Appendix G

Biological Assessment and Evaluation

Final
Biological Assessment and Evaluation
for
Bemidji to Grand Rapids 230kV Transmission Line Project

Prepared by:

Otter Tail Power Company
Minnesota Power
Minnkota Power Cooperative, Inc.

Prepared for:

US Fish and Wildlife Service
US Forest Service, Chippewa National Forest
Division of Resources Management for the Leech Lake Reservation
Minnesota Department of Natural Resources

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This Biological Evaluation was prepared pursuant to the National Environmental Policy Act, National Forest Management Act, and other applicable laws and regulations. For additional information, please contact the team leader for the Bemidji to Grand Rapids 230 kV Transmission Line project:

Ms. Cathy Thompson
Chippewa National Forest
Address: 200 Ash Avenue NW
Cass Lake, MN 56633
Phone: (218) 335-8600
TTY: (218) 335-8632
FAX: (218)335-8637

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Prepared by: Lydia C. Nelson — July 6, 2010
Lydia Nelson, HDR Engineering, Inc. — Date

Reviewed by: Nick Rowse — July 15, 2010
Nick Rowse, U.S. Fish and Wildlife Service — Date

Reviewed by: Todd Tisler — 7/6/10
Todd Tisler, U.S. Forest Service
Chippewa National Forest — Date

Reviewed by: Steve Mortensen — 7/8/10
Steve Mortensen
Leech Lake Division of Resources Management — Date

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Acronyms and Abbreviations

APLIC	Avian Powerline Interaction Committee
Applicants	Otter Tail Power Company, Minnkota Power Cooperative and Minnesota Power Company
BA	Biological Assessment
BE	Biological Evaluation
BGR	Bemidji to Grand Rapids
BMP	Best Management Practice
Cf	Confer or compare
Cm	Centimeter
CNF	Chippewa National Forest
CR	County Road
DNR	Minnesota Department of Natural Resources
EIS	Environmental Impact Statement
END	Endangered Species
EP	Enbridge Pipeline
ESA	Endangered Species Act
FSM	Forest Service Manual
Ft	Feet/foot
GIS	Geographic Information System
Ha	Hectare
HDR	HDR Engineering, Inc.
in	inch
kV	Kilovolt
LLBO	Leech Lake Band of Ojibwe
LLR	Leech Lake Reservation
M	Meter
MDL	Minnesota Drift and Lake Plains Ecological Section
MnDOT	Minnesota Department of Transportation
MVA	Million volt-amperes
MIST	Monitoring, Inventory and Survey Team (USFS)
NHIS	Natural Heritage Information System
NNIS	Non-native Invasive Species
NWI	National Wetland Inventory

Oz	Ounce
Pers. Comm.	Personal Communication
Project	Bemidji to Grand Rapids 230 kV Transmission Line
PUC	Public Utilities Commission
RFSS	Regional Foresters Sensitive Species
ROW	Right-of-Way
SEN	Sensitive Species (as identified by the Leech Lake Band of Ojibwe)
SGR	State Game Refuge
SNA	Scientific and Natural Area
SPC	Special Concern Species
Sq ft	square feet
TES	Threatened and Endangered Species, includes all species listed by USFWS, DNR, CNF, and DRM as Threatened, Endangered, Special Concern, Sensitive or Regional Foresters Sensitive Species
THR	Threatened Species
US 2	U.S. Highway 2
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WMA	Wildlife Management Area

1.0 INTRODUCTION

1.1 Purpose of this Report

Projects that require Federal approvals or Federal funding must evaluate potential impacts to rare species and their habitats. Under Section 7 of the Endangered Species Act (ESA), the U.S. Fish and Wildlife Service (USFWS) is responsible for identifying and listing a species as threatened, endangered, or candidate and for identifying critical habitat. The USFWS must be consulted to determine if a project will have an effect on a federally listed species or critical habitat. The evaluation of potential effects is documented in a Biological Assessment (BA), which is developed by the project proposer and submitted to the USFWS. The USFWS uses the BA to develop a Biological Opinion, which states whether the Federal action is likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction or adverse modification of critical habitat.

The U.S. Forest Service (USFS) is required to protect sensitive species on the land that it manages. The Land and Resource Management Plan (Forest Plan) identifies Regional Forester Sensitive Species (RFSS) that must be considered for any project that may impact such species. The USFS also has a responsibility to the Leech Land Band of Ojibwe (LLBO) to protect and manage lands within the Leech Lake Reservation (LLR) consistent with retained treaty rights and interests, including the protection of threatened, endangered, sensitive, or rare species that are of interest to tribes (Forest Plan, S-TR-5). The evaluation of potential effects is documented in a Biological Evaluation (BE), which is developed by the project proposer and submitted to the USFS. Per the USFS Forest Service Manual (FSM 2672.41), the USFS uses the BE to review projects and document findings in order:

- To ensure that USFS actions do not contribute to loss of viability of any native or desired non-native plant or contribute to animal species or trends toward Federal listing of any species.
- To comply with the requirements of the ESA, that actions of Federal agencies not jeopardize or adversely modify critical habitat of federally listed species.
- To provide a process and standard by which to ensure that threatened, endangered, proposed, and sensitive species receive full consideration in the decision making process.

The Division of Resources Management (DRM) for the LLR has developed the LLR Endangered, Threatened, and Sensitive species list. Through the NEPA process, the effects of a project on these species must be evaluated and DRM-approved avoidance or mitigation must be developed.

In addition to the evaluations described above, the Minnesota Department of Natural Resources (DNR) requires that projects consider impacts to State-listed threatened and endangered species, in accord with the Minnesota's endangered species law (Minnesota Statute 84.0895) and associated rules (Chapter 6212.1800, 6212.2300 and 6134). Based on surveys conducted and documented by the project proposer, the DNR determines if a species would be impacted and identifies mitigation that may be required.

The purpose of this combined Biological Assessment/Biological Evaluation (BA/BE) is to review the proposed Bemidji to Grand Rapids 230kV Transmission Line in sufficient detail to determine to what extent the Proposed Action and construction related activities may affect any Federal, USFS, State, or LLR threatened, endangered, sensitive, special concern or candidate species and designated or proposed critical habitats.

1.2 Decisions to be Based on this Evaluation

This report will be used by the USFWS to develop a Biological Opinion, by the USFS - Chippewa National Forest (CNF) to develop a determination of effects and mitigation for a Special Use Permit, by the Minnesota Department of Natural Resources (DNR) to develop a determination of effects and mitigation for a Take Permit, and by LLR DRM to determine potential effects and mitigation for impacts to species of concern on LLR lands with retained treaty rights and interests.

2.0 DESCRIPTION OF THE PROPOSED ACTION

2.1 Background Information

Otter Tail Power Company (Otter Tail Power), Minnesota Power, and Minnkota Power Cooperative, Inc. (Minnkota Power), collectively referred to as "the Applicants," on behalf of themselves and Northern States Power Company, a Minnesota corporation (Xcel Energy) and Great River Energy, a Minnesota cooperative association (collectively, the Utilities) propose constructing a new 230 kV transmission line. The Project would extend from the Wilton Substation, located just west of Bemidji, Minnesota, to the Boswell Substation, located in Cohasset, Minnesota.

Three potential routes are being evaluated in a joint State/Federal Environmental Impact Statement (EIS). The Draft EIS and Final EIS are scheduled to be completed during the fall 2009 and winter 2009/2010. Portions of the Project may cross the CNF and Leech Lake Reservation, depending on which route is approved through the State/Federal processes.

The following Project actions trigger the need to complete this BA/BE:

- Minnkota Power has submitted a funding application to the US Department of Agriculture - Rural Utilities Service (RUS) for the Project.
- The Project will likely require a Section 404 permit from the U.S. Army Corps of Engineers (USACE).
- The Project will likely cross portions of the CNF and would require a USFS Special Use Permit.
- The Project will likely cross portions of the LLR and will require Reservation Tribal Council and BIA approval and permits if located on LLR lands with retained treaty rights and interests.

Construction would begin by fall 2010, and be completed by the end of 2011 to meet the anticipated 2011/2012 winter peak demand in the Bemidji area.

2.2 Previous Project Studies

CapX2020 is a joint initiative of 11 transmission-owning utilities in Minnesota and the surrounding region. The CapX2020 planning group formed in response to planning studies that show increased demand for electricity by 4,000 to 6,000 megawatts by 2020. Each utility is responsible for meeting the electrical demand for their customers. As a group, the CapX2020 has identified the need to construct four new transmission lines to ensure reliable electric service in Minnesota and the surrounding region. The proposed Bemidji to Grand Rapids 230 kV Transmission Line Project is one of four lines identified in the CapX2020 studies. See http://www.capx2020.com/index.html for more information on the CapX2020 planning efforts.

The Applicants have completed a number of preliminary studies for the Project as a basis for identifying the project need and routing options. The following studies are available on-line from the Minnesota Public Utilities (http://energyfacilities.puc.state.mn.us/Docket.html?Id=19344):

- Certificate of Need Application for the Bemidji – Grand Rapids 230 kV Transmission Line Project (March 17, 2007)
- Application for a Route Permit for the Bemidji – Grand Rapids 230 kV Transmission Line Project (June 4, 2008)
- Advisory Task Force Report for the Bemidji – Grand Rapids 230 kV Transmission Line Project (September 24, 2008)

- Public Scoping Comments (November 18, 2008)
- Public Information Meeting Transcripts (March 25, 2009)
- Bemidji – Grand Rapids EIS Scoping Decision (April 2, 2009)
- Bemidji – Grand Rapids 230 kV Transmission Project Environmental Report (May 4, 2009)

The following studies are available on-line from the Rural Utilities Service (http://www.usda.gov/rus/water/ees/eis.htm#Minnkota%20Electric%20Cooperative,%20Inc.0):

- Macro-Corridor Study Report (June 2008, revised 9/2/08)
- Alternative Evaluation Study (June 2008)

Transmission planning, designing, engineering, and environmental criteria were used to develop three route alternatives. State, tribal, and Federal regulatory requirements, as well as input from stakeholders, were also considered. Route alternatives were developed by considering the following:

- **Follow existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries when feasible –** A primary factor in identifying routes is Minnesota's policy that new right-of-way for a project should be avoided where existing right-of-way can be used. This is called the nonproliferation policy, adopted by the Minnesota Supreme Court in *People for Environmental Enlightenment and Responsibility, Inc. (PEER) v. Minnesota Environmental Quality Council*, 266 N.W.2d 858, 868 (Minn.1978). In that case, the Supreme Court held that "as a matter of law, [one should] choose a pre-existing route unless there are extremely strong reasons not to do so." *Id*. At 868. The Public Utilities Commission's (PUC) rules also recognize that nonproliferation is an important consideration in selecting final routes for new transmission. Minn. R. 7849.5910 H and J. Selecting a route that would result in completely new right-of-way would run counter to the nonproliferation policy. The Applicants used geographic information system (GIS) mapping and field verification to identify existing rights-of-way (transmission lines, pipelines, railroads, roads, etc.), and natural division and field boundaries.
- **Minimize length –** Minimizing the length of a route generally decreases its impacts on the environment. In some situations, however, a longer route or route segment is chosen to avoid specific, undesirable impacts.
- **Avoid populated areas where feasible –** One of the most common comments received at the Applicants' public meetings was that residences should be avoided where possible.
- **Avoid major environmental features where feasible –** Major natural features such as non-fragmented forest land, threatened and endangered species, waterbodies and wetlands, and biodiversity areas identified by the CNF, DRM, and the Minnesota County Biological Survey (including Wildlife Management Areas (WMAs), Scientific and Natural Areas (SNAs), and State Game Refuges (SGRs)) were identified, mapped, and avoided where feasible.
- **Maximize transmission system reliability and promote system redundancy where feasible –** Both the routing of the Project in close proximity to existing lines or double-circuiting it with existing lines were considered. In some cases, however, there were system reliability and safety concerns that supported keeping the Project separate. Routing options were excluded from further consideration if the construction or maintenance of the Project as a double-circuit or parallel line with an existing transmission line would compromise system reliability or violate North American Electric Reliability Corporation (NERC) regulations.

- **Avoid agricultural production –** Consideration was given to avoiding center pivots and farming operations where feasible.
- **Avoid airports and other conflicting land uses –** The Applicants worked with Federal and State agencies, the DRM, and local governments to identify and map land uses that could conflict with the Project. These included airports, WMAs, SNAs, SGRs, trails, sensitive CNF management areas, and tribal and Indian-owned lands. These land uses were avoided where feasible.

In addition, consideration was given to comments received during a number of public information meetings, numerous agency meetings, and public scoping meetings which echoed many of the points discussed above. These comments included:

- Utilize existing rights-of-way where feasible.
- Avoid or minimize impacts to CNF, Leech Lake Reservation (LLR), privately owned lands, and population concentrations.
- Minimize impact to property values.
- Avoid or minimize impacts to water resources and wildlife.
- Avoid or minimize conflicts with adjacent land uses such as forestry and sensitive species.
- Avoid or minimize impacts to cultural resources.
- Avoid or minimize impacts to businesses.

2.3 Project Description

2.3.1 Location

The CapX2020 planning studies identified the end points for the Proposal as (from west to east) the Wilton Substation, located west of Bemidji, and the Boswell Substation, located west of Grand Rapids in Cohasset. The Study Area is located in portions of Itasca, Cass, Hubbard, and Beltrami counties in north central Minnesota. The Study Area includes portions of the LLR and CNF (Figure 1 – Project Location and Study Area).

2.3.2 Objectives

The primary purpose of the Project is to improve long-term reliability of the local and regional transmission system. As documented by the CapX2020 planning studies and the Certificate of Need Application for the Bemidji – Grand Rapids 230 kV Transmission Line Project (March 17, 2007), the Project is needed to effectively maintain reliable electrical service as well as to meet projected future customer demand in the Bemidji area in north central Minnesota. The Bemidji area includes communities from Bagley in the west, Walker in the south, and Blackduck in the northeast, as well as a large portion of the LLR in the east.

Although the Project is necessary to assure reliable service to the Bemidji area, it is also required to improve the regional transmission reliability of the larger northwestern Minnesota and eastern North Dakota region. This line would also provide an ancillary benefit: facilitating the addition of new generation sources in the region. Specifically, portions of the Red River Valley and eastern North Dakota have been identified as areas for the potential development of wind-energy generation sources, and the added transmission capacity from the Project would assist in the development of such resources.

2.3.3 Alternatives

Through the evaluations completed to date, the Applicants have identified three routes that could meet the Project purpose and need, as well as a number of alternative segments and crossovers (Figure 2 – Project Alternatives). The route widths are generally 1,000 feet or greater. The actual transmission line would only require a 125-foot-wide right-of-way (ROW). These 1,000-foot-wide routes will be used to identify a 125-foot ROW within which the transmission line would be constructed, and do not represent the total footprint of the alternatives. The final centerline and ROW will be identified after the route is selected through the environmental review and permitting process.

Ancillary facilities necessary to support the project include new or upgraded substations and a breaker station. Each of the routes and ancillary facilities are described below.

Route 1 generally follows the Great Lakes Gas Transmission Company (Great Lakes) pipeline right-of-way from the Wilton Substation to just east of Deer River, where it then follows a Minnesota Power 115 kV transmission line to the Boswell Substation.

Route 2 generally follows U.S. Highway 2 (US 2) and the pipeline rights-of-way of Enbridge Pipelines LLC (Enbridge) for its entire length between the Wilton Substation and Boswell Substation.

Route 3 bypasses the LLR by taking a more northerly route between Bemidji and Grand Rapids. This route generally parallels existing transmission line rights-of-way between Bemidji, Blackduck, Deer River, and Grand Rapids. Route 3 passes though the CNF in Itasca and Beltrami counties.

Route options 1A, 1B, 1C, and 2C represent bypass routes that connect sections of Routes 1 and 2, and are intended to allow opportunities for connections between portions of the primary routes in order to avoid sensitive environmental resources.

Certain upgrading of the Wilton Substation near Bemidji and the Boswell Substation near Grand Rapids would be required, as well as upgrading an existing 115 kV substation or building a new 230 kV substation in the Cass Lake area. Depending on the route selected, a breaker station may also be constructed at Nary Junction. The upgrades and proposed new construction are discussed below.

Wilton Substation – The Project would not require physical expansion of the existing Wilton 230 kV Substation. Two new 230 kV breakers and a line termination structure would be added as a result of the Project, along with modifications to the existing 230 kV buses and relay panels. The Project would also require completion of a new ring bus section, as well as five new 230 kV switches with foundations, steel structures, and control panels.

Boswell Substation – The Project would require the expansion of the Boswell 230 kV Substation by approximately 1.3 acres. No land procurement is required, however, because the entire expansion of the substation would be on Minnesota Power-owned property. In addition to modifications to the existing 230 kV buses and relay panels, a new 230 kV breaker and a half bay would be added to the substation. This would involve installing two new 230 kV circuit breakers and 230 kV dead-end structures, a new 230 kV bus, five new 230 kV switches, and associated foundations, steel structures, and control panels.

Cass Lake Area Substation – The Project would require the expansion of the existing Cass Lake 115/69 kV Substation or construction of a new 230/115 kV substation, depending on which route is selected. Routes 2 and 2C would require upgrading of the existing Cass Lake Substation. This would be accomplished by extending the existing fence line approximately 320 feet west. No land procurement would be required because the expansion of the substation would be on existing Otter Tail Power-owned property. The expansion would be for the 230 kV equipment, which includes a 230 kV

three-breaker ring bus with line switches, a new 230/115 kV transformer (approximately 187 million volt-amperes [MVA]), and associated 115 kV facilities to integrate this transformer into the existing equipment.

Routes 1, 1A, 1B, and 1C would require construction of a new substation near the intersection of the route and the existing Nary Junction – Cass Lake 115 kV line. It would be designed and constructed with a 230 kV three-breaker ring bus with 230 kV line switches. The facility would include a 230/115 kV transformer of approximately 187 MVA that steps down the voltage to a 115 kV three-breaker ring bus. In addition, the new substation would require a control house, relay panels, foundations, steel structures, and switches. The substation yard would be approximately 500 feet by 500 feet of yard fence and require an access road.

Nary Breaker Station – In addition to the substation improvement mentioned above, Route 1A includes a section where the proposed 230 kV line would be double-circuited with an existing 115 kV transmission line between Bemidji and Cass Lake. Double-circuit construction, operation, and maintenance can have impacts on the security and reliability of the transmission system that must always be taken into account. The Applicants believe the Project could be double-circuited with the existing 115 kV transmission lines between Bemidji and Cass Lake without significantly affecting area reliability, provided a 115 kV breaker station is constructed at Nary Junction.

This 115 kV breaker station would be located adjacent to the existing switch at Nary Junction on an approximately five-acre site with a fenced and graded area of approximately 200 feet by 200 feet. The breaker station would consist of three 115 kV circuit breakers and associated switches, communications, relay and control equipment, three 115 kV line termination structures, and a control house. An improved access road and small parking lot would also be required to move equipment to the site. Building this 115 kV breaker station sectionalizes the 115 kV circuits serving Bemidji, Cass Lake, Akeley, and Badoura. This provides back-up (redundant) transmission in the event of an outage of the proposed 230/115 kV double-circuit transmission lines.

2.3.4 Transmission Line Design

While final engineering and design have not been completed, transmission line construction would likely use two-pole H-frame structures for a majority of the route (Figure 3 – Structure Figures). These are the typical structures used for a 230 kV transmission line located on wooded, rugged topography. They are also suited for areas requiring longer spans to avoid or minimize the placement of structures in wetlands or waterways. Each H-frame structure would range in height from 70 to 90 feet, and be placed 600 to 1,000 feet apart.

Where conditions warrant, single-pole structures may be used. For this Project, single pole structures would typically be used in areas where the available right-of-way is limited, such as along roads in developed areas. The height of single-pole structures ranges from 80 to 100 feet, with the span between structures from 400 to 800 feet.

The typical right-of-way for a 230 kV transmission line is approximately 125 feet wide. Ultimately, the right-of-way width depends upon the recommended clearances between the conductor and other facilities adjacent to the route. The width of the right-of-way may be reduced in certain high-density, developed areas with the use of single-pole construction. The width of the right-of way may also be reduced where the new transmission line follows an existing linear corridor, such as another utility line or roadway. On the other hand, a wider right-of-way may be required for longer spans of the transmission line or where special design requirements are dictated by topography. The Applicants would seek permanent easements providing the right to construct, operate, and maintain the transmission line along the full width and length of its right-of-way, as necessary.

There are opportunities within the proposed routes for the Project to be located in existing rights-of-way and, where feasible, double-circuited with existing 115 kV or 69 kV lines. That means the structures for the proposed 230 kV transmission line would be designed to also carry the lower voltage transmission line already located in the right-of-way. The height of single-pole double-circuit structures ranges from 95 to 115 feet, with the span between structures from 350 to 800 feet. (See single-pole, double-circuit structure illustration – Figure 3). Double-circuiting, however, raises transmission reliability concerns. For example, a single weather-related event could result in the outage of two circuits rather than just one. Double-circuiting can also affect the constructability and costs of the Project.

2.3.5 Construction Techniques and Best Management Practices

Clearing of all woody vegetation and brush within the 125-foot-wide right-of-way would be required to facilitate the safe and efficient construction, operation, and maintenance of the transmission line. A reasonably level access path is required to provide for safe passage of construction equipment. At structure locations, a stable working surface free of tripping hazards is required for framing and erecting structures, and for the installation of concrete foundations if required.

Construction and maintenance access will use existing public rights-of-way. To the extent practicable, temporary access paths would be located on existing disturbed areas, including forest or farm paths and farm fields. Temporary access roads will be placed on mats if they are located in wet areas or where compaction may be an issue. Since the proposed Project would be located adjacent to existing developed corridors, the need for permanent access roads is not anticipated. However, a final decision on permanent access roads will depend on the route and right-of-way chosen through the environmental review process. If installation of a permanent access road is necessary, it will be installed to avoid TES and will use best management practices to minimize long term impacts. Potential effects to localized hydrology would be minimized though proper culvert installation

Construction equipment has the potential to introduce non-native invasive species (NNIS) into areas that are not currently contaminated. For this project, NNIS include weedy perennial vegetation and earthworms. In order to minimize the risk of spreading NNIS, the contractor will use power washing (or compressed air) to clean construction equipment, including augers and tires, as a best management practice (BMP). Specifications for power washing will be developed in consultation with the CNF, DRM, and DNR.

Woody vegetation would be cut at or slightly above the ground surface. Rootstock would be left in place to stabilize existing soils and to regenerate vegetation after construction. With the approval of the landowner or land manager, stumps of tall-growing species would be treated with an approved herbicide to discourage re-growth. Herbicide application may not be allowed on lands within the CNF and/or LLR; alternatives controls would be identified in consultation with the CNF and/or DRM. Merchantable timber is typically cut to standard log lengths and stacked along the right-of-way. Vegetation clearing debris (unmerchantable trees, brush, and slash) may be cut and scattered, placed in windrow piles, chipped or burned, depending on location. In some special circumstances, this material may be collected for use as fuel.

To minimize the potential for tire and chassis damage to construction equipment, and to maintain a safe, level access path and structure installation area, incidental stump removal would occur. Stumps that interfere with the placement of mats or movement of construction equipment would be ground down to a point at or slightly below ground level. The stump grinding equipment would mix woody material with soils. This mixture would be evenly spread in the vicinity of the stump to a depth that would allow existing low-growing vegetation to re-establish.

Transmission line structures are generally designed for installation at existing grades. However, if vehicles or installation equipment cannot safely access or operate near the structure, minor grading of the immediate terrain would be performed to provide a reasonable level working surface for construction and maintenance of the structure. Timber or synthetic mats are to be used to provide a working surface in unstable soils.

Environmentally sensitive areas or areas susceptible to soil erosion would require special construction techniques and will be clearly marked prior to initiation of any construction activities. Techniques may include the use of low ground pressure equipment, timber or synthetic mats, terracing, water bars, bale checks, rock checks, or temporary mulching and seeding of disturbed areas exposed during long periods of construction inactivity. Permanent soil erosion control measures may include permanent seeding, mulching, erosion control mats, or other measures depending on site conditions. Temporary silt fence, sedimentation ponds, and other measures may be utilized to prevent sediment from running off into wetlands or other surface waters. Reseeding would be completed as soon as work is complete and weather/soil conditions are suitable. Native seed mixes that are certified weed-free will be used.

Construction equipment must be inspected frequently to ensure hydraulic systems and oil pans are in good condition and free of significant leaks. Portable spill containment kits will be required for each piece of construction equipment with the potential to discharge a significant amount of oil to the environment. Operators will be present at the nozzle at all times when refueling is in progress. In the event of a spill, the source of the spill will be identified and contained immediately upon discovery. The spill and contaminated soils will be collected and treated and disposed of in accordance with all applicable Federal, state, and local requirements. If a significant spill were to occur to surface waters, methods to contain and recover released material such as floating booms and skimmer pumps will be used. Noticeably contaminated soils will be excavated and placed on and covered by plastic sheeting in bermed areas. An emergency response contractor would be secured, if necessary, to further contain and clean up a severe spill. Refueling of equipment in wetlands would not be permitted.

In the event that new occurrences of listed threatened and endangered species are encountered during construction activities, project management personnel would consult with regulatory authorities regarding appropriate construction procedures and mitigation measures.

Construction materials would be hauled either directly from the local highway or railroad network to structure sites, or brought first to material staging areas and then to the structure sites. The transmission line components, including the poles, arms, and hardware, are normally brought to the temporary staging areas on flatbed trucks. These materials are stored until needed and then loaded on flatbed trailers or special pole trailers for delivery to the structure site where they are unloaded for installation.

Structures are normally assembled on the ground along with insulator assemblies and single-leader p-line ropes and then raised into position. For direct embedment type structures, the poles are set in augured holes with large rubber-tired or tracked cranes. The annular space between the pole and the augured hole is backfilled with native soils if suitable or with granular materials.

Where reinforced concrete foundations are required, large rubber-tired or track-mounted auger equipment is used to excavate a circular hole of the appropriate diameter and depth. In upland areas, excavated material would be spread evenly around the structure base to promote site drainage. Reinforcing steel and anchor bolts are set in position. Ready-mixed concrete is then placed in the excavation. In wetland areas, a telescoping temporary steel caisson would be placed in the foundation hole to stabilize the soil walls. Concrete is placed in the excavation using the tremie method. Water pumped from the excavation would be placed into tanker trucks or empty concrete trucks and hauled

away to a specially designated upland disposal area, or brought back to the concrete batch plant for discharge. Concrete truck wash water would be discharged only in specially designated upland disposal areas or at the concrete batch plant.

After the concrete is poured, the steel caisson is removed. In some situations, a permanent caisson may be required to stabilize the excavation. During drilling, a minimal amount of granular material (from an outside source) would be placed in the area between the caissons and the timber mats (if required at that location) to provide safe footing for construction personnel. During final restoration, the granular material is leveled or removed to restore the original ground contours for re-vegetation of native species. After the foundation concrete is placed, excess excavated materials will be transported to a suitable upland site by truck for disposal. After allowing adequate curing time, the steel pole structure base plates are bolted to the concrete foundations.

The wire stringing process starts in a setup area prepared to accommodate the stringing equipment and materials, normally located mid-span on the centerline of the right-of-way. The rope machine, new conductor wire trailers, and tensioner are located at the wire stringing setup area. This phase of construction occurs after the structures have been erected and fitted with stringing blocks (also called dollies or sheaves) and single-leader “p-line” ropes that reach the ground. Stringing blocks are a type of pulley that attaches to the insulator assembly and temporarily support a pulling rope or “p-line” and a wire rope or “hard line,” which in turn supports the conductor before it is permanently “clipped in.”

The process starts as the construction crew pulls the p-lines toward the first structure beyond the setup area. The p-lines are normally pulled down the right-of-way with a small wide-track bombardier or other small equipment. At each structure, the ropes are detached from the bombardier and attached to the single leader p-line to lift the ropes up into the dollies. Then the ropes are reattached to the bombardier and driven to the next structure for the same process. After the p-line has been strung through all the structures for all phases within the stringing interval, the pulling ropes are attached to a hard line and pulled, one at a time, back through the dollies to the beginning of the interval. A hard line set-up is located at the opposite end of the interval from the wire stringing setup area. Each hard line is then attached to the conductor wire with an attachment called a “sock,” which is pulled back through the dollies to the end of the interval. Crewmembers travel along the access route in a pickup truck, follow the “sock” as it is being pulled to make sure it does not get hung up in the dollies. One at a time, the conductor wires are then pulled to the appropriate tension and clipped into place utilizing permanent suspension hardware. Wire stringing and hard line set-up areas are normally located in upland areas during spring, summer, or fall conditions. During winter when frozen conditions provide a stable working surface, set-ups may be located in wetland areas. If set-ups in wetlands are required when surface conditions are not stable, extensive use of timber matting is required.

The most effective means to minimize impacts to wetlands, streams, and open water bodies during construction is to span streams and rivers by placing structures above the normal high water level. In general, construction equipment is permitted to be driven across waterways except under special circumstances, and then only after discussion with the appropriate resource agency. Where waterways must be crossed by construction equipment, the Applicants will use temporary clear span bridges to minimize the impact on the waterway. For those waterways which cannot be crossed with construction equipment, workers walk across or use boats during wire stringing operations to pull in the new conductors and shield wires or in the winter drive equipment across the ice. In areas where construction occurs close to waterways, appropriate measures will be employed to minimize soil erosion and prevent sedimentation of the waterways. The Applicants will ensure that equipment fueling and lubricating occur at a reasonable distance from the waterways.

2.3.6 Characteristics of the Project Routes

The following table presents a summary of the design and environmental characteristics for each route.

Table 2-1. Summary Characteristics of Route Alternatives 1, 2, and 3*

Issue	Route 1 Alternative	Route 2 Alternative	Route 3 Alternative
Length	68 miles	69 miles	116 miles
Existing Linear Infrastructure	66.2 miles follow Great Lakes pipeline, existing transmission and existing rail	63.8 miles follow US 2, existing transmission, existing pipelines and existing rail	114.4 miles follow existing transmission, existing pipelines and existing roads
New Corridor Required	1.8 miles	5.2 miles	1.6 miles
New Easement Required	1,032 ac	1,045 ac	1,672 ac
Stream/River Crossings**	7 Public Water crossings	12 Public Water crossings	21 Public Water crossings
Wetland Landcover (NWI)	225 ac	292 ac	420 ac
Forested Landcover	439 ac	579 ac	863 ac
CNF – federally owned property	284 ac	348 ac	353 ac
State Forest – state owned property	154 ac	160 ac	154 ac
Leech Lake Reservation (including LLBO treaty/trust lands)	660 ac	662 ac	3 ac
Previously CNF, DRM and DNR documented threatened, endangered or species of concern w/in Route***	5 DNR listed, 9 DRM listed and 6 CNF listed	7 DNR listed, 12 DRM listed and 10 CNF listed	13 DNR listed, 14 DRM listed and 16 CNF listed

** Based on typical 125-foot-wide rights-of-way.*

*** MN DNR Division of Waters Public Waters Inventory*

****Compiled from the MN DNR NHIS and CNF TES Observations databases.*

2.4 Physical Characteristics of the Study Area

The Study Area includes portions of four counties in northern Minnesota: Cass, Itasca, Hubbard, and Beltrami counties (Figure 1). The Study Area is mostly forestland and a number of water bodies, including large lakes and numerous streams and creeks. Elevations in the Study Area range between 1,250 and 1,450 feet above sea level. The Study Area includes a number of cities and townships and spans the borders of the LLR and CNF.

The topography in the Study Area is associated with the most recent period of glaciation, which occurred approximately 15,000 years ago. Moraines, kames, eskers, and depressional wetlands/lakes are examples of topographic glacial features.

According to the Minnesota DNR's *Field Guide to the Native Plant Communities of Minnesota*, the Study Area is located entirely within the Northern Minnesota Drift and Lake Plains Ecological Section (MDL)

and partly within the Chippewa Plains, Pine Moraines and Outwash Plains, and St. Louis Moraines Subsections. Patterns of vegetation within the MDL reflect the glacial deposits that occur within this area. This includes widespread areas composed of sugar maple, basswood, paper birch, aspen, and northern red oak. Occasional coniferous species are also present (DNR, 2003).

The general land cover within the Study Area consists primarily of deciduous and coniferous forest, large portions of which are managed as state and national forest. Pockets of shrub land are scattered throughout the area. Concentrations of cropland occur in Beltrami County near Blackduck, in Hubbard and Beltrami counties south of Bemidji, in Itasca County near Deer River, and in Cass County near Remer. Major water features include the Mississippi River, the Big Fork River, Pike Bay, Cass Lake, Portage Lake, Lake Winnibigoshish, Ball Club Lake, Leech Lake, Kabekona Lake, and Jesse Lake.

3.0 SURVEY COORDINATION AND METHODS

3.1 Agency coordination

Initial consultation with the CNF, USFWS, DRM, and DNR began during late 2007, and has continued as needed to the present time. USFWS interaction would include consultation regarding impacts to the timber wolf and the Canada lynx. It is likely that Canada lynx are not present, however Lynx Analysis Units have been established within the project area which would be affected by the project. The USFWS will need to be consulted to identify potential effects to these species.

A meeting was held with the DNR during December 2007 to discuss potential routes and issues related to state listed species. Various DNR staff have been consulted to obtain natural heritage data, discuss the process for obtaining a Take Permit, if required, and to discuss route selection. Most recently, the DNR participated in the review of the biological survey protocol developed for this Project.

The CNF and LLR have been more actively involved in the Project, and have hosted a number of meetings to discuss biological issues. Through the scoping process, the CNF and DRM were instrumental in identifying Route 3 as an alternative that should be considered in the EIS. The CNF and DRM also assisted by reviewing and commenting on project documents, including the biological survey protocol developed for this Project.

3.2 Study Area

The Study Area for this BA/BE, as shown on Figure 1, includes all three routes plus an approximate one-mile buffer beyond the routes. For the purpose of this evaluation, the cumulative effects boundary is the same as the Study Area. Most activities considered for cumulative effects would be associated with urban/rural development and forest management. Both of these activities would likely be concentrated within the Study Area.

3.3 DNR lands and areas of Outstanding and High Biodiversity

The Minnesota DNR has established a number of approaches for recognizing, managing, and protecting the state's valuable natural resources, including high quality native plant communities. Approaches include acquisition and management of Scientific and Natural Area (SNAs), Wildlife Management Areas (WMAs) and high quality native plant communities within State Forests. Additionally, the DNR has been surveying the state under the Minnesota County Biological Survey (MCBS) program, identifying sites of Outstanding and High Biodiversity on both public and private lands for the purpose of management and conservation of these resources.

3.3.1 Scientific and Natural Areas (SNAs)

SNAs are areas where the DNR is committed to preserving and perpetuating the ecological diversity of the state by protecting rare features that include landforms, fossil remains, plant and animal communities, rare and endangered species, or other biotic features and geologic formations. Lands placed into this program are intended for scientific study and public edification as components of a healthy environment. These lands are either owned by the State of Minnesota or managed in conjunction with non-governmental organizations dedicated to the goals of the program.

Four SNAs are located within the overall study area; Pennington Bog, Wabu Woods, Lost 40, and Hole-In-The-Bog Peatland. Lost 40 is located more than four miles north of route 3, Wabu Woods is located more than eight miles from Routes 1, 2, and 3, and Pennington Bog is located in the center of the study area more than eight miles from Route 2. None of these locations would be affected by any actions on any of the routes.

Only Hole-In-The-Bog Peatland is located near a proposed route. The boundary of this 1,622 acre SNA is located less than 600 feet south of Route 1 within the same peat basin complex. The SNA program considers this site to be the best example of a basin-filled raised bog, and the only peatland of its type protected under the SNA program. The site is characterized by a solitary well-defined crested raised bog and peatland lake. The plant communities located within this SNA are characteristic of patterned peatlands and the site is minimally disturbed.

While the proposed Route 1 Corridor does not encroach upon the boundary of Hole-In-The-Bog Peatland, it would occur within the same peatland basin and is a concern to the DNR. Route 1 is located adjacent to an existing Great Lakes Pipeline corridor, but the corridor is minimally maintained. Construction and maintenance of a new transmission line through this peatland has the potential to act as a pathway for invasive species (plants and animals) that may move or be moved with construction or maintenance equipment, and along the widened, maintained ROW. Due to the localized nature of construction at pole locations, hydrological impacts to the SNA are not expected. Likewise, operation and maintenance activities are less intensive than construction activities, and would not affect local hydrologic contidions.

3.3.2 Wildlife Management Areas (WMAs)

WMAs are managed by the DNR for recreation and are established to protect lands and waters with high potential for wildlife production, public hunting, trapping, fishing, and other compatible recreational uses. Priorities for WMA management are the protection of wildlife habitat, creating opportunities for citizens to hunt, fish, and observe wildlife, and the promotion of tourism in the state.

Eleven WMAs occur within the Study Area. Of these, two are within one mile of proposed route segments.

Bemidji Slough is a 49-acre grassland and wetland site located 2 miles south of Bemidji and within the proposed Route 1 boundary. The site is surrounded by agricultural lands and commercial development. Within the site, the predominant cover types are grasses/open/hay land in the upland and emergent wetlands and open water in the core, with small inclusions of upland coniferous and mixed trees. The site is protected by the DNR for the purpose of protecting the wetland habitat complex. The DNR restricts hunting and trapping in this WMA according to state regulations. Additionally, the site offers wildlife and waterfowl viewing opportunities, particularly in spring and fall.

Bemidji Slough WMA is located entirely within the Route 1 boundary. The WMA is bisected by an existing pipeline. Paralleling this existing corridor would require the transmission like to transect the WMA. During early conversations with the DNR, the route boundary was expanded to allow construction of the route to avoid direct encroachment into the site. There would be the potential for increased conflicts between a new transmission line and birds near this WMA. The applicant will be required to consult with the Minnesota DNR to develop mitigation for potential conflicts between birds and the transmission line near the Bemidji Slough WMA.

Wolf Lake WMA is a 50 acre site in Hubbard County located southwest of Wolf Lake and directly west of Mud Lake. The WMA is located more than a quarter mile from the Route 2 boundary. The site is located along a channelized stream flowing to Mud Lake. The stream flows through 32 acres of emergent wetlands and lowland shrubs. Five acres of mixed aspen and ash and eight acres of mixed balsam fir forest are present on the site. The DNR manages this site as a protection measure from expanding development, and allows mixed recreation and timber management on the site. Recreation activities allowed on the site include deer, small game, forest bird, ruffed grouse, and bear hunting in addition to wildlife observation opportunities.

The Wolf Lake WMA is located more than a quarter mile from the Route 2 boundary across a mix of forest and open wetland and bisected by residential development and roadways. No effects to this WMA are expected.

3.3.3 State Forests

The DNR owns and maintains forest lands along all three of the Routes. The DNR seeks to maintain healthy, diverse, and productive forests for a range of values including: "timber production, habitat and species preservation, wildlife conservation, scenic beauty, recreation and hunting, watershed health and fishing (DNR, 2009)." The DNR is charged with monitoring all Minnesota forests, and directly maintaining and managing forests on State lands. The DNR uses GIS to track state forest lands through the Forest Inventory Management (FIM) system.

DNR FIM stand data provides information on whether a stand has been designated as "Old Growth" by the state, and if so, DNR forestry manages these stands under the framework of the 1994 Old-Growth Forests Guideline and its amendments (1994 Generic Environmental Impact Statement on Timber Harvesting and Forest Management in Minnesota (1994 Forestry GEIS)). The DNR manages Old Growth forests in order to protect their structural complexity and unique natural characteristics, and these forests are managed within the context of their surroundings. Management tools employed by the DNR in these stands may include: prescribed burning for forest types requiring fire as a regeneration factor, control of exotic species, assessing blowdown damage, developing harvest techniques that protect these and adjacent forest stands and continuing to monitor and research Old Growth stands compared with harvested forests. The DNR considers these stands to be integral to the larger forest ecosystem, not just isolated patches (1994 Forestry GEIS). The DNR manages old growth forests, where practical, with forests being harvested at longer time intervals using extended rotation forestry (ERF). The DNR has a target of 20 percent of Federal and state forests in Minnesota designated as ERF forests. This approach allows forestry practices to change with time, so that if an old-growth stand is lost, then a similar stand outside of the existing old-growth network could be designated to replace the lost stand.

Within the Routes, only Route 2 contains a stand designated as "Old Growth" by the DNR. According to FIM data, a stand mapped as northern hardwoods, 90 years of age at the time of survey in 1982, is present within the route immediately northwest of Portage Lake. Approximately 1.7 acres of this stand is located within the Route 2 boundary. Additional old growth stands, that are not officially designated, are located in the same general area within Routes 1 and 2. The Applicants will work with the DNR to identify old growth resources and to modify the final design to avoid these resources to the extent practicable, for the chosen route.

3.3.4 Minnesota County Biological Survey (MCBS)

The Minnesota County Biological Survey (MCBS) "systematically collects, interprets, and delivers baseline data on the distribution and ecology of rare plants, rare animals, native plant communities, and functional landscapes needed to guide decision making (MN DNR 2009)." As the DNR collects data in a geographic region, MCBS create maps describing the native community type, and assign a biodiversity significance rank to each survey site. The DNR uses this information to help guide conservation and land management in the state by making the data available to state and local government, natural resource professionals and the public.

Biodiversity significance rankings are based on the presence of rare species, size, and condition of native plant communities and landscape context (fragmented from, or connected to other intact native plant communities. The four biodiversity significance ranks are outstanding, high, moderate and below. Rankings are based on the following criteria (MN DNR 2009):

- "**Outstanding**" sites contain the best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most ecologically intact or functional landscapes.
- "**High**" sites contain very good quality occurrences of the rarest species, high-quality examples of rare native plant communities, and/or important functional landscapes.
- "**Moderate**" sites contain occurrences of rare species, moderately disturbed native plant communities, and/or landscapes that have strong potential for recovery of native plant communities and characteristic ecological processes.
- "**Below**" sites lack occurrences of rare species and natural features or do not meet MCBS standards for outstanding, high, or moderate rank. These sites may include areas of conservation value at the local level, such as habitat for native plants and animals, corridors for animal movement, buffers surrounding higher-quality natural areas, areas with high potential for restoration of native habitat, or open space.

Within the project area, the MCBS has completed the first steps in surveying natural communities and the data has not yet been made publicly available. Preliminary data has been provided by the DNR for analysis of this project. At present, the DNR has only identified through air photo interpretation, areas in Itasca and Beltrami Counties that are priorities for field survey. These areas have not been ranked according to biodiversity significance as field data has not yet been incorporated into the DNR data set. Within these areas, the MCBS has placed high priority for surveys on large portions of the Chippewa National Forest. Moderate priority for MCBS surveys have been placed on the Mississippi River crossing in Beltrami County at the location of all three route alternatives south of Bemidji.

Within Cass and Hubbard counties, the DNR has determined a preliminary biodiversity ranking for native plant communities. Only one area within Hubbard County, located near the Wolf Lake WMA, has been identified as containing High Biodiversity Significance within Route 2 directly adjacent to Highway 2. The Hubbard County data appears to have been developed at a coarse scale, not yet dividing diverse areas into a mix of native community types.

Within Cass County, the MCBS preliminary mapping indicates that the DNR identifies vast tracts within the Chippewa National Forest as having Outstanding or High Biodiversity Significance. Along Route 1 from an area just west of south end of Pike Bay to the west side of Sixmile Lake, the DNR has identified 23 linear miles within the corridor as having High or Outstanding Biodiversity significance. Within this portion of the route, these areas are typically located on both sides and are transected by the Great Lakes Pipeline corridor.

Along Route 2 in Cass County, the MCBS preliminary data shows approximately seven linear miles of High or Outstanding Biodiversity Significance lands located within the route. In all cases, the Highway 2 and utility corridor determines the existing edge of these areas on both the north and south sides of the existing utility corridor. In no cases are the High and Outstanding areas transected by corridor.

In Itasca County, the DNR has not yet performed the MCBS field surveys, but has identified the Deer River Peatlands 1, extending from the Mississippi River west of Ball Club Lake to east of the City of Deer River as an area of high priority for future surveys. This area is located adjacent to the Route 2 corridor.

Forest removal along the edges of existing utility corridors would be required. Mitigation for impacts will be negotiated in consultation with the DNR.

3.4 Basis for Species Listing

3.4.1 Federal Listing

Under the Endangered Species Act, the following factors determine whether or not a species should be listed as endangered or threatened:

- the present or threatened destruction, modification, or curtailment of the species' habitat or range;
- overutilization for commercial, recreational, scientific, or educational purposes;
- disease or predation;
- the inadequacy of existing regulatory mechanisms; and
- other natural or manmade factors affecting the species' continued existence.

A species is listed under one of two categories, endangered or threatened, depending on its status and the degree of threat it faces. An "endangered species" is one that is in danger of extinction throughout all or a significant portion of its range. A "threatened species" is one that is likely to become endangered in the foreseeable future throughout all or a significant portion of its range (USFWS Endangered Species Bulletin November/December 1999).

3.4.2 CNF RFSS Listing

Region 9 RFSS are identified by applying two means to generate lists. Species included as RFSS include FWS Candidates for listing under the Endangered Species Act, species delisted in the last five years under ESA, and species ranked by The Nature Conservancy as G1-G3, T1-T3, and N1-N3. Risk evaluations are used to determine which other species to add to the list. State Natural Heritage Program (NHP) S1, S2, State Threatened and Endangered, and species considered at risk on individual Forests are screened using a risk evaluation process. This evaluation considers the species abundance, distribution, population trend, habitat integrity, and population vulnerability. (FSM 2600, Ch 2670).

3.4.3 DRM Listing

The DRM maintains a list of endangered, threatened, and sensitive species on the Leech Lake Reservation. As of January 2007, forty species of plants were listed. They include trees, orchids, ferns, and grasses. Habitats for the listed species include hardwood forests, coniferous forests, and bogs. The future existence of the listed species on the Leech Lake Reservation is mainly threatened by loss of suitable habitat. Activities that disturb or change the condition of soil, water, or sunlight in an area may result in conditions in which the current inhabitants of a site can no longer survive and reproduce. (Leech Lake DRM web site: http://www.lldrm.org/plants.html)

3.4.4 DNR Listing

The species included in the Rare Species Guide are those designated as endangered, threatened, or special concern in Minnesota Rules, Chapter 6134, parts 6134.0200 to 6134.0400. Generically, this is referred to as Minnesota's List of Endangered, Threatened, and Special Concern Species(List). The List was last revised in 1996, but is currently undergoing a formal rule revision process. Once the revision process is completed, additional species profiles will be added to the Rare Species Guide, and status designations and taxonomy information will be updated as appropriate. A species is considered endangered if the species is threatened with extinction throughout all or a significant portion of its range within Minnesota.

A species is considered threatened if the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range within Minnesota. A species is considered a species of special concern if, although the species is not endangered or threatened, it is extremely uncommon in Minnesota, or has unique or highly specific habitat requirements and deserves careful

monitoring of its status. Species on the periphery of their range that are not listed as threatened may be included in this category along with those species that were once threatened or endangered but now have increasing or protected, stable populations. (DNR web site: http://files.dnr.state.mn.us/natural_resources/ets/endlist.pdf)

3.5 CNF Guidance Documentation

The CNF Forest Plan provides guidance on vegetation and wildlife management. The following general Objectives, Goals, and Standards of the Land and Resource Management Plan are pertinent to this BA/BE and are considered in the determination of effects:

O-WL-17 (Objective - Terrestrial and Aquatic Wildlife) Maintain, protect, or improve habitat for all sensitive species. Meeting this objective will involve two basic and complementary strategies that would be implemented based on species' habitat requirements and distribution, individual site conditions, expected management impacts, and other multiple use objectives. These strategies include:

1) *Landscape level (or coarse filter) management strategies:* Addressing species' needs through integrated resource management at large landscape scales including, but not limited to: Landscape Ecosystem or Land type scales for vegetation and management indicator habitat objectives; watersheds for aquatic and riparian condition objectives; and Management Areas for desired or acceptable levels of human uses.
2) *Site-level (or fine filter) management strategies:* Addressing species' needs by managing specifically for high quality potential habitat or known locations of sensitive species.
3) **G-WL-11 (Goal - Terrestrial and Aquatic Wildlife)** Avoid or minimize negative impacts to known occurrences of sensitive species.
4) **G-WL-12 (Goal - Terrestrial and Aquatic Wildlife)** Minimize negative impacts to known sensitive species from management activities that may disturb pairs in their breeding habitat during critical breeding season (varies by species). Meeting G-WL-11 and -12 will involve diverse management approaches that depend on species' habitat requirements and distribution, individual site conditions, and expected management impacts. These include two basic and complementary strategies include:
    a) Landscape level or coarse filter management strategies may allow negative modifications of some portions of sensitive species habitat as long as overall objectives for habitat amount, quality, and distributions are generally met.
    b) Site level or fine filter management strategies may warrant protections of known individual sensitive species locations or high quality potential habitat.
5) **S-WL-5 (Standard -Terrestrial and Aquatic Wildlife)** If negative impacts to sensitive species cannot be avoided, management activities must not result in a loss of species viability forest-wide or create significant trends toward Federal listing.
6) **O-WL-31 (Objective - Terrestrial and Aquatic Wildlife)** Enhance or restore high-quality habitat on a minimum of 20 known sites of sensitive plants (average of two sites per year). Priority for habitat improvement will generally be for those species and habitats for which:
    a) Proactive management (versus protection based on avoidance of any management activities) is needed to maintain species and;
    b) Coarse filter management does not provide adequate maintenance or restoration.

7) Proactive management (versus protection based on avoidance of any management activities) is needed to maintain species and
8) Coarse filter management does not provide adequate maintenance or restoration.
9) **S-WL-6 (Standard - Terrestrial and Aquatic Wildlife)** Prohibit the harvesting of sensitive and State-listed threatened and endangered plants. Exceptions may be made for scientific research purposes or in fulfillment of treaty rights.

In additional to the general Objectives, Goals, and Standards included above, the CNF Forest Plan includes specific objectives for certain threatened, endangered or species of concern (TES). The species-specific Objectives, Goals, and Standards are included in Chapter 4 of this report.

3.6 LLR and Bureau of Indian Affairs Guidance

The Land Use Plan for the LLR has outlined criteria for utility crossing of tribal lands. Approval of any such use must be reviewed and approved by the Bureau of Indian Affairs.

3.7 Previous Biological Surveys

The CNF, DNR, and DRM have collected TES data that identify species of concern within their survey areas. These data were used as base information for the Project.

In addition to the available databases, a number of TES surveys have been completed for other linear projects between Bemidji and Grand Rapids. Specifically, surveys were conducted within the CNF and LLR for the Enbridge Pipeline Expansion project. Surveys included evaluation of habitat and species occurrences for TES plants, birds and other animals. The data from this survey are applicable for BGR Route 2; Enbridge has given permission to use their survey data.

Great Lakes surveyed the pipeline rights-of-way along much of Route 1 prior to 2008. During 2008 and 2009, BGR conducted additional surveys for TES plants, birds, and other animals along Route 1 and the identified cross-over segments that are within the CNF and LLR. These survey results are included in this BA/BE.

TES surveys for Route 3 were conducted during 2009. These surveys included evaluation of habitat and species occurrences for TES plants, birds, and other animals. These survey results are included in this BA/BE.

In summary, the following survey data are included in the analysis for this BA/BE:

- CNF rare species inventory data (2008 and earlier)
- DRM rare species inventory data (2008 and earlier)
- DNR Natural Heritage Inventory System data (NHIS) (2008 and earlier)
- Enbridge Pipeline (EP) survey data (~2006-2008)
- Bemidji to Grand Rapids (BGR) transmission line survey data (2007 – 2009)

3.8 Survey Protocol

Survey protocol for the 2008 and 2009 surveys were developed by the Applicants in consultation with the CNF, DNR, USFWS, and DRM. The following provides a summary of the general TES survey guidelines:

- The surveys will be led by a qualified botanist or biologist/technician identified on the DNR and CNF contractors lists.

- Habitat review and species surveys will focus on areas of appropriate habitat along each route. The CNF and the DNR have provided the Applicants with forest stand information that will be used to determine areas of appropriate habitat. Outside the CNF and state forests, appropriate habitat will be identified using GAP data, aerial photography, visual identification, other relevant data, and professional knowledge of the area.
- Surveys will typically be limited to a 250-foot wide (125 feet on either side of the likely centerline) survey area that covers the potential Project rights-of-way on Federal, State, and tribal lands and public rights-of-way. The Applicants will make these surveys available in GIS format. In cases where the surveys identify target species, the survey area on these lands may be expanded up to the full 1,000-foot wide route (if appropriate habitat is present) in an attempt to locate a route that avoids impacts to the target species. The 250-foot-wide survey area will not be expanded on lands where survey permission has not been granted to the Applicants.
- The Applicants will conduct surveys on public property and from public rights-of-way as permitted by the Federal, Tribal, State, and county property administrators, in areas of suitable habitat (Figure 4). Surveys will not be conducted on private properties, unless access permission is currently available. This protocol does not include obtaining access to additional private lands.
- Field surveys for TES are not required in survey areas that do not have suitable habitat for that target species.
- Field surveys for TES will not be conducted if the species would not be impacted by the Project, even if suitable habitat is present.
- TES surveys completed within the CNF and LLR (for BGR, pipelines and other projects) will not be repeated unless specific species were not included in the previous surveys.

Detailed survey techniques were developed for target species, such as call point surveys for songbirds and screening procedures/survey timing criteria for plants. The more detailed survey techniques can be found in the *Bemidji to Grand Rapids 230 kV Project – USFWS, CNF, LLR and DNR Biological T&E Species Survey Protocol* (May 2009), which was previously submitted.

3.9 Species to be Considered

In consultation with USFWS, USFS, DNR, and DRM representatives, species were identified for surveys and analysis. Further analysis and consultation with all of the above agencies regarding project alternatives indicated that habitat for some species is not present within the Study Area, and/or project activities are not expected to impact certain habitats for species considered during initial consultation. The following complete list indicates the status of species listed by the USFWS, USFS, DNR, and DRM. The species listed include federally threatened or endangered, CNF Regional Forester Sensitive Species, DNR threatened or endangered, and DRM sensitive. The table also indicates whether and why species are fully evaluated in this BA/BE. If a No Evaluation determination was reached, the reason for non-consideration is provided, and the species is not considered further in this report.

Table 3-1. Complete list of TES considered in the Biological Assessment/Biological Evaluation.

Taxonomic Group	Scientific Name	Common Name	DNR Status	CNF Status	DRM Status	Species Evaluated in BA/BE?
Fish	*Etheostoma microperca*	Least darter	SPC	RFSS	None	No, aquatic impacts are not anticipated
	Moxostoma valeniennesi	Greater redhorse	None	RFSS	SEN	No, aquatic impacts are not anticipated
	Notropis anogenus	Pugnose shiner	SPC	RFSS	SEN	No, aquatic impacts are not anticipated
Amphibians	*Hemidactylium scutatum*	Four-toed salamander	SPC	RFSS	SEN	Yes
	Plethodon cinerus	Red-backed salamander	None	None	SEN	Yes
Amphibians	*Rana clamitans*	Green frog	None	None	SEN	Yes
Birds	*Accipiter gentilis*	Northern goshawk	None	RFSS	END	Yes
	Ammodramus leconteii	LeConte's sparrow	None	RFSS	SEN	Yes
	Ammodramus nelsoni	Nelson's sharp-tailed sparrow	SPC	RFSS	SEN	Yes
	Ammondramus henslowii	Henslow's sparrow	END	None	END	No, grassland species, only known from large contiguous grassland areas.
	Ardea herodias	Great blue heron (rookeries only)	None	None	SEN	No, sensitive species on LLR list only. No significant bodies of open water are located adjacent to survey area in Area C.
	Asio flammeus	Short-eared owl	SPC	None	SEN	Yes
	Botaurus lentiginosus	American bittern	None	None	SEN	Yes
	Buteo lineatus	Red-shouldered hawk	SPC	RFSS	THR	Yes

Taxonomic Group	Scientific Name	Common Name	DNR Status	CNF Status	DRM Status	Species Evaluated in BA/BE?
Birds	*Charadrius melodus**	Piping plover	END	RFSS	END	No, nests on sandy beaches with areas of gravel or pebble substrate and little or no vegetation. Project would not impact similar habitats. Current observations in MN are on Lake of the Woods and Duluth harbor.
	Chlidonias niger	Black tern	None	RFSS	SEN	Yes
	Conturicops navoboracensis	Yellow rail	SPC	RFSS	THR	Yes
	Cygnus buccinator	Trumpeter swan	THR	RFSS	END	Yes
	Dendroica caerulescens	Black-throat blue warbler	None	RFSS	SEN	Yes
	Dendroica castanea	Bay-breasted warbler	None	RFSS	SEN	Yes
	Falcipennis canadensis	Spruce grouse	None	RFSS	THR	Yes
	Falco peregrinus	Peregrine falcon	THR	None	None	No, observations are limited to those associated with nest box at Boswell Station. No impacts are anticipated.
	Grus canadensis	Sandhill crane	None	None	SEN	Yes
	Haliaeetus leucocephalus	Bald eagle	SPC	RFSS	THR	Yes
	Lanius ludovicianus	Loggerhead shrike	THR	None	None	No, observations have not been made in the project vicinity.
	Larus argentatus	Herring gull	None	None	THR	No, marine/aquatic/riverine habitats will not be affected by the routes.
	Larus pipixcan	Franklin's gull	SPC	None	SEN	No, nests in freshwater marshes/lakes in grassland habitat. No observations recorded in Study Area.
	Oporornis agilis	Connecticut warbler	None	RFSS	SEN	Yes
	Pandion halietus	Osprey	None	None	SEN	Yes

Taxonomic Group	Scientific Name	Common Name	DNR Status	CNF Status	DRM Status	Species Evaluated in BA/BE?
Birds	*Pelecanus erythrorhynchos*	American white pelican	SPC	None	SEN	No, impacts to islands not anticipated.
	Phalaropus tricolor	Wilson's phalarope	THR	RFSS	SEN	Yes
	Picoides arcticus	Black-backed woodpecker	None	RFSS	THR	Yes
	Podiceps auritus	Horned grebe	THR	None	THR	No, largely aquatic. Aquatic impacts are not anticipated.
	Rallus elegans	King rail	END	None	END	Yes
	Sterna caspia	Caspian tern	None	RFSS	THR	Yes
	Sterna forsteri	Forester's tern	SPC	None	SEN	No, per DNR data, the forester's tern is not listed in the affected counties. All observations are located to south and west.
	Sterna hirundo	Common tern	THR	RFSS	THR	No, while scattered observations are present along Leech Lake and Winnibigoshish, the project is not anticipated to impact large lakes.
	Strix nebulosa	Great gray owl	None	RFSS	THR	Yes
	Tympanuchus phasianellus	Sharp-tailed grouse	None	RFSS	Extirpated	No, inhabits large brushland complexes (>5,000 acres).
Higher Plants	*Arethusa bulbosa*	Dragon's mouth orchid	None	None	SEN	Yes
	Botrychium dissectum	Dissected grape-fern	None	None	THR	Yes
	Botrychium lanceolatum var. angustisegmentum	A moonwort	THR	RFSS	THR	Yes
	Botrychium minganense	Mingan moonwort	SPC	None	THR	Yes
	Botrychium mormo	Goblin fern	SPC	RFSS	END	Yes
	Botrychium oneidense	Blunt-lobed grapefern	END	RFSS	END	Yes
	Botrychium pallidum	Pale moonwort	END	RFSS	THR	Yes

Taxonomic Group	Scientific Name	Common Name	DNR Status	CNF Status	DRM Status	Species Evaluated in BA/BE?
Higher Plants	*Botrychium rugulosum*	Ternate grape-fern	THR	RFSS	THR	Yes
	Botrychium simplex	Least grape-fern	SPC	RFSS	THR	Yes
	Calypso bulbosa	Fairy slipper	None	RFSS	THR	Yes
	Carpinus caroliniana	Blue beech	None	None	SEN	Yes
	Carya cordiformis	Bitternut hickory	None	None	SEN	Yes
	Celtis occidentalis	Hackberry	None	None	SEN	Yes
	Comptonia peregrina	Sweet fern	None	None	SEN	Yes
	Cypripedium arietinum	Ram's head ladyslipper	THR	RFSS	THR	Yes
	Drosera intermedia	Spatulate-leaved sundew	None	None	SEN	Yes
	Dryopteris goldiana	Goldie's fern	SPC	RFSS	THR	Yes
	Eleocharis olivacea	Olivaceous spike-rush	THR	RFSS	THR	Yes
	Eleocharis quinqueflora	Few-flowered spike-rush	SPC	RFSS	SEN	Yes
	Erythronium albidum	White trout-lily	None	RFSS	THR	No, inhabits northern hardwoods near large lakes. Survey area for Route 3 is not within 1/2 mile of Leech, Cass, Winnibigoshish, or Bowstring Lakes. No populations found on Routes 1 and 2, during previously surveys. No habitat present along Route 3.
	Gentiana andrewsii	Closed gentian	None	None	SEN	Yes
	Gymnocarpium robertianum	Limestone oak fern	None	RFSS	SEN	Yes
	Hierchloe odorata	Sweet grass	None	None	SEN	Yes
	Juglans cinerea	Butternut	SPC	None	SEN	Yes
	Listera auriculata	Auricled twayblade	END	None	None	Yes

Taxonomic Group	Scientific Name	Common Name	DNR Status	CNF Status	DRM Status	Species Evaluated in BA/BE?
Higher Plants	*Malaxis monophyllos var.brachypoda*	White adder's mouth	SPC	RFSS	THR	Yes
	Malaxis paludosa	Bog adder's mouth	END	None	END	Yes
	Mitchella repens	Partridge-berry	None	None	SEN	Yes
	Najas gracillima	Slender naiad	SPC	None	SEN	No, aquatic impacts are not anticipated
	Nymphaea leibergii	Dwarf water-lily	THR	None	None	No, aquatic impacts are not anticipated
	Orobanche uniflora	One-flowered broomrape	SPC	RFSS	THR	Yes
	Pinus strobus	White pine	None	None	SEN	Yes
	Platanthera clavellata	Club spur orchid	SPC	RFSS	THR	Yes
	Platanthera flava var. herbiola	Tubercled rein-orchid	END	None	None	Yes
	Polemonium occidentale	Western Jacob's ladder	END	None	None	Yes
	Potamogeton bicupulatus	Snailseed pondweed	END	None	None	No, aquatic impacts are not anticipated
	Ranunculus lapponicus	Lapland buttercup	SPC	None	THR	Yes
	Sparganium glomeratum	Northern bur-reed	SPC	RFSS	THR	Yes
	Subularia aquatica	Awlwort	THR	RFSS	None	No, aquatic impacts are not anticipated
	Taxus canadensis	Canada yew	None	RFSS	SEN	Yes
	Torryochloa pallida	Torey's manna-grass	SPC	None	SEN	Yes
	Ulmus americana	American elm	None	None	SEN	Yes
	Ulmus rubra	Slippery elm	None	None	THR	Yes
	Utricularia geminiscapa	Hiddenfruit bladderwort	None	None	THR	No, marine/aquatic/riverine habitats will not be affected by the routes.
	Utricularia gibba	Humped bladderwort	None	None	SEN	No, marine/aquatic/riverine habitats will not be affected by the routes.

Taxonomic Group	Scientific Name	Common Name	DNR Status	CNF Status	DRM Status	Species Evaluated in BA/BE?
Higher Plants	*Utricularia purpurea*	Purple bladderwort	SPC	None	SEN	No, marine/aquatic/riverine habitats will not be affected by the routes.
	Viola novae-angliae	New England violet	None	None	SEN	Yes
	Waldsteinia fragarioides	Barren strawberry	SPC	None	SEN	Yes
Insects	*Ceraclea vertreesi*	Vertree's caddisfly	SPC	RFSS	None	No, larvae are known only from substrates of lakes and slow moving streams. No aquatic impacts are anticipated.
	Cicindela patruela patruela	Northern barrens tiger beetle	SPC	None	SEN	No, observations restricted to extreme southeast MN.
Mammals	*Canis lupus**	Gray wolf	SPC	THR	SEN	Yes
	Felis concolor	Mountain lion	SPC	None	END	Yes
	*Lynx canadensis**	Canada lynx	None	THR	END	Yes
	Martes americana	Pine martin	None	None	SEN	Yes
	Microtus ochrogaster	Prairie vole	SPC	None	SEN	No, inhabits dry upland prairie. Habitat not present within survey areas.
	Myotis septentrionalis	Northern myotis	SPC	None	SEN	Yes
	Phenacomys intermedius	Heather vole	SPC	None	SEN	Yes
	Spermophilus franklinii	Franklins' ground squirrel	None	None	SEN	Yes
	Spilogale putorius	Eastern spotted skunk	THR	None	None	Yes
	Synaptommys borealis	Northern bog lemming	SPC	RFSS	SEN	Yes
Mollusks	*Lasmigona compressa*	Creek heelsplitter	SPC	RFSS	SEN	No, aquatic impacts are not anticipated
	Lasmigona costata	Fluted-shell mussel	SPC	RFSS	None	No, aquatic impacts are not anticipated
	Ligumia recta	Black sandshell	SPC	RFSS	SEN	No, aquatic impacts are not anticipated

Taxonomic Group	Scientific Name	Common Name	DNR Status	CNF Status	DRM Status	Species Evaluated in BA/BE?
Reptiles	*Chelydra serpentina*	Snapping turtle	SPC	None	SEN	Yes
	Emydoidea blandingii	Blanding's turtle	THR	RFSS	THR	Yes
	Heterodon platirhinos	Eastern hognose snake	None	None	SEN	Yes

Species with shaded rows satisfied the criteria necessary for analysis in this BE (i.e., suitable habitat, potential impact to habitat or known species presence).

Status Abbreviations: THR = Threatened, END = Endangered, SPC = Special Concern, RFSS = Regional Forester's Sensitive Species, SEN = Sensitive.

** Federally listed species.*

4.0 SPECIES AND ASSOCIATED HABITAT

4.1 Federally Listed Threatened and Endangered Species

4.1.1 Gray Wolf

Species Description

The following species description is included in the Minnesota DNR species profile for Gray Wolf - *Canis lupus* (2009).

> Adult female gray wolves in Minnesota weigh 22.7-38.6 kg (50-85 lbs.) and average 1.4-1.8 m (4.5-6.0 ft.) long. Adult males weigh 31.8-49.9 kg (70-110 lbs.) and average 1.5-2.0 m (5.0-6.5 ft.) long. Average height at the shoulder in both sexes is 66-81 cm (26-32 in.). Their pelage is gray, black, and/or buff with reddish coloring, but they can also be all black. Wolves have rounded and relatively short ears, and a large, blocky muzzle. The size of wolf tracks is dependent on the age and size of the wolf, and whether it is a front or rear paw, but the average size of an adult wolf track is 11.4 cm (4.5 in.) long and 8.9 cm (3.5 in.) wide.
>
> In comparison, coyotes (*Canis latrans*) are 1.1-1.3 m (3.6-4.4 ft.) long and 40.6-50.8 cm (16-20 in.) high; weigh on average 11-16 kg (25-35 lbs.) in Minnesota; and have gray or reddish brown pelage with rusty legs, feet, and ears and a whitish throat and belly. Additionally, their ears are pointed and relatively long, and they have a petite, pointed muzzle. Coyote tracks average 3.8-6.4 cm (1.5-2.5 in.) long. Several species of dogs also resemble wolves, but coloration, size, body proportion, and behavior can be used to discern the difference.

Species Habitat

The following habitat description is included in the Minnesota DNR species profile for Gray Wolf - *Canis lupus* (2009).

> Gray wolves are habitat generalists and populations can thrive in any type of habitat in the Northern Hemisphere (forests, prairies, swamps, mountains, deserts, tundra, and barren lands) from about 20° latitude to the polar ice pack, as long as there is abundant prey and controlled human-caused mortality (Young and Goldman 1944). They were once considered a wilderness animal, but have expanded into areas previously considered uninhabitable by wolves (U.S. Fish and Wildlife Service 1978, 1992; Berg and Benson 1999). In the early 1950s, Minnesota's primary wolf range encompassed a 31,080 sq km (12,000 sq mi.) area in northern Minnesota. Since the winter of 1997-98, regularly-occupied wolf range in Minnesota has been estimated at 88,325 sq km (34,102 sq mi.) in the forested portions of central and northern Minnesota. However, dispersing individuals have been documented in southern Minnesota.

Species Distribution and Occurrences within the Study Area

Historically, gray wolves were distributed widely across North America between Alaska and Mexico, although their range has been greatly restricted within the lower 48 states. At the time of their listing, the breeding range of the gray wolf had been restricted to extreme northeastern Minnesota. Recovery efforts have since restored its range to encompass northern Minnesota, northern Wisconsin, and Michigan's Upper Peninsula (USFWS, 2009).

In Minnesota, gray wolves are known to occur in Northeast Minnesota, north of Lake Mile Lacs and east of Red Lake. Their population is thought to be expanding numerically but not in range. Within the Study Area, wolves are known to occur in packs and as solitary individuals. Observations are most densely concentrated between Blackduck and Lake Winnibigoshish, as well as in the area northeast of Talmoon. While less common, observations have also occurred in the vicinity of US 2 (Erb 2008).

Risk Factors

The greatest threats to wolf populations are associated with habitat loss and fragmentation. Factors presented in the *Recovery Plan for Eastern Timber Wolf* that are relevant to evaluation of effects of this project include (1) large tracts of wild land with low human densities and minimal accessibility by humans; (2) ecologically sound management; and (3) availability of prey.

Growing human populations and dispersion into wolf habitat has increased the likelihood of negative wolf-human interactions, and has reduced potential habitat for white tailed deer, a primary prey source in Minnesota. Depletion of prey, however, has not currently seriously threatened any wolf populations (Boitani 2003).

Gray wolves have demonstrated the ability to adapt to human presence within their habitat. While hunting and trapping of this species is not currently permitted, the trend towards delisting the western Great Lakes population of gray wolves may mean that these activities could play an important role in wolf population management in the future (DNR 2009). If not properly managed, over-hunting may reduce the wolf population in Minnesota.

4.1.2 Canada Lynx

Species Description

The Canada Lynx Conservation Assessment and Strategy (2000) contains the following species description for the Canada lynx:

> Canada lynx are medium-sized cats, 75-90 cm long (30-35 inches) and weighing 8.0-10.5 kg (18-23 pounds) (Quinn and Parker 1987). They have large feet adapted to walking on snow, long legs, tufts on the ears, and black-tipped tails. Their historical range extends from Alaska across much of Canada (except for coastal forests), with southern extensions into parts of the western United States, the Great Lakes states, and New England (McCord and Cardoza 1982).

Species Habitat

The Canada lynx Conservation Assessment and Strategy (2000) contains the following habit description for the Great Lakes population of Canada lynx:

> Lynx habitat in the Great Lakes Geographic Area is imbedded within the ecotone between boreal and mixed deciduous forests. In the Great Lakes states, lynx habitat consists of boreal spruce-fir forests, aspen, pine, and mixtures of upland conifer and hardwood, interspersed with lowland conifer and shrub swamps and bogs, in those areas where snow accumulation and condition may limit travel of competing species.
>
> Some forest habitats are primarily coniferous, others are primarily deciduous, and many are mixtures of both coniferous and deciduous trees. Similarly, some forested habitats contain one or few species, while others contain many species. Conifer species include white and black spruce; balsam fir; northern white cedar; jack, white and red pine; hemlock and tamarack. Deciduous species include aspen, paper birch, and mixtures of

northern hardwoods and lowland hardwoods. Large stands of essentially pure northern hardwoods are not considered lynx habitat. Of the non-forested types, shrub swamps and conifer bogs are generally considered lynx habitat. Shrub swamps consist mainly of alder or willow. Bogs typically have components of black spruce, tamarack, or other lowland conifers.

Lynx denning habitat is suspected to be associated more with structural components of forests, such as blow down, deadfalls and root wads, rather than forest cover type, based on studies in other geographic areas.

In addition to climatic and topographic influences, a variety of disturbance factors create and maintain forest composition and successional patterns, which provide landscape mosaics of suitable lynx habitat. These disturbance factors included fire, insects, and wind. Pre-settlement forests in this area historically maintained three distinct fire regimes (Kilgore and Heinselman 1990):

1) Jack pine and spruce-fir forest with very large (sometimes >250,000 acres) stand-replacement crown fires or severe surface fires, every 50 to 100 years in the west and 80 to 250 years in the east;

2) Red pine and white pine forests with combinations of moderate intensity surface fires at 20 to 40 year intervals, with more intense crown fires at 150 to 300 year intervals, and

3) Mixed aspen-birch-conifer forests with high-intensity surface or crown fires.

Larger blow downs due to wind shear and tornadoes occurred infrequently, but often caused extensive localized disturbance. Insect infestations such as those caused by spruce budworm contributed to large areas of tree mortality, and may have created conditions conducive to large fires.

These major disturbance events created diverse, early successional forests that provide habitats preferred by snowshoe hare, and thus important foraging areas for lynx. The less intense, more frequent ground fires were an important factor in maintaining the conifer understory component throughout much of this area. Smaller, localized wind events and insect infestations likely created concentrations of downed logs, which can provide suitable denning habitat for lynx.

Sites in this geographic area where the best lynx habitat is found include the Voyageurs National Park and Boundary Waters Canoe Area Wilderness (Minnesota), and Quetico Provincial Park (Ontario). Wisconsin and Michigan currently suffer from a lack of connectivity with Minnesota and Ontario, and may have limitations of size, fragmentation, and current vegetation composition. Of these two states, the largest areas of contiguous habitat occur on the Ottawa and Hiawatha National Forests and associated state forests in Michigan.

Approximately 41 percent of lynx habitat in this geographic area is in public or tribal ownership (John Wright, unpubl. data from Great Lakes Ecological Assessment).

The snowshoe hare is a primary food source for the Canada lynx. The Canada lynx Conservation Assessment and Strategy (2000) contains the following habit description for snowshoe hare.

> Snowshoe hare habitat consists primarily of all lowland shrub and conifer bogs, and the sapling and older sawlog stands, rather than the early regenerating or pole-sized stands. Sapling-sized aspen adjacent to conifer cover also provides snowshoe hare habitat. Conifer bogs or lowland conifer forests may serve as refuge for hare during low points in their cycle. Red squirrels are associated with forested stands that contain conifers of cone bearing age. Small, permanent upland openings would probably also be used by lynx for foraging.

The *Hierarchical Structure of Canada Lynx Space Use and of Habitat Selection in Northeastern Minnesota* (January 2008) concluded that the Minnesota population tends to select for early succession forests where hare are more abundant. Some territories also included core areas of mature coniferous forest and denning is known to occur within mature lowland coniferous forest. This study concluded that close spatial proximity of these forest types may play an important role in Canada lynx habitat selection in Minnesota (Burdett, 2008).

Species Distribution and Occurrences within the Study Area

Canada lynx are widely distributed along the northern latitudes of North America from Maine to the northern Great Lakes, Colorado, Wyoming, Idaho, and Montana as well as along the Cascade Range. The northern extent of their range extends through the boreal forests of Canada and into Alaska (USFWS, 2000).

In Minnesota, Canada lynx are known to be most densely distributed within St. Louis, Lake, and Cook counties, but observations have been made across the northeastern portion of the state. Radio telemetry and GPS tracking indicate that the arrowhead population is most abundant inland from Lake Superior, generally oriented along the North Shore, although observations occur in the northern portions of these counties as well (Moen, 2008). Twenty-five other counties in Minnesota have had lynx sightings, including Beltrami, Cass, Hubbard, and Itasca. While digital, spatial data is unavailable, seven probable and four unverified sightings of lynx have occurred in the Study Area (DNR, 2009b).

Risk Factors

Moen et al. (2008) identify the following risk factors.

- Timber management emphasizing techniques such as clear cutting, shearwood cuts, seed tree cuts, large diameter trees, timber salvage, even aged cutting can reduce appropriate foraging and den habitat.
- Wildfire management/suppression can prevent areas of successional forest from developing which would limit the amount of appropriate foraging habitat for Canada lynx.
- Increasing recreational pressure on remote habitat area, especially motorized recreation and dispersed recreation which encourage snow compaction may limit lynx competitive advantage.
- Trail and road development, have the potential to reduce available habitat, as well as increasing the likelihood of snow compaction along their routes during the winter months.
- Livestock grazing can reduce the amount of available woody species used by snowshoe hares during the winter months.
- Over exploitation from trapping may reduce the viability of lynx populations if not properly managed (Moen et al., 2008).

4.2 Chippewa National Forest, DNR and DRM Listed Species

4.2.1 Avian Species

*4.2.1.1 Northern Goshawk (*Accipiter gentilis*)*

The northern goshawk is listed as CNF RFSS and as DRM Endangered.

Species Description

The Conservation Assessment for the Northern Goshawk in the Western Great Lakes (Curnutt, 2007) includes the following species description:

> The largest accipiter in North America; long, broad wings and long, rounded tail allow for agility in flight through forests. As is usual for raptors, female larger than male, but difference is much less pronounced than in other accipiters (Storer 1966). Average total length, male 55 cm, female 61 cm; wing-span, male 98–104 cm, female 105–115 cm mass, male 631–1,099 g, female 860–1,364 g. For full measurement data see Squires and Reynolds (1997). Upperparts of adult brown-gray to slate gray; head with black cap and pronounced white superciliary line. Undertail-coverts white, often quite fluffy, especially during courtship or when alarmed. Tail dark gray above with inconspicuous broad, dark bands (3–5). Female similar to male but browner above and more coarsely marked below, sometimes appearing barred. Partial albinism may occur (Evans 1978). Adult plumage grows in after 2 years, for hatchling and juvenal plumage, see Squires and Reynolds (1997).

Species Habitat

The Conservation Assessment for Northern Goshawk (*Accipiter gentilis*) in the Western Great Lakes (Curnutt, 2007) includes the following habitat description:

> Goshawks in the WGLR have built nests in most species of large trees with growth patterns that provide a stable nest platform, including Aspen (*Populus* sp.; Richardson and Bach 2002, Rosenfield et al. 1998), beech (*Fagus grandifolia*; Gibson 2003), white pine (*Pinus strobus*; Dick and Plumpton 1999), white oak (*Quercus alba*; Haug 1981), and others. Nests have been constructed and successful in dead white pines and dead aspen (Dick and Plumpton 1999). DBH and tree height measurements in themselves are more or less useless because goshawk nest tree preference is comparative rather than absolute (e. g., Rosenfield et al. (1998) reported mean tree density at 28 nest sites as 353 stems/ha).
>
> In general, deciduous trees are much more commonly used than conifers for nesting by goshawks in the WGLR (Boal et al. 2006). Larger aspens are preferred throughout the WGLR (Postupalsky 1998, Rosenfield et al. 1998, Maya Hamady, DNR, pers. comm.) probably owing to their forming multiple crotches within the crown. For the same reason, in the Upper Peninsula of Michigan, beech trees were used selectively to nest in Hiawatha NF (West Unit) by goshawks; and preference was shown for sugar maple (*Acer saccharum*) and yellow birch (*Betula lutea*) (Gibson 2003). Beech is often the largest tree in these areas and the structure is favorable for nest placement (Gibson 2003).
>
> In Gibson's (2003) study of three sympatric raptors in the west unit of the Hiawatha NF, goshawks selected trees for nesting that were significantly larger (DBH) than random, but compared to the red-shouldered and red-tailed nest trees, goshawk trees also showed a high degree of variability in nest tree size.

> Alternative nests have been shown to be important to goshawks in the Kaibab Plateau (Reynolds et al. 2005). In the WGLR the literature is relatively silent on this aspect of goshawk nesting. An exception is Ennis et al. (1993) who reported on approximately 40 territories in the Huron-Manistee NF. Of these territories half were searched for and, of those, 13 had one or two alternative nests. Of the 19 alternative nests located, 11 were greater than 300 m from the active nest and 6 were between 40 m and 100 m away.

Species Distribution and Occurrences within the Study Area

Northern goshawks are a circumpolar species, with a North American population stretching from Alaska, to the Rockies and west to Quebec (Curnutt, 2007). Their breeding range in Minnesota is generally restricted to the northern third of the state (MOU, 2009).

Northern goshawks are found throughout the CNF and LLR at low densities. CNF database records indicate that there are approximately 105 historic and current records of goshawks and 18 known territories within the Study Area on the CNF. No known nesting territories exist within 1,000 feet of the routes. The 18 historic nest territories located within the Study Area were recorded between 1998 and 2006 and two of these nests were described as active in 2007.

Risk Factors

Risk factors include forest fragmentation and isolation of primary habitats, cutting, and regeneration in nesting areas that result in vegetative simplification, predation by other raptors such as great-horned owls and red-tailed hawks, and predation by fisher. Human disturbance at the nest site may result in nest failure and abandonment (Crocker-Bedford, 1990).

*4.2.1.2 LeConte's Sparrow (*Ammodramus leconteii*)*

The LeConte's sparrow is listed as a CNF RFSS and as DRM Sensitive.

Species Description

The National Audubon Society's Watchlist - LeConte's Sparrow (National Audubon Society, 2007) contains the following species description:

> One of North America's most colorful sparrows, the Le Conte's is most easily identified by its orange face and richly patterned plumage. The sides are finely streaked, and the undersides are pale, with fine vertical streaking on the buff breast. The pale orange rump and darkly striped back can be good field marks as this bird flies low and away from the observer (often the best view one can hope to attain of this elusive species). Le Conte's is among the tiniest of the sparrows, less than five inches in length, with a wingspan of just 6.5 inches. Its weak, buzzy song has been described as more typical of a grasshopper than of a bird.

Species Habitat

LeConte's sparrows are a secretive species that utilize wet grasslands (sometimes mixed with cattails and *Phragmites)* and sedge marshes often interspersed with small alders, birches, and shrubs (Rising, 1996). However, they normally avoid areas with permanent standing water. In addition to wetlands, this species also regularly inhabits timothy hayfields and other types of damp meadows, tall grass prairies, and dry short-grass hayfields (Robbins, 1991; Stewart, 1975; Cooper, 1984). This sparrow is a locally common breeding resident of central and northern Minnesota (Janssen, 1987). Due to their weak insect-like songs, territorial LeConte's sparrows are often overlooked. This sparrow also tends to be most vocal at night (Murray, 1969). Territorial males will utilize grass clumps, persistent herbaceous vegetation, and

small shrubs as singing perches and will also sing from the ground. Given their secretive behavior, historic changes in the status and distribution of LeConte's sparrows are poorly understood. Wetland drainage may have caused declines in some populations, but since this species also breeds in upland grasslands, their overall populations may not have been reduced to the same extent as species restricted to wetlands. Additionally, populations are known to experience considerable annual fluctuations in abundance in portions of their range, becoming most numerous during wet years (Stewart, 1975). These fluctuations tend to obscure long-term population trends. Abundant habitat for this species exists around the Study Area.

Species Distribution and Occurrences within the Study Area

This sparrow nests across several northern states and south central Canada. Its range extends between northwestern Montana/Alberta to Michigan and south to Illinois. Wintering populations are found along the Gulf Coast and southern Atlantic seaboard (National Audubon Society, 2007).

This species is known to occur within portions of the CNF where sedge meadows, wetlands, and sedge dominated bogs occur. Twenty-two historic observations of LeConte's Sparrows have been documented within the CNF.

Risk Factors

Risk factors include fire suppression, successional changes to fields, and alteration of hydrology within wetlands habitats.

*4.2.1.3 Nelson's Sharp-tailed Sparrow (*Ammodramus nelsoni*)*

The Nelson's sharp-tailed sparrow is listed as a CNF RFSS and as DRM Sensitive.

Species Description

The National Audubon Society's Watchlist – Nelson's Sharp-tailed Sparrow (National Audubon Society, 2007) contains the following species description:

> The Nelson's Sharp-tailed Sparrow is a small perching bird, weighing about 0.6 ounces and measuring about 5 inches long, with a wingspan of 7 inches. Overall, the bird's coloration is subtly complex. The head is boldly marked with yellow-orange, forming a triangle around each grey cheek. This bright ochre color moves down the lower face into the sides of the neck and then into the chest. From the dark eye, a thin, brown stripe cuts through the ochre to the grey nape of the neck. The crown is also grey. The sparrow's upper parts are mostly warm brown, with black and whitish streaks. Light steaks mark the sides and fade into the ochre chest. The chin and belly are whitish. The bill is short; the tail is likewise short and sharp, appearing frayed. Breeding populations on the eastern seaboard are generally duller, grayer, and larger.

Species Habitat

Nelson's sharp-tailed sparrows are a secretive species that utilize prairie habitats where cordgrass, squirreltail, whitetop, and *Phragmites* are common (Rising, 1996). They have also been observed in wet meadows, peatbogs, lakesides with emergent vegetation, native prairie, abandoned fields, and planted cover, although use of these habitats may vary depending upon moisture conditions. In the CNF, they occur in areas where expansive shallow sedge meadows with little open water predominate. This sparrow is a rare breeding resident of central and northwestern Minnesota (Janssen, 1987). Like many members of the *Ammodramus* genus, this species has a weak insect-like song that is easily overlooked.

This sparrow also vocalizes at night (Rising, 1996). Territorial males sing persistently upon arrival on breeding grounds where they sing from the ground and grassy clumps.

Species Distribution and Occurrences within the Study Area

Three geographically isolated breeding populations are present in North America. One population breeds in the prairie pothole region, one along the south shore of the Hudson Bay, and one near the eastern coastline between Maine and the St. Lawrence Seaway. Wintering takes place along the Gulf Coast and the southern Atlantic seaboard (National Audubon Society, 2007).

This species is known to occur within portions of the CNF and LLR where sedge meadows, wetlands, and sedge-dominated bogs occur.

Risk Factors

Risk factors include fire suppression, successional changes to fields and alteration of hydrology within wetlands habitats.

*4.2.1.4 Short-eared Owl (*Asio flammeus*)*

The short-eared owl is listed as DNR Special Concern and as DRM Sensitive.

Species Description

The Conservation Assessment for Short-eared Owl (*Asio flammeus*) (USDA Forest Service, 2003) includes the following species description:

> Medium sized owl with females larger. Adult plumage: dorsally mottled brown and buff, resembles dried grasses. Ventrally, whitish to rust colored with dense vertical streaking on breast, thinning out on sides and flanks. Females generally darker dorsally owing to more brown, and ventrally owing to rust color and heavier streaking. Sexes readily distinguished during the breeding season using color, size, and behavior. Head large and round with very small tufts arising from the center of forehead, generally not seen. Face large and facial ruff round during the normal posture. Facial disk gray/white, orbits black, eyes yellow, bill black. Wings long and broad with 10 primaries and 12 secondaries. Tail medium length with 12 feathers. In ascending flight, bouncing high flapping wing-beats. When hunting, few wing-beats interspersed with quartering on slightly positive dihedral wings. Aerial agility a good field characteristic of this species as it is often seen foraging during the day (Holt and Leasure 1993).
>
> Morphologically similar to the Long-eared Owl (*Asio otus*), but larger overall. Long-eared Owl's flight is more direct with wings held most often on a horizontal plane. Long-eared Owl plumage is darker dorsally and more heavily streaked and barred ventrally. Usually separated by diel activity period (Long-eared: nocturnal, Short-eared: crepuscular), but latitude and season may complicated this (Holt and Leasure 1993).

Species Habitat

The short-eared owl is a species that utilizes open habitats that include old fields, crop stubble, meadows, pastures, prairie, grasslands, and shrubby habitats (Johnsgard, 1988). During the breeding season these owls utilize prairies, grassy plains, and Mikkola (1983) describes breeding habitats as moorlands, marshlands, bogs, dunes, and cleared forest. A combination of substantial areas of resting and nesting cover with nearby hunting areas having an abundance of small mammals is probably a dominant factor in breeding habitat selection (Cramp, 1985). The short-eared owl is best represented in

the northwestern and portions of the north-central region of the state during the breeding season (Janssen, 1987).

Species Distribution and Occurrences within the Study Area

The short-eared owl is widely distributed, with breeding populations occurring across North America and northern Eurasia as well as in South America. In North America, this species is known to breed from Alaska to Labrador, with some wintering individuals traveling as far south as central Mexico (National Audubon Society, 2007).

This species is not tracked by the CNF and no documentation is available for the short-eared owl on forest lands, although it has been known to occur just west of the CNF.

Risk Factors

Risk factors include fire suppression, agricultural conversion, and human development of grasslands, successional changes to fields and alteration of hydrology within wetland habitats.

*4.2.1.5 American Bittern (*Botaurus lentiginosus*)*

The American bittern is listed as DRM Sensitive.

Species Description

The National Audubon Society's Waterbird Conservation – American Bittern (National Audubon Society, 2007) contains the following species description:

> This stocky heron is heavily streaked with tan, brown, and white over its entire body. Darker wings and flight feathers, a black face, and neck streaks accentuate the plumage. Males and females have similar plumage. The bittern has a 3 foot wingspan, and is approximately 2.5 feet long from the tip of its long pointed bill to the end of its tail. While the bird appears quite large, it weighs only about a pound.

Species Habitat

The American bittern is a medium-sized heron that utilizes large cattail, bulrush, or sedge marshes for breeding and feeding. Other habitats utilized for foraging or breeding also include bogs, wet meadows, and hayfields (www.nj.gov/dep/fgw/ensp/pdf/end-thrtened/ambittern.pdf). The American bittern is best represented in the central, northeast, and northwest regions of Minnesota, but may breed sparingly throughout the state wherever suitable marsh habitat exists (Janssen, 1987).

Species Distribution and Occurrences within the Study Area

The American bittern ranges throughout all but the desert region of the contiguous United States and has been recorded throughout Minnesota. This species is not tracked by the CNF or DMR and no documentation is available for the American bittern on forest or tribal lands. According to the DRM, it is known to occur within the CNF and LLR in areas of suitable habitat.

Risk Factors

Risk factors include diminished frog populations, human disturbance, and alteration of hydrology within wetlands habitats.

4.2.1.6 Red-shouldered Hawk (Buteo lineatus)

The red-shouldered hawk is listed as a CNF RFSS and as DRM Threatened.

Species Description

The Conservation Assessment for Red-shouldered Hawks (*Buteo lineatus*) (Jacobs & Jacobs, 2002) includes the following species description:

> The Red-shouldered Hawk is a medium sized raptor that exhibits reverse sexual dimorphism (females are larger, but to a lesser degree than accipiters). Males measured in total length 43-58 cm (17-23 in) and females 48-61 cm (19-24 in) (Crocoll 1994). Mass from breeding birds found males and females averaged 550 g and 701 g respectively in Michigan (Craighead and Craighead 1956) and 544 g (486-582) and 670 g (593-774) respectively in Wisconsin (J. & E. Jacobs in Crocoll 1994).
>
> Adult Plumage is dark brown dorsally with black and white bands on the flight feathers. Ventrally the breast and belly are colored with orange, pale orange or rusty reddish horizontal barring. Upper lesser wing coverts ("shoulders") are rusty brown. Tail is relatively longer when compared to other eastern *Buteos* with (when viewed dorsally) three distinct narrow white bands (approx. 1 cm wide) separated by wider (approx. 3 cm) corresponding black bands. Cere, legs, and feet are pale yellow to orange in color. The iris color is dark brown (pers. obs.)

Species Habitat

Red-shouldered hawks require a substantial food base, and at least during the breeding season they are distinctly territorial. The red-shouldered hawk is associated with mixed coniferous-deciduous woodlands, moist hardwood forests, swamps, river bottomlands, and wooded marsh openings, with the borders of lakes and streams or other wetlands being especially favored habitat (Johnsgard, 1990). Widespread destruction and fragmentation of riparian habitats has forced this species to rely on upland forests to a greater extent (Ebbers 1991a). In such areas, human-made grasslands may replace wetlands as hunting habitat (Ebbers 1991a).

Nesting habitat is characterized by taller than average closed-canopy trees with well-developed crowns. American beech and sugar maple are frequently selected for nesting, where the nest is usually built in a secure crotch of a large-diameter tree situated well below the canopy (Ebbers, 1991a). Morris and Lemon (1983) found that red-shouldered hawk nests were typically found in mature deciduous forest stands dominated by sugar maple and American beech and characterized by mature trees and a reduced understory. A two-year study located 20 red-shouldered hawk nests on the CNF. These nests occurred in closed-canopy mature northern hardwoods (17 nests) or mature aspen (three nests) interspersed with wetlands (McLeod and Anderson 1997)

Home ranges for the red-shouldered hawk are smaller when compared to those of the northern goshawk. In Michigan, Craighead and Craighead (1956) found that mean breeding home ranges were 63 hectares, but varied from 7.7 to 155 hectares.

Species Distribution and Occurrences within the Study Area

The red-shouldered hawk's range generally extends between the Mississippi River Valley and the Atlantic Coast. A separate population also resides along the Pacific Coast in California (All About Birds 2009). Red–shouldered hawks are at the northern periphery of their range in the National Forests of Minnesota, Wisconsin, and Michigan (USFS, 2002). Much of this species' former habitat in southern Minnesota was destroyed or fragmented by human development, logging, and agriculture (USFS 2004). There are presently about 430 known or suspected nesting sites in Minnesota; a majority of these sites are located within just a few meta-populations (USFS, 2004). One of these meta-populations occurs on

the Ottertail Peninsula of Leech Lake within the CNF. However, red-shouldered hawks are found throughout the CNF at low densities.

Risk Factors

A conservation assessment was prepared for the red-shouldered hawks in the national forests of the north central states (Jacobs & Jacobs, 2002). Red-shouldered hawks are believed to have been one of the most common hawks in their historic range prior to 1900. Logging conducted during the 1800's and early 1900's appears to be the cause of declines in red-shouldered hawk populations throughout the north central states. Breeding bird survey data also indicate a population decline of between 65 percent and 95 percent in the Great Lakes states between 1950 and 1970 (TNC, 1992). Habitat loss, loss of mature forest conditions, human disturbance, predation, and competition with red-tailed hawks appear to be the cause of this decline. Risk factors are forest fragmentation and isolation of primary habitats, cutting, and regeneration in nesting areas that result in vegetative simplification and predation by other raptors such as great horned owls and red-tailed hawks. Human disturbance at the nest site may result in nest failure and abandonment.

4.2.1.7 Black Tern (Chlidonias niger)

The black tern is listed as a CNF RFSS and as DRM Sensitive.

Species Description

The Conservation Assessment for the Black Tern (*Chidonias niger*) (Kudell-Ekstrum & Rinaldi 2004) includes the following species description:

> The Black Tern is an easy tern to identify with its black head, black body and gray wings (USGS 2000). It is boldly marked during the breeding season with a black head and black underparts (Royal Ontario Museum and the Ontario Ministry of Natural Resources – hereafter cited as ROM 1999). The sexes are similar in coloration and size. Identification tips for the Black Tern are its small size, very short dark legs, a short-notched tail, and its distinctive feeding habit of swooping down and picking prey off the surface of the water or over land. A distinguishing characteristic of this species is a dark ear patch extending down from a black crown (Currier 2000). The juvenile form has a white face, foreneck, breast, and belly; an irregular black cap connected by a dark ear spot, a brownish back and upperwing and dark gray shoulder bar. The first winter/first summer form is similar to the adult basic form, but often with blackish mottling in first summer. Wintering adults and juveniles are white or patchy black, and white below with a gray tail (Currier 2000). The adult alternate form has dark legs, black head, neck, breast, and belly. The dark gray back and upperwings have no apparent contrast. The underwing coverts are pale and the undertail coverts are white. The adult basic form has a white face, foreneck, breast and belly, an irregular black cap connected to a dark ear spot, a gray back and upperwing (paler than in alternate plumage) and a dark gray shoulder bar (Gough et al. 1998).

Species Habitat

Black terns are a neotropical migratory species that are semi-colonial breeders. Black terns reach their breeding territories in Minnesota in late April through the beginning of May (Janssen, 1987). Breeding occurs in shallow freshwater marshes with emergent vegetation found along lake margins and occasionally in rivers (Dunn and Argo, 1995). Vegetation utilized for nest platforms can vary, but cattails or bulrushes are characteristically dominant in black tern colonies (Dunn 1979, Cuthbert 1954). Vegetation cover can also vary between dense and sparse but nests are usually protected from direct

open water to avoid dangers such as wind and wave action (Currier, 2000). Nesting locations of 12 acres or more are thought to be necessary for establishment of nesting colonies. The black tern is found throughout most of the state during the breeding season and Minnesota is thought to harbor the largest population in the north central United States (Baker and Hines, 1996). Population declines have been noted by U.S. Geological Survey's Breeding Bird Survey and this decline has resulted in the species being protected in neighboring states such as Ohio, Indiana, Illinois, Iowa, and Wisconsin.

Species Distribution and Occurrences within the Study Area

The black tern has a core range found in Alberta, Saskatchewan, Manitoba, North and South Dakota, and Minnesota (Kudell-Ekstrum & Rinaldi, 2004). Historic and recent records show seven records of colonies on CNF and LLR lands, four of which occur within the Study Area.

Risk Factors

Risk factors include human disturbance, and alteration of hydrology within wetlands habitats.

*4.2.1.8 Yellow Rail (*Conturicops navogoracensis*)*

The yellow rail is listed as DNR Special Concern, as a CNF RFSS, and as DRM Threatened.

Species Description

The Conservation Assessment for Yellow Rail (*Conturicops navogoracensis*) (Southwell 2002a) includes the following species description

> The yellow rail is a small, very shy and secretive ground-dwelling marsh bird. As typical of all rails, it has a laterally compressed body with long toes for maneuvering through aquatic vegetation (Species at Risk 2001). Measuring 5-7 1/2 inches long with a wingspan of 10-13 inches and weighing 46-60 grams, this is the smallest rail in the world (INHS 2001). The plumage on its back is yellowish-brown with dark stripes crossed by white bars, the breast is buffy-yellow, the flanks gray, and the legs and feet greenish-yellow. The distinguishing characteristics of the yellow rail are the white patches on the trailing edge of each wing that are visible only in flight, and the short, black bill that is yellow in males until after the breeding season when it fades to black (NatureServe 2001).
>
> This bird rarely flies but instead will hide or run when disturbed, and therefore is rarely seen. The best form of identification is its distinctive voice consisting of a series of five *kiks* resembling two stones being struck together (Bookhout 1995b). Before incubation begins, the male will call for numerous hours during the night with only short, infrequent breaks. During and after incubation, the calling will continue, though at a subdued level, and will typically stop completely by mid-August (NatureServe 2001). The female also uses a variety of calls with her chicks, including a *rowr* when the nest is disturbed, whining to attract the chicks, and moans when brooding (NatureServe 2001). During the fall, the yellow rail is silent and therefore becomes difficult to detect (NatureServe 2001).
>
> The chicks are black in color with a pink bill that will fade to black as it becomes a juvenile. The juveniles are darker than the adults with white-barred areas on the breast and spots on the head. Vocalizations of both the chicks and juveniles consist of *wees* and *peeps* (NatureServe 2001).

Species Habitat

Yellow rails are very selective when choosing a breeding habitat. These areas are specifically characterized by expansive sedge or grass-dominated wet meadows (usually >100 acres) (Southwell, 2002), with vegetation consisting of wiregrass sedge (*Carex lasiocarpa*), or Canada bluejoint (*Calamagrostis canadensis*) and lake sedge (*Carex lacustris*) (DNR, 2009). Over time, the persisting dead stems of these species bend over to form a horizontal mat that hangs over the substrate to form sheltered pathways (Hyde, 2001). Cattail, forb, woody, and shrubby habitats are not preferred. Standing water is also an important characteristic of yellow rail breeding habitat with typical levels ranging between 2 and 12 inches. Yellow rails have been known to abandon or adopt breeding areas based upon the lack or presence of standing water (DNR, 2009).

Species Distribution and Occurrences within the Study Area

Yellow rails are known to be widely distributed west of the Rockies, ranging from southeastern Alberta and northeastern Montana to southern Quebec and New England. A separate population is also known to exist in southern Oregon. This species winters in the southeastern United States. Due to their specific habitat affinity, their distribution across this region is patchy (Southwell, 2002a).

Within Minnesota, the yellow rail has been documented in many north-central counties (DNR, 2009). Specifically, it is known to occur within the CNF and LLR in areas of suitable habitat.

Risk Factors

Risk factors to yellow rails include drainage, impoundment, and conversion of wetland habitat (DNR, 2009). This species is especially sensitive to these activities because of its specific habitat requirements.

*4.2.1.9 Trumpeter Swan (*Cygnus buccimator*)*

The trumpeter swan is listed as DNR Threatened, as a CNF RFSS, and as DRM Endangered.

Species Description

The Conservation Assessment for Trumpeter Swan (*Cygnus buccimator*) (Southwell, 2002b) contains the following species description:

> With a wingspan of 8 feet, a height of 4 feet, and weighing 25-35 pounds, the trumpeter swan is the largest waterfowl in North American and the largest swan in the world (USFWS 1995). Native to North America, this swan is known for its large size, long neck, short duck-like bill, and resonant trumpet-like call. The males, called cobs, and females, called pens, of this species have the same color and appearance. The adult plumage is purely white with a dense layer of down (up to 5 cm thick) which enables toleration of temperatures as low as -30ºC (Red Rock 2001). Often, the head and neck are stained orange-brown due to foraging in iron-rich water (Mitchell 1994). The bill is broad and flat with serrations on the edges that allow it to strain water from aquatic vegetation (Wisconsin Department of Natural Resources 2001). The coloration of the bill appears to be entirely black from a distance, though closer inspection reveals a thin red line along the rear upper edge of the lower mandible (Mitchell 1994). The black coloration of the bill extends to the edge of the eye and forms a V-shape with the white plumage on the forehead. In addition to the bill, the short legs and feet of the adult trumpeter swan are also black in color. There are two categories of cygnets: those that hatch with “normal” plumage, and those that hatch with “leucistic” plumage. The normal plumage is dull gray, darker dorsally and nearly white ventrally. The bill is mottled pink and gray-black while the legs and feet are gray-pink. The leucistic cygnets have completely white

plumage with a pale-gray wash, a completely pink bill, and yellow legs and feet. Leucistic cygnets have only been reported in Red Rock Lakes National Wildlife Refuge, Montana, at a 1.8% occurrence, and at Yellowstone National Park, Wyoming, at a 13% occurrence (Mitchell 1994). The cygnets undergo a complete prejuvenal molt that begins around 6 weeks of age and is completed around 10 weeks of age. Between 12 and 16 months of age, the bill will turn to the black adult coloration. The second year swans are mostly white with a few pale-gray or brown feathers on the head, neck, and body, and have yellowish-greenish gray to black feet and tarsi. As juveniles and adults, leucistics will maintain yellow legs and feet and may have pale yellow or olive lores on the bill (Mitchell 1994).

The trumpeter swan call is described as deep, resonant, loud, and trumpet-like. Its call has many social functions, such as alarm, excitement, territorial display, and defense. It may call with its bill open or shut to produce slightly different sounds. In addition to the characteristic calls, it will also hiss, peep, and gurgle. The cygnets will softly 'pip' with a high-pitched tone that will deepen into the adult tone at 6-8 months of age. How vocal a swan will be depends upon its social context, with incubating or brooding swans remaining relatively quiet while non-breeding swans or wintering flocks tend to be more vocal (Mitchell 1994).

Species Habitat

During the breeding season, trumpeter swans select small ponds, lakes, or bays within larger lakes with extensive beds of cattails, bulrush, sedges, and/or horsetail (Coffin and Pfanmuller, 1987). Coffin and Pfanmuller also state that "muskrat houses and beaver lodges are frequently used for nesting platforms." They are known to protect large territories during the nesting period and are intolerant of crowding by other species. They have been known to kill perceived competitors such as pelicans while protecting breeding territories. Trumpeter swan nesting territories range from 6 to 150 acres in size. They utilize large, shallow wetlands one to three feet deep with a diverse mix of emergent vegetation and open water offer ideal habitat. Such locations support a rich variety of submerging (underwater) plants used for food, such as sago pondweed and water milfoil (Wisconsin DNR website).

Species Distribution and Occurrences within the Study Area

Three populations of trumpeter swans are distributed across North America. The Pacific population, which migrates between Alaska and Oregon, the Rocky Mountain population, which ranges between the Yellowstone area and the northern Rockies, and the interior population, which is located in the upper Midwest and northern Great Plains. The interior population, consisting of Minnesota, South Dakota, Iowa, Wisconsin, Michigan, Ohio, and Ontario has largely been reintroduced since 1987 (Southwell, 2002b).

Minnesota's flock now consists of 2,400 birds (DNR, 2009). CNF historic and recent records show 17 records on Forest Service lands and one within the Study Area.

Risk Factors

Risk factors include human disturbance, accidental shooting, powerline collision, and alteration of hydrology to wetlands habitats (DNR, 2009).

*4.2.1.10 Black-Throated Blue Warbler (*Dendroica caerulescens*)*

The black-throated blue warbler is listed as a CNF RFSS and as DRM Sensitive.

Species Description

The Conservation Assessment for Black-throated Blue Warbler (*Dendroica caerulescens*) (Burdett & Niemi 2003) includes the following species description:

> Although both sexes weigh about 10 g and share a relatively stocky, short-necked appearance, the male and female of this species bear little resemblance to each other. In fact, in the early- and mid-19th century the male and female Black-throated Blue Warbler were believed to be separate species with the female mistakenly classified as the Pine Swamp Warbler (Audubon 1841). The species does not molt into a vastly different fall plumage so year-round identification is simplified. The male is a distinctive dark rich blue above with black on the throat, sides of the head, and sides of the breast. Some feathers on the dark blue back show central black spotting. The underside of the male is snowy white (including axillars and underwing coverts) with an occasional slight buff or yellow on the flanks. Remiges and rectices are black with subterminal white spots on the outer rectices. The primary and secondary coverts are black. There is a distinctive white spot at the base of the primaries that extends 9-14 mm beyond the greater primary coverts (Holmes 1994). Younger males can be distinguished from after second year males by the dull primary coverts, olive green margins on most feathers but particularly the alula coverts, ashy gray edgings to the various black regions, brown tint to primaries and secondaries, and bluish-gray or bluish-olive edging to remiges (particularly secondaries and tertials) in younger males (Holmes 1994, Graves 1997a).
>
> The female Black-throated Blue Warbler lacks the distinctive blue, black, and white coloration of the male. The female is olive green above with a buffy to yellowish underside that becomes increasingly olive on the sides and flank. The tail is darker and slightly grayer than the back. A distinctive whitish yellow supercillium occurs over the eye. This streak continues into slight dark shading on the auriculars. The lower half of the eye ring is white. Similar to the male, the female has a white spot at the base of the primaries however it extends only 4-8 mm beyond the greater primary coverts (Holmes 1994). Wing linings show a white tint. As females age the loss of feather edges makes the dorsal surface take on a more olive and less green hue, and the ventral surface becomes increasingly white and less yellow.
>
> The southern subspecies *D. c. cairnsi* tends to be darker on the dorsal side of both males and females (Holmes 1994). The dorsal blue on the back and crown of the male are often marked with black patches. The female *D. c. cairnsi* is also a darker olive above and on the flanks and has less yellow underside. Juveniles of both sexes and subspecies are olive brown above with dark brown or black retrices and remiges. The retrices and remiges of juvenile females tend to be browner with green edgings than the black with blue edgings these areas display on juvenile males. On all juveniles the ventral surface is a lighter olive than the dorsal region (Holmes 1994).
>
> The vocalizations of this species are not as extensively studied as those of other warblers. Holmes (1994) provides an excellent summary of the vocalizations of *D. caerulescens*.
>
> Despite scattered documentations of female singing, almost all singing is performed by males. Singing occurs almost exclusively during the breeding season from early May through early August. At least three distinct songs have been recognized in this warbler. The first is the most commonly heard song, typically referred to as a buzzy *zee-zee-zee-*

zreeeee. The final note in this song is most often slurred upwards (Holmes 1994). Bent (1953) notes from 41 recorded samples that 54% end in an upward slur, 34% are unslurred, and 12% are slurred downward. This standard Black-throated Blue Warbler song is typically sung 5-6 times per minute. In Massachusetts, the average interval between renditions of the most common song was 17.4 seconds (Nice 1930). The second song is also fairly common and contains two notes, often referred to as *zree-zhrurrrr*. The second note most often slurs upwards (Holmes 1994). Nice considers this two-note song to be the most rare Black-throated Blue Warbler song (Nice 1930). The third song is similar to the standard song but each of 3-5 notes is delivered more slowly and slur upwards. This song is typically rendered as *zhrurrrr... zhrurrrr... zhrurrrr*. Holmes (1994) states that the second and third songs are commonly given between two counter-singing males and may have some unknown role in communication between rival males. Males also utter a fast staccato of trilled notes during aggressive encounters between other males (Holmes 1994).

The only call documented in the Black-throated Blue Warbler is a flat sounding note rendered as *ctuk*. Although emitted by both sexes, it is most commonly given by the female, particularly during the breeding season. Females are also known to emit a fast, high-pitched twitter when attempting to distract a potential predator near the nest (Holmes 1994).

Species Habitat

The black-throated blue warbler is a bird of the forest interior that generally inhabits large tracts of northern hardwood, maple-basswood, and mixed deciduous-coniferous forests (Holmes, 1994). Breeding habitat characteristics include continuous tracts of deciduous and mixed forest, with a dense shrub understory, remote from openings of edges (Curson et al. 1994). Black-throated blue warblers have been identified as sensitive to forest area size (NRRI 1992). Finch (1991) classified this species as area sensitive and suggested minimum area of suitable habitat fore breeding at 100 ha. However, his study was for populations in the eastern United States in an urbanized and agricultural-dominated landscape. The sensitivity of the species to patch size in a forest dominated landscape is unknown (NRRI 1992). These forests are generally dominated by maples, birch, aspen, and other northern hardwoods, with varying amounts of coniferous species. A study in northeastern Minnesota found that in northern hardwood areas with few shrubs, black-throated blue warblers are primarily associated with small gaps (0.05-0.10 ha) in the canopy that have resulted from blowdowns (Hanowski 1998). Several studies indicate that forest interior species such as the black-throated blue warbler have likely experienced historic population declines due to extensive deforestation during settlement of forested areas. However, recently some forest species have experienced modest population increases due to cleared areas reverting to forest (Holmes, 1994).

Species Distribution and Occurrences within the Study Area

Black-throated blue warblers are distributed between the western Great Lakes, Nova Scotia, and northern New England. This range also extends south from Pennsylvania along the Appalachian Mountains as far south as northern Georgia. Black-throated blue warblers winter on many Caribbean Islands as well as portions of Central America (Burdett & Niemi, 2003).

Black-throated blue warblers are at the western periphery of their range in the CNF and LLR. The population is known to be less abundant at the edges of its range, although it is known to be locally common along Minnesota's North Shore (Burdett & Niemi, 2003).

Risk Factors

Risk factors include short rotation cycles, decreasing forest age, and forest fragmentation.

*4.2.1.11 Bay-breasted Warbler (*Dendroica castanea*)*

The bay-breasted warbler is listed as a CNF RFSS and as DRM Sensitive.

Species Description

The Conservation Assessment for Bay-breasted Warbler (*Dendroica castanea*) (Mayasich & Niemi, 2002) includes the following species description:

> The Bay-breasted Warbler is a neotropical migrant that inhabits boreal coniferous forests in a broad band, primarily, across central and eastern Canada. It breeds in northern spruce forests, feeding and nesting in the dense foliage of these conifers (Williams 1996). It winters in Panama and northern South America (Eisenmann 1957, Morton 1980).
>
> Males and females are fairly large relative to other members of the genus Dendroica, being 13 to 14 cm long and weighing about 13 g (Williams 1996). Wing chord measurements from preserved specimens were reported to average 7 cm (Greenberg 1984). The first nuptial plumage is acquired by a prenuptial molt that occurs before the birds migrate north (Bent 1953). This molt affects most of the body plumage and wing coverts to produce a deep chestnut crown, paler throat and lateral stripes, black sides of the head and forehead, olive-gray back streaked with black, rich buff patches on the sides of the neck, and black wing coverts that are plumbeous-edged and white-tipped (Dwight 1900). Adults have a complete postnuptial molt, mainly in July. The adult male has distinctive alternate (breeding) plumage with a black face, chestnut crown, throat and sides, cream-colored neck patch and belly, and two prominent white wing-bars. Breeding adult females are duller in coloration than the males. They lack the black face markings and the chestnut crown and throat, but retain the distinctive white wing-bars of the male (Williams, 1996).
>
> The Bay-breasted Warbler in basic (non breeding) plumage is most easily confused with the basic-plumaged Blackpoll Warbler; both having dull olive upper parts with streaking, slightly yellowish under parts, and white wing-bars. However, Bay-breasted Warblers usually have some trace of chestnut wash on the sides, less streaking on the above parts and unstreaked under parts (Bent 1953, Williams 1996). It can also be confused with the basic-plumaged Pine Warbler, which lacks the streaked back of the Bay-breasted Warbler but possesses white (vs. cream-colored) under-tail coverts (Williams 1996). The Bay-breasted Warbler is also distinguishable from the Blackpoll and Pine Warblers by the dark or black coloration of its legs and feet, and dark undersides of its toes (Kaufman 1990, Curson et al. 1994).
>
> The Bay-breasted Warbler produces low-volume songs composed of very high, thin, squeaking notes that are quite uniform in pitch (Williams 1996). The song is similar to that of the Blackburnian, Black-poll, Black and White, and Cape May Warblers but is generally louder (G.W. Thayer to Dr. Chapman in Bent 1953: page 386). The song is delivered (with frequency) throughout the day and the female's singing from the nest, in response to the male, is markedly weaker than the males, being barely distinguishable from that of the Blackburnian (P. Phillip and B. Bowdish in Bent 1953, page 386). Songs are typically comprised of five to ten high-pitched, lisping notes rendered as see-atzee-

> atzee-atzee-atzee or seetzy-seetzy, seetzy, seetzy-see (Griscom and Sprunt 1957), uttered in such a rapid succession that a continuous sound is produced. Vocalizations are typically two-noted syllables with one note shorter than the other; however, a less typical single-noted syllable with each one of nearly equal length is also possible (Borror Laboratory of Bioacoustics in Williams 1996, Fig. 2 page 7). Two song types are recognized. Accented and unaccented (Ficken and Ficken 1962) or first and second category (Spector 1992). The accented, or first category, song has an accented ending and it predominates early in the breeding season during male-female communication.

Species Habitat

The bay-breasted warbler is a regular breeding resident only in the northern portions of Cook, Lake, and Saint Louis counties in Minnesota (Janssen, 1987). It breeds in mid-age to mature spruce fir forests where cool, dense coniferous growth is interrupted by small openings such as bogs or clearings (Morse, 1989). Preferred nesting trees include balsam fir and spruces, mixed with tamaracks, white pines, birches, or aspens. Nests are usually saddled on a horizontal limb at medium heights (averaging about 20 feet off the ground) and usually in conifers (DeGraaf et al., 1991). The species breeds throughout the spruce-fir forest of Canada and the northernmost parts of the U.S. following the range of spruce budworm (Janssen, 1987). The forests surrounding the routes are predominantly spruce-fir types, so abundant potential habitat for this species exists in the vicinity of the Study Area, though the routes may be south of this species' range.

Species Distribution and Occurrences within the Study Area

The bay-breasted warbler's North American range is closely correlated with spruce and balsam fir boreal forests extending from southwestern Northwest Territories and eastern British Columbia, to the northern Great Lakes, New England, and Nova Scotia (Mayasich & Niemi, 2002). Specifically, this species has been known to occur in spruce stands that have been infected by a spruce budworm outbreak (Morse, 1989). Bay-breasted warblers winter in Central America and northern South America. Breeding populations are known to exist in extreme northeast Minnesota, although this population is along the southern edge of its distribution (Janssen, 1987).

Due to the patchy and isolated distribution of appropriate conifer habitats on the CNF and LLR, these stands do not support spruce budworm outbreaks, limiting the occurrences on the CNF and LLR. There are 23 historic and current records of bay-breasted warblers and two known territories within the Study Area on the CNF and LLR.

Risk Factors

Risk factors include the loss of breeding habitat due to short-cycle harvesting, conversion of mixed stands to monotypic plantations and pesticide control of spruce budworms (Mayasich & Niemi, 2002).

*4.2.1.12 Spruce Grouse (*Falcipennis canadensis*)*

The spruce grouse is listed as a CNF RFSS and as DRM Sensitive.

Species Description

The Conservation Assessment for Spruce Grouse (*Falcipennis canadensis*) (Gregg et al., 2002) contains the following species description:

> Spruce grouse are medium-sized, stocky, dark-colored residents of northern conifer forests. The sexes are dimorphic with the male being larger and having a black throat and breast, a red comb over the eye and a black tail with a broad rufous terminal band.

> Females also have black tails with brown terminal bands but are paler than males and have a gray-brown or reddish-brown plumage with considerable amounts of white barring on the under-parts.
>
> In the Great Lakes region, the spruce grouse could be confused only with the ruffed grouse, a species of similar size, which can also share the same habitats. The two species can readily be distinguished at close range by tail color (pale with sub-terminal dark band in ruffed grouse but dark with a lighter terminal band in spruce grouse) and by the presence of a crest. Ruffed grouse erect their crown feathers to form a crest when alarmed while spruce grouse do not.

Species Habitat

Spruce grouse are a species of coniferous forests including spruce, pine, and fir. Nesting and foraging habitat consists of conifer dominated habitats. The adult spruce grouse prefer to eat the needles of black spruce and white spruce trees. They also feed on jack pine and tamarack. During summer they eat blueberries and snowberries; they eat invertebrates such as caterpillars and grasshoppers during the nesting season (Tekiela, 1998). Young of the year feed primarily on insects during the summer. In Minnesota, spruce grouse live in the birch and evergreen (coniferous) forests of extreme northern Minnesota, generally the northern portions of Beltrami, Cook, Lake, St. Louis, Hubbard, Itasca, Koochiching, and Lake of the Woods counties (Janssen, 1987).

Species Distribution and Occurrences within the Study Area

The spruce grouse is a bird of North American short-needled conifer forests. Its range includes most of Alaska and continental Canada, south of the treeline. It extends south into the northern Rockies, northern Minnesota, Michigan's Upper Peninsula, and northern New England. In Minnesota, the spruce grouse is widely distributed across the extreme northern counties (Gregg et al., 2002). The spruce grouse is a non-migratory species. CNF and DRM historic and recent records show one record on USFS lands and none occur within the Study Area.

Risk Factors

Risk factors include alteration of forest type, deforestation and predation (Gregg et al., 2002).

4.2.1.13 Sandhill Crane (Grus canadensis)

The sandhill crane is listed as DRM Threatened.

Species Description

The NatureServe Online Encyclopedia of Life (NatureServe, 2009) includes the following species description:

> A tall, long-necked, long-legged bird with a clump of feathers that droops over the rump; flies with neck and legs fully extended; adults are gray overall (may have brownish-red staining resulting from preening with muddy bill), with a whitish chin, cheek, and upper throat, and dull red skin on the crown and lores (lacking in immatures); immatures have a pale to tawny, feathered head and neck, and a gray body with brownish-red mottling; average length around 104 cm, wingspan 185 cm (NGS 1983).

Species Habitat

Sandhill cranes are primarily birds of open fresh water wetlands, but the different subspecies utilize habitats that range from bogs, sedge meadows, and fens to open grasslands, pine savannas, and

cultivated lands. Sandhill cranes occur at their highest breeding density in habitats that contain open sedge meadows in wetlands that are adjacent to short vegetation in uplands (International Crane Foundation, 2009). The sandhill crane is omnivorous and feeds on a variety of grains, seeds, some insects, other invertebrates, and small vertebrates found in marsh and meadow habitats listed above. Breeding takes place in marshes where a nest platform is built by mounding up vegetation (Johnsgard, 1983). The sandhill crane is best represented in the north-western and north-central regions of the state during the breeding season (Janssen, 1987).

Species Distribution and Occurrences within the Study Area

Sandhill cranes are widely distributed across North America with breeding habitat covering most of continental Canada, west of Hudson Bay into Alaska. Its breeding range extends south from Hudson Bay into northern Minnesota, northern Wisconsin, and Michigan. Breeding populations are also found along the central Rocky Mountains. Wintering areas are along the southwestern Gulf Coast (Natureserve 2009).

This species is not tracked by the CNF or DRM and no documentation is available for sandhill cranes on forest lands.

Risk Factors

Risk factors to sandhill cranes include wetland degradation and loss, power line collisions, predation and increased human activities near breeding areas (NatureServe, 2009).

4.2.1.14 Bald Eagle (Haliaeetus leucocephalus)

The bald eagle is listed as a CNF RFSS and Management Indicator Species (MIS), as well as DRM Threatened.

Species Description

The Special animal abstract for *Haliaeetus leucocephalus* (bald eagle) (Gehring 2006), includes the following species description:

> Adults differ from other eagles in having both a white head and white tail (head of white-tailed eagle may look white at a distance). Bald eagle has a proportionately larger head and bill than does the golden eagle, in the immatures of which the white is confined to the base of the primaries and the base of the tail. Bald eagle lacks the long wedge-shaped tail of Steller's sea-eagle. Bald eagle's neck is shorter and tail is longer than in white-tailed eagle. Bald eagle eyes, beak, and feet are bright yellow. Until bald eagles are approximately four to six years old they show variable white head and tail plumage ranging from completely dark brown to completely white (Sibley, 2000). Like most raptors, females are larger than males. The most similar species that occasionally occurs in Michigan is the golden eagle (*Aquila chrysaetos*). This species is larger than the bald eagle and remains dark brown throughout its life. Golden eagles have distinctive white plumage on the base of their tails and on the base of their flight feathers. Juvenile bald eagles may have white on the base of their flight feathers but they also have white on their wing linings or coverts (Wheeler and Clark 1995).

Species Habitat

Bald eagles' characteristic breeding habitat includes super-canopy trees such as red and white pine near lakes and rivers that support an abundant supply of fish (Mathisen 1983). While most nest sites are

located in areas with minimal human activity, some eagles have adapted to human presence and nest in close proximity to human dwellings and other features such as railroads, highways, and boat landings.

Species Distribution and Occurrences within the Study Area

The bald eagle is widely distributed across North America, found from Alaska to Florida, south of the treeline. Bald eagles are not generally found in the northern Great Plains region, the Appalachian region, or the high deserts of Nevada. Individuals breeding in Canada and the northern United States tend to migrate into the southern regions of the bald eagle's distribution during the winter months (NatureServe, 2009). In Minnesota, bald eagles are mostly found in the forested northern counties, but their range has been expanding into the southwest region of the state as this species continues to rebound from low population levels in the 1970's (DNR, 2009).

Within the CNF and LLR, bald eagles breed in high densities, along rivers, lakes and wetland complexes. There are numerous breeding pairs known on the CNF and LLR.

Risk Factors

Risk factors include lead poisonings, power line collisions, vehicle collisions, increased human activity near nesting areas, and the loss of large diameter pines near open water which are used for nesting (DNR, 2009).

4.2.1.15 Connecticut Warbler (Oporornis agilis)

The Connecticut warbler is listed as a CNF RFSS and as DRM Sensitive.

Species Description

The Conservation Assessment for Connecticut Warbler (*Oporornis agilis*) (Kudell-Ekstrom 2002) includes the following species description:

> The Connecticut warbler is 13-15 cm in length (Pitocchelli et al. 1997) and weighs about 13 (Humberto Elizondo 2000) to 15 grams (Pitocchelli J. et. al. 1997). Measurements of the adult male are wing, 68.8-73.5 (71.2) mm (Godfrey 1986); tail 47.5-52.5 (49.5) mm; exposed culmen 11.7-12.9 (12.2) mm; tarsus 20.0-22.5 (21.3) mm. The adult female wing is 67.5-71.8 (69.3) mm (Godfrey 1986). Jahn et al (1999) reported measurements that were slightly different than those above, it was not specified if the measurements were for a male or female but it was described as a first winter Connecticut warbler. These measurements are tail 43 mm, wing-tail 22 mm, bill length 11.95 mm, tarsus 19.65 mm, and body mass 12.5 grams.
>
> The plumage is predominately olive to olive brown above, yellow to yellowish white below, with a gray or brownish hood extending to the lower throat, and a complete, whitish eye-ring in all plumages and all ages (the exception is the juvenile nestling (Walkinshaw and Dryer 1961). The sexes are similar throughout the year, but females are duller than males and immatures are duller and with browner heads and paler throats than adults. Both sexes have pink legs (Bernstein 2000). The female plumage is so similar to that of the Mourning warbler (in which adults also have an eye ring) that even specimens have been misidentified (Binford 199, Walkinshaw and Dryer 1961). Connecticut warblers can usually be separated from Mourning warbler (*O. philadelphia*) by wing-tail value equal to 19mm or more (Olaf et al., 1999), especially in the fall. Females and immatures of *O. philadelphia*, *O. tolmiei* (MacGillivray's warbler), and *O. agilis* are easily confused without careful measuring of both wing and tail (Hicks, 1967), but the Connecticut warblers can most often be distinguished by its larger size and its

complete eye-ring which is not broken or lacking (Pitocchelli et al., 1997). Adult male Connecticut warblers lack the black feathering found on the upper breast of adult male Mourning warbler and MacGillivray's warblers (Pitocchelli et. al. 1997). Immature Connecticut warblers have a buffy colored throat and have underparts that are duller yellow compared to Mourning and MacGillivray's warblers (Pyle and Henderson 1990). The Nashville and Connecticut warbler could be confused, however the white-eye ring of the Nashville warbler is connected by a white line to the base of the bill (Nearactica.com Inc. 2001).

In juvenile plumage upperparts and head olive brown; eye-ring buffy, not white. Olive brown breast, flanks merge with buffy yellow belly (Pitocchelli et al. 1997). There are other plumages (Basic I plumage, Alternate I plumage, Definitive Basic plumage, Definitive Alternate plumage) listed in Pitocchelli et al. 1997).

Species Habitat

The Connecticut warbler is an uncommon, elusive, neotropical migrant. The species forages for invertebrates and builds nests on the ground under low, dense shrubs (Jaakko Poyry Consulting, 1992). Their habit of remaining concealed within dense foliage makes them difficult to detect (McPeek and Adams, 1994). The species breeds in a variety of habitats, ranging from wet coniferous bogs to well-drained deciduous woodlands (Curson et al., 1994). However, this warbler is most abundant in mature, lowland coniferous habitats and is uncommon to rare in other types of coniferous vegetation (NRRI, 1992). The variety of habitat types utilized by this species makes it difficult to determine any strong habitat affinities. This habitat plasticity also suggests that the species is not limited by habitat availability in natural conditions on the forest, but human alteration of the landscape is probably an important factor. In general, preferred habitats appear to be relatively open, with only moderate understory and ground cover. This describes much of the forested areas surrounding the Study Area. Thus, there is suitable habitat in the immediate vicinity of the Study Area.

Species Distribution and Occurrences within the Study Area

The breeding range of the Connecticut warbler is restricted to a narrow band which extends between central Alberta, central Saskatchewan, south central Manitoba and Lake Winnipeg, southern Ontario and east central Quebec. It also extends into northeastern Minnesota, northern Wisconsin and the Upper Peninsula of Michigan (Kudell-Ekstrom, 2002). The Connecticut warbler winters in north central South America (NatureServe, 2009).

In Minnesota, the Connecticut warbler is known as a local resident in the northeastern counties in areas of appropriate habitat (Janssen, 1987). It is known to occur within spruce and tamarack bogs on the CNF and LLR.

Risk Factors

Risk factors to Connecticut Warblers include forest fragmentation, brown-headed cowbird parasitism and peat mining (Kudell-Ekstrom, 2002)

4.2.1.16 Black-backed Woodpecker (Picoides arcticus)

The black-backed woodpecker is listed as a CNF RFSS and as DRM Threatened.

Species Description

The Conservation Assessment for Black-backed Woodpecker (*Picoides arcticus*) (Corace et al. 2001) includes the following species description:

The Black-backed Woodpecker is a medium-sized bird. Adults are approximately 23 cm in total length, with a body mass of 61-88 g and wing length of 12.3-13.4 cm; males are typically 6-7% larger than females. Adults have solid black upperparts, white underparts and are heavily barred with black on sides and flanks. Primaries are black and white (barred), outer rectrices white, and the face has a white stripe below the eye from bill to nape. The male has a prominent yellow patch on the center of the crown; the female does not. Plumage is similar throughout the year. Juvenile Black-backed Woodpeckers are similar to the adults in appearance, except that they are duller overall, have a dull black crown (yellow patch very faint or absent), and their underparts are dull buff (Dixon and Saab 2000).

Black-backed Woodpeckers can be confused with the closely related Three-toed Woodpecker (*Picoides tridactylus*), which has similar plumage patterns and distribution. The Black-backed Woodpecker is slightly larger, has darker upper parts (solid black head and back) and a narrow white streak behind the eye. The Three-toed Woodpecker also has a white streak behind the eye, but has more white markings on its back (except for the *P. t. bacatus* subspecies) and a narrower white stripe underneath the eye. The Black-backed Woodpecker's rectrix 4 is primarily to entirely white, while the Three-toed Woodpecker’s rectix 4 is usually barred with black (Dixon and Saab 2000). In addition, the male Black-backed Woodpecker has a smaller and more solid yellow crown patch than the male Three-toed Woodpecker, and the Black-backed Woodpecker female has a solid black forehead and crown compared to the paler, streaked forehead and crown of the female Three-toed Woodpecker (Pyle 1997). The primary features that distinguish these two species from all other woodpeckers are the presence of three toes instead of four and a yellow crown patch (males) instead of red (Dixon and Saab 2000).

The Black-backed Woodpecker is well camouflaged with sooty black dorsal plumage that blends easily against the charred bark of trees. Therefore difficult to spot in some instances, the loud foraging taps, calls and drumming patterns of this species makes detection relatively simple (Dixon and Saab 2000). Although an approachable bird, the Black-backed Woodpecker is apt to challenge intruders with its Scream-Rattle-Snarl Call, one of the most distinctive, complex calls of *Picoides* woodpeckers (Dixon and Saab 2000). When trying to distinguish Black-backed Woodpeckers from Three-toed Woodpeckers by sound, it helps to know the former has a lower-pitched, shorter and more metallic call note. The tempo of the drumming also varies between the two species: the Black-backed Woodpecker has faster bursts with more beats, and are typically longer in duration than its close relative (Short 1974).

Black-backed Woodpeckers are more vocal than Three-toed Woodpeckers (Dixon and Saab 2000). Call notes are given year round, by both sexes. Most vocalizations begin 0.5 hours after sunrise, peaking about 1-2 hours later. Responsiveness tends to increase prior to sunset, but not to the level reached during the morning hours (Goggans et al. 1988). However, vocalization rates can be quite variable. Rattle calls are often given during flight while other calls are generally given from perch (Dixon and Saab 2000).

Species Habitat

The Conservation Assessment for Black-backed Woodpecker (*Picoides arcticus*) (Corace et al., 2001) includes the following habitat description:

The Black-backed Woodpecker requires large-scale forest disturbances, specifically fire regulated landscapes. Studies documenting this have been undertaken in Montana, Michigan, Minnesota (particularly the Boundary Waters Canoe Area), the Northern Rockies, Alaska and Alberta (Blackford 1955, Mayfield 1958, Heinselman 1973, Apfelbaum and Haney 1981, Hutto 1995, Caton 1996, Murphy and Lehnhausen 1998, Hoyt 2000).

Black-backed Woodpeckers inhabit boreal and montane coniferous forests, though conifer composition varies depending on geographic location (Dixon and Saab 2000). According to Short (1982), the following species are important components of sites inhabited by birds: spruce (*Picea* spp.); tamarack (*Larix laricina*); northern pines (*Pinus* spp.); red fir (*Abies magnifica*); mountain hemlock (*Tsuga mertensiana*); Douglas fir (*Pseudotsuga menziesii*); ponderosa pine (*Pinus ponderosa*); and lodgepole pine (*P. contorta*).

In Michigan, Black-backed Woodpeckers are found in open and closed black spruce and tamarack bogs, mixed forests with eastern hemlock (*Tsuga canadensis*), northern white cedar (*Thuja occidentalis*) swamps, jack pine plains, and coniferous clearcuts (Evers 1991). Baetson (2000) observed birds in Michigan nesting in jack pine forests, upland mixed forested condition consisting of hemlock, pine and spruces, as well as mixed swamp conifer forests with black spruce, tamarack and balsam firs (*Abies balsamifera*).

In Minnesota, birds are more common in trees destroyed by fire 1-2 year postfire than in mature forests (Heinselman 1973). During the 2-4 year period following a fire, birds were found by Niemi (1978) to increase in abundance, but were rare in non-burned areas surrounding the burned forest. A bird population study focusing on populations before and after wildfire in Great Lakes jack pine and black spruce forest revealed that the Black-backed Woodpecker, which was not present before a wildfire in a given local, established territories within the first year after a fire.

Kilham (1966) reports suitable Black-backed Woodpecker habitat in New Hampshire as logged, burned, swampy or spruce budworm infested areas with copious dead tress. Vermont, according to Oatman (1985) supports Black-backed Woodpecker's in black-spruce forests, while in New York, balsam fir (*Abies balsamea*) and spruce forests are favored (Peterson 1988).

Even though the Black-backed Woodpecker is primarily sedentary and does not migrate, winter irruptions occur whereby Black-backed Woodpeckers can be found in urban habitats that hardly resemble their resident, boreal forest habitat. Yunick (1985) reports that Black-backed Woodpeckers irrupting into the northeast United States during the 1950s and 1960s would frequent urban areas overcome with Dutch Elm disease.

Species Distribution and Occurrences within the Study Area

Black-backed woodpeckers are considered permanent residents of conifer forests across North America. Breeding populations extend between eastern British Columbia, central Oregon and Idaho, western Montana, southern Ontario, northern Minnesota and Wisconsin, Michigan, southern Quebec and New England (Corace et al., 2001).

In Minnesota, black-backed woodpeckers are along their southern edge, known to occur in the north central and northeastern counties, although populations may increase during winter months as migrants

move into areas of appropriate habitat from the north (Janssen, 1987). The black-backed woodpecker has been documented within the CNF and LLR.

Risk Factors

Risk factors include fire suppression, and post fire salvage of effected timber (Corace et al. 2001).

4.2.1.17 Wilson's Phalarope (Phalaropus tricolor)

The Wilson's phalarope is listed as DNR Threatened, as a CNF RFSS and as DRM Sensitive.

Species Description

The DNR Rare Species Guide: Wilson's phalarope (DNR, 2009) includes the following species description:

> Wilson's phalaropes are a relatively small, long-legged shorebird. They are unique among Minnesota birds in that they are one of only a few species in which the female is much more brightly colored than the male. Wilson's phalaropes can be distinguished from most other shorebirds by the bright coloration on their neck and head. Additionally, unlike other shorebirds, Wilson's phalaropes often feed while floating on the water, sometimes spinning like tops to stir up aquatic invertebrates. The relatively long, thin bill, and bold blackish stripe on the neck and face distinguish the Wilson's phalarope from the red-necked phalarope (*Phalaropus lobatus*), which is a migrant in Minnesota.

Species Habitat

Wilson's phalaropes prefer shallow freshwater marshes in prairie and other open country. It has been known to nest on the ground in wet meadows, sedge meadows, river floodplains, near pasture and croplands, grassy marshes, and along edges of shallow inland waters. Nest site selection varies seasonally, as it nests in upland vegetation early in the breeding season and wet-meadows later in the season (Colwell and Oring 1990). The Wilson's phalarope is a very local summer resident mainly in the northwestern and central regions during the breeding season (Janssen, 1987).

Species Distribution and Occurrences within the Study Area

The Wilson's phalarope breeding distribution includes the northwest United States and southwestern Canada. It also extends into the western Great Lakes region as well as Alaska (DNR, 2009) with limited observations occurring in New England. Wintering grounds are located along the west coast and southern South America (NatureServe, 2009).

In Minnesota, breeding populations are found in the western and central counties (Janssen, 1987). The CNF is on the eastern edge of Wilson's phalarope distribution.

Risk Factors

Risk factors for the Wilson's phalarope include habitat loss and poor habitat (lack of fire and/or grazing), wetland drainage, cowbird parasitism sand high selenium levels in lakes. Fatalities due to collision with a transmission line have been documented. The line was constructed over a wetland that was intermittently flooded. (Dechant et. al. 2003)

4.2.1.18 King Rail (Rallus elegans)

The king rail is listed as DNR Endangered and as DRM Endangered.

Species Description

The Conservation Assessment for King Rail (*Rallus elegans*) (USDA Forest Service, 2003b) includes the following species description:

> A large rusty rail with a slender bill, longer than its head and slightly decurved. Laterally compressed body and long toes. Males indistinguishable from females in plumage coloration, but slightly larger in size. Upper parts olive brown, breast rufescent, flanks barred with black and white; tail short and often uplifted. Species differs from northern Clapper Rail (*R.l. crepitans*) by being rusty-brownish above instead of grayish; also slightly larger than Clapper (38-48 cm vs. 35-40 cm). Weighs about 340 g (male) and 305-364 g (female). Some southern and western forms of Clapper are warm brown or even rusty-brown in general tone, but still differ from King in duller brown wing-coverts (where King is rich chestnut), grayer face, slightly less distinct barring on flanks. The possibility of hybrids is a further complication in brackish marshes where breeding ranges of King and Clapper rails meet (Meanley 1992).

Species Habitat

The Conservation Assessment for King Rail (*Rallus elegans*) (USDA Forest Service, 2003b) includes the following habitat description:

> King rails utilize marshes, wetlands, and river floodplains where abundant emergent vegetation provides nesting and foraging habitat. They breed in marshes in eastern North America. The presence of tussocks or clumps of vegetation in a rail territory is a key determinant of nest site selection (Evers, 1984; Rabe, 1986). Nest sites are usually in shallow water with depths of less than 10 inches (Meanley, 1969). The nest is a raised platform built with marsh vegetation and covered by a canopy. The king rail is considered a casual species and its population status is generally unknown (Janssen, 1987).

Species Distribution and Occurrences within the Study Area

King rails are known to locally occur in a widespread area of the southeastern United States. Their distribution occurs between southeastern North Dakota, the Great Lakes region, eastern Oklahoma, Alabama and along the Atlantic seaboard as far north as New York. King rails are not found along the Appalachian mountain range (NatureServe, 2009). King Rails winter in the southeast states as well as central Mexico (DNR, 2009).

In Minnesota, king rail distribution is extremely restricted as the state is on the northern edge of its range. Additionally, only a handful of records from southern Minnesota have been made in recent decades (DNR, 2009). It is not tracked on the CNF or the LLR and likely does not exist within their boundaries.

Risk Factors

Risk factors to king rails include impoundment or drainage of wetland habitats, nocturnal collisions with illuminated structures, and vehicle collisions.

4.2.1.19 Caspian Tern (Sterna caspia)

The Caspian tern is listed as CNF RFSS and DRM Threatened.

Species Description

The Conservation Assessment for Caspian Tern (*Sterna caspia*) (Kudell-Ekstrom, 2001) includes the following species description:

> The Caspian tern is the largest tern in the world (Evers 1997). Adults vary from 19 to 23 inches (48 to 58 cm) in length and have a 30 to 55 inch (127 to 140 cm) wingspan (Evers 1997). Caspian terns are barrel-chested terns with a long thick reddish bill (Gough et al. 1998). The rear of the head shows a hint of a crest. The underwings are pale with dark patches in the primaries. The tail is short and is notched. The sexes are similar. As other terns, the Caspian tern dives into the water for prey (Gough et al. 1998). When in adult alternate plumage, Caspian terns have a deep red bill, often with an indistinct black ring at the tip, black legs, white face, neck, breast, and belly. A black cap has a very slightly crested appearance. The upperwings and back are a pale gray. The underwings are pale with dusky gray on the outer 5-6 primaries. The tail is white. Caspain terns reach full adult plumage in three years (Gough et al. 1998).The adult basic is similar to the adult alternate but has a black cap streaked with white and the primaries are darker and more worn (Gough et al. 1998). In juvenile plumage, Caspian terns have pale legs, a deep orange bill, a brownish cap streaked with white and a white face, neck, breast, and belly. The upperwing coverts and scapulars are marked by crisp black scallopings. The upperwing is pale and has darker outer primaries and secondaries. The tail is grayish (Gough et al. 1998). Immature plumage, first-year birds are like basic-plumaged adults but have darker uppersurfaces to the outer primaries, dark secondaries, a grayish tail, and a pale forehead. Second-year birds are almost identical to alternate-plumaged adults, but often have white spots in the cap, darker outer primaries, and some gray in the tail (Gough et al. 1998). The Royal and Elegant terns are the only other large, orange-billed terns, however the elegant tern is smaller, has slim wings, and has a slimmer orange bill. The Caspian can be distinguished from the Royal by its thicker, reddish bill, dark wedge on the outer portion of the underwing, and its tendency to have an almost complete cap in basic and immature plumages (Gough et al. 1998).

Species Habitat

The Conservation Assessment for Caspian Tern (*Sterna caspia*) (Kudell-Ekstrom, 2001) includes the following habitat description:

> Caspian terns prefer nesting on sandy islands with sparse vegetation (Evers 1992). The Caspian tern breeds in a wide variety of habitats, ranging from coastal estuarine, salt marsh, and barrier islands. Nests are found among driftwood and debris on low, flat, sandy or rocky islands, shell banks and beaches and on sandy, muddy, or pebbly shores with sparse vegetation (Cuthbert and Wires 1999). Breeding habitat is specific: open, fairly flat islands. On Pacific and Gulf Coasts, often nests on sparsely vegetated natural and dredge-material islands and salt dikes with the largest populations associated with artificial habitats (Gill and Mewaldt 1983, Quinn 1990, Stadlander et al. 1993, Rodgers et al. 1996 In Cuthbert and Wires 1999).
>
> In the Great Lakes, nests are on pristine habitat on open, pebble, gravel, or sandy beach islands, where the average temperature is 5-20 degrees Centigrade (Cuthbert 1981, Ludwig 1991 In Cuthbert and Wires 1999).

Species Distribution and Occurrences within the Study Area

Caspian terns are locally distributed throughout the continental United States with populations occurring along the Atlantic and Gulf Coasts between Florida and Virginia, throughout the Great Lakes region, between west central Minnesota and Lake Winnipeg, as well as along the west coast in California, Oregon, and Washington. Winter distribution is restricted to the Gulf Coast, the Atlantic coast of Florida, Georgia, and South Carolina and the southern Pacific coast in California (Kudell-Ekstrom, 2001)

The distribution of Caspian terns in Minnesota is mainly restricted to migratory populations. However, a nesting colony has become established on tribal lands in Leech Lake in the past three years (Mortensen and Ringle 2007).

Risk Factors

Risk factors to Caspian terns include limited nesting habitat, competition with other colonial waterbirds for nest space such as gulls and cormorants, human disturbance of colonies and PCB contamination (Kudell-Ekstrom, 2001).

*4.2.1.20 Great Gray Owl (*Strix nebulosa*)*

The great gray owl is listed as a CNF RFSS and as DRM Threatened.

Species Description

The DNR Rare Species Guide: Great Gray Owl (DNR, 2009b) includes the following species description:

> The great gray owl has a big, domelike head and a flat facial disc, its most conspicuous feature. North America's tallest owl species, the great gray stands about 27 inches and has a wingspan exceeding 4 feet. But this imposing owl is mostly feathers. It typically weighs just 2.4 pounds. Its thick, downy plumage is a vital adaptation for living in northern forests, where temperatures can drop to minus 40° F.

Species Habitat

Great gray owls utilize dense boreal forest conifers, stands of aspen, and other hardwoods within or adjacent to lowland tracts for nesting, and a variety of open habitats (meadows, fields) for foraging (NRRI, 2001). The NRRI suggest that this species is likely a permanent resident, but rare nesting species in Minnesota counties that have extensive coniferous vegetation such as black spruce and tamarack peatlands, extensive upland coniferous forests, and black ash wetlands. Suitable habitat consists of 30 to 300 acre expanses of dense, mature, and old-aged aspen and mixed conifer stands adjacent or within one to three km of open to park-like areas utilized for foraging (Nero, 1987). In winter these owls often move out of forested habitats to hunt in open fields with scattered trees, scrub patches, weedy areas, and fencerows. The great gray owl is a small mammal specialist, utilizing primarily microtine voles (meadow voles, red-backed voles). As a result, the species is prone to conspicuous large-scale movements when small mammal populations crash. The great gray owl initiates its courtship calling in February and March (depending upon latitude), and generally uses the abandoned nests of crows, ravens, and raptors for establishing new nest sites (NRRI, 2001).

Species Distribution and Occurrences within the Study Area

Great gray owls enjoy a wide, contiguous North American distribution which ranges between eastern Quebec, Ontario, northeast Minnesota, central Manitoba, British Columbia, the Northwest Territories, and Alaska. Their distribution also extends south into the United States along the northern Rockies and Cascades and into the northern Sierra Nevada (NatureServe, 2009). This population is largely non-

migratory, although its winter distribution is known to extend southward as the abundance of voles become scarce (Henderson, 2006).

The Minnesota population of great gray owls is on the southern edge of their distribution; therefore eruptive populations have been observed in association with the availability prey (Henderson, 2006). Breeding populations of great gray owls in Minnesota are generally restricted to the northeast corner of the state (Janssen, 2009). Great gray owls have been observed in the CNF and LLR on various occasions. At least two nesting territories have been located in the vicinity of Routes 1 and 2 (DRM, 2009).

Risk Factors

Risk factors to great gray owls include loss of mature forest habitat due to logging or clearcutting and vehicle collisions (NatureServe, 2009).

4.2.2 Mammalian Species

4.2.2.1 Mountain Lion (Felis concolor)

The mountain lion is listed as DNR Special Concern and as DRM Endangered.

Species Description

The DNR Species profile for the mountain lion (DNR, 2009) includes the following species description:

> Mountain lions are basically monotone in color, except for the black tip on their tail (Beier 1999) and on the back of their ears. They range in color from grayish-brown to reddish-brown (Currier 1983; Beier 1999). Their long tail is typically about 1/3 of their body length (Currier 1983) and is usually held close to the ground when walking (Beier 1999). Male mountain lions weigh an average of 62 kg (137 lbs.) and average 200 cm (6.6 ft.) from their nose to the tip of their tail, while females average 42 kg (93 lbs.) and 186 cm (6.0 ft.) from nose to tip of tail (Beier 1999). Young mountain lions have black spots and rings on their tails. There are no other animals that strongly resemble mountain lions in Minnesota, but their monotone color and long tail distinguish them from other animals, including lynx (Lynx canadensis), bobcat (Lynx rufus) and wolves (Canis lupus). Yellow Labrador retrievers are sometimes mistaken for mountain lions.
>
> Because mountain lions are elusive animals, tracks may be the only things many people see. Their tracks are similar to wolf (or large dog) tracks, but mountain lion tracks are more rounded in shape, and 7.6-8.9 cm (3.0-3.5 in.) wide and 7.6 cm (3.0 in.) long. Wolves on the other hand have more elongated prints that average 8.9 cm (3.5 in.) wide and 11.4 cm (4.5 in.) long. Mountain lion tracks don't usually have claw marks, but if present, they are narrower than canid claw marks. Canids do not always leave claw marks. Also, mountain lion toe pads are more tear shaped and small in relation to the size of the heal pad, while canids are more ovate and large in relation to the heal pad. Bobcat and lynx tracks are similar in shape to mountain lions tracks, but bobcat tracks are smaller, and lynx tracks, while similar in size, are less distinct due to the abundant hair on their feet.
>
> While the Minnesota DNR gets about 50 reports of mountain lion sightings each year, most of them turn out to be large house cats, yellow Labrador retrievers, or escaped or released pet mountain lions.

According to DRM, some of the mountain lions found in Minnesota are of wild origins, usually young males dispersing from other locations. A radio-collared male was tracked traveling from the Black Hills of

South Dakota to northwestern Minnesota a few years ago. More recently, a male mountain lion was hit and killed by a car on the south edge of Bemidji in September of 2009. This occurred within a mile or so of the proposed project routes. Initial examination of this animal did not indicate that it was a released pet, but final determination of its origin was not available at the time of this document's preparation.

Species Habitat

The DNR Species profile for the mountain lion (DNR, 2009) includes the following species habitat:

> Mountain lions are found in a wide variety of habitats, as long as there is a sufficient prey base. Habitats used included desert scrub, chaparral, swamps, and forests (Beier 1999). Mountain lions tend to avoid habitats that lack topography or vegetative cover, including agricultural areas and other flat shrubless areas (Beier 1999). If present in Minnesota, mountain lions are most likely inhabiting remote, heavily forested areas.

Species Distribution and Occurrences within the Study Area

Mountain lions are known to occur in North America across the western United States, southwestern Canada and most of Mexico. A population also persists in Florida. A dearth of research on this species in Minnesota makes scientific information limited. These available data suggest that Minnesota does not support a viable breeding population, although sufficient habitat and prey sources are likely present (DNR, 2009).

Three observations of mountain lions have been recorded within the Study Area (DNR, 2009).

Risk Factors

Due to their large home range and the widely dispersed nature of individuals, habitat fragmentation and habitat destruction threaten to further restrict their distribution.

4.2.2.2 Pine Marten (Martes americana)

The pine marten is listed as DRM Sensitive.

Species Description

The pine marten is a member of the weasel family characterized by its golden brown fur, yellow chest long body and round ears. It measures approximately 20 to 24 inches and can weigh up to two pounds. An omnivorous species, the pine marten relies heavily upon mice, chipmunks, and red squirrels, but they are also known to feed on berries and nuts during the summer months. This species is known to hunt in tunnels built under the snow during the winter months (DNR, 2009c).

Species Habitat

Pine martens typically prefer old-growth conifer and mixed forests containing an understory that supports small rodents, which are a major prey source (Snyder, 1991). In Minnesota, this species is known to frequent both coniferous and deciduous forest types with canopy cover ranging between 4 and 60 percent. They tend to avoid forests too dense to support the growth of understory vegetation which support rodents and give appropriate cover for denning (Snyder, 1991). Females typically make their nests in hollowed out logs and beneath bushes (DNR, 2009c).

Species Distribution and Occurrences within the Study Area

Pine martens are currently distributed widely across the Alaskan and Canadian boreal forests; populations reach into New England, northern Minnesota, northern Wisconsin, and Michigan's Upper Peninsula, as well as along the Rocky Mountain and Sierra Nevada Ranges (Natureserv 2009). In Minnesota, pine martens range widely across the northern portion of the state across deciduous and

coniferous landscapes. In recent years, this population has been expanding in number and in range to the south and east (DNR, 2009c).

Within the Study Area, specific observations of pine martens are unavailable, although appropriate habitat is likely present.

Risk Factors

Risk factors include overharvest, loss of forested habitat or fragmentation of forested habitat. The Minnesota population is currently of sufficient size and viability that a limited trapping season is held (DNR, 2009c). If this trapping season is not properly managed it could negatively affect pine marten populations. Additionally, pine martens tend to avoid large openings, especially during the winter months. They can be especially sensitive to conversion of forest to create or expand open habitats (Snyder, 1991).

4.2.2.3 Prairie Vole (Microtus ochrogaster)

The prairie vole is listed as DNR Special Concern and as DRM Sensitive.

Species Description

The following species description is included in the DNR Rare Species Guide (2009):

> The prairie vole is a medium-sized vole with a stocky, compact body (Jones and Birney 1988). It weighs 16.8-49.1 g (0.6-1.7 oz.) and has a total body length of 119-166 mm (4.7-6.5 in.) (Hazard 1982). The pelage is generally grayish-brown with black and brownish-yellow tipped longer hairs, which gives them a grizzled appearance (Mumford and Whitaker 1982; Jones and Birney 1988; Stalling 1999), although several color variations have been found (Stalling 1990, 1999). The sides of the body are somewhat paler than the back, the tail is distinctly bicolored (Stalling 1990, 1999), and the belly fur usually has a yellow cast. The prairie vole greatly resembles the meadow vole (*Microtus pennsylvanicus*), but meadow voles lack a grizzled appearance, and rarely have a yellow cast to the belly. Identification by skull characteristics is preferred.

Species Habitat

The following habitat description is included in the DNR Rare Species Guide (2009):

> Prairie voles, as the name implies, are a species which occur in grassy areas, particularly ones which have well-drained (dry) soil. In the Upper Midwest, prairie voles are mainly restricted to relatively undisturbed, dry grasslands (Hazard 1982), however, they have been found in other habitats (Oehlenschlager 1994). Suitable ground litter for runways seems to be an important habitat feature (Stalling 1999), although it may not be required (Oehlenschlager 1994).

Species Distribution and Occurrences within the Study Area

The prairie vole is distributed across the Upper Great Plains ranging between central Alberta, Saskatchewan and southern Manitoba, south through eastern Montana and the Dakotas to Oklahoma and east into the Ohio River Valley states of Indiana, Illinois Kentucky, Tennessee, and Ohio. The northern edge of its range extends into southern Michigan, southern Wisconsin and the southwest half of Minnesota (NatureServ 2009). In Minnesota, this species is known to have a patchy distribution but is generally found southwest of the deciduous/coniferous ecotone, although records are lacking from the south central portions of the state (DNR 2009).

The prairie vole is tracked by the DNR in its Natural Heritage Information System (NHIS) database; there are no observation records in the Study Area. The Study Area is on the northern fringe of this species range but appropriate habitat may be present. Additionally, the DNR cites that a more intensive survey of prairie voles needs to be conducted in Minnesota to develop a more precise understanding of this species distribution (DNR 2009).

Risk Factors

Risk factors include loss of grassland habitat to tilled agriculture practices and overgrazing and the general lack of large grassland habitats. Roads and trails built in appropriate habitat may also restrict movement. Frequent burning of grasslands may further restrict appropriate habitat, as this species frequently relies upon ground litter for cover, which would not build up when appropriate habitat is subjected to frequent fire treatments (NatureServ 2009).

4.2.2.4 Northern Myotis (Myotis septentrionalis)

The northern myotis is listed as DNR Special Concern and DRM Sensitive.

Species Description

The following species description for the northern myotis is included in the DNR Rare Species Guide (2009):

> The northern myotis is a medium-sized bat with relatively long ears, each with a long, sharply pointed tragus (fleshy projection in the ear). The pelage is dull brown on the back and pale grayish brown on the underside. The membranes are dark, and the calcar (bone or cartilage growth from the ankle that helps to support the tail membrane in flight) is slightly keeled. Adults typically measure 78-95 mm (3.1-3.7 in.), with a tail length of 32-34 mm (1.2-1.3 in.). Weights range from 5.0-6.4 g (0.18-0.23 oz.) (Hazard1982). The northern myotis can be distinguished from the little brown bat by its long ears, which, when folded forward, extend at least 3 mm (0.12 in.) beyond its nose. The ears of the little brown bat, on the other hand, are even with or only barely extend past the tip of the nose.

Species Habitat

The following habitat description is included in the DNR Rare Species Guide (2009):

> Northern myotis have been found in the winter in Minnesota in natural caves, sand mines, and deep iron mines. They seem to prefer cool, moist hibernating sites where the air is still (Fitch and Shump 1979). Farther south, northern myotis may also use attics, bridges, and buildings. In summer, the species is often associated with forested habitats, especially around wetlands. Summer roosts are believed to include separate day and night roosts. Day roosts may be under loose tree bark, in buildings, or behind signs or shutters, and night roosts may include caves, mines, and quarry tunnels (summarized in NatureServe 2008). The sexes tend to roost separately, with females forming small (30 individuals) maternity colonies in relatively warm sites to bear and rear their offspring.

Species Distribution and Occurrences within the Study Area

The northern myotis is generally distributed in the states and providences that border the Great Lakes but also extends into Iowa and Arkansas, the Ohio River Valley states, New England, Virginia, and North Carolina. The range extends northwest from Minnesota into portions of eastern North Dakota, central

Saskatchewan, and northern Alberta. In Minnesota, the northern myotis is known to have a patchy distribution in the eastern portions of the state where caves or mines are available for hibernation.

Within the Study Area, there are no NHIS observations of this species in the Study Area. Appropriate habitat may exist, although the general lack of caves and mines used for hibernation likely restricts the ability of this species to utilize the Study Area.

Risk Factors

This species is sensitive to disturbance of its hibernacula and tends to prefer mature forest types. Additionally, the white-nose syndrome poses the threat of local extinction. When subjected to human disturbance, hibernating bats can be subjected to direct mortality and undue stress. Careful management is necessary to protect hibernacula. Management of forest habitats to conserve mature trees may be beneficial to northern myotis (DNR, 2009).

4.2.2.5 Heather Vole (Phenacomys ungava)

The heather vole is listed as DNR Special Concern and as DRM Sensitive.

Species Description

The DNR Rare Species Guide includes the following species description for the heather vole (2009):

> The heather vole is a small, short tailed rodent with a total length of 135-155 mm (5.3-6.1 in.), and a weight of 30-45 g (1.1-1.6 oz.). The species resembles other voles (*Microtus* spp.) and bog lemmings (*Synamtomys* spp.). It has fur that is brown on the back, usually more yellowish or tan than other voles or lemmings, and white or gray underneath. Heather vole's feet are white or pale gray (McAllister and Hoffman 1988; George 1999). Their tail is bicolor and shorter than that of other vole species, but longer than that of bog lemmings. Heather voles are best distinguished from other species by their teeth. Unlike other species, the inner reentrant angles on the lower molars are much deeper than the outside angles (George 1999). Additionally, the upper incisors lack deep grooves that are present in bog lemmings.

Species Habitat

The DNR Rare Species Guide includes the following habitat description for the heather vole (2009):

> Throughout its range, the heather vole may inhabit coniferous forests with a heath understory, wet meadows, rocky hillsides, forest edge, or deciduous shrubby habitats (George 1999). Proximity to water, boulders, coarse woody debris, and plants of the *Ericaceous* family are important to its survival (U.S. Forest Service 2000). In Minnesota, one heather vole was trapped in a poorly drained black spruce and balsam fir woodland with groundcover of mosses, ferns, horsetail (*Equisetum* spp.) and ground pine (*Lycopodium* spp.) (Etnier 1989). Other Minnesota specimens have been documented in the following habitats: 1) a boulder field with a black spruce (*Picea mariana*) and balsam fir (*Abies balsame*a) overstory and a groundcover of lichens, ferns, and mosses; 2) a clearcut with boulders covered in lichens, ferns, and mosses (Jannett and Oehlenschlager 1997); and 3) a large, semi-open black spruce sphagnum bog.

Species Distribution and Occurrences within the Study Area

The heather vole ranges widely across the boreal forests of Canada. It is found between northern British Columbia and the southern Yukon through Ontario and Quebec to Newfoundland (NatureServ, 2009). Its range also spills into extreme northeast Minnesota, where it is known to occur in isolated populations

within Lake and Cook counties. Logistically, this species is difficult to accurately survey because it is difficult to trap and leaves no evidence of its presence. More research is needed to develop an accurate picture of the range of the heather vole in Minnesota (DNR, 2009).

There are no NHIS observations of heather voles in the Study Area, although appropriate habitat may exist.

Risk Factors

Risks to heather voles are not fully understood due to a lack of research on this species. More research is needed to develop an accurate understanding of conservation threats. What information does exist suggests that heather voles may be out-competed by meadow voles, if appropriate heather vole habitat is converted to a more grassy landscape preferred by meadow voles (DNR, 2009).

4.2.2.6 Franklin's Ground Squirrel (Spermophilus franklinii)

The Franklin's ground squirrel is listed as DRM Sensitive.

Species Description

The Franklin's ground squirrel is a long-bodied squirrel with a gray speckled coat and less bushy tail. The head of this species is typically grayer than the rest of the body and the fur on the sides of the body tends to be lighter in color. This species averages 12 inches in length and can weigh between 11 and 13 ounces, with the males typically weighing more than the females. The Franklin's ground squirrel is an omnivorous species with a seasonally flexible diet, where greens are preferred in the spring, meat during the summer, and fruit and nuts in the late summer and fall. Breeding occurs in the spring after females have emerged from their burrows and can take place into early June. A typical brood would contain seven or eight young (Ostroff & Finck, 2003).

Species Habitat

This terrestrial species prefers tall grassland habitats and tends to avoid habitats that have been subjected to overgrazing, haying or frequent fire treatments. It is often observed along a forest—prairie or marsh edge. It is also known to frequent unmowed grasslands bordering highways and railroads (Ostroff & Finck, 2003).

Species Distribution and Occurrences within the Study Area

This species is distributed across the upper Midwest and northern Great Plains. It can be found in appropriate habitat areas between central Alberta, central Saskatchewan, south-central Manitoba, eastern North and South Dakota, eastern Nebraska, northern Kansas, northern Missouri, southeastern Wisconsin and western Minnesota (Ostroff & Finck, 2003). In Minnesota, this species can be found throughout the prairie region but are most common in the northwest brush lands.

No NHIS observations of this species are recorded within the Study Area, nor were observations made during field surveys for this project. At least one observation has been recorded in the NHIS database in southeast Hubbard County. DRM reports recent sitings of Franklin's ground squirrels in Bena, and a colony living in the CNF Norway Beach Campground just north of Routes 1 and 2 (Mortensen personnel communication).

Risk Factors

Risks to Franklin's ground squirrel include loss of appropriate grassland habitat to agricultural uses. Tilling, overgrazing and haying can also remove the grassy cover preferred by this species.

4.2.2.7 Eastern Spotted Skunk (Spilogale putorius)

The eastern spotted skunk is listed as DNR Threatened.

Species Description

The DNR Rare Species Guide includes the following species description for the eastern spotted skunk (2009):

> The eastern spotted skunk can be easily confused with the more common striped skunk (*Mephitis mephitis*). Both species have a characteristic bushy tail, black and white pelage, and pungent odor. The eastern spotted skunk is smaller 46-56 cm (18-22 in.) than the more common striped skunk 64-76 cm (25-30 in.) and has a more complex pattern of white spots or broken stripes than does the striped skunk, which has 2 white stripes running from head to tail. The eastern spotted skunk generally has a white-tipped tail.

Species Habitat

Eastern spotted skunks prefer a range of open habitat that offers sufficient cover. They are known to occur in forests, brushy areas and woodlands in prairies (NatureServe, 2009). Fencerows, shelterbelts and riparian woodlands are also known to contain appropriate habitat. This species is well adapted to agricultural land use and are known to utilize outbuildings for cover and denning (DNR, 2009).

Species Distribution and Occurrences within the Study Area

This species ranges across the east central and southeast United States as well as northeastern Mexico. It can be found in appropriate habitats between the Dakotas, Wyoming, Texas, the northeastern Mexican states, Alabama, Georgia, Florida, and into the central Appalachian states of Maryland, the Virginias, and Kentucky (NatureServe, 2009; DNR, 2009). Minnesota is on the northern edge of the eastern spotted skunk's range. It is locally distributed across the state, with known occurrences restricted to Roseau, Hubbard, Hennepin, Washington, Watonwan, and Blue Earth counties (DNR, 2009).

Within the Study Area, there is one DNR observation of this species; however, it is noted as questionable. Appropriate habitat may exist within the Study Area.

Risk Factors

Risk factors to eastern spotted skunks are not clearly understood, as there is a general lack of understanding of the recent declines seen in this population. The decline of family farms, in favor of larger farming enterprises and building techniques meant to exclude small mammals may have reduced the availability of potential food sources and denning sites within the state. The increased use of pesticides is also thought to have had a detrimental effect on this species (DNR, 2009).

4.2.2.8 Northern Bog Lemming (Synaptommys borealis)

The northern bog lemming is listed as DNR Special Concern, CNF RFSS, and as DRM Sensitive.

Species Description

The following species description of the northern bog lemming is included in the DNR Rare Species Guide (2009):

> The northern bog lemming closely resembles other microtine rodents with which it may share habitat. Grooved upper incisors, a very short tail (18-25 mm; 0.7-1.0 in.), and grizzled grayish brown to chestnut colored pelage, with a buffy orange patch at the base of the ear, can help distinguish bog lemmings of the genus *Synaptomys* from other

> microtines, such as *Clethrionomys, Microtus,* and *Phenacomys.* The northern bog lemming closely resembles the more common southern bog lemming (*S. cooperi*) and both may be found at the same location. Female northern bog lemmings have 4 pairs of mammae, while female southern bog lemmings have 3 pairs. Species identification can only be confirmed by examining dental and skull characteristics. In the northern bog lemming, lower molars lack distinct inward angles on the outer (labial) edge, the upper incisors frequently have labial spines, and the palate has a sharply pointed spine at its posterior end.

Species Habitat

The following habitat description for the northern bog lemming is included in the DNR Rare Species Guide (2009):

> Northern bog lemmings typically occur in open, wet habitats dominated by sphagnum moss, ericaceous shrubs, and graminoids. Subspecies exhibit different habitat preferences that include conifer forests, shrublands, alpine meadows, and dry sagebrush hillsides (Banfield 1974; Foresman 2001). In Minnesota, northern bog lemmings have been found in open bog, shrub carr, and black spruce swamp (Nordquist 1992).

Species Distribution and Occurrences within the Study Area

The northern bog lemming is distributed widely across boreal North America. It can be found between Alaska, Washington, Montana, Ontario, Quebec, Labrador, and Maine. Minnesota is on the extreme southern fringe of this species range. It is only known to occur in appropriate habitat areas of Itasca, Koochiching, and Roseau counties (DNR, 2009).

Within the Study Area, one observation of the northern bog lemming has been made by the USFS. Appropriate habitat likely exists although the Study Area is on the extreme southern edge of this species range.

Risk Factors

Risks to northern bog lemmings include habitat loss due to filling, peat mining and drainage. Logging for pulp and Christmas trees also threatens habitats in Minnesota (DNR, 2009; NatureServe, 2009).

4.2.3 Reptile Species

4.2.3.1 Snapping Turtle (Chelydra serpentina)

Snapping turtles are listed as DNR Special Concern and as DRM Sensitive.

Species Description

The DNR Rare Species Guide (2009) contains the following species description for snapping turtles:

> The common snapping turtle is Minnesota's largest turtle. As an adult, its upper shell (carapace) averages 20-36 cm (8-14 in.) in length and its weight ranges from 4.5-16.0 kg (10-35 lbs.). The largest known Minnesota individual weighed 29.5 kg (65 lbs.) and had a carapace that was 49.5 cm (19.5 in.) long. The common snapping turtle's carapace is variably colored from green to brown to black, and often has moss covering it. In young turtles, raised crests form three longitudinal keels along the carapace. These crests gradually disappear as the turtles mature. The back edge of the carapace in all sized turtles is strongly toothed. The lower shell (plastron) is considerably reduced in size

> relative to the upper shell, and provides little protection for the turtle. Common snapping turtles have a long tail with a series of raised scales along the top that create sawtooth projections. Their head is large, with large, powerful jaws, and their neck is long. The common snapping turtle is usually docile in the water, but can be aggressive when it is on land, often lunging forward and striking out to "snap" at its foe.

Species Habitat

The snapping turtle is an aquatic species which has adapted to a wide range of aquatic habitats including rivers, lakes and marshes. It tends to prefer slow moving and quiet waters with a dense vegetative cover and muddy bottoms. Thick vegetative cover and muddy bottoms are used during hibernation. Suitable nesting areas must be open and sunny and contain moist but well-drained sand or soil. Nesting areas are commonly sandy banks and fields, but also include gravel roads and lawns. (DNR, 2009)

Species Distribution and Occurrences within the Study Area

Snapping turtles are distributed widely across the eastern United States and Canada. They can be found in appropriate habitat areas east of the Rocky Mountain Front Range. The northern extent of their range extends from northern Montana into southern Saskatchewan, central Manitoba, southern Ontario, southern Quebec and into northern New England. The eastern and southern extent of their range reaches to the Atlantic and Gulf Coasts. New Mexico forms the southwest fringe of the snapping turtles range. A population is also known to persist in Central America. In Minnesota, this species is widely distributed within a diverse array of aquatic habitats.

While CNF, DRM and DNR observations of snapping turtles within the Study Area are not available, this species has been observed during site-visits. Appropriate habitat exists within the Study Area.

Risk Factors

Risks to snapping turtle populations include loss and degradation of habitat, overharvest and vehicle collision. Historically, snapping turtle harvesting in Minnesota was largely unregulated. Recent changes to regulations will help managers develop a more sustainable harvest regime. Harvesting that takes place during June can compromise reproductive success and harvesting in fall of communal hibernacula can further threaten local populations (DNR, 2009). Both nesting females and their eggs can be susceptible to vehicle collisions if nesting sites along roadways are selected.

4.2.3.2 Blanding's Turtle (Emydoidea blandingii)

The Blanding's turtle is listed as DNR Threatened, CNF RFSS, and DRM Threatened.

Species Description

The DNR Rare Species Guide (2009) contains the following species description for Blanding's turtles:

> The Blanding's turtle averages 15-25 cm (5.9-9.8 in.) in length. Its most diagnostic characteristics are its domed upper shell (carapace) and its bright yellow chin and throat. The dark carapace typically has numerous, scattered yellow flecks. Adult males have a slightly concave lower shell (plastron) and a longer and thicker tail than females, with the vent extending beyond the rear edge of the carapace. Blanding's turtles are often referred to as semi-box turtles because their plastron is hinged across the front third. This hinge enables the turtle to pull the front edge of the plastron firmly against the carapace to provide additional protection when threatened.

Species Habitat

The DNR Rare Species Guide (2009) contains the following habitat description for Blanding's turtles:

Wetland complexes and adjacent sandy uplands are necessary to support viable populations of Blanding's turtles. Calm, shallow waters, including wetlands associated with rivers and streams, with rich aquatic vegetation are especially preferred. In Minnesota, this species appears fairly adaptable, utilizing a wide variety of wetland types and riverine habitats in different regions of the state. In central Minnesota, shrub wetlands are utilized throughout the summer and also serve as over-wintering sites (Piepgras and Lang 2000). In southeastern Minnesota, open marshes and bottomland wetlands provide summer and winter habitat. Ephemeral wetlands are utilized in spring and early summer, while deeper marshes and backwater pools are utilized in both the summer and winter (Hammernick 2000; Pappas et al. 2000). In southwestern Minnesota, meandering streams and rivers, fens, prairie marshes, backwaters, and oxbows are important aquatic habitats, and upland habitats include adjacent agricultural lands (Lang 2003). Female Blanding's turtles often nest in agricultural fields. This may be hazardous to both adult females and nests in the form of chemicals, disking, machinery usage, increased nest predation, and shade produced by growing crops.

Species Distribution and Occurrences within the Study Area

Blanding's turtles range largely encompasses the Great Lakes states as well as northeastern Iowa and east central Nebraska. Within this region this species can be found in southern Wisconsin, Michigan's Lower Peninsula, northeastern Illinois, northern Indiana, and northern Ohio. Disjunct populations are also located in New York, Massachusetts, Rhode Island, and New Hampshire (NatureServe, 2009). In Minnesota, the range of the Blanding's turtle generally corresponds to the Mississippi, Minnesota, and St. Croix waterways, but can also stretch into the southwestern portions of the state (DNR, 2009).

Observations have been documented in Beltrami, Itasca, Cass, and Hubbard counties. One DNR observation of a Blanding's turtle is located within the Study Area.

Risk Factors

Risk factors to Blanding's turtles include catastrophic events to local populations, and habitat loss due to management for game species. As this species is slow maturing, catastrophic events which disturb localized populations may be slow to recover. Management activities intended to benefit other species which drawdown water levels in fall can further threaten Blanding's turtle by removing appropriate hibernacula or stranding hibernating individuals outside of appropriate conditions (DNR, 2009).

4.2.3.3 Eastern Hognose Snake (Heterodon platirhinos)

The eastern hognose snake is listed as DRM Sensitive.

Species Description

The eastern hog-nosed snake is a thick bodied snake of medium size. It can be recognized by its flat and upturned snout and flat tail. They feature a wide head which may not be distinctive from the neck due to its heavy body shape. A typical eastern hog-nosed snake is 20 to 45 inches long. Coloration varies widely with some individuals exhibiting irregular dark blotches along the back and some have alternating dark patches down their sides. Body color can range between gray, brown, tan, olive, orange and pink. Many individuals have an intermediate pattern with faded blotches. Long dark spots stretch along the neck in many individuals. Bellies range between yellow, cream, gray and pink (Harding 1997).

The eastern hog-nosed snake primarily feeds upon small amphibians, particularly toads. Their upturned nose is specifically adapted to root toads out of their burrows. This species is also known to feed on small mammals, birds, eggs, small reptiles, insects, and carrion (LeClere 2009).

This species is slow moving but has an elaborate defense display. A threatened adult will coil up, rise, and flatten its head to resemble a cobra and emit a hissing sound. This species is known to strike, but usually with a closed mouth. Anal secretions and feces are also emitted to discourage predation (Harding, 1997).

Species Habitat

Eastern hog-nosed snakes have adapted to a wide range of upland habitats such as coniferous and deciduous forests, old fields, meadows and fields. In Minnesota they are often found along the forest edge or within open woodlands. While observations of this species have occurred near wetlands, they prefer habitat types with dry, sandy soils (DNR, 2009; Harding, 1997). However, they are not adverse to moist soil conditions, as these habitats are typically preferred by toads (LeClere 2009).

Species Distribution and Occurrences within the Study Area

The eastern hog-nosed snake ranges widely across the eastern United States. It generally ranges between southeastern Minnesota, east Texas, the Gulf and Atlantic coasts, southern New England and the Great Lake states, and extreme southeast Ontario (Harding 1997). In Minnesota this species is generally distributed along the Mississippi and St. Croix rivers. Cass and Hubbard counties contain some the most northeastern records of this species (LeClere 2009).

Observations of this species are available in the NHIS database, but none are located within the Study Area. Within the Study Area, appropriate habitat may exist even though this area is on the extreme fringe of the eastern hog-nosed snakes range.

Risk Factors

Risks to the eastern hog-nosed snake include loss of habitat to human uses and vehicle collisions. This species seems to have a moderately low tolerance to human activity. Continued decline of toad populations may also threaten eastern hog-nosed snake populations (Harding 1997).

4.2.4 Amphibians Species

4.2.4.1 Four-toed salamander (Hemidactylium scutatum)

The four-toed salamander is listed as DNR Special Concern, CNF RFSS and as DRM Sensitive.

Species Description

The DNR Species profile for the four-toed salamander (DNR, 2009) includes the following species description:

> Four-toed salamanders have 4 toes on each of their front and hind feet. Other terrestrial salamanders in Minnesota have 5 toes on their back feet. This species averages 5-10 cm (2-4 in.) in total length (Petranka 1998). Its base color is red-brown with dark flecks on its sides. The belly of adults is white with black markings. Unlike other species of salamanders in Minnesota, the tail of the four-toed salamander may become detached from its body near a constriction at the base of the tail.

Species Habitat

The DNR Species profile for the four-toed salamander (DNR, 2009) includes the following species habitat:

> Throughout their range, four-toed salamanders live in mature upland deciduous or mixed deciduous-coniferous forests interspersed with sphagnum seepages, vernal ponds, or other fish-free habitats that serve as nesting sites (Pfingsten and Downs 1989;

Petranka 1998). Mature closed-canopy forests provide favorable conditions including a shaded moist forest floor with organic soils and woody debris. Mature forests also encourage the growth of moss around pond margins (Petranka 1998). Upland forests provide cover, foraging sites, and overwintering habitat for juveniles and adults. Egg deposition and larval development occur in wetland habitats devoid of fish, often with a sphagnum component. In Minnesota, four-toed salamanders occur most frequently in mature forests of glacial moraine landscapes where such isolated wetlands are abundant.

Species Distribution and Occurrences within the Project Area

Four-toed salamanders are known to occur across the eastern United States and Canada. Their range is generally east of the Mississippi between the Gulf States and Hudson Bay. Several states bordering and west of the Mississippi River are also within their range. Within Minnesota the range of the four-toed salamander is restricted to six counties in north central Minnesota including Itasca Count, Aitkin, Mille Lacs, St. Louis, Carlton, and Pine counties (DNR, 2009).

The eleven NHIS documented observations of four-toed salamanders within the study area are restricted to the extreme eastern portions of the study area (DNR, 2009).

Risk Factors

Risk factors to four-toed salamanders include catastrophic habitat loss or habitat alteration, as individual populations of this species tend to be isolated and local. Their limited capacity for dispersal and highly selective nature make this species especially sensitive to disturbance of uplands and forested wetlands where breeding occurs. Disturbance would include logging, road building and filling or draining of wetlands.

4.2.4.2 Red-backed Salamander (Plethodon cinerus)

The red-backed salamander is listed as DRM Sensitive.

Species Description

Red-backed salamanders are small, thin, lungless salamanders with very small legs and rounded tails. They typically measure 2.3 to 5.0 inches in length. This species has two common color phases. The “redback” phase typically features a redish orange stripe running laterally down its back and onto the tail. Its face, sides, and legs are dark grey to back. Their underbelly is typically mottled white or brown. The “leadback” phase lacks the red stripe down the back and has the same dark grey or black coloring across the top and sides of its belly but can exhibit lightly colored speckles along its back. Unlike many salamanders, this species does not go through metamorphosis, rather young salamanders hatch as miniature forms of the adult (Harding, 1997).

Species Habitat

Red-backed salamanders are a woodland species known to frequent deciduous, coniferous and mixed forest habitats. They tolerate a wide range of forests so long as the soils are not too dry, or the area is not subjected to frequent flooding. Red-backed salamanders are typically found under logs, fallen bark or rocks and seem to prefer the humid conditions present in these areas. This species depends upon root systems and crevices which are used to escape summer heat and the winter freeze. Preferred locations can support a congregation of individuals during these times (Harding, 1997).

Species Distribution and Occurrences within the Project Area

The red-backed salamander is widely distributed across the northeastern United States, generally within the Great Lakes States and New England, Virginia and North Carolina, as well as in southern Ontario and Quebec (USGS, 2008; NatureServ, 2009). Within Minnesota, the red-backed salamander is restricted to the northeast portion of the state and is on the western periphery of its range (DNR, 2009c).

Within the Study Area, observations of red-backed salamanders have not been documented; however appropriate habitat is likely present. According to the National Amphibian Atlas, this species is present in Cass and Itasca Counties (USGS, 2008).

Risk Factors

While relatively tolerant of human disturbance in forests, this species can be sensitive to the removal of key habitat factors such as leaf litter, fallen logs or disturbance of underground sanctuaries. This species would also be sensitive to the conversion of forest cover to open habitats (Harding, 1997).

4.2.4.3 Green Frog (Rana clamitans)

The green frog is listed as DRM Sensitive.

Species Description

Green frogs are known to occur in a range of colors varying from green, yellowish green, olive, grey and in rare cases, even blue. Black spotting on the back and legs is common. A ridge of skin runs from each eye and extends approximately two-thirds down the back. The belly is white, sometimes with grey speckles. Mature males have bright yellow throats while the female's throat is light yellow or cream colored. Each sex has a large tympanum, which is typically of equal or greater size than the eye. Breeding takes place in spring and summer when males can be heard calling their distinctive "clung" (or loose banjo string sound).

Species Habitat

Green frogs inhibit a wide range of aquatic environments including lakes, sloughs, swamps, slow moving streams and impoundments, although they seem to prefer habitat with permanent standing water. This species typically prefers riparian habitats but may disperse beyond these areas during warm, rainy evenings. Winters are spent in dormancy, buried in bottom mud or debris, between early November and early April (Harding, 1997).

Species Distribution and Occurrences within the Project Area

The green frog is widely distributed across the eastern United States. It range stretches between northwest Minnesota, eastern Texas, northern Florida, New England, New Brunswick, Quebec and Ontario (Harding, 1997). In Minnesota, this species is on the northwest fringe of its range, where it occurs across the eastern half of the state (DNR, 2009c).

Within the study area, observations of green frog have not been documented; appropriate habitat is present. According to the National Amphibian Atlas, this species is present in Cass, Itasca, and Hubbard counties (USGS, 2008).

Risk Factors

Risk factors include loss of appropriate wetland habitat due to drainage or filling (NatureServ 2009).

4.2.5 Plant Species

For effects analysis on plant species, each of the following species have been ascribed to a broadly defined guild based on shared habitat requirements. Some species occur in multiple guilds based on their ability to inhabit a wider range of habitat types.

While there are many risk factors identified for the various plants being evaluated, only a few of those factors are directly applicable to this Project. Consideration of risk factors such as climate change, drought and/or flooding are not directly applicable to the Project and are beyond the scope of this evaluation. The primary risk factors related to the project include habitat loss, local changes to light and moisture regimes, introduction of NNIS and direct destruction due to construction activities,

4.2.5.1 Dragon's Mouth Orchid (Arethusa bulbosa)

The dragon's mouth orchid is listed as DRM Sensitive because it is rare and may experience habitat loss due to beaver flooding and development.

Potential effects for this species are described in the following Guilds: Bogs and Fens, Sedge Meadows and Emergent Wetlands, Cedar and Mixed Conifer Swamps.

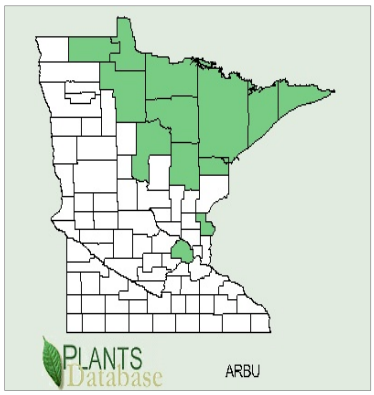
Species Description

The dragon's mouth orchid has stems between 7 and 36 cm long, glabrous from a bulbous corm. It has one linear lanceolate leaf that only protrudes upward following flowering. Inflorescence is comprised of a single brilliant rose-purple flower distinguished from other similar species by the absence of the leaf during flowering.

Species Habitat

This species is found in various types of coniferous swamps, but most commonly on a substrate of deep *Sphagnum* moss under partial canopy gaps. It may also be present on floating mats around "bog" lakes in acidic, peaty sedge meadows (Smith, 1993). Minnesota populations are known from conifer swamps, floating mats, fens, and sedge-dominated water tracks. It is usually associated with wet, sunny, or partially shaded conditions and hummocks of *Sphagnum* moss (Coffin and Pfannmuller 1988).

Species Distribution and Occurrences within the Study Area



Dragon's mouth orchid extends across temperate and boreal North America along a band from Saskatchewan, south from the Great Lakes states to Virginia and North Carolina, and north to Newfoundland and Labrador. USDA Plants Database at:

http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=ARBU

NHIS data indicates six population records of this species distributed across the overall project boundary. These records are located throughout the Study Area in bogs and conifer swamps. CNF does not track this species.

Risk Factors

Risk factors to Dragon's mouth orchid include alteration of existing hydrology, shift from a partially closed canopy to an open setting due to forest removal, and direct impact to individuals due to construction.

4.2.5.2 The genus Botrychium

The genus *Botrychium* are members of the Ophioglossaceae family of ferns. The genera is found worldwide in a range of habitats including open grasslands and forests. Within the BGR study area, eight species are listed by the CNF, DRM and DNR as Threatened and Endangered or RFSS. *Botrychium* typically produce a single leaf, divided into two axes, one bearing a sterile segment (the tropophore), the other bearing the fertile segment (the sporophore). The underground rhizome is upright and short, producing a single leaf bud at the apex. The North American genera is divided into three subgenera and is broadly distinguished by the following:

- *Botrychium* (Moonworts): Generally the smallest subgenera, the Moonworts have fleshy roots and a delicate texture with generally upright tropophores with "half moon" leaflets (excepting *B. lanceolatum*).
- *Sceptridium* (Grapeferns): The evergreen grapeferns are typically larger than the moonworts, are leathery in texture with the tropophore-sporophore union typically occurring below ground and a tropophore that is generally held parallel to the ground plane.
- *Osmundopteris* (Rattlesnake Fern): The species *B. virginianum* is typically the largest and most common of the North American species. This species is not listed as threatened or endangered by any agency in the study area.

Habitat requirements for *Botrychium* are widely varied, with some species, including rare species, adapted to a range of habitat types from open grasslands to mature forest. The genus contains numerous species that are considered rare or uncommon. This rarity may be due to difficulty of detection based on small size, difficulty in species identification, relatively recent increase in botanical field investigations, seasonal dormancy, and true rarity due to habitat alteration and loss, or presettlement rarity and limited range. Additionally, several members of the moonwort subgenera are known to remain dormant or are able to persist under thick leaf litter for several years producing extensive gemmae (belowground reproductive structures) while not exhibiting above ground growth. Extensive studies have been performed on the Minnesota populations focusing on reproductive characteristics, relationship to myccorhizal conditions, soil and associated moisture characteristics and NNIS (particularly non-native invasive earthworms).

Johnson-Groh (1999 cited in Chadde and Kudray, 2000a) concluded that mycorrhizae are the most limiting factor for *Botrychium* establishment, distribution, and abundance. *Botrychium* are quite often a part of the flora of utility corridors, which suggests members of this genera of fern respond positively to the disturbance associated corridor development. The suitability of these newly developed habitats is, however, likely associated with presence of mycorrhizae populations, as well as moisture availability. The invasion of exotic earthworms appears to be a significant threat to the genus as a whole. In ongoing *B. mormo* monitoring efforts on the Chippewa National Forest, plots impacted by worms exhibit significant negative effects on *B. mormo* populations (Johnson-Groh, 1999 cited in Chadde and Kudray, 2000). Numerous additional studies have correlated the relationship between relative abundance of non-native invasive worm species and subsequent thinning of the soil O layer with the decline of *B. mormo* (Almendinger and Hansen cited in U.S. Forest Service, 2002 and Gundale, 2002).

The following table, developed by the USFS (Chadde and Kudray, 2001) provides the relative risk assessment for each species listed in the Study Area based on recognized threats.

Table 4-1. Major threats to Botrychium species.

Threat	Degree of Impact				Disturbance	
Species	Exotic Earthworms	Exotic Plants	Canopy Thinning	Succession To Closed Canopy	Major	Minor
B. dissectum	medium	medium	medium	low	high	medium
B. lanceolatum var. angustisegmentum	high	medium	medium	low	medium	low
B. minganense	high	medium	medium	low	medium	medium
B. mormo	high	low	high	low	high	medium
B. oneidense	high	medium	medium-high	low	high	medium-high
B. pallidum	low	high	low	high	medium	low
B. rugulosum	low	medium	low	high	high	medium
B. simplex	medium	medium	low	medium	medium	low

Key: High, medium, or low are used to indicate the estimated degree of impact of a specific threat to a Botrychium population.
Source: Chadde and Kudray, 2001

4.2.5.3 Dissected Grape Fern (Botrychium dissectum)

The dissected grape fern is listed as DRM Threatened. This species is listed because it is considered very rare on the reservation.

This species has the potential to occur in the following cover types: Forest Openings/Exposed Soils, Riparian Habitats, Lowland Forest, Upland Forest and Woodlands.

Species Description

The dissected grape fern is an evergreen perennial to 30 cm tall; the common stalk at the plant base is 4-5 cm long. The blade is three-parted, 8 to 14 cm long and 8 to 15 cm wide, somewhat leathery and typically turning bronze-colored in fall. The fertile spike is two to three times pinnate, on a stalk to 20 cm long; sporangia are globe-shaped, to 1 mm diameter; spores yellowish, and maturing in late September-October. The roots are fleshy (from Lellinger 1985, Cody and Britton 1989, Wagner and Wagner 1993, Mohlenbrock 1999). This plant emerges from the ground in late spring.

Species Habitat

Botrychium dissectum occurs in habitats ranging from open grasslands to deep shaded woods (Wagner and Wagner, 1993). Lellinger (1985) described the habitat as “moist to rather dry woods, swamps, and pastures or old fields, commonly under somewhat disturbed conditions.” In Canada, habitats are described as sterile hilltops, dry pastures, dry woodlands, and grassy banks (Cody and Britton, 1989). In Michigan, *B. dissectum* is reported from low woods, swamp margins, thickets, and old pastures, especially where soils are sandy (Billington, 1952). On the Ottawa National Forest in Michigan, the species is reported from rich mesic hardwood forests dominated by sugar maple, yellow birch, and basswood, and in soil along shaded roadsides (Ottawa NF *Botrychium* survey form, 2000).

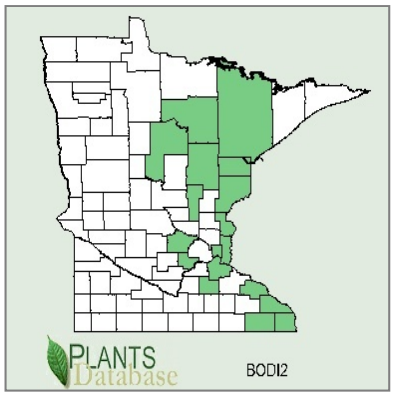
In northern Wisconsin, *B. dissectum* is found in a wide variety of habitats, including old fields and barrens, and rich sugar maple forests. (Chequamegon-Nicolet NF *Botrychium* survey form, 2000).

In Minnesota, two specimens from the CNF and LLR have been deposited in the University of Minnesota Bell Herbarium (www.wildflowers.umn.edu). Habitats associated with each specimen are listed as mesic hardwood forests of sugar maple and basswood. Associated herbaceous species include *Athyrium filix-femina, Dryopteris carthusiana, Scutellaria lateriflora, Uvularia grandiflora,* and *Streptopus roseus*.

The single most important limiting factor affecting *Botrychium sp*. establishment, distribution and abuncance, according to Johnson-Groh (1999 cf. Chadde and Kudray, 2001) is the relationship that this genus has to soil mycorrhizae. Abundance, establishment, and distribution of this genus rely on the presence of and interrelationship with mycorrhizae on any given site. A number of species of *Botrychiu,* including *B. dissectum* are often present along utility corridors, suggesting this genera of fern responds positively to the disturbance associated corridor development. The suitability of these newly developed habitats is, however, likely associated with presence of mycorrhizae populations, as well as moisture availability. The invasion of exotic earthworms appears to be a significant threat to members of this genus, though the USFS indicates that the threat by earthworms to this species may be moderate. Table 4-1 provides an assessment of potential risk factors to members of this genus. In an ongoing *B. mormo* monitoring effort on the Chippewa National Forest plots impacted by worms exhibited significant negative effects on *B. mormo* populations (Johnson-Groh, 1999 cf. Chadde and Kudray, 2001).

Species Distribution and Occurrences within the Study Area

This species is known from Minnesota and Ontario south to Texas and in all states and provinces east.



USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=BODI2

This species is not tracked by either the CNF or DNR, though as part of past studies, specific location data has been identified for the purposes of *Botrychium* studies. CNF data shows one population of this species within CNF, though it is known that more populations are present but are not typically included in CNF surveys, and additional populations have been identified in field surveys used and performed for this project.

Risk Factors

Threats to *Botrychium dissectum* include road building, timber harvesting, hydrologic alteration, invasion by exotic plant species and exotic earthworm invasion. Invasion of exotic earthworms appears to represent the greatest threat to this species and the genus as a whole within the CNF and LLR area. USFS Conservation Assessments(Chadde and Kudray,2001) list as “high” the threat of earthworms to this species. While earthworms are generally assumed to have beneficial effects on soil structure, litter decomposition, soil chemistry, and nutrient cycling, their presence alters soil horizination, reducing the O (organic) layer, eliminating the E (leaching) layer, and altering the hydrologic function of soils (Chadde and Kudray, 2000a). The presence of earthworms has been shown to decrease micorrizal health and abundance, and by extension, represents a threat to all species of the genera *Botrychium*. Risk of exotic earthworm spread into areas where a healthy mycorrhizal and *Botrychium* community is present may represent a threat to this species.

Additionally, the risk of direct impact to individuals due to construction is possible if the species is present at a pole location.

4.2.5.4 Triangle Moonwort (Botrychium lanceolatum var. angustisegmentum)

Botrycium lanceolatum var. angustisegmentum is listed as DNR Threatened, CNF RFSS and DRM Threatened.

Species Description

Botrychium lanceolatum has a stalk 6-15 cm (2.4-5.9 in.) long, with an unstalked frond. The frond (sterile blade) is dark green, very shinny, glabrous, and deltoid. It has two to five pairs of *pinnatifid pinnae*, the lowest pair much the larger (hence the common name triangle). The bud is enclosed in the stalk base. *B. lanceolatum* can be distinguished from *B. matricariifolium* (matricary grapefern) by the deltoid, usually sessile, blade with both sterile and fertile blades reflexed in bud. The variety of *B. lanceolatum* (S.G. Gmelin) in Minnesota is var. *angustisegmentum.* (Pease & Moore).

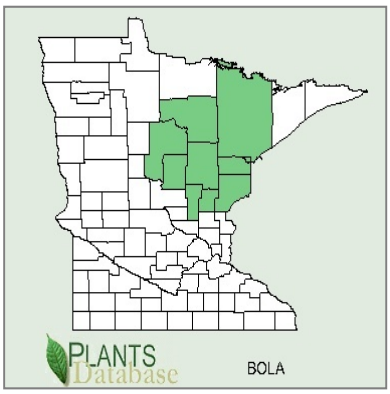
Leaves of this species emerge in the spring and are divided into a sterile photosynthetic portion and a fertile spore-bearing portion. Spores of the fertile portion mature slowly through the summer, changing to a noticeable gold color by late summer. The aboveground portion of the plant is killed by frost in the fall, sometimes as late as October.

Species Habitat

According to the DNR Rare Species Guide:

In Minnesota, *B. lanceolatum* prefers moist, shady, mature northern hardwood forests, particularly in low areas. It usually occurs with Acer saccharum (sugar maple), *Betula alleghaniensis* (yellow birch), *Fraxinus pennsylvanica* (green ash), *Fraxinus nigra* (black ash), *Quercus rubra* (red oak), *Tilia americana* (basswood), and sometimes *Thuja occidentalis* (northern white cedar). The understory can be rather open and the ground cover often sparse with *Athyrium angustum* (lady fern) and other *Botrychium* species, especially *B. matricariaefolium. Botrychium lanceolatum* populations often occur as a few scattered individuals, but occasionally 50 or more can be found in a single site.

Species Distribution and Occurrences within the Study Area



A widely distributed plant, *B. lanceolatum* occurs from Newfoundland across the Canadian provinces to Yukon and Alaska, south to California, east to New Mexico, then Minnesota to the Atlantic Coast states as far south as Virginia and inland to Tennessee. The species is not noted in the central plains states west and south of Minnesota (DNR, 2009). USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=BOLA

Botrychium lanceolatum is listed by the DNR and CNF with point data indicating 10 distinct populations identified throughout the Study Area.

Risk Factors

Threats to *Botrychium lanceolatum* include road building, timber harvesting, hydrologic alteration, invasion by exotic plant species, removal of mature hardwood forests, and exotic earthworm invasion. Invasion of exotic earthworms appears to represent the greatest threat to this species, and the genus as a whole within the CNF and LLR area. Herbivory and drought likely pose short term risks to this species.

The single most important limiting factor affecting *Botrychium sp*. establishment, distribution and abuncance, according to Johnson-Groh (1999 cf. Chadde and Kudray, 2001) is the relationship that this

genus has to soil mycorrhizae. Abundance, establishment and distribution of this genus rely on the presence of and interrelationship with mycorrhizae on any given site. While earthworms are generally assumed to have beneficial effects on soil structure, litter decomposition, soil chemistry and nutrient cycling, their presence alters soil horizination, reducing the O (organic) layer, eliminating the E (leaching) layer, and altering the hydrologic function of soils (Chadde and Kudray, 2000x). The invasion of exotic earthworms appears to be a significant threat to members of this genus. The USFS (Chadde and Kudray, 2001) indicates that the threat by earthworms to this species is likely high. Table 4.1 provides an assessment of potential risk factors to members of this genus. In an ongoing *B. mormo* monitoring effort on the Chippewa National Forest plots impacted by worms exhibited significant negative effects on *B. mormo* populations (Johnson-Groh, 1999 cf. Chadde and Kudray, 2001).

Additionally, the risk of direct impact to individuals due to construction is possible if the species is present at a pole location.

4.2.5.5 Mingan Moonwort (Botrychium mingananense)

Mingan moonwort is listed as DNR Special Concern and DRM Threatened.

Potential effects for this species are described in the following Guilds: Riparian Habitats, Lowland Forest, Northern Hardwood Forests, Woodlands and Forest Openings/Exposed Soils/Grasslands.

Species Description

The aboveground parts of *Botrychium minganense* consist of a single upright stem arising from the ground and terminating in a cluster of tiny ball-like structures that resemble a bunch of grapes (hence one of the common names for the genus of 'grapefern'). These globular structures (the sporangia) contain the spores necessary for sexual reproduction. Branching from the main stem is the sterile, fern-like leaf blade (the trophophore). In *Botrychium*, the portion of the stem below this juncture of the sterile blade with the main stem is referred to as the common stalk, and the portion supporting the sporangia is called the fertile stalk (sporophore). At the base of the common stalk, but just below the ground, *Botrychium* species have several layers of leaf primordia that are the preformed buds of plants that will emerge in future years.

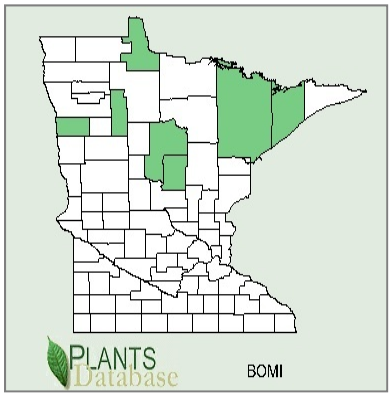
Species Habitat

Throughout its range *Botrychium minganense* grows in a broad variety of usually moist or mesic habitats. It was often reported growing with a suite of other *Botrychium* species including: *B. echo, B. hesperium, B. lanceolatum, B. lunaria, B. matricariifolium, B. montanum, B. mormo, B. paradoxum*, and *B. pinnatum* (Wagner and Wagner 1983).

Lellinger (1985) described the North American habitat of *B. minganense* as meadows, prairies, woods, sand dunes, and riverbanks. Wagner and Wagner (1990) described the typical habitat as "woods and second-growth shrubby fields." In the Great Lakes region, maple-basswood forests, grassy skid-trails, and meadows and clearings are typical habitats (Wagner and Lord, 1956).

In Minnesota, *B. minganense* is most commonly found in maple-basswood forests. Associated species include species typical of rich mesic woods such as *Actaea rubra, Dirca palustris, Uvularia grandiflora*, *Aralia nudicaulis*, and *B. virginianum, Aralia racemosa, B. multifidum*, and *Carex pensylvanica. Botrychium mormo* was reported nearby at several sites, including one site where exotic earthworms were present. Several Minnesota populations were located in transition areas between upland and wetland habitats, along fluctuating sandy shorelines, or in moist-wet woods under *Thuja occidentalis. B. minganense* was also found in dry-mesic woods. Northern red oak, basswood, bigtooth aspen, and paper birch were common overstory trees.

Species Distribution and Occurrences within the Study Area



A widely distributed plant, *B. minganense* occurs from Newfoundland across the Canadian provinces to the Northwest Territories and Alaska, south to California, east to Arizona and Colorado, then Minnesota to the Atlantic Coast states as far south as New York. The species is not noted in the central plains states west and south of Minnesota (DNR, 2009)

UDSA Plants Database at:

http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=BOMI

Botrychium minganense is listed by the DNR and DRM and is tracked by the CNF. Point data provided by these agencies identifies 22 distinct populations throughout the Study Area concentrated within the central portions of the CNF.

Risk Factors

Threats to *Botrychium minganense* include road building, timber harvesting, especially in those systems that support a predominance of sugar maple in the overstory, hydrologic alteration, invasion by exotic plant species, removal of mature hardwood forests, and exotic earthworm invasion. Herbivory and drought likely pose short term risks to this species. Most known locations of this species are moist and cool, so alteration of canopy cover may have an effect on site microclimate, creating potentially warmer, drier settings.

Invasion of exotic earthworms appears to represent the greatest threat to this species, and the genus as a whole within the CNF and LLR area. While earthworms are generally assumed to have beneficial effects on soil structure, litter decomposition, soil chemistry and nutrient cycling, their presence alters soil horizination, reducing the O (organic) layer, eliminating the E (leaching) layer, and altering the hydrologic function of soils (Chadde and Kudray, 2000x). The presence of earthworms has been shown to decrease micorrizal health and abundance, and by extension, represents a threat to all species of the genera *Botrychium*. Risk of exotic earthworm spread into areas where a healthy mycorrhizal and *Botrychium* community is present may represent the greatest threat to this species that occupies a range of habitat types.

Additionally, the risk of direct impact to individuals due to construction is possible if the species is present at a pole location.

4.2.5.6 Goblin Fern (Botrychium mormo)

Goblin fern is listed as DNR Special Concern, CNF RFSS and DRM Endangered.

Potential effects for this species are described in the following Guilds: Northern Hardwood Forests.

Species Description

Botrychium mormo is succulent and tiny, to only 8-10 cm in height (often smaller), and highly reduced in comparison to other moonworts. The plants are a satiny or shiny yellowish-green color. The stem terminates in a blunt to somewhat elongate fertile segment embedded with fleshy sporangia. The sterile leaf blade is variable; more mature or larger plants may have two to three pairs of small blunt lobes (pinnae), while the leaf blade may be virtually absent in smaller individuals. *B. mormo* may not appear aboveground during drought years, and due to the plant's small stature, it often fails to emerge from the leaf litter. The small stature of *B. mormo* also means that the plant is easily overlooked. Plants

underneath the litter layer are usually whitish and lack chlorophyll (Wagner and Wagner, 1981). The plant first emerges from the leaf litter in June or July and can often be identified into October.

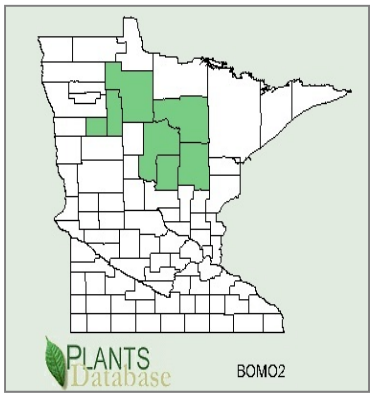
Species Habitat

This species occurs in rich hardwood sites in full to partial shade, typically on north-facing slopes on moist, mineral-rich soils (Ostlie, 1990c) and often found at the base of basswood trees. The fern grows in the leaf litter, and is dependent on mycorrhizal associations that allow it to grow whether or not it emerges above the surface of the duff. Under some habitat conditions, the fern can remain below ground or below the duff surface for several years (Berlin et al., 1998). This makes observing the fern very difficult. Sites are known in the eastern Upper Peninsula of Michigan, northern Wisconsin, and Minnesota. Common associates include sugar maple, yellow birch and basswood trees, *Lonicera canadensis, Carex intumescens, Caulophyllum thalictroides, Allium tricoccum, Asarum canadense, Trillium grandiflorum*, and *Aralia nudicaulis* (Chadde 1999; MNFI 1996).

This fern is very sensitive to moisture conditions and drought effects (Ostlie, 1990c). Natural succession and development of old-growth conditions may make the area better *B. mormo* habitat, e.g. by allowing different mycorrhizal fungal species to colonize the soils. Conversely, these processes may not have any effect on the quality of the habitat; we do not know enough about this rare fern and its needs to be certain, although it seems to prefer mature forests (Ostlie, 1990c).

The major threat to *B. mormo* across its range is non-native earthworms. Some *B. mormo* populations and habitat are currently threatened by these worms (and others will become threatened, as the worms continue to expand their range), which have colonized hardwood stands after release (probably unintentional) from bait buckets (Berlin et al., 1998) and other sources. Many of the worms used as bait are not native to the Upper Great Lakes and do not have naturally-occurring predators.

Species Distribution and Occurrences within the Study Area



B. mormo has a very limited range, known only from Minnesota, Wisconsin, and Michigan and in the Canadian province of Quebec (DNR, 2009).

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=BOMO2

Botrychium mormo is listed by the DNR, DRM and the CNF with element occurrence data available by each agency. Point data provided by these agencies identifies 115 distinct populations throughout the Study Area. Chadde and Kudray (2001) cite 162 known occurrences in the state of Minnesota and 249 known global populations. According to DRM, the largest known concentration of plants is found on Guthrie Till plain soils of Ottertail Point of Leech Lake. This is the area that Route 1 proposes to cross. This alternative would pass through a major section of habitat for this species, immediately adjacent to a long term study site for the species.

Summer 2009 surveys performed for the BGR project located 13 new populations ranging from single isolated plants to a single location with more than 300 individuals along Route 3. More than 550 individual plants were observed in total, all within 500 feet of the existing transmission line corridor. New observations generally took place in areas apparently unaffected by the presence of non-native invasive earthworms. All new locations were distant from paved roadways, were generally found between major drainage areas (a likely barrier to earthworm movement) and apparently isolated from

the earth moving activities associated with major roads, a potential source for earthworm contaminated soil.

Risk Factors

Threats to *Botrychium mormo* include loss of habitat through cover type conversion, road building, timber harvesting that removes significant canopy, soil compaction, alteration in moisture regime, sustained drought, invasion by exotic plant species, removal of mature hardwood forests and exotic earthworm invasion.

Invasion of exotic earthworms appears to represent the greatest threat to this species, and the genus as a whole within the CNF and LLR area. While earthworms are generally assumed to have beneficial effects on soil structure, litter decomposition, soil chemistry and nutrient cycling, their presence alters soil horizination, reducing the O (organic) layer, eliminating the E (leaching) layer, and altering the hydrologic function of soils (Chadde and Kudray, 2000x). The presence of earthworms has been shown to decrease micorrizal health and abundance, and by extension, represents a threat to all species of the genera *Botrychium*. USFS Conservation Assessments (Chadde and Kudray 2001) list as "high" the threat of earthworms to this species. Risk of exotic earthworm spread into areas where a healthy mycorrhizal and *Botrychium* community is present may represent the greatest threat to this species.

Additionally, the risk of direct impact to individuals due to construction is possible if the species is present at a pole location.

4.2.5.7 Blunt-lobed Grapefern (Botrychium oneidense)

Blunt-lobed grapefern is listed as DNR Endangered, CNF RFSS, and DRM Endangered.

Potential effects for this species are described in the following Guilds: Lowland Forest and Northern Hardwood Forests.

Species Description

Botrychium oneidense has a single triangular leaf borne parallel to the ground. Mature specimens have a stalked, spore-bearing, reproductive structure. The spore-bearing structure may or may not be produced annually, and can be 3 times as long as the leaf blade. The leaf diverges from the stem about 2.5-5.0 cm (1-2 in.) above the ground and may be up to 20 cm (8 in.) wide and 20 cm (8 in.) long, usually pinnate 2-3 times. The ultimate leaf segments are mostly obtuse to rounded. Leaves stay bright green throughout the winter with new leaves appearing in the spring (Gleason and Cronquist, 1991; Wagner and Wagner, 1993).

Species Habitat

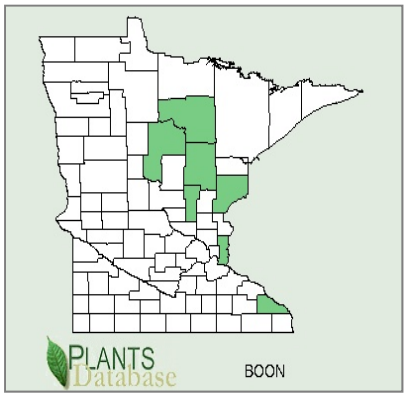
In Minnesota, *B. oneidense* occurs in forests of *Acer saccharum* (sugar maple), *Betula alleghaniensis* (yellow birch), *Fraxinus nigra* (black ash), *Quercus rubra* (northern red oak), and *Tilia americana* (basswood). It occasionally occurs with *Acer rubrum* (red maple), *Fraxinus pennsylvanica* (green ash), *Populus spp*. (aspen), *Pinus spp*. (pine), *Quercus macrocarp*a (bur oak), and *Thuja occidentalis* (northern white cedar). Within the forest, *B. oneidens*e usually grows in moist loam in low areas, swamp edges, or between the high and low water marks of vernal pools. It most often occurs as a few scattered plants, but as many as 100 plants have been observed at one location. It often occurs with other *Botrychium* species, most notably *B. multifidum* (leathery grapefern).

The best time to search for *B. oneidense* is any time before leaves fall from trees in autumn. Snowmelt in the spring reveals the battered, but still identifiable, old frond.

As a member of the *Ophioglossaceae* or evergreen grapefern family, the frond of *B. oneidense* is not killed by frost in the fall but holds its form through winter. Then, during the summer, typically in late June, a new leaf begins to emerge and unfold. The overwintering leaf tends to disintegrate as the new leaf appears. An immature plant will usually bear a single sterile leaf, not developing a spore-bearing stalk until subsequent years. Therefore, many plants are sterile in any given year. The leaf of older plants is more dissected than the leaf of younger plants. In the past, B. oneidense has been treated as a form or variety of *B. dissectum* (dissected grapefern) or *B. multifidum* (leathery grapefern) as well as their hybrid. *Botrychium dissectum*, *B. multifidum*, and *B. oneidense* look very similar when young (U.S. Forest Service, 1999). Wagner (1961) determined that *B. oneidense* is a distinct species, which is supported by Smith's 1967 study of phenolic substances present in this and related species (U.S. Forest Service, 1999).

Sources: language directly from: DNR Rare Species Guide: Query Page: http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PPOPH010C0

Species Distribution and Occurrences within the Study Area



USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=BOON

Botrychium oneidense is listed by the DNR, DRM and the CNF with element occurrence data available by each agency. Point data provided by these agencies identifies 4 distinct populations throughout the Study Area.

Risk Factors

Threats to *Botrychium oneidense* include drought, fire, timber harvest, collecting, herbicides, herbivory, exotic earthworms, succession, and grazing (Chadde and Kudray, 2000d).Most known locations of this species are moist and cool, so alteration of canopy cover may have an effect on site microclimate, creating potentially warmer, drier settings (Chadde and Kudray, 2000a).

Invasion of exotic earthworms appears to represent the greatest threat to this species, and the genus as a whole within the CNF area. While earthworms are generally assumed to have beneficial effects on soil structure, litter decomposition, soil chemistry and nutrient cycling, their presence alters soil horizination, reducing the O (organic) layer, eliminating the E (leaching) layer, and altering the hydrologic function of soils (Chadde and Kudray, 2000x). The presence of earthworms has been shown to decrease micorrizal health and abundance, and by extension, represents a threat to all species of the genera *Botrychium*. USFS Conservation Assessments(Chadde and Kudray,2001) list as “high” the threat of earthworms to this species.

4.2.5.8 Pale Moonwort (Botrychium pallidum)

Pale moonwort is listed as DNR Endangered, CNF RFSS, and DRM Threatened.

Potential effects for this species are described in the following Guilds: Riparian Habitats, Northern Hardwood Forests, Woodlands, and Forest Openings/Exposed Soils/Grasslands.

Species Description

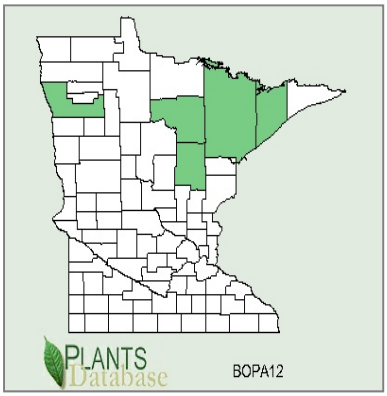
This tiny plant is 2.5-7.6 cm (1-3 in.) high and has a pale green leaf with up to 5 pairs of whitish, kidney-shaped pinnae (lobes of the leaf). Each pair of pinnae may be folded towards each other. The bottom, largest pair of pinnae often split into 2 unequal lobes with rounded tips and with veining like the ribs of

a fan, with no central midrib. Spore capsules, while typically occurring on the fertile or spore-bearing frond, can also occasionally be found on the lobes of the trophophore or non-spore-bearing frond. *Botrychium pallidum* commonly produces dense clusters of minute, spherical gemmae at the root bases. *Botrychium pallidum* can be distinguished from small plants of other *Botrychium* species by the often-folded pinnae and pale green to whitish color (Wagner and Wagner, 1993). Although most populations contain only a few plants, up to 50 individuals have been recorded at a single site. The best time to search for *B. pallidum* is in late spring and early summer when the leaves come out. However, in some years plants do not show above the ground.

Species Habitat

In Minnesota*, B. pallidum* has been found in a diversity of habitats ranging from open fields, dry sand and gravel ridges, roadsides, wet depressions, marshy lakeshores, and tailings basins, as well as second-growth forests and shaded, moist, mixed deciduous-hardwood forests. It is often found growing in disturbed, weedy areas and in forest areas without an overstory. Botrychium pallidum also grows in the shade in mixed forests of *Acer saccharum* (sugar maple), *Alnus* spp. (alder), *Betula* spp. (birch), *Picea mariana* (black spruce), *Populus grandidentata* (big-toothed aspen), *P. balsamifera* (balsam poplar), *P. tremuloides* (quaking aspen), *Quercus rubra* (northern red oak), *Thuja occidentalis* (northern white cedar), and *Tilia americana* (basswood). It is often found growing with other *Botrychium* species, especially B*. matricariifolium* (matricary grapefern), *B. minganense* (Mingan moonwort), *B. multifidum* (leathery grapefern), *B. simplex* (least moonwort), and *B. virginianum* (rattlesnake fern*). B. pallidum* has been found only in association with other *Botrychium* species; it has not been found by itself (Wagner and Wagner 1990).

Species Distribution and Occurrences within the Study Area



B. pallidum is generally a northern species with a distribution from Montana to New York, north to Quebec and west to Alberta. The species is also known from five Rocky Mountain and Front Range counties in Colorado.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=BOPA12

Botrychium pallidum is listed by the DNR, DRM and the CNF with element occurrence data available by each agency. Point data provided by these agencies identifies 18 distinct populations located throughout the Study Area.

Risk Factors

Threats to *Botrychium pallidum* appear to be loss of its typical open grassy habitat due to successional overgrowth. Recreation, changes to available moisture, shifts in the mycorrhizal community, soil compaction, invasion of exotic earthworms and agriculture are additional threats identified by Chadde and Kudray (2003). Invasion of exotic earthworms may be a threat to this species, though the negative effects associated with this threat are assumed to be most pronounced in the O (organic) and A soil layers. *B. pallidum* often occurs where organic matter is minimal, and the impact of worm invasion on this *Botrychium* species is not well understood. In shaded, forest habitats, worms may present a risk to the species through the alteration of forest duff, though research has been generally focused on other species within the genus in these habitats (Chadde and Kudray, 2003). The USFS rates the risk of earthworms on this species as “low” (Chadde and Kudray, 2000).

4.2.5.9 Ternate Grape Fern (Botrychium rugulosum)

Ternate grapefern is listed as DNR Threatened, CNF RFSS and DRM Threatened.

Potential effects for this species are described in the following Guilds: Riparian Habitats, Northern Hardwood Forests, Woodlands, and Forest Openings/Exposed Soils/Grasslands.

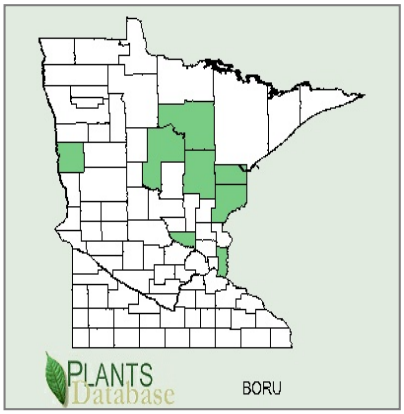
Species Description

In habit, *B. rugulosum* resembles *B. dissectum* forma *obliquum* (cutleaf grapefern) and *B. multifidum* with which it commonly grows, but its leaf emerges from the ground in late May before the former and after the latter. Sterile deltoid leaf blades average 4-8 cm (1.6-3.1 in.) long, with the stalk more or less the same length (shorter in sun forms and longer in shade forms). Unlike the rounded lobes of the leaf of *B. multifidum*, the *B. rugulosum* leaf has angular lobes, mostly 2-5 mm (0.08- 0.2 in.) wide, with the edge of the leaf mostly coarsely and irregularly toothed. *Botrychium rugulosum*'s teeth are dentate (wide-based, squarish, outward-pointing) as opposed to the serrate (narrow, sharp, forward pointing, saw-like) teeth of *B. dissectum* forma *obliquum*. The leaf of *B. rugulosum* may maintain its green color, while the leaf of *B. dissectum* can turn a drab, reddish color and then become bronze-colored in autumn. The best time to search for *B. rugulosum* is from early spring, when snow melts and reveals plants, to late autumn before snowfall covers plants. *Botrychium* species may not emerge every year, especially during drought. The leaf of *B. rugulosum* is semi-evergreen and persists through the winter. When summer approaches, the old frond deteriorates as the new frond emerges (U.S. Forest Service, 1999).

Species Habitat

Botrychium rugulosum grows in low, moist habitats in brushy or grassy areas and in open forest areas. It can be found growing in mossy areas in forests of *Pinus banksiana* (jack pine) or *P. resinosa* (red pine). *Botrychium rugulosum* also occurs in the transition zone between these habitats and adjacent habitats. In most locations, there may be only 1 or a few individuals occurring with relatively more common species of *Botrychium*, especially *B. dissectum* and *B. multifidum*, with which it is often confused (DNR, 2009).

Species Distribution and Occurrences within the Study Area



B. rugulosum occurs in a narrow east-west band from the Atlantic Provinces in Canada to Minnesota mostly known south of the Great Lakes (Chadde and Kudray, 2003b).

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=BORU

Botrychium rugulosum is listed by the DNR, DRM and the CNF with element occurrence data available by each agency. Point data provided by these agencies identifies 17 distinct populations located throughout the Study Area.

Risk Factors

Threats recogonized by Chadde and Kudray (2003b) include: succession to dense canopy tree and shrub cover, extended periods of drought, alteration of the mycorrhizal community, soil compaction, and invasion of exotic earthworms,.

Effects of invasive earthworms on this species are unknown, as the species usually favors disturbed sites where organic soil matter is often limited, though the reduction in mychorrhizal activity due to worms

remains a concern throughout the forest and may affect this species. The USFS rates the risk of earthworms on this species as "low" (Chadde and Kudray, 2000).

4.2.5.10 Least grapefern (Botrychium simplex)

Least grapefern is listed as DNR Special Concern, CNF RFSS and DRM Threatened.

Potential effects for this species are described in the following Guilds: Wet Prairie, Sedge Meadows and Emergent Wetlands, Cedar and Mixed Conifer Swamps, Riparian Habitats, Lowland Forests, Northern Hardwood Forests, Woodlands and Forest Openings/Exposed Soils/Grasslands.

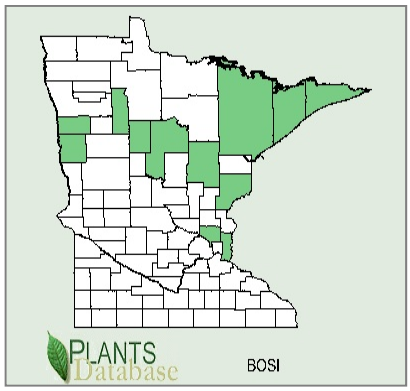
Species Description

Botrychium simplex is a stout and rather fleshy perennial fern, growing 4-12 inches (10-30 cm) tall (Wagner and Wagner, 1993; Rook, 2001). There is a single erect frond divided into a sterile (trophophore) and a fertile (sporophore) segment. The single leaf is pale green, resembling a daisy leaf in shape; about 1 inch (2.5 cm) long, twice-cut, and erect. The stalk is pale green, slender, succulent, fragile, and about 4 inches (10 cm) long. The fertile frond rises above the leaf with erect, branched clusters of prominent yellow spore cases (Chadde, 1999).

Species Habitat

The habitat of the least moonwort includes meadows, barrens, woods, dry fields, marshes, bogs, swamps, and roadside ditches (Lellinger, 1985; Wagner and Wagner, 1993). Lellinger (1985) indicates that the substrate supporting this moonwort is typically subacid. According to Wagner and Wagner (1993) the many environmental forms and juvenile stages of *Botrychium simplex* have resulted in the naming of numerous, mostly taxonomically worthless, intraspecific taxa. In Minnesota, *B. simplex* has been found in northern hardwood forest of sugar maple and basswood, rich black ash and cedar swamps, jack pine woods, prairies, and disturbed areas such as borrow pits, tailings ponds and road shoulders (Chadde and Kudray, 2000e). Rock (2001 cf. Chadde and Kudray, 2000e) cited habitat in Minnesota as including dry or more often damp, partially shaded areas in coniferous forest, or rich deciduous woods on slopes.

Species Distribution and Occurrences within the Study Area



Botrychium simplex is a wide ranging species known from eastern North America from Minnesota east to eastern North Carolina north to New Foundland and Greenland. West Coast populations range from the mountainous regions of eastern California to Utah and Colorado, north in coastal regions of British Columbia and Alaska.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=BOSI

Botrychium simplex is listed by the DNR, DRM and the CNF with element occurrence data available by each agency. Point data provided by these agencies identifies approximately 10 distinct populations located throughout the Study Area (adjacent point data is grouped).

Risk Factors

Threats to *Botrychium simplex* appear to be loss of its typical open grassy habitat due to successional overgrowth. Recreation, development and agriculture are additional threats identified by Chadde and Kudray (2003).

Invasion of exotic earthworms may be a threat to this species, though the negative effects associated with this threat are assumed to be most pronounced in the O (organic) and A soil layers. *B. simplex* often occurs where organic matter is minimal, and the impact of worm invasion on this *Botrychium* species is not well understood. In shaded, forest habitats, worms may present a risk to the species through the alteration of forest duff, though research has been generally focused on other species within the genus in these habitats (Chadde and Kudray, 2003). The USFS rates the risk of earthworms on this species as "medium" (Chadde and Kudray, 2000).

4.2.5.11 Fairy slipper (Calypso bulbosa)

Fairy slipper is listed as CNF RFSS and DRM Threatened.

Potential effects for this species are described in the following Guilds: Cedar and Mixed Conifer Swamps.

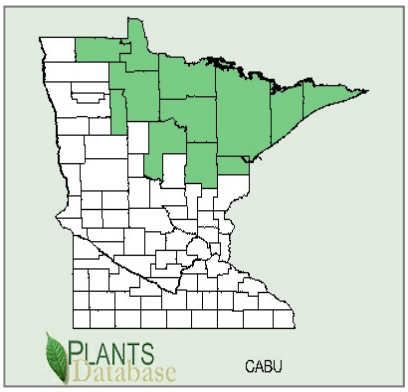
Species Description

At flowering time, the visible portion of this plant consists of a single pleated oval, basal leaf, and a leafless stalk 1-2 dm tall, topped by a tiny solitary flower. The nodding blossom has five purple to magenta petals (1-2 cm long) and a sac-like lip about 2 cm long. The back of the lip is translucent white and spotted with purple, while the front is crested with three rows of yellow hairs (MNFI, 1996b).

Species Habitat

Fairy slipper is widely distributed throughout the Lakes States but locally rare. The species is an inhabitant of moist coniferous forests, particularly spruce-balsam-cedar swamps and drier cedar-fir thickets. When found in boggy areas, it persists on dry hummocks or near the bases of old trees. This orchid occurs in moist, shaded, generally mature coniferous forests, such as spruce-cedar-balsam fir swamps and bog forests. It also occurs in cedar-fir thickets along the Great Lakes shorelines (Case, 1987), often in calcareous sites, and in boreal forests (Chadde, 1999). Canopy cover is usually at least 60% and soil temperature below 15°C (Caljouw, 1981).

Species Distribution and Occurrences within the Study Area



C. bulbosa is a widely ranging species across North America. Populations are known from California to New Mexico north to South Dakota and east to New York and north through all Canadian Provinces and Alaska (USDA Plants Database).

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=CABU

Calypso is listed by the CNF and DRM with element occurrence data available through the CNF database. The DNR does not track this species and location data is not available. CNF data shows 13 distinct areas where this species has been identified.

Risk Factors

Greatest threats to the viability of populations of *C. bulbosa* appear to be extensive deer browsing, loss of viable closed canopy cedar stands, beaver activity (flooding or drainage), alterations to hydrology due to road construction and development (Schmidt, 2003).

4.2.5.12 Blue beech (Carpinus caroliniana)

Blue beech is listed as DRM Sensitive.

Potential effects for this species are described in the following Guilds: Riparian Habitats, Northern Hardwood Forests and Lowland Forests.

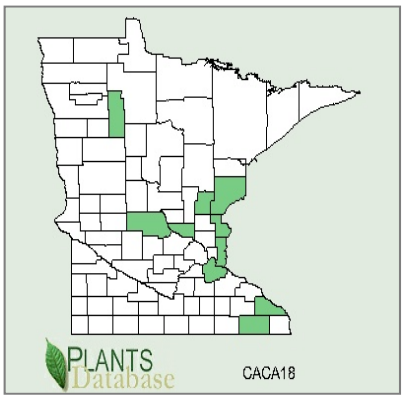
Species Description

The blue beach is a small, understory tree that reaches a height of 10 meters. Distinguishable by it's fluted, "muscular" appearing gray trunk. This member of the Birch Family has simple, alternate finely toothed leaves fruits borne on a distinctive 3-lobed leafy bract in long hanging clusters (Farrar, 1995).

Species Habitat

This species thrives in deep shade and is common in the understory of late successional hardwood forests in Minnesota (Smith, 2008). Additional habitat types include moist soils on lower slopes in valleys and along the borders of streams and swamps (Farrar, 1995). Typical associates include maples, basswood, oaks, black cherry, or paper birch. Although this species is shade tolerant, it still needs light for seed germination. The species also spreads by root suckers, and often forms large colonies (Smith, 2008).

Species Distribution and Occurrences within the Study Area



C. caroliniana is a common understory tree of the eastern United States and Canada, known from Minnesota south to Texas, east to Florida and north to Quebec and Ontario. It is a relatively common understory component for forested areas along the St. Croix River Valley.

USDA Plants Database at:

http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=CACA18

Carpinus caroliniana is only listed by the DRM, so point data from DNR and CNF are not available. According to DRM, it is very uncommon in the LLR (personal communication, DRM, 2009)

Risk Factors

The primary risk factor to this species is conversion of forested habitat to an open setting. In some instances, however, minimal clearing may benefit this species as some light is required for germination.

4.2.5.13 Bitternut Hickory (Carya cordiformis)

Bitternut hickory is listed as DRM Sensitive.

Potential effects for this species are described in the following Guilds: Riparian Habitats, Lowland Forest and Northern Hardwood Forests.

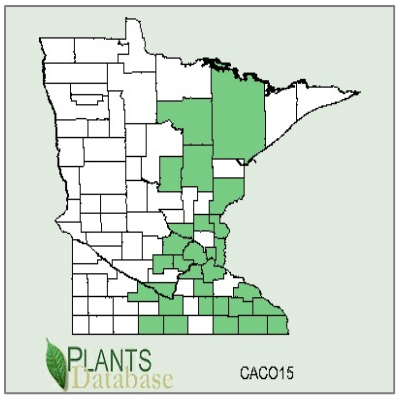
Species Description

Bitternut hickory is a tall, canopy tree most easily identified by it's smooth, tight gray bark with shallow fissures and distinctively bright yellow buds. The opposite leaves on this species are comprised of 7-9 leaflets on a pinnately compound leaf (Smith, 2008)

Species Habitat

This species inhabits beech-maple and mixed hardwood stands (Voss, 1985), river flood plains, well-drained hillsides, and limestone glades (Stone, 1997 cf. U. S. Forest Service, 2001a).

Species Distribution and Occurrences within the Study Area



Bitternut hickory's range extends from the New England States south to Florida west to Texas and north to northern Minnesota. It is most common from southern New England west to Iowa and from southern Michigan south to Kentucky (Coladonato, 1992). As of 2001, this species was known form two sites on the CNF, McAvity Bay on the north shore of Lake Winnibigoshish (U. S. Forest Service, 2001a). These sites represent the northern-most location for this species in Minnesota.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=CACO15

Carya cordiformis is only listed by the DRM, so point data from DNR and CNF are not available. According to DRM, only one occurrence is known to exist on the CNF and LLR.

Risk Factors

The primary threat to this species where it occurs in the CNF is direct removal for development or clear-cut timber practices.

4.2.5.14 Hackberry (Celtis occidentalis)

Hackberry is listed as DRM Sensitive.

Potential effects for this species are described in the following Guilds: Riparian Habitats, Northern Hardwood Forests and Lowland Forests.

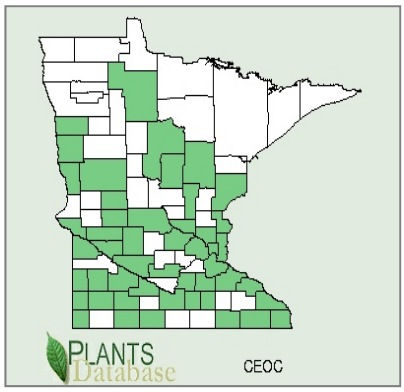
Species Description

Hackberry is a large tree with a broad open crown. Easily recognizable by its gray bark with warty ridges on young trees and distinct raised scales on mature trees, this member of the elm family grows to 33m in height (Smith, 2008).

Species Habitat

Hackberry is common to floodplains, though not considered a floodplain specialist. It grows in a wide range of soils with the exception of peat. The species is considered a climax species of hardwood forests, though usually outcompeted by maple and basswood when in direct competition for light. For this reason, hackberry rarely becomes a dominant species in northern hardwood forests (Smith, 2008).

Species Distribution and Occurrences within the Study Area



Hackberry is widely distributed throughout east central North America from north Texas north to North Dakota, east to southern Quebec and Vermont, south to Georgia.

In Minnesota, Hackberry is common to the southern and eastern portions of the state, but not known from the arrowhead region. The Study Area is at the northern edge of the species range.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=CEOC

Celtis occidentalis is only listed by the DRM, so point data from DNR and CNF are not available. According to the DRM, hackberry is only known to grow in scattered shoreline and island locations around Leech Lake.

Risk Factors

The primary threat to this species where it occurs in the Study Area is direct removal for development or clear-cut timber practices. Seedlings of this species typically extablish in hardwood stands, and rarely occur in openings.

4.2.5.15 Sweet-fern (Comptonia peregrina)

Sweet-fern is listed as DRM Sensitive.

Potential effects for this species are described in the following Guilds: Woodlands and Openings/Exposed Soils/Grasslands.

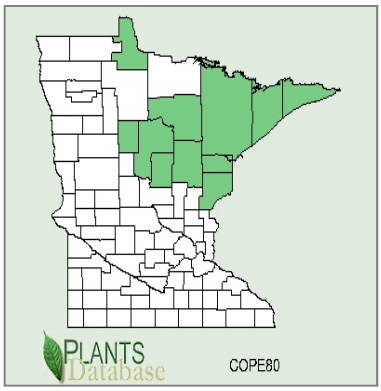
Species Description

Sweet-fern is a small bushy shrub with a fern-like appearance that grows up to 1 meter tall. Distinguishable in the field by its woody, brown to reddish brown hairy stems, this member of the Bayberry Family has simple leaves, 3-12 cm long with prominent rounded or rhombic-shaped lobes with sinuses extending nearly to the midvein (Smith, 2008).

Species Habitat

This species occurs on dry, sterile soils, usually under scattered pines, oaks or aspen. A fire dependent species, sweet-fern is favored by periodic burns. The species diminishes with the closure of forest canopy but may quickly reappear with the reintroduction of fire, or alternately, clear cutting. Reproduction following forest clearing may occur due to dormant rhizomes or seeds that remain viable for long periods of time (Smith, 2008). Because it fixes nitrogen, it does well on disturbed sites or sites with sterile soil, such as abandoned fields and pine barrens. Sweetfern is a shade intolerant invader of newly opened canopies and disturbed sites (Snyder, 1993).

Species Distribution and Occurrences within the Study Area



Sweet-fern occurs from New Brunswick south through the New England states to the northern tip of Georgia and west through northern Illinois, Indiana, and the Great Lakes states to eastern Saskatchewan and North Dakota (Snyder, 1993).

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=COPE80

Comptonia peregrina is only listed by the DRM, so point data from DNR and CNF are not available. According to DRM, sweet-fern was only known to grow in one location within the LLR; the population was recently lost due to timber harvest.

Risk Factors

Risk to this species could occur as direct loss of individuals if located at a pole location. If present, this species may benefit from the clearing of closed canopy, particularly on dry soils. Smith (2009) points out that this species may seem to disappear in fire-suppressed habitats where light availability has been

limited, but may reappear after clearing, possibly due to new shoots from dormant buds, or from seeds known to remain viable for long periods.

4.2.5.16 Ram's-Head Ladyslipper (Cypripedium arietinum)

Ram's-head ladyslipper is listed as DNR Threatened, CNF RFSS, and DRM Threatened.

Potential effects for this species are described in the following Guilds: Cedar and Mixed Conifer Swamps.

Species Description

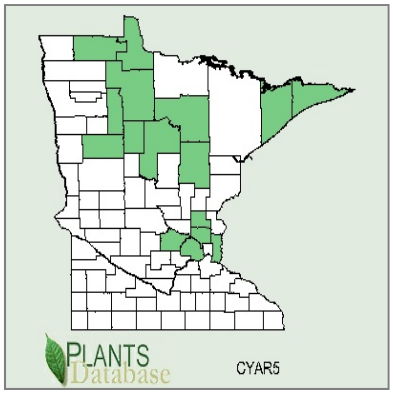
Like all members of this genus, *C. arietinum* has 3 petals, 1 modified into a pouch or "slipper." In *C. arietinum* the pouch is densely pubescent and white with purple markings, which, with a little imagination, looks like the head of a charging ram. It has 2 or more alternate leaves borne nearly to the top of the stem. The lateral sepals are free rather than fused, which distinguishes *C. arietinum* from all other Cypripediums (Smith, 1993).

Species Habitat

The Minnesota populations of *C. arietinum* occur in a variety of coniferous forest habitats. Several populations occur in swamps, bogs, or lowland forests dominated by *Thuja occidentalis* (northern white cedar*), Larix laricina* (tamarack), *Abies balsamea* (balsam fir), or *Picea mariana* (black spruce). The species also occurs in the drier upland conifer forests that may be dominated by *Pinus strobus* (white pine), *P. resinosa* (red pine), or *P. banksiana*. All these habitats appear to be weakly acidic or circumneutral, but vary in their mineral composition from poor to rich (Coffin and Pfannmuller, 1988).

Forest, bogs, acidic; bedrock; shorelines-interdunal areas; wide variety of forested habitats; (tends to uplands on Superior NF; wetlands on CNF). This orchid occurs in shaded low dunes along the Great Lakes, under jack pine-oak forest, in coniferous swamps, and fir- cedar-spruce bogs. Case (1987) notes that it occurs on both sub-acid and neutral soils. Associated species include white cedar, balsam fir, spruce, pine, paper birch, *Ledum groenlandicum, Linnaea borealis, Gaultheria hispidula, Arctostaphylos uva-ursi, Cypripedium acaule, Chimaphila umbellata*, and Aster species (Case, 1987; Ostlie, 1990d).

Species Distribution and Occurrences within the Study Area



C. arietinum ranges from Ontario and the Canadian Atlantic Provinces to Maine and New York, west to Northern Minnesota and in a band extending through central Manitoba and Saskatchewan (Brzeskiewicz, 2000).

USDA Plants Database at:

http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=CYAR5

Cyprepidium arietinum is listed by the DNR, DRM and the CNF with element occurrence data available by each agency. Point data provided by these agencies identifies approximately 12 distinct populations located throughout the Study Area (point data within the same basin is grouped).

Risk Factors

Principle recognized threats to this species include timber clearing, associated ground disturbance and increased light with accompanying soil drying. The species appears to prefer mid-successional forest habitats formed from past disturbance, so full canopy closure may adversely affect the species as do forest clearing practices. Other potential threats to this species include alteration of drainage patterns

due to human and beaver activity and development, excessive browse by deer, cattle or insects and competition from invasive shrub species (*Rhamnus cathartica, R. frangula, Lonicera morowii* and others, and *Berberis thunbergii*) (Brzeskiewicz, 2000).

4.2.5.17 Spatulate-leaved Sundew (Drosera intermedia)

Spatulate-leaved sundew is listed as DRM Sensitive.

Potential effects for this species are described in the following Guilds: Bogs and Fens.

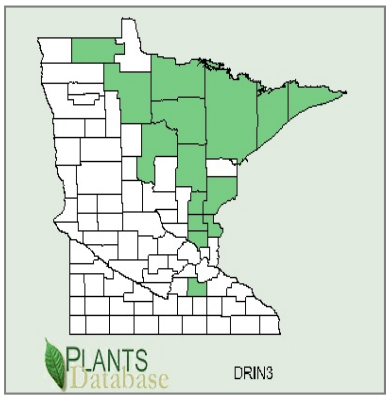
Species Description

Spatulate-leaved sundew is a perennial insectivorous plant with a basal rosette of spatula-shaped leaves with an upper surface covered with gland-tipped hairs. The 2-4 mm wide leaves sit atop a 2-5 cm smooth petiole. The white flower has 3-4 mm long sepals and petals 4-5 mm long sitting atop a 20 cm tall stem (Chadde, 2002).

Species Habitat

This species occurs in the wettest parts of bogs and on sandy shores subject to periodic inundation (Voss, 1985). Lakela (1965) cites the species as occurring in floating bogs, on edges of mucky hummocks in northeastern Minnesota.

Species Distribution and Occurrences within the Study Area



D. intermedia ranges across the North American continent from Nunavut in Canada south to Texas, east to Florida and north to the Canadian Atlantic Provinces. The species is known from one county in Idaho.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=DRIN3

Drosera intermedia is only listed by the DRM, so point data from DNR and CNF are not available.

Risk Factors

Principle threats to this species are alteration of hydrology due to human or beaver activities and succession to dense shrub or tree cover.

4.2.5.18 Goldie's fern (Dryopteris goldiana)

Goldie's fern is listed as DNR Special Concern, CNF RFSS and DRM Threatened.

Potential effects for this species are described in the following Guilds: Lowland Hardwood Forests and Northern Hardwood Forests.

Species Description

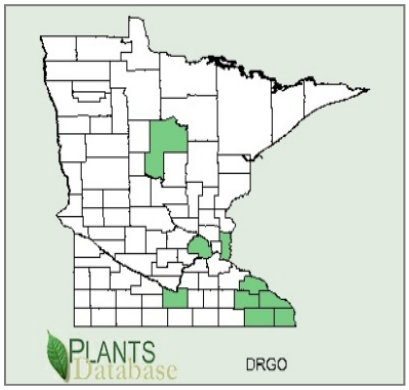
This large, clumped fern with creeping rhizomes has leaves that grow to 1 meter long with blades 30 to 60 cm long and 20-40 cm wide. Distinguished by large, broad backward tilting, golden-green leaves, backward tilting blades and shallowly toothed pinnules (Tryon, 1993 and Cobb, 1963).

Species Habitat

Range wide, Goldie's fern inhabits dense, moist woods, especially ravines, limey seeps, on peninsulas of large water bodies or at the edge of swamps (Montgomery and Wagner, 1993). Minnesota represents

the northwestern extent of the species range; inhabiting moist soil on north-facing or east-facing, wooded slopes (Coffin and Phannmuller, 1988).

Species Distribution and Occurrences within the Study Area



This species ranges from eastern Canada to South Carolina, west to Iowa and Minnesota.

In 1993, this species was recognized in only four counties in Minnesota with three of these counties located in the southern portion of the state. The northern populations are known from Ottertail Point on Leech Lake in Cass County (Tryon, 1993) and along the north shore of Lake Winninibigoshish (DNR Element Occurrence Records).

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=DRGO

Dryopteris goldiana is listed by the DNR, DRM and the CNF with element occurrence data available by each agency. Point data provided by these agencies identifies approximately 4 distinct populations located in two areas within the Study Area. One area occurs along Ottertail Point on Leech Lake, the other on the north shores of Lake Winnibigoshish. According to the DRM, it was also recently found along Big Lake in Beltrami County.

Risk Factors

Conversion of forest to more open conditions and removal of mature forest canopy is the primary risk to this species.

4.2.5.19 Olivaceous Spike-Rush (Eleocharis olivacea)

Note: the accepted scientific name for this species is now *Eleocharis flavescens* var. *olivacea*.

Olivaceous spike-rush is listed as DNR Threatened, CNF RFSS and DRM Threatened.

Potential effects for this species are described in the following Guilds: Bogs and Fens and Wet Prairie, Sedge Meadows and Emergent Wetlands.

Species Description

Eleocharis olivacea is a short, stocky, tufted species that can be reliably identified by the achenes (seeds). They are biconvex with a 2-cleft style, olive to dark brown in color, and have overtopping bristles. The tubercle at the top of the achene is saucer-shaped with a conical center. The scales that subtend the achenes are ovate and round-tipped, with a prominent green midrib and sides that are brown to reddish in color.

Species Habitat

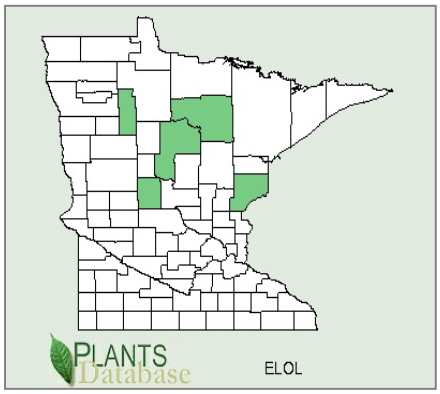
Eleocharis olivacea exhibits a preference for shoreline habitats, where substrates may include peat, sand, silt, or mud. Plants may occur in several centimeters of water or stranded above the water line. Habitats have been described as along edges of small bog pools, on floating mats, in a bog dominated by *Chamaedaphne calyculata* (leatherleaf) and *Carex* spp. (sedges), a muddy shore of a peatland pond, and a mucky lakeshore in a mixed forest. One record is from the mucky edge of a beaver channel in a bog, appearing to be in the traffic pattern of beaver activity. The largest population of *E. olivacea* found to date occurs on the black, silty, saturated masses of bog material floating at the water surface along a

boggy shoreline. Associated species may include *Potamogeton bicupulatus* (snailseed pondweed), *P. amplifolius* (large-leaved pondweed), *Myriophyllum farwellii* (Farwell's water milfoil), *Scirpus subterminalis* (swaying bulrush), *Pogonia ophioglossoides* (rose pogonia), *Polygonum amphibium* (water smartweed), and *Megalodonta beckii* (Beck's water-marigold). *Utricularia gibba* (humped bladderwort) was an associated species in at least 4 of the 10 known sites.

This spike-rush is an emergent on open, moist shores, mud flats, or bog mats, occurring in saturated substrates to standing water (Voss, 1972). It is often found in marly areas although substrates may also be peaty, sandy, or muddy. One site is known in the Upper Peninsula of Michigan, in Houghton County (Voss, 1972). The plant is also known from Vilas County on the Chequamegon-Nicolet National Forest (Regional Forester, Eastern Region, 2/2000; WI Vascular Plants database, 2009).

Minnesota populations of this species are known from a mucky lakeshore in a mixed forest and from the muddy shore of a peatland pond. Shorelines appear to provide the most preferred habitats with a substrate that ranges from peat, sand, silt or mud and may occur in several inches of standing water (Coffin and Pfannmuller, 1988).

Species Distribution and Occurrences within the Study Area



This species occurs along the East Coast of the United States and Canada and along a band at the south end of the Great Lakes. Minnesota is located at the western edge of the species range. The species is considered rare in its inland habitats (Coffin and Pfannmuller, 1998).

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=ELOL

CNF, DRM and DNR data indicate that this species is known within the Study Area from only one wetland area near Hale Lake, north of Lake Winnibigoshish.

Risk Factors

Threats to this species are alterations to the hydrology of appropriate wetland/shoreland habitat and individual destruction due to construction activities.

4.2.5.20 Few-flowered Spike-rush (Eleocharis quinqueflora)

Few-flowered spike-rush is listed as DNR Special Concern, CNF RFSS, and DRM Sensitive.

Potential effects for this species are described in the following Guilds: Bogs and Fens and Wet Prairie, Sedge Meadows and Emergent Wetlands.

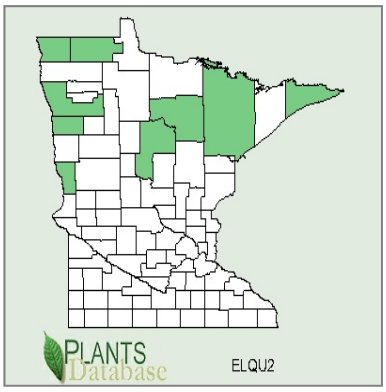
Species Description

Few-flowered spike-rush is a small, clumped perennial that spreads by rhizomes. The species has threadlike stems, 1-3 dm long and less than 1 mm wide.

Species Habitat

In habits wet, sandy or gravelly shores, marshes and fens in often calcium rich locations (Gleason and Cronquist, 1991). In Minnesota, specimens are from the prairie region from aquatic habitats along lakeshores. In adjacent states the species is reported from saline and alkaline habitats (Coffin and Pfannmuller, 1998).

Species Distribution and Occurrences within the Study Area



This species ranges from Mexico and California to Alaska to Newfoundland south to New Jersey and across the Northern Great Plains.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=ELQU2

DNR and CNF data indicate that *Eleocharis quinqueflora* is known from three locations along the southern and eastern portions of the Study Area.

Risk Factors

Threats to this species are alterations to the hydrology, primarily increasing water levels of appropriate wetland/shoreland habitat and individual destruction due to construction activities.

4.2.5.21 Closed gentian (Gentiana andrewsii)

Closed gentian is listed as DRM Sensitive.

Potential effects for this species are described in the following Guilds: Wet Prairie, Sedge Meadows and Emergent Wetlands.

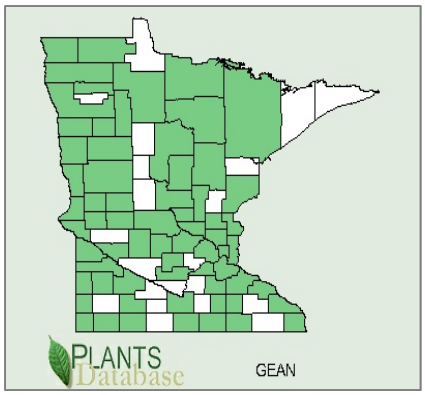
Species Description

Closed, or Bottle Gentian is an herbaceous flowering plant that grows to 20in tall, usually without branches on a stout, erect stem. Leaves are arranged opposite along the stem, are long-oval to lance shaped, pointed at the tip and narrowing toward the base with parallel veining. Uppermost leaves often forma a whorl of four to six at the base of the main flowerhead. The bright blue or purple flower is 2” long and clustered without individual flower stalks (Runkel, 1999).

Species Habitat

This species inhabits rich, damp soils of low prairies, and the edges of moist woodlands (Runkel, 1999).

Species Distribution and Occurrences within the Study Area



G. andrewsii is a species of northeastern North America ranging from Colorado and Nebraska east to Virginia, north to Quebec and west to Saskatchewan. The species is generally rare within its eastern range. The species is known from all regions of the State of Minnesota.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=GEAN

Gentiana andrewsii is only listed by the DRM, so point data from DNR and CNF is not available.

Risk Factors

Risk includes direct loss due to construction activities or conversion of open habitats to closed canopy settings.

4.2.5.22 Limestone oak fern (Gymnocarpium robertianum)

Limestone oak fern is listed as CNF RFSS and DRM Sensitive.

Potential effects for this species are described in the following Guilds: Cedar and Mixed Conifer Swamps.

Species Description

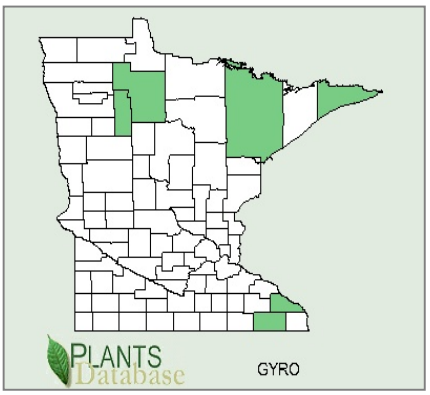
Limestone oak-fern is a small, delicate triangular leaved and perennial fern. This species grows from fine, wirey, smooth stems. This species is very similar to the more common Oak Fern (*Gymnocarpium dryopteris*), but is distinguished by the shape and relative size of the lowest pair of leaflets, with *G. dryopteris* having the two lowest leaflets nearly as large as the broadly triangular central segment, and *G. robertianum* having the lowest leaves clearly smaller than the central segment. *G. robertianum* contains glands along the rachis, whereas the rachis of *G. dryopteris* is usually glabrous (Cobb, 1963 and Tryon, 1993).

Species Habitat

This species inhabits calcareous substrates such as limestone pavement, outcrops, and cliffs and also in *Thuja* swamps (Pryer, 1993).

In Minnesota, *Gymnocarpium robertianum* occurs on shaded talus and shale, in clay soil in forests and on roots in cedar swamps. In the CNF, occurrences are all on moss in cedar swamps "shaded talus slope and calcareous shale; within forests on clay soil; perched rootmass of cedar (*Thuja*) swamps". In CNF, the three occurrences of this species are all on mossy ground in cedar swamps. Elsewhere in the state, it occurs in spruce-fir forests. One collection from Cook County was from a granitic, possibly acidic, cliff (Schultz, 2002).

Species Distribution and Occurrences within the Study Area



This is generally a northern species with a range from Newfoundland to Alaska in the north, south to Pennsylvania, Iowa and British Columbia. There are 13 known populations in Minnesota with three of these located in the CNF (Schultz, 2002).

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=GYRO

CNF data indicate that *Gymnocarpium robertianum* is known from only one location in the center of the Study Area.

Risk Factors

The principal risk to this species where it occurs is the removal of the forest canopy due to natural or human caused activities, particularly in its preferred cedar and mixed conifer swamp habitat. Additional threats to the species include alteration of hydrology to cedar swamps (beaver activity) and the introduction of exotic and invasive species (Schultz, 2002).

4.2.5.23 Sweet grass (Hierochloe odorata)

Sweet grass is listed as DRM Sensitive.

Potential effects for this species are described in the following Guilds: Bogs and Fens, Wet Prairie, Sedge Meadows and Emergent Wetlands, Woodlands and Openings/Exposed Soil/Grasslands.

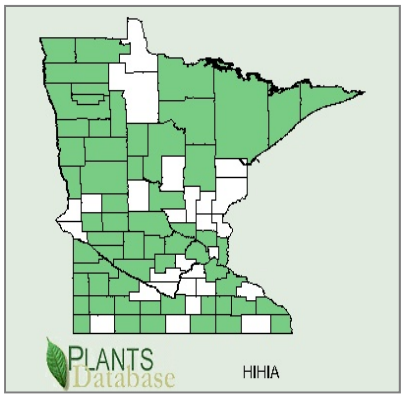
Species Description

Sweet grass grows from 30 cm to 60 cm. tall with few to several leafy shoots and slender creeping rhizomes. Leaf blades are 2 to 5 mm wide. The panicle is a somewhat pyramidal shape, 4 to 12 cm long with slender drooping branches and mostly short pediceled, bronze colored spikelets (Hitchcock, 1950). The name derives from the sweet, vanilla-like smell of all parts.

Species Habitat

Most commonly known from wet meadows, bogs and moist places, though may be found in drier sandy sites.

Species Distribution and Occurrences within the Study Area



The taxonomy of this species is in dispute, and synonyms include *Anthoxanthum monticola, Hierochloe hirta* ssp. *arctica,* ssp. *hirta* and ssp. *dahurica.* The USDA plants database lists Northern Sweetgrass (*Hierochloe hirta* spp. *arctica*) as the only species in this genus from Minnesota.

H. hirta spp. *arctica* is known from Alaska to Labrador, south to New Mexico and Arizona to New Jersey. The DRMlists this plant as: "Traditionally used; fairly uncommon, unrecognized, or under-reported on reservation."

The following distribution map shows the herbarium records for the synonym *Hierochloe hirta* spp. *arctica.*

USDA Plants Database at:
http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=HIHIA

Hierochloe odorata is only listed by the DRM, so point data from DNR and CNF is not available.

Risk Factors

Risks to this species include direct disturbance of existing populations and succession from openings to closed canopy settings.

4.2.5.24 Butternut (Juglans cinerea)

Butternut is listed as DNR Special Concern and DRM Sensitive.

Potential effects for this species are described in the following Guilds: Riparian Habitats and Lowland Forest.

Species Description

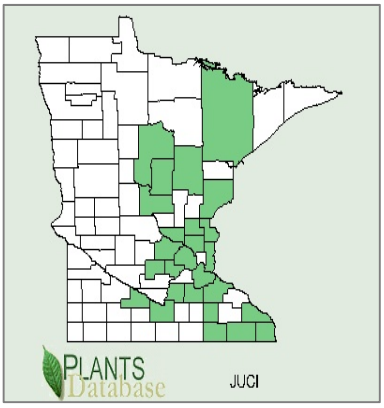
Butternut is a small to medium-sized tree averaging 40 to 60 feet (12-18m) in height and 12 to 24 inches (30-60 cm) in d.b.h. This tree has a short trunk which is divided into a few ascending limbs with large spreading, sparsely forked branches. The smaller branches tend to bend downwards and then turn up at the ends. The crown is open, broad, irregular in outline, and rounded at the top (Coladonato, 1991).

Species Habitat

This tree occurs in mesic hardwoods, stream banks and bottomlands, swamp forests, and also on dry, rocky, limestone soils. Associates include *Tilia americana*, *Acer saccharum* and *Quercus* sp.

Butternut is shade intolerant and can only reproduce in openings without shade. Thus, seedlings will not develop under the parent tree. Good seed crops are only produced every 2-3 years, and seed production does not begin until about age 20. As young trees grow, they need to stay in the upper canopy to fully develop (Ostry et al., 1994).

Species Distribution and Occurrences within the Study Area



Coladonato (1991) provides the following Distribution information:

Butternut is distributed from southeastern New Brunswick throughout the New England States except for northern Maine and Cape Cod. Its range extends south to include northern New Jersey, western Maryland, Virginia, and Tennessee. Small isolated pockets occur in North Carolina, northwestern South Carolina, northern Georgia, northern Alabama, northern Mississippi, and Arkansas. Westward it is found in eastern Iowa and southeastern Minnesota. Disjunct populations occur in Wisconsin, Michigan, and northeast into Ontario and Quebec. Throughout most of its range, butternut is not a common tree and its frequency is declining. The ranges of butternut and black walnut overlap, but butternut occurs farther north than and not as far south as black walnut.

USDA Plants Database at:
http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=JUCI

DNR Element Occurrence Data shows no known occurrences of *Juglans cinerea* within the Study Area. According to DRM, there is a small population found in Northern Cass County within the LLR.

Risk Factors

Risks to occurrences of this species are direct loss of individuals due to forest clearing. This species may benefit from additional forest opening.

4.2.5.25 Auricled Twayblade (Listera auriculata)

Auricled twayblade is listed as DNR Endangered.

Potential effects for this species are described in the following Guilds: Riparian Habitats and Lowland Forest.

Species Description

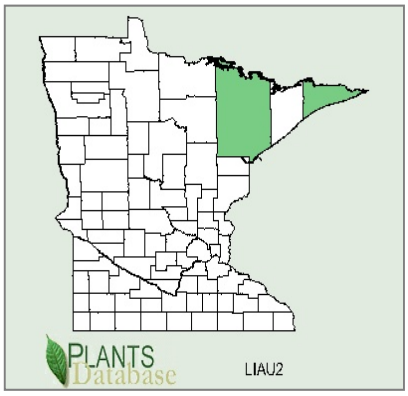
Listera auriculata produces a flowering stem 10-20 cm (4-8 in.) high with small distinctive flowers that necessitate a close examination for positive identification. Flowers are pale green with 3 sepals and 3 petals. The lower petal is modified into a broad lip that is dilated near the summit. The lip is cleft 1/4 to 1/3 its length and auricled at the base. There is a single pair of opposite, ovate, sessile leaves. Two other species of *Listera* occur in the state. One of these, *L. cordata*, is similar but the lip is not dilated above. *Listera convallarioides* is also similar and does have a dilated lip, but the base in not auricled.

Species Habitat

In the Great Lakes region, *L. auriculata* is reported to colonize sites near the mouths of streams, above the normal high-water line, either in sand under *Alnus* spp. (alders) or on mossy banks under forest trees (Case, 1964). In Minnesota, it is characteristically found along streams or pond margins in low, moist hardwood forests, mixed hardwood-coniferous forest, and shrub swamps. It is also found on the

bedrock and gravel shore of Lake Superior. These are typically shady, mossy, acidic habitats on alluvial deposits or on shallow, organic soil. The collection record indicates *L. auriculata* most often occurs in rather small, transient colonies. Most populations recorded in Minnesota have only a few individuals; only occasionally will a large population be found (Smith, 1993).

Species Distribution and Occurrences within the Study Area



Auricled twayblade is found generally along the northern Great Lakes and northward throughout Ontario, Quebec, Newfoundland and Labrador.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=LIAU2

DNR Element Occurrence data shows no known locations of auricled twayblade within the Study Area.

Risk Factors

Because auricled twayblade is most often found in frequently disturbed natural communities, changes in disturbance frequency or severity can alter or destroy its habitat. In northern New England, the most frequent disturbers of auricled twayblade–related hydrology are logging and dams for flood control and electricity (Hoy, 2001).

4.2.5.26 White adder's mouth (Malaxis brachypoda [M. monophylla var. brachypoda)

White adder's mouth is listed as DNR Special Concern, CNF RFSS and DRM Threatened.

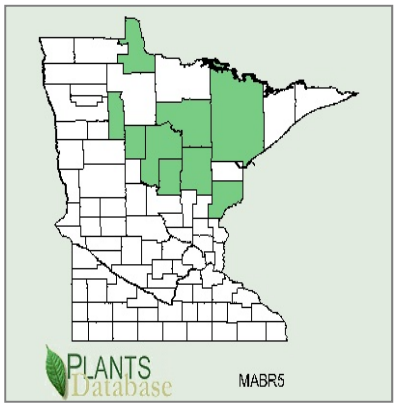
Potential effects for this species are described in the following Guilds: Riparian Habitats and Lowland Forest.

Species Description

Perennial herb that grows from a bulblike base. Stems are 1-2 dm long and smooth with a single ovate to oval leaf that appears attached well above the base of the stem. The leaf base clasps the stem. The inflorescence is spicate and slender with up to 30 tiny, green-white evenly spaced flowers with linear petals. Lip is heart-shaped, bent downward, 2-3 mm long and 2-1 mm wide and narrows in the middle, forming a long, lance-shaped tip (Chadde, 2002).

Species Habitat

This perennial orchid is found in cold, wet soils in conifer swamps (cedar-balsam, tamarack, and fir-spruce), especially in wet depressions and where soils are marly (Case, 1987). It may also occur in wet hardwoods bordering conifer swamps, along streams, near springs (Case, 1987), or in moist jack pines (Newhouse, 1993). Microsites may occur in animal trail wet depressions or low pockets at the bases of old cedar trees (Case, 1987), on hummocks, tip-ups, or mossy logs (Newhouse, 1993). Case (1987) states that populations are "always local or spotty" and that the species is non-aggressive and non-competitive. Associates include mosses and sedges (Case, 1987).



Species Distribution and Occurrences within the Study Area

In North America this species is known from Alaska through the

Northwest Territories to Labrador in Canada, south to New Jersey, Pennsylvania, Indiana and Illinois north to Minnesota and west to British Columbia. Disjunct populations are known from California and Colorado (USDA Plants Database).

USDA Plants Database at:
http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=MABR5

CNF and DNR data indicate that this species is known within the Study Area from 27 distinct locations. According to the DRM, about six new locations were found for this species in the summer of 2009 by DRM and DNR personnel in Beltrami County.

Risk Factors

USFS (1999 cf. Schultz, 2003) suggests, "The major threat to *Malaxis brachypoda* appears to be changes to the wetland hydrology of sites supporting this species, either from human-caused drainage, or from fluctuating water levels due to beaver or climatic changes." Case (pers. comm. cited in Schultz, 2003) observed that *Malaxis brachypoda* occurrence is much more localized due to "destruction and drainage of the land, lack of suitable cover, and in open habitats with over warm soil temperatures." According to the USFS (2000 cited in Schultz, 2003), in Region 9, 50 percent or more canopy cover is best for *Malaxis brachypoda.* A major threat to *Malaxis brachypoda* is logging which removes or reduces canopy cover through clear-cuts and heavy thinning (USFS 1999 cf. Schultz, 2003). Other risks include peat mining and conversion of peat lands to other land uses.

4.2.5.27 Bog adder's mouth (Malaxis paludosa)

Bog adder's mouth is listed as DNR Endangered and DRM Endangered.

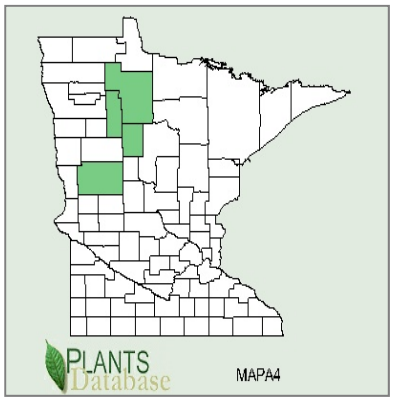
Potential effects for this species are described in the following Guilds: Cedar and Mixed Conifer Swamp.

Species Description

Malaxis paludosa has 2-5 alternate, basal leaves that subtend a pseudobulb. Leaves may also develop marginal bulblet-like reproductive structures. The inflorescence is spicate and very slender with up to 30 tiny, yellowish-green flowers with ovate petals. Malaxis paludosa bears a superficial resemblance to the somewhat larger M. monophyllos (white adder's mouth), which differs in having a single leaf, linear petals, and a long-pointed lip (Smith, 1993).

Species Habitat

Minnesota populations are found in rich conifer swamps of *Thuja occidentalis* (white cedar), *Picea mariana* (black spruce) and *Larix laricina* (tamarack). In its chosen habitat, *M. paludosa* generally occurs on hummocks of *Sphagnum* spp. (sphagnum moss). Individuals sometimes appear to be perched on the moss as if they were not actually rooted. Most populations consist of only a very few individual plants (Smith, 1993). It is not only rare but also easily overlooked. This is because of its small stature (its flowers may be the smallest of any North American orchid), and its habit of growing on moss hummocks where its greenish color makes it difficult to see. Furthermore, the leaves are often concealed beneath the mosses and only the slender inflorescence (sometimes only 2-5 cm tall; 0.8-2 in.) is visible above the moss carpet.



Species Distribution and Occurrences within the Study Area

Common in Northern Europe, this species is considered extremely rare throughout its range in North America (Coffin and Pfannmuller, 1998).

USDA Plants Database at:
http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=MAPA4

CNF and DNR data indicate that this species is known from only one location near the eastern edge of the Study Area on private land. Unconfirmed occurrences of two populations identified in 2008 and 2009 within the CNF have been reported (pers. comm. Husveth, 2009).

Risk Factors

Threats to *M. paludosa* include timber harvesting in suitable wet conifer forests where harvest practices remove canopy and alterations to hydrology from beaver or human activities (flooding or drainage).

4.2.5.28 Partridge-berry (Mitchella repens)

Partridge-berry is listed as DNR Special Concern, CNF RFSS and DRM Sensitive.

Potential effects for this species are described in the following Guilds: Lowland Forest and Northern Hardwood Forest.

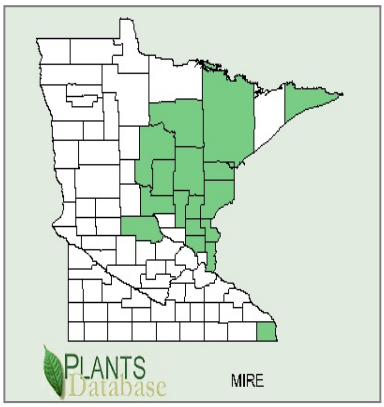
Species Description

This is a creeping (not climbing), evergreen vine. The leaves are opposite, dark green, short petioled, ovate to cordate with a pale yellow midrib. Inflorescence is comprised of axillary or terminal white flowers borne in pairs followed by a single scarlet or white berries. Each flower has one pistil and four stamens. Stems root at the nodes, forming mats (Gleason and Cronquist, 1991).

Species Habitat

Typically, Partridgeberry inhabits climax undergrowth vegetation in several forest communities in the eastern United States. It is not dominant in any habitat type. Partridge-berry typically prefers mildly acidic, well drained mesic soils, but can be found in a variety of sites. Most commonly, it grows on moss hummocks, shaded ledges and banks where leaching is present It (Coladonato, 1993a).

Species Distribution and Occurrences within the Study Area



Widely distributed throughout the eastern United States, Partridgeberry is found from Newfoundland to Florida, and Texas to southern Ontario (Coladonato, 1993a).

USDA Plants Database at:
http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=MIRE

CNF and DNR data show no element occurrences for this species within the Study Area.

Risk Factors

The primary threat to this species is removal of forest canopy and conversion of mature forest to more open settings.

4.2.5.1 One-flowered broomrape (Orobanche uniflora)

One-flowered broomrape is listed as DNR Special Concern, CNF RFSS and DRM Threatened.

Potential effects for this species are described in the following Guilds: Northern Hardwood Forest.

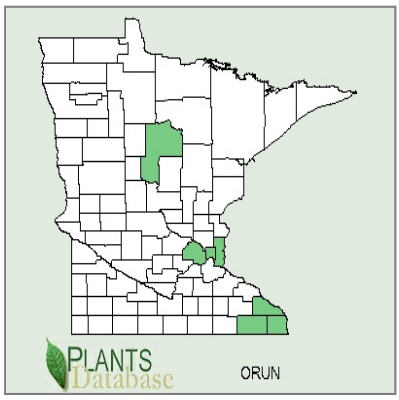
Species Description

Parasitic on many kinds of plants. Flowers solitary, or a few, rarely up to ten. Stem 1-3 cm with some or all underground with a few overlapping, oblong-obvate, glabrous, blunt or apiculate scales. Inflorescence is Calyx bell-shaped, usually pointed downward. Pedicels 1-3, erect, finely glandular-hairy, each with a single white to violet flower 2cm with 5 calyx lobes slightly longer than the tube.

Species Habitat

This species is a root parasitic of woodland habitats , including woodland edges and openings. A variety of plants can act as hosts to the species, including forest trees and herbaceous plants. Known mostly from Southeastern Minnesota forests two records are documented from Cass County. The stem of *O. uniflora* is generally subterranean with small flowers that appear above leaf litter. "If there is a preference, it is probably for mesic wooded sites with north-facing slopes" (Coffin and Phannmuller, 1988), this species is also known from a variety of habitat locations in Minnesota. Southeastern Minnesota element occurrences for this species include wooded bluffs in Winona County, in a bedrock bluff prairie in Winona County with dry prairie species, and north facing moist woods in Fillmore County. In Blaine, Minnesota, on the Anoka Sandplain, the species has been found in sandy soils under well drained forests of quaking aspen, black cherry with common buckthorn, gray dogwood, reed canary grass, Canada bluejoint and sessileleaf bellwort.

Species Distribution and Occurrences within the Study Area



O. uniflora is found in the west from British Columbia and Saskatchewan south to Eastern California, to Utah and Colorado. Eastern populations (including Minnesota) extend from eastern Nebraska south to eastern Texas to northern Florida and north to Newfoundland.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=ORUN

DNR and previously documented CNF records (since updated) indicate a population 300'-400' south of the Route 1 Study Area and 900'-1,000' south of the existing pipeline corridor. DRM staff have indicated that the original point location for this species was identified by DRM and a botanical survey crew , led by Beth Nixon, that was working on the Great Lake Corridor Survey in 1997. The DNR/CNF point location was probably based on centering the plant location to the nearest quarter/quarter section or taken by an older GPS unit that was uncorrected for error. The actual location is within about five feet of the southern edge of the Great Lakes Gas Pipeline corridor. During the past few years plant survey crews working on the Enbridge and BGR projects, as well as CNF and DRM staff, have attempted to relocate the original plants without success. An additional attempt was made by DRM and CNF staff on June 17, 2009. The original plants along the southern edge of the existing corridor were not relocated. However, they did locate a population on the northern side of the corridor approximately across from the original location. The new location has been documented by the DRM and CNF and provided to the other agencies. The 2009 location is clustered on the northern side of the Great Lakes Pipeline Corridor, extending into the middle of this corridor. A total of 665 above ground stems were found in the new location. According to DRM, CNF data, "Most of the plants were observed growing along the northern edge of the pipeline corridor under a canopy that consisted primarily of balsam

poplar (*Populus balsamifera*), with occasional willow (*Salix interior*), bur oak (*Quercus macrocarpa*), and ash spp. (*Fraxinus* spp.). Herbaceous layer consisted of northern hardwood forest species in addition to *Solidago gigantea.* This area has a high water table, but most of the plants appeared to be on a slightly raised area." Based on site review by HDR staff (October 29, 2009), forest stand on north side of Great Lake Gas corridor is consistent with CNF forest stand data which shows stand origin of 1998, most of the plants, however, based on a limited search are found in the corridor.

Risk Factors

Conversion of existing habitat to a different land cover type is the principle known threat to this species. It is not entirely clear whether increased light poses a threat as this species is an obligate parasite that does not perform photosynthesis, though loss of forest habitat has been recognized as a primary concern (Coffin and Phannmuller, 1988). Changes in hydrology may also be an important factor. Habitat requirements for this species are not well known, particularly the single northern Minnesota population identified within the Route 1 corridor, where individuals have been identified both under the canopy of balsam poplar as well as within the temporary workspace along the corridor with mixed shrub and dense herbaceous groundcover.

4.2.5.2 White pine (Pinus strobus)

White Pine is listed as DRM Sensitive.

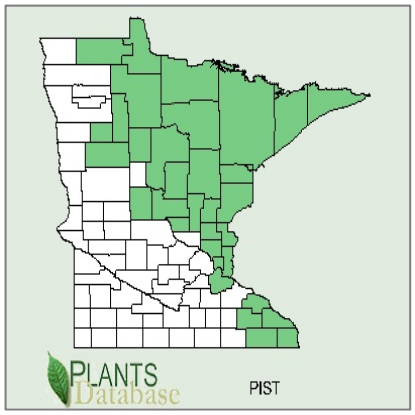
Potential effects for this species are described in the following Guilds: Cedar and Conifer Swamps, Riparian Habitats, Lowland Forest, Northern Hardwood Forest and Woodlands.

Species Description

A fast growing tree, white pine grows to 30 m tall, and often exceeds 200 years. Young trees for a conical crown, with a whorled branch pattern. With age, crown becomes irregular with a few larger branches extending at right angles to the main trunk, then bending upward. The root system of white pine is often comprised of 3-5 moderately deep lateral roots with sinker roots extending downward from them (Farrar, 1999). The evergreen needles of this species are slender, flexible and bluish green, borne in bundles of five.

Species Habitat

This species occurs in mixed woods, sandy plains and dunes, bogs with tamarack, in swampy woods, on rock ridges, and cedar swamps (Voss, 1972). Thrives in full sunlight, though can grow in an open canopy of trees. Usually growing with a mix of other tree species (Farrar, 1999). Often a dominant or codominant, White pine is common to xeric northern pine forests and mixed hardwoods (Carey, 1993).



Species Distribution and Occurrences within the Study Area

P. strobus is known from Manitoba in the northwest, south to Arkansas, east to Georgia and north to Newfoundland and Quebec.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=PIST

Pinus strobus is only listed by the DRM, so point data from DNR and CNF is not available.

Risk Factors

The DRM provides the following reasoning for listing this species: "Population greatly reduced due to over-harvest, blister rust, deer browsing, and insect pests. Regeneration efforts underway." This species was noted in a range of age classes in nearly all mature upland forest stands and is a typical component of young forest stands. The primary threat due to the project would be direct loss of individuals and future maintenance along the route that would preclude reestablishment of mature white pine within the area.

4.2.5.3 Club spur orchid (Platanthera clavellata)

Club spur orchid is listed as DNR Special Concern, CNF RFSS, and DRM Threatened.

Potential effects for this species are described in the following Guilds: Bogs and Fens.

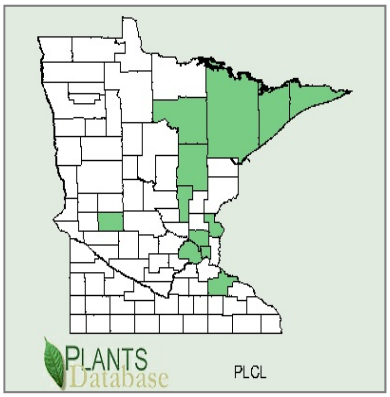
Species Description

This summer flowering orchid grows to 10-50 cm. tall with a single flower spike. *P. clavellata* has 1 to 3 ovate-lanceolate leaves below the midpoint of the stem with additional bractlike leaves above. The green-yellow flowers range from 5-20 borne on a short raceme, with sepals and lateral petals broadly ovate, 3-5 mm long. The lip is oblong, 3-5 mm long shallowly 3-lobed or thoothed. The flower has a curved spur, 8-12 mm. long and widened at the tip (Chadde, 2002). Distinguishing characteristics of this orchid are the arrangement of the flowers at angles to the stem and the distinctive spur, which is swollen at the tip (Brown, 2006).

Species Habitat

Case (1987) indicates this species is widespread and tolerant of many situations; most common in tamarack-spruce bogs, where it grows in Sphagnum, in shade or sun. It also grows in loose moss in balsam-cedar-spruce swamps or a less acid nature, sometimes in alder thickets or damp woods. In Minnesota, Smith (1993) indicates that this orchid occurs mostly in boreal-type *Sphagnum* swamps and floating mats; usually associated with scattered, often stunted black spruce or tamarack.

Species Distribution and Occurrences within the Study Area



This range of this species extends from Newfoundland west through Ontario to North Dakota and Minnesota, south to Texas, and east to Florida. It is known to be more common in the eastern part of it's range, becoming rare in the west (Coffin and Phannmuller, 1988).

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=PLCL

Platanthera clavellata is known from only two locations within the Study Area according to CNF and DNR Element Records. These locations are both located in the eastern portion of the Study Area.

Risk Factors

The primary risk to this species is alteration of hydrologic conditions (flooding or draining). Additionally, removal of canopy may act as a stressor to established populations, though *P. clavellata* is adapted to open, sunny habitats.

4.2.5.4 Tubercled rein-orchid (Platanthera flava var. herbiola)

Tubercled rein-orchid is listed as DNR Endangered.

Potential effects for this species are described in the following Guilds: Bogs and Fens and Wet Prairie, Sedge Meadows and Emergent Wetlands.

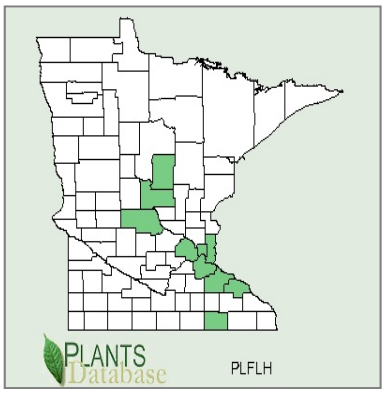
Species Description

Like all orchids, *P. flava* var. *herbiola* has 3 sepals and 3 petals, with the lower petal modified into a lip with a slender spur. The shape and form of the lip is diagnostic to the identification of this species. It is oblong, with a base shaped like an arrowhead, and a thick tubercle on the upper surface near the base. The tubercle separates this species from all look-alikes, especially the common *P. aquilonis* (tall northern bog orchid), which may occur in the same habitat but lacks the tubercle and the arrowhead-shaped base. The variety *herbiola* of *P. flava* is distinguished from the typical southern variety by the longer leaf-like bracts on the flowering stalk. A sweet but subtle fragrance of the flowers seems to be sporadic and undetectable by some observers.

Species Habitat

Platanthera flava var. *herbiola* prefers wet prairies and meadows, swales in mesic prairies, or the sandy or peaty habitats along the edges of marshes, swamps, or lakeshores. These habitats are in full sun or in the partial shade of scattered shrubs such as *Salix* spp. (willows) and *Cornus* spp. (dogwoods). Only high quality habitats that show little if any impact from human activities seem to be suitable for this orchid. Degraded habitats with a substantial number of nonnative species will not support this very rare plant. Range wide the species occurs in alluvial forests, riparian thickets, wet meadows, wet prairies, seeps, and salt marshes (Sheviak, 2002). In Minnesota, Smith (1993) indicates the habitat includes moist grassy or sedge-dominated meadows on calcareous or circumneutral substrate. The known habitats tend to be somewhat brushy, with scattered willow (*Salix*) and dogwood (*Cornus*).

Species Distribution and Occurrences within the Study Area



This species is known from Missouri north to Minnesota and Ontario, east through Quebec and Newfoundland south to South Carolina and Georgia. Though widespread, it is generally considered rare throughout its range.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=PLFLH

Tubercled rein-orchid Element Occurrence data available from the DNR indicates no known occurrences within the Study Area.

Risk Factors

Development pressure is generally considered the primary threat to this species, and is considered the primary cause for its decline (Coffin and Phannmuller, 1988). As the species is known to inhabit only high quality sites with native vegetation dominant, introduction of NNIS is a potential threat to populations of *P. flava* var. *herbiola.* Drawdown of the water table also presents a threat to the species where present.

4.2.5.5 Western polemonium (Polemonium occidentale)

Western polemonium is listed as DNR Endangered.

Potential effects for this species are described in the following Guilds: Cedar and Mixed Conifer Swamps.

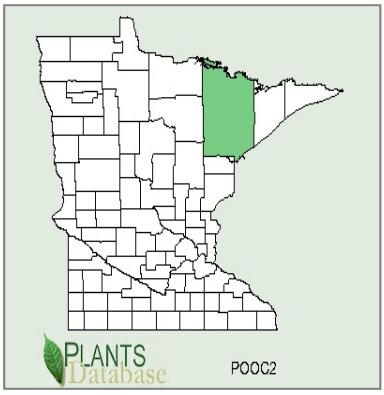
Species Description

Polemonium occidentale ssp. *lacustre* is a singled-stemmed, perennial plant up to 10 dm (40 in.) tall, growing from a horizontal rhizome. Leaves are divided, with a variable number of narrow leaflets. The blue, bell shaped flowers are arranged in a compact cluster (Lakela 1965 cf. DNR, 2009b).

Species Habitat

This herb occurs in cedar, black spruce, or tamarack swamps with mineral-rich, alkaline surface waters (e.g. calcareous soils), generally with an open canopy (Newhouse, 1993). Associates include *Carex stricta, C. lacustris, Equisetum fluviatile, Smilacina trifolia, Rubus pubescens, Caltha palustris, Potentilla palustris, Mitella* species, *Saxifraga pensylvanica*, and *Sphagnum* mosses (DNR, 1995; Newhouse, 1993).

Species Distribution and Occurrences within the Study Area



Polemonium occidentale ssp. *lacustre* is known from only six locations documented since 1944. One site is known from Florence County, Wisconsin, in an area that was selectively logged (Newhouse, 1993). Three occurrences in Minnesota are also at sites that have been logged (DNR, 1995). The western variety (spp. *occidentale)* occurs in the mountain west in distinctly different habitats.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=POOC2

No known locations of *Polemonium occidentale* spp. *lacustre* are indicated in data provided by the DNR or CNF within the Study Area.

Risk Factors

The primary risk factor to this very rare subspecies is likely alteration of hydrology where the species is present. Alteration may take the form of human changes, or natural processes, including beaver activity. Additional risks include invasion of habitat by NNIS and conversion of land-use, though selective small scale logging practices, as long as individuals are not harmed may provide small openings preferred by and benefit this species.

4.2.5.6 Lapland buttercup (Ranunculus lapponicus)

Lapland buttercup is listed as DNR Special Concern and DRM Threatened.

Potential effects for this species are described in the following Guilds: Cedar and Mixed Conifer Swamps.

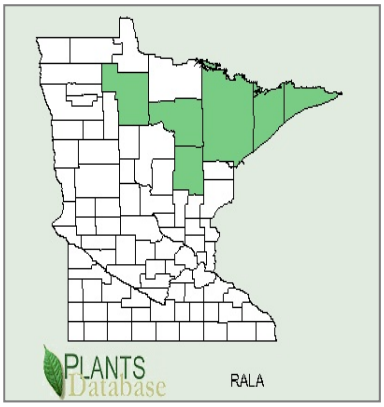
Species Description

Lapland buttercup is a perennial herbaceous plant that spreads by rhizomes. The plant has prostrate stems 1-2 dm tall and sends up a shoot from each node, each shoot with two basal leaves. Leaves are kidney shaped, deeply 3 cleft with rounded teeth or shallow lobes. The yellow petals of the flowers have orange veins, are 8-12 mm wide with three sepals borne at the ends of shoots (Chadde, 2002).

Species Habitat

Known populations in the state occur on sphagnum hummocks in cool conifer swamps.

Species Distribution and Occurrences within the Study Area



Lapland buttercup is broadly distributed across the arctic and boreal regions of Alaska, Canada, Greenland, and Europe (Coffin and Pfannmuller, 1988). The species is very rare south of Canada and has only been identified in Minnesota and Maine. In Minnesota, ten stations have been found, three of these in St. Louis County. This northern, circumboreal species is known from only four US states (Minnesota, Wisconsin, Michigan, Maine and Alaska) and all Canadian Provinces and Greenland.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=RALA

Two known locations for *Ranunculus lapponicus* are shown in data provided by the DNR and CNF within the Study Area. These are located in Cedar dominated swamps in the eastern portion of the Study Area.

Risk Factors

Threats to this species include alteration of hydrology where the species is present, and stress due to removal of forest tree canopy.

4.2.5.7 Northern bur-reed (Sparganium glomeratum)

Northern bur-reed is listed as DNR Special Concern, CNF RFSS and DRM Threatened.

Potential effects for this species are described in the following Guilds: Bogs and Fens and Wet Prairie, Sedge Meadows and Emergent Wetlands.

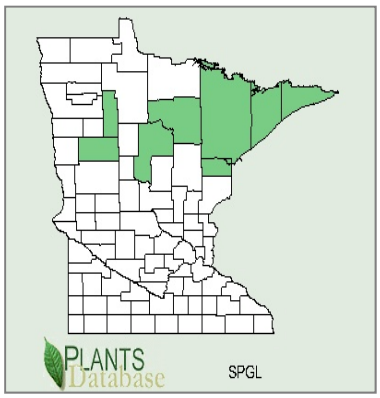
Species Description

This species is of a genus of sedge like herbs, floating or emergent in shallow water, forming rhizomatous colonies (Chadde, 2002). This species can be distinguished from similar species of *Sparganium* by the inflorescence. Staminate flowers are borne in a single, small, terminal head. There are three to five supra-axillary, densely crowded, pistillate heads with all but the lowest head overlapping (Coffin and Phannmuller, 1988).

Species Habitat

The species has been found in several locations in Lake and St. Louis Counties in shallow sphagnum bogs and floating mats in emergent wetlands.

Species Distribution and Occurrences within the Study Area



Northern bur-reed is a typically Eurasian species that has been found in North America only in Alberta, Quebec, and Minnesota (Coffin and Pfannmuller, 1988). Common in Northern Europe, this species is uncommon in North America and is suspected to have been introduced to the continent as North American populations are all located near international ports. In recent years, the species has been identified and found to be common throughout the CNF. The species is known from only four Canadian Provinces (Newfoundland, Quebec, Saskatchewan and Alberta) and two US states (Minnesota and Wisconsin).

USDA Plants Database at:
http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=SPGL

Seventeen populations of *Sparganium glomeratum* are identified in data provided by the DNR and CNF within the Study Area. These populations are generally distributed throughout the Study Area.

Risk Factors

The primary risk to this species is significant drainage of existing hydrology.

4.2.5.8 Canada Yew (Taxus canadensis)

Canada Yew is listed as CNF RFSS and DRM Threatened.

Potential effects for this species are described in the following Guilds: Cedar and Mixed Conifer Swamps and Lowland Forest.

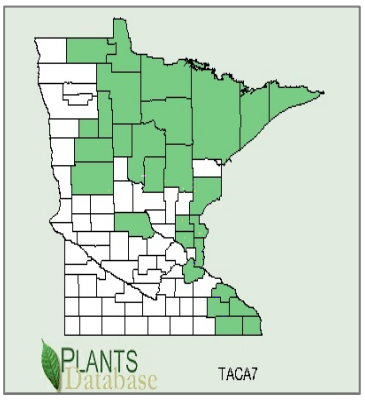
Species Description

Canada yew is a native, evergreen, coniferous shrub. It grows from 1 to 3 feet (0.3-0.9 m) and occasionally up to 6 feet (2.8 m) tall. The dense, spreading branches can grow up to 6.6 feet (2 m) long, spreading from the base for about one-third of their length. The bark is nearly smooth. The fruit is a fleshy, cuplike aril surrounding a single seed (Sullivan, 1993).

Species Habitat

A widespread, but somewhat uncommon shrub in Minnesota, Canada Yew is found on cool, moist, north facing slopes in limestone karst areas in Southern Minnesota. In the northern parts of the state, the species is found in forested swamps of peat filled basins with inflows of mineral rich waters. Mosses and sedges are usually present in the ground layer, and tamarack or northern white cedar often dominate the canopy. The species often thrives in deep shade, and forms stable communities in this setting where other species are unable to tolerate this lack of sunlight (Smith, 2008).

Species Distribution and Occurrences within the Study Area



Canada yew is found from Newfoundland west to Manitoba, south to Virginia, Tennessee, Illinois, and Iowa (Sullivan, 1993).

USDA Plants Database at:
http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=TACA7

33 distinct populations of *Taxus canadensis* are identified in data provided by the CNF within the Study Area. These populations are generally distributed throughout the southern and eastern portions of the Study Area.

Risk Factors

Risk factors for this species include over-browsing by deer, logging, or other land type alterations that remove portions of the canopy. Removal of canopy reduces the competitive advantage of this shade tolerant species. It is poorly adapted to browsing or fire. Over-browsing by deer appears to be the primary reason for population decline.

4.2.5.9 Torrey's Manna Grass (Torreyochloa pallida)

Sooty-colored beak-rush is listed as DNR Special Concern and DRM Sensitive.

Potential effects for this species are described in the following Guilds: Bogs and Fens, Cedar and Mixed Conifer Swamps and Lowland Forest.

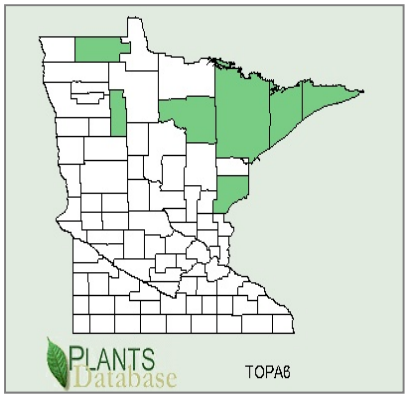
Species Description

A clumped perennial grass with weak, slender stems, usually reclining at the base growing 3-10 dm long. Flat leaves, 3-8mm wide with open sheaths and a ligule 3-9mm long. The seed head is a pale green, open panicle 5-15 dm long with upright branches that become spreading. Spikelets are 4-7 flowered and oval in outline with rounded tips on the glumes. Lemmas are 5 veined, finely hairy with a rounded and jagged tip (Chadde, 2002).

Species Habitat

Torreyochloa pallida var. *fernaldii* grows in swamps, marshes, bogs, and margin of lakes and streams (Davis, 2007). Chadde (2002) adds alder thickets, forest depressions and often in shallow water to the above descriptions.

Species Distribution and Occurrences within the Study Area



This species is known from all Canadian Provinces except for the Northwest Territories and Nunavut. In the United States, the species is distributed across the continent except for the central plains (North Dakota to Texas) and the Deep South (Louisiana to Florida). The species is listed as endangered in Illinois, Kentucky and Maryland.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=TOPA6

Only one population of *Torreyochloa pallida* is identified in data provided by the DNR and CNF within the Study Area. This population is located on the eastern edge of the Study Area.

Risk Factors

The primary threat to this species is loss of habitat by alteration of existing hydrology. Other factors that could affect this species include conversion of land to a different land use, construction and/or timber harvesting practices that result in increased sedimentation of habitat.

4.2.5.10 American elm (Ulmus americana)

American elm is listed as DRM Sensitive.

Potential effects for this species are described in the following Guilds: Riparian Habitats, Northern Mesic Hardwood, Woodlands, and Lowland Forest.

Species Description

Coladonato (1992b) provides the following description:

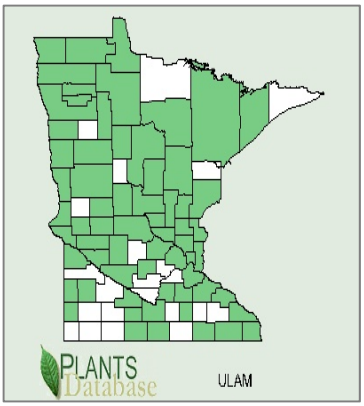
> American elm is a deciduous, fast-growing, long-lived tree which may reach 175 to 200 years old with some as old as 300 years. In dense forest stands, American elm may reach 100 to 200 feet (30-36 m) in height and 48 to 60 inches (122-152 cm) in d.b.h. Heights of 80 feet (24 m) are common on medium sites but on very wet or very dry soils, the species is often 40 to 60 feet (12-18 m) tall at maturity. In the forest American elm often develops a clear bole 50 to 60 feet (15-18 m) in length. Open-grown trees fork 10 to 20

feet (3-6 m) from the ground with several erect limbs forming a wide, arching crown. The alternate, double-toothed leaves are 2 to 5 inches (5-10 cm) long and 1 to 3 inches (2.5-7.5 cm) wide. The dark gray bark is deeply furrowed (9, 15). The perfect flowers are borne in dense clusters of three or four fascicles. The fruit is a samara consisting of a compressed nutlet surrounded by a membranous wing.

Species Habitat

American elm is common on wet flats and bottomlands but is not restricted to these sites. In the southern bottomland regions, it commonly occurs on terraces and flats but not in deep swamps. In the Lake States and Central States, it is found on plains and moraine hills as well as the bottomlands and swamp margins. American elm grows best on rich, well-drained loams. Growth is poor on dry sands and where the summer water table is constantly high. (Coladonato 1992b).

Species Distribution and Occurrences within the Study Area



The typical variety of American elm (var. *americana*) is found throughout eastern North America margins (Coladonato, 1992b).

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=ULAM

Ulmus americana is only listed by the DRM, so point data from DNR and CNF is not available.

Risk Factors

The greatest risk to this species is the presence of Dutch Elm disease, which has devastated populations across North America. Other threats to this species where present are clear-cut timber management, conversion of land to another land use, and hydrologic alterations which reduce available moisture. It is not known how this species, if present in the vicinity, would respond to development of permanent and temporary utility corridor construction. Although seedlings of this species will grow in full sunlight, they make their best growth with about one-third of full sunlight (USDA, 1965). It does, however, regenerate profusely via vegetative means, following cutting or disturbances (USDA, 1965).

4.2.5.11 Slippery Elm (Ulmus rubra)

Slippery elm is listed as DRM Sensitive.

Potential effects for this species are described in the following Guilds: Riparian Habitats, Northern Mesic Hardwood, Woodlands, and Lowland Forest.

Species Description

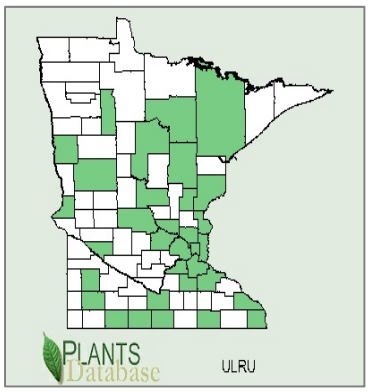
Slippery elm is a native, medium-sized, deciduous tree reaching 60 to 70feet (18-21 m) on average sites and 135 feet (41 m) on the best sites. In the forest, it has a straight bole with the trunk dividing into widespreading limbs high up the tree. The crown is broad and rather flat topped. The perfect flowers form dense packed clusters. The root system is shallow but wide spreading (Coladonato, 1993b).

Species Habitat

Slippery elm grows best on moist, rich soils of lower slopes, streambanks, river terraces, and bottomlands but is also found on much drier sites, particularly those of limestone origin. Examples of sites on which it is an important species are floodplains and terraces. Slippery elm can persist on poorly

drained soils that are occasionally flooded for periods of 2 or 3 months, but it does not reproduce or grow well if flooding is frequent or prolonged (Coladonato 1993b).

Species Distribution and Occurrences within the Study Area



Slippery Elm ranges from Maine and southern Quebec to North Dakota, south to Florida and Texas.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=ULRU

Ulmus rubra is only listed by the DRM, so point data from DNR and CNF is not available.

Risk Factors

The greatest risk to this species is the presence of Dutch Elm disease, which has devastated populations across North America. The proposed project would not affect the spread or presence of this disease. Other threats to this species in sites supporting it are loss of habitat through land conversion and timber harvesting activities such as clearcutting. Studies in southeastern Minnesota showed that slippery elm seedlings grow well in the open or under light shade (USDA 1965). Thus, selective harvesting of surrounding trees may not significantly alter the habitat for this species. It is uncertain how this species would respond to the development of temporary and permanent utility corridor.

4.2.5.12 New England Violet (Viola novae-angliae)

New England violet is listed as DRM Sensitive.

Potential effects for this species are described in the following Guilds: Wet Prairie, Wet Meadow and Emergent Wetlands, Riparian Habitats, Lowland Forest, Northern Hardwood Forest, Woodlands and Forest Openings/Exposed Areas/Grasslands.

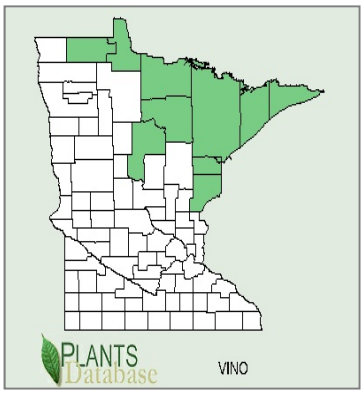
Species Description

Viola novae-angliae is considered a form between *Viola sororia* and *V. sagittata.* It is a stemless, hairy or glabrous blue flowered violet that spreads by short rhizomes. Leave are born from base of plant with long hairs, margins with rounded teeth. Flowers are on stalks about as high as the leaves with the two side petals densely bearded with 1mm long hairs. This species is distinguished from the other two above mentioned species by the leaf blades which are distinctly longer than wide but not long and narrow (Gleason and Croquist 2003, Chadde 2002).

Species Habitat

This species inhabits open, xeric-mesic rock or sand sites. In Minnesota it occurs most often in rock crevices, along the North Shore of Lake Superior and beside cold, rapidly flowing streams. It also occurs in meadows, grassy lake terraces, and rock outcrops (Coffin and Pfannmuller, 1988). NatureServe (2007) cites this species as being found on undisturbed acidic, xeric, or xeric-mesic rock or sand substrates, under partially or totally closed-canopy dry northern forest of mixed hardwoods and conifers.

Species Distribution and Occurrences within the Study Area



This species is known from the northern tier of US states from Michigan to Maine, and Canadian Provinces Quebec and Ontario.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=VINO

Viola novae-angliae is only listed by the DRM, so point data from DNR and CNF is not available.

Risk Factors

Viola novae-angliae is a species of open, xeric-mesic sites, yet there appear to be few threats to its occurrence at a site containing suitable habitat. In fact, destructive activities that would tend to eliminate other rare plant species (disturbed fields, road building, etc.) tend to enhance the species survival. Ballard (1989a cited in NatureServe, 2007) indicated that the species is able to invade such areas at numbers significantly higher than found in natural settings. Such evidence suggests that the habitat is highly recoverable with respect to this species, and that V. novae-angliae is a species that may be dependent on moderate levels of disturbance. Maintenance of moderately open woodlands via selective logging is probably the most beneficial method for long-term survival of the species at a given site (Ballard pers. comm. cited in NatureServe, 2007). He suggested that certain human disturbances, if they do not disturb the soil chemistry of the substrate or strongly shade sites, may enhance the vigor and viability of a given violet population (Ballard 1988 cited in NatureServe 2007). The largest populations that have been found have been associated with areas of past, low-level disturbance: old meadows, disturbed roadsides and power-line rights-of-way.

4.2.5.13 Barrens strawberry (Waldsteinia fragaroides)

Barrens strawberry is listed as DNR Special Concern and DRM Sensitive.

Potential effects for this species are described in the following Guilds: Northern Hardwood Forest, Woodlands and Forest Openings/Exposed Areas/Grasslands.

Species Description

Hill (2003) provides the following description for barrens strawberry:

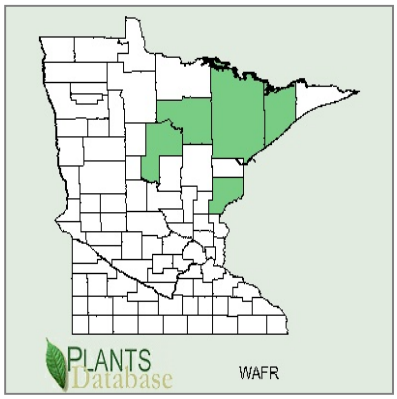
> *Waldsteinia fragarioides* ssp. *fragarioides* is a low perennial herb 10-20 cm tall with short to elongate slender tough and fibrous (sub-woody) shallow rhizomes that are generally crowded together and so the colony appears to be in a mat; the roots are mostly adventitious and develop in clusters at rhizome tips; the basal, normally evergreen leaves are also found at the end of the rhizomes, they resemble those of a strawberry, and they have 3 leaflets each at the top of an elongate (3-17 cm) hairy petiole; the leaflets are broadly cuneate-obovate, 2-8 cm long and 2-6 cm wide, only sparsely hairy, serrate and usually shallowly lobed, the lateral ones are asymmetrical and the middle leaflet is usually longer and wider than the lateral ones; the leaves generally turn somewhat bronze in the winter; stipules are adnate to the petiole or obsolete; the flowers are in a several-flowered loose cyme on a stalk that about equals the leaves in length. The small flowers are bracteate, yellow, the five petals are obovate to broadly elliptic and generally 5-10 mm long and 3-6 mm wide, and they are obtuse or rounded and longer than the five 2-7.5 mm long sepals. There are numerous stamens

(50?) and 2-6 (-10?) separate pistils, each of which matures into a small hairy achene (dry, single seeded fruit) about 2 mm long.

Species Habitat

The Conservation Assessment (Hill 2003) for barren strawberry indicates that in Wisconsin this species has been collected in a wide range of habitats including old fields, open dry places, secondary forests, bottomlands, stream banks, burned over forests, sand hills, and virgin forest (Hill, 2003). Coffin and Pfannmuller (1988) describe Minnesota occurrences coming mostly form upland pine forests, particularly jack pine (*Pinus banksiana*). Minnesota is the western most occurrence of this species in North America.

Species Distribution and Occurrences within the Study Area



Barrens strawberry is known from the Canadian Provinces of Ontario and Quebec, Minnesota to Maine and south to Georgia and west to Arkansas.

USDA Plants Database at: http://plants.usda.gov/java/county?state_name=Minnesota&statefips=27&symbol=WAFR

4 populations of *Waldsteinia fragaroides* are identified in data provided by the DNR and CNF within the Study Area. These populations are generally distributed throughout south and eastern portions of the Study Area with a very large cluster between Bowstring River and Lake Winnibigoshish.

Risk Factors

Threats to this species include clear-cutting practices that create too much sunlight, competition from aggressive species, including native invasive and NNIS, recreation and trampling. Because this species is very slow to establish and reproduces infrequently, fragmentation of existing populations should be avoided and sites monitored and protected.

5.0 ENVIRONMENTAL CONSEQUENCES

The proposed Project currently includes three potential alternative routes that are at least 1,000 feet wide. A final 1,000-foot-wide route will be chosen through the environmental review process, which includes consideration of this BA/BE analysis. Construction of the transmission line will require a 125-foot-wide right-of-way. The final alignment of the transmission line within the selected route will be determined based on engineering constraints, avoidance requirements (including biological considerations), co-located ROWs, and landowner consultation. Since the final alignment is not yet known, the environmental consequences discussion refers to the 1,000-foot-wide route and identifies potential avoidance and minimization opportunities that are likely to be incorporated for development of the 125-foot-wide right-of-way needed to construct the Project.

For purposes of the following discussion, direct and indirect impacts are related to:

- Changes in habitat and plant communities – reducing forest area due to tree clearing, increasing grassland area, potentially increasing shrublands, and adding perches
- Potential forest fragmentation by increasing the width of existing disturbed corridors and by constructing a new corridor though undisturbed (greenfield) areas
- Construction activity – equipment operation, vehicles and human activity
- Not electrocutions since line design has changed
- Not changes in hydrology since pole installation won't change hydrology, temporary construction impacts would use mats if soils are wet, and permanent access roads are not anticipated to be necessary
- Potential for avian collision with the in-place conductors
- Maintenance activities post construction
- Potential for non-native invasive species (NNIS) to become established due to right-of-way clearing and equipment
- Potential for cow birds, other prey/predators and people to use the right-of-way
- Potential for great-horned owls and red-tailed hawk to become established in an increasingly fragmented corridor.

Cummulative effects are discussed in Section 6.0. The discussion of cumulative effects includes evaluation of past, present and reasonably forseeable future projects that may occur within the project area, including projects proposed by others that are not directly related to the Bemidji to Grand Rapids 230 kV Transmission Line project.

Based on the information gathered about the species, this BA/BE includes a proposed Determination of Effects. These determinations are subject to review and approval by the USFWS, CNF, DNR and LLR Tribal Council. In general, the criteria used for the determinations included:

- Presence/absence of appropriate habitat
- Presence/absence of observations within the 1,000-foot-wide Route
- Presence/absence of observations within the Study Area

- Potential to avoid and minimization impacts through timing restrictions and best management practices
- Level of potential impact in relation to known populations

The relationship of these criteria is shown in the flow chart depicted in Figure 5. This flow chart was generally followed for all determinations; exceptions are noted in the discussion leading to the determination.

5.1 Federally Listed Threatened and Endangered Species

5.1.1 Gray Wolf

Gray wolves have been observed within the Study Area in a wide mix of habitat types. There are no documented dens within the proposed Routes.

5.1.1.1 Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the proposed 125-foot right-of-way (ROW). As large portions of the Study Area are forested, the amount of appropriate forest cover for gray wolves in the Study Area would be slightly reduced as a result of ROW clearing. This would increase the width of the existing corridors and reduce the area of large tracts of forest favored by gray wolves. Human access and use of the area would primarily be limited to construction and maintenance activities, with potential for traditional gathering on public lands. The removal of forested cover could increase the patchy habitat types and regeneration favored by deer and other prey sources for gray wolves.

Temporary impacts may occur due to construction and/or maintenance of the transmission line as wolves would likely change their movements to avoid areas where prolonged activity would take place. Additionally, construction activity that would occur proximate to dens during breeding season may result in failure and abandonment. If an active den is located during construction, then construction activities would be restricted to avoid failure or abandonment of the denning site. The location and avoidance measures would be coordinated with the USFWS, CNF, DRM and DNR, as appropriate.

Route 1 Alternative (Great Lakes Pipeline)

Gray wolves are known to occur along the Route 1 Alternative. Three CNF observations of gray wolves have been made within five miles of this route. Additionally, dispersed observations of single individuals and packs have been documented in the vicinity of this alternative (Erb, 2008).

It is likely that individual wolves would be affected along this route by removal of forest cover and conversion to grasslands and shrublands. Forest conversion to grasslands would provide additional habitat for prey species. In most cases, the width of the existing disturbed corridor would more than triple.

Route 2 Alternative (US 2)

Gray wolves are known to occur along the Route 2 Alternative. Three CNF observations of gray wolves have been made within five miles of this route. Additionally, dispersed observations of single individuals and packs have been documented in the vicinity of this alternative (Erb, 2008).

It is likely that individual wolves would be affected along this route by removal of forest cover and conversion to grasslands and shrublands. Forest conversion to grasslands would provide additional habitat for prey species. In most cases, the width of the existing utility/railroad/road corridor would increase by less than 30 percent.

Route 3 Alternative (Northern Route)

Gray wolves are known to occur along the Route 3 Alternative. Three CNF observations of gray wolves have been made within five miles of this route and four observations were made during the 2009 surveys. Additionally, concentrated observations of single individuals and packs have been documented in the vicinity of this alternative, northwest of Lake Winnibigoshish as well as north of Talmoon (Erb, 2008).

It is likely that individual wolves would be affected along this route by removal of forest cover and conversion to grasslands and shrublands. Forest conversion to grasslands would provide additional habitat for prey species. In most cases, the width of the existing disturbed corridor would more than double.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse impacts would occur.

5.1.1.2 Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- USFWS: Not likely to adversely effect. Appropriate habitat area would be slightly reduced as a result of timber removal, but would be countered by increased habitat for primary prey species. The width of the disturbed corridor would increase from 60 feet (typical, existing) to 185 feet (existing plus Project ROW). The project would not change density of roads or permanent human population.
- CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area. Appropriate habitat area would be slightly reduced as a result of timber removal, but would be countered by increased habitat for primary prey species. The width of the disturbed corridor would increase from 60 feet (typical, existing) to 185 feet (existing plus Project ROW). The project would not change density of roads or permanent human population.

Route 2 Alternative (US 2)

- USFWS: Not likely to adversely effect. Appropriate habitat area would be slightly reduced as a result of timber removal, but would be countered by increased habitat for primary prey species. The width of the disturbed corridor would increase from 580 feet (typical, existing) to 800 feet (existing plus Project ROW). The project would not change density of roads or permanent human population.
- CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area. Appropriate habitat area would be slightly reduced as a result of timber removal, but would be countered by increased habitat for primary prey species. The width of the disturbed corridor would increase from 580 feet (typical, existing) to 800 feet (existing plus Project ROW). The project would not change density of roads or permanent human population.

Route 3 Alternative (Northern Route)

- USFWS: Not likely to adversely effect. Appropriate habitat area would be slightly reduced as a result of timber removal, but would be countered by increased habitat for primary prey species. The width of the disturbed corridor would increase from 100 feet (typical, existing) to 225 feet (existing plus Project ROW). The project would not change density of roads or permanent human population.

- CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area. Appropriate habitat area would be slightly reduced as a result of timber removal, but would be countered by increased habitat for primary prey species. The width of the disturbed corridor would increase from 100 feet (typical, existing) to 225 feet (existing plus Project ROW). The project would not change density of roads or permanent human population.

5.1.2 Canada Lynx

Canada lynx are thought to sporadically occur in the Study Area across a wide mix of habitat types, thought there are no verified observations in the Study Area.

To more effectively manage habitat for this species in the Study Area, the CNF developed Lynx Analysis Units to identify areas of suitable habitat and to track changes within these areas. They are intended to approximate the area of female home ranges but do not necessarily represent actual territories (Ruediger, et al., 2000).

For purposes of this analysis, unsuitable habitat is that which is capable of producing lynx foraging or denning habitat; but which, at its present stage of development, does not have the necessary vegetation composition, structure, and /or density to support lynx and snowshoe hare populations during all seasons. Such unsuitable habitat in the action area is dominated by regenerating stands less than 10 years old, older northern hardwood stands lacking sufficient understory development, and large maintained openings.

5.1.2.1 Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the 125-foot ROW. As large portions of the Study Area are forested, the amount of appropriate forest cover for Canada lynx and their primary prey, the snowshoe hare, would be slightly reduced as a result of tree clearing. In particular snowshoe hares tend to prefer young forests with a dense understory. The removal of forested and brushy cover along the proposed ROWs could reduce available habitat for this species, therefore, limiting the available food sources to the Canada lynx (Sullivan, 1995). It could also reduce the amount of denning habitat available unless sufficient amounts of coarse woody debris are left on site to provide for potential future den sites.

Forest clearing would also increase the width of existing ROW, which may deter Canada lynx from crossing these areas. However, data is not available that document when a corridor is too wide to be crossed by lynx. Additional cleared rights-of-way could also encourage wolf, coyote, bobcat, and cougar (if present) competition for prey sources during winter, due to increased snow compaction. This could make the area less suitable for lynx.

Maintenance activities would occur during daylight hours, when the lynx are mostly inactive. Activities that occur near a den location may cause a temporarily disruption, depending on the proximity of the den to the activity. Specific impacts to Lynx Analysis Unites (LAUs) were analyzed to estimate the amount of habitat that would be converted from suitable to unsuitable habitat with this project. A GIS analysis to determine the impacts to LAUs by each route was conducted. None of the LAUs affected by the proposed routes would experience more than a 0.5 % loss of habitat. (Table 5-1).

Table 5-1. Acres of ROW* and percent reduction of suitable habitat within Lynx Analysis Units by route.

Lynx Analysis Unit	LAU Size (acres)	Route 1	Route 2	Route 3
LAU 3	55,750	-	-	154.6 ac (0.28%)
LAU 5	44,879	-	-	208.6 ac (0.46%)
LAU 6	43,154	-	-	82.4 ac (0.19%)
LAU 7	44,737	-	-	8.0 ac (0.02%)
LAU 9	36,031	-	-	46.5 ac (0.13%)
LAU 10	49,835	155.1 ac (0.31%)	137.8 ac (0.28%)	-
LAU 14	46,855	-	-	189.2 ac (0.40%)
LAU 15	53,269	142.1 ac (0.27%)	145.0 ac (0.27%)	-
Total		**297.1**	**282.8**	**689.4**

**Using ROW width of 125' based upon anticipated centerline.*
LAUs were provided by CNF.

Temporary impacts may occur due to construction activity as Canada lynx would likely change their movements to avoid construction areas. Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. Additionally, construction activity that would occur proximate to dens during breeding season may result in failure and abandonment.

Route 1 Alternative (Great Lakes Pipeline)

Two unverified and one probable observations of this species occur within the vicinity of the Route Alternative. No CNF, DRM or DNR observations have been documented, nor were any observations made during the 2007, 2008, and 2009 surveys.

Route 1 would cross LAUs 10 and 15. Approxiamtely 155 acres (0.31%) of LAU 10 and 142 acres (0.27%) of LAU 15 would be converted to unsuitable habitat. Total impacts to these LAUs would be approximately 297 acres, as a result of forest cover removal. The existing disturbed corridor would more that double in width, typically from 60 feet (or less) to more than 180 feet. This additional width may deter lynx from crossing the corridor, thereby increasing habitat fragmentation.

Route 2 Alternative (US 2)

Two unverified and one probable observations of this species occur within the vicinity of the Route 2 Alternative. No CNF, DRM or DNR observations have been documented, nor were any observations made during the 2007, 2008, and 2009 surveys.

Route 2 would cross LAUs 10 and 15. Approxiamtely 137.8 acres (0.28%) of LAU 10 and 145.0 (0.27%) of LAU 15 would be converted to unsuitable habitat. Total impacts to these LAUs would be approximately 283 acres, as a result of removal of forest cover. The existing disturbed corridor would increase in width by 125 feet, from 580 feet (typical, existing width) to 800 feet (existing width plus Project ROW). This additional width may deter lynx from crossing the corridor, thereby increasing habitat fragmentation.

Route 3 Alternative (Northern Route)

One unverified and seven probable observations of this species occur within the vicinity of the Route 3 Alternative. No CNF, DRM or DNR observations have been documented, nor were any observations made during the 2007, 2008, and 2009 surveys.

Route 2 would cross LAUs 3, 5, 6, 7, 9 and 14. LAU 5 would experience the greatest reduction of suitable habitat, totaling approximately 208 acres (0.46%). LAUs 3 and 14 would also experience large reduction of suitable habitat, totaling approximately 154 (0.28%) and 189 (0.40%) acres of impact, respectively. Total impacts to these LAUs would be approximately 689 acres, as aresult of forest cover removal. The existing disturbed corridor would more that double in width, typically from 100 feet (or less) to more than 225 feet. This additional width may deter lynx from crossing the corridor, thereby increasing habitat fragmentation.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse impacts would occur.

5.1.2.2 Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

USFWS: Not likely to adversely effect. Appropriate habitat area would be slightly reduced as a result of timber removal. The width of the disturbed corridor would increase from 60 feet (typical, existing) to 185 feet (existing plus Project ROW).

- USFWS: Not likely to adversely effect. Appropriate habitat area would be slightly reduced as a result of timber removal. The width of the disturbed corridor would increase from 60 feet (typical, existing) to 185 feet (existing plus Project ROW).
- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area. Appropriate habitat area would be slightly reduced as a result of timber removal. The width of the disturbed corridor would increase from 60 feet (typical, existing) to 185 feet (existing plus Project ROW).
- DNR: Not Listed.

Route 2 Alternative (US 2)

- USFWS: Not likely to adversely effect. Appropriate habitat area would be slightly reduced as a result of timber removal. The width of the disturbed corridor would increase from 580 feet (typical, existing) to 800 feet (existing plus Project ROW).
- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area. Appropriate habitat area would be slightly reduced as a result of timber removal. The width of the disturbed corridor would increase from 580 feet (typical, existing) to 800 feet (existing plus Project ROW).
- DNR: Not Listed.

Route 3 Alternative (Northern Route)

- USFWS: Not likely to adversely effect. Appropriate habitat area would be slightly reduced as a result of timber removal. The width of the disturbed corridor would increase from 100 feet (typical, existing) to 225 feet (existing plus Project ROW).

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area. Appropriate habitat area would be slightly reduced as a result of timber removal. The width of the disturbed corridor would increase from 100 feet (typical, existing) to 225 feet (existing plus Project ROW).
- DNR: Not Listed.

5.1.3 Bald Eagle (Haliaeetus leucocephalus)

Bald eagles are known to occur within the Study Area in forests near lakes, rivers and wetlands.

5.1.3.1 Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW. To limit impacts during the breeding season, tree removal and construction activities within 200 m of the nest site would be restricted between February 15th and September 31st. Ground disturbing activities would occur within 100 m of up to three nests.

Bald eagles are also known to be susceptible to electrocution and collision with transmission line facilities (APLIC, 2006). Phase separation and inslulator dimensions make electrocution a very unlikely occurance. Most electrocutions are associated with distribution lines, not high voltage transmission lines like BGR.

Human activity along the chosen route will be high during construction compared to nearby areas of unfragmented habitat. This may prevent bald eagles from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans. Periodic maintenance projects would also increase human activity along the proposed line. Routine maintenance activies proximate to active nest sites would be restricted during the breeding season, as described above.

To comply with new federal guidelines regarding impacts to Bald Eagles, consultaion with the USFWS would take place. A take permit for bald eagle is not anticipated as being necessary, as the chosen route would have options to avoid direct impact to an eagle or its nest. Discussion with the USFWS regarding incidental take is on-going, since transmission lines may pose a collision hazard to low-flying eagles.

Route 1 Alternative (Great Lakes Pipeline)

The CNF, DRM, and DNR have documented the location of one bald eagle nest within Route 1 and another 26 are within a mile. An additional nest was observed during the EP surveys. These observations were made in forested areas near lakes and rivers. As large portions of the Route 1 area are forested, the amount of appropriate habitat for bald eagles in the Study Area would be reduced as a result of removal of forest cover. No nests are located within 100 m of the proposed ROW.

Impacts to individuals, nests, and appropriate habitat areas will be minimized by implementing constuction restrictions during the breeding season, if activities are proposed within 660 feet of an active nest, depending on the level of screening between the construction activity and the nest site. Known nests existing within the route would be avoided to the maximum extent practicable.

Route 2 Alternative (US 2)

The CNF, DRM, and DNR have documented the location of three bald eagle nests within Route 2 and another 23 are within a mile. No additional nests were located during the EP surveys. These observations were made in forested areas near lakes and rivers. As large portions of the Route 2 area are forested, the amount of appropriate habitat for bald eagles in the Study Area would be reduced as a result of removal of forest cover. No nests are located within the proposed ROW. Three nests are located within 100 m of the proposed ROW.

Impacts to individuals, nests, and appropriate habitat areas will be minimized by implementing constuiction restrictions during the breeding season, if activities are proposed within 660 feet of an active nest, depending on the level of screening between the construction activity and the nest site. Known nests existing within the route would be avoided to the maximum extent practicable.

Route 3 Alternative (Northern Route)

No CNF, DRM, or DNR documented bald eagle nests are located within the route; 21 have been documented within one mile. These observations were made in forested areas near lakes and rivers. As large portions of the Route 3 area are forested, the amount of appropriate habitat for bald eagles in the Study Area would be reduced as a result of removal of forest cover. No nests are located within 100 m of the proposed ROW.

Impacts to individuals, nests, and appropriate habitat areas will be minimized by implementing constuiction restrictions during the breeding season, if activities are proposed within 660 feet of an active nest, depending on the level of screening between the construction activity and the nest site. No nests are known to exist within the route, but if one is located prior to construction, it would be avoided to the maximum extent practicable.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

5.1.3.2 Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- USFWS: While the bald eagle is not listed, the Project has potential to result in an incidental take and would require a permit from the USFWS under the Bald Eagle and Golden Eagle Protection Act.
- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

Route 2 Alternative (US 2)

- USFWS: While the bald eagle is not listed, the Project has potential to result in an incidental take and would require a permit from the USFWS under the Bald Eagle and Golden Eagle Protection Act.
- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

Route 3 Alternative (Northern Route)

- USFWS: While the bald eagle is not listed, the Project has potential to result in an incidental take and would require a permit from the USFWS under the Bald Eagle and Golden Eagle Protection Act.

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

5.1.3.3 Mitigation

The following recommendations were provided by the Department of Interior to protect bald eagles. These recommendations will be followed as noted.

1. Keep contruction activity at least 660 feet away from an active nest, if the construction activity is visible from the nest.
2. Limit clearing to within the ROW; maintain existing forest or natural vegetation between the construction activity and nest trees.
3. Avoid certain activities during the breeding season. (See #1 above.)
4. Site high voltage transmission lines at least two miles away from nests, foraging areas and communal roosts. (This recommendation is not reasonable or feasible given the density of the bald eagle population in the project area.)
5. Employ industry-accepted best management practices to prevent birds from colliding with or being electrocuted by utility lines, towers and poles. If possible, bury lines in important eagle areas. (Burying the transmission line was considered and rejected as an alternative. See DEIS Section 2.3.4 Underground Transmission Line Alternative.)
6. Miminize potentially disruptive activities and development in the eagles' direct flight path between their nest and roost sites and important foraging areas. (See #1 above.)
7. Where bald eagles are likely to nest in human-made structures and such use could impede operation or maintenance of the structures or jeopardize the safety of the eagles, equip the structures with either (1) devices engineered to discourage bald eagles from building nests, or (2) nesting platforms that will safely accommodate bald eagle nests without interfereing with structure performance. (Applicants will develop an avian protection plan that outlines steps to identify potential problems with eagles nesting on structures and procedures to work with USFWS to address such issues.)
8. Protect and preserve potential roost and nest sites by retaining mature trees and old growth stands, particularly within 1/2 mile of water. (Applicants will only remove trees within ROW as necessary to safely operate and maintain the transmission line.)
9. Utility line should be strung in areas where surrounding vegetation is higher than utility poles to reduce collision risk. (Most of the project area is forested; however not all locations have existing forest vegetation. Thus, this recommendation is not reasonable or feasible.)
10. Providing perch guards on utility line poles near areas of high bald eagle concentration to prevent bird electrocution. (The structures would be constructed according to APLIC standards to minimize potential for electrocution.)
11. Educate construction personnel of the presenece of bald eagle nests along the transmission line routes and about the need for not approaching any actively nesting bald eagles, particularly on foot. (Nest sites, including appropriate buffer, will be marked as off limits to foot and other construction traffic. Preconstruction meetings will be conducted to discuss environmental issues, including bald eagle protections.)
12. Inform Twin Cities ES Field Office, FWS of any unusual bald eagle activity noted during or after project construction at 612-725-3548 x2202.

5.2 DNR, DRM and CNF Listed Species

5.2.1 Avian Species

5.2.1.1 Northern Goshawk (Accipiter gentilis)

Northern goshawks are known to occur in the Study Area in mature forest habitats with closed canopies.

Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the rights-of-way (ROW). As large portions of the Study Area are forested, the amount of appropriate habitat for northern goshawks in the Study Area would be slightly reduced as a result of removal of forest cover. In particular, this species may be sensitive to the removal of mature forests that are used for breeding. Additionally, alteration of appropriate goshawk habitat through isolation, increased width of disturebed corridors, cutting, or regeneration can lead to increased predation by great horned owls, red-tailed hawks and fisher.

Table 5-2 displays the acreage of impacts to known goshawk territories within the Chippewa National Forest. Impacts to nesting habitats, post-fledging habitats and and foraging habitats were examined as a part of this analysis (USDA FS, 2004). Except for the Ketchum, Nature's Lake II and Sucker Lake post-fledging and/or nesting territories, impacts would be restricted to foraging territories.

As a forest species, northern goshawks tend to perch and nest in trees and are therefore not as susceptible to electrocution from or collision with transmission line facilities.

Temporary impacts may occur due to construction activity that occurs proximate to goshawk territories during nesting season. Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. Human disturbance at the nest site may result in nest failure and abandonment, especially if individuals have a low tolerance for humans.

To minimize impacts, construction and logging timing restrictions would be developed using General Forest Plan guidelines, to avoid impacts to individuals and known territories. These restrictions would be employed where nests are located within 1,640 feet (500 meters) of proposed construction activities. No nests are known to exist within any Route, but if one is located prior to construction, it would be avoided to the maximum extent practicable.

Table 5-2. Acres of ROW* within known Goshawk Territories by route.

Territory Name	Territory Type	Route 1 (Acres)	Route 2 (Acres)	Route 3 (Acres)
Bass Lake	Foraging	-	-	50.4
Dogfish Lake	Foraging	-	-	67.3
East Banks	Foraging	52.1	55.8	-
Grass Lake	Foraging	-	75.2	-
Hinken Creek	Foraging	-	-	89.2
Ketchum	Post-Fledging	10.7	-	-
	Foraging	84.7	31.5	-
Nature's Lake	Foraging	-	-	32.4
Nature's Lake II	Post-Fledging	-	-	12.2
	Foraging	-	-	99.2
Necktie	Foraging	61.2	-	-
Ottertail	Foraging	65.2	-	-
Pipeline	Foraging	80.0	77.3	-
Popple River	Foraging	-	-	92.7
Portage Lake	Foraging	73.4	79.1	-
Sucker Lake	Nesting	0.4	-	-
	Post-Fledging	14.6	-	-
	Foraging	85.1	-	-
Waboose Bay	Foraging	81.5	-	-
Wagner	Foraging	-	-	64.3
Total Acreage		**608.8**	**327.2**	**507.7**

**Using ROW width of 125' based upon anticipated centerline.*

Route 1 Alternative (Great Lakes Pipeline)

No CNF documented nests are located within the route, but 4 are located within one mile (two in the Sucker Lake territory, and one in both Ketchum and Waboose Bay), specifically, the ROW would pass within 1,640 feet (500 meters) of the documented location of the Sucker Lake nest. In addition, 4 DNR observations of this species are within one mile. No observations of northern goshawks were made during the EP surveys. Seasonal construction restrictions would be necessary for this route if the Sucker Lake nest is actively being used.

Route 1 would cross portions of eight known goshawk territories. Impacts are largely restricted to foraging territories, aside from where the route would cross the Ketchum and Sucker Lake territories. Approximately 0.4 acres of nesting territory and 15 acres of post-fledging would be affected within the Sucker Lake territory in addition to impacts to the foraging territory. Nearly 11 acres of post-fleding territory would be affected within the Ketchum territory as well as impacts to forging terrotiry. In totoal, approximately 609 acres of known goshawk territories would be impacted as a result of construction of Route 1.

Route 2 Alternative (US 2)

One CNF documented observation of a northern goshawk has occurred within Route 2, but no nests were located within 1,640 feet (500 meters) of the Route or ROW. The Portage Lake nesting territory is the closest documented nesting location and is within one mile of this route. No DNR or EP observations of this species are located within one mile of the Route.

Route 2 would cross portions of six known goshawk territories. Impacts are restricted to foraging territories. The Portage Lake foraging territory would experience the largest impact of approxiamtley 79 acres, though the Pipeline and Grass Lake foraging territories would experience 77 acres and 75 acres of impacts, respectively. In total, approximately 327 acres of known goshawk territories would be impacted as a result of Route 2 construction.

Route 3 Alternative (Northern Route)

One CNF observation of a northern goshawk nest is located within one mile of Route 3 (Nature's Lake II), as well as one DNR observation. This nest is located within 1,640 feet (500 meters) of this Route and within approximately 500 feet (150 meters) of the ROW. No observations of this species were made during the BGR survey. Construction restrictions would be in place if this nest site is actively being used.

Route 3 would cross portions of six known goshawk territories. The Nature's Lake II Territory would experience the greatest impacts where approximately 12 acres of nesting habitat and approximately 99 acres of post-fledging would be affected. The Hinken Creek and Popple River territories would also experience larger impacts, totaling 89 and 93 acres (respectively) of impact to foraging habitat. Total impacts to goshawk territories would be equal to approximately 508 acres, as a result of Route 3 construction.

Given their proximity to the Route 3 Alternative, the Nature's Lake II and Hinken Creek were surveyed for goshawks during the summer of 2009 but no response was observed.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse impacts would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. The width of the disturbed corridor would increase from 60 feet (typical, existing) to 185 feet (existing plus Project ROW). Appropriate breeding habitat would be slightly reduced as a result of tree removal, although impacts would be restricted to a single known territory, where 0.4 acres of forest cover would be removed from the Sucker Lake nesting habitat. Impacts to post-fledging habitats would occur within the Sucker Lake territory (14 acres) and the Ketchum territory (11 acres). Impacts to known foraging habitats would total 609 acres across eight known territories. It is possible that undocumented territories would be impactsed outside of these areas. Construction restrictions would be in place during active nesting. If individuals are present during construction they may be exposed to greater levels of human activity in the Study Area.
- DNR: Not Listed.

Route 2 Alternative (US 2)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. The width of the disturbed corridor would increase from 580 feet (typical, existing) to 800 feet (existing plus Project ROW).The removal of forest cover within this route would avoid impacting known nesting and post-fledging habitats. Six territories would be impacted, where approximately 327 acres of foraging habitat would be impacted. It is possible that undocumented territories would be impacted outside of these areas. Construction restrictions would be in place during active nesting. If individuals are present during construction they may be exposed to greater levels of human activity in the Study Area.
- DNR: Not Listed.

Route 3 Alternative (Northern Route)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. The width of the disturbed corridor would increase from 100 feet (typical, existing) to 225 feet (existing plus Project ROW). The removal of forest cover within this route would avoid impacting known nesting habitats. Approximately 12 acres of post-fledging habitat would be removed from the Natures Lake II territory. This route would impact foraging areas of eight known territories, where approximately 507 acres would be impacted. It is possible that undocumented territories would be impacted outside of these areas. Construction restrictions would be in place during active nesting. If individuals are present during construction they may be exposed to greater levels of human activity.
- DNR: Not Listed.

5.2.1.2 LeConte's Sparrow (Ammodramus leconteii)

LeConte's sparrows are known to occur in the Study Area in sedge meadows and grasslands.

Direct & Indirect Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands as trees would be removed to allow for transmission line development, although this conversion is not likely to increase the area of appropriate LeConte's sparrow habitat. Temporary impacts to wetland habitats may occur as a result of construction activities.

Permanent impacts to grassland habitats will be limited to the footprint of power line structures. Temporary impacts to hayfields would result from construction activities. Grasslands will be returned to their original condition after construction is completed. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent LeConte's sparrows from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans. This species may be especially sensitive due to its secretive nature.

Deforestation and fragmentation have increased the available habitat and range of the brown headed cowbird in North America, bringing it into contact with species which have had little experience with parasitism (Hilty et al., 2006). Forest clearing within the final ROW may increase suitable brown headed cowbird habitat by creating grassland and brushy habitats, which may be used by this species. Brown headed cowbirds are not specifically adapted to forested landscapes, so parasitism is typically higher near forest edges (Robinson, Thompson et al., 1995). Therefore, areas with a high edge-to-patch ratio would be expected to be more susceptible to cowbird parasitism (Hilty et al., 2006). Because LeConte's sparrows are known to be parasitized by brown-headed cowbirds (Shaffer et al., 2003), individuals in the Study Area may experience increased exposure to brown-headed cowbirds.

Route 1 Alternative (Great Lakes Pipeline)

One CNF documented observation of this species has occurred within Route 1, located in a large emergent wetland. No observations were made during the EP survey. The DNR does not track this species.

Route 1 would cross several large emergent wetlands, although appropriate habitat may not occur in large enough of an area to support breeding. Minimal impacts to appropriate wetland habitat would occur as a result of structures placed in wetlands.

Route 1 does not cross hayfields which are known to contain appropriate LeConte's sparrow, although appropriate habitat may be present. Forested and brushy areas would be converted into grasslands, although this conversion may not create the specific conditions preferred by LeConte's sparrows. The width of the disturbed corridor would increase from 60 feet (typical, existing) to 185 feet (existing plus Project ROW), thereby providing more habitat for brown headed cowbirds.

Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible and by applying BMPs to construction in wetlands. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

One CNF documented observation of this species has occurred within Route 2, located in a large emergent wetland. The EP surveys included no observations of this species. This species is not tracked by the DNR.

LeConte's sparrow habitat likely occurs along Route 2, although it may not occur in large enough of an area to support breeding. These habitat areas consist of several large sedge meadows which would be crossed by this route. Minimal impacts to appropriate wetland habitat would occur as a result of structures placed in wetlands.

Route 2 does not cross hayfields which are known to contain appropriate LeConte's sparrow, although appropriate habitat may be present. Forested and brushy areas would be converted into grasslands, although this conversion may not create the specific conditions preferred by LeConte's sparrows. The width of the disturbed corridor would increase from 580 feet (typical, existing) to 800 feet (existing plus Project ROW), thereby providing more habitat for brown headed cowbirds.

Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible and by applying BMPs to construction in wetlands. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No CNF documented observations occur within 1 mile of Route 3, however, 15 observations were made during the BGR surveys. These observations were made in sedge meadows and open grasslands within the CNF as well as the LLR. The DNR does not track this species.

Route 3 would cross several large sedge meadows which are likely large enough to support breeding. Minimal impacts to appropriate wetland habitat would occur as a result of structures placed in wetlands.

Route 3 would cross several grasslands which are likely large enough to support breeding. Minimal impacts to appropriate grassland habitats would be limited to structure placement. Forested and brushy areas would be converted into grasslands, although this conversion may not create the specific conditions preferred by LeConte's sparrows. The width of the disturbed corridor would increase from 100 feet (typical, existing) to 225 feet (existing plus Project ROW).

Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible and by applying BMPs to construction in wetlands. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in wetlands. Increased potential for predation by cowbirds may occur.
- DNR: Not Listed.

Route 2 Alternative (US 2)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in wetlands. Increased potential for predation by cowbirds may occur.
- DNR: Not Listed.

Route 3 Route 3 Alternative (Northern Route)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in wetlands. Increased potential for predation by cowbirds may occur.
- DNR: Not Listed.

5.2.1.3 Nelson's Sharp-tailed Sparrow (Ammodramus nelsoni)

Nelson's sharp-tailed sparrows are known to occur in the Study Area, in expansive shallow sedge meadows with little open water.

Direct & Indirect Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. Conversion of forested wetlands would not likely create additional Nelson's sharp-tailed sparrow habitat. Temporary impacts to wetland habitats may occur as a result of construction activities.

Forested wetlands would be converted to emergent wetland habitat, although it is unlikely that this conversion would create habitat sufficient for breeding.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent Nelson's sharp-tailed sparrow from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Deforestation and fragmentation have increased the available habitat and range of the brown headed cowbird in North America, bringing it into contact with species which have had little experience with parasitism (Hilty et al., 2006). Forest clearing within the final ROW may increase suitable brown headed cowbird habitat by creating grassland and brushy habitats, which may be used by this species. Brown headed cowbirds are not specifically adapted to forested landscapes, so parasitism is typically higher near forest edges (Robinson, Thompson et al., 1995). Therefore, areas with a high edge-to-patch ratio would be expected to be more susceptible to cowbird parasitism (Hilty et al., 2006). Because Nelson's sharp-tailed sparrows are known to be parasitized by brown-headed cowbirds (Nordhagen, Nordhagen and Hendricks, 2005), individuals in the Study Area may experience increased exposure to brown-headed cowbirds.

Route 1 Alternative (Great Lakes Pipeline)

No CNF or DNR observations of Nelson's sharp-tailed sparrows occur within one mile of Route 1. Surveys of the EP did not detect this species, although appropriate habitat may exist but not likely in large enough of an area to support breeding. These areas of appropriate habitat consist of several large sedge meadows which would be crossed by this alternative. The width of the disturbed corridor would increase from 60 feet (typical, existing) to 185 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation. Minimal loss of appropriate wetland habitat would occur as a result of structure placement in these wetlands.

Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible and by applying BMPs to construction in wetlands. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No CNF or DNR observations of Nelson's sharp-tailed sparrows occur within one mile of Route 2. Surveys of the EP did not detect this species, although appropriate habitat may exist but not likely in large

enough of an area to support breeding. These areas of appropriate habitat consist of several large sedge meadows which would be crossed by this alternative. The width of the disturbed corridor would increase from 580 feet (typical, existing) to 800 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation. Minimal loss of appropriate wetland habitat would occur as a result of structure placement in these wetlands.

Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible and by applying BMPs to construction in wetlands. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No CNF, DNR or BGR survey observations have been made of the Nelson's sharp-tailed sparrow along the Route 3 Alternative, although it is likely that appropriate wetland habitat exists along this route. Route 3 would cross several large sedge meadows which may be large enough to support breeding. The width of the disturbed corridor would increase from 100 feet (typical, existing) to 225 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation. Minimal loss of appropriate wetland habitat would occur as a result of structure placement in these wetlands.

Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible and by applying BMPs to construction in wetlands. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in wetlands. Increased potential for predation by cowbirds may occur.
- DNR: Not Listed.

Route 2 Alternative (US 2)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in wetlands. Increased potential for predation by cowbirds may occur.
- DNR: Not Listed.

Route 3 Alternative (Northern Route)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement. Increased potential for predation by cowbirds may occur.

- DNR: Not listed.

5.2.1.4 Short-eared Owl (Asio flammeus)

Short-eared owls are known to occur in the vicinity of the Study Area in open grasslands, meadows and hayfields.

Direct & Indirect Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. Temporary impacts to wetland habitats may occur as a result of construction activities.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitats. This may prevent short-eared owls from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No DNR observations have occurred within one mile of Route 1, and no observations were made during the EP surveys. The CNF does not track this species. Appropriate habitat may be present along this route where it crosses grasslands and sedge meadows, although these areas are likely not large enough to support breeding. Right-of-way clearing would increase the area of grassland habitat available for this species. Minimal impacts to these areas would occur as a result of structure placement.

Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible and by applying BMPs to construction in wetlands. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No DNR observations have occurred in the Route 2 vicinity and no observations were made during EP surveys. The CNF does not track this species. Appropriate habitat may be present along this route where it crosses sedge meadows although these areas are likely not large enough to support breeding. Right-of-way clearing would increase the area of grassland habitat available for this species. Minimal impacts to these wetlands would occur as a result of structure placement.

Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible and by applying BMPs to construction in wetlands. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No DNR observations have occurred within one mile of Route 3, nor were any observations made during the BGR surveys. The CNF does not track this species. This route crosses several sedge meadows where short-eared owl habitat may exist, although it is likely not wide enough to support a breeding population. Right-of-way clearing would increase the area of grassland habitat available for this species. Minimal impacts to these wetlands would occur as a result of structure placement.

Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible and by applying BMPs to construction in wetlands. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands, and increased through clearing of woody vegetation within the right-of-way.

Route 2 Alternative (US 2)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands, and increased through clearing of woody vegetation within the right-of-way.

Route 3 Alternative (Northern Route)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands, and increased through clearing of woody vegetation within the right-of-way.

5.2.1.5 American Bittern (Botaurus lentiginosus)

American bitterns are known to occur in the Study Area in emergent wetlands with a standing water component.

Direct & Indirect Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be

removed to allow for transmission line development. Temporary impacts to wetland habitats may occur as a result of construction activities.

If structures are placed in large emergent wetlands which are lacking standing snags or scattered trees, they may provide a perching opportunity for hunting raptors. American bitterns have been known to fall prey to great-horned owls (EPA, 2009), so individuals found along the chosen route may experience increased pressure.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent American bitterns from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No DNR observations of this species have been made within one mile of Route 1. During the EP surveys, no additional observations were made. The CNF does not track this species. Appropriate habitat likely exists where this route crosses emergent wetlands interspersed with standing water.

Several large wetland complexes are crossed by Route 1 which are likely of sufficient of area to support breeding. Minimal impacts to appropriate wetland habitats would occur as a result of structure placement. Right-of-way clearing would increase the area of meadow and emergent habitat available for this species

Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible and by applying BMPs to construction in wetlands. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No DNR observations of an American bittern have been made within one mile of Route 2. During the EP survey period, no additional observations were made. The CNF does not track this species. Appropriate habitat likely exists where this route crosses emergent wetlands interspersed with standing water.

Several large wetland complexes are crossed by Route 2 which are likely of sufficient of area to support breeding. Minimal impacts to appropriate wetland habitats would occur as a result of structure placement. Right-of-way clearing would increase the area of meadow and emergent habitat available for this species

Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible and by applying BMPs to construction in wetlands. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No DNR observations of an American bittern have been made within one mile of Route 3. During the BGR surveys, one observation was made along Route 3, although American bitterns likely occur along the route in greater abundance where it crosses emergent wetlands interspersed with standing water. The CNF does not track this species.

Several large wetland complexes are crossed by Route 3 which are likely of sufficient of area to support breeding. Minimal impacts to appropriate wetland habitat would occur as a result of structure placement. Right-of-way clearing would increase the area of meadow and emergent habitat available for this species

Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible and by applying BMPs to construction in wetlands. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in wetlands. Right-of-way clearing would increase the area of meadow and emergent habitat available for this species.

Route 2 Alternative (US 2)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in wetlands. Right-of-way clearing would increase the area of meadow and emergent habitat available for this species.

Route 3 Alternative (Northern Route)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in wetlands. Right-of-way clearing would increase the area of meadow and emergent habitat available for this species.

5.2.1.6 Red-shouldered Hawk (Buteo lineatus)

Red-shouldered hawks are known to occur in the project Study Area in mixed coniferous-deciduous woodlands, moist hardwood forests, swamps, river bottomlands, wooded marsh openings, and along the borders of lakes and streams (Johnsgard, 1990).

Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW. As portions of each route are forested, the amount of appropriate habitat for red-shouldered hawk in the Study Area may be reduced as a result of removal of forest cover. Forested wetlands would be converted to open wetland habitat.

As a forest species, the Avian Powerline Interaction Committee (APLIC) categorizes the risk of electrocution and collision for this raptors species as low (2006).

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent red-shouldered hawks from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline Corridor)

Seven DNR documented red-shouldered hawk observations occur within one mile of Route 1. Two observations of this species were made during the EP surveys along the Route 1 alternative. No CNF or DRM observations are located within one mile of this route. These observations occur within forest stands in the vicinity of lakes, streams and wetlands, which are a part of the largest concentration of high quality red-shouldered hawk habitat in the area.

Where Route 1 crosses forests of appropriate habitat, it would be converted into grassy and shrubby habitat. In particular, this species may also be sensitive to the conversion of forested wetland habitats into emergent wetlands, as forested wetlands can be used by this species for foraging. Habitat loss would compound upon historical habitat destruction in the area to further limit the range of this species in the area. The width of the disturbed corridor would increase from 60 feet (typical, existing) to 185 feet (existing plus Project ROW).

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities (see Section 8.0 for a description of BMPs). If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No DNR, DRM, or CNF observations of this species occur within one mile of Route 2. This species was not observed along this route during the EP surveys. Where this route crosses appropriate forested areas, it would be converted into grassy and shrubby habitat. In particular, this species may also be sensitive to the conversion of forested wetland habitats into emergent wetlands, as forested wetlands can be used by this species for foraging. Habitat loss would compound upon historical habitat destruction in the area to further limit the range of this species in the area. The width of the disturbed corridor would increase from 580 feet (typical, existing) to 800 feet (existing plus Project ROW).

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No DNR, DRM, or CNF observations of red-shouldered hawks have been made within one mile of Route 3. During the BGR surveys of Route 3, no additional observations of red-shouldered hawks were made, although appropriate habitat likely exists in woodlands near streams, rivers, lakes and wetlands.

Where Route 3 crosses mature forests near lakes minimal loss of habitat would occur as these areas would be converted to grassland or scrub/shrub habitat. In particular, this species may also be sensitive to the conversion of forested wetland habitats into emergent wetlands, as forested wetlands can be used by this species for foraging. This habitat loss would compound upon historical habitat destruction in the area to further limit the range of this species in the area. The width of the disturbed corridor would increase from 100 feet (typical, existing) to 225 feet (existing plus Project ROW).

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. This alternative would cross through an area known to contain a high concentration of this species; individuals would be subjected to habitat loss, although these impacts would not likely affect viability in the Study Area.
- DNR: Not listed.

Route 2 Alternative (US 2)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

Route 3 Alternative (Northern Route)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

5.2.1.7 Black Tern (Chlidonias niger)

Black terns are known to occur in emergent wetlands within the CNF and the LLR.

Direct & Indirect Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. Converted wetlands are not likely to create additional habitat for black terns.

As black terns often forage in midflight and sometimes in colonies, they may be more susceptible to transmission line collisions than other species, if facilities are placed near breeding colonies or foraging areas. The APLIC does not discuss risk to black terns (2006).

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent black terns from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No CNF or DRM observations of black terns or black tern breeding colonies have been made within one mile of Route 1. Additionally, no observations were made during the EP surveys. The DNR does not track black terns. This alternative does cross large sedge meadows which may contain appropriate foraging habitat, but may not support breeding. Minimal impacts to appropriate wetland habitat would occur as a result of structure placement. Right-of-way clearing would increase the area of wet meadow and emergent habitat available for this species.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

One CNF documented black tern colony is within one mile of Route 2, in a diverse wetland complex. No observations were made during the EP surveys. The DNR does not track black terns. Where this route alternative crosses appropriate wetland areas, minimal impacts would occur as a result of structure placement. Right-of-way clearing would increase the area of wet meadow and emergent habitat available for this species.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No CNF or DRM observations of black terns or documented black tern breeding colonies have been within one mile of Route 3. However, five observations of black terns were made during the BGR survey. Observations were made in the vicinity of large wetlands areas, often supporting floating vegetative mats. These wetland complexes contain habitat which likely occurs in sufficient enough of area to support breeding, as a number of individuals were observed at these locations landing and taking off from vegetative mats. The DNR does not track black terns. Minimal impacts to appropriate wetland habitat would occur as a result of structure placement. Right-of-way clearing would increase the area of wet meadow and emergent habitat available for this species.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands. Right-of-way clearing would increase the area of wet meadow and emergent habitat available for this species.
- DNR: Not listed.

Route 2 Alternative (US 2)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands. Right-of-way clearing would increase the area of wet meadow and emergent habitat available for this species.
- DNR: Not listed.

Route 3 Alternative (Northern Route)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Potential breeding colonies may also be affected as a result of structure placement. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands. Right-of-way clearing would increase the area of wet meadow and emergent habitat available for this species.
- DNR: Not listed.

5.2.1.8 Yellow Rail (Conturicops navogoracensis)

Yellow rails are known to occur in the Study Area in expansive emergent wetlands.

Direct Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. Converted wetlands are not likely to contain appropriate habitat for yellow rails.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent yellow rails from using suitable habitat along the ROW, especially due to this species secretive nature.

Route 1 Alternative (Great Lakes Pipeline)

No CNF, DRM or DNR observations of yellow rails have been made within one mile of Route 1, nor were observations made during the EP surveys. Appropriate habitat may exist where this route crosses large sedge meadows, although it is unlikely that these areas contain the specific habitat requirements of this species. Minimal impacts to appropriate habitats would occur as a result of structure placement. Right-of-way clearing would increase the area of wet meadow and emergent habitat available for this species.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No CNF, DRM or DNR observations of yellow rails have been made within one mile of Route 2, nor were observations made during the EP surveys. Appropriate habitat may exist where this route crosses large sedge meadows, although it is unlikely that these areas contain the specific habitat requirements of this

species. Minimal impacts to appropriate habitats would occur as a result of structure placement. Right-of-way clearing would increase the area of wet meadow and emergent habitat available for this species.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No CNF, DRM or DNR observations of yellow rails have been made in the Route 3 vicinity. During the BGR surveys, two observations were made. These observations are restricted to a single expansive sedge meadow with a component of standing water.

Route 3 would skirt this sedge meadow, which may experience minimal impacts to appropriate habitat, although the majority of this wetland area is south of this route. It is likely that this wetland contains suitable habitat for breeding. Minimal impacts to appropriate habitats would occur as a result of structure placement. Right-of-way clearing would increase the area of wet meadow and emergent habitat available for this species.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands. Right-of-way clearing would increase the area of wet meadow and emergent habitat available for this species.

Route 2 Alternative (US 2)

- CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands. Right-of-way clearing would increase the area of wet meadow and emergent habitat available for this species.

Route 3 Alternative (Northern Route)

- CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands. Right-of-way clearing would increase the area of wet meadow and emergent habitat available for this species.

5.2.1.9 Trumpeter Swan (Cygnus buccimator)

Trumpeter swans are known to occur in the Study Area in emergent wetlands and along lakes, river and streams.

Direct & Indirect Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. No transmission line structures would be placed in open water.

Due to the large size of trumpeter swans, they may be more susceptible to transmission line collisions than other species if facilities are placed along flyways, or near breeding and foraging habitat, although the APLIC does not site potential risks for this species.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent trumpeter swans from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No CNF or DNR observations of trumpeter swans have been made within one mile of Route 1, nor were observations made during the EP surveys. However, DRM reports swans staging in open water areas, such as the channel between Pike Bay and Cass Lake, early in the spring before their nesting ponds open up. It is unlikely that construction within Route 1 would impact swans using the Pike Bay/Cass Lake channel.

Appropriate habitat likely exists where this route crosses large sedge meadows, or is located near open water. These habitats may be present in large enough areas to support breeding. Minimal impacts to appropriate wetland habitats would occur as a result of pole placement.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities, including timing restrictions for activities occurring proximate to nesting and installation of flight diverters at key locations. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No CNF or DNR observations of trumpeter swans have been made in the Route 2 vicinity, nor were observations made during the EP surveys. However, DRM reports swans staging in open water areas, such as the channel between Pike Bay and Cass Lake, early in the spring before their nesting ponds open up. This location may be directly impacted by the project, depending on the final location of the 125-foot right-of-way within the 1,000-foot route.

Appropriate habitat likely exists where this route crosses large sedge meadows, or is located near open water. These habitats may be present in large enough areas to support breeding. Minimal impacts to appropriate wetland habitats would occur as a result of pole placement.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities, including timing restrictions for activities occurring proximate to nesting and installation of flight diverters at key locations. In particular, flight diverters would be considered if the project crosses the Pike Bay/Cass Lake channel. If an active nest is

found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

One DNR observation of this species is located within one mile of Route 3. During the BGR surveys, three observations of trumpeter swans were made. The BGR survey observations were made in habitats adjacent to open water and floating vegetative mats. No CNF observations of trumpeter swans have been made within one mile of Route 3.

Route 3 would cross several wetland areas which contain appropriate trumpeter swan habitat, likely in sufficient enough quantity to support breeding. Minimal impacts to appropriate wetland habitat would occur as a result of pole placement.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities, including timing restrictions for activities occurring proximate to nesting and installation of flight diverters at key locations. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies. Although the APLIC does not specifically address risks to trumpeter swans, the large size of this species makes it more susceptible to collision or electrocution (APLIC 2006).

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands. Development may increase risk of collision if line is placed across flyways.

Route 2 Alternative (US 2)

- CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands. Installation of flight diverts would be necessary if the transmission line is placed near the Pike Bay/Cass Lake channel. Development may increase risk of collision if line is placed across flyways.

Route 3 Alternative (Northern Route)

- CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands. Development may increase risk of collision if line is placed across flyways.

5.2.1.10 Black-throated Blue Warbler (Dendroica caerulescens)

Black-throated blue warblers are known to occur in the Study Area in mixed forest habitats.

Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW. To reduce to potential of disruption of breeding activities, construction in appropriate black-throated blue warbler habitat would occur outside the breeding season.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent black-throated blue warblers from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Deforestation and fragmentation have increased the available habitat and range of the brown headed cowbird in North America, bringing it into contact with species which have had little experience with parasitism (Hilty et al., 2006). Forest clearing within the final ROW may increase suitable brown headed cowbird habitat by creating grassland and brushy habitats, which may be used by this species. Brown headed cowbirds are not specifically adapted to forested landscapes, parasitism is higher near forest edges (Robinson, Thompson et al., 1995). Therefore, areas with a high edge-to-patch ratio would be expected to be more susceptible to cowbird parasitism (Hilty et al., 2006). Black-throated blue warblers are known to be infrequently parasitized by brown-headed cowbirds (Birds in Forested Landscapes, 2009), so local populations may be subjected to a slight increase in the risk of parasitism.

Route 1 Alternative (Great Lakes Pipeline)

No CNF, DRM, or DNR observations of black-throated blue warblers have been made within one mile of Route 1. No observations of this species were made along this route during the EP surveys. While no observations have been made, appropriate forested habitat for this species likely exists in large enough of an area to support breeding along this route. Where this route crosses appropriate forest habitat, it would be converted to grasslands, likely reducing the amount of appropriate habitat for black-throated blue warblers in the Study Area. The width of the disturbed corridor would increase from 60 feet (typical, existing) to 185 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No CNF, DRM, or DNR recorded observations of this species were made within one mile of this route, nor was it observed during the EP surveys. While no observations have been made along this route, appropriate forested habitat for this species likely exists in large enough of an area to support breeding. Where this route crosses appropriate forest habitat, it would be converted to grasslands, likely reducing the amount of appropriate habitat for black-throated blue warblers in the Study Area. The width of the disturbed corridor would increase from 580 feet (typical, existing) to 800 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No CNF, DRM or DNR observations of black-throated blue warblers have been made in the Route 3 vicinity. No observations of this species were made along Route 3 during the BGR surveys. While no observations are present, it is likely that appropriate habitat exists in large enough of an area to support

breeding, where sections of Route 3 crosses mixed forests. Where this route crosses appropriate forest habitat, it would be converted to grasslands, likely reducing the amount of appropriate habitat for black-throated blue warblers in the Study Area. The width of the disturbed corridor would increase from 100 feet (typical, existing) to 225 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal. The width of the disturbed corridor would increase from 60 feet (typical, existing) to 185 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation.
- DNR: Not listed.

Route 2 Alternative (US 2)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal. The width of the disturbed corridor would increase from 580 feet (typical, existing) to 800 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation.
- DNR: Not listed.

Route 3 Alternative (Northern Route)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal. The width of the disturbed corridor would increase from 100 feet (typical, existing) to 225 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation.
- DNR: Not listed.

5.2.1.11 Bay-breasted Warbler (Dendroica castanea)

Bay-breasted warblers are known to occur in the Study Area, in coniferous forests.

Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW. To reduce to potential of disruption of breeding activities, construction in appropriate bay-breasted warbler habitat would occur outside the breeding season.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent bay-breasted warblers from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Deforestation and fragmentation have increased the available habitat and range of the brown headed cowbird in North America, bringing it into contact with species which have had little experience with parasitism (Hilty et al., 2006). Forest clearing within the final ROW may increase suitable brown headed cowbird habitat by creating grassland and brushy habitats, which may be used by this species. Brown headed cowbirds are not specifically adapted to forested landscapes, parasitism is higher near forest edges (Robinson, Thompson et al., 1995). Therefore, areas with a high edge-to-patch ratio would be expected to be more susceptible to cowbird parasitism (Hilty et al., 2006). Bay-breasted warblers are known to be rarely parasitized by brown-headed cowbirds as ranges tend not to overlap (Birds in Forested Landscapes, 2009). Local populations may be subjected to increased contact and parasitism with brown-headed cowbirds.

Route 1 Alternative (Great Lakes Pipeline)

No CNF observations of bay-breasted warblers have been made within one mile of Route 1, nor was this species observed during the EP surveys. This species is not tracked by the DNR. It is likely that suitable habitat is present along this route, although it may not be suitable for breeding. Where Route 1 would cross appropriate forest stands, it would be converted to grasslands. The width of the disturbed corridor would increase from 60 feet (typical, existing) to 185 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

One CNF observation of a bay-breasted warbler is located within one mile of Route 2. This species was not observed during the EP surveys. This species is not tracked by the DNR. It is likely that suitable habitat is present along this route, although it may not be suitable for breeding. Where Route 2 would cross appropriate forest stands, it would be converted to grasslands. The width of the disturbed corridor would increase from 580 feet (typical, existing) to 800 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No CNF observations of bay-breasted warblers have been within one mile of Route 3. One observation of this species was made during the BGR surveys. This observation was made in a coniferous forested habitat. This species is not tracked by the DNR.

As portions of the Route 3 area are forested, it is likely that appropriate coniferous habitat is present, although it may not occur in sufficient enough of an area to support breeding. Where Route 3 would cross appropriate forest habitat, it would be converted to grasslands. The width of the disturbed corridor would increase from 100 feet (typical, existing) to 225 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal. The width of the disturbed corridor would increase from 60 feet (typical, existing) to 185 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation.
- DNR: Not listed.

Route 2 Alternative (US 2)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal. The width of the disturbed corridor would increase from 580 feet (typical, existing) to 800 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation.
- DNR: Not listed.

Route 3 Alternative (Northern Route)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal. The width of the disturbed corridor would increase from 100 feet (typical, existing) to 225 feet (existing plus Project ROW), thereby increasing the potential for brown headed cowbird predation.
- DNR: Not listed.

5.2.1.12 Spruce Grouse (Falcipennis canadensis)

Spruce grouse are known to occur in the Study Area, in coniferous forests.

Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW. To reduce the potential of disruption of breeding activities, construction in appropriate spruce grouse habitat would occur outside the breeding season.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent spruce grouse from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No CNF, DRM or EP survey observations of this species were made within one mile of Route 1. The DNR does not track this species. It is likely that appropriate habitat exists along Route 1, although coniferous

stands large enough to support breeding may not be present. Appropriate forest habitat would be removed as a result of the removal of forest cover. In particular, this species may be especially sensitive to the removal of coniferous forested habitats.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No CNF, DRM or EP survey observations of this species were made within one mile of Route 2. The DNR does not track this species. It is likely that appropriate habitat exists along Route 2, although coniferous stands large enough to support breeding may not be present. Appropriate forest habitat would be removed as a result of the removal of forest cover. In particular, this species may be especially sensitive to the removal of coniferous forested habitats.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No CNF, DRM or BGR observations were made of spruce grouse within one mile of Route 3. The DNR does not track this species. It is likely that appropriate habitat exists along Route 3, although coniferous stands large enough to support breeding may not be present. As large portions of the Route 3 area are forested, the amount of appropriate habitat for spruce grouse in the Study Area would be reduced as a result of removal of forest cover. In particular, this species may be especially sensitive to the removal of coniferous forested habitats.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

Route 2 Alternative (US 2)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

Route 3 Alternative (Northern Route)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

5.2.1.13 Sandhill Crane (Grus canadensis)

Sandhill cranes are known to occur in the Study Area in wet meadows and open hayfields.

Direct & Indirect Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. Converted wetlands are not likely to contain appropriate habitat.

Impacts to hayfield habitats will be limited to the footprint of power line structures. Temporary effects to hayfields would result from construction activities. Hayfields will be returned to their original condition after construction is completed.

To reduce the potential of disruption of breeding activities, construction would occur outside the breeding season.

Sandhill cranes are known to be susceptible to collisions with transmission line facilities (APLIC, 2006).

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent sandhill cranes from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

If structures are placed in large emergent wetlands which are lacking standing snags or scattered trees, they may provide a perching opportunity for hunting raptors and ravens. Sandhill cranes have been known to fall prey to hawks, eagles and ravens (Synder, 1992), so individuals found along the chosen route may experience increased pressure from predators.

Route 1 Alternative (Great Lakes Pipeline)

No DNR or EP survey observations of sandhill cranes have been made within one mile of Route 1. It is likely that this species is present in greater abundance than these records indicate. The CNF does not track this species. Appropriate habitat likely exists where this route crosses emergent wetlands and open hayfields. These habitats may also support breeding. Minimal impacts to wetland areas would occur as a result of structure placement.

Where Route 1 crosses appropriate hayfield habitat, minimal impacts would occur as a result of pole placement.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No DNR or EP survey observations of sandhill cranes have been made within one mile of Route 2. It is likely that this species is present in greater abundance than these records indicate. The CNF does not track this species. Appropriate habitat likely exists where this route crosses emergent wetlands and open hayfields. These habitats may also support breeding. Minimal impacts to wetland areas would occur as a result of structure placement.

Where Route 2 crosses appropriate hayfield habitat, minimal impacts would occur as a result of pole placement.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No DNR observations of sandhill cranes are located within one mile of Route 3, although one observation was made during the BGR surveys. This observation was made near open hayfields and large emergent wetlands which are likely large enough to support breeding. The CNF does not track this species. It is likely that this species exists in appropriate habitat in greater abundance than records indicate.

Route 3 would cross several wetland complexes which may contain suitable habitat for sandhill cranes. These wetlands likely contain sufficient breeding habitat as well. Minimal impacts to appropriate wetland habitat would occur as a result of pole placement.

Route 3 would cross open hayfields which likely contain appropriate sandhill crane breeding habitat. Minimal impacts would occur to appropriate open hayfield habitat, resulting from pole placement.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of structure placement in wetlands.

Route 2 Alternative (US 2)

- CNF: Not listed.
- DNR: Not listed.

- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of structure placement in wetlands.

Route 3 Alternative (Northern Route)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of structure placement in wetlands.

5.2.1.14 Connecticut Warbler (Oporornis agilis)

Connecticut warblers are known to occur in the Study Area in black spruce and tamarack bogs.

Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW. To limit impacts to breeding activity, construction activities would occur outside of the breeding season. This species may be especially sensitive to the loss of forested wetlands, which would be converted to more open wetland habitats.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent Connecticut warblers from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

Sixteen CNF observations of Connecticut warblers have been made within Route 1 and 7 CNF observations are located within one mile. An additional 5 observations were made within the route during the EP surveys. This species is not tracked by the DNR. These observations occur in tamarack bogs, black spruce stands and in mixed wet forests, which likely contain sufficient habitat for breeding. In these areas, the amount of appropriate habitat for Connecticut warblers in the Study Area would be reduced as a result of removal of forest cover.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

Sixteen CNF observations of Connecticut warblers have been made within Route 2 and an additional 7 CNF observations are located within one mile. An additional 5 observations were made within the route during the EP surveys. This species is not tracked by the DNR. These observations occur in tamarack and spruce stands, as well as mixed wet forests, which likely contain sufficient habitat for breeding. In these areas, the amount of appropriate habitat for Connecticut warblers in the Study Area would be reduced as a result of removal of forest cover.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

Five CNF observations of Connecticut warblers have been made within one mile of Route 3. Additionally, 22 observations of this species were made within this route during the BGR survey. This species is not tracked by the DNR. Observations are largely restricted to black spruce and tamarack bogs, where appropriate habitat likely exists in large enough of an area to support breeding. In these areas, the amount of appropriate habitat for Connecticut warblers in the Study Area would be reduced as a result of removal of forest cover.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

Route 2 Alternative (US 2)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

Route 3 Alternative (Northern Route)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

5.2.1.15 Black-backed Woodpecker (Picoides arcticus)

Black-backed woodpeckers are known to occur in the Study Area in spruce stands and burned areas when available.

Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW. As a cavity nester, this species may attempt nesting in wooden transmission line structures (Birds of North America, 2009).

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent black-backed woodpeckers from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

One CNF and DRM observation of this species is located within Route 1 and three observations are located within one mile. An additional single observation was made within this route during the EP surveys. The DNR does not track this species. These observations were made in coniferous forest habitats, which may contain sufficient breeding conditions. In these areas, the amount of appropriate habitat for black-backed woodpeckers would be reduced as a result of removal of forest cover.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs, including the following:

- To limit impacts to breeding activity, there would be no activities in stands with known occurrences during the breeding season from March 1 to August 31.
- Any known nests found during project implementation would be protected with a 200-foot buffer from March 1 to August 31 or until the young have fledged. (see section 8.0) to construction activities.

If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

One CNF and DRM documented observation of a black-backed woodpecker has been made within Route 2 and two observations are located within one mile. One additional observation was made during the EP surveys. The DNR does not track this species. These observations were made in coniferous forest habitats, which may contain sufficient breeding conditions. In these areas, the amount of appropriate habitat for black-backed woodpeckers would be reduced as a result of removal of forest cover.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs, including the following:

- To limit impacts to breeding activity, there would be no activities in stands with known occurrences during the breeding season from March 1 to August 31.
- Any known nests found during project implementation would be protected with a 200-foot buffer from March 1 to August 31 or until the young have fledged. (see section 8.0) to construction activities.

If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

One CNF observation of black-backed woodpeckers has been made within one mile of Route 3. During the BGR surveys, three additional observations of this species were made. The DNR does not track this species. These observations were made in coniferous forest habitats, which may contain sufficient breeding conditions. In these areas, the amount of appropriate habitat for black-backed woodpeckers would be reduced as a result of removal of forest cover.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs, including the following:

- To limit impacts to breeding activity, there would be no activities in stands with known occurrences during the breeding season from March 1 to August 31.

- Any known nests found during project implementation would be protected with a 200-foot buffer from March 1 to August 31 or until the young have fledged. (see section 8.0) to construction activities.

If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding and foraging habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

Route 2 Alternative (US 2)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding and foraging habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

Route 3 Alternative (Northern Route)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding and foraging habitat area would be reduced as a result of timber removal.
- DNR: Not listed.

5.2.1.16 Osprey (Pandion haliaetus)

Osprey are known to occur within the Study Area in riparian areas.

Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW. To limit impacts, construction activities proximate to active nest sites would be restricted during the breeding season, which extends from February 28th through September 1st .

Ospreys are known to frequently nest on transmission line structures. They may be susceptible to electrocution and collision with transmission line facilities although these interactions are uncommon. (APLIC, 2006).

Human activity along the chosen route will be high during construction & maintenance activities when compared to nearby areas of unfragmented habitat. This may prevent osprey from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

One CNF and DRM documented osprey nest is located within this route. An additional nest was located during the EP surveys. These observations were made in forested habitats near water. The DNR does not track this species.

As large portions of the Route 1 area are forested, the amount of appropriate habitat for osprey in the Study Area would be reduced as a result of removal of forest cover. However, this species is known to utilize transmission line structures for nesting, so the overall loss of habitat may be offset.

Impacts to individuals, nests and appropriate habitat areas will be minimized by limiting construction and logging activities that may affect nesting success to outside of the breeding season. Known nests existing within the route would be avoided to the maximum extent practicable.

Route 2 Alternative (Enbridge Pipeline)

No CNF or DRM documented osprey nests are located within one mile of this route, although two CNF observations of this species are present within the route. No observations were made during the EP surveys. These observations were made in forested habitats near water. The DNR does not track this species.

As large portions of the Route 2 area are forested, the amount of appropriate habitat for osprey in the Study Area would be reduced as a result of removal of forest cover. However, this species is known to utilize transmission line structures for nesting, so the overall loss of habitat may be offset.

Impacts to individuals, nests, and appropriate habitat areas will be minimized by limiting construction and logging activities that may affect nesting success to outside of the breeding season. No nests are known to exist within the route, but if one is located prior to construction, it would be avoided to the maximum extent practicable.

Route 3 Alternative (Northern Route)

No CNF or DRM documented osprey nests are located within one mile of this route. The DNR does not track this species.

As large portions of the Route 3 area are forested, the amount of appropriate habitat for osprey in the Study Area would be reduced as a result of removal of forest cover. However, this species is known to utilize transmission line structures for nesting, so the overall loss of habitat may be offset.

Impacts to individuals, nests and appropriate habitat areas will be minimized by limiting construction and logging activities that may affect nesting success to outside of the breeding season. No nests are known to exist within the route, but if one is located prior to construction, it would be avoided to the maximum extent practicable.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.
- DNR: Not listed.

- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal.

Route 2 Alternative (US 2)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal.

Route 3 Alternative (Northern Route)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of timber removal.

5.2.1.17 Wilson's Phalarope (Phalaropus tricolor)

Wilson's phalarope are known to occur within the Study Area in emergent wetlands with open water.

Direct & Indirect Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. Converted wetlands are not likely to contain appropriate habitat. No transmission line structures would be placed in open water.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent Wilson's phalarope from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No CNF, DRM, or DNR observations of Wilson's phalarope are located within one mile of Route 1. EP surveys did not observe this species. Appropriate habitat may occur where this alternative crosses emergent wetlands with standing water; however it is unlikely that this area is large enough to support breeding. Minimal impacts to appropriate wetland habitat would occur as a result of structure placement.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No CNF, DRM, or DNR observations of Wilson's phalarope are located within one mile of Route 2. EP surveys did not observe this species. Appropriate habitat may occur where this alternative crosses emergent wetlands with standing water; however it is unlikely that this area is large enough to support breeding. Minimal impacts to appropriate wetland habitat would occur as a result of structure placement.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No CNF, DRM, or DNR observations of Wilson's phalarope are located within one mile of Route 3. BGR surveys did not observe this species. Appropriate habitat likely exists along Route 3 where this alternative crosses emergent wetlands with standing water; however it is unlikely that this area is large enough to support breeding. Minimal impacts to appropriate wetland habitat would occur as a result of structure placement.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of structure placement in wetlands.
- DNR: Not listed.

Route 2 Alternative (US 2)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of structure placement in wetlands.
- DNR: Not listed.

Route 3 Alternative (Northern Route)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be reduced as a result of structure placement in wetlands.
- DNR: Not listed.

5.2.1.18 King Rail (Rallus elegans)

King rails are not known to occur within the Study Area. They may occur in expansive wetland areas, although it is unlikely.

Direct & Indirect Effects:

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development.

No transmission line structures would be placed in open water.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent king rails from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No DNR, DRM, or EP survey observations of king rails are located within one mile of Route 1. The CNF does not track this species. Appropriate habitat of sufficient size to support breeding may exist along this route. Minimal impacts to appropriate wetland habitat would occur as a result of pole placement, limiting the amount available in the vicinity of Route 1.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No DNR, DRM, or EP survey observations of king rails are located within one mile of Route 2. The CNF does not track this species. Appropriate habitat of sufficient size to support breeding may exist along this route. Minimal impacts to appropriate wetland habitat would occur as a result of pole placement, limiting the amount available in the vicinity of Route 2.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No DNR, DRM, or BGR survey observations of king rails are located within one mile of Route 3. The CNF does not track this species. Appropriate habitat of sufficient size to support breeding may exist along this route. Minimal impacts to appropriate wetland habitat would occur as a result of pole placement, limiting the amount available in the vicinity of Route 3.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.
- DNR and DRM: No impact. No observations of this species have occurred in or near the Study Area.

Route 2 Alternative (US 2)

- CNF: Not listed.
- DNR and DRM: No impact. No observations of this species have occurred in or near the Study Area.

Route 3 Alternative (Northern Route)

- CNF: Not listed.
- DNR and DRM: No impact. No observations of this species have occurred in or near the Study Area.

5.2.1.19 Caspian Tern (Sterna caspia)

Caspian terns are known to occur within the Study Area during migration. According to the DRM, caspian terns may be found in the channel between Pike Bay and Cass Lake.

Direct & Indirect Effects:

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. No transmission line structures would be placed in open water.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent Caspian terns from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No EP survey observations of Caspian terns have been made along Route 1. The CNF and the DNR do not track observations of this species. Appropriate habitat may exist along this route, although breeding areas are not likely present, as these areas consist of sandy islands in large lakes. Minimal impacts to wetland areas would occur as a result of town placement.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No EP survey observations of Caspian terns have been made along Route 2. The CNF and the DNR do not track observations of this species. DRM reports that the species sometimes forages on Pike Bay and Cass Lake and is likely to move between the lakes in the area of the Pike Bay Channel. Appropriate habitat

may exist along this route, although breeding areas are not likely present, as these areas consist of sandy islands in large lakes. Minimal impacts to wetland areas would occur as a result of town placement.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No BGR survey observations of Caspian terns have been made along Route 3. The CNF and the DNR do not track observations of this species. Appropriate habitat may exist along this route, although breeding areas are not likely present, as these areas consist of sandy islands in large lakes. Minimal impacts to wetland areas would occur as a result of town placement.

Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No habitat impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.
- DNR: Not listed.
- DRM: No impact. Appropriate breeding habitat would be avoided.

Route 2 Alternative (US 2)

- CNF: Not listed.
- DNR: Not listed.
- DRM: No impact. Appropriate breeding habitat would be avoided.

Route 3 Alternative (Northern Route)

- CNF: Not listed.
- DNR: Not listed.
- DRM: No impact. Appropriate breeding habitat would be avoided.

5.2.1.20 Great Gray Owl (Strix nebulosa)

Great gray owls are known to occur within the Study Area, in appropriate forest habitat.

Direct & Indirect Effects:

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW. Forests converted into open habitats as a result of construction may create additional foraging areas for this species.

Great gray owls are also known to be susceptible to electrocution and collision, although these occurrences are rare (APLIC, 2006).

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent great gray owls from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

According to the DRM, one nest is known to have existed within one mile of this alternative. No CNF documented nesting locations have been identified within one mile of Route 1. No DNR observations of this species are located within a mile of Route 1, nor were observations made during the EP surveys. As portions of the Route 1 area are forested, the amount of appropriate habitat for great gray owls in the Study Area would be reduced as a result of forest cover removal.

No nest sites are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No CNF documented nesting locations have been identified within one mile of Route 2. No DNR observations of this species are located within a mile of Route 2, nor were observations made during the EP surveys. As portions of the Route 2 area are forested, the amount of appropriate habitat for great gray owls in the Study Area would be reduced as a result of removal of forest cover.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No CNF documented nesting locations have been identified within one mile of Route 3. No DNR observations of this species are located within a mile of Route 3, nor were observations made during the BGR surveys. As portions of the Route 3 area are forested, the amount of appropriate habitat for great gray owls in the Study Area would be reduced as a result of removal of forest cover.

No nests are known to exist within the route. Impacts to individuals and appropriate habitat areas will be minimized by applying BMPs to construction activities. If an active nest is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be slightly reduced as a result of forest cutting. Foraging habitat may be increased as open habitats will be created and structures would provide additional hunting perches.
- DNR: Not listed.

Route 2 Alternative (US 2)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be slightly reduced as a result of forest cutting. Foraging habitat may be increased as open habitats will be created and structures would provide additional hunting perches.
- DNR: Not listed.

Route 3 Alternative (Northern Route)

- CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Appropriate breeding habitat area would be slightly reduced as a result of forest cutting. Foraging habitat may be increased as open habitats will be created and structures would provide additional hunting perches.
- DNR: Not listed.

5.2.2 Amphibian Species

5.2.2.1 Four-toed salamander (Hemidactylium scutatum)

Four-toed salamanders are known to occur in the Study Area in mixed forests with interspersed sphagnum seepages and other fish-free waters.

Direct & Indirect Effects:

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW.

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing for native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. No transmission line structures would be placed in open water.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent four-toed salamanders from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No CNF, DRM, or DNR documented observations of four-toed salamanders are located within one mile of Route 1. No observations of this species were made during the EP surveys of this route, although appropriate habitat may be present in forested areas along this route.

This species may be especially sensitive to the conversion of forested wetlands to open habitats. Minimal habitat loss would occur as a result of forest removal.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction in wetlands to minimize impacts to these areas. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No CNF, DRM, or DNR documented observations of four-toed salamanders are located within one mile of Route 2. No observations of this species were made during the EP surveys of this route, although appropriate habitat may be present.

This species may be especially sensitive to the conversion of forested wetlands to open habitats. Minimal habitat loss would occur as a result of forest removal.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction in wetlands to minimize impacts to these areas. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No CNF or DNR documented observations of four-toed salamanders are located within one mile of Route 3. No observations of this species were made during the BGR surveys of this route, although appropriate habitat may be present.

This species may be especially sensitive to the conversion of forested wetlands to open habitats. Minimal habitat loss would occur as a result of forest removal.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction in wetlands to minimize impacts to these areas. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 2 Alternative (US 2)

- CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 3 Alternative (Northern Route)

- CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

5.2.2.2 Red-backed salamander (Plethodon cinerus)

Red-backed salamanders are known to occur within the Study Area in appropriate forested habitats.

Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW, reducing the amount of appropriate habitat in the area.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent red backed salamanders from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

This species was not documented during the EP surveys of this route, although appropriate habitat may be present. The CNF, DRM, and DNR do not track observations of this species.

Removal of forested areas along this route could reduce the amount of appropriate habitat available for red-backed salamanders. Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

This species was not documented during the EP surveys of this route, although appropriate habitat may be present. The CNF, DRM, and DNR do not track observations of this species.

Removal of forested areas along this route could reduce the amount of appropriate habitat available for red-backed salamanders. Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

This species was not documented during BGR surveys of this route, although appropriate habitat may be present. The CNF, DRM, and DNR do not track observations of this species.

Removal of forested areas along this route could reduce the amount of appropriate habitat available for red-backed salamanders. Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 2 Alternative (US 2)

- CNF: Not listed.

- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 3 Alternative (Northern Route)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

5.2.2.3 Green Frog (Rana calmitans)

Green frogs are known to occur within the Study Area within a wide variety of open aquatic habitats.

Direct & Indirect Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. No transmission line structures would be placed in open water.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent green frogs from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No observations of this species were made during EP surveys of this route, although appropriate habitat may be present. The CNF, DRM, and DNR do not track this species.

It is likely that appropriate habitat is present in aquatic and riparian areas of this route. A minimal amount of wetland habitat would be converted to upland as a result of structure placement. Conversion of forested wetlands to emergent wetlands would also occur across a limited area. These converted wetlands may increase the amount of habitat available to green frogs if the appropriate hydrology is present.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No observations of this species were made during EP surveys of this route, although appropriate habitat may be present. The CNF, DRM, and DNR do not track this species.

It is likely that appropriate habitat is present in aquatic and riparian areas of this route. A minimal amount of wetland habitat would be converted to upland as a result of structure placement. Conversion

of forested wetlands to emergent wetlands would also occur across a limited area. These converted wetlands may increase the amount of habitat available to green frogs if the appropriate hydrology is present.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No observations of this species were made during BGR surveys, although appropriate habitat may be present. The CNF, DRM, and DNR do not track this species.

It is likely that appropriate habitat is present in aquatic and riparian areas of this route. A minimal amount of wetland habitat would be converted to upland as a result of structure placement. Conversion of forested wetlands to emergent wetlands would also occur across a limited area. These converted wetlands may increase the amount of habitat available to green frogs if the appropriate hydrology is present.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not Listed
- DNR: Not listed
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 2 Alternative (US 2)

- CNF: Not Listed
- DNR: Not listed
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 3 Alternative (Northern Route)

- CNF: Not Listed
- DNR: Not listed
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

5.2.3 Mammalian Species

5.2.3.1 Mountain Lion (Felis concolor)

Mountain lions have been observed within the Study Area, although it is unlikely that breeding takes place. Mountain lions tend to avoid open, flat habitats, generally restricting appropriate habitats in Minnesota to heavily forested areas (DNR, 2009).

Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW, which would reduce the amount of cover available for this species.

A major factor in appropriate habitat for mountain lions is the availability of prey sources (DNR, 2009). The removal of forest cover along the ROW would allow for herbaceous and shrubby revegetation, which can be a favored food source for browsing deer. If deer begin to use the newly established ROW in greater numbers, mountain lions could indirectly benefit from timer removal along the ROW, as hunting opportunities may be increased.

Route 1 Alternative (Great Lakes Pipeline)

No DNR, DRM, or CNF observations of mountain lions occur within one mile of Route 1. No observations of this species were made during BGR survey, although appropriate habitat may be present.

A minimal amount of forest cover along this route would be removed, which could eliminate appropriate cover used by this species. Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No DNR, DRM, or CNF observations of mountain lions occur within one mile of Route 2. No observations of this species were made during EP surveys of this route, although appropriate habitat may be present.

A minimal amount of forest cover along this route would be removed, which could eliminate appropriate cover used by this species. Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

One CNF observation of a mountain lion is within one mile of route 3. No DRM or DNR observations have been made, nor were observations of this species were made during BGR surveys of this route.

A minimal amount of forest cover along this route would be removed, which could eliminate appropriate cover used by this species. Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.

- DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss. Right-of-way clearing would increase the area of grassland habitat available for prey species.

Route 2 Alternative (US 2)

- CNF: Not listed
- DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss. Right-of-way clearing would increase the area of grassland habitat available for prey species.

Route 3 Alternative (Northern Route)

- CNF: Not listed.
- DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss. Right-of-way clearing would increase the area of grassland habitat available for prey species.

5.2.3.2 Pine Marten (Martes Americana)

Pine martens are known to occur within the Study Area in appropriate forested habitats.

Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW, which would reduce the amount of appropriate habitat available for this species.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent pine marten from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No DNR, DRM, or CNF observations are available for this species. No observations of pine martens were made during the EP survey.

Forested habitat would be removed as a result of Route 1 construction, which could reduce the amount of appropriate habitat available for this species. Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No DNR, DRM, or CNF observations are available for this species. No observations of pine martens were made during the EP survey, although appropriate habitat may be present.

Forested habitat would be removed as a result of Route 2 construction, which could reduce the amount of appropriate habitat available for this species. Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No DNR, DRM, or CNF observations are available for this species. No observations of pine martens were made during the BGR survey of this route, although appropriate habitat may be present.

Forested habitat would be removed as a result of Route 3 construction, which could reduce the amount of appropriate habitat available for this species. Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 2 Alternative (US 2)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 3 Alternative (Northern Route)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

5.2.3.3 Northern Myotis (Myotis septentrionalis)

Northern myotis are known to occur in Northern Minnesota in forests near appropriate hibernacula. This species may occur in areas of appropriate habitat.

Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW. Forested wetlands would be converted into open habitat.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent northern myotis from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No DRM or DNR observations of this species are located within one mile of Route 1. No observations were recorded during the EP survey, although appropriate habitat may be present. Hibernacula are not known to be present within this route and are not likely present. The CNF does not track this species.

Forested habitat would be converted into open habitat, which could reduce the amount of appropriate cover along this route. Additionally, this species may be especially sensitive to the loss of forested wetlands. Forested wetlands would be converted to open habitats from the construction of Route 1.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No DRM or DNR observations of this species are located within one mile of Route 2. No observations were recorded during the EP survey, although appropriate habitat may be present. Hibernacula are not known to be present within this route and are not likely present. The CNF does not track this species.

Forested habitat would be converted into open habitat, which could reduce the amount of appropriate cover along this route. Additionally, this species may be especially sensitive to the loss of forested wetlands. Forested wetlands would be converted to open habitats from the construction of Route 2.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No DRM or DNR observations of this species are located within one mile of Route 3. No observations were recorded during the BGR survey, although appropriate habitat may be present. Hibernacula are not known to be present within this route and are not likely present. The CNF does not track this species.

Forested habitat would be converted into open habitat, which could reduce the amount of appropriate cover along this route. Additionally, this species may be especially sensitive to the loss of forested wetlands. Forested wetlands would be converted to open habitats from the construction of Route 3.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Direct Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.
- DNR and DRM: No impact. Hibernacula are not known to be present; all documented observations are in the mining region of northeast Minnesota.

Route 2 Alternative (US 2)

- CNF: Not listed.
- DNR and DRM: No impact. Hibernacula are not known to be present; all documented observations are in the mining region of northeast Minnesota.

Route 3 Alternative (Northern Route)

- CNF: Not listed.
- DNR and DRM: No impact. Hibernacula are not known to be present; all documented observations are in the mining region of northeast Minnesota.

5.2.3.4 Heather Vole (Phenacomys intermedius)

Heather voles are not known to occur within the Study Area, although appropriate habitat may be present in coniferous wetlands and open areas with heather or sphagnum moss.

Direct & Indirect Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. No transmission line structures would be placed in open water.

Transmission line structures placed in open habitats can create potential raptor perches which can be used for hunting. This may afford raptors additional hunting opportunities, which may negatively affect heather voles, if poles are placed in appropriate habitat.

Route 1 Alternative (Great Lakes Pipeline)

No observations of heather voles were made during EP surveys of this route, although appropriate habitat may exist. The CNF, DRM and DNR do not track this species.

A minimal amount of wetland habitat, including spruce wetlands would be converted to open wetlands. This could reduce the amount of appropriate habitat available for heather voles.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No observations of heather voles were made during EP surveys of this route, although appropriate habitat may exist. The CNF, DRM and DNR do not track this species.

A minimal amount of wetland habitat, including spruce wetlands would be converted to open wetlands. This could reduce the amount of appropriate habitat available for heather voles.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No observations of heather voles were made during BGR surveys of this route, although appropriate habitat may exist. The CNF, DRM and DNR do not track this species.

A minimal amount of wetland habitat, including spruce wetlands would be converted to open wetlands. This could reduce the amount of appropriate habitat available for heather voles.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.
- DNR and DRM: No effect. The range of this species in Minnesota is restricted to Lake and Cook Counties in the extreme northeastern corner of the state.

Route 2 Alternative (US 2)

- CNF: Not listed.
- DNR and DRM: No effect. The range of this species in Minnesota is restricted to Lake and Cook Counties in the extreme northeastern corner of the state.

Route 3 Alternative (Northern Route)

- CNF: Not listed.
- DNR and DRM: No effect. The range of this species in Minnesota is restricted to Lake and Cook Counties in the extreme northeastern corner of the state.

5.2.3.5 Franklin's Ground Squirrel (Spermophilus franklinii)

According to the DRM, Franklin's ground squirrels are known to occur within the Study Area where grassy, open habitats are present.

Direct & Indirect Effects

Transmission line construction in grassland habitats would remove a minimal amount of herbaceous habitat per structure. Additionally, temporary impacts to vegetation would occur during construction, which could disturb the species composition of the grassland. Heavy equipment can crush or collapse burrows, if present.

Transmission line structures placed in open habitats can create potential raptor perches which can be used for hunting. This may afford raptors additional hunting opportunities, which may negatively affect Franklin's ground squirrels.

Route 1 Alternative (Great Lakes Pipeline)

No observations of Franklin's ground squirrels were made during the EP surveys of this route, although appropriate habitat is present. The CNF and DNR do not track this species.

A minimal amount of grassland habitat would be removed as a result of transmission line structure placement. Right-of-way clearing would increase the area of grassland habitat available for this species. It is unlikely that all grasslands within the Study Area would support the conditions favored by Franklin's ground squirrels.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No observations of Franklin's ground squirrels were made during the EP surveys of this route. According to the DRM, Franklin's ground squirrels are known to occur in Bena where appropriate habitat is present, especially near the railroad tracks. The CNF and DNR do not track this species, but DRM has observed it in several locations.

A minimal amount of grassland habitat would be removed as a result of transmission line structure placement. Right-of-way clearing would increase the area of grassland habitat available for this species. It is unlikely that all grasslands within the Study Area would support the conditions favored by Franklin's ground squirrels.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No observations of Franklin's ground squirrels were made during the BGR surveys of this route, although appropriate habitat may be present. The CNF and DNR do not track this species.

A minimal amount of grassland habitat would be removed as a result of transmission line structure placement. Right-of-way clearing would increase the area of grassland habitat available for this species. It is unlikely that all grasslands within the Study Area would support the conditions favored by Franklin's ground squirrels.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not Listed
- DNR: Not listed
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 2 Alternative (US 2)

- CNF: Not Listed
- DNR: Not listed
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 3 Alternative (Northern Route)

- CNF: Not Listed
- DNR: Not listed
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

5.2.3.6 Eastern Spotted Skunk (Spilogale putorius)

One DNR observation of this species is within the Study Area, indicating that appropriate habitat is likely present in open habitats which offer sufficient cover, although this observation is listed as questionable.

Direct & Indirect Effects

Brushy, shrubby, and forested habitat would be cleared as a result of transmission line construction. This may reduce the amount of appropriate habitat by eliminating proper cover. However, brushy species tends to revegetate cleared forest ROWs depending on how frequently they are maintained to remove vegetation.

Transmission line structures placed in open habitats can create potential raptor perches which can be used for hunting. This may afford raptors additional hunting opportunities, which may negatively affect eastern spotted skunks.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent eastern spotted skunks from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No DNR or DRM observations of this species occur within one mile of Route 1, nor were any located during EP survey. This species is not tracked by the CNF.

A minimal amount of forested and shrubby habitat would be converted into open habitat. This may remove appropriate eastern spotted skunk habitat from the vicinity of Route 1. Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No DNR or DRM observations of this species occur within one mile of Route 2, nor were any located during the EP survey. This species is not tracked by the CNF.

A minimal amount of forested and shrubby habitat would be converted into open habitat. This may remove appropriate eastern spotted skunk habitat from the vicinity of Route 1. Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an

individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No DNR or DRM observations of this species occur within one mile of Route 3, nor were any located during the EP survey. This species is not tracked by the CNF.

A minimal amount of forested and shrubby habitat would be converted into open habitat. This may remove appropriate eastern spotted skunk habitat from the vicinity of Route 1. Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.
- DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss, however, observations in the Study Area are listed as questionable and this species may not be present.

Route 2 Alternative (US 2)

- CNF: Not listed.
- DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss, however, observations in the Study Area are listed as questionable and this species may not be present.

Route 3 Alternative (Northern Route)

- CNF: Not listed.
- DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss, however, observations in the Study Area are listed as questionable and this species may not be present.

5.2.3.7 Northern Bog Lemming (Synaptommys borealis)

One DNR observation of this species is located in the Study Area, indicating appropriate habitat is present. These areas would likely be restricted to wetland habitats with sphagnum moss and an ericaceous shrub layer, such as spruce bogs.

Direct & Indirect Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-

colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. No transmission line structures would be placed in open water.

Transmission line structures placed in open habitats can create potential raptor perches which can be used for hunting. This may afford raptors additional hunting opportunities, which may negatively affect northern bog lemmings.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent northern bog lemmings from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No DNR or DRM observations of this species have been made with one mile of Route 1, nor were any observations made during the EP survey. However, appropriate habitat may exist where this route crosses spruce wetlands. The CNF does not track this species.

A minimal amount of appropriate forest habitat would be removed as a result of construction. In particular, this species may be especially sensitive to the conversion of forested wetlands (spruce bogs) into open habitats.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No DNR or DRM observations of this species have been made with one mile of Route 2, nor were any observations made during the EP survey. However, appropriate habitat may exist where this route crosses spruce wetlands. The CNF does not track this species.

A minimal amount of appropriate forest habitat would be removed as a result of construction. In particular, this species may be especially sensitive to the conversion of forested wetlands (spruce bogs) into open habitats.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No DNR or DRM observations of this species have been made with one mile of Route 3, nor were any observations made during the BGR survey. However, appropriate habitat may exist where this route crosses spruce wetlands. The CNF does not track this species.

A minimal amount of appropriate forest habitat would be removed as a result of construction. In particular, this species may be especially sensitive to the conversion of forested wetlands (spruce bogs) into open habitats.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF, DNR, and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 2 Alternative (US 2)

- CNF, DNR, and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 3 Alternative (Northern Route)

- CNF, DNR, and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

5.2.4 Reptile Species

5.2.4.1 Snapping Turtle (Chelydra serpentia)

Snapping turtles are known to occur in the Study Area in the vicinity of slow moving water with emergent vegetation. Appropriate habitat is likely present throughout the Study Area in these types of habitats.

Direct & Indirect Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. No transmission line structures would be placed in open water.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent snapping turtles from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No observations of this species were made during the EP survey of this route, although appropriate habitat is likely present in many locations. The CNF and DNR do not track this species, but DRM reports sightings of this species in the survey area.

Route 1 crosses several wetland and riparian zones which likely contain appropriate habitat for snapping turtles. A minimal amount of wetland habitat would be converted to upland. Where forested wetlands would be converted into open wetlands, more appropriate habitat for this species may be developed.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No observations of this species were made during the EP survey of this route, although appropriate habitat is likely present in many locations. The CNF and DNR do not track this species, but DRM reports sightings of this species in the survey area.

Route 2 crosses several wetland and riparian zones which likely contain appropriate habitat for snapping turtles. A minimal amount of wetland habitat would be converted to upland. Where forested wetlands would be converted into open wetlands, more appropriate habitat for this species may be developed.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

Four observations of this species were made during the BGR field surveys of this route. Appropriate habitat is likely present in many locations. The CNF and DNR do not track this species.

Route 3 crosses several wetland and riparian zones which likely contain appropriate habitat for snapping turtles. A minimal amount of wetland habitat would be converted to upland. Where forested wetlands would be converted into open wetlands, more appropriate habitat for this species may be developed.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.
- DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 2 Alternative (US 2)

- CNF: Not listed.
- DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 3 Alternative (Northern Route)

- CNF: Not listed.

- DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

5.2.4.2 Blanding's Turtle (Emydoidea blandingii)

Blanding's turtles are known to occur within the Study Area in wetlands with nearby sandy uplands. These habitats have a patchy distribution across the Study Area.

Direct & Indirect Effects

Current transmission line construction practices minimize impacts to wetland habitats by spanning these areas (when possible), constructing these segments during the winter months (when appropriate), using mats to minimize impacts from heavy equipment (when appropriate), allowing native vegetation to re-colonize disturbed areas and by maintaining existing hydrology and grade. Permanent loss of wetland habitat will be restricted to the footprint of transmission line structures placed in wetland areas. Forested wetlands would be converted into emergent or scrub/shrub wetlands, as trees would be removed to allow for transmission line development. No transmission line structures would be placed in open water.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent Blanding's turtles from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No CNF, DRM, or DNR observations of Blanding's turtles have been made within one mile of Route 1. No observations were made of this species during the EP survey, although appropriate habitat may be present.

Route 1 crosses several wetland and riparian zones which likely contain appropriate habitat for Blanding's turtles. A minimal amount of wetland habitat would be converted to upland. Where forested wetlands would be converted into open wetlands, more appropriate habitat for this species may be developed.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No CNF, DRM, or DNR observations of Blanding's turtles have been made within one mile of Route 2. No observations were made of this species during the EP survey, although appropriate habitat may be present.

Route 2 crosses several wetland and riparian zones which likely contain appropriate habitat for Blanding's turtles. A minimal amount of wetland habitat would be converted to upland. Where forested wetlands would be converted into open wetlands, more appropriate habitat for this species may be developed.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No CNF, DRM or DNR observations of Blanding's turtles have been made within one mile of Route 3. No observations were made of this species during the BGR survey, although appropriate habitat may be present.

Route 3 crosses several wetland and riparian zones which likely contain appropriate habitat for Blanding's turtles. A minimal amount of wetland habitat would be converted to upland. Where forested wetlands would be converted into open wetlands, more appropriate habitat for this species may be developed.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF, DNR, and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 2 Alternative (US 2)

- CNF, DNR, and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 3 Alternative (Northern Route)

- CNF, DNR, and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

5.2.4.3 Eastern Hognose Snake (Heterodon platirhinos)

Eastern hognose snakes are not known to occur within the Study Area, although appropriate habitat may exist along forest edges and in open woodlands.

Direct & Indirect Effects

Construction of transmission line infrastructure requires the permanent removal of trees within the ROW, which may reduce the amount of appropriate habitat available for eastern hognose snakes in the Study Area.

Human activity along the chosen route will be high during construction when compared to nearby areas of unfragmented habitat. This may prevent eastern hog-nosed snakes from using suitable habitat along the ROW, especially if individuals have a low tolerance for humans.

Route 1 Alternative (Great Lakes Pipeline)

No DNR or DRM observations occur within 1 mile of Route 1, nor were any observations made during the EP survey. However, appropriate habitat may exist where conditions are favorable. The CNF does not track this species.

Forested habitat would be removed as a result of construction. Some of these forests may contain appropriate habitat for snakes and American toads, a major food source for eastern hognose snakes.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 2 Alternative (US 2)

No DNR or DRM observations occur within 1 mile of Route 2, nor were any observations made during the EP survey. However, appropriate habitat may exist where conditions are favorable. The CNF does not track this species.

Forested habitat would be removed as a result of construction. Some of these forests may contain appropriate habitat for snakes and American toads, a major food source for eastern hognose snakes.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

Route 3 Alternative (Northern Route)

No DNR or DRM observations occur within 1 mile of Route 3, nor were any observations made during the BGR survey. However, appropriate habitat may exist where conditions are favorable. The CNF does not track this species.

Forested habitat would be removed as a result of construction. Some of these forests may contain appropriate habitat for snakes and American toads, a major food source for eastern hognose snakes.

Impacts to individuals and appropriate habitat areas will be minimized by using BMPs during construction activities. If an individual is found during construction, potential impacts and avoidance will be assessed and coordinated with the appropriate agencies.

No Build Alternative

The no build alternative would maintain the existing conditions along each alternative. No adverse or beneficial impact would occur.

Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 2 Alternative (US 2)

- CNF: Not listed.

- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

Route 3 Alternative (Northern Route)

- CNF: Not listed.
- DNR: Not listed.
- DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Some individuals may be subjected to habitat loss.

5.3 DNR, LLR, and CNF Listed Plant Species

This analysis uses plant communities to evaluate potential impacts to TES plants. The plant community includes a grouping of TES plants, a plant guild, that have similar habitat requirements. In most cases, several plant communities were grouped together according to habitat similarities. The analysis includes a listing of the plant communities, the TES that make up each guild, a description of the community/habitat, and the potential effects. Species with varied habitat requirements were included in more than one guild. A summary table is provided in Chapter 7.0 of this document.

The Forest Plan for the CNF provides general maintenance and protection guidelines for listed RFSS. These guidelines are provided in Chapter 4.0 of this document. Forest Plan language specific to all plant species are provided under the following guidance:

- O-WL-31: Enhance or restore high-quality habitat on a minimum of 20 (average of 2 sites per year) known sites of sensitive plants. Priority for habitat improvement will generally be for those species and habitats for which:

a. Proactive management (versus protection based on avoidance of any management activities) is needed to maintain species and

b. Coarse filter management does not provide adequate maintenance or restoration.

- S-WL-6: Prohibit the harvesting of sensitive and State listed threatened and endangered plants. Exceptions may be made for scientific research purposes or in fulfillment of treaty rights.

Additional guidance is provided specifically for *Botrychium mormo* (Goblin Fern) and *Pinus strobus* (White Pine). This language is provided below in Section 5.2.2.6

Surveys for the three routes include data collected for the Enbridge Southern Lights Project and surveys performed on all other public lands where alternatives are proposed. Occurrence citations are based on the raw data collected during these surveys conducted from 2007 to 2009. Plant populations are determined to be TES listed plant populations with same-species occurrences merged into a single population if their point locations occur within 300 feet of each other and are on the same side of the cleared right-of-way and/or road.

5.3.1 Bog and Fen Communities

This guild includes eleven TES that have potential to be found within these communities:

- *Arethusa bulbosa* – Dragon's mouth orchid

- *Botrychium simplex* – least moonwort
- *Drosera intermedia* – spatulate-leaved sundew
- *Eleocharis olivacea* – olivaceous spike-rush
- *Eleocharis quinqueflora* - few-flowered spike-rush
- *Hierchloe odorata* – sweet grass
- *Platanthera flava* var. *herbiola* – tubercled rein-orchid
- *Platanthera clavellata* – club spur orchid
- *Ranunculus lapponicus* – Lapland buttercup
- *Sparganium glomeratum* – northern bur-reed
- *Torreyochloa pallida* – Torrey's Manna Grass

5.3.1.1 Description of Habitat Type

These two wetland communities include open habitats, usually on floating mats of peat, with scattered to abundant *Sphagnum* moss. Open *Sphagnum* bogs occur where an area is too wet to support tree species (usually black spruce). The water in true bogs is nutrient-poor, due to elevated peat becoming isolated from mineral-rich runoff or groundwater and with nutrients being supplied only by precipitation. Ground layer plant communities may be dominated by ericaceous shrubs, sedges, or cotton grasses. *Sphagnum* is common to continuous in all bog communities. According to DRM, this plant community can be slow to recover from disturbance because it is, generally, a slow growing plant community.

Fen communities range from poor to rich fens based on nutrient availability in the subsurface hydrology. Poor fens are considered transitional communities between open bogs and rich fens. They occur on deep peat and receive minimal nutrient rich runoff from surrounding uplands. Poor fens are located in the interior of small basins isolated from upland runoff or on large peatland sites with infiltration from adjacent raised bogs. Surface water is slightly acidic and nutrient poor.

Rich fen communities occur within the Northern Floristic Region on deep peat or floating peat mats (DNR, 2003) with characteristic species *Carex lasiocarpa, C. limosa, C. chordorrhiza,* and *Rhynchospora alba* common. Rich fens generally contain higher species diversity and species adapted to higher levels of nutrients. Surface waters in rich fens are slightly acidic to circumneutral with moderate levels of nutrients. Mosses in rich fens may be abundant or scarce and shrub species, which may be present, are typically bog birches, willows and shrubby cinquefoils.

DNR data does not identify any calcareous seepage fens within the Study Area. Forested bog communities and associated species are considered in the conifer swamp community.

5.3.1.2 Direct and Indirect Effects

This guild is adapted to open wetland habitats. Direct adverse impacts related to project activities would be restricted to direct taking of individual plants during construction. The construction of H-frame structures will likely have a limited footprint (1,000 sq. ft. per structure). Vehicles accessing the structure sites may result in ground disturbance, and also have potential to directly take individual plants. Tree clearing could result in beneficial impacts since additional open habits would be created or maintained.

Winter construction using matting and removal of excavated material from pole locations will limit the potential indirect effects to bog and fen communities. No indirect effects to species of this guild are

expected since: project activities will not alter hydrological conditions, winter construction activities will limit ground disturbance, and none of the alternatives are expected to substantially increase wetland fill.

Route 1 Alternative (Great Lakes Pipeline)

This alternative crosses numerous bogs and poor fens, including large bog areas near Sucker Creek, through Hole in the Bog SNA, south of Bena and the Nushka Lake area. The following species have been documented within this route:

- Nine populations with 110 *Botrychium simplex* individuals were identified within this route during EP surveys, but none in bog or fen locations.
- One population of *Hierchloe odorata* was identified during Enbridge surveys along this route, but not in a Bog or Fen location.
- Five populations of more than 118 *Sparganium glomeratum* individuals were located in this route and alternatives in 2008 during EP surveys; two populations are noted by the DNR and CNF along Route 1, but neither population is in an area identified as fen or bog.
- More than 1,200 individual *Torreyochloa pallida* were identified in three different emergent wetland locations during EP surveys (One along Route 1, and two along Segment B).

Individual structure locations will be sited to avoid known TES locations. Vehicle traffic that may affect individual plants would be directed around known TES by installation of protective fencing and signage prior to construction activities. Additional TES individuals/populations may exist that were not identified during previous surveys. Once the final route and centerline are chosen, suitable habitat will be evaluated in advance of construction activities and suitable habitat will be surveyed for species of this guild within the proposed work areas. Protective fencing will be installed if additional populations are found and if those populations are within the impact area. All construction within bog and fen locations will occur during winter under frozen conditions or during other seasons with the use of construction mats. No impacts are expected to any species of this guild based on the ability to span and avoid all known populations.

Route 2 Alternative (US 2)

This alternative crosses numerous bogs and poor fens, including large bog areas east and west of Bena, north of Six Mile Lake, and near Schley. The following species have been documented within this route.

- Two populations of *Botrychium simplex* were identified within this route during 2008 surveys in an upland area near a bog. Four additional populations were identified during 2009 surveys; these populations were located between BNSF and Enbridge ROWs. CNF and DNR have eight records of this species within Route 2.
- Three populations of *Drosera intermedia* with more than 300 individuals are scattered throughout a large shrub peatland west of Bena within Route 2.
- Three populations of *Hierochloe odorata* were identified during 2008 and 2009 in Route 2, but none in bog and fen habitats.
- Ten total populations of *Sparganium glomeratum* were noted within the Route 2 corridor during EP surveys. One population was observed on a floating mat and two of the populations on peatland with other bog species.

Individual structure locations will be sited to avoid known TES locations. Vehicle traffic that may affect individual plants would be directed around known TES by installation of protective fencing and signage prior to construction activities. Additional TES individuals/populations may exist that were not identified during previous surveys. Once the final route and centerline are chosen, suitable habitat will be evaluated in advance of construction activities and suitable habitat will be surveyed for species of this guild within the proposed work areas. Protective fencing will be installed if additional populations are found and if those populations are within the impact area. All construction within bog and fen locations will occur during winter under frozen condition conditions or during other seasons with the use of construction mats. No impacts are expected to any species of this guild based on the ability to span and avoid all known populations.

Route 3 Alternative (Northern Route)

This alternative crosses numerous bogs and poor fens, with extensive communities/habitats located 4 to12 miles north of Deer River, numerous small bogs between Highway 29 and Highway 6 and a half-mile wide spruce bog, previously cleared for an existing transmission line, located between the Bowstring River and Whitefish Lake. The following species have been documented within this route.

- One 1994 DNR element occurrence of *Arethusa bulbosa* is noted within the LLR on Route 3 near Highway 6. This population was not relocated during 2008 surveys. The point data is located within an area of closed canopy tamarack and white cedar.
- Six populations of *Botrychium simplex* were identified during 2009 surveys within Route 3, though none of these populations are located within bog or fen habitat.
- A population of *Platanthera clavellata* is present under the existing cleared power corridor in an area between shrub swamp and black spruce bog.
- A population of *Platanthera flava* var. *herbiola* was observed within the route on an overgrown two track road in a transitional area between shrub swamp and bog communities.
- Two populations of *Sparganium glomeratum* were observed within the route on an overgrown roadway in a transitional area between shrub swamp and bog communities and in shallow open water at the edge of a lake.

Individual structure locations will be sited to avoid known TES locations. Vehicle traffic that may affect individual plants would be directed around known TES by installation of protective fencing and signage prior to construction activities. Additional TES individuals/populations may exist that were not identified during previous surveys. Once the final route and centerline are chosen, suitable habitat will be evaluated in advance of construction activities and suitable habitat will be surveyed for species of this guild within the proposed work areas. Protective fencing will be installed if additional populations are found and if those populations are within the impact area. All construction within bog and fen locations will occur during winter under frozen condition conditions or during other seasons with the use of construction mats. No impacts are expected to any species of this guild based on the ability to span and avoid all known populations.

No Build Alternative

The No Build Alternative would not alter the existing condition; no adverse or beneficial effects would occur.

5.3.1.3 Determination of Effects

This determination of effects is based on the surveys completed, the types of activities proposed for the Project, and the characteristics and risk factors of the species evaluated. The following effects are anticipated for TES located within the bog and fen communities.

Route 1 Alternative (Great Lakes Pipeline)

- CNF: No impact.
- DNR: No impact. While Botrychium simplex, Spraganium glomeratum and Torreyochloa pallida are present within the route, strict avoidance of all known populations and ability to span these populations will be observed. The project is likely to have no effect on the remainder of the species in this guild.
- DRM: No impact. While individuals of some species in this guild are present along Route 1 (i.e., Botrychium simplex, Hierchloe odorata and Sparganium glomeratum); the status of these species' populations will not be affected on LLR lands, and impacts to known populations will be avoided through avoidance and protective measures. No indirect effects are expected to any individuals in this guild. The project is likely to have no effect on the remainder of the species in this guild.

Route 2 Alternative (US 2)

- CNF: No impact.
- DNR: No impact. While *Botrychium simplex*, *Drosera intermedia*, *Spraganium glomeratum* and *Torreyochloa pallida* are present within the route, strict avoidance of all known populations and ability to span these populations will be observed. The project is likely to have no effect on the remainder of the species in this guild.
- DRM: No impact. While individuals of some species in this guild are present along Route 2 (i.e., *Botrychium simplex*, *Drosera intermedia*, *Hierchloe odorata,* and *Sparganium glomeratum*); the status of these species' populations will not be affected on LLR lands, and impacts to known populations will be avoided through avoidance and protective measures. No indirect effects are expected to any individuals in this guild. The project is likely to have no effect on the remainder of the species in this guild.

Route 3 Alternative (Northern Route)

- CNF: No impact. The project will not likely cause a trend to Federal listing or loss of viability for any of these species.
- DNR: No impact. While *Arethusa bulbosa*, *Botrychium simplex*, *Platanthera flava var. herbiola*, Spraganium glomeratum and Torreyochloa pallida are present or have been noted within the route, strict avoidance of all known populations and ability to span these populations will be observed. The project is likely to have no effect on the remainder of the species in this guild.
- DRM: No impact. While individuals of some species in this guild are present along Route 3 (i.e., *Botrychium simplex*, *Platanthera flava var. herbiola*, *Hierchloe odorata* and *Sparganium glomeratum*); the status of these species' populations will not be affected on LLR lands, and impacts to known populations will be avoided through avoidance and protective measures. The project is likely to have no effect on the remainder of the species in this guild.

No Build Alternative

The No Build Alternative will not change the existing condition; no adverse or beneficial effects would occur.

5.3.1.4 Mitigation

The final route will be chosen, centerline identified and construction details finalized after the Record of Decision is completed. Prior to construction, known populations of listed plant species will be resurveyed and protective fencing with signage will be installed if TES plants are located within the impact area.

5.3.2 Wet Prairie, Sedge Meadow and Emergent Wetland Communities

This guild includes ten TES that have potential to be found within these communities:

- *Botrychium simplex* – least moonwort,
- *Eleocharis olivacea* – olivaceous spike-rush,
- *Eleocharis quinqueflora* - few-flowered spike-rush,
- *Gentiana andrewsii* – closed gentian,
- *Hierchloe odorata* – sweet vernal grass,
- *Platanthera flava* var. *herbiola* – tubercled rein-orchid,
- *Platanthera clavellata* – club spur orchid,
- *Sparganium glomeratum* – northern bur-reed,
- *Torreyochloa pallida* – Torrey's manna grass
- *Viola novae-angliae* – New England violet.

5.3.2.1 Description of Habitat Type

Natural communities included in this guild include open communities on saturated to semipermanently flooded mineral soil, muck, or shallow peat. These communities include varying levels of shrub cover. Wet prairies are typically dominated by grasses and sedges with scattered forbs and shrubs and sometimes aspen. This community is historically fire dependent, though within the Study Area, this community type may persist where maintenance activities on utility rights-of-way occur in the absence of fire. In the absence of these disturbances, this community naturally succeeds to greater shrub and tree cover, shifting the community type. Wet meadows and emergent wetlands occur in increasing wetter areas with wet meadows typically flooded only during the spring or during rains; the water table is usually below the soil surface for the remainder of the growing season. Wet meadows are typically grass (often *Calamagrostis*) and sedge (*Carex*) dominated communities with scattered forbs. Emergent wetlands are typically flooded for extended periods during the growing season, with surface water usually absent by the end of the growing season. Emergent wetlands are typically dominated by cattails and bulrushes. These communities may contain up to 50% cover by shrub species, typically dominated by willows (*Salix* sp.), meadowsweet (*Spiraea* sp.) and scattered aspen.

5.3.2.2 Direct and Indirect Effects

Impacts to these species, which are adapted to full sun conditions, are likely to be restricted to alteration of hydrological conditions or direct impact to individuals due to construction. The construction of H-frame structures will likely have a limited footprint (1,000 sq. ft. per structure).

Individual structure locations will be sited to avoid known TES locations. No impacts are anticipated due to hydrologic changes, since such changes would not occur as a result of the Project.

Winter construction or the use of construction mats will limit the potential effects to open wetland communities. No indirect effects to species of this guild are expected as project activities are not expected to alter hydrological conditions or plant community structure. Winter construction and the use of construction mats will limit ground disturbance, none of the alternatives are expected to substantially increase wetland fill.

Route 1 Alternative (Great Lakes Pipeline)

This alternative crosses numerous wet prairies, and wet meadows and emergent wetlands including lowland areas associated with Moss and Twin Lakes, wetlands in the Sucker Creek area and large marsh and meadow complexes extending between Portage Lake and Cohaset. The following species have been documented within this route.

- Nine populations with 110 *Botrychium simplex* individuals were identified within this route during EP surveys. One population of *Hierchloe odorata* was identified during Enbridge surveys along this route in an open upland location.
- Five populations of more than 118 *Sparganium glomeratum* individuals were located in this route and alternatives in 2008 during EP surveys; two populations are noted by the DNR and CNF along Route 1.
- More than 1,200 individual *Torreyochloa pallida* were identified in three different emergent wetland locations during EP surveys (One along Route 1, and two along Segment B).

Individual structure locations will be sited to avoid known TES locations. Vehicle traffic that may affect individual plants would be directed around known TES by installation of protective fencing and signage prior to construction activities. Additional TES individuals/populations may exist that were not identified during previous surveys. Once the final route and centerline are chosen, suitable habitat will be evaluated in advance of construction activities and suitable habitat will be surveyed for species of this guild within the proposed work areas. Protective fencing will be installed if additional populations are found and if those populations are within the impact area. No impacts are expected to any species of this guild based on the ability to span and avoid all known populations.

Route 2 Alternative (US 2)

This alternative crosses numerous wet prairies and wet meadows and emergent wetlands including lowland areas associated with the Pike Bay/Cass Lake channel, wet meadow and emergent communities near Bena and numerous large and small wetlands west to Cohasset. The following species have been documented within this route.

- Two populations of *Botrychium simplex* were identified within this corridor during EP surveys in an upland area near a bog location. Four additional populations were identified in 2009 in the corridor between BNSF and Enbridge lines. CNF data has 8 records of this species within Route 2.
- Three populations of *Hierochloe odorata* were identified during 2008 and 2009 EP and HDR surveys in upland habitats.
- Ten total populations of *Sparganium glomeratum* were noted within Route 2 during EP surveys in wetland locations

- Two populations consisting of more than 67 *Viola novae-angliae* individuals were observed during EP surveys along Route 2.

Individual structure locations will be sited to avoid known TES locations. Vehicle traffic that may affect individual plants would be directed around known TES by installation of protective fencing and signage prior to construction activities. Additional TES individuals/populations may exist that were not identified during previous surveys. Once the final route and centerline are chosen, suitable habitat will be evaluated in advance of construction activities and suitable habitat will be surveyed for species of this guild within the proposed work areas. Protective fencing will be installed if additional populations are found and if those populations are within the impact area. No impacts are expected to any species of this guild based on the ability to span and avoid all known populations.

Route 3 Alternative (Northern Route)

This alternative crosses numerous wet prairie, wet meadow, and emergent wetlands, with significant emergent wetlands between Deer River and Bowstring, large wetlands near Fletcher Creek, Wagoner River and Popple River across the north, and numerous small wetlands south from Blackduck to Bemidji. The following species have been documented within this route:

- One 1994 element occurrence of *Arethusa bulbosa* is noted within the Leech Lake Reservation on Route 3 near Highway 6. This population was not relocated during 2009 surveys. The point data is located within an area of closed canopy tamarack and white cedar
- Six populations of *Botrychium simplex* were identified during 2009 surveys within the Route 3 corridor.
- A population of *Platanthera clavellata* is present under the existing cleared power corridor in an area between shrub swamp and black spruce bog.
- A population of *Platanthera flava* var. *herbiola* was observed within the route on an overgrown two track road in a transitional area between shrub swamp and bog communities.
- Two populations of *Sparganium glomeratum* were observed within the route on an overgrown roadway in a transitional area between shrub swamp and bog communities and in shallow open water at the edge of a lake.
- A population of *Viola novae-angliae*, consisting of 60 individuals was observed in 2009 along Highway 6 within the LLR Boundary approximately 5 miles north of Deer River within Route 3.

Individual structure locations will be sited to avoid known TES locations. Vehicle traffic that may affect individual plants would be directed around known TES by installation of protective fencing and signage prior to construction activities. Additional TES individuals/populations may exist that were not identified during previous surveys. Once the final route and centerline are chosen, suitable habitat will be evaluated in advance of construction activities and suitable habitat will be surveyed for species of this guild within the proposed work areas. Protective fencing will be installed if additional populations are found and if those populations are within the impact area. No impacts are expected to any species of this guild based on the ability to span and avoid all known populations.

No Build Alternative

The No Build Alternative would not alter the existing condition along any of the routes where existing utility corridors exist; no adverse or beneficial effects would occur.

5.3.2.3 Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: No impact.
- DNR: No impact. While *Botrychium simplex, Spraganium glomeratum, Torreyochloa pallida* and *Viola novae-angliae* are present within the route, strict avoidance of all known populations and ability to span these populations will be observed. The project is likely to have no effect on the remainder of the species in this guild.
- DRM: No impact. While individuals of some species in this guild are present along Route 1 (i.e., *Botrychium simplex*, *Hierchloe odorata*, *Sparganium glomeratum* and *Viola novae-angliae*); the status of these species' populations will not be affected on LLR lands, and impacts to known populations will be avoided through avoidance and protective measures. No indirect effects are expected to any individuals in this guild. The project is likely to have no effect on the remainder of the species in this guild.

Route 2 Alternative (US 2)

- CNF: No impact.
- DNR: No impact. While *Botrychium simplex, Drosera intermedia, Spraganium glomeratum and Torreyochloa pallida* are present within the route, strict avoidance of all known populations and ability to span these populations will be observed. The project is likely to have no effect on the remainder of the species in this guild.
- DRM: No impact. While individuals of some species in this guild are present along Route 1 (i.e., *Botrychium simplex*, *Drosera intermedia*, *Hierchloe odorata* and *Sparganium glomeratum*); the status of these species' populations will not be affected on LLR lands, and impacts to known populations will be avoided through avoidance and protective measures. No indirect effects are expected to any individuals in this guild. The project is likely to have no effect on the remainder of the species in this guild.

Route 3 Alternative (Northern Route)

- CNF: No impact.
- DNR: No impact. While *Arethusa bulbosa*, *Botrychium simplex, Platanthera flava* var. *herbiola*, *Spraganium glomeratum* and *Torreyochloa pallida* are present or have been noted within the route, strict avoidance of all known populations and ability to span these populations will be observed. The project is likely to have no effect on the remainder of the species in this guild.
- DRM: No impact. While individuals of some species in this guild are present along Route 3 (i.e., *Botrychium simplex*, *Platanthera flava* var. *herbiola*, *Hierchloe odorata*, *Sparganium glomeratum* and *Viola novae-angliae*); the status of these species' populations will not be affected on LLR lands, and impacts to known populations will be avoided through avoidance and protective measures. No indirect effects are expected to any individuals in this guild. The project is likely to have no effect on the remainder of the species in this guild.

No Build Alternative

The No Build Alternative will not change the existing condition; no adverse or beneficial effects would occur.

5.3.2.4 Mitigation

Known populations of listed plant species will be resurveyed and protective fencing placed prior to construction activities after the final route has been chosen, and centerline identified, if they are within the potential impact area.

5.3.3 Conifer Swamps

This guild includes twelve TE plant species that have potential to be found within these communities:

- *Arethusa bulbosa* – Dragon's mouth orchid,
- *Botrychium simplex*, least moonwort,
- *Calypso bulbosa* – fairy slipper,
- *Cypripedium arietinum* – ram's-head lady slipper,
- *Gymnocarpum robertianum* – limestone oak fern,
- *Malaxis monophyllos* var. *brachypoda* – white adder's mouth orchid,
- *Malaxis paludosa* – bog adder's mouth orchid,
- *Pinus strobus* – White Pine
- *Platanthera clavellata* – club spur orchid,
- *Polemonium occidentale var. lacustre* – Western Jacob's ladder,
- *Ranunculus lapponicus* – Lapland buttercup,
- *Taxus canadensis* – Canada yew

5.3.3.1 Description of Habitat Type

This group of forested communities includes cedar swamps, tamarack swamps, black spruce swamps, black spruce bogs and mixed conifer swamps and shares the common traits of being dominated by coniferous tree species on mostly peat soils or wet mineral soils. Differences in the communities are most often associated with depth of peat, groundwater chemistry, or successional stage.

White cedar swamp is dominated by white cedar in the canopy, forming either pure, dense, even-aged stands or mixed, uneven aged stands with black spruce, balsam fir, white spruce, poplars or black ash also present. Shrubs are usually dominated by alders when present, but stands with dense canopy cover often have a very sparse shrub layer. Likewise, mosses tend to form complete ground layer cover but become less dense in deep shade. White cedar swamps occur on wet mineral soils or peat on level to gently sloping terrain at the edge of peatlands, in stream floodplain and shallow basins. White cedar is a long-lived species and white cedar swamp forms into mature and old-growth communities in the absence of catastrophic disturbance.

Black spruce and tamarack swamps and bogs generally occur on peat with mildly to moderately acidic groundwater. These communities tend to grade from minerotrophic or mildly acid to acidic along a gradient from tamarack swamps, to black spruce swamps to black spruce bogs. Distinctions between communities are discernable by the presence of minerotrphic species in the swamp communities and the absence of these species in true bogs. In black spruce bogs, trees are often stunted black spruce (<10m tall) and may contain scattered tamaracks. Mixed conifer forests may contain a mix of the previous species.

5.3.3.2 Direct and Indirect Effects

Impacts to these species typical of partial to closed canopy conifer swamp, are likely to consist of alteration of hydrological conditions, removal of forest canopy, or direct impact to individuals due to construction.

The construction of H-frame structures will likely have a limited footprint (1,000 sq. ft. per pole maximum). Individual pole locations will be sited to avoid any known TES locations. No impacts are expected to any species of this guild based on direct construction activities as all known locations will be avoided for both permanent pole siting, or during temporary construction.

Transmission line construction will generally consist of H-frame timber construction with permanent direct ground alteration limited to pole locations. Individual poles would be placed into a drilled hole and backfilled with compacted material for stability. It is not expected that any alteration of hydrology within conifer swamps would occur based on placement of transmission line poles.

Species of this guild will be adversely impacted where canopy is temporarily or permanently removed for the new corridor. *Arethusa bulbosa* – dragon's mouth orchid, *Botrychium simplex,* least moonwort, *Platanthera clavellata* – club spur orchid and *Ranunculus lapponicus* – lapland buttercup are also listed in open bog and fen communities. Though individuals of those species that may inhabit open areas are also present in these forested communities, removal of canopy can adversely affect those individuals due to the related stress of canopy removal and the potential for direct harvesting and construction related impacts. Removal of canopy will create localized increases in sunlight, favoring species adapted to open conditions, and removing habitat for those species (and individuals) not adapted to open conditions. All species in this guild present in locations where new transmission corridor would be placed would be adversely affected due to loss of canopy.

Winter construction using matting and removal of excavated material from pole locations will limit the potential effects to hydrology and soil disturbance. Where clearing of canopy occurs, individual species of this guild are likely to be adversely effected, directly and indirectly by change in plant community structure. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place where possible. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 1 Alternative (Great Lakes Pipeline)

This alternative crosses numerous conifer swamps which have been cleared in the past along existing utility corridors and presently exist as sedge meadows, shrub-carr and regrowth conifer swamp. This alternative would likely involve widening these existing corridors. Significant conifer swamps occur in scattered stands around the south side of Lower Sucker Lake, south of Portage Lake, a mile wide portion between Portage Lake and Bena, a half mile portion north of Six Mile Lake, in a roughly four mile segment near Nushka Lake and Rice Lake, and a one-mile portion largely maintained as utility corridor north of the Cohaset Power Plant.

- Nine populations with 110 *Botrychium simplex* individuals were identified within this route during EP surveys. Two populations of this species were identified during Enbridge Pipeline surveys within Route 1, Alternative C.
- DNR and CNF data indicates that one population of *Malaxis monophyllos* var. *brachypoda* is present within Route 1 south of Lower Sucker Lake.

- More than 292 individual *Taxus canadensis* individuals were identified during EP surveys in five locations along Route 1. CNF data indicates 4 locations where this species is present within Route 1.
- White pine is common in all age classes along this route.

These species would be adversely impacted if conifer swamp canopy cover that provides habitat for these individuals is removed adjacent to the individuals. Where clearing for ROW is required, white pine would be removed, and ongoing maintenance activities would preclude this species from reaching maturity within the corridor. All construction within conifer swamp locations will occur during winter under frozen condition conditions or during other seasons with the use of construction mats. Refinement of the route will avoid, to the greatest extent possible, identified individuals plant species within this guild.

Route 2 Alternative (US 2)

This alternative crosses numerous conifer swamps which have been cleared in the past along existing utility corridors. This alternative would likely involve widening these existing corridors. Significant conifer swamps occur adjacent to this route on the west side of Sucker Lake, north of the east end of Portage Lake, along the north side of Six Mile Lake, along both sides of US 2 between in a roughly four mile segment near Nushka Lake and Rice Lake, the two miles west of Zemple and two large spruce swamps between Deer River and Cohaset on the south side of US 2.

- Ten new *Botrychium simplex* populations were located within Route 2 during EP surveys, but none in conifer swamp locations. CNF data indicates eight identified populations of this species on this route in upland locations along utility corridors.
- A single population of *Ranunculus lapponicus* was identified on this route during Enbridge Surveys.
- More than 160 individual *Taxus canadensis* individuals were identified in eight locations along Route 2 during surveys performed for Enbridge in 2007 and 2008. CNF data indicates five observations of this species along Route 2.
- White pine is present in all age classes in conifer swamps along this route.

Individuals of these species would be adversely impacted if conifer swamp canopy cover that provides habitat for these individuals is removed adjacent to the individuals. Where clearing for ROW is required, white pine would be removed, and ongoing maintenance activities would preclude this species from reaching maturity within the corridor. All construction within conifer swamp locations will occur during winter under frozen condition conditions or during other seasons with the use of construction mats. Refinement of the route will avoid, to the greatest extent possible, identified individuals plant species within this guild.

Route 3 Alternative (Northern Route)

This alternative crosses numerous conifer swamps which have been cleared in the past along existing utility corridors. This alternative would likely involve widening these existing corridors. Significant conifer swamps occur on private lands north of Highway 71 near Blackduck Lake in Beltrami County, numerous small cedar swamps along Forest Road 2429 east of Popple River, a large black spruce swamp with cedar swamp inclusions west of Helen Lake in Wirt Township, a high quality mixed conifer swamp near Forest Road 2402 and Spur Lake, the nearly seven mile linear crossing of a black spruce swamp in the Bowstring State Forest, or alternately, the crossing of one mile of mixed conifer swamp within the

same basin along Highway 6, the two miles west of Zemple and two large spruce swamps between Deer River and Cohaset on the south side of US 2.

- One DNR record for *Arethusa bulbosa* from 1994 is located on this route east of Highway 6 in the Bowstring State Forest. The population was not relocated during 2009 surveys.
- Six *Botrychium simplex* populations with at least 132 individuals were located within Route 3 in 2009, but none in Conifer Swamp locations.
- One DNR record for *Cyprepidiaum arietinum* is located on private lands near the intersection of Highway 71 and County Road 300 in Beltrami County. Surveys conducted in 2009 on public lands did not include this location.
- A population of *Platanthera clavellata* was located during 2009 BGR surveys under the existing cleared power corridor in an area between shrub swamp and black spruce bog.
- Two populations of *Sparganium glomeratum* were observed within the route on an overgrown roadway in a transitional area between shrub swamp and bog communities and in shallow open water at the edge of a lake.
- Two *Taxus canadensis* populations were identified along Route 3 in 2009 in cedar swamps on each side of Highway 6 in the Bowstring State Forest.
- White pine is present in all age classes in Conifer Swamps along this route.

Individuals of these species would be adversely impacted if conifer swamp canopy cover that provides habitat for these individuals is removed adjacent to the individuals. Where clearing for ROW is required, white pine would be removed, and ongoing maintenance activities would preclude this species from reaching maturity within the corridor. All construction within conifer swamp locations will occur during winter under frozen condition conditions or during other seasons with the use of construction mats. Refinement of the route will avoid, to the greatest extent possible, identified individuals plant species within this guild.

No Build Alternative

The No Build Alternative would not alter the existing condition along any of the routes where existing utility corridors exist; No adverse impacts would occur.

5.3.3.3 Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium simplex, Malaxis monophyllos* var. *brachypoda* and *Taxus canadensis* are present within the route. Where individuals or populations of these species are present within the clearing area of the transmission corridor, project activities may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.
- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. Individual *Botrychium simplex,*

Malaxis monophyllos var. *brachypoda, Pinus strobus* and *Taxus canadensis* are present along Route 2, only *M monophyllos* and *T. Canadensis* are located within conifer swamps. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects are expected to occur. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 2 Alternative (US 2)

- CNF: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium simplex* and *Taxus canadensis* are present within the route, though none of the *B. simplex* records are located within conifer swamps along this route. Where individuals or populations of these species are present within the clearing area of the transmission corridor, project activities may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. Individuals of some species in this guild are present along Route 2 (i.e., *Botrychium simplex, Malaxis monophyllos* var. *brachypoda, Pinus strobus* and *Taxus canadensis*). Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects are expected to occur. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 3 Alternative (Northern Route)

- CNF: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium simplex* and *Taxus canadensis* are present within the route, though none of the *B. simplex* records are located within conifer swamps along this route. The DNR record indicating a population of *Arethusa bulbosa* was not relocated in 2009 and may no longer be present in the location east of Highway 6 in Bowstring Township. The DNR record for *Cyprepidium arietinum* located near Blackduck Lake is on private lands. Surveys for this population will take place only if this route is chosen and Rights-of-Way secured. Where individuals or populations of these species are present within the clearing area of the transmission corridor, project activities may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium simplex* and *Taxus canadensis* are present within the route, though none of the *B. simplex* records are located within conifer swamps along this route. The DNR record indicating a population of *Arethusa bulbosa* was not relocated in 2009 and may no longer be present in the location along Highway 6 in Bowstring Township. The DNR record for *Cyprepidium arietinum* located near Blackduck Lake is on private lands. Surveys for this population will take place only if this route is chosen and Rights of Way secured. Where individuals or populations of these species are present within

the clearing area of the transmission corridor, adverse effects are expected to occur. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

No Build Alternative

The No Build Alternative would not alter the existing condition along any of the routes where existing utility corridors exist; No adverse impacts would occur.

5.3.3.4 Mitigation

Known populations of listed plant species will be resurveyed and protective fencing placed prior to construction activities after the final route has been chosen, and centerline identified. Where possible, the route will shift within the 1,000-foot-wide route corridor to avoid known populations. Where route shifting is not possible, the Applicants will seek take permits and negotiate appropriate mitigation with the agencies.

5.3.4 Riparian Habitats

This guild includes 14 TE plant species that have potential to be found within these communities:

- *Botrychium minganense* – Mingan's moonwort
- *Botrychium pallidum* – pale moonwort
- *Carpinus caroliniana* – blue beech
- *Carya cordiformis* – bitternut hickory
- *Celtis occidentalis* – Hackberry
- *Eleocharis olivacea* – olivaceous spike-rush
- *Juglans cinerea* – butternut
- *Listera auriculata* – auricled twayblade
- *Pinus strobus* – White Pine
- *Torreyochloa pallida* – Torrey's Manna-grass
- *Ulmus americana* – American elm
- *Ulmus rubra* – Slippery elm
- *Viola novae-angliae* – New England Violet

5.3.4.1 Description of Habitat Type

Riparian habitats are areas near active river systems that are periodically and temporarily affected by changes in river water levels. Subtypes within the guild include floodplain forest, herbaceous wetland communities, and shrub wetland community types. These communities may have full to partial canopy cover or may be open areas. These habitats share a common trait of spring flooding and high water during heavy rains with flowing waters. Communities are typically dominated by annual herbaceous species and firmly rooted perennials. These communities occur on sand and gravel where river scouring and deposition are common with soils becoming finer and with more organic material where active river processes are less pronounced and along river systems located on low, flat river shorelines.

Northern floodplain forests occur on sandy or silty alluvium on low, level sites where annual flooding is typical along large rivers. Common characteristics include scattered pools with debris, ice scars and fresh deposits of silt or sand. Often with open ground and understory vegetation early in the growing season and with dense annual vegetation carpeting the forest floor later in the season. Emergent and shrub wetland communities that occur along riparian zones range from densely to sparsely vegetated.

5.3.4.2 Direct and Indirect Effects

Potential effects to species of this guild include alteration of hydrology (due to project activities), conversion of cover type, removal of forest cover and direct impact to individuals due to construction activities.

Winter construction using matting and removal of excavated material from pole locations will limit the potential indirect effects to hydrology and soil disturbance. Where appropriate, summer construction will be performed using matting in wetland areas, limiting soil disturbance to temporary surface effects. Where clearing of canopy occurs, individual species of this guild are likely to be adversely effected indirectly if adapted to shaded habitats.

Route 1 Alternative (Great Lakes Pipeline)

This alternative crosses numerous broad riparian corridors including the Necktie River, Sucker Creek, Portage Creek Six Mile Brook, Mississippi River, and Ball Club River. In all cases, these rivers can be spanned by overhead power lines and no construction will take place within the ordinary water level of rivers.

- *Botrychium minangense* was observed during 2008 surveys in seven locations along the Great Lakes corridor.
- *Botrychium pallidum* was observed in six locations with 31 individual plants observed during EP surveys.
- *Carpinus caroliniana* was recorded in five locations along Route 1 with 50 individuals noted during EnbridgePipeline surveys.
- White pine is present in all age classes in forested areas along this route.
- More than 1,200 individual *Torreyochloa pallida* were identified in three different emergent wetland locations during EP surveys (One along Route 1, and two along Segment B).
- *Ulmus Americana* and to a lesser degree, *Ulmus rubra* were noted in riparian forests throughout Route 1.
- Four populations of *Viola novae-angliae* were observed in a location on Alternative 1C west of the Mississippi River during EP surveys.

Woody and herbaceous species would be cleared within the work space of the project during construction and periodic maintenance will prevent future canopy closure. These activities will directly affect some of the known occurrences for species adapted to shaded conditions as areas will be exposed to additional direct sunlight. Species adapted to partial or full shade include *Botrychium minganense, B. pallidum, and Carpinus caroliniana.* Where clearing of canopy occurs, sun intolerant species of this guild are likely to be adversely effected, directly and indirectly. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 2 Alternative (US 2)

This alternative crosses numerous broad riparian corridors including the Necktie River, The Pike Bay channel, Sucker Creek, Portage Creek Six Mile Brook, Mississippi River, and Ball Club River.

For those species adapted to open settings, project activities are likely to only have an impact in areas of direct power pole installation.

- Six *Botrychium minangense* populations were observed in 6 locations during Enbridge and HDR surveys in this route. DNR data shows three populations of this species in Cass Lake along the Enbridge corridor. CNF indicates one population near a DNR point in Cass Lake.
- *Botrychium pallidum* was observed in three new locations in HDR 2009 surveys along the north side of the tree strip located between the Enbridge corridor and the BNSF railroad. DNR records show eight records for this species along the Enbridge corridor. CNF point data indicates 12 populations of this species along the Enbridge corridor.
- Enbridge corridor surveys in 2008 identified a cluster of *Carpinus caroliniana* south of the corridor near the intersection of Highway 10 and US 2. Neither the DNR nor the CNF track this species.
- White pine is present in all age classes in a mix of forests along this route.
- More than 65 individual *Viola novae-angliae* plants were identified in two locations. One of these populations is present on private lands south of Zemple in the floodplain of Deer River.

Woody and herbaceous species would be cleared within the work space of the project during construction and periodic maintenance will prevent future canopy closure. These activities will directly affect some of the known occurrences for species adapted to shaded conditions as areas will be exposed to additional direct sunlight. Species adapted to partial or full shade include *Botrychium minganense* and *Carpinus caroliniana.* Where clearing of canopy occurs, sun intolerant species of this guild are likely to be adversely effected, directly and indirectly. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 3 Alternative (Northern Route)

This alternative crosses numerous broad riparian corridors including the Necktie River, The Pike Bay channel, Sucker Creek, Portage Creek Six Mile Brook, Mississippi River, and Ball Club River.

- *Botrychium pallidum* was observed in four locations with at least 23 individuals identified within Route 3 in 2009. All observations were in or adjacent to lowland forests.
- White pine is present in all age classes in a mix of forests along this route.
- Sixty-three individual *Viola novae-angliae* were observed along one quarter mile segment within the right of way of Highway 6 on state forest land

Woody and herbaceous species would be cleared within the work space of the project during construction and periodic maintenance will prevent future canopy closure. These activities will directly affect some of the known occurrences for species adapted to shaded conditions as areas will be exposed to additional direct sunlight. Species adapted to partial or full shade include *Botrychium minganense* and *B. pallidum,* though *B. pallidum* is also found in open habitats. Where clearing of canopy occurs, sun-intolerant species of this guild are likely to be adversely effected, directly and indirectly. Prior to

construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

No Build Alternative

The No Build Alternative would not alter the existing condition along any of the routes where existing utility corridors exist; No adverse impacts would occur.

5.3.4.3 Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. While *Botrychium pallidum, Botrychium simplex,* and *Torreyochloa pallida* are present or have been noted within the route, strict avoidance of all known populations and ability to span these populations will be observed. Adverse affects to *B. pallidum* and *B. simplex* could occur due to clearing activities and increased exposure to sunlight, but these species are known to persist and thrive in regenerating forest and shrublands. Where individuals or populations of these species are present within the clearing area of the transmission corridor, project activities may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.
- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium simplex, Botrychium pallidum, Carpinus caroliniana, Pinus strobus, Torreyochloa pallid, Ulmus americana, U. rubra* and *Viola novae-angliae* are present within the route. *Botrychium simplex, Botrychium pallidum,* and *Carpinus caroliniana* individuals would be adversely impacted where overhead canopy is cleared for construction, though all three species can occur and thrive under moderately shady conditions of regenerated shrubland. Pinus strobus, *Ulmus Americana* and *U. rubra* would be adversely impacted within the cleared corridor, and ongoing maintenance would preclude these species from achieving maturity.

Route 2 Alternative (US 2)

- CNF: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. While *Botrychium pallidum, Botrychium simplex* and *Torreyochloa pallida* are present or have been noted within the route, strict avoidance of all known populations and ability to span these populations will be observed. Adverse affects to *B. pallidum and B. simplex* could occur due to clearing activities and increased exposure to sunlight, but these species are known to persist and thrive in regenerating forest and shrublands. Where individuals or populations of these species are present within the clearing area of the transmission corridor, project activities may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend forward

Federal listing. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium simplex, Botrychium pallidum, Carpinus caroliniana, Pinus strobus, Torreyochloa pallida, Ulmus americana, U. rubra* and *Viola novae-angliaie are* present within the route. *Botrychium simplex, Botrychium pallidum, Carpinus caroliniana* individuals would be adversely impacted where overhead canopy is cleared for construction, though all three species can occur and thrive under moderately shady conditions of regenerated shrubland. *Pinus strobus, Ulmus Americana* and *U. rubra* would be adversely impacted within the cleared corridor, and ongoing maintenance would preclude growth to maturity for these species.

Route 3 Alternative (Northern Route)

- CNF: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. While *Botrychium pallidum* is present within the route, strict avoidance of all known populations and ability to span these populations will be observed. Adverse affects to *B. pallidum* could occur due to clearing activities and increased exposure to sunlight, but this species is known to persist and thrive in regenerating forest and shrublands. Where individuals or populations of these species are present within the clearing area of the transmission corridor, project activities may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.
- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Viola novae-angliae* is present within the route within the Leech Lake Reservation Boundary yet is known to thrive in open conditions as well as shaded habitats. *Botrychium pallidum* individuals would be adversely impacted where overhead canopy is cleared for construction, though this species can occur and thrive under moderately shady conditions of regenerated shrubland. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

No Build Alternative

Alternative 4 will not change the existing condition.

Mitigation

Known populations of listed plant species will be resurveyed and protective fencing placed prior to construction activities after the final route has been chosen, and centerline identified. Where possible, the route will shift within the 1,000-foot-wide route corridor to avoid known populations. Where route shifting is not possible, the Applicants will seek take permits and negotiate appropriate mitigation with the agencies.

5.3.5 Lowland Forest

This guild includes 22 TE plant species that have potential to be found within these communities:

- *Botrychium dissectum* – dissected grape fern
- *Botrychium lanceolatum* var. *angustisegmentum* – lance-leaf or triangle grape fern
- *Botrychium minganense* – Mingan's moonwort
- *Botrychium oneidense* – blunt-lobed grape fern
- *Botrychium simplex* – least grape fern
- *Carpinus caroliniana* – blue beech
- *Carya cordiformis* – bitternut hickory
- *Celtis occidentalis* – Hackberry
- *Dryopteris goldiana* – Goldie's wood fern
- *Juglans cinerea* – butternut
- *Listera auriculata* – auricled twayblade
- *Malaxis monophyllos* var. *brachypoda* – white adder's mouth orchid
- *Malaxis paludosa* – bog adder's mouth orchid
- *Mitchella repens* – partridge-berry
- *Polemonium occidentale* var. *lacustre* – Western Jacob's ladder
- *Pinus strobus* – white pine
- *Taxus canadensis* – Canada yew
- *Torreyochloa pallida* – Torrey's Manna-grass
- *Ulmus americana* - American elm
- *Ulmus rubra* – Slippery elm
- *Viola novae-angliae* – New England violet
- *Waldsteinia fragarioides* – barren strawberry

5.3.5.1 Description of Habitat Type

This forested wetland type is typically dominated by hardwoods adapted to wet conditions where hydrology is at or near the ground surface for significant portions of the growing season. These forests are usually located on peaty soils in small closed depressions or at the margins of large peatlands. Canopy cover is complete to interrupted and usually dominated by black ash or quaking aspen, with moderate amounts of white cedar, balsam fir, yellow birch, paper birch, and red maple, with tamarack often present. Shrub and subcanopy layers are often dominated by black ash, with speckled alder and American elm common. Prior to settlement and logging, this was a natural community with infrequent catastrophic disturbance, usually localized windthrow. Tamarack and white spruce become more common in maturing stands.

5.3.5.2 Direct and Indirect Effects

Winter construction using matting and removal of excavated material from pole locations will limit the potential indirect effects to hydrology and soil disturbance. Where appropriate, summer construction will be performed using matting in wetland areas, limiting soil disturbance to temporary surface effects.

Where clearing of canopy occurs, individual species of this guild are likely to be adversely effected indirectly if adapted to shaded habitats.

Route 1 Alternative (Great Lakes Pipeline)

Numerous areas of lowland hardwood forest are crossed by this alternative, though are typically cleared of mature trees within the existing Great Lakes Corridor. Lowland hardwood forests occur as small isolated basins within other forest types, and as large forest stands. Large patches of this forest type (black ash-American elm-red maple) within Route 1 are mapped by the CNF west and south of Lower Sucker Lake and just west of the Mississippi River.

- *Botrychium minangense* was observed during 2008 surveys in 7 locations along the Great Lakes corridor.
- *Botrychium lanceolatum* was observed in four locations along Route 1 with a total plant count of 67 individuals during Great Lakes Pipeline surveys. One individual was located on Alternative 1B and one population with 7 individuals was identified on Alternative 1C. DNR records indicate one location in mature hardwoodforest between Six Mile Lake and Bena within Route 1.
- Nine populations with 110 *Botrychium simplex* individuals were identified within this route during EP surveys. Two populations of this species were identified during EnbridgePipeline surveys within Route 1, Alternative C.
- *Carpinus caroliniana* was recorded in five locations along Route 1 with 50 individuals noted during EP surveys.
- DNR, DRM, and CNF data indicates that one population of *Malaxis monophyllos* var. *brachypoda* is present within Route 1 south of Lower Sucker Lake during Great Lakes Pipeline surveys. Four populations of this species are located within Route 1, Alternative C.
- *Pinus strobus* is found in all age classes in Lowland Hardwood Forest habitats along Route 1.
- More than 292 individual *Taxus canadensis* individuals were identified during EP surveys in five locations along Route 1. CNF data indicates 4 locations where this species is present within Route 1. DRM is aware of numerous plants in and near Bena on tribal lands.
- More than 1,200 individual *Torreyochloa pallida* were identified in three different emergent wetland locations during EP surveys (One along Route 1, and two along Segment B).
- *Ulmus americana,* and to a lesser degree *Ulmus rubra,* were observed in lowland forests along this route.

Woody and herbaceous species would be cleared within the work space of the project during construction and periodic maintenance will prevent future canopy closure. These activities will directly affect known occurrences for species adapted to shaded conditions as areas will be exposed to additional direct sunlight. Lowland species ill adapted to partial or full sun include *Botrychium lanceolatum, Botrychium minanense, Carpinus caroliniana, Malaxis monophyllos* var. *brachypoda,* and *Taxus canadensis.* Where clearing of canopy occurs, sun intolerant species of this guild are likely to be adversely effected, directly and indirectly. *Botrychium pallidum* and *B. simplex* are adapted to open habitats, but changes in microhabitats due to clearing may adversely affect individuals of these species adapted to more closed canopy conditions. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Protective fencing will be placed where construction is expected to occur in the vicinity of known

populations. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 2 Alternative (US 2)

Lowland hardwood forests occur as small isolated basins within other forest types, and as large forest stands, though few are present along Route 2. Within the corridor, mature forest has been cleared and open conditions maintained. A large patch of this forest type (black ash-American elm-red maple) within Route 1 are mapped by the CNF just west of the Mississippi River.

- 5 *Botrychium minangense* individuals were observed during 2007 and 2008 Enbridge surveys in 3 locations in Route 2. Surveys conducted in 2009 by HDR s along Route 2 identified 3 additional populations. DNR data shows three populations of this species in Cass Lake along the Enbridge corridor. CNF indicates one population near a DNR point in Cass Lake.
- Enbridge corridor surveys in 2008 identified a cluster of *Carpinus caroliniana* south of the corridor near the intersection of Highway 10 and US 2. Two data points are within the Route 2 corridor. Neither the DNR nor the CNF track this species.
- White pine (*Pinus strobus*) is present in all age classes in a mix of forests along this route.
- More than 160 individual *Taxus canadensis* individuals were identified in eight locations along Route 2 during surveys performed for Enbridge in 2007 and 2008. CNF data indicates five observations of this species along Route 2. DRM is aware of numerous plants in and near Bena on tribal lands.
- *Ulmus americana* and to a lesser degree *Ulmus rubra* were observed in lowland forests along this route.
- More than 65 individual *Viola novae-angliae* plants were identified in two locations during EP surveys. One of these populations is present on private lands south of Zemple in the floodplain of Deer River.

Woody and herbaceous species would be cleared within the work space of the project during construction and periodic maintenance will prevent future canopy closure. These activities will directly affect known occurrences for species adapted to shaded conditions as areas will be exposed to additional direct sunlight. Lowland species ill adapted to partial or full sun include *Botrychium lanceolatum, Botrychium minanense, Carpinus caroliniana, Malaxis monophyllos* var. *brachypoda,* and *Taxus canadensis.* Where clearing of canopy occurs, sun intolerant species of this guild are likely to be adversely effected, directly and indirectly. *Botrychium pallidum* and *B. simplex* are adapted to open habitats, but changes in microhabitats due to clearing may adversely affect individuals of these species adapted to more closed canopy conditions. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Protective fencing will be placed where construction is expected to occur in the vicinity of known populations. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 3 Alternative (Northern Route)

Lowland hardwood forest are common along Route 3, occurring as small isolated basins within other forest types, and as large forest stands though are typically cleared of mature trees within the existing transmission line Corridor. Large patches of this forest type (black ash-American elm-red maple) within Route 1 are mapped by the CNF in Kinghurst Township and as multiple small scattered basins throughout Liberty Township.

- *Botrychium dissectum* was observed in one location on the Leech Lake Reservation along Highway 6 southwest of Bowstring Lake in an upland location under clear powerline corridor.
- 136 *Botrychium simplex* individual plants were observed in 6 locations on Route 3 in cleared corridors generally in transitional areas between upland and lowland hardwood forest.
- Two *Taxus canadensis* populations were identified along Route 3 in 2009 in cedar swamps on each side of Highway 6 in the Bowstring State Forest. These populations are not located in lowland hardwood forest.
- 63 individual *Viola novae-angliae* were observed along the highway on a quarter miles segment of Highway 6 on state forest land

Woody and herbaceous species would be cleared within the work space of the project during construction and periodic maintenance will prevent future canopy closure. These activities will directly affect known occurrences for species adapted to shaded conditions as areas will be exposed to additional direct sunlight. Lowland species ill adapted to partial or full sun include *Taxus canadensis.* Where clearing of canopy occurs, sun intolerant species of this guild are likely to be adversely effected, directly and indirectly. *Botrychium pallidum* and *B. simplex* are adapted to open habitats, but changes in microhabitats due to clearing may adversely affect individuals of these species adapted to more closed canopy conditions. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Protective fencing will be placed where construction is expected to occur in the vicinity of known populations. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

No Build Alternative

The No Build Alternative would not alter the existing condition along any of the routes where existing utility corridors exist; No adverse impacts would occur.

5.3.5.3 Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium minganense, B. lanceolatum, B. simplex, Malaxis monophyllos var. brachypoda* and *Torreyochloa pallida* are present within the route. Adverse affects to *Botrychium minganense, B. lanceolatum* and *Malaxis monophyllos var. brachypoda* are likely occur due to clearing activities and increased exposure to sunlight, as these species are not known to be well adapted to direct sunlight conditions. The project is likely to have no effect on the remainder of the species in this guild as strict avoidance of known populations will be adhered to, and these species are adapted to more open conditions. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.
- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. Where individuals or populations of *Botrychium minganense, B. lanceolatum* and *Malaxis monophyllos* var. *brachypoda* are present within the clearing area of the transmission corridor, adverse effects are expected to occur. Adverse affects to *Botrychium minganense, B. lanceolatum* and *Malaxis monophyllos* var. *brachypoda* could occur due to clearing activities and increased exposure to sunlight, as these

species are not known to be well adapted to direct sunlight conditions. *Botrychium simplex, Botrychium pallidum, Carpinus caroliniana, Pinus strobus, Torreyochloa pallida, Ulmus americana, U. rubra* and *Viola novae-anglia* are present within the route. *Botrychium simplex, Botrychium pallidum, Carpinus caroliniana* individuals would be adversely impacted where overhead canopy is cleared for construction, though all three species can occur and thrive under moderately shady conditions of regenerated shrubland. *Pinus strobus, Ulmus americana* and *U. rubra* would be adversely impacted within the cleared corridor, and ongoing maintenance would preclude growth to maturity for these species. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 2 Alternative (US 2)

- CNF: The project will not likely cause a trend to Federal listing or loss of viability for any of these species.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium minganense* is present within the route. Adverse affects are likely to occur due to clearing activities and increased exposure to sunlight, as this species are not known to be well adapted to direct sunlight conditions. The project is likely to have no effect on the remainder of the species in this guild as strict avoidance of known populations will be strictly adhered to, and these species are adapted to more open conditions.
- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. Where individuals or populations of *Botrychium minganense, Carpinus caroliniana, Pinus strobus, Ulmus Americana and Ulmus rubra* and *Taxus Canadensis* are present within the clearing area of the transmission corridor, adverse effects are expected to occur. Adverse affects to *Botrychium minganense, Carpinus caroliniana,* and *Taxus canadensis* could occur due to clearing activities and increased exposure to sunlight, as these species are not known to be well adapted to direct sunlight conditions. *Pinus strobus, Ulmus americana,* and *U. rubra* would be adversely impacted within the cleared corridor, and ongoing maintenance would preclude growth to maturity for these species. The project is likely to have no effect on the remainder of the species in this guild as strict avoidance of known populations will be strictly adhered to, and these species are adapted to more open conditions.

Route 3 Alternative (Northern Route)

- CNF: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium simplex* is present within the route. Adverse affects to are likely occur due to clearing activities and increased exposure to sunlight to individuals of species adapted to shady microhabitats, though as this species is adapted to open conditions, effects are expected to be short lived as corridor becomes more shrubby. The project is likely to have no effect on the remainder of the species in this guild as strict avoidance of known populations will be strictly adhered to, and these species are adapted to more open conditions. Where individuals or populations of these species are present within the clearing area of the transmission corridor, project activities may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a

trend forward Federal listing. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. Where individuals or populations of *Taxus canadensis* are present within the clearing area of the transmission corridor, adverse effects are expected to occur. Adverse affects to are likely occur due to clearing activities and increased exposure to sunlight to individuals of *Botrychium dissectum* and *Botrychium simplex* adapted to shady microhabitats, though as these species are also adapted to open conditions, effects are expected to be short lived as corridor becomes more shrubby. The project is likely to have no effect on the remainder of the species in this guild as strict avoidance of known populations will be strictly adhered to, and these species are adapted to more open conditions. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

No Build Alternative

The No Build Alternative would not alter the existing condition along any of the routes where existing utility corridors exist; no adverse impacts would occur.

Mitigation

Known populations of listed plant species will be resurveyed and protective fencing placed prior to construction activities after the final route has been chosen, and centerline identified. Where possible, the route will shift within the 1,000-foot-wide route corridor to avoid known populations requiring closed canopy. Where route shifting is not possible, the Applicants will seek take permits and negotiate appropriate mitigation with the agencies.

5.3.6 Northern Hardwood Forest

This guild includes eightteen TE plant species that have potential to be found within these communities:

- *Botrychium dissectum* – Dissected grape fern,
- *Botrychium lanceolatum var. angustisegmentum* – lance-leaved grape fern,
- *Botrychium minganense* – Mingan moonwort,
- *Botrychium mormo* – goblin fern,
- *Botrychium oneidense* – blunt-lobed grape fern,
- *Botrychium simplex* – least grape fern,
- *Carya cordiformis* – bitternut hickory,
- *Carpinus caroliniana* – blue beech,
- *Celtis occidentalis* – Hackberry,
- *Dryopteris goldiana* – Goldie's wood fern,
- *Juglans cinerea* – butternut,
- *Mitchella repens* – partridge-berry,
- *Orobanche uniflora* – One-flowered broomrape,
- *Pinus strobus* – white pine,

- *Ulmus americana* - American elm,
- *Ulmus rubra* – Slippery elm,
- *Viola novae-angliae* – New England violet,
- *Waldsteinia fragarioides* – barren strawberry

5.3.6.1 Description of Habitat Type

This community type is a mesic to dry-mesic closed canopy forest that occurs on well-drained to moderately drained loamy soils throughout the Study Area. Dominant tree species of this community are sugar maple and basswood with northern red oak, yellow birch, paper birch, trembling aspen, big-tooth aspen, white pine, white cedar, balsam fir and white spruce common depending upon the age and nature of past disturbance. Sugar maple and basswood forests are considered a climax forest type with sugar maples capable of growing into gaps left by periodic, small scale disturbance (fire, selective logging, wind-throw). Prior to settlement, and subsequent logging, catastrophic disturbance in this community was rare. According to the DNR, recurrence of catastrophic fire or windthrow occurred in the order of 1,000 years between disturbances (DNR, 2003).

Many of the forests that would have been historically northern hardwoods today exist in a range of growth stages based on past and present logging practices. The DNR timeline for this community as described in the *Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (2003) describes the stages of recovery from catastrophic disturbance as follows:

- 0-55 years – recovery period is community dominated by quaking aspen and paper birch with sugar maple, basswood, and northern red oak present.
- 55-95 years – transition from paper birch and quaking aspen to sugar maple, white spruce, and basswood dominance. White pine seedlings establish.
- 95-205 years – mixed canopy of paper birch, sugar maple, white spruce, and basswood with white pine. Aging aspen and northern red oak present in canopy.
- 205-295 years – increase in white spruce and white pine and decline in paper birch
- >295 years – old growth forest dominated by white pine and sugar maple. Sugar maple seedlings and saplings dominate the understory.

Most of the northern hardwood forests along all of the proposed routes fall into the first two age categories with abundant paper birch and aspen in the canopy, though beyond the second age category (>55 years), canopy has closed and typical habitat for northern hardwoods can be assumed to be present..

5.3.6.2 Direct and Indirect Effects

Potential effects to species of this guild include removal of forest cover and direct impact to individuals due to construction activities.

CNF Species Guidance

Specific to the Goblin fern (*Botrychium mormo*) the following Forest Plan Objectives apply.

S-WL-7

- Activities that could disturb goblin ferns, their habitat, or microhabitat should not occur within 250 feet of known goblin fern populations. The exception to this standard is for administrative studies or research that contributes to the conservation of the species.
- In suitable habitat that is immediately adjacent and contiguous to existing populations beyond the 250-foot no-activity zone, site disturbing activities should occur only during frozen ground conditions (as evidenced by and absence of rutting, compaction, or breaking through the frost layer), and a minimum canopy closure of 70 percent should be maintained. (Single tree selection would generally meet desired conditions in this standard, but group selection harvest does not meet conditions desired in this standard because of the gaps created in proximity to occupies habitat.)
- Minimize the likelihood of worm invasion in existing or potential habitat areas identified as having low potential for worm invasion. Such conditions exist where areas are void of roads and trails (or where densities can be minimized), developments, lakes and streams that support game fish, or are isolated due to wetlands or some other condition not conducive to worm colonization. Examples of actions to minimize worm invasion include limiting vehicle or OHV access, road building, or summer activities that move soil into geologically isolated habitat.
- In unoccupied habitat, not contiguous to occupied habitat, of moderate or high quality (generally defined as mature or older northern hardwoods, mixed hardwoods on mesic northern hardwood or rich hardwood native plant communities; on sites currently free of exotic worm populations):
- In order to avoid light level changes that result in soil temperature increases, humidity and soil moisture decreases, management activities will maintain a minimum of 70 percent crown closure on average at the stand level. (Single tree of group selection harvests could be used as long as at least minimal conditions desired in the standard are met). On low quality unoccupied habitat or former habitat that has been impacted by exotic earthworms (determined at the project level by a biologist, ecologist, or botanist), management emphasis may be towards meeting other multiple use objectives and may deviate from the conditions above.

While the white pine is not a CNF threatened or endangered species, it is listed as Sensitive by the DRM. The CNF Plan has provided guidance for white pine as an indicator species under the following guidance:

O-WL-33

Increase amount of white pine to amounts more representative of native plant communities by planting or naturally regenerating white pine trees in white pine forest types and in other upland deciduous, mixed, and conifer forest types. This objective matches white pine objectives shown in the Landscape

O-WL-34

Manage to improve white pine survival on planted sites and as many naturally regenerating sites as practical.

Potential indirect effects include increased light availability and associated alteration of ambient temperature and moisuture, introduction of invasive earthworms and introduction and facilitation of invasive plant species movement.

Removal of canopy removes shade cover, increasing light adjacent to cut areas. Areas adjacent to clearings are likely so see a change in species composition from plant species adapted to shade to those tolerant of openings. Often, the edges of cleared areas are dominated by brushy species not typical of

interior hardwood forest habitats. Additionally, these clearings can function as sources for invasive weedy plant species.

A major effect to the herbaceous layers in this upland forest type is the introduction of invasive earthworms. Research on *Botrychium mormo* populations indicate that this species and potentially other *Botrychium* species are severely adversely affected by the presence of exotic earthworms. These negative effects can be facilitated by construction activities, particularly where earth moving is involved as worms are potentially moved in soil transported from site to site. Where earth moving equipment is used in areas where northern hardwood forests are present, strict equipment cleaning practices will be required when moving between sites. CNF Forest Plan Objectives limit cutting within 250 feet of known populations of *B. mormo.* In some cases, a shift away from known populations may not be possible, and the Applicants will be required to seek a take permit, and work with agencies to provide appropriate mitigation for adverse impacts. All other Forest Plan Objectives will be adhered to in consultation with Forest Service staff.

Winter construction using matting and removal of excavated material from pole locations will limit the potential indirect effects to hydrology and soil disturbance. Where appropriate, summer construction will be performed using matting in wetland areas, limiting soil disturbance to temporary surface effects. Where clearing of canopy occurs, individual species of this guild are likely to be adversely effected indirectly if adapted to shaded habitats.

Route 1 Alternative (Great Lakes Pipeline)

This forest type is present as both small patches and as large mature forest stands along the route. The largest and most contiguous stands of northern hardwood forest occur on Route 1 from Pike Bay to the west side of Bena.

- Two individual *Botrychium dissectum* plants were observed in nearby locations west of Six Mile Lake along the edge of the Great Lake Pipeline corridor and another along the Enbridge corridor near the Mississippi River. CNF data indicates that this species is present west of Cass Lake within the Great Lakes/Enbridge Corridor.
- *Botrychium minangense* was observed during EP surveys in nine locations along the Great Lakes corridor. DNR data identifies five populations, and CNF data indicates two populations within this route.
- *Botrychium lanceolatum* was observed in four locations along Route 1 with a total plant count of 67 individuals during Great Lakes Pipeline surveys. One individual was located on Alternative 1B and one population with 7 individuals was identified on Alternative 1C. DNR records indicate one location in Mature Hardwood Forest between Six Mile Lake and Bena within Route 1. CNF shows two data points for this species within route 1.
- 13 individual *Botrychium mormo* plants were observed in three populations southwest of Lower Sucker Lake during EP surveys. These same locations contain records from CNF, DRM and DNR data sets dating from the 1990s with populations ranging from only one noted to more than 30 in a location
- One hundred ten *Botrychium simplex* individuals were identified in nine populations within this route during EP surveys.
- *Carpinus caroliniana* was recorded in five locations along Route 1 with 50 individuals noted during EP surveys.

- One population of *Orobanche unifilora* with at least 665 individuals is known to occur within the 1,000-foot-wide route along the Great Lake Pipeline corridor.
- *Pinus strobus* is found in all age classes in northern hardwood forest habitats along Route 3.
- *Ulmus americana* and to a lesser degree *Ulmus rubra* were observed in lowland forests along this route.
- *Viola novae-angliae* was reported from four locations during EP surveys. One of these populations is present on private lands south of Zemple in the floodplain of Deer River.

Woody and herbaceous species would be cleared within the work space of the project during construction and periodic maintenance along the transmission line corridor will prevent future canopy closure. These activities will directly affect some of the known occurrences for species adapted to shaded conditions as areas will be exposed to additional direct sunlight. Riparian species adapted to partial or full shade include *Botrychium minganense, B. mormo, B. simplex* and *Carpinus caroliniana,* though *B. simplex* is also adapted to open, sunny habitats. Where clearing of canopy occurs, sun intolerant species of this guild are likely to be adversely effected, directly and indirectly. Additionally, *Botrychium mormo* is highly sensitive to the introduction of exotic earthworms due to the alteration of soil composition and the rapid deterioration of forest floor leaf litter. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 2 Alternative (US 2)

This forest type is present as both small patches and as large mature forest stands along the route. The largest and most contiguous stands of northern hardwood forest occur on Route 2 between Pike Bay and Cass Lake to the west side of Bena concentrated mostly south of US 2.

- *Botrychium dissectum* was observed in one location during Enbridge surveys and in two locations during 2009 BGR surveys along Route 2.
- CNF, DRM and DNR records indicate one *Botrychium mormo* record in the same location north of US 2 near the intersection with Highway 10 in mature hardwood forest.
- Eight *Botrychium minangense* individuals were observed in six locations during Enbridge and HDR surveys along Route 2. DNR data shows three populations of this species in Cass Lake along the Enbridge corridor. CNF indicates one population near a DNR point in Cass Lake.
- Six populations of *Botrychium simplex* were identified within this corridor during EP and HDR surveys. CNF data has 8 records of this species within Route 2.
- Enbridge corridor surveys in 2008 identified a population of *Carpinus caroliniana* south of the corridor near the intersection of Highway 10 and US 2. Neither the DNR nor the CNF track this species.
- White pine (*Pinus strobus*) is present in all age classes in a mix of forests along this route.
- *Ulmus americana,* and to a lesser degree *Ulmus rubra,* were observed in lowland forests along this route.
- More than 65 individual *Viola novae-angliae* plants were identified in two locations during EP surveys. One of these populations is present on private lands south of Zemple in the floodplain of Deer River.

Woody and herbaceous species would be cleared within the work space of the project during construction and periodic maintenance along the transmission line corridor will prevent future canopy closure. These activities will directly affect some of the known occurrences for species adapted to shaded conditions as areas will be exposed to additional direct sunlight. Northern hardwood forest species adapted to partial or full shade include *Botrychium dissectum, B. minganense, B. mormo, B. simplex,* and *Carpinus caroliniana,* though *B. simplex* is also adapted to open, sunny habitats. Where clearing of canopy occurs, sun intolerant species of this guild are likely to be adversely effected, directly and indirectly. Additionally, *Botrychium mormo* is very sensitive to the introduction of exotic earthworms and the accompanying alteration of soil composition and the rapid deterioration of forest floor leaf litter. Strict standards must be adhered to when working in areas where northern hardwood forests are the dominant cover type to prevent the movement of soils containing earthworms. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 3 Alternative (Northern Route)

This forest type is present as both small patches and as large mature forest stands along the route. The largest and most contiguous stands of northern hardwood forest occur on Route 3 in Kinghurst, Wirt, Liberty and Lake Jessie Townships.

- *Botrychium dissectum* was observed in one location on the Leech Lake Reservation along Highway 6 southwest of Bowstring Lake in an upland location under clear powerline corridor.
- *Botrychium mormo* was observed in 13 locations in 2009 with populations ranging from single isolated plants to a location with more than 300 individuals. More than 550 individual plants were observed in total. DNR records show one occurrence and CNF shows two records for this species within Route 3.
- 136 *Botrychium simplex* individual plants were observed in 6 locations on Route 3 in cleared corridors generally in transitional areas between upland and lowland hardwood forest.
- *Pinus strobus* is found in all age classes in lowland hardwood forest habitats along Route 3.
- *Ulmus americana* and to a lesser degree *Ulmus rubra* were observed in lowland forests along this route.
- 63 individual *Viola novae-angliae* were observed along the highway on a quarter miles segment of Highway 6 on state forest land

Woody and herbaceous species would be cleared within the work space of the project during construction and periodic maintenance along the transmission line corridor will prevent future canopy closure. These activities will directly affect some of the known occurrences for species adapted to shaded conditions as areas will be exposed to additional direct sunlight. Northern Hardwood Forest species adapted to partial or full shade include *Botrychium dissectum, B. mormo, B. simplex* and *Carpinus caroliniana,* though *B. simplex* is also adapted to open, sunny habitats. Where clearing of canopy occurs, sun intolerant species of this guild are likely to be adversely effected, directly and indirectly. Additionally, *Botrychium mormo* is very sensitive to the introduction of exotic earthworms and the accompanying alteration of soil composition and the rapid deterioration of forest floor leaf litter. Strict standards must be adhered to when working in areas where northern hardwood forests are the dominant cover type to prevent the movement of soils containing earthworms. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild

and route shifts will take place if possible. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

No Build Alternative

The No Build Alternative would not alter the existing condition along any of the routes where existing utility corridors exist; No adverse impacts would occur.

5.3.6.3 Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- CNF *Orobanche uniflora* determination: No effect. The proposed action will not directly disturb the site currently known to be occupied by this population. Direct and indirect effects have not been shown to be likely as much of the site occupied by *Orobanche uniflora* is currently maintained in an open-brushy condition. While detailed information is lacking on the host range and ecological amplitude of this species, most indications are that it is adapted to a broad range of physical and biological environmental factors and should tolerate the range of hydrological and solar conditions likely to occur following project implementation.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium dissectum, B. minangense, B. lanceolatum, B. mormo* and *B. simplex* are known to occur on Route 1. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur. While the species *B. simplex* is adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. *B. lanceolatum, B. minangense* and *B. mormo* would be adversely affected if populations are located within the area of forest removal. Strict standards must be adhered to when working in areas where northern hardwood forests are the dominant cover type to prevent the movement of soils containing earthworms. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Where individuals or populations of these species are present within the clearing area of the transmission corridor, project activities may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.
- DNR *Orobanche uniflora* determination: The Route 1 Alternative is likely to jeopardize the viability of the only known Northern Minneosta population of this species, located within the corridor. The DNR concurs with the DRM finding for this species as described in the following section.
- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium dissectum, B. dissectum, B. minangense, B. lanceolatum, B. mormo, B. simplex, Carpinus caroliniana, Pinus strobus, Ulmus americana* and *U. rubra* are known to occur on Route 1. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects mayoccur. While the species *B. dissectum* and *B. simplex* are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. *P. strobus*, *U. americana* and *U. rubra* are present in a

mix of upland and wet forests along Route 1. Individuals of these species will be adversely affected by initial clearing of the transmission corridor and future maintenance. *B. lanceolatum*, *B. minangense, B. mormo* and *Carpinus carolinana* would be adversely affected if populations are located within the area of forest removal. Strict standards must be adhered to when working in areas where Northern Hardwood Forests are the dominant cover type to prevent the movement of soils containing earthworms. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

- DRM *Orobanche uniflora* determination: Route 1 Alternative is likely to jeopardize the viability of this species on the LLR. The reason for this determination is that little is known about the habitat requirements for this species, the only known northern Minnesota/LLR/CNF population of this species. The effects of more than doubling the width, and maintaining it in a more open condition, of the corridor on this species are unknown. This action has the potential to substantially alter habitat conditions for this species in this location.
- Being that the extent of the population is unknown and habitat requirements are unknown, it is likely that direct impacts could occur. Indirect impacts may also occur, depending on the proximity of the Project centerline (125-foot-wide ROW) to the population. Construction along the south side of the Great Lakes pipeline might be able to avoid most of the currently know population, but it would pass through the former location and it is unknown the extent of the population. The new corridor may also change shading characteristics and/or soil moisture characteristics. The effect that such changes may have is unknown.
- The DRM have indicated that the full extent of the population is unknown, and that this species may still be present along the south side of the Great Lakes pipeline (per 1997 observation) as well as other locations within the Route. Documentation of this species is problematic, as it is visually observable for a very brief period – several weeks, usually in mid June - and is rather inconspicuous. If other undocumented populations are present in the construction zone, they may be directly and/or indirectly impacted by tree and shrub removal, construction traffic, pole installation and maintenance activities.

Route 2 Alternative (US 2)

- CNF: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium dissectum, B. minangense, B. mormo* and *B. simplex* are known to occur on Route 2. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur. While the species *B. simplex* isadapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. *B. lanceolatum, B. minangense* and *B. mormo* would be adversely affected if populations are located within the area of forest removal. Strict standards must be adhered to when working in areas where Northern Hardwood Forests are the dominant cover type to prevent the movement of soils containing earthworms. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium dissectum, B. dissectum, B. minangense, B. lanceolatum, B. mormo, B. simplex, Carpinus caroliniana, Pinus strobus, Ulmus americana* and *U. rubra* are known to occur on Route 2. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur. While the species *B. dissectum* and *B. simplex* are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. *P. strobus, U. americana* and *U. rubra* are present in a mix of upland and wet forests along Route 1. Individuals of these species will be adversely affected by initial clearing of the transmission corridor and future maintenance. *B. lanceolatum, B. minangense, B. mormo* and *Carpinus carolinana* would be adversely affected if populations are located within the area of forest removal. Strict standards must be adhered to when working in areas where Northern Hardwood Forests are the dominant cover type to prevent the movement of soils containing earthworms. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 3 Alternative (Northern Route)

- CNF: The The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- *Botrychium mormo* Determination: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. Based on the success in locating new populations of this species during 2009 surveys along the Route 3 corridor, and the apparent rarity of the specie*s based on past* surveys in Minnesota (162 known populations (Mortensen, 2001)), the increase in known occurrences (13 new populations) represents a significant increase in the number of known occurrences. The new population data represents a greater than 8% increase in known Minnesota populations of a species that is considered globally Vulnerable (G3), vulnerable (S3) in Minnesota and Wisconsin, Imperiled (S2) in Michigan and Critically Imperiled (S1) in Quebec, the only states and provinces where this species is known to be present (NatureServe, 2009).
- In Minnesota, while the species is known from Aitkin, Becker, Beltrami, Cass, Clearwater, Crow Wing, Itasca, lake Mahnomen, Mille Lacks, Polk, St. Louis and Stearns Counties, the CNF represents the area with the largest populations and clusters of this species in the state. This species is notoriously difficult to survey for due to the combination of very small stature and inconsistent year to year emergence.
- 2009 surveys along Route 3 located hundreds of individual plants in 13 distinct populations (defined as point locations within 300 feet of each other). Surveys took place only within the 1,000 foot route which is centered on an existing cleared corridor, typically 80-100’ at present. The individuals present ranged from within approximately 20’ of the cleared corridor edge to points near the corridor line within the forested area on both sides of the cleared corridor.
- In order to construct the new transmission corridor, widening the existing cleared area up to 125 feet would be necessary to ensure the safe operation of the electrical system during construction. Double circuiting may allow for this corridor to reforest over time (likely decades), but as *Botrychium mormo* apparently requires closed forest canopy, it can be assumed that populations within the temporary clearing may not recover at these locations. Not all the newly

located populations would be affected as clearing would likely take place on one side of the existing corridor. Populations on the cleared side of the corridor would be adversely affected.

- Though the increase in known populations located during 2009 surveys for this species within Route 3 represent a significant increase in element occurrence records, it is likely that the species is present within the contiguous forest areas with suitable habitat beyond the 1,000 foot corridor.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium dissectum, B. mormo* and *B. simplex* are known to occur on Route 3. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur. While the species *B. simplex* is adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. *B. mormo* would be adversely affected if populations are located within the area of forest removal. Strict standards must be adhered to when working in areas where Northern Hardwood Forests are the dominant cover type to prevent the movement of soils containing earthworms. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Where individuals or populations of these species are present within the clearing area of the transmission corridor, project activities may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.
- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium dissectum, B. mormo, B. simplex, Pinus strobus, Ulmus americana* and *U. rubra* are known to occur on Route 3. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur. While the species *B. dissectum* and *B. simplex* are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. *P. strobus, U. americana* and *U. rubra* are present in a mix of upland and wet forests along Route 1. Individuals of these species will be adversely affected by initial clearing of the transmission corridor and future maintenance. *B. lanceolatum, B. minangense, B. mormo* and *Carpinus carolinana* would be adversely affected if populations are located within the area of forest removal. Strict standards must be adhered to when working in areas where Northern Hardwood Forests are the dominant cover type to prevent the movement of soils containing earthworms. Prior to construction, field surveys will be conducted to identify individual occurrences of species in this guild and route shifts will take place if possible. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

No Build Alternative

The No Build Alternative would not alter the existing condition along any of the routes where existing utility corridors exist; No adverse impacts would occur.

Mitigation

Known populations of listed plant species will be resurveyed and protective fencing placed prior to construction activities after the final route has been chosen, and centerline identified. Where possible, the route will shift within the 1,000 foot wide route corridor to avoid known populations and to avoid

clearing of forested areas within 250 feet of known populations of *Botrychium mormo.* Where route shifting is not possible, the Applicants will seek take permits and negotiate appropriate mitigation with the appropriate agencies.

5.3.7 Woodlands

This guild includes fourteen TE plant species that have potential to be found within these communities:

- *Botrychium dissectum* – dissected grape fern
- *Botrychium minganense* – Mingan moonwort
- *Botrychium pallidum* – pallid moonwort
- *Botrychium rugulosum* – ternate grape fern
- *Botrychium simplex*– least moonwort
- *Comptonia peregrine* – sweet fern
- *Hierchloe odorata* – sweet grass
- *Pinus strobus* – white pine
- *Viola novae-angliae* – New England violet
- *Waldsteinia fragaroides* – barren strawberry

5.3.7.1 Description of Habitat Type

Woodlands habitat types include upland areas with open grown trees with canopy openings, partial shade partial/sun. Community types include jack pine woodlands, aspen woodlands, oak woodlands and savannas and recently disturbed (logged, burned, large scale windthrow, etc.) forest areas. Woodlands in the CNF area occur as early successional communities. Historically fire maintained these communities, though more commonly they occur as post logging landscapes or on thin, rocky soils of the Canadian Shield or poor sandy soils in outwash areas. Typical tree species of the early successional conifer woodlands include jack pine and red pine with oaks and aspen common. Conifer woodlands are intermediate between conifer shrubland and conifer forest. Deciduous woodlands are typically dominated by quaking and big-toothed aspen with bur oak and green ash common. Deciduous woodlands are transitional communities between forested communities and prairie or savanna. Many of the communities that resemble natural woodlands in Minnesota are post logging or grazing communities.

The species included in the guild consideration are typical of natural woodlands but also occur in human created types that resemble natural woodlands.

5.3.7.2 Direct and Indirect Effects

Potential indirect effects include increased light availability and associated alteration of ambient temperature and moisture in localized situations where scattered overhead canopy is removed. Additionally, introduction and facilitation of invasive plant species movement is a potential effect.

Removal of canopy removes shade cover, increasing light adjacent to cut areas. Areas adjacent to clearings are likely so see a change in species composition from plant species adapted to partial sun/shade to those tolerant of openings. In most cases, woodland communities along the proposed routes are the result of past and present timber harvests and species of this guild are known to occupy habitats with abundant light availability. All of the species in this guild are known to occupy openings as

well as woodlands, and in some cases thrive in open conditions. Individuals of this guild adapted to some overhead canopy may be temporarily adversely affected by tree removal, but are likely to persist in a post project scenario where ongoing management typically creates brushy shrubland settings under transmission lines.

Opening of woodlands may provide additional pathways for invasive species typical of openings.

Route 1 Alternative (Great Lakes Pipeline)

Woodlands and areas that resemble woodlands occur along the entire Route 1 area. Logging has taken place along this entire route, and regrowth forests that resemble natural woodlands are present where recent logging has occurred. Natural woodlands would have occurred on thin, rocky to sandy soils, typically both east and west of the Ten Section area.

- Two individual *Botrychium dissectum* plants were observed in nearby locations west of Six Mile Lake along the edge of the Great Lake Pipeline corridor and another along the Enbridge corridor near the Mississippi River. CNF data indicates that this species is present west of Cass Lake within the Great Lakes/Enbridge Corridor.
- *Botrychium minangense* was observed during EP surveys in nine locations along the Great Lakes corridor. DNR data identifies five populations, and CNF data indicates two populations within this route.
- *Botrychium pallidum* was observed in six locations with 31 individual plants observed during EP surveys.
- A new population of *Botrychium rugulosum* was observed once during 2009 surveys in an area near the previously known location. CNF, DRM and DNR data record a single observation of *Botrychium rugulosum* on Route 1 just west of the Mississippi River.
- One hundred ten *Botrychium simplex* individuals in 9 populations were identified within this route during Great Lakes Pipeline surveys along cleared corridors.
- *Pinus strobus* is found in all age classes in forest habitats along Route 1 and is present in young forests along this route.

Woody species would be cleared within the work space of the project during construction and periodic maintenance along the transmission line corridor will prevent future canopy closure. These activities will directly affect some of the known occurrences for species adapted to shaded conditions as areas will be exposed to additional direct sunlight. All of the species this guild are adapted to at least partial sunlight and some species to full sun. Prior to construction, field surveys will be conducted to identify populations of species in this guild. Where possible, populations will be spanned, and maintenance will allow for regrowth of short stature species. Individuals of this guild may experience adverse affects where these individuals have adapted to partial shade environments. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 2 Alternative (US 2)

Woodlands and areas that resemble woodlands (due to logging) occur along the entire Route 2 area. Logging has taken place along this entire route, and regrowth forests that resemble natural woodlands are present where recent logging has occurred. Natural woodlands would have occurred on thin, rocky to sandy soils, typically both east and west of the Ten Section area.

- *Botrychium dissectum* was observed in one location during EP surveys and in two locations during 2009 surveys along Route 2.

- 8 *Botrychium minangense* individuals were observed in six locations during Enbridge and HDR surveys along Route 2. DNR data shows three populations of this species in Cass Lake along the Enbridge corridor. CNF indicates one population near a DNR point in Cass Lake.
- *Botrychium pallidum* was observed in three new locations during BGR 2009 surveys along the north side of the tree strip located between the Enbridge corridor and the BNSF railroad. DNR records show eight records for this species along the Enbridge corridor. CNF point data indicates 12 populations of this species along the Enbridge corridor.
- A new population of *Botrychium rugulosum* was observed once during 2009 BGR surveys in an area near the previously known location. CNF data identifies seven populations and DNR records 10 observations of this species along the Enbridge corridor.
- Two populations of *Botrychium simplex* were identified within this corridor during 2008 surveys. Six additional populations were identified in 2009 BGR surveys in the corridor between BNSF and Enbridge lines. CNF, DRM and DNR data have 8 records of this species within Route 2.
- Three populations of *Hierochloe odorata* were identified during EP and BGR surveys in the Route 2 corridor along cleared rights-of-way.
- *Pinus strobus* is found in all age classes in forest habitats along Route 2 and is present in young forests and woodlands along this route.
- More than 65 individual *Viola novae-angliae* plants were identified in two locations. One of these populations is present on private lands south of Zemple in the floodplain of Deer River.

Woody species would be cleared within the work space of the project during construction and periodic maintenance along the transmission line corridor will prevent future canopy closure. These activities will directly affect some of the known occurrences for species adapted to shaded conditions as areas will be exposed to additional direct sunlight. All of the species this guild are adapted to at least partial sunlight and some species to full sun. Prior to construction, field surveys will be conducted to identify populations of species in this guild. Where possible, populations will be spanned, and maintenance will allow for regrowth of short stature species. Individuals of this guild may experience adverse affects where these individuals have adapted to partial shade environments. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 3 Alternative (Northern Route)

Woodlands and areas that resemble woodlands (due to logging) occur along the entire Route 3 area. Logging has taken place along this entire route, and regrowth forests that resemble natural woodlands are present where recent logging has occurred.

- *Botrychium dissectum* was observed in one location on the Leech Lake Reservation along Highway 6 southwest of Bowstring Lake in an upland location under clear powerline corridor.
- *Botrychium pallidum* was observed in four locations with at least 23 individuals identified within Route 3 in 2009. All observations were in or adjacent to lowland forests.
- *Botrychium rugulosum* was observed at two locations during the 2009 HDR surveys along Route 3, one in a cleared corridor and the other in lowland hardwood forest.
- One hundred thirty-six (136) *Botrychium simplex* individual plants were observed in 6 locations on Route 3 in cleared corridors generally in transitional areas between upland and lowland hardwood forest.

- Sixty-three individual *Viola novae-angliae* plants were observed in a population along the highway on a quarter miles segment of Highway 6 on state forest land.

Woody species would be cleared within the work space of the project during construction and periodic maintenance along the transmission line corridor will prevent future canopy closure. These activities will directly affect some of the known occurrences for species adapted to shaded conditions as areas will be exposed to additional direct sunlight. All of the species this guild are adapted to at least partial sunlight and some species to full sun. Prior to construction, field surveys will be conducted to identify populations of species in this guild. Where possible, populations will be spanned, and maintenance will allow for regrowth of short stature species. Individuals of this guild may experience adverse affects where these individuals have adapted to partial shade environments. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

No Build Alternative

The No Build Alternative would not alter the existing condition along any of the routes where existing utility corridors exist; No adverse impacts would occur.

5.3.7.3 Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *B. minangense, B. pallidum, B. rugulosum* and *B. simplex* are known to occur on Route 1. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur adjacent to clearing. While these species are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. Additionally, these species tend to populate the southern, shaded edge of clearings and will likely find habitat and occupy this future edge of the widened corridors.
- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium dissectum, B. minangense, B. pallidum, B. rugulosum, B. simplex, Pinus strobus* are known to occur on Route 1. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur adjacent to clearing. While the species *B. dissectum, B. minganense, B. pallidum, B. rugulosum* and *B. simplex* are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. Additionally, these species tend to populate the southern, shaded edge of clearings and will likely find habitat and occupy this future edge of the widened corridors. *P. strobus* individuals will be adversely affected by initial clearing of the transmission corridor and future maintenance will prevent individuals of this species from achieving maturity.

Route 2 Alternative (US 2)

- CNF: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *B. minangense, B. pallidum, B. rugulosum* and *B. simplex* are known to occur on Route 2. Where individuals or populations of

these species are present within the clearing area of the transmission corridor, adverse effects may occur adjacent to clearing. While these species are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. Additionally, these species tend to populate the southern, shaded edge of clearings and will likely find habitat and occupy this future edge of the widened corridors.

- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium dissectum, B. minangense, B. pallidum, B. rugulosum, B. simplex, Hierchloe odorata, Pinus strobus* and *Viola novae-angliae* are known to occur on Route 2. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur adjacent to clearing. While the species *B. dissectum, B. minganense, B. pallidum, B. rugulosum* and *B. simplex* are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. Additionally, these species tend to populate the southern, shaded edge of clearings and will likely find habitat and occupy this future edge of the widened corridors. *P. strobus* individuals will be adversely affected by initial clearing of the transmission corridor and future maintenance will prevent individuals of this species from achieving maturity.

Route 3 Alternative (Northern Route)

- CNF: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *B. pallidum, B. rugulosum and B. simplex* are known to occur on Route 3. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur adjacent to clearing. While these species are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. Additionally, these species tend to populate the southern, shaded edge of clearings and will likely find habitat and occupy this future edge of the widened corridors.
- DRM: The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing. *Botrychium dissectum* and *Viola novae-angliae* are known to occur on Route 3 within the Leech Lake reservation boundary. Both known locations are within roadway or utility corridors. Protective fencing would prevent direct or indirect effects to individuals of these two species.

No Build Alternative

The No Build Alternative would not alter the existing condition along any of the routes where existing utility corridors exist; no adverse impacts would occur.

Mitigation

Known populations of listed plant species will be resurveyed and protective fencing placed prior to construction activities after the final route has been chosen, and centerline identified. For those species adapted to open settings, individuals will be avoided by spanning known populations. Where necessary and possible, the route will shift within the 1,000-foot-wide route corridor to avoid known populations.

5.3.8 Forest Openings/Exposed Soils/Grasslands

This guild includes seven TE plant species that have potential to be found within these communities:

- *Botrychium dissectum* – dissected grape fern,
- *Botrychium pallidum* – pallid moonwort,
- *Botrychium rugulosum* – ternate grape fern,
- *Botrychium simplex*– least moonwort,
- *Comptonia peregrine* – sweet fern,
- *Hierchloe odorata* – sweet grass,
- *Waldsteinia fragaroides* – barren strawberry

5.3.8.1 Description of Habitat Type

Upland forest, exposed soils, and grasslands generally occur within the Study Area where either catastrophic human or natural disturbance has taken place, or where maintained, often for utility and road rights-of-way and permanent settlements. In the presettlement landscape, upland openings would have been relatively short lived, replaced by woodland/brushland, and in the absence of fire, would have succeeded to coniferous or deciduous forest community types. The species of this guild are either early successional species that occur only where high light levels are available or are adapted to a range of habitat conditions, including woodland and forests with more closed canopy conditions.

5.3.8.2 Direct and Indirect Effects

Route 1 Alternative (Great Lakes Pipeline)

- Two individual *Botrychium dissectum* plants were observed in nearby locations west of Six Mile Lake along the edge of the Great Lake Pipeline corridor and another along the Enbridge corridor near the Mississippi River. CNF data indicates that this species is present west of Cass Lake within the Great Lakes/Enbridge Corridor.
- *Botrychium pallidum* was observed in six locations with 31 individual plants observed during Great Lakes Pipeline surveys.
- CNF, DRM, and DNR data record a single observation of *Botrychium rugulosum* on Route 1 just west of the Mississippi River during Great Lakes Pipeline surveys. A new population of *Botrychium rugulosum* was observed once during 2009 surveys in an area near the previously known location.
- One hundred ten *Botrychium simplex* individuals were identified in nine populations within this route during Great Lakes Pipeline surveys along cleared corridors.

All of the species this guild are adapted to at least partial sunlight and some species to full sun. Prior to construction, field surveys will be conducted to identify populations of species in this guild. Where possible, populations will be spanned, and maintenance will allow for regrowth of short stature species. Individuals of this guild may experience adverse affects where these individuals have adapted to partial shade environments. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 2 Alternative (US 2)

Suitable habitat occurs for plants of the forest openings/exposed soils and grasslands guild along portions of all the alternatives as all alternatives follow existing utility corridor alignments.

- *Botrychium dissectum* was observed in one location during Enbridge surveys and in two locations during 2009 surveys along Route 2.
- *Botrychium pallidum* was observed in three new locations in 2009 BGR surveys along the north side of the tree strip located between the Enbridge corridor and the BNSF railroad. DNR records show ten records for this species along the Enbridge corridor. CNF point data indicates 14 populations of this species along the Enbridge corridor.
- CNF, DRM, and DNR data record a single observation of *Botrychium rugulosum* on Route 2 just west of the Mississippi River, a cluster along a mile long stretch within the Enbridge corridor north of Portage Lake and a record on the pipeline just west of Cass Lake. A new population of *Botrychium rugulosum* was observed once during 2009 BGR surveys in an area near the previously known location.
- Six populations of *Botrychium simplex* were identified within this corridor during EP and HDR surveys. CNF data has right records of this species within Route 2. The DNR indicates eight known populations within Route 2.
- Three populations of *Hierochloe odorata* were identified during 2008 and 2009 EP and HDR surveys in the Route 2 corridor along cleared rights-of-way.

All of the species this guild are adapted to at least partial sunlight and some species to full sun. Prior to construction, field surveys will be conducted to identify populations of species in this guild. Where possible, populations will be spanned, and maintenance will allow for regrowth of short stature species. Individuals of this guild may experience adverse affects where these individuals have adapted to partial shade environments. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

Route 3 Alternative (Northern Route)

Suitable habitat occurs for plants of the forest openings/exposed soils and grasslands guild along portions of all the alternatives as all alternatives follow existing utility corridor alignments.

- *Botrychium dissectum* was observed in one location on the Leech Lake Reservation along Highway 6 southwest of Bowstring Lake in an upland location under clear powerline corridor.
- *Botrychium pallidum* was observed in four locations with at least 23 individuals identified within Route 3 in 2009.
- *Botrychium rugulosum* was observed in two locations in 2009 surveys along Route 3, within a cleared corridor and in lowland hardwood forest.
- One hundred thirty-six (136) *Botrychium simplex* individual plants were observed in six locations on Route 3 in cleared corridors generally in transitional areas between upland and lowland hardwood forest.

All of the species this guild are adapted to at least partial sunlight and some species to full sun. Prior to construction, field surveys will be conducted to identify populations of species in this guild. Where possible, populations will be spanned, and maintenance will allow for regrowth of short stature species. Individuals of this guild may experience adverse affects where these individuals have adapted to partial shade environments. Where impacts are unavoidable, the applicant will obtain necessary take permits and negotiate appropriate mitigation.

No Build Alternative

Alternative 4 will not change the existing condition.

5.3.8.3 Determination of Effects

Route 1 Alternative (Great Lakes Pipeline)

- CNF: No effect or beneficial effect.
- DNR: No effect. *Botrychium pallidum, B. rugulosum,* and *B. simplex* are known to occur on Route 1. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur adjacent to clearing. While these species are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. These species tend to populate the southern, shaded edge of clearings and will likely find habitat and occupy this future edge of the widened corridors.DRM: No effect or beneficial effect. *Botrychium dissectum, B. pallidum, B. rugulosum,* and *B. simplex* are known to occur on Route 1. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur adjacent to clearing. While the species *B. dissectum, B. pallidum, B. rugulosum* and *B. simplex* are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. These species tend to populate the southern, shaded edge of clearings and will likely find habitat and occupy this future edge of the widened corridors.
- DRM: No effect or beneficial effect. *Botrychium dissectum, B. pallidum, B. rugulosum,* and *B. simplex* are known to occur on Route 1. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur adjacent to clearing. While the species *B. dissectum, B. pallidum, B. rugulosum,* and *B. simplex* are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. These species tend to populate the southern, shaded edge of clearings and will likely find habitat and occupy this future edge of the widened corridors.

Route 2 Alternative (US 2)

- CNF: No effect or beneficial effect. The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: No effect. *Botrychium pallidum, B. rugulosum,* and *B. simplex* are known to occur on Route 2. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur adjacent to clearing. While these species are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. These species tend to populate the southern, shaded edge of clearings and will likely find habitat and occupy this future edge of the widened corridors.
- DRM: No effect or beneficial effect. *Botrychium dissectum, B. pallidum, B. rugulosum, B. simplex,* and *Hierochloe odorata* are known to occur on Route 2. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur adjacent to clearing. While the species *B. dissectum, B. pallidum, B. rugulosum,* and *B. simplex* are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. These species tend to populate

the southern, shaded edge of clearings and will likely find habitat and occupy this future edge of the widened corridors. *Hierochloe odorata* will likely expand in additional openings created by this project.

Route 3 Alternative (Northern Route)

- CNF: No effect or beneficial effect. The project may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend forward Federal listing.
- DNR: No effect. *Botrychium pallidum, B. rugulosum,* and *B. simplex* are known to occur on Route 3. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur adjacent to clearing. While these species are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. These species tend to populate the southern, shaded edge of clearings and will likely find habitat and occupy this future edge of the widened corridors.
- DRM: No effect or beneficial effect. *Botrychium dissectum, B. pallidum, B. rugulosum,* and *B. simplex* are known to occur on Route 3. Where individuals or populations of these species are present within the clearing area of the transmission corridor, adverse effects may occur adjacent to clearing. While the species *B. dissectum, B. pallidum, B. rugulosum* and *B. simplex* are adapted to openings, individuals may be adversely affected where clearing of canopy takes place above individuals adapted to shaded habitat. These species tend to populate the southern, shaded edge of clearings and will likely find habitat and occupy this future edge of the widened corridors.

No Build Alternative

The No Build Alternative would not alter the existing condition along any of the routes where existing utility corridors exist; No adverse impacts would occur.

Mitigation

Known populations of listed plant species will be resurveyed and protective fencing placed prior to construction activities after the final route has been chosen, and centerline identified. For those species adapted to open settings, individuals will be avoided by spanning known populations. Where necessary and possible, the route will shift within the 1,000-foot-wide route corridor to avoid known populations.

6.0 INTERRELATED, INDEPENDENT AND CUMULATIVE EFFECTS

This section provides an analysis of cumulative impacts for the Project in combination with other past, present, and future actions. Cumulative impacts are not causally linked to the Project, but are the total effect of actions with similar impacts in a broader geographic area. The purpose of a cumulative impacts analysis is to look for impacts that may be minimal and therefore neither significant nor adverse when examined within the context of a single proposed action, but that may accumulate and become both significant and adverse over a large number of actions. The Councel on Environmental Quality (CEQ) regulations define cumulative effects as:

> "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

6.1 Methodology

6.1.1 Study Area Definition

The BA/BE evaluation of direct and indirect effects considers potential impacts within the Study Area, which includes all of the route alternatives plus a buffer. This Study Area includes a substantial portion of the CNF and LLR, as well as the towns and cities proximate to the Project. This same Study Area will be used for the cumulative effects analysis, since it includes the area where most activates would occur, especially as they relate to potential impact to local biological resources.

6.1.2 Time Frame

The temporal scope of this review begins during initial project planning and agency consultation and extends through completion of construction, approximately May 2007 through Fall 2011. In addition, this analysis considers the potential cumulative effects of other planned, proposed, or funded projects that are reasonably foreseeable within five years after Project construction, through 2013.

6.1.3 Projects to be Considered

The projects that are considered in the cumulative effects analysis include the following:

- Alberta Clipper - Enbridge Pipeline Project (EPP), an approved project that includes construction of additional pipelines along an existing pipeline corridor. Most of Route 2 would parallel the EPP. The project is in its initial phase of construction.
- The Cuba Hill Resource Management Project (RMP), a proposal by the CNF, would include various management activities in an area entirely south of US 2 and east of Minnesota Highway 371. Activities include commercial harvest, transportation projects, prescribed burns, and other activities consistent with the Forest Plan. The Cuba Hill RMP is expected to be implemented during the next five years. The project was evaluated in an Environmental Assessment, with a Decision Notice/Findings of No Significant Impacts (date unknown).
- The Lower East Winnie Vegetation Management Project (VMP), a proposed CNF project, would primarily constitute timber harvest, conversion, and planting, but would also include road and impoundment decommissioning. The Lower East Winnie VMP area is centered on US 2 from the cities of Bena to Ball Club, north to Lake Winnibigoshish, and south to the Deer River Ranger District boundary. The decision on this project was recently made in September 2008. The Lower

East Winnie VMP is expected to be implemented during the next five years. The project was evaluated in an Environmental Assessment, with a Decision Notice/Findings of No Significant Impacts (date unknown).

- The Boy River 2 Resource Management Project, a proposed CNF project, would include timber harvest and non-harvest management activities, prescribed burns, seeding/planting, riparian improvements, road repair and road removal, culvert repair, and invasive species treatment. The Study Area encompasses most of the Boy River watershed, the east side of Leech Lake, and south of Bena. The project was evaluated in an Environmental Assessment that was published in July 2009. A Decision Notice/Findings of No Significant Impacts has not been received.
- The Upper East Winnie VMP, a proposed CNF project, would include commercial harvest, planting, fuel management, site preparation, road decommissioning, impoundment restoration or maintenance, and bridge replacement. The Study Area extends from north of Lake Winnie to Squaw Lake and northeast of Lake Winnie to Sand Lake. The project was evaluated in an Environmental Assessment, with a Decision Notice/Findings of No Significant Impacts (August 2009).
- The North Winnie Semi-private Non-motorized Area Boundary Change and Trail Project, a proposed CNF project, includes extension of the boundary to the south (approximately three square miles), road decommissioning, addition of new trail segments and various gat improvements. The Study Area is located north of Lake Winnie and south of Squaw Lake, near the Lower Pigeon Lake Game Refuge. The project was evaluated in an Environmental Assessment, with a Decision Notice/Findings of No Significant Impacts (June 2009).
- The Continental Divide Resource Management project, a proposed CNF project, includes timber harvest and vegetation management activities, various road changes, and changes to off-highway vehicle access. The approximate Study Area extends from Tenstrike on the west to the Itasca/Beltrami county line on the east, and from Blackduck on the north to the Leech Lake Reservation boundary on the south. The project was evaluated in an Environmental Assessment, with a Decision Notice/Findings of No Significant Impacts (May 2009).
- A NNIS plant management program is being developed for the CNF. The program would identify weed control treatments (mechanical, chemical, or manual) to be used along access roads, utility rights-of-way, and other project related areas for a select group of undesirable plants. A 10-year time frame for treatment/control is proposed. The project is currently in the scoping phase.
- The Lydick RMP, a proposed CNF project that would occur north of US 2. No other information is available for this project.
- County Road 33 (Mission Road) Reconstruction would occur north Cass Lake, between CR 8 and CR 12. This project would use existing and expanded rights-of-way, with several minor alignment shifts necessary to improve the safety of the road. The project was evaluated in an Environmental Assessment, with a Decision Notice/Findings of No Significant Impacts (August 2009)
- Past CNF harvest projects accomplished within the last five years include: Mississippi River, Leech Lake River, Portage, Conifer Thin, Cass Lake, and Sand Plain. These projects were covered by Environmental Assessments.

- Unaccomplished CNF projects under decision but not yet harvested or roads not yet decommissioned. These activities were covered by Environmental Assessments for the following projects: Mississippi River, Leech Lake River, Portage, Conifer Thin, Cass Lake, and Sand Plain. For the purpose of this analysis, it is assumed these activities will be completed within the next 5 years.

MnDOT has planned/proposed and completed a number of US 2 improvement projects between Bemidji and Grand Rapids. The projects include installation of signals, resurfacing, bridge replacement, and adding a lane (in Deer River). The US 2 improvement projects are completed, planned, or currently under way. See http://www.dot.state.mn.us/roadwork/hwy2.html for additional information. Little to no impacts beyond the existing right-of-way are anticipated; therefore, these projects are not included in the cumulative effects analysis.

6.2 Cumulative Effects

The following table presents the potential for cumulative effects for the proposed Project in combination with other past, present, and future actions that may occur within the Study Area. For the purposes of this evaluation, similar projects are grouped since they would likely have similar impacts. For example, most CNF resource management projects include harvest, planting, site preparation and road changes. Therefore, it is appropriate to group these projects together.

Table 6-1. Summary of potential cumulative effects for past, present, and reasonably foreseeable future projects.

Project	TES Group			
	Forest Species	**Wetland Species**	**Grassland Species**	**Shrubland Species**
Pipeline Project	Pipeline construction may result in negative impact to forest plants and animal species due to permanent tree clearing; may introduce earthworms into ROW which could alter duff layer and have negative impact on understory plants; may introduce weed seed during construction and long term maintenance of the ROW; and may allow invasion by cowbirds on cleared ROW, with potential negative impact to forest edge songbirds due to predatory nesting. The project will include best management practices to avoid and minimize potential negative impacts to forest species.	Pipeline construction may have negative impact to wetland plants and animal species due to tree clearing, excavation, and fill activities, and may introduce weed seed during construction and long term maintenance of the ROW. The project will include best management practices to avoid and minimize potential negative impacts to wetland species.	Pipeline construction may have both negative and positive impacts to grassland species. Permanent tree and brush clearing will increase grassland habitat available, with potential for beneficial impact. Negative impacts may occur due to potential introduction of earthworms, weed seed, and invasion by cowbirds. The project will include best management practices to avoid and minimize potential negative impacts to grassland species.	Pipeline construction may have negative impact to shrubland plants and animal species due to tree clearing, excavation and fill activities; and may introduce weed seed during construction and long term maintenance of the ROW. The project will include best management practices to avoid and minimize potential negative impacts to shrubland species.
CNF Resource Management & Vegetation Management Projects	Commercial harvest and transportation improvements may result in negative impact to forest plants and animal species due to permanent tree clearing; may introduce earthworms into ROW which could alter duff layer and have negative impact on understory plants; may introduce weed seed on harvest/construction equipment. The projects will include best management practices to avoid and minimize potential negative impacts to forest species.	Commercial harvest and transportation improvements may have negative impact to wetland plants and animal species due to tree clearing, excavation and fill activities; and may introduce weed seed on harvest/ construction equipment. The projects will include best management practices to avoid and minimize potential negative impacts to wetland species.	Transportation improvements may have negative impact to grassland plants and animal species due to construction activities; and may introduce weed seed on harvest/ construction equipment. Prescribed burns may have beneficial impact to grassland species that are fire dependent. The projects will include best management practices to avoid and minimize potential negative impacts to grassland species.	Transportation improvements may have negative impact to shrubland plants and animal species due to construction activities; and may introduce weed seed on harvest/construction equipment. Prescribed burns may have beneficial impact to shrubland species that are fire dependent. The projects will include best management practices to avoid and minimize potential negative impacts to shrubland species.

Project	TES Group			
	Forest Species	**Wetland Species**	**Grassland Species**	**Shrubland Species**
CNF Non-native Invasive Plant Management Project	Control of invasive plants within forests would likely have positive impact to forest plant and animal species. The project will include best management practices to avoid and minimize potential negative impacts to forest species.	Control of invasive plants within wetlands would likely have positive impact to wetland plant and animal species. The project will include best management practices to avoid and minimize potential negative impacts to wetland species.	Control of invasive plants within grasslands would likely have positive impact to grassland plant and animal species. The project will include best management practices to avoid and minimize potential negative impacts to grassland species.	Control of invasive plants within shrublands would likely have positive impact to shrubland plant and animal species. The project will include best management practices to avoid and minimize potential negative impacts to shrubland species.
Past CNF Harvest Projects	Harvest projects, by their very nature, have potential to negatively affect forest species due to tree clearing; may introduce earthworms into ROW which could alter duff layer and have negative impact on understory plants; may introduce weed seed via equipment and vehicles during construction. However, recently completed harvest projects have evaluated their potential effects on TES and have included best management practices to avoid and minimize those affects.	Harvest projects, except in forested wetlands, have minimal impact to wetland habitats and wetland species. Recently completed harvest projects have evaluated their potential effects on TES and have included best management practices to avoid and minimize those affects.	Harvest projects have minimal impact to grassland habitats and species. Recently completed harvest projects have evaluated their potential effects on TES and have included best management practices to avoid and minimize those affects.	Harvest projects have minimal impact to shrubland habitats and species. Recently completed harvest projects have evaluated their potential effects on TES and have included best management practices to avoid and minimize those affects.

Project	TES Group			
	Forest Species	**Wetland Species**	**Grassland Species**	**Shrubland Species**
Unaccomplished CNF Projects	The CNF is required to evaluate the potential effects of their projects/ activities on TES resources. All planned and future projects will include avoidance measures and best management practices to avoid and minimize affects to TES. Minimal negative effects on forest habitats and species are anticipated as a result of future CNF projects. The projects will include best management practices to avoid and minimize potential negative impacts to forest species.	The CNF is required to evaluate the potential effects of their projects/ activities on TES resources. All planned and future projects will include avoidance measures and best management practices to avoid and minimize affects to TES. Minimal negative effects on wetland habitats and species are anticipated as a result of future CNF projects. The projects will include best management practices to avoid and minimize potential negative impacts to wetland species.	The CNF is required to evaluate the potential effects of their projects/activities on TES resources. All planned and future projects will include avoidance measures and best management practices to avoid and minimize affects to TES. Minimal negative effects on grassland habitats and species are anticipated as a result of future CNF projects. The projects will include best management practices to avoid and minimize potential negative impacts to grassland species.	The CNF is required to evaluate the potential effects of their projects/activities on TES resources. All planned and future projects will include avoidance measures and best management practices to avoid and minimize affects to TES. Minimal negative effects on shrubland habitats and species are anticipated as a result of future CNF projects. The projects will include best management practices to avoid and minimize potential negative impacts to shrubland species.
County Road 33 (Mission Road) Reconstruction Project	Minimal impacts to forest species would occur, since project would mostly be conducted within existing right-of-way; may introduce earthworms into ROW which could alter duff layer and have negative impact on understory plants; may introduce weed seed during construction and long term maintenance of the ROW. The project will include best management practices to avoid and minimize potential negative impacts to forest species.	Minimal impacts to wetland species would occur, since project would mostly be conducted within existing right-of-way; may introduce weed seed during construction and long term maintenance of the ROW. The project will include best management practices to avoid and minimize potential negative impacts to wetland species.	Minimal impacts to grassland species would occur, since project would mostly be conducted within existing right-of-way; may introduce weed seed during construction and long term maintenance of the ROW. The project will include best management practices to avoid and minimize potential negative impacts to grassland species.	Minimal impacts to shrubland species would occur, since project would mostly be conducted within existing right-of-way; may introduce weed seed during construction and long term maintenance of the ROW. The project will include best management practices to avoid and minimize potential negative impacts to shrubland species.

Project	TES Group			
	Forest Species	**Wetland Species**	**Grassland Species**	**Shrubland Species**
BGR Transmission Line Project	Potential negative impact to forest plants and animal species due to permanent tree clearing; may introduce earthworms into ROW which could alter duff layer and have negative impact on understory plants; may introduce weed seed during construction and long term maintenance of the ROW; may allow invasion by cowbirds on cleared ROW, with potential negative impact to forest edge songbirds due to predatory nesting. The project will include best management practices to avoid and minimize potential negative impacts to forest species.	Potential negative impact to forested wetland species due to forest clearing; minimal negative impacts to all other wetland species since most wetlands will be spanned by the project. The project will include best management practices to avoid and minimize potential negative impacts to wetland species.	Forest clearing may result in increased habitat available for grassland species, depending on long-term maintenance required for the Project; depending on location, herbicides may be used to control regrowth of trees that may interfere with transmission line; some incidental takes of nests may occur depending on the timing of construction. The project will include best management practices to avoid and minimize potential negative impacts to grassland species.	Temporary clearing of shrubs required for construction, with regrowth allowed post-construction. Impacts to shrubland species would be temporary and short term (up to several years until regeneration occurs). The project will include best management practices to avoid and minimize potential negative impacts to shrubland species.

Project	TES Group			
	Forest Species	**Wetland Species**	**Grassland Species**	**Shrubland Species**
Cumulative Effects Summary	Past, present, and foreseeable activities within the cumulative effects area will have both adverse and beneficial impacts to forest species. In particular, timber harvesting and cutting for project rights-of-way have potential to negatively impact forest species. Whereas, other timber management activities focused on ecosystem restoration would have beneficial impacts on forest species. TES impact avoidance is required by Federal and state regulations, CNF management plans and DRM. Careful attention to avoidance and use of best management practices will minimize TES impacts for most projects (exception being private projects on private land). As a result, the proposed project, in conjunction with past, present, and reasonably foreseeable actions, is not expected to contribute to a significant adverse cumulative effect upon TES associated with forest habitats.	Past, present, and foreseeable activities within the cumulative effects area will have minimal adverse and beneficial impacts to wetland species. In particular, timber harvesting, excavation and filling, and rights-of-way clearing have potential to negatively impact forested wetland species. Whereas, other management activities focused on ecosystem restoration would have beneficial impacts on wetland species. TES impact avoidance is required by Federal and state regulations, CNF management plans and DRM. Careful attention to avoidance and use of best management practices will minimize TES impacts for most projects (exception being private projects on private land). As a result, the proposed project, in conjunction with past, present, and reasonably foreseeable actions, is not expected to contribute to a significant adverse cumulative effect upon TES associated with wetland habitats.	Past, present, and foreseeable activities within the cumulative effects area will have both adverse and beneficial impacts to grassland species. In particular, timber harvesting and cutting for project rights-of-way have potential to increase grassland habitats, with potential beneficial impacts to grassland species. Likewise, management activities focused on ecosystem restoration would have beneficial impacts on grassland species. Negative impacts would be related to potential introduction of invasive species TES impact avoidance is required by Federal and state regulations, CNF management plans and DRM. Careful attention to avoidance and use of best management practices will minimize TES impacts for most projects (exception being private projects on private land). As a result, the proposed project, in conjunction with past, present, and reasonably foreseeable actions, is not expected to contribute to a significant adverse cumulative effect upon TES associated with grassland habitats.	Past, present, and foreseeable activities within the cumulative effects area will have minimal adverse impacts to shrubland species, due to clearing of new rights-of-way. Management activities focused on ecosystem restoration would have beneficial impacts. TES impact avoidance is required by Federal and state regulations, CNF management plans and DRM. Careful attention to avoidance and use of best management practices will minimize TES impacts for most projects (exception being private projects on private land). As a result, the proposed project, in conjunction with past, present, and reasonably foreseeable actions, is not expected to contribute to a significant adverse cumulative effect upon TES associated with forest habitats.

7.0 SUMMARY OF FINDINGS

The determination of effects is based upon the proposed Project as described in this BA/BE, using information collected by the project team, as well as data provided by CNF, DRM, DNR and others. Mitigation measures have been identified to minimize the Project's effects on TES.

Project changes that would require a re-evaluation of effects upon these species include but may not be limited to:

- inability or failure to implement one or more of the mitigation measures outlined in this evaluation;
- substantive changes in the propose design or construction methodology that increase adverse effects upon listed species beyond what has been disclosed in this evaluation;
- unknown or previously unaddressed listed species or their habitats are discovered in the project influence area and can not be avoided.

The No-build alternative would have no beneficial or adverse effects to TES in the Study Area. Table 7-1 provides a summary of TES determinations for the proposed build alternatives.

Table 7-1. Summary of TES determinations for Route1, Route 2 and Route 3 Alternatives.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**
Federally Listed Species						
Gray Wolf *Canis lupus*	Yes; Wolf packs are known to occur within the Study Area. Woodland habitat area would be slightly reduced as a result of timber removal, but would be countered by increased habitat for primary prey species.	USFWS: Not likely to adversely effect. CNF, DNR, and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area.	Yes; Wolf packs are known to occur within the Study Area. Woodland habitat area would be slightly reduced as a result of timber removal, but would be countered by increased habitat for primary prey species.	USFWS: Not likely to adversely effect. CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area.	Yes; Wolf packs are known to occur within the Study Area. Woodland habitat area would be slightly reduced as a result of timber removal, but would be countered by increased habitat for primary prey species.	USFWS: Not likely to adversely effect. CNF, DNR and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area.
Canada Lynx Lynx canadensis	**No documented observations;** Unverified sightings within the Study Area Appropriate habitat area would be slightly reduced as a result of timber removal.	USFWS: Not likely to adversely effect. CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area. DNR: Not listed	**No documented observations;** Unverified sightings within the Study Area Appropriate habitat area would be slightly reduced as a result of timber removal.	USFWS: Not likely to adversely effect. CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area. DNR: Not listed	**No documented observations;** Unverified sightings within the Study Area Appropriate habitat area would be slightly reduced as a result of timber removal.	USFWS: Not likely to adversely effect. CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area. DNR: Not listed
Bald eagle *Haliaeetus leucocephalus*	Yes – 27 CNF documented nests; one within the Route. Forest habitat for bald eagles in the project area would be reduced as a result of removal of forest cover. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites. Incidental take permit may be required in case of an eagle collision with the transmission line.	USFWS: Not listed but protected under the BGEPS. CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – 26 CNF documented nests; three within the Route. Forest habitat for bald eagles in the project area would be reduced as a result of removal of forest cover. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites. Incidental take permit may be required in case of an eagle collision with the transmission line.	USFWS: Not listed but protected under the BGEPS. CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – 21 CNF documented nests; none within the Route. Forest habitat for bald eagles in the project area would be reduced as a result of removal of forest cover. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites. Incidental take permit may be required in case of an eagle collision with the transmission line.	USFWS: Not listed but protected under the BGEPS. CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
Non-Federal TES (CNF, DNR & DRM) – Animals						
Northern goshawk Accipiter gentilis	Yes– 4 CNF documented nest sites are located in the vicinity. Appropriate breeding habitat area would be slightly reduced as a result of tree removal. Construction restrictions would be in place during active nesting to avoid impacts. If individuals are present during construction they may be exposed to greater levels of human activity.	CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes - 5 CNF documented nest sites are located in the vicinity. Appropriate breeding habitat area would be slightly reduced as a result of tree removal. Construction restrictions would be in place during active nesting to avoid impacts. If individuals are present during construction they may be exposed to greater levels of human activity.	CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes - 1 CNF observation; no known nest sites. Appropriate breeding habitat area would be slightly reduced as a result of tree removal. Construction restrictions would be in place during active nesting to avoid impacts. If individuals are present during construction they may be exposed to greater levels of human activity.	CNF and DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**
LeConte's sparrow Ammodramus leconteii	Yes – 1 CNF observation Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in meadows. Construction restrictions would be in place during active nesting if a nest is found within the construction zone.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – 1 CNF observation. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in meadows. Construction restrictions would be in place during active nesting if a nest is found within the construction zone.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – 15 BGR observations in the vicinity in sedge meadows and hay fields. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in meadows. Construction restrictions would be in place during active nesting if a nest is found within the construction zone.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
Nelson's sharp-tailed sparrow *Ammodramus nelsoni*	**No documented observations –** suitable habitat may be present but may not be extensive enough for breeding. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in sedge meadows, but may be offset by forest clearing and conversion to open grasslands.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** suitable habitat may be present but may not be extensive enough for breeding. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in sedge meadows, but may be offset by forest clearing and conversion to open grasslands.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** suitable habitat may be present that is extensive enough for breeding. Minimal area of appropriate breeding habitat area would be reduced as a result of structure placement in sedge meadows, but may be offset by forest clearing and conversion to open grasslands.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
Short-eared owl *Asio flammeus*	**No documented observations –** though this species is not tracked by the DNR or CNF. Minimal area of appropriate habitat area would be reduced as a result of structure placement.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** though this species is not tracked by the DNR or CNF. Minimal area of appropriate habitat area would be reduced as a result of structure placement.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** though this species is not tracked by the DNR or CNF. Minimal area of appropriate habitat area would be reduced as a result of structure placement.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
American bittern Botaurus lentiginosus	**No documented observations –** though this species is not tracked by the DNR or CNF; appropriate habitat is present. Wetland impacts will be avoided to the extent practicable. Minimal area of appropriate breeding habitat area may be reduced as a result of structure placement.	CNF: Not listed. DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** though this species is not tracked by the DNR or CNF; appropriate habitat is present. Wetland impacts will be avoided to the extent practicable. Minimal area of appropriate breeding habitat area may be reduced as a result of structure placement.	CNF: Not listed. DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	Yes –1 BGR observation. Wetland impacts will be avoided to the extent practicable. Minimal area of appropriate breeding habitat area may be reduced as a result of structure placement.	CNF: Not listed. DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**
Red-shouldered hawk *Buteo lineatus*	Yes – 7 DNR and 2 EP documented observations in the vicinity. Appropriate breeding habitat area would be reduced as a result of timber removal.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	No documented observations – suitable habitat may be present. Appropriate breeding habitat area would be reduced as a result of timber removal.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	No documented observations – suitable habitat may be present. Appropriate breeding habitat area would be reduced as a result of timber removal.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
Black tern *Chlidonias niger*	**No documented observations –** suitable foraging habitat may be present. Wetland impacts will be avoided to the extent practicable. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands. Construction restrictions would be in place during active nesting.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – 1 CNF documented observation of a black tern colony. Wetland impacts will be avoided to the extent practicable. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands. Construction restrictions would be in place during active nesting.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – 5 BGR documented observations. Wetland impacts will be avoided to the extent practicable. Minimal area of appropriate habitat area would be reduced as a result of structure placement in wetlands. Construction restrictions would be in place during active nesting.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
Yellow rail *Conturicops navoboracensis*	**No documented observations –** suitable habitat may be present. Minimal impacts to appropriate habitats would occur as a result of structure placement. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible, applying BMPs to construction in wetlands and by limiting construction activities to outside of the breeding season.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. Minimal impacts to appropriate habitats would occur as a result of structure placement. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible, applying BMPs to construction in wetlands and by limiting construction activities to outside of the breeding season.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	Yes – 2 BGR documented observations. Minimal impacts to appropriate habitats would occur as a result of structure placement. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible, applying BMPs to construction in wetlands and by limiting construction activities to outside of the breeding season.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Trumpeter swan *Cygnus buccinator*	**No documented observations –** suitable habitat may be present. Minimal impacts to appropriate wetland habitats would occur as a result from pole placement. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible, applying BMPs to construction in wetlands and by limiting construction activities to outside of the breeding season.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. Minimal impacts to appropriate wetland habitats would occur as a result from pole placement. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible, applying BMPs to construction in wetlands and by limiting construction activities to outside of the breeding season.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	Yes – 3 BGR and 1 DNR documented observations. Minimal impacts to appropriate wetland habitats would occur as a result from pole placement. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible, applying BMPs to construction in wetlands and by limiting construction activities to outside of the breeding season.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect
Black-throated blue warbler *Dencroica caerulescens*	**No documented observations –** suitable habitat may be present. Appropriate breeding habitat area would be reduced as a result of timber removal. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** suitable habitat may be present. Appropriate breeding habitat area would be reduced as a result of timber removal. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** suitable habitat may be present. Appropriate breeding habitat area would be reduced as a result of timber removal. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
Bay-breasted warbler *Dendroica castanea*	**No documented observations –** suitable habitat may be present. Appropriate habitat area would be reduced as a result of timber removal. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – 1 CNF documented observation. Appropriate habitat area would be reduced as a result of timber removal. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – 1 BGR documented observation. Appropriate habitat area would be reduced as a result of timber removal. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
Spruce grouse *Falcipennis canadensis*	**No documented observations –** suitable habitat may be present. Appropriate habitat area would be reduced as a result of timber removal. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** suitable habitat may be present. Appropriate habitat area would be reduced as a result of timber removal. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** suitable habitat may be present. Appropriate habitat area would be reduced as a result of timber removal. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
Sandhill crane *Grus canadensis*	**No documented observations –** suitable habitat may be present. Appropriate habitat area would be reduced as a result of structure and overhead wire placement in fields and wetlands. Wetland impacts would be avoided to the extent practicable. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF: Not listed. DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. Appropriate habitat area would be reduced as a result of structure and overhead wire placement in fields and wetlands. Wetland impacts would be avoided to the extent practicable. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF: Not listed. DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	Yes – 1 BGR documented observation. Appropriate habitat area would be reduced as a result of structure and overhead wire placement in fields and wetlands. Wetland impacts would be avoided to the extent practicable. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF: Not listed. DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**
Connecticut warbler *Oporonis agilis*	Yes – 23 CNF documented observations; 5 EP documented observations. Appropriate habitat for Connecticut warblers would be reduced as a result of removal of forest cover. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – 23 CNF documented observations; 5 EP documented observations. Appropriate habitat for Connecticut warblers would be reduced as a result of removal of forest cover. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – 5 CNF documented observations; 22 BGR documented observations. Appropriate habitat for Connecticut warblers would be reduced as a result of removal of forest cover. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
Black-backed woodpecker *Picoides arcticus*	Yes – 4 CNF documented observations; 3 within the Route; 1 EP documented observation. Appropriate breeding and foraging habitat area would be reduced as a result of timber removal. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites. BMPs will be used during construction to minimize impacts to these areas.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – 3 CNF documented observations; 1 within the Route; 1 EP documented observation. Appropriate breeding and foraging habitat area would be reduced as a result of timber removal. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites. BMPs will be used during construction to minimize impacts to these areas.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – 1 CNF and 3 BGR documented observations. Appropriate breeding and foraging habitat area would be reduced as a result of timber removal. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites. BMPs will be used during construction to minimize impacts to these areas.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
Osprey *Pandion halietus*	**Yes – 1 CNF and 1 EP documented nest sites are located in the vicinity; one is within the route.** Appropriate breeding habitat may be reduced as a result of timber removal. Impacts to individuals, nests and appropriate habitat areas will be minimized by limiting construction and logging activities that may affect nesting success to outside of the breeding season.	CNF & DNR: Not Listed DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**Yes – 2 CNF documented observations; no known nest sites**. Appropriate breeding habitat may be reduced as a result of timber removal. Impacts to individuals, nests and appropriate habitat areas will be minimized by limiting construction and logging activities that may affect nesting success to outside of the breeding season.	CNF & DNR: Not Listed DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. Appropriate breeding habitat may be reduced as a result of timber removal. Impacts to individuals, nests and appropriate habitat areas will be minimized by limiting construction and logging activities that may affect nesting success to outside of the breeding season.	CNF & DNR: Not Listed DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**
Wilson's phalarope *Phalaropus tricolor*	**No documented observations –** suitable habitat may be present. Minimal impacts to appropriate wetland habitats would occur as a result from pole placement. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible, applying BMPs to construction in wetlands. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** suitable habitat may be present. Minimal impacts to appropriate wetland habitats would occur as a result from pole placement. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible, applying BMPs to construction. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** suitable habitat may be present. Minimal impacts to appropriate wetland habitats would occur as a result from pole placement. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetland areas when possible, applying BMPs to construction in wetlands. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
King rail *Rallus elegans*	**No documented observations -** species occurs in southern Minnesota, which is outside of study area. No impacts anticipated.	CNF: Not listed. DNR & DRM: No impact.	**No documented observations -** species occurs in southern Minnesota, which is outside of study area. No impacts anticipated.	CNF: Not listed. DNR & DRM: No impact.	**No documented observations -** species occurs in southern Minnesota, which is outside of study area. No impacts anticipated.	CNF: Not listed. DNR & DRM: No impact.
Caspian tern *Sterna caspia*	**No documented observations –** species utilizes islands for nesting. No impacts anticipated.	CNF and DNR: Not listed. DRM: No impact.	**No documented observations –** species utilizes islands for nesting. No impacts anticipated.	CNF and DNR: Not listed. DRM: No impact.	**No documented observations –** species utilizes islands for nesting. No impacts anticipated.	CNF and DNR: Not listed. DRM: No impact.
Great gray owl *Strix nebulosa*	**No documented observations –** suitable habitat may be present. Appropriate breeding habitat area would be slightly reduced as a result of forest cutting. Foraging habitat may be increased as open habitats will be created and structures would provide additional hunting perches. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** suitable habitat may be present. Appropriate breeding habitat area would be slightly reduced as a result of forest cutting. Foraging habitat may be increased as open habitats will be created and structures would provide additional hunting perches. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** suitable habitat may be present. Appropriate breeding habitat area would be slightly reduced as a result of forest cutting. Foraging habitat may be increased as open habitats will be created and structures would provide additional hunting perches. Construction restrictions would be in place during active nesting to avoid direct impacts to nest sites. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect
Four-toed salamander *Hemidactylium scutatum*	**No documented observations –** suitable habitat may be present. This species is found in mature forests of glacial moraine landscapes where isolated wetlands are abundant. Some habitat loss would occur as a result of upland and wetland forest removal. Impacts to individuals and appropriate habitat areas will be minimized by spanning isolated wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. This species is found in mature forests of glacial moraine landscapes where isolated wetlands are abundant. Some habitat loss would occur as a result of upland and wetland forest removal. Impacts to individuals and appropriate habitat areas will be minimized by spanning isolated wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. This species is found in mature forests of glacial moraine landscapes where isolated wetlands are abundant. Some habitat loss would occur as a result of upland and wetland forest removal. Impacts to individuals and appropriate habitat areas will be minimized by spanning isolated wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Red-backed salamander *Plethodon cinerus*	**No documented observations –** suitable habitat is present. This species is found in a wide range of forest habitats. Some habitat loss would occur as a result of forest removal.	CNF and DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat is present. This species is found in a wide range of forest habitats. Some habitat loss would occur as a result of forest removal.	CNF and DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat is present. This species is found in a wide range of forest habitats. Some habitat loss would occur as a result of forest removal.	CNF and DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Green frog *Rana clamitans*	**No documented observations –** suitable habitat may be present. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF & DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF & DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF & DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Mountain lion *Felis concolor*	**No documented observations –** suitable habitat may be present. Appropriate habitat area would be slightly reduced as a result of forest cutting, which would increase habitat for primary prey species.	CNF: Not listed. DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. Appropriate habitat area would be slightly reduced as a result of forest cutting, which would increase habitat for primary prey species.	CNF: Not listed. DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	Yes – 1 CNF documented observation. Appropriate habitat area would be slightly reduced as a result of forest cutting, which would increase habitat for primary prey species.	CNF: Not listed. DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Pine martin *Martes americana*	**No documented observations –** suitable habitat may be present. Appropriate habitat area would be slightly reduced as a result of forest cutting, which would increase habitat for primary prey species.	CNF & DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. Appropriate habitat area would be slightly reduced as a result of forest cutting, which would increase habitat for primary prey species.	CNF & DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. Appropriate habitat area would be slightly reduced as a result of forest cutting, which would increase habitat for primary prey species.	CNF & DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect
Northern myotis *Myotis septentrionalis*	**No documented observations –** hibernacula are not known to be present; all documented observations are in mining region of northeast Minnesota. No impacts expected.	CNF: Not listed. DNR & DRM: No impact.	**No documented observations –** hibernacula are not known to be present; all documented observations are in mining region of northeast Minnesota. No impacts expected.	CNF: Not listed. DNR & DRM: No impact.	**No documented observations –** hibernacula are not known to be present; all documented observations are in mining region of northeast Minnesota. No impacts expected.	CNF: Not listed. DNR & DRM: No impact.
Heather vole *Phenacomys intermedius*	**No documented observations –** all documented observations are in northeast Minnesota, outside of the Study Area. No impacts expected.	CNF: Not listed. DNR & DRM: No impact.	**No documented observations –** all documented observations are in northeast Minnesota, outside of the Study Area. No impacts expected.	CNF: Not listed. DNR & DRM: No impact.	**No documented observations –** all documented observations are in northeast Minnesota, outside of the Study Area. No impacts expected.	CNF: Not listed. DNR & DRM: No impact.
Franklin's ground squirrel *Spermophilus franklinii*	**No documented observations –** this species can be found throughout the prairie region and most commonly in the northwest brush lands which are outside of the Study Area. No impacts expected.	CNF: Not listed. DNR & DRM: No impact.	**No documented observations –** However, DRM indicates that this species can be found in the town of Bena.	CNF: Not listed. DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** this species can be found throughout the prairie region and most commonly in the northwest brush lands which are outside of the Study Area. No impacts expected.	CNF: Not listed. DNR & DRM: No impact.
Eastern spotted skunk *Spilogale putorius*	**No documented observations –** one DNR observation listed as questionable. Species primarily distributed in open prairie areas and is not likely present in the project area. Impacts are unlikely.	CNF: Not listed. DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** one DNR observation listed as questionable. Species primarily distributed in open prairie areas and is not likely present in the project area. Impacts are unlikely.	CNF: Not listed. DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** one DNR observation listed as questionable. Species primarily distributed in open prairie areas and is not likely present in the project area. Impacts are unlikely.	CNF: Not listed. DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Northern bog lemming *Synaptommys borealis*	**No documented observations –** suitable habitat may be present. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Snapping turtle *Chelydra serpentina*	**No documented observations –** suitable habitat is present. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF: Not listed. DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat is present. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF: Not listed. DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	Yes – 4 BGR documented observations. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF: Not listed. DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**
Blanding's turtle *Emydoidea blandingii*	**No documented observations –** suitable habitat may be present. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** suitable habitat may be present. Impacts to individuals and appropriate habitat areas will be minimized by spanning wetlands, to the extent practicable. BMPs will be used during construction in wetlands to minimize impacts to these areas.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Eastern hognose snake *Heterodon platirhinos*	**No documented observations –** nearest records are for locations south of the Study Area. Habitat is present within project area. Impacts are unlikely.	CNF & DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** nearest records are for locations south of the Study Area. Habitat is present within project area. Impacts are unlikely.	CNF & DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** nearest records are for locations south of the Study Area. Habitat is present within project area. Impacts are unlikely.	CNF & DNR: Not listed. DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Non-Federal TES (CNF, DNR & DRM) – Plants						
Dragon's mouth orchid *Arethusa bulbosa*	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	**Yes - One 1994 DNR population within the DRM; not relocated in 2009** - Suitable habitat extensively surveyed with no documented occurrences, including DNR record. Where clearing of coniferous swamps occurs, individuals may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.
Dissected grape-fern *Botrychium dissectum*	Yes – 2 EP and One CNF documented populations within Route. Clearing of ROW canopy will likely benefit this species by creating additional brushy habitat, but may adversely affect individuals adapted to shaded conditions. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	Yes – One EP and 2 BGR documented populations within Route. Clearing of ROW canopy will likely benefit this species by creating additional brushy habitat, but may adversely affect individuals adapted to shaded conditions. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	Yes – One BGR documented population within the DRM within Route. Clearing of ROW canopy will likely benefit this species by creating additional brushy habitat, but may adversely affect individuals adapted to shaded conditions. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**
Moonwort *Botrychium lanceolatum var.* Angustiseg-mentum	Yes – 4 EP documented populations within the Route. Habitat has been surveyed. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	No documented observations – Habitat has been surveyed. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** Habitat has been surveyed. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Mingan moonwort *Botrychium minganense*	Yes – 9 EP documented populations within the Route. Habitat has been surveyed. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Individuals adapted to openings within the corridor are unlikely to be affected. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.	Yes – 6 EP/BGR populations, 3 DNR and 1 CNF documented populations within the Route. Habitat has been surveyed. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Individuals adapted to openings within the corridor are unlikely to be affected. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.	No documented observations – Habitat has been surveyed. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.
Goblin fern *Botrychium mormo*	Yes – 3 EP and 2 CNF/DNR documented populations in the Route. Habitat has been surveyed. Where clearing of mesic and forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Where possible, route shifts within the 1,000' corridor may occur to avoid known populations. Where clearing occurs above known populations, adverse impacts are expected to occur. CNF BMPs, including those designed to limit spreading of invasive worms species will be applied to minimize adverse impacts.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	Yes – 1 CNR/DNR documented population in the Route. Habitat has been surveyed. Where clearing of mesic forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. The only known population is located across US 2 from the likely location of the corridor.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	Yes – 13 EP and 2 CNF and 1 DNR documented populations in the Route. Habitat has been surveyed. Where clearing of mesic forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Where possible, route shifts within the 1,000' corridor may occur to avoid known populations. Where clearing occurs above known populations, adverse impacts are expected to occur. CNF BMPs, including those designed to limit spreading of invasive worms species will be applied to minimize adverse impacts.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect
Blunt-lobed grapefern *Botrychium oneidense*	**No documented observations –** Habitat has been surveyed. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** Habitat has been surveyed. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** Habitat has been surveyed. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Pale moonwort *Botrychium pallidum*	Yes – 6 EP documented populations within the Route. Habitat has been surveyed. Where clearing of forest and woodland occurs, individuals present that are adapted to shade may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Individuals adapted to openings within the corridor are unlikely to be affected. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited. Where closed canopy forests are cleared, this species may benefit from increased habitat availability.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	Yes – 3 BGR, 12 CNF and 8 DNR documented populations within the Route. Habitat has been surveyed. Where clearing of forest and woodland occurs, individuals present that are adapted to shade may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Individuals adapted to openings within the corridor are unlikely to be affected. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited. Where closed canopy forests are cleared, this species may benefit from increased habitat availability.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	Yes – 4 BGR documented populations within the Route. Habitat has been surveyed. Where clearing of forest and woodland occurs, individuals present that are adapted to shade may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Individuals adapted to openings within the corridor are unlikely to be affected. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited. Where closed canopy forests are cleared, this species may benefit from increased habitat availability.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Ternate grape-fern *Botrychium rugulosum*	Yes – 1 new BGR and one CNF/DNR population documented in the same location in the Route. Where clearing of forest and woodland occurs, individuals present that are adapted to shade may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Individuals adapted to openings within the corridor are unlikely to be affected. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited. Where closed canopy forests are cleared, this species may benefit from increased habitat availability.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	Yes – 1 new BGR, 7 CNF and 10 DNR documented populations within the Route. Habitat has been surveyed. Where clearing of forest and woodland occurs, individuals present that are adapted to shade may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Individuals adapted to openings within the corridor are unlikely to be affected. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited. Where closed canopy forests are cleared, this species may benefit from increased habitat availability.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	Yes – 2 BGR documented populations within the Route. Habitat has been surveyed. Where clearing of forest and woodland occurs, individuals present that are adapted to shade may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Individuals adapted to openings within the corridor are unlikely to be affected. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited. Where closed canopy forests are cleared, this species may benefit from increased habitat availability.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**
Least grape-fern *Botrychium simplex*	Yes – 9 EP documented populations within the Route. Clearing of ROW canopy will likely benefit this species adapted to open and brushy conditions, allowing additional colonization within cleared corridor. Known populations will be avoided through the creation of construction exclusion zones and transmission line spanning.	CNF, DNR & DRM: No impact	Yes – 7 EP/BGR and 8 CNF/DNR documented populations within the Route. Clearing of ROW canopy will likely benefit this species adapted to open and brushy conditions, allowing additional colonization within cleared corridor. Known populations will be avoided through the creation of construction exclusion zones and transmission line spanning.	CNF, DNR & DRM: No impact	Yes – 6 BGR documented populations within the Route. Clearing of ROW canopy will likely benefit this species adapted to open and brushy conditions, allowing additional colonization within cleared corridor. Known populations will be avoided through the creation of construction exclusion zones and transmission line spanning.	CNF, DNR & DRM: No impact
Fairy slipper *Calypso bulbosa*	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
Blue beech *Carpinus caroliniana*	Yes – 5 EP documented populations within the Route. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	Yes – One EP documented population within the Route. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	**No documented observations –** Habitat along this corridor on public lands within the DRM Reservation Boundary is very limited. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.
Bitternut hickory *Carya cordiformis*	**No documented observations –** Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Loss of habitat will occur as ongoing maintenance will prevent tree species form achieving maturity. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	**No documented observations –** Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Loss of habitat will occur as ongoing maintenance will prevent tree species form achieving maturity. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	**No documented observations –** Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Loss of habitat will occur as ongoing maintenance will prevent tree species form achieving maturity. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.
Hackberry *Celtis occidentalis*	**No documented observations –** Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Loss of habitat will occur as ongoing maintenance will prevent tree species form achieving maturity. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	**No documented observations –** Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Loss of habitat will occur as ongoing maintenance will prevent tree species form achieving maturity. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	**No documented observations –** Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Loss of habitat will occur as ongoing maintenance will prevent tree species form achieving maturity. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect
Sweet fern *Comptonia peregrina*	**No documented observations –** Clearing of ROW canopy will likely benefit this species, allowing additional colonization within cleared corridor.	DRM: Beneficial impact. CNF & DNR: Not listed.	**No documented observations –** Clearing of ROW canopy will likely benefit this species, allowing additional colonization within cleared corridor.	DRM: Beneficial impact. CNF & DNR: Not listed.	**No documented observations –** Clearing of ROW canopy will likely benefit this species, allowing additional colonization within cleared corridor.	DRM: Beneficial impact. CNF & DNR: Not listed.
Ram's head ladyslipper *Cypripedium arietinum*	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Spatulate-leaved sundew *Drosera intermedia*	Yes – 3 EP documented populations within the Route. This species is adapted to moderate canopy to openings. Conifer Swamp clearing will be limited to the extent necessary to construct and operate the project. Where closed canopy conifer swamps are cleared, this species may benefit from increased habitat availability. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	Yes – 3 EP documented populations within the Route. This species is adapted to moderate canopy to openings. Conifer Swamp clearing will be limited to the extent necessary to construct and operate the project. Where closed canopy conifer swamps are cleared, this species may benefit from increased habitat availability.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	**No documented observations –** This species is adapted to moderate canopy to openings. Conifer Swamp clearing will be limited to the extent necessary to construct and operate the project. Where closed canopy conifer swamps are cleared, this species may benefit from increased habitat availability.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.
Goldie's fern *Dryopteris goldiana*	**No documented observations –** Habitat has been surveyed. Where clearing of mesic forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** Habitat has been surveyed. Where clearing of mesic forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** Habitat has been surveyed. Where clearing of mesic forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Olivaceous spike-rush *Eleocharis olivacea*	**No documented observations –** Habitat has been surveyed. Wetland impacts will be minimized through BMPs and avoidance to the greatest extent possible. Impacts to habitat for this species are expected to be highly localized at pole locations. Hydrological impacts are not expected	CNF, DNR & DRM: No impact	**No documented observations –** Habitat has been surveyed. Wetland impacts will be minimized through BMPs and avoidance to the greatest extent possible. Impacts to habitat for this species are expected to be highly localized at pole locations. Hydrological impacts are not expected	CNF, DNR & DRM: No impact	**No documented observations –** Habitat has been surveyed. Wetland impacts will be minimized through BMPs and avoidance to the greatest extent possible. Impacts to habitat for this species are expected to be highly localized at pole locations. Hydrological impacts are not expected	CNF, DNR & DRM: No impact

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect
Few-flowered spike-rush *Eleocharis quinqueflora*	**No documented observations –** Habitat has been surveyed. Wetland impacts will be minimized through BMPs and avoidance to the greatest extent possible. Impacts to habitat for this species are expected to be highly localized at pole locations. Hydrological impacts are not expected	CNF, DNR & DRM: No impact	**No documented observations –** Habitat has been surveyed. Wetland impacts will be minimized through BMPs and avoidance to the greatest extent possible. Impacts to habitat for this species are expected to be highly localized at pole locations. Hydrological impacts are not expected	CNF, DNR & DRM: No impact	**No documented observations –** Habitat has been surveyed. Wetland impacts will be minimized through BMPs and avoidance to the greatest extent possible. Impacts to habitat for this species are expected to be highly localized at pole locations. Hydrological impacts are not expected	CNF, DNR & DRM: No impact
Closed gentian *Gentiana andrewsii*	No documented observations – This species is typical of open wet areas. Where clearing occurs, this species would benefit from increased light availability.	DRM: Beneficial impact. CNF & DNR: Not listed.	**No documented observations –** This species is typical of open wet areas. Where clearing occurs, this species would benefit from increased light availability.	DRM: Beneficial impact. CNF & DNR: Not listed.	**No documented observations –** This species is typical of open wet areas. Where clearing occurs, this species would benefit from increased light availability.	DRM: Beneficial impact. CNF & DNR: Not listed.
Limestone oak fern *Gymnocarpium robertianim*	No documented observations – Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
Sweet grass *Hierchloe odorata*	Yes – One EP documented population in the Route. This species is typical of open wet and dry areas. Where clearing occurs, this species would benefit from increased light availability. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited.	DRM: Beneficial impact. CNF & DNR: Not listed.	Yes – 1 EP and 2 BGR documented populations within the Route. This species is typical of open wet and dry areas. Where clearing occurs, this species would benefit from increased light availability. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited.	DRM: Beneficial impact. CNF & DNR: Not listed.	**No documented observations –**This species is typical of open wet and dry areas. Where clearing occurs, this species would benefit from increased light availability.	DRM: Beneficial impact. CNF & DNR: Not listed.
Butternut *Juglans cinerea*	**No documented observations –** Where clearing of mesic, lowland, and riparian forest occurs, individuals present may be adversely impacted. Loss of habitat will occur as ongoing maintenance will prevent tree species form achieving maturity. Forest clearing will be limited to extent necessary to construct and operate the project.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.	**No documented observations –** Where clearing of mesic, lowland and riparian forest occurs, individuals present may be adversely impacted. Loss of habitat will occur as ongoing maintenance will prevent tree species form achieving maturity. Forest clearing will be limited to extent necessary to construct and operate the project.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.	**No documented observations –** Where clearing of mesic, lowland and riparian forest occurs, individuals present may be adversely impacted. Loss of habitat will occur as ongoing maintenance will prevent tree species form achieving maturity. Forest clearing will be limited to extent necessary to construct and operate the project.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect
Auricled twayblade *Listera auriculata*	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project.	DNR: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DRM: Not listed.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project.	DNR: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DRM: Not listed.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project.	DNR: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DRM: Not listed.
White adder's mouth *Malaxis monophyllos var. brachypoda*	Yes – 4 EP and one DNR and CNF documented population in the Route. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project. Where possible, the route would be shifted to avoid known populations, and work exclusion zones established to keep construction activities away from known occurrences. If avoidance is not possible, individuals present under cleared canopy would be adversely affected.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.
Bog adder's mouth *Malaxis paludosa*	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.
Partridge-berry *Mitchella repens*	**No documented observations –** Habitat has been surveyed. Where clearing of mesic forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	**No documented observations –** Habitat has been surveyed. Where clearing of mesic forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	**No documented observations –** Habitat has been surveyed. Where clearing of mesic forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect
One-flowered broomrape *Orobanche uniflora*	**Yes. One 2009 documented population within the route. –** Habitat has been surveyed. Where clearing of forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Where possible, route shifts within the 1,000' corridor may occur to avoid known populations. Where clearing occurs above known populations, adverse impacts may be expected to occur, though most of the known population occurs within the existing cleared utility corridor.	CNF Orobanche uniflora determination: No effect. The proposed action will not directly disturb the site currently known to be occupied by this population. Direct and indirect effects have not been shown to be likely as much of the site occupied by Orobanche uniflora is currently maintained in an open-brushy condition. While detailed information is lacking on the host range and ecological amplitude of this species, most indications are that it is adapted to a broad range of physical and biological environmental factors and should tolerate the range of hydrological and solar conditions likely to occur following project implementation. DNR Orobanche uniflora determination: Route 1 is likely to jeopardize the viability of the only known Northern Minneosta population of this species, located within the corridor. DRM: Route 1 is likely to jeopardize the viability of this species on the LLR. The reason for this determination is that little is known about the habitat requirements for this species, the only known northern Minnesota/LLR/CNF population of this species. The effects of more than doubling the width, and maintaining it in a more open condition, of the corridor on this species are unknown. This action has the potential to substantially alter habitat conditions for this species in this location.	**No documented observations –** Habitat has been surveyed. Where clearing of mesic forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.	**No documented observations –** Habitat has been surveyed. Where clearing of mesic forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project.	CNF, DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**
White pine *Pinus strobus*	Yes – Common in all age classes in the Route. This species inhabits a range of forest, brushlands and openings at all age classes throughout the project area. Individuals located within the corridor would be adversely impacted by initial ROW clearing and maintenance that would preclude growth to maturity.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	Yes – Common in all age classes in the Route. This species inhabits a range of forest, brushlands and openings at all age classes throughout the project area. Individuals located within the corridor would be adversely impacted by initial ROW clearing and maintenance that would preclude growth to maturity.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	No documented observations within the LLR in the Route. This species inhabits a range of forest, brushlands and openings at all age classes throughout the project area. Individuals located within the corridor would be adversely impacted by initial ROW clearing and maintenance that would preclude growth to maturity.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.
Clubspur orchid *Platanthera clavellata*	No documented observations – This species is adapted to moderate canopy to openings. Conifer Swamp clearing will be limited to the extent necessary to construct and operate the project. Where closed canopy conifer swamps are cleared, this species may benefit from increased habitat availability. Spanning wetlands to the greatest degree possible will minimize potential impacts to unknown populations.	CNF, DNR & DRM: No impact	No documented observations – This species is adapted to moderate canopy to openings. Conifer Swamp clearing will be limited to the extent necessary to construct and operate the project. Where closed canopy conifer swamps are cleared, this species may benefit from increased habitat availability. Spanning wetlands to the greatest degree possible will minimize potential impacts to unknown populations.	CNF, DNR & DRM: No impact	Yes – One BGR documented population within the Route. This species is adapted to moderate canopy to openings. Conifer Swamp clearing will be limited to the extent necessary to construct and operate the project. Where closed canopy conifer swamps are cleared, this species may benefit from increased habitat availability. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited and spanning of transmission lines.	CNF, DNR & DRM: No impact
Tubercled rein-orchid *Platanthera flava var. herbiola*	No documented observations – This species is adapted to moderate canopy to openings. Conifer Swamp clearing will be limited to the extent necessary to construct and operate the project. Where closed canopy conifer swamps are cleared, this species may benefit from increased habitat availability. Spanning wetlands to the greatest degree possible will minimize potential impacts to unknown populations.	DNR: No impact CNF & DRM: Not listed.	No documented observations – This species is adapted to moderate canopy to openings. Conifer Swamp clearing will be limited to the extent necessary to construct and operate the project. Where closed canopy conifer swamps are cleared, this species may benefit from increased habitat availability. Spanning wetlands to the greatest degree possible will minimize potential impacts to unknown populations.	DNR: No impact CNF & DRM: Not listed.	Yes – One BGR documented population within the Route. This species is adapted to moderate canopy to openings. Conifer Swamp clearing will be limited to the extent necessary to construct and operate the project. Where closed canopy conifer swamps are cleared, this species may benefit from increased habitat availability. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited and spanning of transmission lines.	DNR: No impact CNF & DRM: Not listed.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect	Species present in vicinity?	Determination of effect
Western Jacob's ladder *Polemonium occidentale*	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted, though this species prefers open canopy settings, and may thrive under the brushy post project conditions. Forest clearing will be limited to the extent necessary to construct and operate the project.	DNR: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DRM: Not listed.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted, though this species prefers open canopy settings, and may thrive under the brushy post project conditions. Forest clearing will be limited to the extent necessary to construct and operate the project.	DNR: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DRM: Not listed.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted, though this species prefers open canopy settings, and may thrive under the brushy post project conditions. Forest clearing will be limited to the extent necessary to construct and operate the project.	DNR: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DRM: Not listed.
Lapland buttercup *Ranunculus lapponicus*	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.	Yes – One EP documented population in the Route. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project. Where possible, the route would be shifted to avoid known populations, and work exclusion zones established to keep construction activities away from known occurrences. If avoidance is not possible, individuals present under cleared canopy would be adversely affected.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.	**No documented observations –** Suitable habitat extensively surveyed with no documented occurrences. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.
Northern bur-reed *Sparganium glomeratum*	Yes – 5 EP and 2 CNR/DNR documented populations in the Route. Habitat has been surveyed. Wetland impacts will be minimized through BMPs and avoidance to the greatest extent possible. Impacts to habitat for this species are expected to be highly localized at pole locations. Hydrological impacts are not expected. Where forest cover is cleared, this species, where adjacent, may find suitable habitat where wet forest is converted to open wetlands. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited and spanning of transmission lines.	DNR, CNF & DRM: No impact	Yes – 10 EP documented populations in the Route. Habitat has been surveyed. Wetland impacts will be minimized through BMPs and avoidance to the greatest extent possible. Impacts to habitat for this species are expected to be highly localized at pole locations. Hydrological impacts are not expected. Where forest cover is cleared, this species, where adjacent, may find suitable habitat where wet forest is converted to open wetlands. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited and spanning of transmission lines.	DNR, CNF & DRM: No impact	Yes – 2 BGR documented populations in the Route. Habitat has been surveyed. Wetland impacts will be minimized through BMPs and avoidance to the greatest extent possible. Impacts to habitat for this species are expected to be highly localized at pole locations. Hydrological impacts are not expected. Where forest cover is cleared, this species, where adjacent, may find suitable habitat where wet forest is converted to open wetlands. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited and spanning of transmission lines.	DNR, CNF & DRM: No impact

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**
Canada yew *Taxus canadensis*	Yes – Five EP and 4 CNF documented populations within the Route. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project. Where possible, the route would be shifted to avoid known populations, and work exclusion zones established to keep construction activities away from known occurrences. If avoidance is not possible, individuals present under cleared canopy would be adversely affected.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – Eight EP and 5 CNFdocumented populations within the Route. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project. Where possible, the route would be shifted to avoid known populations, and work exclusion zones established to keep construction activities away from known occurrences. If avoidance is not possible, individuals present under cleared canopy would be adversely affected.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.	Yes – Two BGR documented populations within the Route. Where clearing of coniferous swamps occurs, individuals present may be adversely impacted. Forest clearing will be limited to the extent necessary to construct and operate the project. Where possible, the route would be shifted to avoid known populations, and work exclusion zones established to keep construction activities away from known occurrences. If avoidance is not possible, individuals present under cleared canopy would be adversely affected.	CNF & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. DNR: Not listed.
Torrey's manna-grass *Torreyochloa pallida*	Yes – 3 EP documented populations within the Route. Habitat has been surveyed. Wetland impacts will be minimized through BMPs and avoidance to the greatest extent possible. Impacts to habitat for this species are expected to be highly localized at pole locations. Hydrological impacts are not expected. Where forest cover is cleared, this species, where adjacent, may find suitable habitat where wet forest is converted to open wetlands. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited and spanning of transmission lines.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.	**No documented observations –** Habitat has been surveyed. Wetland impacts will be minimized through BMPs and avoidance to the greatest extent possible. Impacts to habitat for this species are expected to be highly localized at pole locations. Hydrological impacts are not expected. Where forest cover is cleared, this species, where adjacent, may find suitable habitat where wet forest is converted to open wetlands. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited and spanning of transmission lines.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.	**No documented observations –** Habitat has been surveyed. Wetland impacts will be minimized through BMPs and avoidance to the greatest extent possible. Impacts to habitat for this species are expected to be highly localized at pole locations. Hydrological impacts are not expected. Where forest cover is cleared, this species, where adjacent, may find suitable habitat where wet forest is converted to open wetlands. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited and spanning of transmission lines.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.
American elm *Ulmus americana*	Yes – Common in all age classes in the Route. This species inhabits a range of forest, brushlands and openings at all age classes throughout the project area. Individuals located within the corridor would be adversely impacted by initial ROW clearing and maintenance that would preclude growth to maturity.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	Yes – Common in all age classes in the Route. This species inhabits a range of forest, brushlands and openings at all age classes throughout the project area. Individuals located within the corridor would be adversely impacted by initial ROW clearing and maintenance that would preclude growth to maturity.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	Yes – Common in all age classes in the Route. This species inhabits a range of forest, brushlands and openings at all age classes throughout the project area. Individuals located within the corridor would be adversely impacted by initial ROW clearing and maintenance that would preclude growth to maturity.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.

Species	Route 1 Alternative		Route 2 Alternative		Route 3 Alternative	
	Species present in vicinity?	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**	**Species present in vicinity?**	**Determination of effect**
Slippery elm *Ulmus rubra*	Yes – Common in all age classes in the Route. This species inhabits a range of forest, brushlands and openings at all age classes throughout the project area. Individuals located within the corridor would be adversely impacted by initial ROW clearing and maintenance that would preclude growth to maturity.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	Yes – Common in all age classes in the Route. This species inhabits a range of forest, brushlands and openings at all age classes throughout the project area. Individuals located within the corridor would be adversely impacted by initial ROW clearing and maintenance that would preclude growth to maturity.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	Yes – Common in all age classes in the Route. This species inhabits a range of forest, brushlands and openings at all age classes throughout the project area. Individuals located within the corridor would be adversely impacted by initial ROW clearing and maintenance that would preclude growth to maturity.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.
New England violet *Viola navae-angliae*	Yes – 4 EP documented populations in the Route. This species inhabits both openings and forested habitats. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Individuals adapted to openings within the corridor are unlikely to be affected. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	Yes – 2 EP documented populations in the Route. This species inhabits both openings and forested habitats. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Individuals adapted to openings within the corridor are unlikely to be affected. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.	Yes – One BGR documented population in the Route within the DRM Reservation Boundary. This species inhabits both openings and forested habitats. Where clearing of mesic and lowland forest occurs, individuals present may be adversely impacted. Forest clearing will be limited to extent necessary to construct and operate the project. Individuals adapted to openings within the corridor are unlikely to be affected. Known populations will be avoided by creating work exclusion zones where construction activities will be prohibited.	DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF & DNR: Not listed.
Barren strawberry *Waldesteinia fragarioides*	No documented observations – This species inhabits both woodlands and forested habitats. Where clearing of woodlands and open canopy forest occurs, individuals present may be adversely impacted, though may recolonize brushy post project habitats. Forest clearing will be limited to extent necessary to construct and operate the project.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.	No documented observations – This species inhabits both woodlands and forested habitats. Where clearing of woodlands and open canopy forest occurs, individuals present may be adversely impacted, though may recolonize brushy post project habitats. Forest clearing will be limited to extent necessary to construct and operate the project.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.	No documented observations – This species inhabits both woodlands and forested habitats. Where clearing of woodlands and open canopy forest occurs, individuals present may be adversely impacted, though may recolonize brushy post project habitats. Forest clearing will be limited to extent necessary to construct and operate the project.	DNR & DRM: May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing. CNF: Not listed.

8.0 MITIGATION MEASURES

The following discussion provides a detailed list of proposed mitigation measures applicable to USFWS listed TES, CNF listed RFSS, DNR listed TES, and DRM listed TES that are within their jurisdictional boundaries. Mitigation measures for CNF and DRM identified species would be conducted on CNF properties; for DRM listed specis mitigation would be conducted on LLR lands with retained treaty rights. Mitigation measures for USFWS and DNR listed species are applicable for the entire project. Activities on private lands may require additional coordination with those landowners.

In addition to the following mitigation measures for TES, the Project will include BMPs to mitigate other environmental issues, such as water quality, soil erosion, hazardous spill prevention, cultural resource preservation, etc. These BMPs will be outlined in the Final EIS and will be included in Federal, state and local permits required for Project construction. The Applicants will develop an Environmental Compliance Plan, will provide environmental training to the selected contractor, and will have an on-site environmental compliance monitor to ensure that the required BMPs and mitigation measures are carried out in compliance with applicable permits and agreements.

8.1 Corridor Clearing

- The most recent DNR NHIS data will be reviewed prior to land clearing to determine if there are any new TES observations within the proposed ROW.
- Prior to corridor clearing, tribal members will be given opportunity to remove, transplant, or collect (in whole or in part) traditionally important plants from properties where landowner permission for such activities has been obtained.
- When clearing on sandy soils, retain on-site the fine logging slash (material < 3” diameter) on the outer sections of the right-of-way. (Note – construction crews do not desire tire ripping snags on access paths and/or structure setting areas.
- Limit clearing and construction to frozen ground conditions and/or use of construction mats on peat and muck soils.
- If using a hydro-ax (or similar equipment) to lower slash, the same seasonal restrictions used for harvesting would apply.
- Concentrate construction equipment traffic to primary and secondary access paths, as practicable. Keep the size of lay down areas to a minimum.
- Extra care should be taken with harvesting woody vegetation on steeper slopes. Soil erosion would be minimized as long as water bars, dips, and slash on the trails are properly installed.
- Newly cleared bare soils are to be mulched, seeded or covered with erosion control blanket on steep slopes upon completion of project to prevent erosion. Reseeding would be completed as soon as work is complete and weather/soil conditions are suitable. Native seed mixes that are certified weed-free will be used.

8.2 Avian Protection

8.2.1 General Practices for all Species

- Construction in occupied habitat areas for TES raptors will occur outside of the typical avian breeding season (March 1 – August 31) if an active nest is present, or will be conducted at a suitable distance from the nest such that nest abandonment would be unlikely. Species specific

details will be determined based on consultation with the appropriate State and Federal agencies.

- Trees within the proposed ROW that support stick nests of listed species will not be removed without consultation with and written approval from appropriate State and Federal agencies.
- Flight diverters would be installed where the new route would cross known flyways or near large wetlands, impoundments, and lakes. Locations would be determined in consultation with State and Federal agencies.

The following sections summarize CNF species guidance that will apply to this Project.

8.2.2 Practices Specific to the Northern Goshawk

- There would be no disturbing activities (right-of-way clearing, access path construction, etc.) within the nesting and post-fledging areas during the breeding season, which lasts from March 1 - August 31.
- If a new stick nest is discovered in the project area during construction layout and marking operations, right-of-way clearing would be deferred within the immediate vacinity until spring stick nest surveys can confirm whether the nest is active and coordination with Forest Service botanists reaches an appropriate settlement. Non-breeding season mitigation in coordination with CNF staff will be required in order to avoid impacts that could cause the abandonment of the territory. The applicant must consider potential right-of-way shifts within the approved route to avoid active goshawk nests. Nest removal will require coordination with CNF biologists to ensure that impacts are minimized.

8.2.3 Practices Specific to the Bald Eagle

- All ground disturbing activities within 200m of an active nest are seasonally restricted; construction activities would occur from October 1 through February 14.
- No ground disturbing activities within 100m of an eagle nest unless the project would benefit the nest stand.

The following recommendations were provided by the Department of Interior to protect bald eagles. These recommendations will be followed as noted.

- Keep contruction activity at least 660 feet away from an active nest, if the construction activity is visible from the nest.
- Limit clearing to within the ROW; maintain existing forest or natural vegetation between the construction activity and nest trees.
- Avoid certain activities during the breeding season. (See #1 above.)
- Site high voltage transmission lines at least two miles away from nests, foraging areas and communal roosts. (This recommendation is not reasonable or feasible given the density of the bald eagle population in the project area.)
- Employ industry-accepted best management practices to prevent birds from colliding with or being electrocuted by utility lines, towers and poles. If possible, bury lines in important eagle areas. (Burying the transmission line was considered and rejected as an alternative. See DEIS Section 2.3.4 Underground Transmission Line Alternative.)
- Miminize potentially disruptive activities and development in the eagles' direct flight path between their nest and roost sites and important foraging areas. (See #1 above.)

- Where bald eagles are likely to nest in human-made structures and such use could impede operation or maintenance of the structures or jeopardize the safety of the eagles, equip the structures with either (1) devices engineered to discourage bald eagles from building nests, or (2) nesting platforms that will safely accommodate bald eagle nests without interfereing with structure performance. (Applicants will develop an avian protection plan that outlines steps to identify potential problems with eagles nesting on structures and procedure to work with USFWS to address such issues.)
- Protect and preserve potential roost and nest sites by retaining mature trees and old growth stands, particularly within 1/2 mile of water. (Applicants will only remove trees within ROW as necessary to safely operate and maintain the transmission line.)
- Utility line should be strung in areas where surrounding vegetation is higher than utility poles to reduce collision risk. (Most of the project area is forested; however not all locations have existing forest vegetation. Thus, this recommendation is not reasonable or feasible.)
- Providing perch guards on utility line poles near areas of high bald eagle concentration to prevent bird electrocution. (The structures would be constructed according to APLIC standards to minimize potential for electrocution.)
- Educate construction personnel of the presenece of bald eagle nests along the transmission line routes and about the need for not approaching any actively nesting bald eagles, particularly on foot. (Nest sites, including appropriate buffer, will be marked as off limits to foot and other construction traffic. Preconstruction meetings will be conducted to discuss environmental issues, including bald eagle protections.)
- Inform Twin Cities ES Field Office, FWS of any unusual bald eagle activity noted during or after project construction at 612-725-3548 x2202.

8.2.4 Practices Specific to the Black-backed Woodpecker

- There would be no activities in stands with known occurrences during the breeding season from March 1 to August 31.
- Any known nests found during project implementation would be protected from March 1 to August 31 with a 200 foot buffer until the young have fledged.

8.3 Threatened and Endangered Plants

- All known plant locations near the selected right-of-way are to be resurveyed and outer boundaries of populations are to be determined with sub-meter accuracy GPS units.
- Populations are to be outlined and marked with orange construction fencing and signage (“Environmentally Sensitive Area”) placed to prevent encroachment into known populations by all construction activities.
- Forest Plan S-WL-7 guidelines designed to protect *Botrychium mormo* will apply. If the project cannot comply with Forest Plan S-WL-7 guidance, the applicant will seek approval and take permits from the USFS, DRM and DNR and seek appropriate mitigation in consultation with these agencies.

8.4 Non-native Invasive Species (NNIS)

- ROW management will restrict the use invasive species and actively manage the spread of invasive species within the corridor by revegetating cleared corridor areas with native seed mixes appropriate to the cleared area.
- Clean potentially infested equipment to help prevent the spread of NNIS.

- New construction access paths, temporary roads, and material storage areas should avoid occurrences of NNIS or crossing areas infested with NNIS.
- Prior to exposing bare mineral soil, the NNIS occurrence within the right-of-way should be treated by mechanical means such as mowing or hand pulling to minimize the seed production while the soil is exposed.
- Minimize the spread of NNIS by using clean granual fill or clean gravel sources (per MnDOT Specification 3138.2 A1 Aggregate Composition) for backfill material. No organic fill will be imported to the site.
- Within the CNF and LLR, seed mixes will be developed in conjunction with and approved by DRM and CNF.
- The following seed mixes, which were developed by the Minnesota Board of Soil and Water Resources for restoration purposes, are recommended for re-vegetation within the cleared corridor outside of the CNF and LLR:
    - Upland Sand/Gravel area seed mixes: BWSR U7 (Native Savanna and Woodland Edge), BWSR U1 (Native NW MN Mesic Tall-Grass Prairie), MnDOT 350NGR (Native General Roadside Mix) or MnDOT 340NSM (Native Sandy Mid-Height Mix).
    - Upland Loam/Silt/Clay soil area seed mixes: BWSR U14 (DNR NE MN Trail ROW – Forest Edge Mix
    - Wetland seed mixes: BWSR W1 (Native Emergent/Wetland Fringe), BWSR W2 (Native Sedge/Wet Meadow), BWSR W3 (Native Wet Prairie
- Newly seeded areas will be inspected for weed establishment three times during the first growing season. If present, weeds will be controlled (mechanically or via herbicide – with landowner approval) to minimize weed seed production.

8.5 Wetlands

Transmission line construction in wetlands will consist of clearing of trees, constructing H-frame structures near final pole locations, augering of holes, dewatering, backfilling, cleanup, and revegetation. However, due to the unstable nature of some wetland soils, construction activities may differ somewhat from those described for typical upland areas. Construction activities will be minimized in wetlands and/or special construction techniques will be used to minimize the disturbance to plants and soils and to protect wetland hydrology.

- Winter construction over frozen surfaces sufficient to support the weight of all construction equipment or the use of construction timber mats is required for all construction activities in wetlands with peat soils, muck soils or open water
- Staging areas and, temporary excavated soil storage areas, will typically be located in upland areas at least 50-feet away from wetland boundaries where topographic conditions permit. If topographic conditions do not permit a 50-foot setback, then these areas will be located as far away from the wetland as is practicable. Vegetation will not be cleared between these areas and the wetland in any event. Trees within wetlands will be cut off at ground level, leaving existing root systems intact; clearing debris will generally be removed from the wetland for disposal. Chips, hydro-axe debris, or similar can be left in the wetland if spread evenly in the right-of-way up to a depth not to exceed 1 inch in thickness and in a manner which will allow for normal revegetation.

- Use vehicle construction mats to support equipment used during construction in wetlands to minimize wetland soil compaction
- Locate structures and new roads to avoid wetlands and buffers.
- Mechanized clearing within wetlands will only be conducted when necessary.
- Limit disturbance to the minimum necessary when working in and immediately adjacent to wetlands.
- Delineate wetlands before final design and post clear signage for contractor avoidance during construction.
- Use erosion control measures when conducting any earth disturbance upslope of wetlands to ensure soil is not washed downhill during storms.
- Ensure noxious weed infestations do not become a problem in wetlands by cleaning (via washing or using compressed air) all construction vehicles prior to entering any new wetland location. (Applicable to summer construction only.)
- The ROW will be the main traffic road for the heavy construction equipment, and frost/ice road construction must focus on adequately building this area prior to all construction activities at any given site.
- Low ground pressure equipment (wide tires or tracked vehicles) and/or construction mats will be used during any non-winter operations, minimizing disturbance to wetlands.
- Tree stumps, brush riprap, imported soil, and rock fill will not be brought in to stabilize the right-of-way in wetlands. Where a wetland cannot support construction equipment, and low-ground-weight equipment is not used, construction activities will be accomplished from timber or other types of construction mats.
- The contractor is responsible for having a sufficient number of construction mats to perform the work. Timber riprap (also known as or corduroy road) cannot be used without prior written approval from the company and the appropriate regulatory agencies.
- Pre-existing corduroy roads in wetlands may be used but, may not be improved, maintained, restored, or replaced without site-specific authorization from applicable agencies.
- All construction mats, construction debris, and larger vegetative debris will be removed during cleanup of wetlands.
- If the wetland right-of-way is stable (dry work area or construction mats), structures may be constructed and set in place as in upland areas. Supplemental equipment supports, such as construction mats, will be used in wetlands to provide temporary portable support for heavy construction equipment to reduce ground pressure and minimize soil compaction and/or soil mixing.

9.0 CONCLUSIONS

This BA/BE provides a summary of agency coordination and biological surveys that have been conducted over the past several years for the proposed Bemidji to Grand Rapids 230 kV Transmission Line project. It includes a review of data collected by the CNF, DRM, DNR, Enbridge Pipeline Project and recent biological surveys conducted by the Applicants specifically for the proposed route alternatives.

The proposed Project has a small potential to benefit those species that inhabit or otherwise utilize grasslands and shrublands, since these habitats will be expanded due to forest clearing. Conversely, the proposed Project has potential to adversely impact those species that inhabit or otherwise utilize forestlands, since this habitat will be reduced due to forest clearing. Overall, the project will require right-of-way that has a maximum width of 125 feet. The length and amount of right-of-way clearing necessary for the Project will be determined once a final route is chosen. Generally, the longest route (Route Alternative 3) would require the more forest clearing.

The proposed Project includes commitments to avoid and minimize impact to TES species, as well as best management practices that will minimize impacts to individuals and their habitat. All impacts will be avoided to the extent practicable and mitigation measures will be in place during project construction.

The analysis of all TES relevant to the USFWS determined that the Project is **not likely to adversely affect** (2 species) federally listed TES species. Likewise, a review of potential cumulative impacts for the proposed Project in combination with other past, present, and future actions is not likely to adversely affect federally listed TES species.

The analysis of TES relevant to the CNF, DNR and DRM determined that the Project would have **no effect** or **may adversely impact individuals, but is not likely to result in a loss of viability in the Planning Area, nor cause a trend toward Federal listing** for all but one species.

The effects determination for *Orabanche uniflora* varied by agency. The CNF determined that the project would have **no effect**. The DNR and DRM determined that **Route 1 is likely to jeopardize** the viability of the only known Northern Minneosta population of this species, located within the corridor. **Other routes would have no effect**.

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Figures

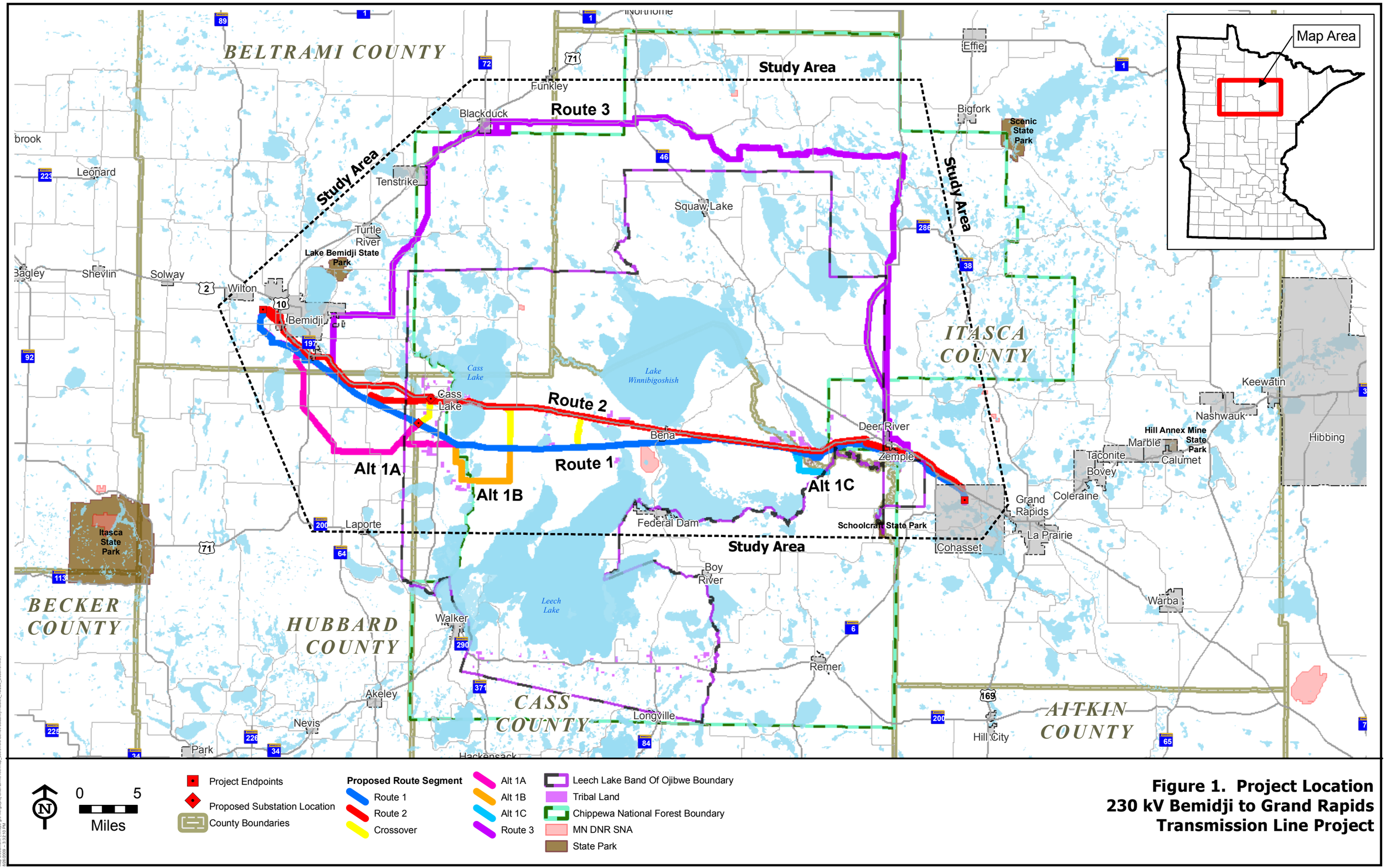


Figure 1. Project Location
230 kV Bemidji to Grand Rapids
Transmission Line Project

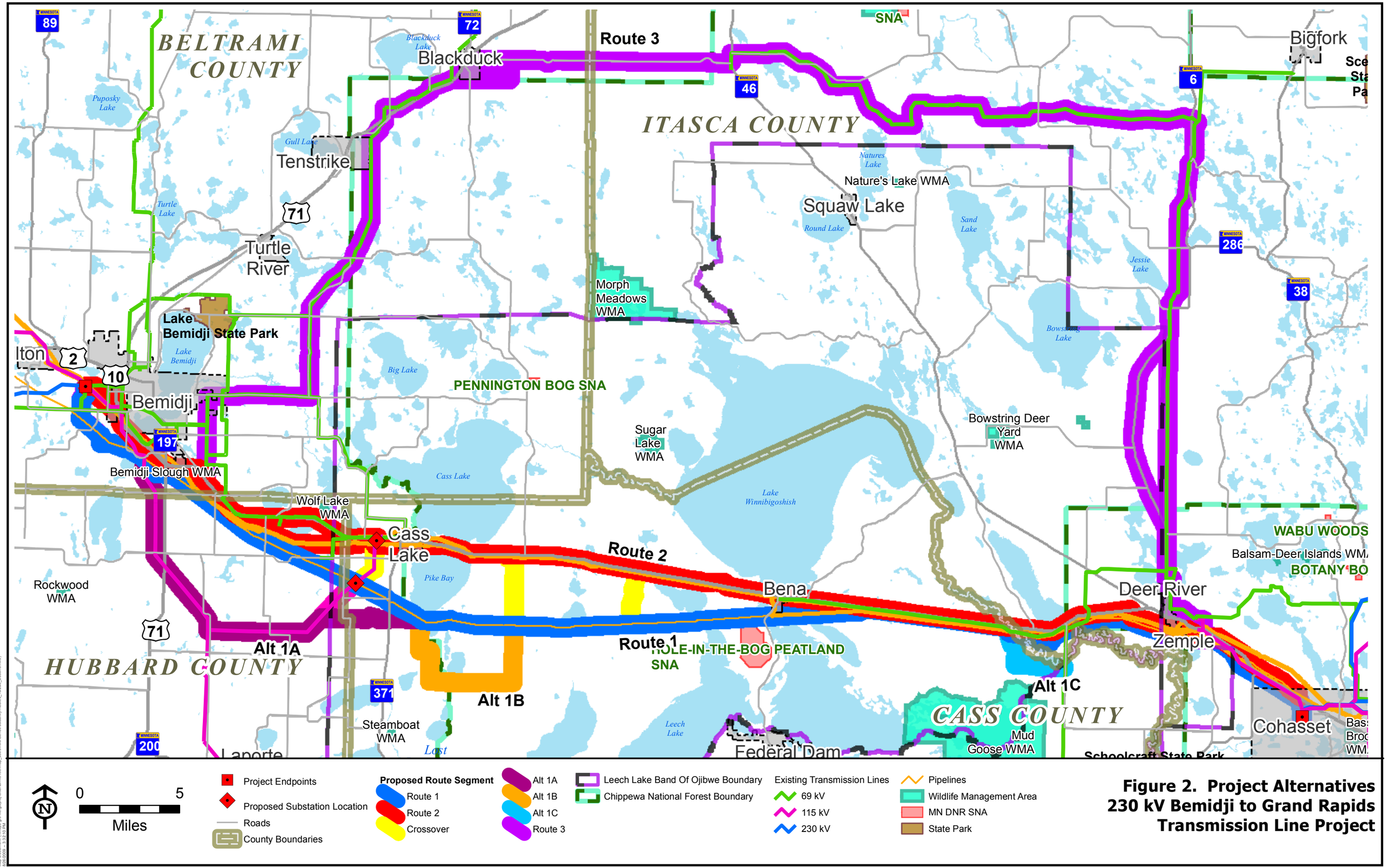


Figure 2. Project Alternatives
230 kV Bemidji to Grand Rapids
Transmission Line Project

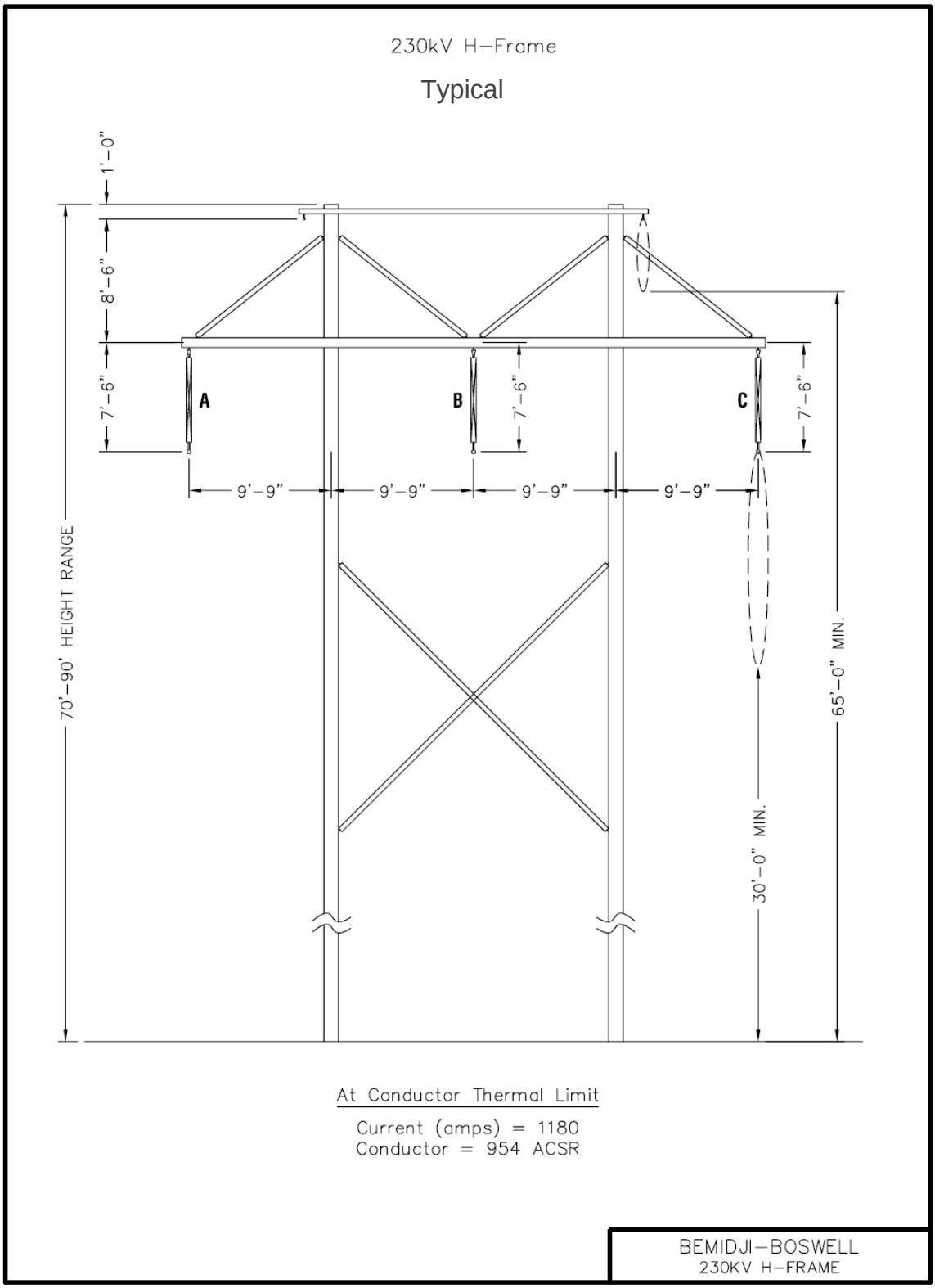
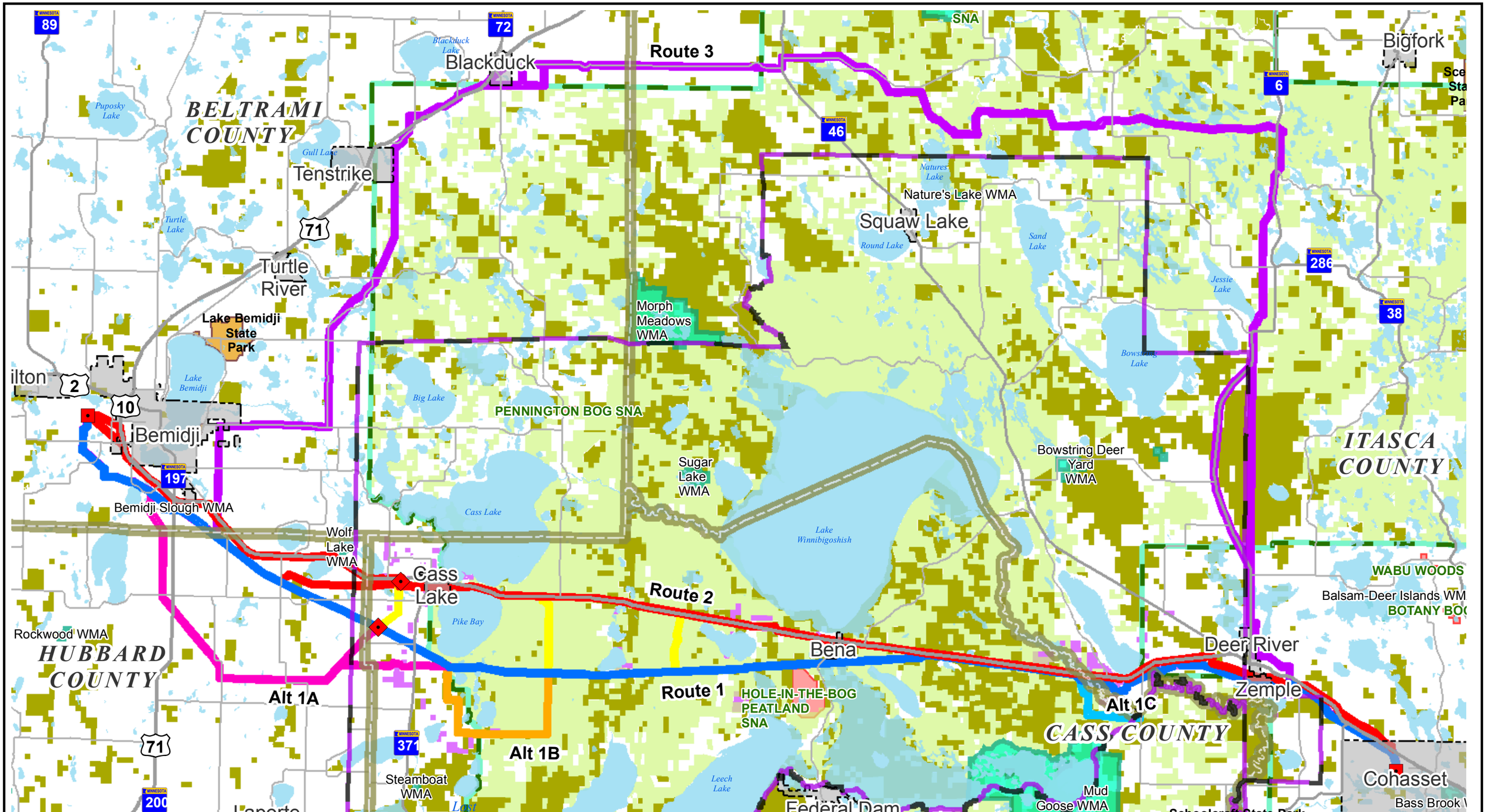


Figure 3. Typical Structure



0 5
Miles

Project Endpoints
Proposed Substation Location
County Boundaries

Proposed Route Segment
Route 1
Route 2
Crossover

Alt 1A
Alt 1B
Alt 1C
Route 3

Leech Lake Band Of Ojibwe Boundary
Tribal Land
Chippewa National Forest Boundary
Chippewa NF Lands

Wildlife Management Area
MN DNR SNA
State Park
State and County Forest

Figure 4. Public Lands
230 kV Bemidji to Grand Rapids
Transmission Line Project

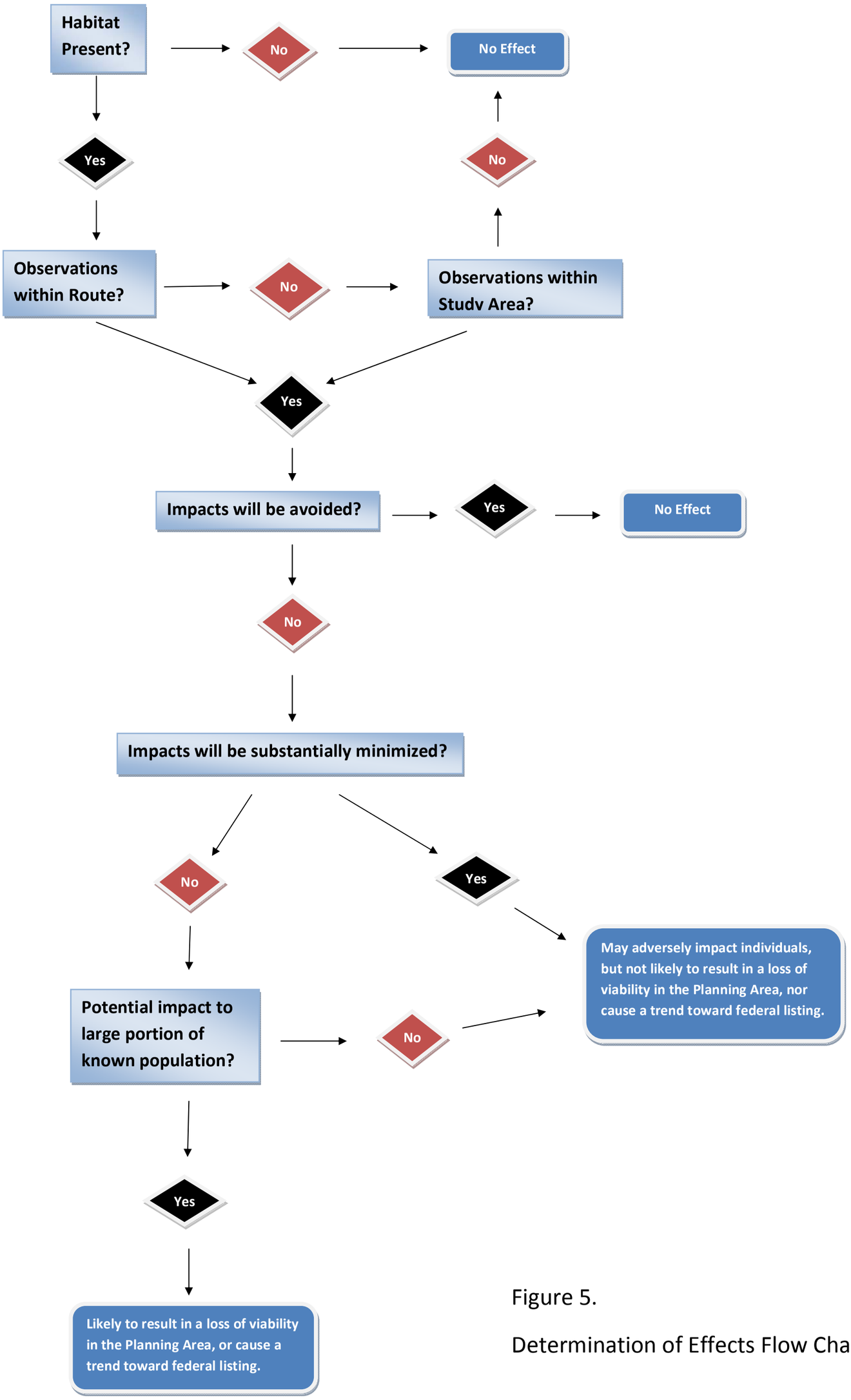


Figure 5.

Determination of Effects Flow Chart