



EXHIBIT 1

UPDATED MANAGEMENT PLAN FOR THE

Magney-Snively Natural Area

OF THE DULUTH NATURAL AREAS PROGRAM

DATE: June 1, 2026

This Management Plan was produced by the City of Duluth's Natural Resources Management Program with the support of an Advisory Committee and the Minnesota Land Trust. Funding for this plan was provided in part by a grant from the National Fish and Wildlife Foundation, Sustain our Great Lakes Program Grant Number 79193, entitled: Habitat Restoration for Birds in the St. Louis River Estuary, Duluth Minnesota.

Accessibility best practices consistent with WCAG 2.1 Level AA were applied to support usability for individuals with disabilities, in alignment with ADA considerations. Appendices referencing materials prepared by other organizations were also reviewed and edited, to the extent feasible, to improve consistency with ADA guidelines.

This updated management plan was approved by:

- Natural Resources Commission on (date):
- The Duluth Planning Commission on (date):
- and The Duluth City Council on (date):

Plan Writer: Kate Kubiak, Natural Resources Coordinator, City of Duluth

Advisory Committee: See Appendix A.

Our thanks to the many organizations and individuals who helped update this Management Plan.



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Introduction

Contained herein is an updated Natural Resources Management Plan for the Magney-Snively Designated Natural Area (Magney-Snively). This Management Plan was developed as part of the requirements set forth in Section 2-152 of Article XXIX, Chapter 2 of the Duluth Legislative Code, also known as the Duluth Natural Areas Program (DNAP).

The purpose of this plan is to provide guidance for protecting and enhancing high quality natural features for which Magney-Snively was nominated to the DNAP, including special plants, natural water features, and geological features.

This plan presents an inventory of natural resources and human uses within the natural area, describes threats to the ecological function of these features, identifies strategies for preserving the natural features, and presents an implementation plan with prioritized actions, timelines, and costs. The Plan is for ten years, and will be updated again after ten years to reflect completed projects, new priorities and threats and updated funding plans.

Magney-Snively has long been recognized as one of Minnesota's best examples of old-growth Maple-Basswood (Bluebead Lily) Forest. It is the largest tract of this type of forest in the Duluth area and represents one of the most significant tracts of intact habitat of its type in northern Minnesota. Approximately 400 acres of the currently designated Natural Area came close to becoming a Minnesota Department of Natural Resources (MNDNR) Scientific and Natural Area (SNA) in 1986. That process was never completed. However, with the help of The Nature Conservancy (TNC), the City selected Magney-Snively as its first Designated Natural Area in 2003. It remained the only designated Natural Area until 2020 when two more areas became designated – Hartley and the St. Louis River Designated Natural Areas.

Part of the City's DNAP is to develop a Management Plan for the designated area. These plans are non-regulatory in nature but serve as essential tools by providing a comprehensive inventory of natural resources, outlining current and allowed recreational uses, and recommending management strategies and projects focused on conserving the area's ecological integrity.

Magney-Snively's original Management Plan was completed in 2003. Thanks to funding from the Sustain Our Great Lakes Program, and support from the Minnesota Land Trust and a twelve-member Advisory Committee, the City is now undertaking an update to this plan. This updated version incorporates new ecological data, proposes more strategic and targeted implementation projects, and articulates a renewed vision for the long-term stewardship of this ecologically significant and locally cherished Natural Area.

The guidelines contained in this document are intended to be implemented using an adaptive management approach. Adaptive management involves setting ecological goals; implementing goals that the City and its partners can afford to implement or, are most pressing; monitoring the effectiveness of our management techniques as best as we can, with the staff capacity we have available; and adjusting management based on results. Adaptive management allows us to use available resources on what we can afford first, see if that is enough to sustain the ecological integrity of the site and, if not, make plans to intentionally find a way to afford more complex and expensive management strategies.

The City of Duluth will implement this plan with assistance from its myriad natural resource and recreational partners with interests in the Natural Area. These partners are listed under the Section “Partners in Implementation.”

The first part of the plan will describe the natural resources found in the Natural Area, and how the area is currently being used. The second part of the plan identifies the known threats to the area. The Plan concludes with strategies for addressing these threats, entities that could help implement such strategies and prioritized management recommendations with estimated costs and timelines.

Natural Area Conditions

NATURAL RESOURCES INVENTORY

This section provides an inventory of natural resources in each of the three scientific categories for which Magney-Snively was nominated to the DNAP. It also describes recreational uses of the Natural Area, and discusses the current status of land ownership.

The significant natural resources for which Magney-Snively was originally nominated are: geological landforms, significant native plant communities (under which important bird area was nested); and species of special concern. The important features of these resources are summarized in Table 1 below (as taken from the original nomination document).

Table 1: Natural Features Supporting Original Designation (2003)

DNAP Scientific Criteria	Important Features
Geologic Landforms	The “type locality” of the great rock mass known as the Duluth Complex includes the nominated area. The bedrock in this area also contains excellent outcrops of the world-famous Midcontinent Rift System, a geologic feature formed 1.1 billion years ago in Precambrian times.
Significant Plant Communities	There are eleven distinct, high quality occurrences of different plant communities native to the Duluth area. One example of an especially significant native plant community within this complex of forests and wetlands is the rich maple-basswood forest, rare in the City of Duluth and throughout northeastern Minnesota.
Important Bird Congregation Area	As a large forested tract along a well-known migration route, Magney-Snively provides important stopover and nesting habitat for migratory songbirds and raptors (hawks and eagles). It is also an important area for sensitive nesting birds such as raptors and neotropical migrants.

DNAP Scientific Criteria	Important Features
Species of Special Concern	There are two state-listed species of special concern within the nominated area, Spring-beauty (<i>Claytonia caroliniana</i>) and Moschatel (<i>Adoxa moschatel</i>). *These species are no longer species of special concern as of 2026.

Although not formally noted in the original nomination document, natural water features are one of the five scientific criteria under which Natural Areas can be designated for the DNAP, and Magney-Snively has two designated trout streams running through it – Sargent and Stewart Creeks. These resources will be discussed in detail in this updated Management Plan as they are important natural features that should be protected and recognized for their ecological values.

Land Classification and Geology

Magney-Snively lies within the Laurentian Mixed Forest Province, Northern Superior Uplands, North Shore Highlands. Soils range from thin patches among exposed bedrock to continuous blankets of shallow, well-drained glacial till. The entire site lies over Duluth Complex igneous bedrock. Like many areas in Duluth, the geology of Magney-Snively includes excellent examples of the Midcontinent Rift System, a geologic feature formed 1.1 billion years ago. Bardon’s Peak and the other high points near the area (e.g. Ely’s Peak) are good examples of this – they are highly resistant to erosion, which is why they still exist millions of years after they were formed.

Native Plant Communities

As part of the development of this updated Management Plan, a consultant was hired to map and study the Native Plant Communities (NPCs) of Magney-Snively. This work was completed in 2024 and 2025 and the final report, *Native Plant Community Mapping and Plant Survey Magney-Snively Natural Area*, can be found in Appendix B.

Ten Native Plant Community types and 1 subtype were documented during the survey in Magney-Snively. Each NPC was given a condition ranking and a conservation status ranks (S-Rank). This Table was taken directly from Appendix B. See Figure 2 for a map of the NPCs and previously documented Old Growth.

The NPCs were given a natural quality ranking based on the DNR’s Natural Heritage Element Occurrence Ranking Guidelines. Condition ranks for NPCs reflect the degree of ecological integrity of a specific occurrence of an NPC. Condition ranks are assigned by considering species composition, vegetation structure, ecological processes and functions, level of human disturbance, and presence of non-native species. Condition ranks are assigned on a scale of A to

D; NA and NN rankings identify altered and disturbed communities. More specific information is provided below.

- A = occurrences have excellent ecological integrity. They have species composition, structure, and ecological processes typical of the natural or historic range of the community and have been little disturbed by recent human activity or invasive species.
- B = occurrences have good ecological integrity. They include lightly disturbed plant communities and communities that were disturbed in the past but have recovered and now have relatively natural composition and structure. B-rank occurrences normally will return to A-rank condition with protection or appropriate management.
- C = occurrences have fair ecological integrity. They show strong evidence of human disturbance but retain some characteristic species and have some potential for recovery with protection and management.
- D = occurrences have poor ecological integrity. The original composition and structure of the community have been severely altered by human disturbances or invasion by exotic species. They have little chance of recovery to their natural or historic condition.
- NA = Native species present in an altered / non-native plant community. This NA ranking can only be used if the site is field checked from the edge or to a greater degree, thus confirming the presence of native species within a non-native community.
- NN = Altered / non-native plant community. These semi-natural communities do not qualify for natural quality ranking. Using NN signifies the site has been field checked and confirms it is a semi-natural community.

NPC types and subtypes have also been assigned conservation status ranks (S-Ranks) that reflect the risk of elimination of the community from Minnesota (Minnesota County Biological Survey, 2009). The five ranks are:

- S1 = critically imperiled
- S2 = imperiled
- S3 = vulnerable to extirpation
- S4 = apparently secure; uncommon but not rare
- S5 = secure, common, widespread, and abundant

Table 2: Native Plant Communities in Magney-Snively Designated Natural Area

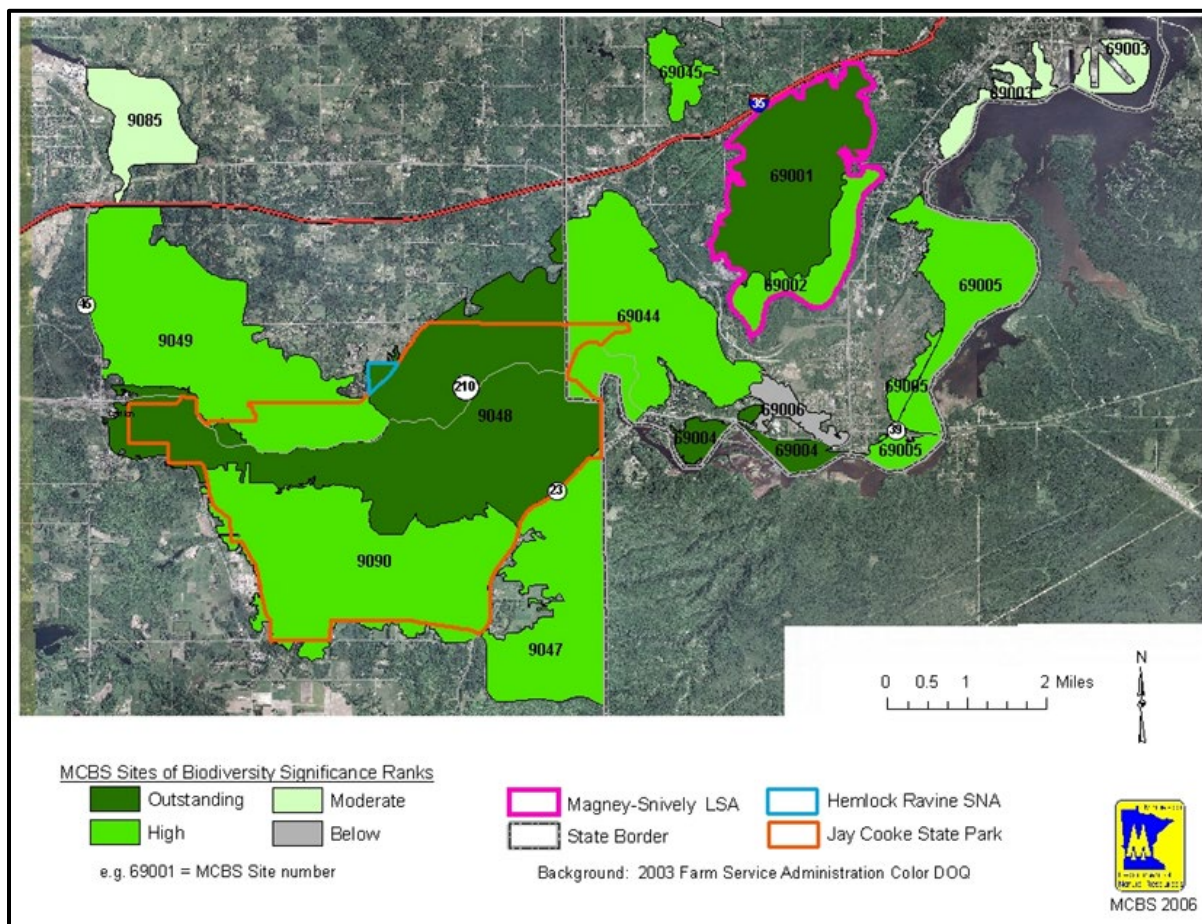
Native Plant Community	Total Acres	GEI Condition Rank	DNR S-Rank	GEI Condition Qualifier
MHn47a – Sugar Maple-Basswood (Bluebead Lily) Forest	880.4	B	S3	B = Worm impacted and low cover (<10%) of non-native species.
MHn35b – Red Oak-Sugar Maple-Basswood (Bluebead Lily) Forest	309	B, C	S4	B = Worm impacted and low cover (<10%) of non-native species. C = Worm impacted and moderate cover (>10%) of non-native species.
FDn33b – Aspen-Birch Woodland	115.2	B, C	S5	B = Worm impacted and low cover (<10%) of non-native species. C = Worm impacted and moderate cover (>10%) of non-native species.
MHn46b – Black Ash-Basswood Forest	64.3	B	S4	B = Worm impacted and low cover (<10%) of non-native species.
ROn23a – Bedrock Shrubland	49.4	B, C	S3	B = Low cover (<10%) of non-native species C = Moderate cover (>10%) of non-native species.
WFn55a – Black Ash-Aspen-Balsam Poplar Swamp	63	A, B	S4	A = Non-native species not present or <1% cover. No indication of other disturbances or impact to ecological integrity. B = Low cover (<10%) non-native species.
WFn64a – Black Ash-Conifer Swamp	35.8	A, B	S4	A = Non-native species not present or <1% cover. No indication of other disturbances or impact to ecological integrity. B = Low cover (<10%) of non-native species.
MHn45b – White Cedar-Yellow Birch Forest	25.6	B, C	S2	B = Worm impacted and low cover (<10%) of non-native species. C = Worm impacted and moderate cover (>10%) of non-native species.

Native Plant Community	Total Acres	GEI Condition Rank	DNR S-Rank	GEI Condition Qualifier
WMn82b – Wet Meadow Bluejoint Subtype	7.6	C	S4 or S5	C = Moderate - High cover (25-50%) of non-native species.
FPn73a – Alder Swamp	1.1	B, C	S5	B = Low cover (<10%) of non-native species. C = Moderate cover (>10%) of non-native species.
CTn42a – Mesic Mafic Cliff	3,071 Linear Feet	A	S2	A = Non-native species not present or <1% cover. No indication of other disturbances or impact to ecological integrity.

Biological significance and old growth

Magney-Snively is part of a cluster of biologically significant sites located on the western edge and beyond the City of Duluth. See Figure 1. Along with Jay Cooke State Park, Mission Forest/Rodney Paine Forest Preserve, and the St. Louis River Estuary, the forests of Magney-Snively contribute to exceptional landscape-level habitat connectivity, supporting a diverse range of avian, terrestrial and aquatic species. Although Figure 1 does not include the 4,400 acre Superior Municipal Forest in Superior, WI, this area also adds to the landscape-level connectivity of high-quality habitats within the St. Louis River Estuary.

Figure 1: Minnesota Biological Survey Sites of Biodiversity Significance. Minnesota County Biological Survey, 2009.

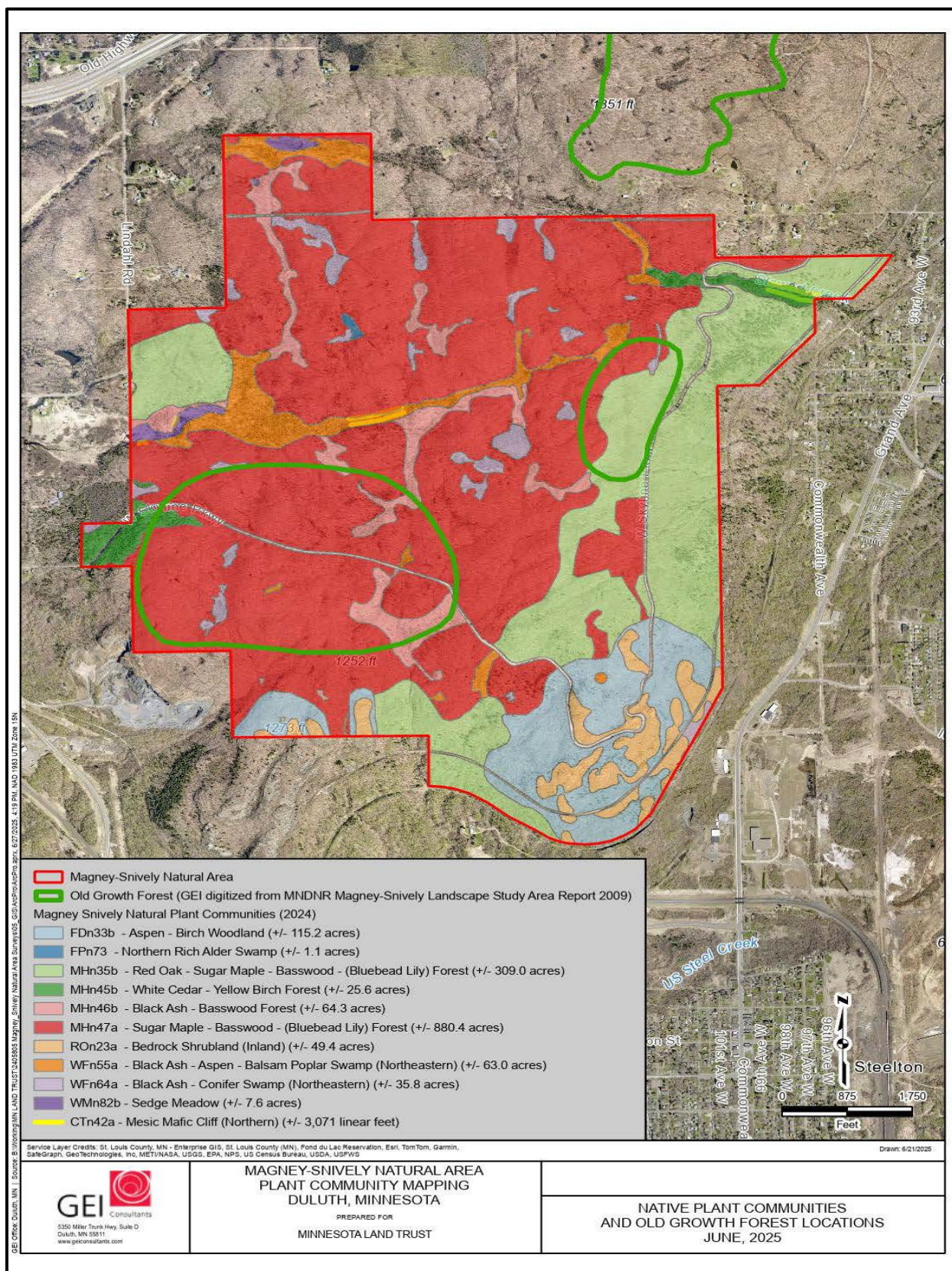


Magney-Snively is also known for its “Old Growth” Mesic Hardwood forests. The NPC type MHn47a – Sugar Maple-Basswood (Bluebead Lily) – makes up almost 900 acres of Magney-Snively and was given a “B” condition, or, good ecological integrity ranking, by the consultants who conducted the NPC mapping study in 2024. The MN DNR definition of “Old Growth” is forests that are 120 years old or older, and that are at least 20 contiguous acres. Two regions of old growth forest of the MHn47a NPC type were identified in Magney-Snively in 1964 and confirmed in 1984 by MN DNR surveys. These areas remain intact; see Figure 2.

The old growth Sugar Maple stands at Magney-Snively cast shade deep enough to prevent other tree species from growing up beneath them. Young sugar maples can grow in the understory, but they are stunted and their growth is “suppressed” until local damage to the canopy brings in enough extra light to permit them to grow taller. This process in old forests is called “advance regeneration” and to many people, it looks like there is almost no regeneration, but it's just a different pattern of regeneration (Schimpf, 2026).

Old growth forests serve an ecologically important role in Minnesota's forested landscapes. They provide unique ecosystem services, habitat for many special species, and serve as genetic reservoirs for future old growth forests (MN DNR, 2026).

Figure 2: Native Plant Communities and Documented Old Growth. GEI Consultants, Inc., 2025



Species of greatest conservation need

The consultant who conducted the NPC survey of Magney-Snively also took the opportunity to look for populations of species of greatest conservation need, spring ephemerals and vernal pools while conducting the NPC survey.

Eastern Hemlock, Narrow Triangular Moonwort and Soapberry are species of special concern that have been documented near Magney-Snively. The only species found during the 2024/2025 survey was Soapberry, of which fifteen “Element Occurrence Records” were located, mostly near exposed bedrock.

Several mature Eastern Hemlock (*Tsuga canadensis*) trees are growing along the eastern boundary of the Natural Area, but not within. Eastern Hemlocks are appreciated for their graceful, drooping branches, long lifespans, and rare, exceptional shade tolerance. It may take 250 to 300 years for this species to reach maturity and it can live for 800 years or more. Endangered in Minnesota, there are fewer than 50 mature, native trees remaining in the wild (Smith, 2018). Historic logging, deer browse and a tendency towards poor natural reproduction have reduced a population that is already quite sparse, as Duluth is at the western edge of its range. In an effort to ensure that Eastern Hemlock remains a part of Minnesota’s northern forests, forestry professionals and citizens are trying to sustain the population with strategic propagation and planting.

Several occurrences of Carolina spring beauty (*Claytonia caroliniana*) and Moschatel (*Adoxa moschatellina*), shown below, were found in the Natural Area in the spring of 2025. These spring ephemerals were noted in the original nomination document and were previously listed as species of special concern, but that status has since been removed. Spring beauty and Moschatel are still very rare within the City of Duluth and worth tracking as indicators of plant community health. Expansive populations of spring beauty were found in the richest forested NPC type (MHn47a). It was also occasionally found along vernal pools and wetlands. Moschatel were found only under old growth trees and in exposed rock crevices.



Moschatel. Image courtesy of GEI Consultants, Inc.

Natural Water Features

Magney-Snively contains several important natural water features, including two designated trout streams and numerous vernal pools. These hydrologic features enhance habitat quality for species of conservation significance by increasing prey availability and maintaining moist, structurally diverse forest conditions. Water features were not specifically identified as

scientific criteria in the original nomination document, though they were acknowledged for their role in supporting local wildlife. Given their ecological significance however, these features warrant focused management and protection, independent of broader ecosystem considerations. Accordingly, this updated plan includes dedicated sections and tailored management recommendations for each of these key water resources.

Streams

As part of the development of this updated Management Plan, the South St. Louis Soil and Water Conservation District conducted an assessment of the two designated trout streams running through Magney-Snively – Stewart Creek and Sargent Creek. This work was completed in 2024 and 2025 and the final report, *Magney-Snively Natural Area: An Assessment of Stream Health*, can be found in Appendix C.

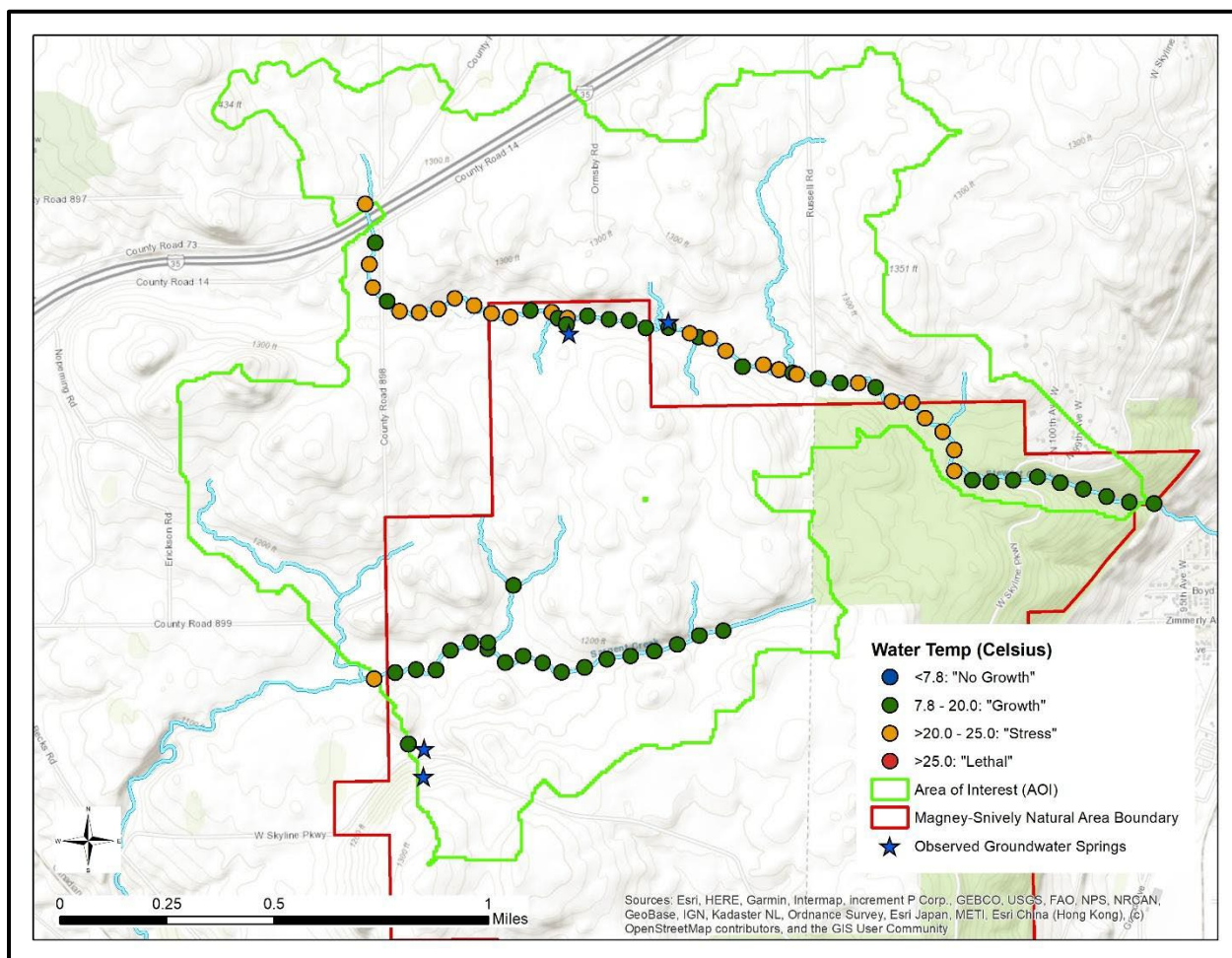
The headwaters of Sargent Creek are located in Magney-Snively, and it empties into the St. Louis River at Boy Scout Landing. Stewart Creek begins north of Magney-Snively in Midway Township and empties into the St. Louis River at Munger Landing. Both streams are of very high quality due to the exceptional forests and wetlands surrounding them. Both streams are also well-connected to their floodplains and are in dynamic equilibrium – that is, they are functioning as they should naturally, not aggrading or eroding.

Brook Trout, native to Minnesota, are naturally reproducing in both Sargent and Stewart Creeks. Brook Trout prefer water temperature in the range of 7.8 to 20 degrees C. If some parts of the stream heat up due to lack of shade or other factors, trout will move up or downstream to find colder pockets called thermal refuges.

The stream assessment conducted for Magney-Snively found that Sargent Creek had reliably cold water, likely due to several springs that are contributing very cold water to the creek as groundwater on the west side of the Natural Area. These springs also contribute significant baseflow to the stream during drought when it is most needed.

Stewart Creek had much more variability in temperature. Monitoring showed that a couple of reaches within the Natural Area exhibited temperatures within the Brook Trout “stress” range. There were also a couple of reaches, the deep bedrock gorge downstream of where Stewart crosses under Skyline Parkway for example, where temperatures are suitable for trout year-round. See Figure 3 below for temperature profiles for both creeks relating to preferred water temperatures for supporting Brook Trout life cycles.

Figure 3: Temperature Monitoring Results for Sargent and Stewart Creeks. Beaster, 2025.



Vernal Pools

Vernal pools are small, seasonally flooded wetlands. Not all melt pools are vernal pools; vernal pools have standing water for at least 3-4 months, long enough for amphibians and other dependent wildlife to complete their life cycles. During the spring of 2025, 198 vernal pools less than one acre were mapped in Magney-Snively as part of the Native Plant Community Mapping process. Vernal pools provide groundwater recharge for the creeks; increased insect availability, moist microclimates, and greater structural heterogeneity for birds and other wildlife. Due to their ephemeral nature, the locations of these critical natural features are not always visible, so it will be important to reference the map if any activities are proposed in the Natural Area, such as trail re-routes.



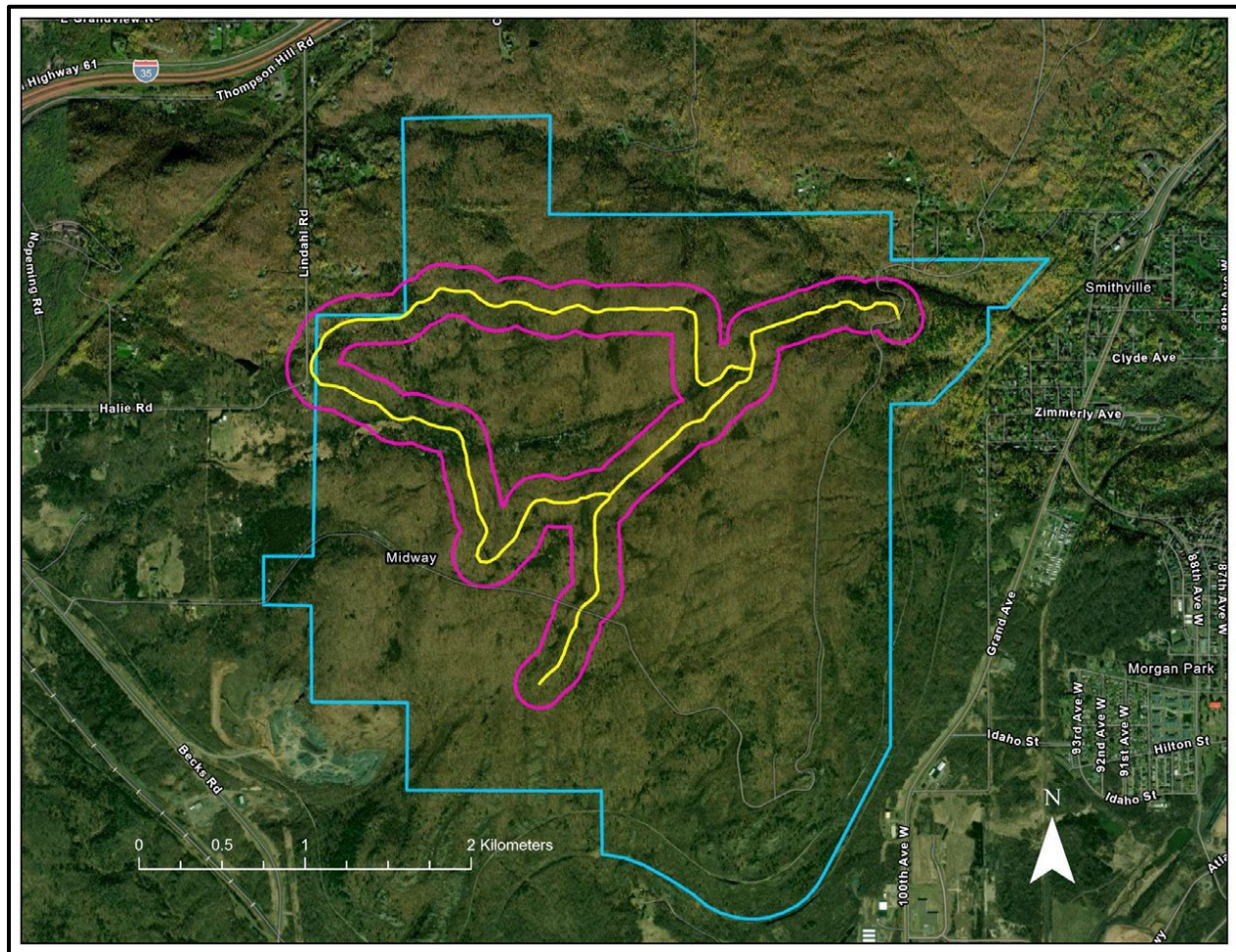
Vernal Pool. Image courtesy of GEI Consultants, Inc.

Blue-spotted salamanders, spring peepers, chorus frogs, gray treefrogs and wood frogs use the temporary open water habitat provided by vernal pools. Aquatic insects that require fish-free wetlands to survive also use them. The bird surveys conducted for this plan also found that, during the breeding season, species richness was greater in areas with pools and streams, underscoring the importance of hydrologic features for bird populations using Magney-Snively (Grinde et. al., 2025).

Bird Congregation Area

As part of the development of this updated Management Plan, bird surveys – migration and breeding based surveys – were conducted by the Natural Resources Research Institute in 2024 and 2025. Figure 4 shows the survey area. See Appendix D for the final report, *Magney–Snively Natural Area: Management and Avian Monitoring Report*, and for more information about how the survey was conducted.

Figure 4: Survey Detection Area within which Bird Observations were Analyzed for the Avian Monitoring Report. Grinde, et. al., 2025.



Magney-Snively's large, contiguous forests provide habitat, food and resting areas for myriad bird species. Forest bird populations across northeastern Minnesota continue to be threatened by habitat loss and degradation. Consequently, Magney-Snively's high quality interior forest conditions are increasingly valuable as these areas become more and more uncommon across the broader landscape.

Like plants and fish, birds can provide us with valuable information regarding forest health, as they respond to changes in vegetation structure, food availability, and landscape connectivity across spatial and temporal scales (Grinde et al, 2025).

The most common bird species detected in Magney-Snively were Least Flycatcher (*Empidonax minimus*), Ovenbird (*Seiurus aurocapilla*), and Red-eyed Vireo (*Vireo olivaceus*), all typically found in mature, deciduous forests. Despite being common throughout Minnesota, Least Flycatchers, shown right, migrate to central America in winter and return to Minnesota in

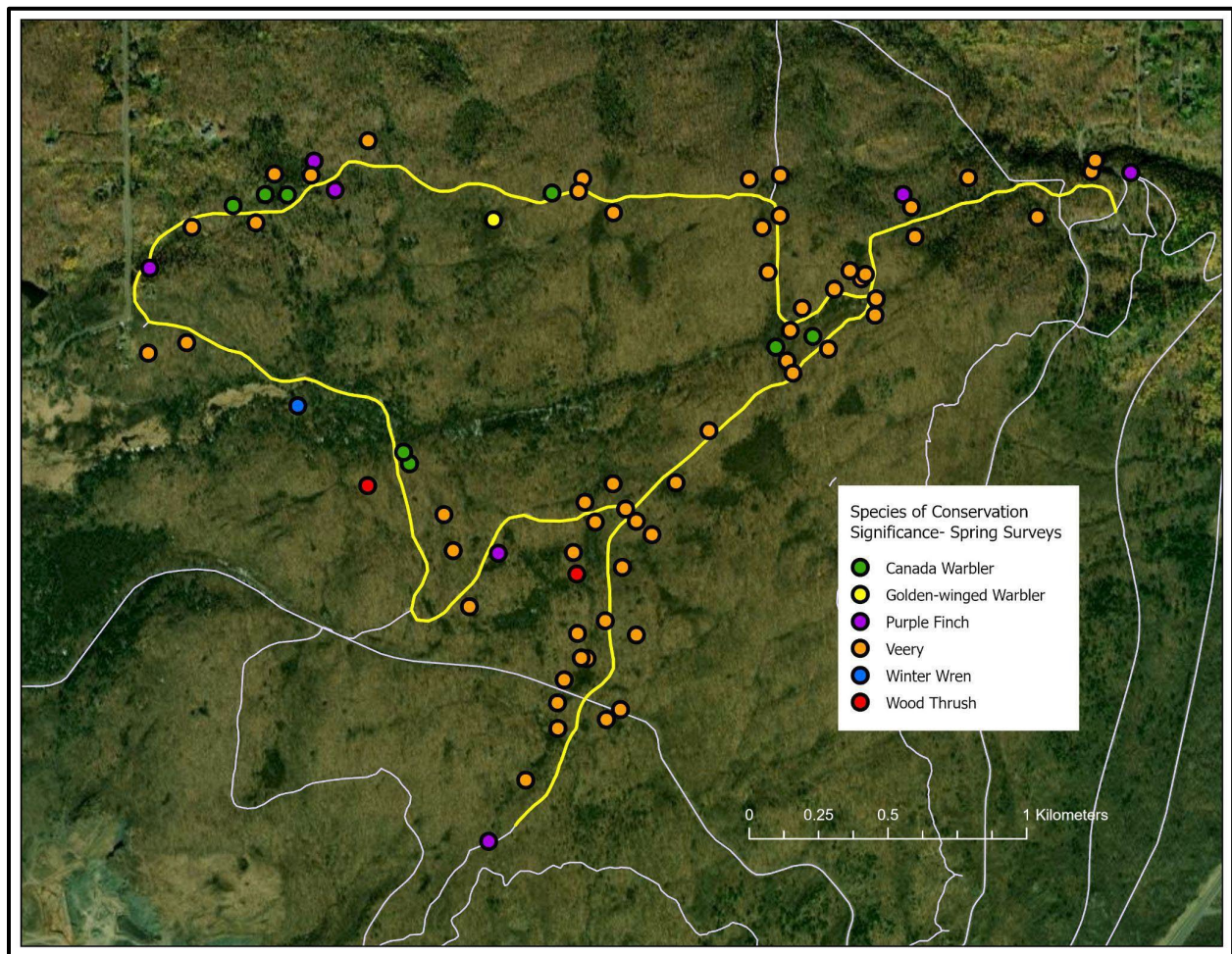
summer to breed. Although not currently threatened, this species is seeing large population declines, likely due to habitat loss, emphasizing the importance of maintaining high quality habitat such as Magney-Snively.

By maintaining large forest interiors, protecting native biodiversity, and sustaining structurally complex forests with intact hydrologic features, the Magney–Snively Designated Natural Area functions as a regional stronghold for breeding and migrating birds (Grinde et. al., 2025).

Species of conservation significance

Several species of conservation significance were documented in Magney-Snively indicating high-quality forest condition and habitat quality. Canada Warbler, and Golden-winged Warbler were detected during both the migration (spring) and breeding (summer) seasons. Focal species for the Upper Mississippi River and Great Lakes Region Joint Venture, these species are of concern due to declining populations. Wood Thrush and Winter Wren, both listed as Species of Greatest Conservation Need in Minnesota and both dependent upon structurally complex (i.e. healthy) forests, were also documented, though at very low densities. See Appendix D for the full list of bird species documented in Magney-Snively during the 2024/2025 breeding seasons.

Figure 5: Species of Conservation Significance Detected within 100 m of Line Transects During Spring Migration Surveys in 2024 and 2025. Grinde, et al, 2025.



Other Wildlife

Mammals are much more difficult (and expensive) to monitor than birds, therefore, a study of the mammals found in Magney-Snively was not included in the scope of this Management Plan Update. However, the high habitat quality and connectivity found in Magney-Snively will naturally support myriad mammal species including bobcat (*Lynx rufus*), black bear (*Ursus americanus*), porcupine (*Erethizon dorsatum*), fischer (*Pekania pennanti*), coyote (*Canis latrans*) and red fox (*Vulpes vulpes*), all of which have been documented in Duluth's forested areas.

HUMAN USES

Indigenous Uses

Magney-Snively is sacred to the Ojibwe and Dakota Tribal nations. As part of the larger, Spirit Mountain landscape, it has even greater spiritual and cultural significance. Bardon's Peak

(Kitchi-Manitou or Manitou-Ah-Ge-Bik in Ojibwe) is located along Skyline Parkway within Magney-Snively. It served as an important observation point and gathering place for the Ojibwe people, as they could easily track and observe any approaching rival tribes, such as the Sioux.

Tribal members routinely use Magney-Snively for fasting, foraging and harvesting. Fasting is a sacred, ancient practice of voluntarily abstaining from food and water for spiritual, ceremonial, and purification purposes and usually takes a couple of days. Tribal members will stay overnight in Magney-Snively to fast and it is important to respect this practice. Foraging is typically done for Fiddlehead ferns, or Ramps (wild leeks), which can be cooked. Some Tribal members also harvest the bark of Yellow Birch for various purposes. Other culturally important species include paper birch, white cedar, sugar maple (sugar bush) and blueberries (Fond du Lac Resource Management Division, 2019).



Fiddlehead fern. Author photo.

All indigenous cultural practices are allowed in Magney-Snively under the 1854 Treaty of La Pointe, which allows Tribal members to retain rights to hunt, fish, and gather for subsistence within the ceded territory of northeastern Minnesota.

Foraging

The City of Duluth does not currently have an ordinance or official guidance regarding foraging on City land, though it may develop one in the future. In general, the City expects foragers to use ethical foraging practices, for example, the “rule of thirds” - collecting no more than one-third of the available bounty, and never from endangered populations.

Trails

Many types of trails are located in Magney-Snively and are well-used throughout the year. The scope of work for this plan update did not include formal trail counts, but if such data could be acquired in the future, it would help gauge any recreational impacts to the Natural Area.

Trail types and the organizations that use and help manage them are listed below:

- Superior Hiking Trail – maintained by the Superior Hiking Trail Association
- Snowmobile Trails – maintained by the Hermantown Night Riders Snowmobile Club
- Cross-Country Ski Trails – maintained by the City with support from Duluth Cross Country Ski Club (DXC). Some people also hike on the ski trails during the summer.

- Mountain Bike Trails - Single track, dirt, mountain bike trails are not allowed in Magney-Snively due to the habitat fragmentation that additional trails would bring to this special area. The Duluth Traverse Mini Master Plan recommends not routing any additional trails within the Magney Snively Natural Area. Trail users are to share the DWP Trail through Magney-Snively in order to minimize any additional impacts to this high quality area (City of Duluth, 2017). Bikes are allowed on the DWP Trail, on Skyline, and on the nearby State-owned Munger Trail. See Figure 6 for the Magney-Snively Trail Map.

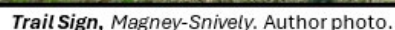
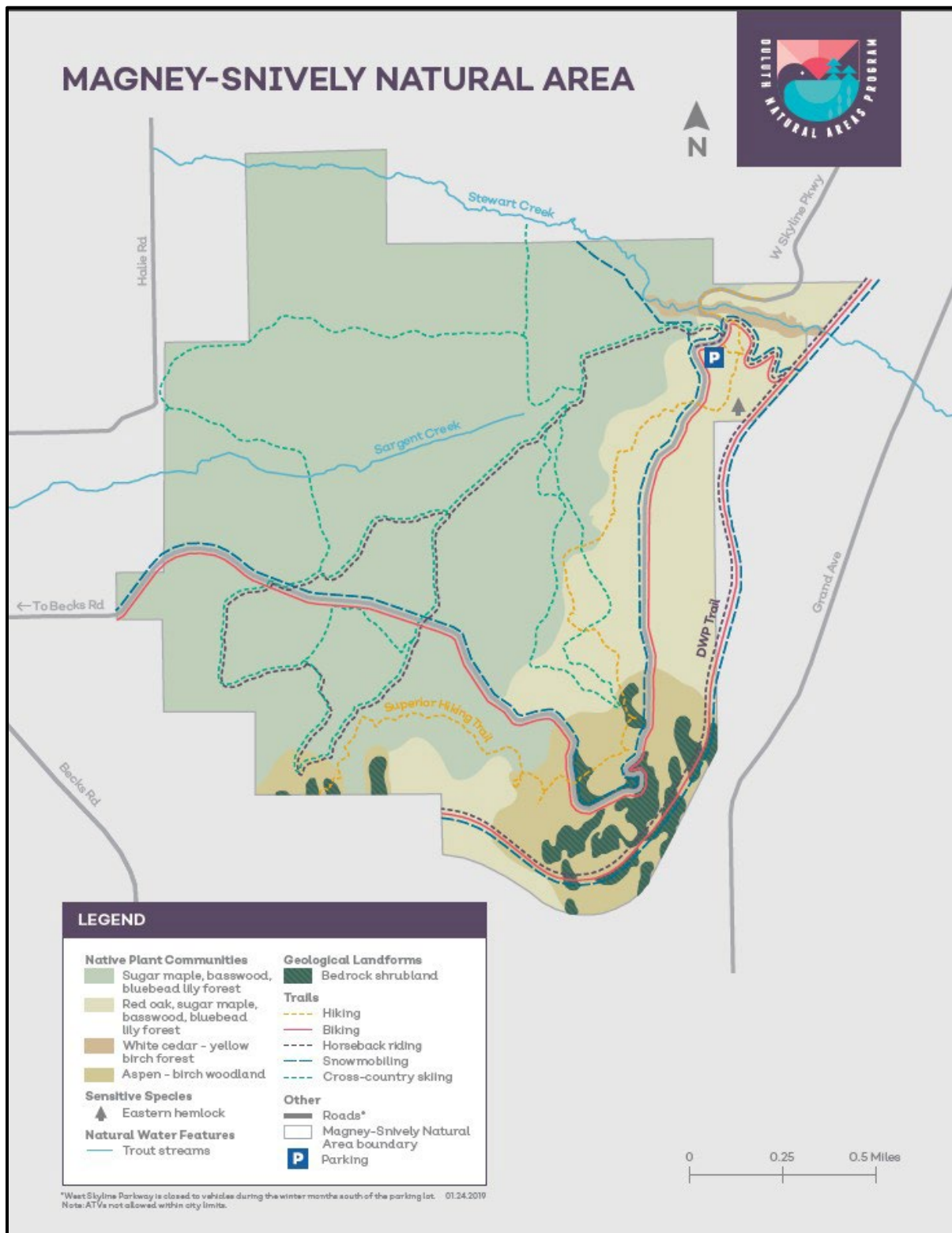


Figure 6: Trail Map, Magney-Snively Designated Natural Area. City of Duluth, 2020.



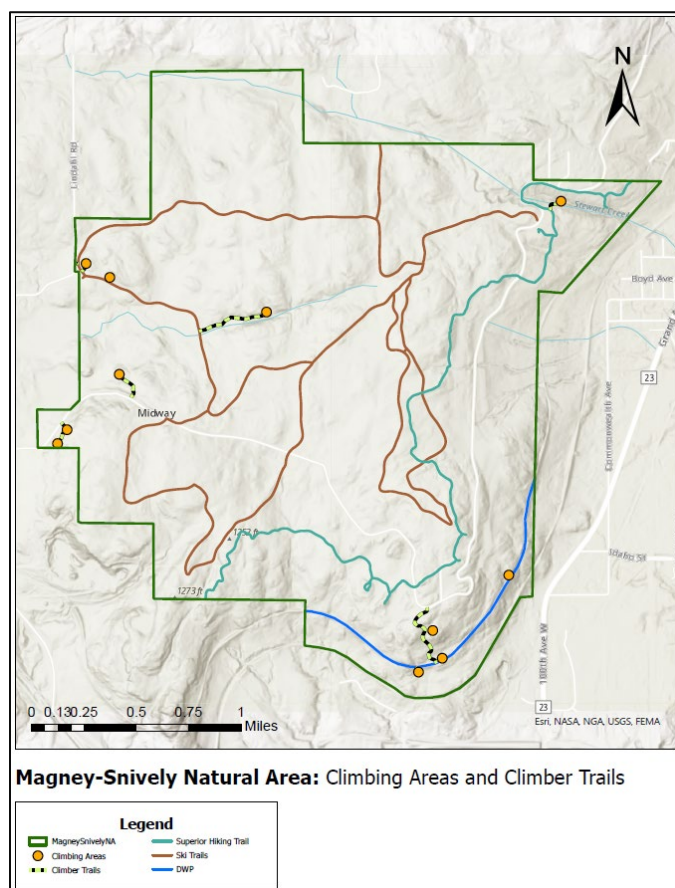
Roads

Skyline Parkway is owned by the City of Duluth and is a federal Scenic Byway. It runs the length of the City generally its ridgeline with approximately 3.5 miles contained within Magney-Snively where it is a gravel road allowing 2-way traffic. It is closed from October through March during which time it is used as a snowmobile and horse trail.

Bouldering

Rock climbing or “Bouldering” is popular in Magney-Snively due to the unique geology. Bouldering is a ropeless form of climbing, in which climbers rely on strategically placed portable crash pads to cushion their fall. Climbing crews can consist of anywhere from one to ten or more climbers. Magney-Snively offers a unique combination of magnificent rock formations, quality climbing routes, and accessibility of which many Midwestern bouldering enthusiasts would be envious. Like the snowmobile club and equestrian club, the Duluth Climbers’ Coalition cuts brush along trails to keep them from becoming overgrown. Figure 7 shows areas that the Duluth Climbers Coalition has identified as appropriate climbing paths and locations that will not negatively impacts the area’s natural features.

Figure 7: Climbing Areas and Climbing Trails. Haynes, 2026



LAND OWNERSHIP

Magney-Snively consists of approximately 133 land parcels equaling approximately 1,614 acres. Approximately 66 of these parcels are tax forfeit parcels currently owned by St. Louis County but managed de facto as part of the Natural Area by the City. Eventually, the City expects to acquire these parcels through a free conveyance process with the County. Adjacent land uses include Spirit Mountain Recreational Area to the north; residential neighborhoods and the St. Louis River Estuary to the east, industrial uses to the southwest and Mission Creek to the west.

Threats

The primary threats to the ecological integrity of the special features for which Magney-Snively was nominated to the DNAP are described in this section.

LACK OF FUNDING

The City of Duluth has limited funding and staff capacity to manage its natural resources. With only one natural resources coordinator and a City forester who is almost exclusively focused on maintaining street trees, managing thousands of acres of forests within City limits is a challenge. Fortunately, the City has many dedicated partners who help us manage our forests, wetlands and streams. Any natural resource work, including tree planting, prescribed burns, stream restoration work, invasive species removal and habitat protection work is almost exclusively grant funded or performed by volunteers. The Natural Resource Management Program Plan, completed in 2022, estimates that funding is at 1/10 of what is needed, just to achieve a level of natural resource management that would keep the quality of our natural resources at status quo. This lack of fiscal resources and staff capacity is a challenge that the City faces in ensuring that Magney-Snively maintains its outstanding biodiversity status.

TERRESTRIAL INVASIVE SPECIES

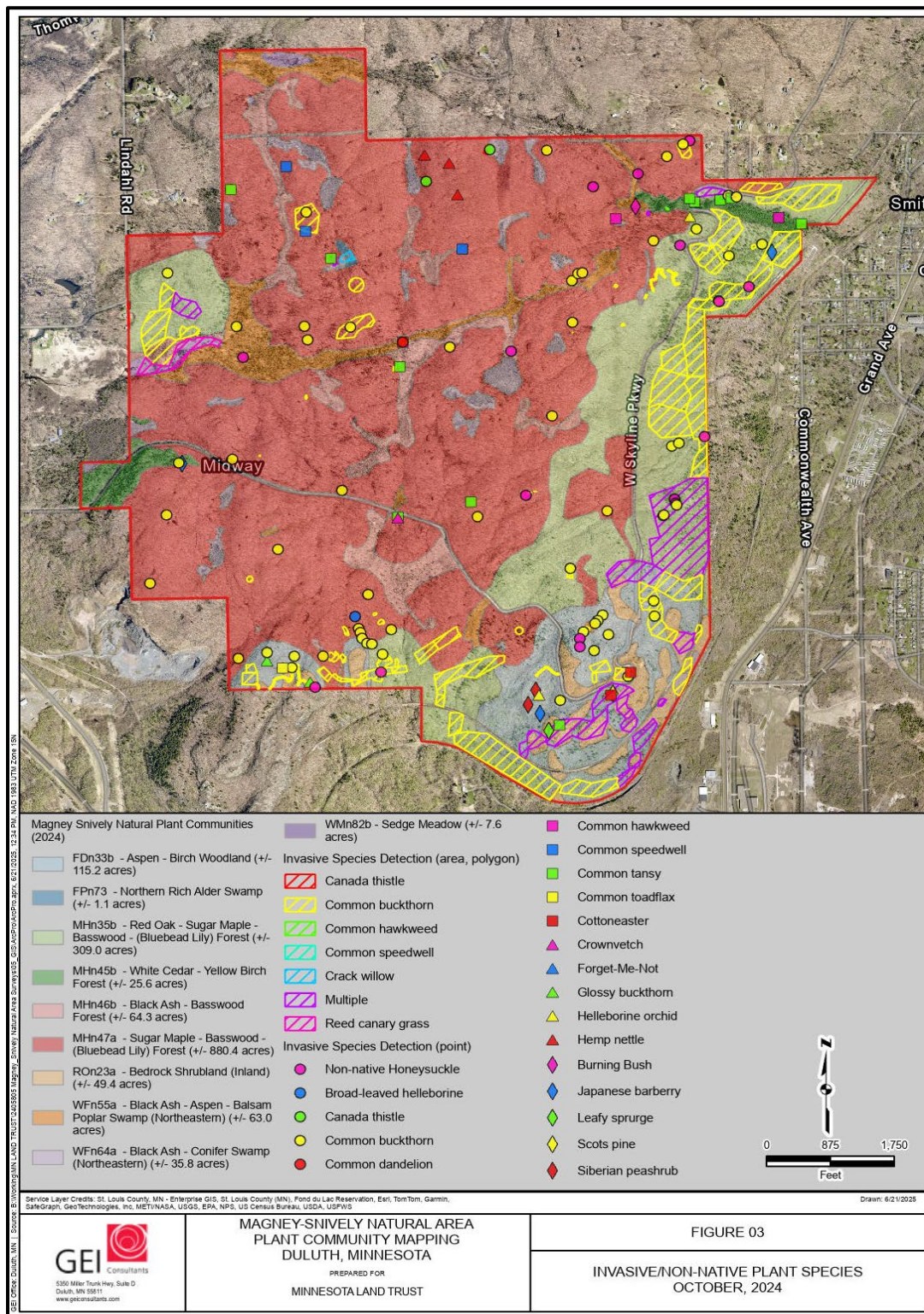
Part of the Scope of the Native Plant Community Mapping and Plant Survey completed in 2024 was to survey invasive species in the Natural Area. The consultants focused along Skyline Parkway and trails as they are well-known conduits for invasives. They also surveyed locations where invasives have been reported in the past. The survey included all plant species identified on the Minnesota Department of Agriculture's noxious weed list and MNDNR's invasive species list. Compared to the Hartley Designated Natural Area, or even the St. Louis River DNAP, Magney-Snively is relatively free of invasives, which contributes to its status as an Outstanding Site of Biodiversity Significance with the Minnesota Biological Survey.

The 2024 survey found that buckthorn, honeysuckle and hawkweed were the most prominent invasives and that they were mostly clustered around rocky outcrops and along Skyline Parkway and trails. The species of most concern is buckthorn as it has taken over many of the City's forests already. Fortunately, the relatively opaque shade from the sugar maple canopy may make it more difficult for common buckthorn to grow beyond the seedling stage in Magney-Snively's old growth. It appears that buckthorn seedlings can establish well in the forest ground layer, but then due to lack of light, their leaves cannot move up into air with less carbon dioxide, essentially arresting their growth (Schimpf, 2025.)

Other invasives were found during the survey but not at scales of great concern to management. They were rarely found beyond the immediate vicinity of trails or other disturbed

areas and were not found in great abundance. See Appendix B and Figure 7 for more information.

Figure 8: Invasive species types and documented locations. GEI Consultants, Inc., 2025.



HUMAN IMPACTS

City residents use the Natural Area for many activities, including hiking, cross-county skiing, horseback riding, birdwatching and foraging. Compared to the other DNAPs, Magney-Snively has the least pressure from human uses. The trail system and Skyline Parkway are how impacts from humans would most likely occur in Magney-Snively. Such impacts include bringing in invasive species, illegal dumping, and illegal motorized vehicle use. Snowmobiles are the only motorized vehicles allowed in the Natural Area; ATVs and the like are only allowed with permission from the City and only for hauling materials or for trail maintenance.

Unofficial or “social” trails and footpaths have been created in Magney-Snively by rock climbers, hikers and other pedestrians. These low-impact trails, though not officially allowed, do not cause severe harm to the Natural Area. More serious issues are caused by trails formed by mountain bikers, motorbikes and ATVs. Many of these trails are wider, deeper and are prone to erosion, which damages the edaphic layer of the forest floor.

Due to the remoteness of the area, and limited staff, it is difficult to enforce rules regarding illegal trail construction. Biking on the DWP or the Munger trail is welcome, however, the creation of natural surface, single track “mountain bike” trails are prohibited within the Natural Area.

Since the trail system is considered to be complete within the Natural Area, the focus of impact reduction must be on proper trail maintenance, prevention of unauthorized trail segments, and education of users regarding appropriate trail use and Best Management Practices (BMPs) for invasive species control. These ideas will be discussed in depth in the “Implementation” section of this Plan.

LACK OF REGENERATION

Lack of regeneration in Magney-Snively is partly due to heavy deer browse and partly due to the natural progression of old forests. Quite undiscerning, deer will eat almost any small seedling if hungry enough. As such, it is almost pointless to plant young white pine and white cedar if deer are not part of the planting plan. In 2007, the City of Duluth and the Arrowhead Bowhunters’ Alliance (ABA) worked together to create a City-wide bowhunt in the hopes of reducing the deer herd within City limits. The hunt divides the City up into zones, and a certain number of hunters are assigned to hunt in each zone. Several of these zones cover Magney-Snively, however the closing of Skyline Parkway starting October 1st makes it difficult to reach hunting stands in this area. Though there are typically a number of hunting spots open in Magney-Snively for the Bowhunt, the ABA rarely fills them.

Increasing the structural diversity of forests in Magney-Snively may be helpful to ensuring that the high-quality habitat and ecosystem services this area provides remain intact and functioning. Volunteers and other entities can help by planting trees with deer protection (cages and tubes. The City is planning on finalizing a City-Wide Forest Management Plan in 2026, which will help support more organized and strategic planting efforts. See Table 3 for specific tree planting goals in Magney-Snively.

DISEASE AND INSECTS

Our forests are always under threat of diseases and pests - some have been present for centuries, while some, like the Emerald Ash Borer (EAB), are just beginning to afflict our northern Minnesota forests. Approximately 100 acres of Magney-Snively is classified as “Wet Forest” - NPCs where Ash is a dominant species. The Minnesota Land Trust and the City have been underplanting these areas with replacement species since 2023 with the goal of preserving a diverse, wet forest ecosystem even after the Ash die off from EAB. The overall goal is to keep forested wetlands forested, as well as to preserve the hydrological balance. Evidence of other diseases and pests impacting forests in Magney-Snively include Nectaria and Eutypella cankers affecting Sugar Maples; Nectria canker and Wood decay fungi afflicting Yellow Birch; and Bronze birch borer (Minnesota County Biological Survey, 2009).

Strategies

Strategies for managing native plant communities, special concern species, natural water features, and bird habitat within Magney-Snively are described in this section. The strategies for protecting the outstanding ecological values of Magney-Snively in the original Management Plan were vague and somewhat custodial. That is to say, they were not strategically focused on maintaining certain habitats and ecosystems and were quite reactionary. Trail maintenance, litter removal and responding to natural disasters were three such strategies. Refer to the original Management Plan for more detail (City of Duluth, 2003). This updated plan is intended to be more thoughtful, more specific, and more targeted in its recommendations for managing this special area.

NATIVE PLANT COMMUNITIES

Plant communities within Magney-Snively will be managed to maintain or improve the condition rank of each NPC, while recognizing natural development through growth stages. Management actions should be aligned with an understanding of the timing, extent, severity, and frequency of the natural dynamics of each NPC to the extent practicable. The following descriptions of each NPC and recommended management actions are taken directly from the Native Plant Community Mapping and Plant Survey completed in 2025 (see Appendix B).

Mesic Hardwood Forest: MHn47a Sugar Maple – Basswood - (Bluebead Lily) – Forest; MHn35b Red Oak - Sugar Maple – Basswood – (Bluebead Lily) – Forest; MHn46b Black Ash – Basswood Forest; MHn45b White Cedar – Yellow Birch Forest

A total of **880.4 acres** of **MHn47a** were mapped within Magney-Snively. The majority of Magney-Snively consists of this NPC with rich, well-drained soils and scattered scoured bedrock terrain. Magney-Snively is a more southern type (of northern hardwood forest) that has four species common in the canopy: sugar maple, yellow birch, basswood, and red oak. The subcanopy also includes ironwood, a more southern species. Duluth is at the northern end of the range for the Northern Maple-Basswood Forest community type (Reschke, 1999). Mature canopy species present place much of the MHn47a plant community within the 75-195 years old age class. White pine continues to remain primarily absent from the community due to the history of selective timber harvests before 1900, depriving MHn47a of white pine seed trees.

In the past, catastrophic disturbances were very rare in MHn47. An analysis of Public Land Survey records indicates that the rotations of catastrophic fires and windthrow both exceed 1,000 years. Events that result in partial loss of trees, such as light surface fires and patchy windthrow, were estimated to have a rotation of about 330 years. Based on the historic composition and age structure of these forests, MHn47 had three growth stages and a period of

transition. Years 0 – 55: Young forests recovering from fire or wind, colonized immediately by sugar maple mixed with some earlier successional species including paper birch, basswood, and quaking aspen. Years 55 – 75: A transition period marked by the gradual decline of paper birch, aspen, and basswood. Yellow birch, white pine, and white spruce seedlings become established during this period. Years: 75 – 195: Mature forests composed of sugar maple, yellow birch, paper birch, and basswood, with modest amounts of white pine and white spruce. Greater than 195 years: Very old forests dominated by sugar maple and white pine mixed with some yellow birch (Minnesota Department of Natural Resources, n.d).

A total of **309.0 acres** of **MHn35b** Red Oak – Sugar Maple – Basswood – (Bluebead Lily) Forest were mapped within the Natural Area, making it the second largest plant community present. Characteristic canopy species observed included sugar maple, red oak, and basswood. Indicator species of MHn35b observed included bush honeysuckle, bracken fern, and wild ginger. Mature white pine, white spruce, and cedar were scattered along the eastern boundary of these units (See Figure 2).

A total of **64.3 acres** of **MHn46b** Black Ash – Basswood Forest were mapped and were typically found in narrow bands connecting forested wetlands, primarily ash forests. The soil was moist but did not contain standing water and was fully or nearly fully vegetated. Most of these forests had large basswood, black ash, and yellow birch in the canopy, followed by aspen, young black ash, ironwood and sugar maple in the sub-canopy. Herbaceous groundcover species present included wild sarsaparilla, large leaved aster, Pennsylvania sedge, wood nettle, zigzag goldenrod, and naked miterwort. The age class of these forests appears to be greater than 95 years based on the presence of very old super canopy species and a new regime of younger species such as aspen and black ash, suggesting moderate disturbance.

A total of **25.6 acres** of **MHn45b** White Cedar – Yellow Birch Forest were mapped within the Natural Area. White cedar and yellow birch mesic forests are found along Stewart Creek, and on the far western boundary of Magney-Snively, near Sargent Creek.

Management: These systems generally require low maintenance once mature. Patchy windthrow is the most common disturbance and still occurs in these areas today. Allowing this type of disturbance to proceed naturally will be the main management action required in these areas. Aspen dominates in young stands but are replaced by later successional species such as white pine, sugar maple, basswood, white spruce and yellow birch in older stands. With few White pine seed trees present, intentional planting of this species is advised. In densely overgrown areas, selective clearing of aspen accompanied by planting of late successional species could speed progression towards mature mesic hardwood forests. Additional management concerns include invasive species, erosion and trails, and forest pests and diseases. Ongoing monitoring and control of invasive species, such as buckthorn and non-native

honeysuckles will be required. The Ash present in these units will eventually die, so underplanting Ash replacement species where needed is advised. When repairing and maintaining trails, care needs to be taken to avoid working these areas when soils are saturated, generally in the spring.

Fire Dependent Forest/Woodland: FDn33b Aspen – Birch Woodland

A total of **105.2 acres** of **FDn33b** Aspen – Birch Woodland were mapped within Magney-Snively. It is the primary forest type surrounding bedrock shrubland communities (ROn23a). Indicator canopy species that characterize this community include paper birch, quaking aspen, and occasional red oak. These canopy species were often stunted due to limited soils and frequent winds. Indicator shrub layer species observed included beaked hazel and red oak. Herbaceous groundcover species included round-leaved pyrola, shinleaf, bracken fern, and bush honeysuckle.

Management: This NPC is located on the southeast section of the Natural Area and has been negatively impacted due to the construction of West Skyline Parkway, DWP railroad/trail, and heavy foot traffic. Prescribed fire could be used to emulate the natural disturbance that these communities need every 50-100 years. However, there has been an overall decline in the old growth stage of these forests across Minnesota so allowing them to mature is also an acceptable management technique. Ongoing monitoring and control of invasive shrubs, such as buckthorn and non-native honeysuckles should be undertaken, if capacity and funding allow.

Rock Outcrop: ROn23a Bedrock Shrubland (Inland)

A total of **49.4 acres** of **ROn23a** Bedrock Shrubland (Inland) were mapped. This community is characterized by exposed bedrock with low growing shrubs within the bedrock cracks and shallow soils between bedrock outcrops. Occasional stunted trees can be found in small pockets, representing a transition between ROn23a and FDn33b. Indicator shrub species of ROn23a observed during this survey included prairie willow, staghorn sumac, snowberry, blueberry, and bush honeysuckle. Herbaceous species observed included rock spikemoss, umbel sedge, rusty woodsia, poverty oat grass, and Canada blue grass.

Management: Management needs are few. Occasional prescribed burning could assist in keeping bedrock areas open. Lichen and bryophytes are extremely sensitive to trampling and disturbance. These communities can be better protected through educational signage, especially near climbing and hiking routes.

Wet Forests: WFn55a Black Ash – Aspen – Balsam Poplar Swamp (Northeastern); WFn64a Black Ash – Conifer Swamp (Northeastern)

A total of **63.0 acres** of **WFn55a** Black Ash – Aspen – Balsam Poplar Swamp (Northeastern) were mapped within the Natural Area and were typically found along the riparian corridors of Sargent and Stewart Creeks. In this community, black ash and yellow birch were found to be the two dominant canopy species with lesser amounts of white spruce and paper birch. Typical indicator shrub species included young black ash, beaked hazel, mountain maple, and swamp red currant. Herbaceous species observed included lady fern, dwarf raspberry, spotted touch me not, and alpine enchanters' nightshade. Species found that further indicated WFn55a included rough bedstraw, flat-topped aster, and tall meadow-rue. The age class of this system is somewhere around 75 years, but it is missing some key indicators such as a decrease in yellow birch and the presence of cedar in the canopy. No cedar seedlings or saplings are present, likely a combination of a lack of seed trees and a deer herd that highly favors cedar seedlings.

A total of **35.8 acres** of **WFn64a** Black Ash – Conifer Swamp (Northeastern) were mapped in relatively small, scattered depressions. Black ash, yellow birch, white spruce, and sugar maple were the primary species growing on raised hummocks that created slightly drier conditions out of the mucky, peaty soils or standing water. The subcanopy consisted of thick speckled alder, mountain maple, winterberry, and red maple. The understory had bristle stalked sedge, fowl manna grass, cinnamon fern, gold thread and beech fern. These WFn64a communities are relatively young, 0-75 years old, having recently transitioned from FPN73a.

Management: The objective for these communities is to manage for emerald ash borer impacts by underplanting the ash communities when possible. Natural windfall events will also create opportunities for natural regeneration. Planting of red maple, northern white cedar, basswood, and yellow birch in gaps created by windfalls or in areas of mortality caused by emerald ash borer may keep these plant communities intact. Wet soil conditions can be conducive to invasive species, such as reed canary grass, with invasion following natural or manmade clearing and disturbance. Where trails are necessary, raised boardwalks should be used.

Shrub Swamp: [FPN73a Alder Swamp](#)

Wetlands dominated by speckled alder were limited within Magney-Snively; only a small (one acre) site was found in the northwest corner of the Natural Area. Common species of alder thickets found in this plant community include wood fern, swamp gooseberry, dwarf raspberry, swamp aster, and spotted touch me not.

Management: Maintain NPC as is, limit disturbance to discourage invasive species including Phragmites and purple loosestrife.

Wet Meadow: [WMn82b Wet Meadow Bluejoint Subtype](#)

A total of **7.6 acres** of **WMn82b** Wet Meadow Bluejoint Subtype were mapped within Magney-Snively. The dominant vegetation is Canada bluejoint with occasional alder pockets beside Sargent Creek in a couple of locations. Fresh meadow species such as flat-topped aster, Joe Pye weed, and St. John's wort were present in low percentages. Fern species such as ostrich fern and sensitive fern were also present in areas of slightly wetter soils. Willow shrubs, primarily slender leaved willow, bebb's willow, and pussy willow were present.

Management: The objective for these communities is to enhance sedge marsh and sedge meadow characteristics. Cattail often comes to dominate these communities in stable conditions, decreasing plant diversity and lowering habitat quality for wildlife. Occasional physical disturbance by mechanical removal of cattail, or water level management will benefit these communities. Where trails are necessary, boardwalks should be used.

CTn42a Mesic Mafic Cliff (Northern)

These cliff features are rather small and primarily associated with narrow, bedrock stream channels. Vascular plants are restricted to crevices, ledges, and moss mats. Common species found in this plant community include lichens, fragile fern, oak fern, beech fern, polypody, Canada yew, white cedar, and yellow birch. The northern wet mafic cliff CTn42a occurrence in Stewart Creek gorge is among the southernmost occurrences of this native plant community in Minnesota (Minnesota County Biological Survey, 2009).

Management: No management is needed. This NPC is considered to be "threatened." It was identified along Stewart Creek with a few, small pockets along Sargent Creek. These communities simply need to be left alone.

SPECIES OF GREATEST CONSERVATION NEED

To protect the three sensitive plant species present in Magney-Snively, Soapberry, Moschatel and Spring Beauty, locations of the occurrences will not be made available to the public. The City will consider the locations of these populations when planning future human use or land management actions in Magney-Snively.

Soapberry is the only species of greatest conservation need documented in the Natural Area as part of the NPC Survey. Recommended management for this species is simply to protect it. Making sure that people recognize the plant is also critical to protecting the species. If any prescribed fires are used to manage NPCs in Magney-Snively, such as Rock Outcrop, the soapberry plants should be marked ahead of time.



Soapberry. Image Courtesy of GEI Consultants, Inc..

NATURAL WATER FEATURES

Both Sargent and Stewart Creeks have aquatic life and recreation beneficial use designations of 2A “general cold water habitat.” Minnesota rules state that “the quality of class 2A surface waters shall be such as to permit the propagation and maintenance of a healthy community of cold water aquatic biota, and their habitats. These waters shall be suitable for aquatic recreation of all kinds, including bathing, for which the waters may be usable. This class of surface waters is also protected as a source of drinking water” (Minnesota Rule 7050.0222).

Management of these creeks and the surrounding landscape within Magney-Snively will be with the intent to comply with water quality standards appropriate to the class 2A designation and to support the health of the cold water fishery, specifically for brook trout. There are 16 designated trout streams within the City of Duluth and the City prioritizes protecting and restoring these streams not just because it is required by the State but because it recognizes the importance of being good stewards of these special resources. The presence of a naturally reproducing brook trout population, which both Sargent and Stewart Creek have, indicates high water quality. This high water quality is due mostly in part to the high quality forest through which these creeks run in their upper reaches. Management of the creeks through Magney-Snively should focus mostly on making sure that Magney-Snively is protected and that strategic forest management plans are implemented and financially supported.

Although the City cannot control what occurs on private lands surrounding Magney-Snively, actions that take place on Stewart Creek upstream have impacts on water quality downstream. For example, the 2024 stream assessment found a dam that is causing severe erosion and

channel impacts just upstream of where Stewart Creek enters the Natural Area. Any cooperation that can be achieved with private landowners surrounding the Natural Area will benefit the quality of Stewart Creek. The SWCD or other partners will be better able to achieve this objective than the City, as they have programs under which they are allowed to work with private landowners, including cost-share opportunities.

The 198 mapped vernal pools in Magney-Snively should simply be left alone. The City should consult the vernal pool map if any trail re-routes are needed so that they may be avoided.

BIRD CONGREGATION AREA

Management strategies for maintaining the high quality bird habitat in Magney-Snively should focus on supporting birds' life cycles across seasons. The Management and Avian Monitoring Report (see Appendix D) recommends that land managers focus on the following:

- Maintaining large, contiguous upland forest patches to support forest-interior bird species and minimize edge effects.
- Creating "gaps" to enhance foraging and nesting habitat without substantially increasing fragmentation.
- Increasing compositional diversity, particularly in areas vulnerable to Emerald Ash Borer.
- Planting scattered conifers within hardwood stands in order to provide thermal cover, winter roosting habitat, and early-season shelter for birds.
- Retaining snags, cavity trees, and coarse woody debris to support cavity-nesting birds, and invertebrate communities.
- Controlling invasive plant and animal species to maintain native forest structure and food webs.

Many of the recommended actions relate to maintaining the NPCs and the streams upon which birds depend for food, breeding and rest and are reflected in the List of Prioritized Management Actions (See Table 3.)

Implementation

The original Management Plan for Magney-Snively identified eight actions that could be taken to help ensure that Magney Snively's high quality ecological values were not compromised. These strategies were not so much specific actions as long-term management techniques such as deter littering, post informational signs and fix erosion along trails. Although all of these actions were valid, they did not provide specific, data-based actions and projects to help protect this special area. This revised Management Plan contains an updated set of prioritized restoration and protection projects.

Management of the streams, forests and wetlands in Magney-Snively will follow a set of prioritized actions that were selected by the Advisory Committee based on the identified threats to the Natural Area. About twenty total implementation actions and projects were identified by the Advisory Committee, in the Avian, Stream and NPC reports, and by City staff. In order to focus our collective efforts over the next decade on the most pressing threats and opportunities, the Advisory Committee prioritized thirteen projects to move forward over the next 10 years. The Advisory Committee considered the following when prioritizing the larger project list:

- Project readiness
- Immediacy of a threat
- Local and regional funding priorities
- City/partner capacity

The goal is to achieve or make progress on implementing the actions listed in Table 3 below by 2036, and then re-evaluate the Natural Area's status and management needs. At that point, the Management Plan will be updated again with a new set of priority management actions.

PRIORITIZED MANAGEMENT ACTIONS

Table 3: List of Prioritized Management Actions for the Magney-Snively Natural Area

Action	Estimated Cost	Responsible Parties	Goal with Target Date
1. Underplant lowland Ash forests vulnerable to Emerald Ash Borer.	\$0 - \$70,000	TNC, City, MN Land Trust, volunteer groups	Plant annually as funding and capacity allows.

Action	Estimated Cost	Responsible Parties	Goal with Target Date
2. Plant conifers in close proximity to the three ‘cold springs’ identified in the <i>Assessment of Stream Health</i> report.	\$0 - \$70,000	City, MN Land Trust, The Nature Conservancy	2027 – priority project in Headwaters Partnership’s Lower St. Louis River Vision Document.
3. Replace the failing culvert under the ski trail at the Sargeant Creek tributary.	\$20,000 (secured through current SOGL grant) for materials; City staff to provide labor.	City, MN Land Trust, MN DNR	2026
4. Design and place two types of signs throughout the Natural Area: Interpretive Signs and Warning Signs.	\$15,000	City	2027
5. Decommission unauthorized trails caused by illegal ATV and bike users.	In-Kind, staff time; \$10,000 - \$15,000 for equipment, trees.	City, trail groups, The Nature Conservancy	0.5 miles of unauthorized trails decommissioned by 2027.
6. Acquire the Tax Forfeit parcels located within the Natural Area from St. Louis County.	\$5,000 - \$30,000;	City, St. Louis County	Interior parcels by 2030.
7. Offer City or Partner-led educational events in Magney-Snively to introduce people to the ecology of the Natural Area and increase public awareness of the City’s Designated Natural Area Program.	In-Kind, staff time.	City, trail groups, UMD, Arrowhead Native Plant Explorers	At least 1 event annually.
8. Remove invasive buckthorn as documented in the <i>Native Plant Community Mapping and Plant Survey</i> .	\$0-\$5,000 / year	Volunteers, Trail groups, Duluth Stream Corps, CCMI	Eradicate along Skyline by 2032. Annually as funding and capacity allows.

Action	Estimated Cost	Responsible Parties	Goal with Target Date
9. Monitor for invasive Garlic Mustard , specifically along Skyline Parkway.	In-Kind, staff, volunteer time.	City, Volunteers, Trail groups	Survey annually.
10. Plant desired tree species throughout the Natural Area to support forest regeneration and increase structural complexity.	\$10,000/yr.	City, TNC, MN Land Trust, volunteers	Goal is 10 acres per year or as funding and capacity allows.
11. Create small, spatially dispersed canopy gaps to help increase structural complexity in the forest and support regeneration.	\$0-\$10,000	TNC; MN Land Trust; City, Stream Corps, CCMI, Lake Superior College	1 project by 2028.
12. Continue to support the City Bowhunt , and work with the Arrowhead Bowhunters' Alliance to try to increase the number of hunters in Zone 2A, the Zone that includes Magney-Snively.	In-Kind - City and ABA	City, ABA	At least one additional hunter in 2A in the 2026 hunt.
13. Conduct Trail Counts to acquire baseline recreational use data in the Natural Area.	In-Kind, staff time.	City, Trail groups	2028

1. Underplant lowland Ash forests vulnerable to Emerald Ash Borer.

The Native Plant Community Mapping and Plant Survey (Appendix B) identifies where Ash-dominated forests are located within the Natural Area. These communities will inevitably decline once Emerald Ash Borer invades. In order to ensure that these areas do not turn into brushy swamps, and that a canopy remains into the future, underplanting needs to occur. Though researchers are still trying to determine how to preserve the unique habitat and hydrologic dynamics of lowland ash forests, recommended species include swamp white oak, red maple and potentially silver maple. Bur Oak has also done well in these wetter systems, despite it typically occurring in drier areas in other parts of the state. Whether tree plugs or container grown trees are planted depends on the ease of access, soil type and available funding and labor. As a reference point, container-grown 15"-18" trees would be planted at 200 trees per acre. The City's Natural Resource Coordinator or City Forester should be consulted

regarding any non-City planned planting projects in order to ensure that the right species are being planted.

The goal will be to do at least some underplanting within all of the Ash-dominated Native Plant Communities by 2035. This work will build off of the 2025 under-ash planting work that the Minnesota Land Trust completed with funding from an Outdoor Heritage Fund grant. See Appendix E for a map of plantings done in 2025. If staff capacity allows, plantings should be monitored for survival rates as this information can help inform other Ash replacement efforts.

Cost for this work is estimated at \$0-\$70,000. Cost varies greatly depending on size and number of trees to be planted, ease of access, and who is providing the labor.

2. Plant conifers in close proximity to the three 'cold springs' identified in the Magney -Snively: An Assessment of Stream Health report.

Plant White Pine, White Cedar, Eastern Hemlock, and spruce in proximity to three cold water springs that were identified in the Assessment of Stream Health report. Conifer species hold on to snow longer, slowing down snowmelt rates and allowing for more infiltration. They also increase shading of the forest floor in late winter/early spring, which will help support the hydrology of Stewart and Sargent Creeks. This project is identified by the Headwaters Partnership as a priority project for this area. **The goal will be to plant 10,000 conifer seedlings (200 trees per acre) across fifty acres by 2027.**

Cost for this action is estimated at \$0 to \$70,000. Similar to the under-ash planting, cost depends on a variety of factors including tree size, ease of access and who performs the labor.

3. Replace the failing culvert under the ski trail at the Sargent Creek tributary.

An 18-inch plastic culvert is heaving and impeding fish passage at the tributary entering Sargent Creek from the north (coordinates: 46.69859, -92.25307).

The culvert was discovered during the streams assessment survey. **The goal is to replace the culvert with a bridge or bottomless culvert in 2026.**

Cost is estimated at \$20,000. It is expected that City staff will perform the work while grant funding through the MN Land Trust pays for the infrastructure.

4. Design and place two types of signs throughout the Natural Area: Interpretive Signs and Warning Signs

The goal for interpretative signs will be to install five cement-based signs at significant ecological sites and trail crossings within the Natural Area by 2027. There aren't any signs currently, and such information is critical to teaching the public on how to interact with these

sensitive areas. These signs will provide information about topics such as bird migration, forest ecosystems, stream restoration and indigenous practices.

The goal for warning signs will be to install 10 signs near known locations of unauthorized trails, especially those caused by bikes or ATVs, by 2027. These signs would not be as robust as the interpretive signs; they will be simple post signs referencing City Code and the protected status of the Natural Area.

Cost for this action is estimated at \$15,000 - \$2,000 per interpretive sign (installed) and \$500 for each warning sign.

5. Decommission unauthorized trails caused by illegal ATV and bike users.

Unauthorized trails are a problem throughout the City. The habitat fragmentation, introduction of invasive species, and erosion that can be caused by these unauthorized trails can negatively impact Magney-Snively. Unfortunately, there is little capacity for enforcement, especially in remote areas. The City has identified and mapped more than two miles of unauthorized trails within the Natural Area ranging from fall line mountain bike trails to social shortcuts created by others. **The goal will be to decommission 0.5 mile of unauthorized trail by 2027.** Depending on the severity of the impact, restoration could include regrading the impacted area, which increases cost. Basic restoration will include planting trees along the unauthorized trails to deter future use. This action should happen concurrently with Priority Management Action #4 – signage.

Estimated cost is \$10,000-\$15,000 to pay for construction equipment, labor, and trees to plant in the impacted areas.

New trails are not recommended in Magney-Snively. There are existing trails throughout the Natural Area for skiers, equestrians, snowmobilers and hikers. Some of the trails are used for more than one use. The Natural Resources Commission will review all requests for changes in trail alignments or use, if such changes would appear to impact the natural features for which Magney-Snively is designated as a Natural Area. If proposed trail changes are not expected cause impacts to natural features, the normal City process for Trail-related projects will be followed.

6. Acquire the Tax Forfeit parcels located within the Natural Area from St. Louis County.

There are sixty-six tax forfeit parcels located near the center of the Natural Area. There are also additional parcels between the current east boundary of the Natural Area and the DWP trail. Rare eastern hemlock trees are located within these eastern tax forfeit parcels. St. Louis County owns these parcels currently, but would likely be interested in divesting themselves of the

property and putting them into City ownership. The City acquires tax forfeit parcels from the County regularly for various reasons. Typically, there are state statutes that allow the County to sell tax forfeit parcels under Conditional Use deeds at less than the Estimated Market Value.

The goal will be to acquire the interior tax forfeit parcels by 2030 and the parcels beyond the boundary of the Natural Area by 2035.

Cost for this project is estimated at \$5,000 - \$30,000 depending upon which mechanism is used to acquire the property. Different state statutes allow for free conveyance or conveyance at a per cent of Estimated Market Value.

7. Offer City or Partner-led educational events in Magney-Snively to introduce people to the ecology of the Natural Area and increase public awareness of the City's Designated Natural Area Program.

Provide educational events to introduce the public to the City's DNAP and to help direct them on how to interact with these sensitive areas. Educational topics could include: Best Management Practices for trail use (leave no trace/stay on trails); invasive species identification; native species identification; cultural values of the Natural Area; vernal pool ecology; stream ecology; birds found in Magney-Snively. Several local groups besides the City could help lead these events. **The goal will be to offer at least one event in 2026 as the new Management Plan is released** and then at least one event annually.

The cost of this action will be in-kind time from City staff or partners.

8. Remove invasive buckthorn (*Rhamnus cathartica*) as documented in the Native Plant Community Mapping and Plant Survey Report.

Buckthorn is not as dense in Magney-Snively as it is in other natural areas, however, it was still documented, primarily between Skyline Parkway and Magney-Snively's eastern boundary. See Figure 7. Keeping buckthorn at bay is critical in this highly diverse and high-quality forest, especially in areas where ash stands will be dying off. **The goal will be to remove buckthorn as much as possible within close proximity to Skyline Parkway by 2032, as mapped in Figure 7.** If buckthorn control is only done by pulling or cutting, repeated visits are required due to re-sprouting. Using herbicide is more effective, but sometimes requires a licensed applicator and can also be more expensive. Once the plants along Skyline are eliminated, efforts can be made to move into less accessible areas of the Natural Area.

Cost for this action is estimated at \$0-\$5,000 per year depending on treatment type and who performs the labor.

9. Monitor for invasive Garlic Mustard (*Alliaria petiolata*), specifically along Skyline Parkway.

Garlic Mustard was not documented in Magney-Snively during the Native Plant Community Mapping and Plant Survey, however, it has been documented in western Duluth. Garlic Mustard is one of the few species that could take over old growth forest; it damages soil so as to inhibit revegetation even after it is removed (Schimpf, 2025). Like many invasives, spread is most likely to come along roads and trails. This task could be performed concurrently with Action #8 – Buckthorn removal, as either volunteers or contractors will already be in the vicinity of Skyline Parkway and could check for Garlic Mustard at the same time. **The goal will be to conduct a survey for Garlic Mustard once a year along both sides of Skyline Parkway** and to remove it, if found. The survey should occur during early spring when the plant is easiest to identify. It is one of the first green plants to emerge, with tall flowering stalks that are highly visible.

The cost of this effort is expected to be in-kind only, as the monitoring will be completed by volunteers or City staff.

10. Plant desired tree species throughout the Natural Area to support forest regeneration and increase its structural complexity.

Although Magney-Snively contains high-quality hardwood forest, much of the landscape is relatively uniform in age and species composition. This is because very little natural regeneration is occurring due mostly to heavy deer browse. It also happens naturally as forests age. **The goal for this action will be to plant a minimum of 10 acres per year** at 200 trees per acre of desired tree species which in Magney-Snively include the following: sugar maple, red oak, basswood and white pine, white cedar, and yellow birch.

Tree planting efforts should start with the ash-dominated NPCs (augment 2025 planting by Minnesota Land Trust), then focus on the riparian areas. After that, planting should be focused in areas that are easily accessible - off of Skyline Parkway and trails, then move outward from there into the interior in a planned manner. Similar to Action #1, the City's Natural Resource Coordinator or City Forester should be consulted regarding any non-City planned planting projects in order to ensure that the right species are being planted. City staff and/or the Natural Resource Commission will also provide guidance on prioritizing planting locations.

An estimate of \$10,000 per year is being provided for planning purposes. As with other actions related to tree planting, cost varies greatly depending on tree size (seedlings or container trees), ease of access, and whether the work is performed by paid or unpaid personnel.

The Nature Conservancy will provide the trees, labor and protection at no cost to the City if this action meets their planting priorities and they have the capacity to perform the work. They will also create gaps if a break in the canopy is needed to ensure that seedlings survive. The City, the Minnesota Land Trust and The Nature Conservancy try to meet annually to discuss planting

priorities and plans in the Duluth area in order to coordinate efforts. Volunteers may also be able to plant trees in smaller, easily accessible areas. Groups will often contact the City looking for locations to do service projects. If these low-cost options are unavailable, there are many granting agencies that will fund tree planting as part of a larger forest management plan.

11. Create small, spatially dispersed canopy gaps to help increase structural complexity in the forest and support regeneration.

Emulating natural disturbance, such as cutting gaps in the canopy, can diversify habitat and increase structural complexity without compromising the integrity of forest interiors essential for species that depend on large, contiguous blocks of forest (Grinde et. al., 2025). Small gaps (6–10 meter in diameter) are suitable for encouraging regeneration of shade-tolerant species (e.g., hemlock-hardwood) and will allow for new tree establishment in the understory while maintaining a semi-closed canopy. **The goal will be to identify an area where gap cutting would be beneficial and to secure funding or a partner agreement to complete the work by 2028.**

The estimated cost of this action is \$0-\$10,000, depending on how easy it is to get to the selected gap cutting sites and who performs the work. One option is to have this work completed at no cost by entities who need to provide chainsaw (sawyer) training for their students or employees. Groups that have worked with the City on this type of training in the past include Lake Superior College and Conservation Corps of Minnesota and Iowa.

This action should be done in conjunction with Action #10 – Plant desired tree species – as seedlings will need the extra light provided when gaps in the canopy are created.

12. Continue to support the City bowhunt, and work with the Arrowhead Bowhunters Alliance to try to increase the number of hunters in Zone 2A, the Zone that includes Magney-Snively.

The white-tailed deer population in Duluth continues to prevent seedlings from reaching the sapling stage across all NPCs. The Arrowhead Bowhunters Alliance conducts an annual bowhunt throughout the City using a lottery system. In the past, not many hunters have been interested in Zone 2A, partly due to increased challenges of accessing the area when Skyline Parkway closes each November. **The goal will be to increase the number of hunters in this zone by at least one in 2026.**

The estimated cost of this action is in-kind staff time and time committed by the ABA Board and bowhunters during the annual fall hunt.

13. Conduct Trail Counts to acquire baseline recreational use data in the Natural Area.

The City of Duluth conducts trail counts on many of its more popular trails. It would be helpful to understand where recreational use is more or less intense in Magney-Snively. For example, the implementation of management Action #4 – Interpretive Signs – will be more successful if the signs are placed where the most people will see them. **The goal will be to conduct trail counts on at least one set of trails (hiking, equestrian or ski) by 2028.**

Cost for this effort is in-kind, from City staff or trail groups.

FUNDING FOR IMPLEMENTATION

Funding sources that can help partners implement the Prioritized Management Actions in this plan are identified below. These sources have funded many natural resource management projects in the City of Duluth in the past.

- **Great Lakes Restoration Initiative:** The GLRI is a federal funding program focused on protecting and restoring the Great Lakes and is managed by several agencies including the U.S. Forest Service, the Natural Resources Conservation Service, and the U.S. Environmental Protection Agency. Grants typically range from \$30,000 for smaller, shovel ready projects to \$5,000,000 for long-term, complex projects.
- **Minnesota Lessard-Sams Outdoor Heritage Fund/Clean Water Fund:** The Lessard Sams Outdoor Heritage Council evaluates and distributes grants of at least \$500,000 from this fund, which is one of four funds created by the State’s Clean Water, Land and Legacy Amendment. A smaller grant program, called the Conservation Partners Legacy Program, distributes grants below the \$500,000 threshold.
- **Minnesota Environmental and Natural Resources Trust Fund:** The Legislative Citizen Commission on Minnesota Resources evaluates and awards grants to support research, habitat restoration and land acquisition. Funding for these grants comes from the Minnesota Lottery and, typically, there is approximately \$100 million available every year to support environmental projects.
- **National Oceanic and Atmospheric Administration - Minnesota Lake Superior Coastal Program:** The MLSCP is a federal-state partnership managed by the Minnesota DNR. Short- and long-term grants are available from \$2,500 to \$150,000.
- **Boreal Waters Community Foundation:** This foundation is a public charity that provides funding for various issues including environmental projects in northeast Minnesota. Typical grants range from \$25,000 to \$250,000.
- **National Fish and Wildlife Federation – Sustain Our Great Lakes Program:** This program provides funding from \$200,000 to \$1,000,000 for projects that restore, protect and sustain fish, wildlife and habitats of the Great Lakes.

PARTNERS IN IMPLEMENTATION

The City of Duluth is responsible for implementing the protection and restoration strategies set forth in this plan. Progress on the Prioritized Management Actions are reported annually to the City's Natural Resources Commission. The Natural Resources Commission's meetings are generally held monthly and are open to the public. The City will work in close collaboration with its natural resource management partners to implement the Plan, including the following agencies and organizations:

Entities that helped develop this plan

- Minnesota Land Trust
- Natural Resources Research Institute
- South St. Louis Soil and Water Conservation District
- Minnesota Department of Natural Resources – Minnesota Biological Survey
- Minnesota Department of Natural Resources – St. Louis River and Lake Superior Program
- Duluth Back Country Horsemen of Minnesota
- Hermantown Nightriders Snowmobile Club
- Duluth Climbers Coalition
- Superior Hiking Trail Association
- University of Minnesota, Duluth

Additional Potential Partners

- Duluth Cross Country Ski Club
- Fond du Lac Band of Lake Superior Chippewa - Resource Management Division
- The Nature Conservancy
- Conservation Corps of Minnesota and Iowa
- St. Louis County
- Community Action Duluth, Duluth Stream Corps
- Arrowhead Bowhunters' Alliance
- Arrowhead Native Plant Explorers

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Appendices

Appendix A: Advisory Committee Members

<u>Committee Member</u>	<u>Position or Affiliation</u>
Gini Breidenbach	Restoration Project Manager, Minnesota Land Trust
Lisa Luukkala	Executive Director, Superior Hiking Trail Association
Deserae Hendrickson	Duluth Back Country Horsemen - Minnesota
Judd Johnson	Hermantown Night Riders Snowmobile Club
Mikayla Haynes	Duluth Climbing Coalition; Ph.D. Student, Etterson Lab, Integrated Biosciences, University of Minnesota, Duluth
Paul Ojanen	University of Minnesota
Shannon Meehan	M.S. Student, Etterson Lab, Integrated Biosciences, University of Minnesota, Duluth
Valerie Ross Zhaawendaagozikwe	Muckleshoot Indian Tribe/Long Plain First Nation, Fond du Lac band of Lake Superior Chippewa descendant; Duwamish, Dakota, Ojibwe, and Yakama; B.S., University of Wisconsin, Superior, Environmental Science/Biology
David Schimpf	Associate Professor, Emeritus, Swenson College of Science and Engineering, University of Minnesota, Duluth
Ethan Perry	Minnesota Biological Survey, Minnesota Department of Natural Resources
Dave Grandmaison	St. Louis River Project Manager, Minnesota Department of Natural Resources
Michael Raichel	Natural Resources Commissioner; Forester

Appendix B: Native Plant Community Mapping and Plant Survey Magney-Snively Natural Area

Native Plant Community Mapping and Plant Survey, Magney-Snively Natural Area Duluth, Minnesota



Submitted to:

Gini Breidenbach
Minnesota Land Trust
394 South Lake Avenue, Suite 404
Duluth, MN 55802

Submitted by:

GEI Consultants, Inc.
5350 Miller Trunk Hwy, Suite D
Duluth, MN 55811

June 20, 2025
Project No. 2405805

Maggie Ross

Botanist/Plant Ecologist

Rob Peterson, P.G., P.W.S.

Senior Environmental Scientist

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- Appendix A: MN DNR Relevé Field Forms
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- Appendix D: Trail Sampling Transect Data

Standard Limitations and Disclaimer

This report was prepared exclusively for the use of Minnesota Land Trust. The findings and conclusions, if any provided by GEI in this report, are based solely on the information reported to GEI as of the date of this report. Future investigations or additional information not provided to GEI at the time of this report may result in modification of this report. GEI's scope of work did not include verifying the completeness or accuracy of information provided by others. Accordingly, GEI shall not be liable for any damages, costs, or other consequences resulting from reliance on such information if it is later determined to be inaccurate or incomplete. GEI's professional services for this project have been performed in a manner consistent with that degree of skill and care ordinarily exercised by members of the same profession currently practicing in the same locality, performing similar services under similar conditions. GEI makes no other representations and no warranties, express or implied.

Accessibility best practices informed by WCAG 2.1 Level AA were applied to support usability for individuals with disabilities, consistent with ADA considerations.

Acronyms and abbreviations

Table 1. Acronyms and Abbreviations Used Throughout This Report

Acronym	Abbreviation
BW_CX	Beaver Wetland Complex
CTn42a	Wet Mafic Cliff
DNR	Department of Natural Resources
END	Endangered
EOR	Element Occurrence Record
FDn33b	Aspen – Birch Woodland
FPn73a	Alder Swamp
GEI	GEI consultants, Inc.
GIS	Geographic Information System
GPS	Global Positioning System
MBS	Minnesota Biological Survey
MHn35b	Red Oak – Sugar Maple – Basswood – (Bluebead Lily) Forest
MHn45b	White Cedar – Yellow Birch Forest
MHn46b	Black Ash – Basswood Forest
MHn47a	Sugar Maple – Basswood – (Bluebead Lily) Forest
MLT	Minnesota Land Trust
NHI	Natural Heritage Inventory
NON	No Legal Status
NPC	Native Plant Community
ROn23	Bedrock Shrubland (Inland)
S1	Critically Imperiled
S2	Imperiled
S3	Vulnerable to Extirpation
S4	Apparently Secure; Uncommon But Not Rare
S5	Secure, Common, Widespread, and Abundant
SPC	Special Concern
THR	Threatened
WFn55a	Black Ash – Aspen – Balsam Poplar Swamp (Northeastern)
WFn64a	Black Ash – Conifer Swamp (Northeastern)
WMn82b	Wet Meadow Bluejoint Subtype

Executive Summary

The Minnesota Land Trust and the City of Duluth are completing natural resource inventories to document current conditions in the Magney-Snively Natural Area in Duluth, Minnesota. GEI Consultants, Inc. (GEI) was tasked with conducting native plant community mapping and botanical surveys within the natural area. The overall objective of this work is to characterize the condition of natural resources to inform site management and restoration objectives that will inform updates to the natural area management plan.

GEI updated the existing native plant community (NPC) classification data prepared by the Minnesota Department of Natural Resources (DNR) in 2004 for the City of Duluth Magney-Snively Natural Area. The NPC verification consisted of a desktop review of existing data and resources to create preliminary plant community boundaries. The boundaries were updated as needed during field surveys. In addition, GEI resurveyed 12 previously completed DNR relevé plots and completed at least two additional relevé plots per NPC for a total of 34 relevé plots. The NPCs were given a natural quality ranking based on the DNR's Natural Heritage Element Occurrence Ranking Guidelines, which reflect the degree of ecological integrity of a specific occurrence of an NPC. A total of 46 plant community polygons covering the 1,577-acre study area were mapped and categorized into twelve NPC types and one NPC subtype. The condition of the NPCs varied and were ranked as having fair, good, or excellent ecological integrity.

GEI also mapped the location and extent of invasive plant species within the Magney-Snively Natural Area NPCs. The survey for invasive species was completed using a meander survey while recording a GPS track log to ensure visual observation of the entire area. Populations of invasive species were documented throughout the natural area, but the greatest infestations occurred east and south of Skyline Parkway on steeper slopes and in rock outcrop areas. The primary invaders were established invasive species including common buckthorn (*Rhamnus cathartica*), orange hawkweed (*Hieracium aurantiacum*), and honeysuckle species (*Lonicera tatarica*, *Lonicera marrowii*, and *Lonicera X bella*).

In addition to the meander survey, a targeted survey was completed for non-native/invasive plant species along roads and trails (trails) within the Magney-Snively Natural Area to assess the role of trails on the spread of invasive plants. A 40-meter transect was centered perpendicular to the trail at each sampling point. Percent relative cover of non-native species present was recorded within a 5-meter radius at the trail centerline and then at 10 meters and 20 meters in each direction. The average percent cover of non-native, weedy species decreased with distance from trails, but the average percent cover of invasive species slightly increased with distance from trails. The total number of both weedy and invasive species decreased with distance from the trails.

Finally, GEI surveyed for select Species of Greatest Conservation Need (SGCN) in the natural area that have been documented in the Minnesota Natural Heritage Information System (NHIS) Biotics database within ¼ mile of the project area, which included soapberry (*Shepherdia canadensis*), eastern hemlock (*Tsuga canadensis*), and narrow triangular moonwort (*Botrychium angustisegmentum*). The SGCN survey began with a desktop review of existing data and resources by reviewing a variety of available information to identify land cover types, potential habitat, native plant communities, and rare species

occurrence records. The desktop review was followed by a meander survey within each identified plant community. Soapberry was found in 15 different populations, totaling approximately 28 individuals within the Magney-Snively Natural Area boundary and two additional individuals were mapped just beyond the boundary. Historic occurrences of narrow triangular moonwort and Eastern hemlock were not relocated, and new no new occurrences were documented.

On a broad scale, the plant communities within Magney-Snively Natural Area remain of high quality, but there are actions that could improve the natural area. GEI recommends prohibiting new trail construction and removing common buckthorn from the highest quality NPCs to provide long-term protection to these areas. Targeted invasive removal of common buckthorn and honeysuckle throughout the natural area is also recommended, beginning with the seed producing mature individuals marked during this study. GEI also suggests focusing additional restoration efforts on FDn33b and ROn23 NPCs. These communities have been the most negatively impacted due to the construction of West Skyline Parkway, DWP railroad/trail, and heavy foot traffic. Finally, desired tree species should be underplanted throughout the natural area since they have little to no regeneration due to heavy deer browse.

There were important aspects of the Magney-Snively Natural Area identified during this study that warrant future investigation. GEI recommends mapping and monitoring vernal pools, which play a significant role in recharging ground water and provide habitat for many species. Spring ephemeral plant species such as Carolina spring beauty (*Claytonia caroliniana*) and moschatel (*Adoxa moschatellina*) should be surveyed as they are still very rare within the City of Duluth and worth tracking as indicators of plant community health. The Wet Mafic Cliff (CTn42a) is a threatened NPC and was identified along Stewart and Sargent Creeks. This plant community should be mapped and surveyed to establish baseline conditions. Finally, a future study should assess whether additional areas within the natural area qualify as old growth forest, which would help prioritize areas to underplant due to lack of tree regeneration.

Introduction

GEI Consultants, Inc. (GEI) completed native plant community mapping and botanical surveys for the Minnesota Land Trust Magney-Snively Natural Area project in Duluth, MN. The Magney-Snively Natural Area project consists of 1,577 acres within portions of Sections 21, 27, 28, 29, 33, and 34 of Township 49 North, Range 15 West (Figure 1). The Magney-Snively Natural Area was designated as a natural area under the Duluth Natural Area Program in 2003. The Magney-Snively Natural Area is a highly functional, viable ecosystem consisting of a diverse mosaic of wetlands, uplands, and rock outcrop communities. These characteristics, as well as its large size, make Magney-Snively one of the highest ecologically significant natural areas to be found within the City of Duluth.

The Minnesota Land Trust (MLT) and the City of Duluth are completing natural resource inventories to document current conditions within the natural area. The overall objective of this work is to characterize natural resource conditions within the natural area to inform site management and restoration objectives that will facilitate updates to the natural area management plan. Specifically, GEI updated the existing native plant community (NPC) classification data, mapped the location and extent of invasive plant species, completed a targeted survey for non-native/invasive plant species along roads and trails (trails), surveyed for select Species of Greatest Conservation Need (SGCN), and completed a vernal pool assessment. This Native Plant Community Mapping and Plant Survey Report presents the methods and results of the native plant community mapping and botanical surveys completed by GEI in the summer/fall of 2024 and Spring of 2025.

Native Plant Communities

Native Plant Community Survey Methods

Native Plant Community Verification

GEI updated the existing native plant community (NPC) classification data prepared by the Minnesota Department of Natural Resources (DNR) in 2004 for the City of Duluth Magney-Snively Natural Area. The Minnesota Biological Survey (MBS) identified ten NPCs within the Magney-Snively Natural Area. The NPC update included field-based vegetation sampling to verify and amend (if necessary) the previously mapped NPC polygons using the MBS classification system. The MBS identifies the NPC by class, type, and subtype. GEI categorized the NPCs to NPC type and/or subtype if applicable.

The NPC verification included the following tasks:

- Desktop GIS analysis of previously mapped NPC data.
- Desktop GIS analysis of existing plant communities using aerial imagery, soils data, topography, and landscape setting.
- Data review of the 12 previously completed DNR relevé plots.
- Completion of updated relevé plots at the 12 previously completed DNR relevé plots.
- Completion of at least 2 additional relevé plots per NPC mapped by the MBS and GEI through desktop analysis and field survey.
- Condition ranking for each NPC.
- NPC data processing, interpretation, and mapping.

The NPC verification began with a desktop review of existing data and resources. The previously mapped NPCs, aerial imagery, and other data analyzed during the desktop review was used to create preliminary plant community boundary Geographic Information System (GIS) files that were incorporated for field verification. The NPC boundaries were adjusted as necessary during the field surveys to update the NPC boundaries. The NPCs were mapped based on field observations and classified using the keys found in the DNR publication, *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MN DNR 2003). Best professional judgement was used to establish the size at which a plant community was large enough to be mapped as an NPC. Some spatial variation in plant species structure and composition may occur within the mapped NPCs.

GEI completed the NPC field sampling using the DNR Relevé Method to document the vegetation species composition and structure and identified the plant communities to class, type, and subtype (if applicable). GEI resurveyed the 12 previously completed DNR relevé plots and completed at least 2 additional relevé plots per NPC as needed to capture representative plant community stands. GEI completed a total of 34 relevé plots, 12 resurveyed DNR plots and 22 additional plots as presented on Figure 2. This method of plot placement is considered subjective. Subjective plot placement involves dividing the study area into sample stands based on plant community units identified during the desktop review and ground reconnaissance prior to sampling. The relevé plot is then placed at a carefully chosen

site within each sample stand so that the data from the plot is representative of the attributes of the stand as a whole.

GEI completed relevant portions of the DNR Relevé Field Form at each plot location to match the data previously collected by the DNR. The relevant portions of the Relevé Field Form included general information, vegetation information, location information, plot information, remarks, partial basal area and tree diameter information, and the vegetation data sheet. Soil information was not collected. Relevé point locations, NPC extent, type, and condition data were collected using ArcGIS Field Maps software and were geolocated using a global positioning system (GPS) capable of sub-foot accuracy and incorporated into a geographic information system (GIS) using ArcPro software. Geospatial data layers were provided to MLT to integrate with other project data sets.

Native Plant Community Condition Assessment

The NPCs were given a natural quality ranking based on the DNR's Natural Heritage Element Occurrence Ranking Guidelines (Table 2). Condition ranks for NPCs reflect the degree of ecological integrity of a specific occurrence of an NPC. Condition ranks are assigned by considering species composition, vegetation structure, ecological processes and functions, level of human disturbance, presence of non-native species, and other factors. Condition ranks are assigned on a scale of A to D with an NA and NN ranking for altered and disturbed communities.

Table 2. Condition Ranks and Their Descriptions

Condition Rank	Condition Rank Description
A	occurrences have excellent ecological integrity. They have species composition, structure, and ecological processes typical of the natural or historic range of the community and have been little disturbed by recent human activity or invasive species.
B	occurrences have good ecological integrity. They include lightly disturbed plant communities and communities that were disturbed in the past but have recovered and now have relatively natural composition and structure. B-rank occurrences normally will return to A-rank condition with protection or appropriate management.
C	occurrences have fair ecological integrity. They show strong evidence of human disturbance but retain some characteristic species and have some potential for recovery with protection and management.
D	occurrences have poor ecological integrity. The original composition and structure of the community have been severely altered by human disturbances or invasion by exotic species. They have little chance of recovery to their natural or historic condition.
NA	Native species present in an altered / non-native plant community. This NA ranking can only be used if the site is field checked from the edge or to a greater degree, thus confirming the presence of native species within a non-native community.
NN	Altered / non-native plant community. These semi-natural communities do not qualify for natural quality ranking. Using NN signifies the site has been field checked and confirms it is a semi-natural community.

Native Plant Community Survey Results

The MBS identifies the NPC by class, type, and subtype. NPCs were categorized to the NPC type and/or subtype if applicable. A total of 46 plant community polygons covering the 1,577-acre study area were mapped and categorized into ten NPC types including one NPC classified to subtype.

GEI completed the NPC field surveys between August 14 and August 26, 2024. Ten native plant communities were characterized within the Magney-Snively Natural Area boundary and classified using the MN DNR's *Field Guide to the Native Plant Communities of Minnesota: The Laurentian Mixed Forest Province* (MN DNR, 2003). Mapped native plant communities were informed using a combination of existing mapped communities from the 2004 MN DNR plant community surveys, previous MN DNR relevé data (1979-2000) (Appendix A), 2024 GEI meander surveys, 2024 GEI relevé data (Appendix B), and aerial photo interpretation. Detailed field notes were taken, including plant species lists and invasive species abundance for each plant community type beyond the relevé data collected. The mapped NPCs are presented in Figure 2 and summarized in Table 3. A photographic log of relevé plots and other site features is included in Appendix C.

Overall, the plant communities within Magney-Snively remain of high quality. Within the study area, the two regions of old growth identified by the Flaccus and Ohmann study in 1964 and confirmed in 1984 by MN DNR surveys remain intact and additional regions throughout the study area might now qualify as maple-basswood old growth through the MN DNR's old growth classification of 120 years old or older within a minimum of 20-acre occurrences. Additional regions for further old growth study might include the northern edge of the boundary south of Stewart Creek and expanding the boundary of the two old growth regions identified in 1964.

A summary of the ten native plant communities characterized within the Magney-Snively Natural Area boundary is presented in the following paragraphs organized from largest to smallest in terms of percent areal cover within the Magney-Snively Natural Area.

Table 3. Native Plant Communities Mapped Within the Magney-Snively Natural Area

Native Plant Community	Total Acres	GEI Condition Rank	DNR Condition rank	S-Rank*	GEI Condition Qualifier
MHn47a	880.4	B	A, B	S3	B = Worm impacted and low cover (<10%) of non-native species.
MHn35b	309	B, C	B	S4	B = Worm impacted and low cover (<10%) of non-native species. C = Worm impacted and moderate cover (>10%) of non-native species.
FDn33b	115.2	B, C	B	S5	B = Worm impacted and low cover (<10%) of non-native species. C = Worm impacted and moderate cover (>10%) of non-native species.
MHn46b	64.3	B	No data	S4	B = Worm impacted and low cover (<10%) of non-native species.
ROn23a	49.4	B, C	No data	S3	B = Low cover (<10%) of non-native species C = Moderate cover (>10%) of non-native species.
WFn55a	63	A, B	B	S4	A = Non-native species not present or <1% cover. No indication of other disturbances or impact to ecological integrity. B = Low cover (<10%) non-native species.
WFn64a	35.8	A, B	No data	S4	A = Non-native species not present or <1% cover. No indication of other disturbances or impact to ecological integrity. B = Low cover (<10%) of non-native species.
MHn45b	25.6	B, C	No data	S2	B = Worm impacted and low cover (<10%) of non-native species. C = Worm impacted and moderate cover (>10%) of non-native species.
WMn82b	7.6	C	No data	S4 or S5	C = Moderate - High cover (25-50%) of non-native species.
FPn73	1.1	B, C	No data	S5	B = Low cover (<10%) of non-native species. C = Moderate cover (>10%) of non-native species.
CTn42a	3,071 Linear Feet	A	No data	S2	A = Non-native species not present or <1% cover. No indication of other disturbances or impact to ecological integrity.

*S1 = critically imperiled, S2 = imperiled, S3 = vulnerable to extirpation, S4 = apparently secure; uncommon but not rare, S5 = secure, common, widespread, and abundant.

MHn47a Sugar Maple – Basswood – (Bluebead Lily)

The majority of the Magney-Snively Natural Area consists of MHn47a Sugar Maple – Basswood – (Bluebead Lily) Forest with rich, well-drained soils and scattered scoured bedrock terrain. A total of 880.4 acres of MHn47a were mapped within the Magney-Snively Natural Area. The canopy is comprised of sugar maple (*Acer saccharum*), basswood (*Tilia americana*), and yellow birch (*Betula allegheniensis*) as dominant species. Common indicator herbaceous species frequently found in Magney-Snively include sessile leaved bellwort (*Uvularia sessilifolia*), beech fern (*Phegopteris connectilis*), wild ramp (*Allium tricoccum*), white baneberry (*Actaea pachypoda*), hairy solomon's seal (*Polygonatum pubescens*), blue cohosh (*Caulophyllum thalictroides*), mountain rice grass (*Oryzopsis asperfolia*), long-stalked sedge (*Carex pedunculata*), and Pennsylvania sedge (*Carex pensylvanica*). Mature canopy species present place much of the MHn47a plant community within the 75-195 years old age class, but white pine (*Pinus strobus*) continues to remain primarily absent from the community due to the history of selective timber harvests before 1900, depriving MHn47a of white pine seed trees (MN DNR, 2009). Ten relevés (003, 004, 005, 006, 007, 017, 025, 026, 027, and 028) were completed within the MHn47a NPC, eight of the ten were resurveys of the 1984 MN DNR relevé survey plots.

Comparison to Previous Relevés

There were nine total relevés completed by the MN DNR in 1979, 1982, 1984, 1999, and 2000 in the MHn47a throughout the natural area. Five relevés (#0099, 0100, 0106, 0119, & 5639) were completed between 1979-1984 and each NPC received an 'A' ranking for the condition assessment, meaning they had excellent ecological integrity. An additional relevé was completed in 1999 and was rated 'A' for the condition assessment. The remaining three relevés were completed in 2000 and were ranked 'B', indicating good ecological integrity. The justification for the ranking was not explicitly stated, but it is noted the humus layer was absent and that earthworm activity was present.

Each of the eight re-surveys (MN DNR relevés #0099 and 0119 were completed in the same location) and two additional surveys completed in 2024 received a 'B' ranking due to earthworm impact and the presence of non-native and invasive species. This indicates that the quality of MHn47a has declined since the initial surveys completed in 1979-1999. While the ranking remained the same since 2000, the cover of invasive and non-native species has increased, and common buckthorn (*Rhamnus cathartica*) is now present in relatively low abundance throughout the community. In addition, deer browse was observed throughout, and forest structure remains primarily stalled at an old growth canopy stage with seedlings in the herbaceous layer but is frequently missing a sub-canopy layer with later successional saplings in the understory. Despite this increase in invasives and decline in condition ranking since 1979-1999, MHn47a remains a large, healthy, old growth forest that still provides the necessary ecological services such as cavity trees, water filtration, seed production, and carbon storage and preservation is still the primary recommendation for this forest ecosystem. A secondary recommendation would be to plant and cage seedlings/saplings of desired tree species to reintroduce structure to the forest.

MHn35b Red Oak – Sugar Maple – Basswood – (Bluebead Lily) Forest

A total of 309.0 acres of MHn35b Red Oak – Sugar Maple – Basswood – (Bluebead Lily) Forest were mapped within the Magney-Snively Natural Area, making it the second largest plant community. MHn35b occurs in the eastern part and the surrounding forests of the rocky outcrops and fire dependent

forests. Much of this community is bisected by both West Skyline Parkway and the historic railroad grade, now the DWP trail, which cuts through the northeast and southeast Magney-Snively Natural Area boundary but carries anthropogenic influence on the plant community. The red oak – sugar maple – basswood community also occurs as inclusions within MHn47a in higher elevations and greater sun exposure on south facing slopes. Characteristic canopy species observed included sugar maple (*Acer saccharum*), red oak (*Quercus rubrum*), and basswood (*Tilia americana*). Indicator species of MHn35b observed included bush honeysuckle (*Diervilla lonicera*), bracken fern (*Pteridium aquilinum*), and wild ginger (*Asarum canadense*). Mature white pine (*Pinus strobus*), white spruce (*Picea glauca*), and cedar (*Thuja occidentalis*) were scattered along the eastern boundary between West Skyline Road and the DWP trail. Inclusions of bedrock outcrops were observed, often as destinations along trails to view the estuary. Invasive buckthorn (*Rhamnus cathartica*) and honeysuckle species (*Lonicera sp*) were prevalent along these rock outcrops. Three relevés (018, 032, and 033) were completed within the MHn35b NPC. Relevé 018 was a resurvey from the 2000 MN DNR relevé survey plot #8300.

Comparison to Previous Relevés

One MN DNR relevé (#8300) was completed in 2000 adjacent to Skyline Parkway. The condition of the NPC was given a 'B' ranking likely because of earthworm impact. The approximate location was resurveyed in 2024 and was given a condition rank of 'C' due to earthworm impact and 30% cover of common buckthorn (*Rhamnus cathartica*). The other two relevés surveyed in 2024 received a 'B' and 'C' ranking, but since there was not a representative survey of the NPC prior to 2024, it is not known if the condition decreased overall.

Due to the historic impacts of West Skyline Parkway and the DWP railroad/trail construction that occurred within this NPC, invasive species have been able to gain traction and increase over the last 24 years. These impacts along with additional trails have increased forest edges, which attract birds and humans, providing a pathway for spread and introduction of invasives, especially common buckthorn. MHn35b still maintains many desired canopy species, such as red oak, yellow birch, sugar maple, and basswood, which are still performing their ecological role, but it is recommended that this plant community receive buckthorn removal to improve the ecological condition.

FDn33b Aspen – Birch Woodland

A total of 105.2 acres of FDn33b Aspen – Birch Woodland were mapped within the Magney-Snively Natural Area. It occurs along the southern boundary and is the primary forest type surrounding bedrock shrubland communities (ROn23a). Indicator canopy species that characterized this community include paper birch (*Betula papyrifera*), quaking aspen (*Populus tremuloides*), and occasional red oak (*Quercus rubrum*). These canopy species were often stunted due to limited soils and frequent winds. Indicator shrub layer species observed included beaked hazel (*Corylus cornuta*) and red oak (*Quercus rubrum*). Herbaceous groundcover species included round-leaved pyrola (*Pyrola rotundifolia*), shinleaf (*Pyrola elliptica*), bracken fern (*Pteridium aquilinum*), and bush honeysuckle (*Diervilla lonicera*). As part of the northern dry-mesic mixed woodlands fire regime, the aspen – birch woodland is young from either 0-35 years or 35-55 years due to the presence of aspen and paper birch dominated stands, and the absence of old aspen among stands of mature white pine, red pine, and paper birch. Four relevés (012, 029, 030,

and 034) were completed by GEI within the aspen – birch woodland, two were resurveys of the 1984 MN DNR relevé plots (#8296 and 8299).

Comparison to Previous Relevés

Two MN DNR relevés (#8296 and 8299) were completed in 2000. FDn33b was affected by non-native species in 2000 and continues to be in 2024. The resurvey of the two relevés shows a slight increase in non-native species and establishment of common buckthorn, but both were ranked ‘B’ in 2000 and remained ‘B’ in 2024. Relevés 012 and 030 completed in 2024 were ranked ‘C’ because they were invaded by honeysuckle and buckthorn. This could indicate that this NPC has seen an increase in non-native and invasive species cover over time.

FDn33b was impacted by the construction of West Skyline Parkway and the DWP railroad/trail that cut through this community. Invasive species have continued to gain traction and increase over the last 24 years. FDn33b is missing some of the later successional species that indicate a healthy, mature community, including the absence of mature to old growth white pine with old growth and dying red pine as canopy dominant species. It is recommended that this plant community receive buckthorn and honeysuckle removal to improve the ecologic condition as well as planting and caging of white pine seedlings to increase the abundance of white pine in the future canopy.

MHn46b Black Ash – Basswood Forest

A total of 64.3 acres of MHn46b Black Ash – Basswood Forest were mapped within the Magney-Snively Natural Area and were typically found in narrow bands connecting forested wetlands, primarily ash forests. The soil was moist but did not contain standing water and was fully or nearly fully vegetated. Most of these forests had large basswood (*Tilia americana*), black ash (*Fraxinus nigra*), and yellow birch (*Betula allegheniensis*) in the canopy, followed by aspen (*Populus tremuloides*), young black ash, and sugar maple (*Acer saccharum*) in the sub-canopy. Herbaceous groundcover species present included wild sarsaparilla (*Aralia nudicaulis*), large leaved aster (*Eurybia macrophylla*), Pennsylvania sedge (*Carex pensylvanica*), wood nettle (*Laportea canadensis*), zigzag goldenrod (*Solidago flexicaulis*), and naked miterwort (*Mitella nuda*). The age class of these forests appears to be greater than 95 years based on the presence of very old super canopy species and a new regime of younger species such as aspen and black ash, suggesting moderate disturbance, such as windthrow in the past that has caused a younger age class (0-35 years old) to be growing beneath. Three relevés (010, 011, and 014) were completed by GEI within MHn46b, relevé 011 was a resurvey of the 2000 MN DNR relevé plot #8298.

Comparison to Previous Relevés

One MN DNR relevé plot #8298 was completed in 2000 and was given a ‘B’ ranking. In the 2024 condition ranking, MHn46b was also given a B ranking due to earthworm impacts and a low cover of invasive species. In addition, little regeneration of super canopy species such as yellow birch, basswood, and black ash were observed or were heavily browsed when they were observed. Comparing the 2000 MN DNR relevé plot #8298 to the 2024 GEI relevé plot 011 indicates some change in graminoid and forb species composition but does not indicate a decrease in overall plant community health. The younger, pioneering forest regime in the understory suggests some disturbance in the past with a lack of

regeneration of the later stage canopy species, so it is recommended that planting and/or caging of desired tree species occurs within this community along with preservation of the canopy.

ROn23a Bedrock Shrubland (Inland)

A total of 49.4 acres of ROn23a Bedrock Shrubland (Inland) were mapped within the Magney-Snively Natural Area. This community was characterized by exposed bedrock with low growing shrubs within the bedrock cracks and shallow soils between bedrock outcrops. Occasional stunted trees can be found in small pockets, representing a transition between ROn23a and FDn33b. Indicator shrub species of ROn23a observed during this survey included prairie willow (*Salix humilis*), staghorn sumac (*Rhus typhina*), snowberry (*Symphoricarpos albus*), blueberry (*Vaccinium angustifolium*), and bush honeysuckle (*Diervilla lonicera*). Herbaceous species observed included rock spikemoss (*Selaginella rupestris*), umbel sedge (*Carex umbellata*), rusty woodsia (*Woodsia ilvensis*), poverty oat grass (*Danthonia spicata*), and Canada blue grass (*Poa compressa*). Two relevés (013 and 031) were surveyed in 2024 by GEI in ROn23a with no known previous MN DNR relevés completed in this community.

Comparison to Previous Relevés

No previous relevés were completed in ROn23a. Based on the 2024 observations, ROn23a was given a B to C condition ranking due to a low to moderate cover of invasive species that were displacing native rock outcrop species. Invasive species removal of buckthorn and honeysuckle is recommended to improve the health of this community.

WFn55a Black Ash – Aspen – Balsam Poplar Swamp (Northeastern)

A total of 63.0 acres of WFn55a Black Ash – Aspen – Balsam Poplar Swamp (Northeastern) were mapped within the Magney-Snively Natural Area and were typically found along the riparian corridors of Sargent and Stewart Creeks. In Magney-Snively, black ash (*Fraxinus nigra*) and yellow birch (*Betula allegheniensis*) were found to be the two dominant canopy species with lesser amounts of white spruce (*Picea glauca*) and paper birch (*Betula papyrifera*). Typical indicator shrub species included young black ash (*Fraxinus nigra*), beaked hazel (*Corylus cornuta*), mountain maple (*Acer spicatum*), and swamp red currant (*Ribes triste*). Herbaceous species observed included lady fern (*Athyrium filix-femina*), dwarf raspberry (*Rubus pubescens*), spotted touch me not (*Impatiens capensis*), and alpine enchanters' nightshade (*Circaea alpina*). Species found that further indicated WFn55a included rough bedstraw (*Galium asprellum*), flat-topped aster (*Doellingeria umbellata*), and tall meadow-rue (*Thalictrum dasycarpum*). The age class of this system is around 75 years, but it is missing some key indicators such as a decrease in yellow birch and the presence of cedar (*Thuja occidentalis*) in the canopy. No cedar seedlings or saplings are present, likely a combination of a lack of seed trees and a deer herd that highly favors cedar seedlings. Three relevés (008, 009, and 015) were surveyed by GEI in 2024. Plot 008 was a resurvey of the 2000 MN DNR relevé plot #8295.

Comparison to Previous Relevés

The condition of WFn55a was assessed in the 2000 MN DNR relevé plot #8295 and received a 'B' ranking. The justification was not stated but could be because of the low cover of a few non-native species. The exact area on the 2000 MN DNR plot was not resurveyed because the given location was within an upland and likely incorrect, so it was moved southwest to capture the correct community type.

The additional two plots completed in 2024 (009 and 015) indicate that the NPC remains intact with low cover of non-native species with plot 009 ranking 'A/B' and plot 015 ranking 'A'. Soils in these sites were more often saturated, keeping earthworms from impacting this community. In addition, black and green ash were in good condition, not exhibiting signs of emerald ash borer or other forest pests.

WFn64a Black Ash – Conifer Swamp (Northeastern)

A total of 35.8 acres of WFn64a Black Ash – Conifer Swamp (Northeastern) were mapped within the Magney-Snively Natural Area in relatively small, scattered depressions. Black ash (*Fraxinus nigra*), yellow birch (*Betula allegheniensis*), white spruce (*Picea glauca*), and sugar maple (*Acer saccharum*) were the primary species growing on raised hummocks that created slightly drier conditions out of the mucky, peaty soils or standing water. The subcanopy consisted of thick speckled alder at 25-60% cover and frequent mountain maple (*Acer spicatum*), winterberry (*Ilex verticillate*), and red maple (*Acer rubrum*). The understory had bristle stalked sedge (*Carex leptalea*), fowl manna grass (*Glyceria striata*), cinnamon fern (*Osmunda cinnamomea*), gold thread (*Coptis trifoliata*), and beech fern (*Phegopteris connectilis*). These WFn64a communities are relatively young, having recently transitioned from FPn73a and fall within the age class 0-75 years old. Two relevés (016 and 019) were placed in representative lowland depressions with standing water dominated by black ash within the northern region of the Magney-Snively boundary.

Comparison to Previous Relevés

The condition of WFn64a was assessed in one MN DNR relevé (#8301) in 2000 beyond the Magney-Snively Natural Area in the Spirit Mountain Area east of Russel Road and received a 'B' ranking. The community observed in the Magney-Snively Natural Area in 2024 remains intact with low cover of non-native species. The only invasive species found in WFn64a was glossy buckthorn (*Frangula alnus*), which was not observed elsewhere in the Magney-Snively Natural Area, signifying a possible preference for these peaty soils that aren't found in the other plant communities. Preservation of these wetland communities is the recommended approach to protect these from future invasion of non-native species.

MHn45b White Cedar – Yellow Birch Forest

A total of 25.6 acres of MHn45b White Cedar – Yellow Birch Forest were mapped within the Magney-Snively Natural Area. White cedar and yellow birch mesic forests were documented in 2009 along Stewart Creek, beginning just above the West Skyline stone bridge crossing and occurring downstream to the boundary edge. In addition, three new locations were observed in 2024 field surveys that were either omitted or misclassified in earlier surveys. The first location was just south of West Skyline Road near the western boundary of the natural area along a steep north facing slope. The other two smaller locations were located north of West Skyline on the far western edge of the boundary on a steep north facing slope overlooking the beaver meadow complex of Sargent Creek and on the steep south facing slope of that same elevation rise separated by MHn47a (Figure 2). Similarly noted in the Stewart Creek community, cedar (*Thuja occidentalis*) was well represented with occasional yellow birch (*Betula allegheniensis*) occurring near the top and the bottom of the steep slopes where it transitions to MHn47a. The presence of but not dominance of paper birch (*Betula papyrifera*), sugar maple (*Acer saccharum*), and white spruce (*Picea glauca*) indicate MHn45 and the presence of beech fern (*Phegopteris connectilis*), mountain ash (*Sorbus decora*) and wood fern (*Dryopteris carthusiana*) further

indicate MHn45b. All these classified MHn45b communities are on scoured bedrock terrain with steep slopes and well drained soils. Two relevés (001 and 002) were placed in the Stewart Creek MHn45b communities and one relevé (024) was placed in the MHn45b community just south of West Skyline. The composition of dominant cedar (*Thuja occidentalis*) with different codominant species suggests variation in the age classes, with the age of MHn45b communities ranging from 75-95 up to 155-195 years old.

Comparison to Previous Relevés

No previous relevés were completed in MHn45b. In 2024 both earthworms and non-native and invasive species were negatively impacting MHn45b, giving it either a condition ranking of B or C. In addition to this, deer browse has heavily influenced the understory of this community, with no seedlings or saplings of either cedar or yellow birch observed, the two primary indicator canopy species. Mature cedar and yellow birch were still in good health and to preserve this community, underplantings of yellow birch and cedar are recommended.

WMn82b Wet Meadow Bluejoint Subtype

A total of 7.6 acres of WMn82b Wet Meadow Bluejoint Subtype were mapped within the Magney-Snively Natural Area. Two new wet meadow plant communities were documented as a direct result of beaver activity. The early stages of the beaver activity were noted in 2009 as being either a Beaver Wetland Complex (BW_CX) or a WFn55a that have solidly turned into WMn82b with standing dead or fallen dead logs without any bark or branches left. The dominant vegetation is Canada bluejoint (*Calamagrostis canadensis*) with occasional alder (*Alnus incana*) pockets beside Sargent Creek in a couple of locations. Fresh meadow species such as flat-topped aster (*Doellingeria umbellata*), joe pye weed (*Eutrochium maculatum*), and St. john's wort (*Hypericum ascyron*) were present in low percentages. Fern species such as ostrich fern (*Matteuccia struthiopteris*) and sensitive fern (*Onoclea sensibilis*) were also present in areas of slightly wetter soils. Willow shrubs, primarily slender leaved willow (*Salix petiolaris*), bebb's willow (*Salix bebbiana*), and pussy willow (*Salix discolor*) were present but less than 25%. Hydrology appeared to have stabilized in response to beaver activity and no recent signs of beaver activity were observed. Two relevés (020 and 021) were collected in the WMn82b on the west side of the natural area along Sargent Creek.

Comparison to Previous Relevés

No previous relevés were completed in WMn82b. In 2024, reed canary grass (*Phalaris arundinacea*) was noted within both relevés at an average of 30% cover, and the plant community was given a condition ranking of C. In other areas beyond the relevés, reed canary grass had less cover and was dominated by Canada bluejoint (*Calamagrostis canadensis*). The hydrology of these meadows has stabilized and reintroducing trees along the river might have a positive impact on the system, but beaver activity will always be a possibility in the future.

Fpn73a Alder Swamp

One Fpn73a Alder Swamp was mapped within the Magney-Snively Natural Area covering 1.1 acres. Wetlands dominated by speckled alder (*Alnus incana*) were very limited within Magney-Snively, and only found in the northwest region in a small area just south of the ski trail. This is a change from the 2009 study that classified other small pockets of wetland as Fpn73a, noting that small, "scattered trees >2m

tall” were present but less than 25% cover. These pockets of alder thicket were classified as WFn64a with a much higher percent cover of Black ash (*Fraxinus nigra*), yellow birch (*Betula allegheniensis*), and white spruce (*Picea glauca*), which likely had grown to overtake the canopy in the last 15 years. The FPn73a community mapped had moist soils but were not fully saturated soils. Alder comprised the dominant canopy species at around 90% cover. Some black ash rose above the canopy but very little were in the understory. Common species of alder thickets found in this plant community include wood fern (*Dryopteris carthusiana*), swamp gooseberry (*Ribes hirtellum*), swamp red currant (*Ribes triste*), dwarf raspberry (*Rubus pubescens*), swamp aster (*Symphyotrichum puniceum*), and spotted touch me not (*Impatiens capensis*). Two relevés (022 and 023) were placed within the same FPn73a plant community due to the lack of other viable options.

Comparison to Previous Relevés

No previous relevés were completed in FPn73a. The alder swamp contained approximately 10% invasive species, receiving a condition ranking of B and C. This community was also surrounded by disturbed areas with crack willow (*Salix x fragilis*) present. Soils remained too wet for earthworms to survive.

CTn42a Mesic Mafic Cliff (Northern)

In the 2009 Biological Survey, CTn42a or the mesic mafic cliff plant community, was identified along Stewart Creek. Similar habitats were observed along Sargent Creek, though in very small pockets that are too limited in size or inaccessible to appropriately characterize with a relevé. GEI mapped this habitat in the field by collecting a GPS line along the base of the cliff. These cliff features are rather small with shady, cool conditions associated with the narrow stream channels through bedrock along Stewart and Sargent Creeks. Additional narrow mesic mafic cliff communities were observed overlooking the Sargent Creek WMn82b Wet Meadow Bluejoint Subtype NPC. Vascular plants are restricted to crevices, ledges, and moss mats. Common species found in this plant community include lichens, fragile fern (*Cystopteris fragilis*), oak fern (*Gymnocarpium Dryopteris*), beech fern (*Phegopteris connectilis*), polypody (*Polypodium virginianum*), Canada yew (*Taxus canadensis*), white cedar (*Thuja occidentalis*), and yellow birch (*Betula allegheniensis*).

Comparison to Previous Relevés

No previous relevés were completed in CTn42a.

Invasive Plant Species

Invasive Plant Species Survey Methods

Meander Survey

The objective of this task was to map the location and extent of non-native invasive plant species within the natural area to inform future management actions. GEI mapped the location and extent of non-native plant species within the Magney-Snively Natural Area NPCs. The survey for invasive species within the NPCs was completed using a meander survey while recording a GPS track log to ensure visual observation of the entire area. Observations of invasive species were also recorded while completing relevé plots, surveys for Species of Greatest Conservation Need, and while generally traversing the survey area. The survey included all species identified on the Minnesota Department of Agriculture noxious weed list and the MN DNR Invasive Species List. Other species that are identified as non-native were also recorded. Non-native species that are present but not known to become invasive were evaluated for potential threat to the natural area.

Each colony of invasive/non-native species was mapped by GPS equipment with a polygon and a percent relative cover was estimated for each colony identified. Relatively small colonies were mapped by a point location with an approximate radius and number of individuals or percent relative cover. Mapping efforts included an independent meander survey combined with observations during other fieldwork.

Road and Trail Sampling Transects

In addition to the meander survey, a targeted survey was completed for invasive plant species along roads and trails (trails) within the Magney-Snively Natural Area to assess the role of trails on the spread of invasive plants. Sampling points were completed approximately every 0.5 miles (0.8 kilometers) along the trails to quantify the invasive species at set locations to prevent surveyor bias in the sampling point location. A 40 meter transect was centered perpendicular to the trail at each sampling point. The transect consisted of 5-meter radius survey plots starting at the trail centerline and then at 10 meters and 20 meters in each direction perpendicular to the trail (Figure 1). Percent relative cover of invasive species present within each survey plot was recorded. Non-native species that are present but not known to become invasive were also recorded. The perpendicular transect method was used to evaluate how far invading species are infiltrating into the NPCs from the trails. Attached Figure 4 shows the invasive species sampling points every 0.5 miles along the trail network. The trail sampling transect data is included in Appendix D.

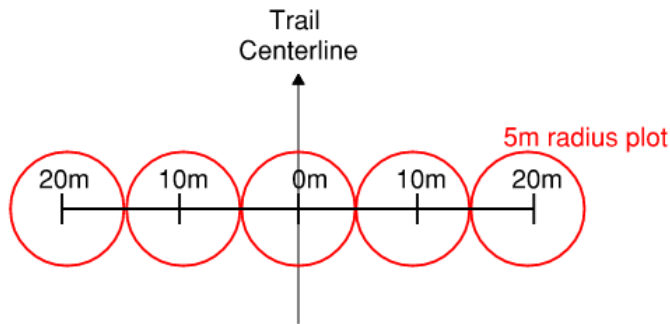


Figure 1. Sampling Design Along Trail Segments

Invasive Plant Species Survey Results

Meander Survey

Populations of invasive species were documented throughout the natural area, but the greatest infestations occurred east and south of Skyline Parkway on steeper slopes and in rock outcrop areas (Figure 3). The primary invaders were established species including common buckthorn (*Rhamnus cathartica*), orange hawkweed (*Hieracium aurantiacum*), and honeysuckle species (*Lonicera tatarica*, *Lonicera marrowii*, and *Lonicera X bella*). The most prevalent invasive species was common buckthorn, which had >50% cover in the most heavily impacted areas with scattered individuals between dense populations. It was often a mature shrub or small tree with fruit in rock outcrop areas and generally a non-fruit bearing seedling in shadier habitats. It was very uncommon in the wetlands and most prevalent in the rock outcrop (ROn23a) and upland forested communities (FDn33a and MHn35b). Common buckthorn also invaded areas north and west of Skyline Parkway but were observed less frequently and in lower abundances.

The occurrences of orange hawkweed ranged from a few scattered individuals to areas where it was a common understory plant with significant ground cover. These larger infestations were generally isolated and not widespread throughout the greater plant community. There were particularly dense populations of orange hawkweed directly north of Skyline Parkway scattered in the MHn47a, MHn35b, and FDn33b NPCs.

Honeysuckle species were generally located in the rock outcrop (ROn23a), fire dependent forest (FDn33a) and transitional areas between those communities. It was often observed as a mature, fruit-bearing shrub.

Other invasive species including common tansy (*Tanacetum vulgare*), spotted knapweed (*Centaurea stoebe*), smooth brome (*Bromus inermis*), bird's-foot trefoil (*Lotus corniculatus*), and butter and eggs (*Linaria vulgaris*) were rarely seen beyond the immediate vicinity of trails or other disturbed areas.

Many non-native, weedy species were documented throughout the natural area but were generally scattered individuals and did not account for a significant portion of ground cover in the NPCs. The most frequently encountered weedy species were common dandelion (*Taraxacum officinale*), bittersweet

nightshade (*Solanum dulcamara*), clover species (*Trifolium* spp.), brittlestem hemp-nettle (*Galeopsis tetrahit*), Kentucky bluegrass (*Poa pratensis*), and creeping bentgrass (*Agrostis stolonifera*).

Other non-native species observed that are not known to be established in the Duluth area but have the potential to become invasive were cotoneaster (*Cotoneaster horizontalis*), barberry (*Berberis vulgaris*), burning bush (*Euonymus alatus*), and helleborine orchid (*Epipactis helleborine*). The cotoneaster was primarily observed in the rock outcrop communities in significant numbers on some outcrops. The barberry, burning bush, and helleborine orchid were observed on the edges of the mesic forests. These species were not widespread and usually occurred as a single individual.

Road and Trail Sampling Transects

A total of 34 non-native species were documented along and near the trails and roads throughout the natural area. Ten of the non-native species are identified as invasive and 24 species were weedy species. On average, the total number of invasive species was the highest closest to the trails and slightly decreased with distance away from trails (Table 4). Most of the common invasive species were observed at each distance, but the less common species were more often observed at 0m and 10m. For example, common buckthorn and orange hawkweed were documented regularly at each distance along the transect, but less common invaders like smooth brome (*Bromus inermis*), tansy (*Tanacetum vulgare*) and spotted knapweed (*Centaurea stoebe*) were primarily observed at 0m.

The average percent cover of invasive species was consistent from 0m to 20m from the trail and only varied 1% across distances (Table 4). The even distribution of invasive species cover along the transect can largely be explained by the prevalence of common buckthorn and orange hawkweed. The cover of both species was not correlated with distance from the trail, which is not surprising since they were also commonly observed in plant communities far from trails.

The average total percent cover and total number of weedy species was highest within 5 meters of a trail or road and decreased with distance (Table 4). Many species were most frequently documented at 0m, and some species including Burdock (*Arctium minus*), black medick (*Medicago lupulina*), and valerian (*Valeriana officinalis*) were only seen within 5m and were either not observed or very uncommon throughout the natural area. A few weedy species such as common dandelion (*Taraxacum officinale*) and bittersweet nightshade (*Solanum dulcamara*) were scattered in low abundance throughout the natural area.

These findings indicate that many weedy and invasive species have not spread far beyond trails or roads while others have infiltrated the surrounding plant communities. In addition, the results show that the trails and roads might be a vector for introducing non-native species to the natural area.

Table 4. Average Percent Cover and Number of Invasive and Weedy Species by Distance

Distance (Meters)	Average Percent Cover Invasive Species	Average Percent Cover Weedy Species	Average Number of Invasive Species	Average Number of Weedy Species
0	6.60	10.29	1.55	2.55
10	6.81	2.0	1.26	.51
20	7.61	1.20	1.13	.45

Select Species of Greatest Conservation Need

GEI surveyed for select Species of Greatest Conservation Need (SGCN) in the natural area that have been documented in the Minnesota Natural Heritage Information System (NHIS) Biotics database within ¼ mile of the project area. A search of this database identified the target species listed in Table 5:

Table 5. Select Species of Greatest Conservation Need

Common Name	Taxonomic Name	Taxonomic Class	State Status
Eastern hemlock	<i>Tsuga canadensis</i>	Vascular Plant	Endangered
Narrow triangular moonwort	<i>Botrychium angustisegmentum</i>	Vascular Plant	Threatened
Soapberry	<i>Shepherdia canadensis</i>	Vascular Plant	Special Concern

Select Species of Greatest Conservation Need Survey Methods

The SGCN survey began with a desktop review of existing data and resources by reviewing a variety of available information to identify land cover types, potential habitat, native plant communities, and rare species occurrence records. The desktop review was followed by a meander survey within each identified plant community. Rare plant meander surveys were completed within each identified plant community while recording a GPS track log to ensure visual observation of the entire natural area. The survey occurred during optimal identification periods for the select SGCN as shown in Table 6.

Table 6. MN DNR Optimal Identification Period

Common Name	Optimal Identification Period
Eastern hemlock	June through September
Narrow triangular moonwort	June through August
Soapberry	June through Mid September

The random meander survey was completed throughout the entire work area, with efforts focused on areas of suitable habitat, to document presence or absence of each plant species. A track log was maintained using the GPS system to document the meander path. The random meander survey follows the DNR Division of Ecological and Water Resources Guidance on documenting rare plants. Any locations of field identified rare species found were surveyed with GPS equipment and photographs were taken. The habitat of the rare plant was documented including the site characteristics. Field data collected met NHIS Biotics Observation Form data fields. The survey methods did not include the take of any species, as defined by Minnesota state statutes, or collection of any specimen vouchers.

SGCN plant species locations, type and extent data were collected using ArcGIS Field Maps software and were geolocated using a GPS capable of sub-foot accuracy and incorporated into a GIS using ArcGIS Pro software. Geospatial data layers were provided to MLT to integrate with other project data sets.

Select Species of Greatest Conservation Need Survey Results

Magney-Snively is known to support several populations and occurrences of rare plants and species tracked by the DNR within the large natural area. Eastern hemlock (*Tsuga canadensis*) was one of the first species to be located in 1939 by Olga Lakela (MN DNR, 2009). Retired botanist Gary Walton located 10 additional rare plant populations between 1999 and 2001, many of which were located north of the Magney-Snively Natural Area within the old growth on Spirit Mountain property (MN DNR, 2009). MN DNR staff members have also noted observations of rare plants, beginning in the 1980's (MN DNR, 2009). This study detected 15 new populations of soapberry (*Shepherdia canadensis*) in rocky outcrops and fire dependent forests.

Table 7 denotes the various species found in Magney-Snively, their taxonomic class, State Status, and number of occurrences within the natural area in this 2024 survey. Some species have been delisted since 2009, and those species are included in the narrative to describe current observations.

Table 7. 2024 Species of Greatest Conservation Need Occurrences

Common Name	Taxonomic Name	Taxonomic Class	State Status	Element Occurrence Record (rare species record) in 2024
Soapberry	<i>Shepherdia canadensis</i>	Vascular Plant	Special Concern	15
Eastern hemlock	<i>Tsuga canadensis</i>	Vascular Plant	Endangered	0
Narrow triangular moonwort	<i>Botrychium angustisegmentum</i>	Vascular Plant	Threatened	0
White baneberry	<i>Actaea pachypoda</i>	Vascular plant	No legal status	4
Nodding sedge	<i>Carex gynandra</i>	Vascular plant	No legal status	1

MHn47a continues to harbor the largest number of historical rare plant occurrences within and beyond the natural area boundary; however, none of those occurrences were confirmed within the Magney-Snively Natural Area during this survey (Figure 5). Some have likely disappeared, including an individual of narrow triangular moonwort (*Botrychium angustisegmentum*) that was found in 2014 as a single individual growing near a trail and trailhead. It was noted in the historical record that earthworms had heavily impacted the site. Other populations of Carolina spring beauty (*Claytonia caroliniana*) and Moschatel (*Adoxa moschatellina*) likely still exist and thrive, but the survey timeline didn't begin until July when both of those species are dormant. Those species have been delisted due to an increase in known populations across the northern region of the state, but they are still very rare within the City of Duluth and worth tracking as indicators of health.

White baneberry (*Actaea pachypoda*) was noted as a significant species within MHn47a in the 2009 surveys and noted three known populations at the time tracked by NHI. This survey found similarly scattered individuals while meandering across rich deciduous forest communities extending beyond the

MHn47a, including MHn33b, MHn45b, and MHn47a. Since this species is not a state listed species, geographical data was not collected for each individual encountered. A quick search on Inaturalist for the area shows seven separate populations with confirmed identification photos of white baneberry, occurring in both MHn47a and MHn35b, though those have not been cross-referenced with historical populations or general observations of this survey team.

Soapberry (*Shepherdia canadensis*) was found in 15 different populations, totaling approximately 28 individuals within the Magney-Snively Natural Area boundary and two additional individuals were mapped just beyond the boundary. Soapberry was found in FDn33b and ROn23 and was usually associated with exposed bedrock. Five individuals, including the two beyond the natural area boundary, were found along trails or road edges along the DWP trail and West Skyline Parkway.

Nodding sedge (*Carex gynandra*) was found in one new location during this survey. Nodding sedge is not a state-listed species but is tracked by the Natural Heritage Inventory. This location occurred in a small, unmapped black ash and yellow birch depression within the larger MHn47a plant community. This depression likely represents a vernal pool, which is similar to the habitat it was found in during the MN DNR 2009 study, describing an east-facing slope in the transition between MHn47a and WFn64a.

Eastern hemlock (*Tsuga canadensis*) was not found during this survey, though descriptions of the presumed historic population within the natural area were thoroughly searched, including all conifers within a mile radius of the assumed location. One standing dead tree was found near the historical point with no bark or other defining characteristics, and the population in question has never been located since that 1939 record. In 2006, a healthy population was documented that fit the description of the 1939 record but was beyond the boundary of the Magney-Snively Natural Area. Other efforts have been made to locate that original record, but no one has found it. Based on other populations where eastern hemlock has been found, there is suitable habitat along ravines and intermittent streams within the MHn47a and MHn35b plant communities, but no populations have been detected within the Magney-Snively Natural Area.

Spring Ephemeral Survey

A spring ephemeral plant species survey was completed in May 2025. The spring ephemeral survey focused on documenting occurrences of Carolina spring beauty (*Claytonia caroliniana*) and moschatel (*Adoxa moschatellina*) because they were previously listed as species of Special concern, serve as indicators of forest health, and were dormant during the 2024 survey window. Carolina spring beauty was previously documented in two different populations but has been documented in recent years between 2020-2024 on Inaturalist in five different populations, including observations from Carol Reschke who conducted the old growth forest survey. Moschatel was previously found in two different populations and has also been documented in two additional locations on Inaturalist.

Targeted meander surveys were conducted throughout Sugar Maple – Basswood (Bluebead Lily) Forest (MHn47a) as this NPC has rich soil that provides nutrients and moisture needed to sustain high photosynthetic rates of spring ephemerals. Surveys also occurred in other mesic forests (MHn35b, MHn45b, MHn46b) and black ash swamps (WFn55a, WFn64a) when they were encountered while navigating to the target habitat.

Each occurrence of a species was documented with a point, line, or polygon. The feature selected was based on the number of individuals and extent of the population with a point used for small populations of scattered individuals, a polygon to delineate the extent of larger populations, and a line to represent an abundant population along a meander track. For each feature, the species' name and an estimate of the number of individuals present was collected. In addition, representative photos were taken for each species, but not for each occurrence.

Carolina spring beauty was previously documented in a few locations in the natural area, and this survey showed that it is common in suitable habitat north of Skyline Parkway. The majority of the populations occurred in the richest forested NPC type (MHn47a). It was also occasionally documented in other mesic NPC types (MHn35b) and on the fringes of vernal pools and other wetlands. The size of the populations varied from a few scattered individuals to expansive populations, and it did not seem to be associated with particular species or microhabitats.

Carolina spring beauty was only documented once south of Skyline parkway and was infrequently found in the areas nearest the north side of the road. This could be due to a higher cover of invasive species such as buckthorn and earthworms. Anecdotally, at least some areas without Carolina spring beauty had high cover of buckthorn or had low species diversity with high Pennsylvania sedge cover, which indicates earth worm impact.

Moschatel was found infrequently in mesic forest NPC types (MHn35b, MHn47a) north and south of Skyline Parkway. Populations were confined to under old-growth trees or in exposed rock crevices. This indicates that this species is likely naturally uncommon since there was seemingly abundant suitable habitat.

Other spring ephemerals that were occasionally observed but not documented include cutleaf toothwort (*Cardamine concatenata*) and dutchman's breeches (*Dicentra cucullaria*). While not a true spring

ephemeral, wild leek (*Allium tricoccum*) was abundant throughout MHn47a. Notable spring ephemerals not observed were yellow trout lily (*Erythronium americanum*) and white trout lily (*Erythronium albidum*). Attached Figure 6 shows the locations of observed Carolina spring beauty and moschatel.

Vernal Pool Survey

Another important feature of Magney-Snively that was not specifically surveyed in 2024 was its high potential for vernal pools. Vernal pools play a significant role for ground water recharge into both Stewart Creek and Sargent Creek and create habitat for species such as wood frogs, blue spotted salamanders, and fairy shrimp that rely on those features across the landscape. Bruce Carlson noted in the 2009 Biological Survey of Magney-Snively that ephemeral wetlands were not mapped but certainly exist within the MHN47a plant community and were likely impacted by the construction of the existing trails and Skyline Parkway and could be impacted further by any future trail construction. Occasional vernal pools were mapped during this study, but only when encountered during meanders and should be verified through spring surveys searching for presence/absence of water and indicator species. Future vernal pools monitoring may further evaluate the contributions and importance of this unique ecosystem. Vernal pools may also play a vital role for sensitive bird species or macroinvertebrate species that rely on these small plant communities.

Following methods established by NRRI in 2014, GEI identified potential vernal pools by using Digital Elevation Models (DEMs) to locate depressions in the landscape and cross-referencing them with leaf-off aerial imagery. GEI evaluated the United States Geological Survey (USGS) 1-meter resolution DEM (2021) available through the USGS National Map, implementing the Flow Direction and Sink tool within the Magney-Snively Duluth Natural Area boundary to identify raster cells without an outflow. The resulting raster cells were converted to point features and evaluated against the St. Louis County's high-resolution leaf-off aerial imagery (2023) to further refine depressional features as potential vernal pool locations. A depressional feature was considered a potential vernal pool when a low spot had a wetland signature on aerial imagery. The resulting potential vernal pool locations were combined with the locations that had been identified by NRRI in 2014, but had not yet been field-evaluated.

Each potential vernal pool was field verified via intuitive meander surveys. At each site, indicators of vernal pools including presence or absence of standing water, sphagnum moss, wood frogs, salamanders, and fairy shrimp were evaluated. Without these indicators, a point could still be a vernal pool if it was in a depression and the soil was saturated or if there were other signs that it was recently wet. If none of these indicators were present or if the pool was not hydrologically isolated from an adjacent wetland, it was not considered to be a vernal pool.

The confirmed vernal pools were mapped using GPS. The presence or absence of vernal pool indicators and canopy tree species were recorded. Representative photos of the vernal pools were taken.

A total of 198 vernal pools totaling 1-acre were mapped. Most of the vernal pools identified through the GIS analysis were confirmed as vernal pools, and several pools were mapped that had not identified by GIS analysis. The majority of pools were in mesic forest NPC types including MHN47a and MHN35b and a few were in fire dependent NPCs. Some of the potential points in fire dependent habitat were excluded because they were inaccessible and unlikely vernal pools. There were likely more vernal pools not surveyed in this study in black ash swamp habitat. The potential pools in these areas were likely not

hydrologically isolated from the surrounding wetland, so efforts were better spent confirming vernal pool locations in upland habitats.

The pools varied in size, habitat, indicators present and canopy composition. Most pools were within mesic forest with black ash, sugar maple, and yellow birch in the canopy. Other less common but frequent canopy species were aspen, white birch, red maple, and red oak. Some vernal pools had a significant shrub canopy of mostly alder with occasional beaked hazelnut. Some standing water was observed in most pools, and if water was not present, the soil was saturated and the leaf litter within the pool was water-stained. Sphagnum moss was occasionally present in and around the pools, especially when near a black ash swamp or other wetland; however, it did not seem like an important feature of most pools within upland NPC types. Wood frogs are less active during the day when the surveys occurred, which could explain why they were only observed in one pool. Salamanders or fairy shrimp were not observed in any of the pools. Attached Figure 7 shows the locations of mapped vernal pools.

Recommendations

On a broad scale, the plant communities within Magney-Snively Natural Area remain of high quality, but there are actions that could improve the natural area or better inform future stewardship management activities. The following recommendations have been drafted based on observations and findings from this 2024 and 2025 survey of the Magney-Snively Natural Area.

1. Preservation of ranked highest quality plant communities
2. Removal of seed producing invasives
3. Restoration of FDn33b and ROn23
4. Underplanting of desired tree species
5. Expansion of old growth study

Preservation of Ranked Highest Quality Plant Communities

It is noteworthy that an old growth forest of this size (approximately 300 acres (MN DNR 2009)) exists within such a large urban area. To continue to protect this forested ecosystem for generations to come, preservation is recommended. Recommended actions include no new trail construction that would further fragment the existing forest, including trail reroutes unless absolutely necessary. Though these communities are ranked A or B and have little to no invasive species throughout most of their area, removing the existing sporadic seedlings and mature seed trees of buckthorn will provide long-term protection. Educational signage that describes appropriate use of these high-quality areas is also recommended to direct the public on how to interact with these sensitive areas. Organizing a volunteer group to take on some of the searching for these sporadic invasive species would also be an effective way to control invasives at little cost.

Removal of Seed Producing Invasives

To slow the spread of buckthorn and honeysuckle, a targeted approach to invasive species removal is recommended, beginning with the seed producing mature individuals marked during this study. Additional surveys must also be taken to locate the seed producing individuals that were not mapped due to time and cost constraints on the 2024 survey.

Restoration of FDn33b and ROn23

These communities have been the most negatively impacted due to the construction of West Skyline Parkway, DWP railroad/trail, and heavy foot traffic. Gridding these areas out to cut and treat stumps and foliar spray invasive species will make a positive impact on the overall plant communities. Additional tree planting within FDn33b following invasive species treatment could increase native vegetation competition. The recommended species to plant in this community include white pine (*Pinus strobus*), red pine (*Pinus resinosa*), and occasional cedar (*Thuja occidentalis*).

Underplanting of Desired Tree Species

White tailed deer have altered the natural regeneration of northern Minnesota's forests since they expanded their range after logging in late 1800's to early 1900's. Little regeneration of sugar maple (*Acer*

saccharum), red oak (*Quercus rubrum*), and basswood (*Tilia americana*) was observed with no regeneration of yellow birch (*Betula allegheniensis*), cedar (*Thuja occidentalis*), or white pine (*Pinus strobus*). Old growth forests will not regenerate with similar species composition if not underplanted but will be replaced with aspen (*Populus tremuloides*) and paper birch (*Betula papyrifera*), two species that do not get large enough to provide cavities for nesting birds and mammals. Table 8 presents the recommended tree species to plant per NPC.

Table 8. Plant Community Species Recommendations

Plant Community	Yellow Birch	Cedar	White Pine	Red Oak	Basswood	Sugar Maple	Priority Ranking
White Cedar – Yellow Birch Forest	Yes	Yes	No	No	No	No	High
Black Ash – Aspen – Balsam Poplar Swamp (Northeastern)	Yes	Yes	No	No	Yes	No	High
Black Ash – Conifer Swamp (Northeastern)	Yes	Yes	No	No	No	No	Moderate
Black Ash – Basswood Forest	Yes	Yes	No	No	Yes	No	Moderate
Sugar Maple – Basswood – (Bluebead Lily) Forest	Yes	No	Yes	No	Yes	Yes	Moderate
Red Oak – Sugar Maple – Basswood – (Bluebead Lily) Forest	Yes	No	Yes	Yes	Yes	Yes	Moderate
Wet Meadow Bluejoint Subtype	No	Yes	No	No	No	No	Low

Expansion of Old Growth Study

Two regions of old growth were identified by the Flaccus and Ohmann study in 1964 and confirmed in 1984 by MN DNR surveys that remain intact. Additional regions throughout the study area might now qualify as maple-basswood old growth through the MN DNR's old growth classification of 120 years old or older within a minimum of 20-acre occurrences. Additional regions for further old growth study might include the northern edge of the boundary south of Stewart Creek and expanding the boundary of the two old growth regions identified in 1964. Identifying where the oldest forests are located might help

prioritize areas to underplant in the future as a lack of regeneration has been cited as an impact to the Magney-Snively Natural Area.

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Figures

Figure 1. Site Location

Figure 2. Native Plant Communities and Relevé Plot Locations

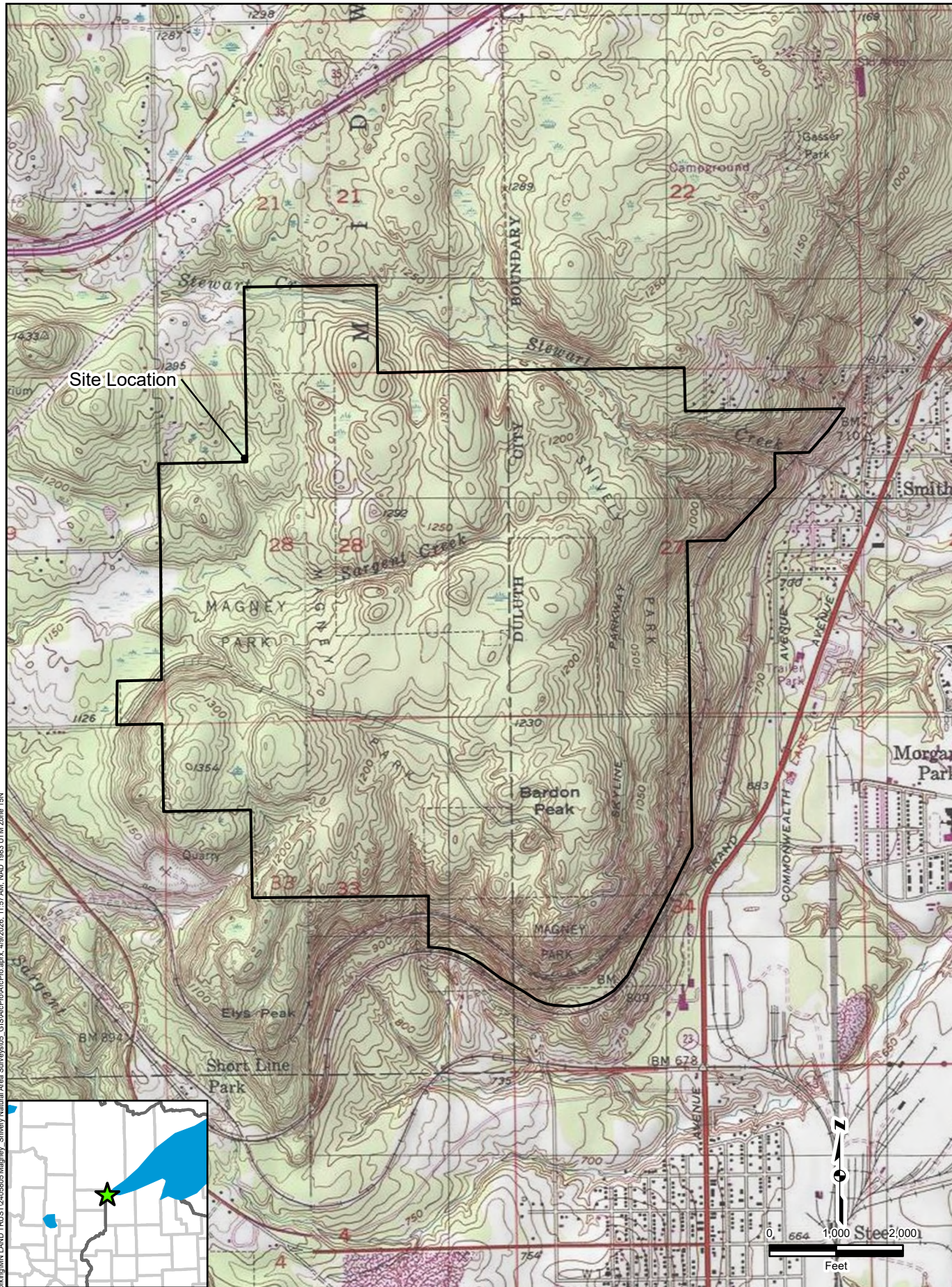
Figure 3. Invasive/Non-native Plant Species

Figure 4. Invasive/Non-native Plant Road and Trail Sampling Transects

Figure 5. Species of Greatest Conservation Need

Figure 6. Spring Ephemerals Survey Results

Figure 7. Vernal pool Survey Results



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Service Layer Credits: USGS Topographical Maps

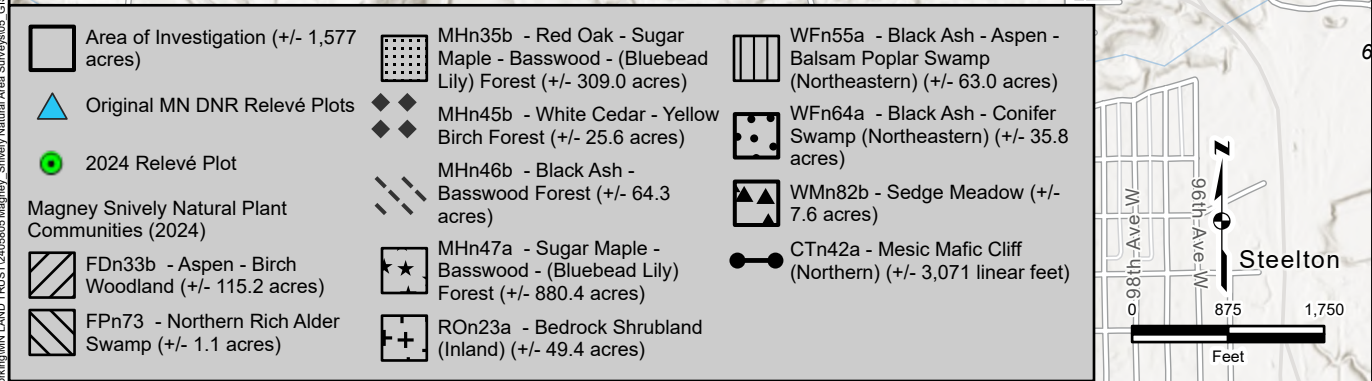
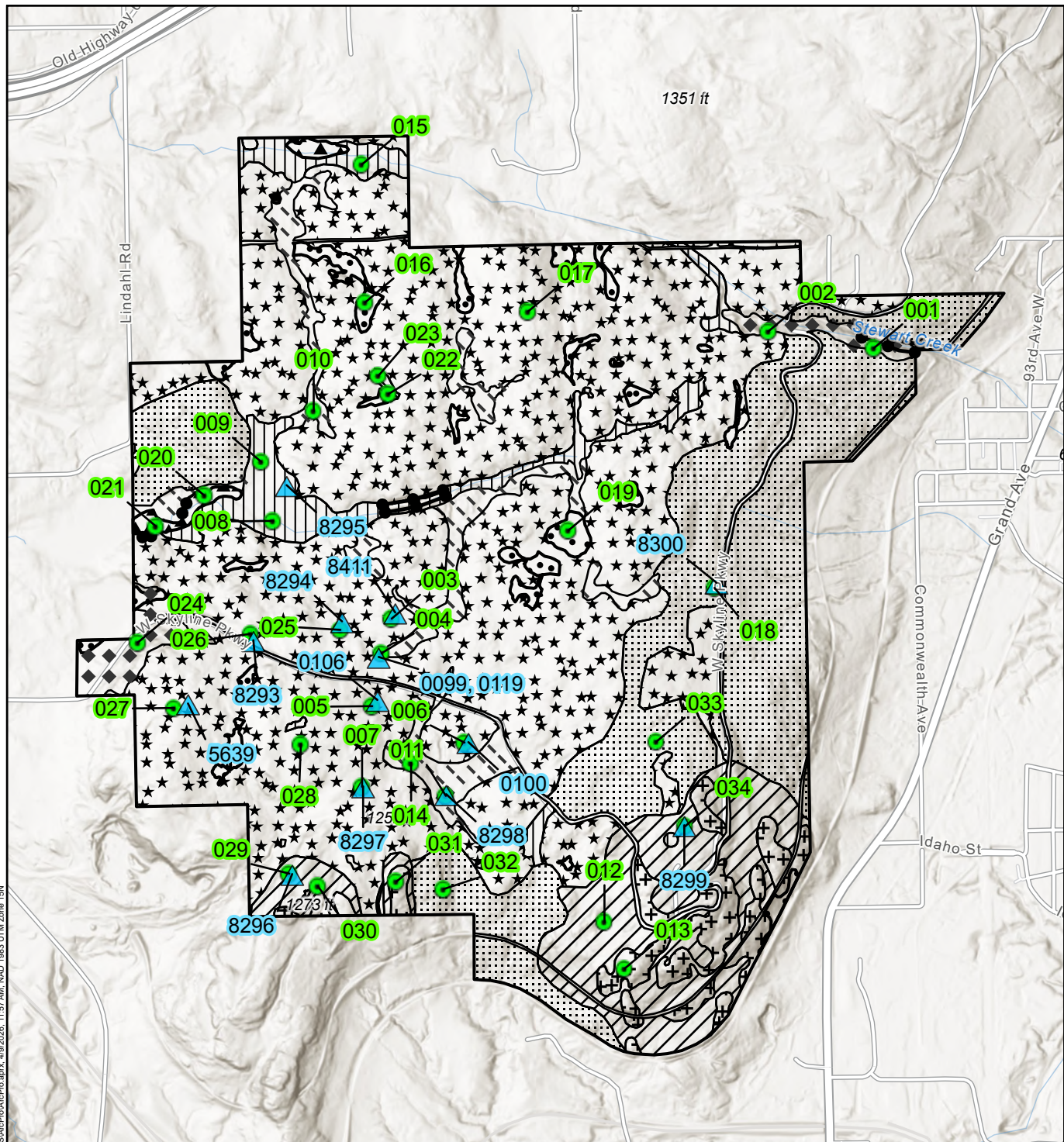


MAGNEY-SNIVELY NATURAL AREA PLANT COMMUNITY MAPPING DULUTH, MINNESOTA

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FIGURE 01

SITE LOCATION
OCTOBER, 2024



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Drawn: 4/9/2026



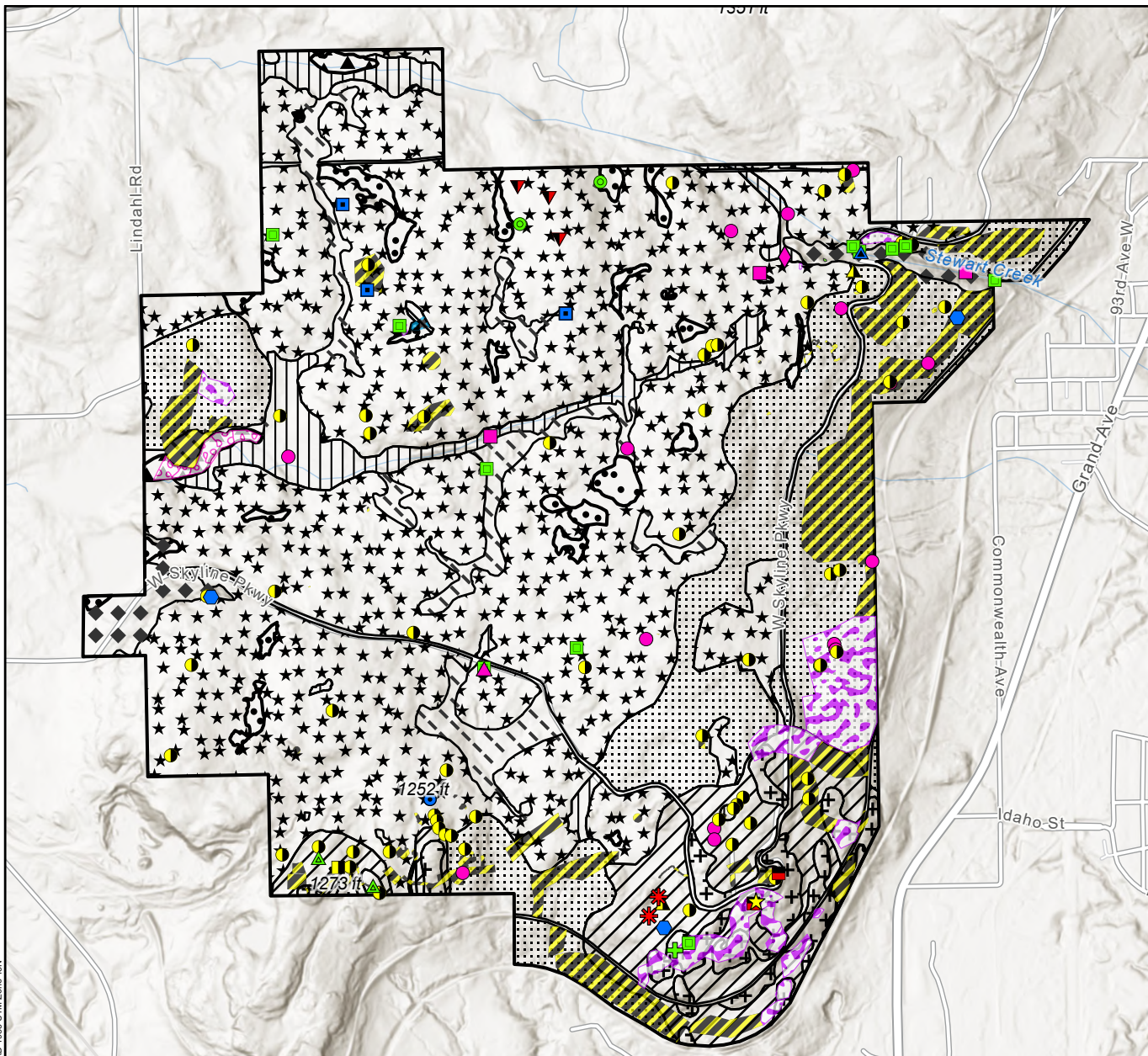
MAGNEY-SNIVELY NATURAL AREA PLANT COMMUNITY MAPPING DULUTH, MINNESOTA

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MINNESOTA LAND TRUST

FIGURE 02

NATIVE PLANT COMMUNITIES
AND RELEVÉ PLOT LOCATIONS
JUNE, 2025

GEI Office: Duluth, MN | Source: B:\Working\MN LAND TRUST\3405805\Magney_Snively Natural Area_Survey\05_GIS\MapPro\ActPro.aprx, 4/9/2026, 12:29 PM, NAD 1983, UTM Zone 15N



Magney Snively Natural Plant Communities (2024)

- FDn33b - Aspen - Birch Woodland (+/- 115.2 acres)
- FPn73 - Northern Rich Alder Swamp (+/- 1.1 acres)
- MHn35b - Red Oak - Sugar Maple - Basswood - (Bluebead Lily) Forest (+/- 309.0 acres)
- MHn45b - White Cedar - Yellow Birch Forest (+/- 25.6 acres)
- MHn46b - Black Ash - Basswood Forest (+/- 64.3 acres)
- MHn47a - Sugar Maple - Basswood - (Bluebead Lily) Forest (+/- 880.4 acres)
- RON23a - Bedrock Shrubland (Inland) (+/- 49.4 acres)
- WFn55a - Black Ash - Aspen - Balsam Poplar Swamp (Northeastern) (+/- 63.0 acres)



WFn64a - Black Ash - Conifer Swamp (Northeastern) (+/- 35.8 acres)



WMn82b - Sedge Meadow (+/- 7.6 acres)

Invasive Species Detection (area, polygon)



Canada thistle



Common buckthorn



Common hawkweed



Common speedwell



Crack willow



Multiple



Reed canary grass

Invasive Species Detection (point)



Non-native Honeysuckle

Broad-leaved helleborine

Canada thistle

Common buckthorn

Common dandelion

Common hawkweed

Common speedwell

Common tansy

Common toadflax

Cottoneaster

Crownvetch

Forget-Me-Not

Glossy buckthorn

Helleborine orchid

Hemp nettle

Burning Bush

Japanese barberry

Leafy spruce

Scots pine

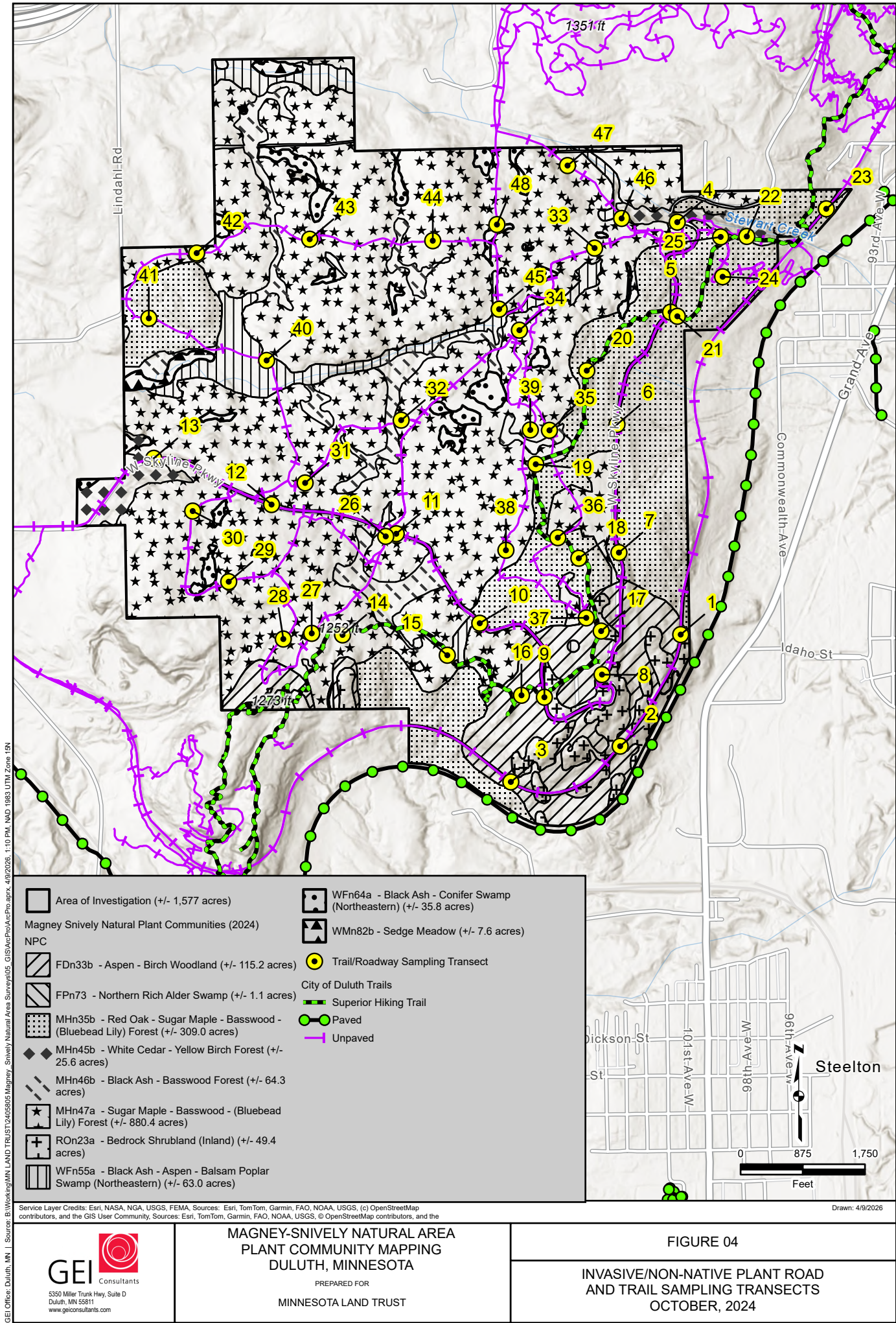
Siberian peashrub



0 875 1,750
Feet

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Drawn: 4/9/2026

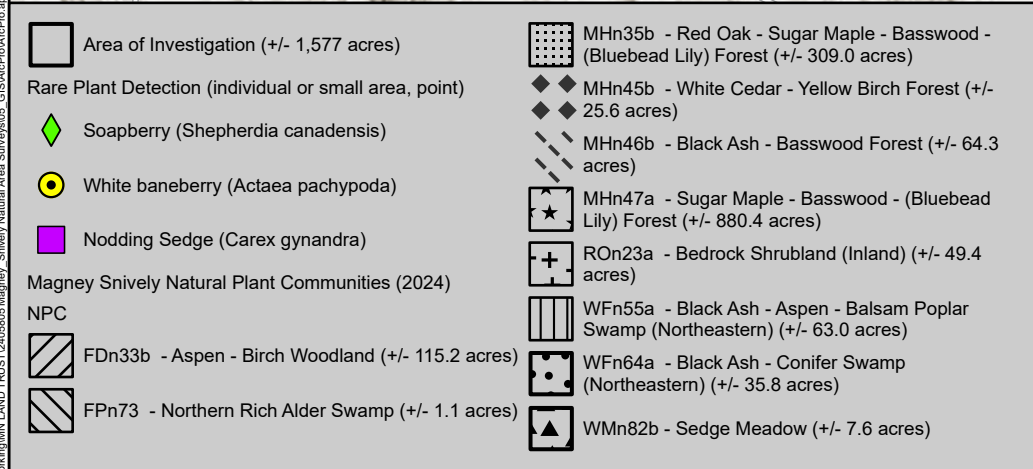
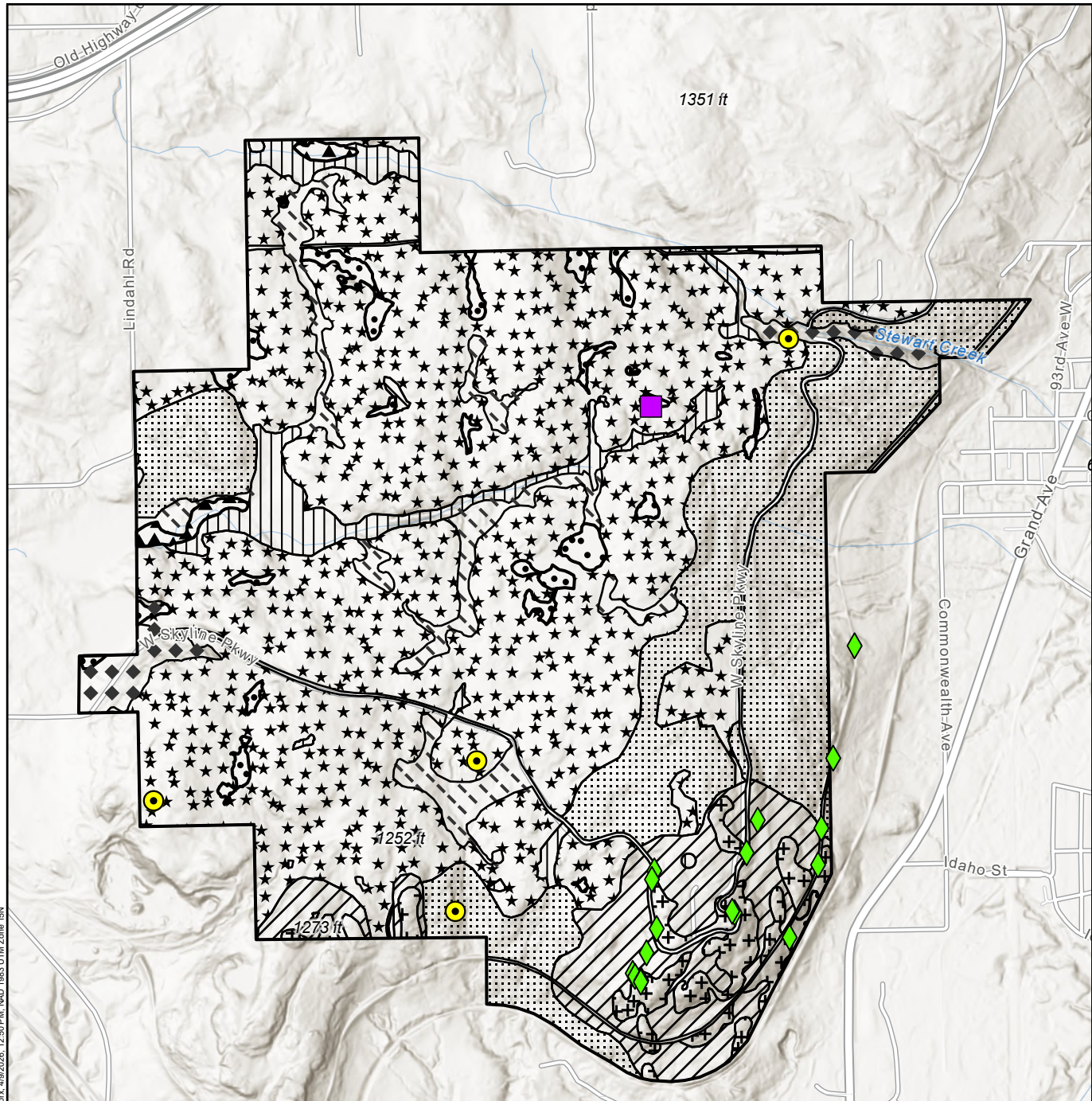


**MAGNEY-SNIVELY NATURAL AREA
PLANT COMMUNITY MAPPING
DULUTH, MINNESOTA**

PREPARED FOR
MINNESOTA LAND TRUST

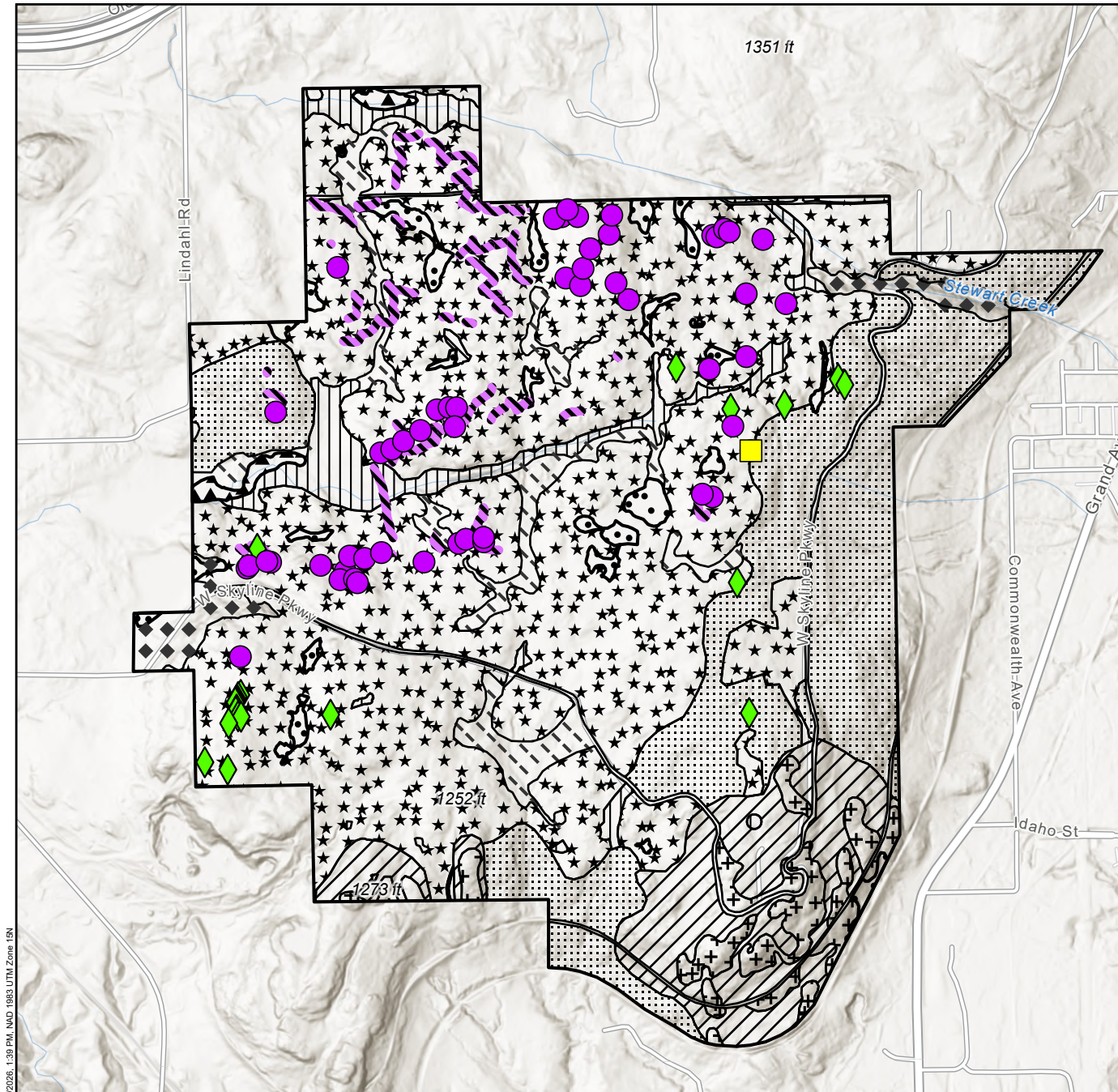
FIGURE 04

**INVASIVE/NON-NATIVE PLANT ROAD
AND TRAIL SAMPLING TRANSECTS
OCTOBER, 2024**



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Area of Investigation (+/- 1,577 acres) Magney Snively Natural Plant Communities (2024) NPC FDn33b - Aspen - Birch Woodland (+/- 115.2 acres) FPn73 - Northern Rich Alder Swamp (+/- 1.1 acres) MHn35b - Red Oak - Sugar Maple - Basswood - (Bluebead Lily) Forest (+/- 309.0 acres) MHn45b - White Cedar - Yellow Birch Forest (+/- 25.6 acres) MHn46b - Black Ash - Basswood Forest (+/- 64.3 acres) MHn47a - Sugar Maple - Basswood - (Bluebead Lily) Forest (+/- 880.4 acres) RON23a - Bedrock Shrubland (Inland) (+/- 49.4 acres)	WFn55a - Black Ash - Aspen - Balsam Poplar Swamp (Northeastern) (+/- 63.0 acres) WFn64a - Black Ash - Conifer Swamp (Northeastern) (+/- 35.8 acres) WMn82b - Sedge Meadow (+/- 7.6 acres) Spring Ephemerals (points) Adoxa moschatellina (Moschatel) Claytonia caroliniana (Carolina spring beauty) Dicentra cucullaria (Dutchman's britches) Spring Ephemerals (polygons) Adoxa moschatellina (Moschatel) Claytonia caroliniana (Carolina spring beauty)
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Drawn: 4/9/2026



MAGNEY SNIVELY NATURAL
COMMUNITY MAPPING
DULUTH, MINNESOTA
PREPARED FOR
MINNESOTA LAND TRUST

FIGURE 06

SPRING EPHEMERALS
SURVEY RESULTS
MAY, 2025

Appendix A: MN DNR Relevé Field Forms

Appendix Accessibility Statement: This appendix contains field data forms obtained from a third-party organization. These materials are included verbatim and have not been modified, and therefore may not conform to ADA accessibility requirements. All relevant data and interpretations derived from these forms are presented within the main report text. Inclusion of the original forms is intended solely as a methodological reference for future field efforts and is not required for interpretation of the report results.

MINNESOTA NATURAL HERITAGE & NONGAME RESEARCH PROGRAM
Department of Natural Resources
500 Lafayette Road
St. Paul, Minnesota 55155
(651) 296-2835

DNR RELEVE #:0099

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: **BAC-005** EO Rec #: **7986**
*Surveyor's ID Code: **CAE** (B. Coffin and D. Engstrom)
Date: **11** Month: **JUN** Year: **1982** (e.g. 04 JUL 1993)
CBS Site #: **1** or Site Name: **Magney - Snively forest**
DNR Ownership Code: **80** (City Park)
*NC Code: **MHn47a** (Sugar Maple-Basswood-(Bluebead Lily) Forest)
Commun. Ranking in Relve:**A** Stand typical of Commun. Type:_ Relve typical of Stand:_

LOCATIONAL INFORMATION

State Code: **MN** *County Code: **69** (St. Louis)
Quad Codes DNR: **L21B** Universal: **46092F2** (West Duluth)
Township: **049N** (e.g. 143N) Range: **15W** (e.g. 32W)
QQRT: **SE** QRT: **SW** of Section **28**
Latitude: **46 degrees, 41 minutes, 35 seconds** LL/GPS registration:
Longitude: **92 degrees, 14 minutes, 50 seconds** *Accuracy: _ Marker: _

RELEVE INFORMATION

Relve Size (sq. m.): **400** Elev. (ft.): **1230** Slope: **05SE** Slope Position: _
*ECS Subsection: **15** (Glacial Lake Superior Plain)
Minnesota Soil Atlas Mapping Unit: **LLWL**
*Geomorphic Unit: **58** (Automba Drumlin Area)

Remarks: **Old growth N. hardwoods, dom. by Acer sac., Bet. lut. and Tilia amer.**
Largest old-growth NH stand in N. MN. Redoaks 163 yrs-58cm dbh and 157
yrs-43cm dbh. Soils: deep silty or loamy (MN Soil Atlas).

OTHER DATA COLLECTED

Soils: **N** Forestry: **Y** o=old growth Water Chemistry: **N** Publication: **Y**
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Broadleaf Deciduous, Height: 20-35m, Cover patchy

- 2.1 Acer saccharum (Sugar maple)
- 2.1 Betula alleghaniensis
- 2.1 Quercus rubra (Common red oak)
- 1.1 Tilia americana (Basswood)

Woody Broadleaf Deciduous, Height: 10-20m, Cover rare

- 2.1 Acer saccharum (Sugar maple)

Woody Broadleaf Deciduous, Height: 5-10m, Cover patchy

- 2.1 Acer saccharum (Sugar maple)
- +1 Ostrya virginiana (Ironwood, hop hornbeam)

Woody Broadleaf Deciduous, Height: 2-5m, Cover interrupted

- 4.1 Acer saccharum (Sugar maple)
- +1 Prunus virginiana (Chokecherry)

Woody Broadleaf Deciduous, Height: .5-2m, Cover rare

- 3.1 Acer saccharum (Sugar maple)
- 1.1 Prunus virginiana (Chokecherry)
- +1 Lonicera canadensis (Fly honeysuckle)

Woody Broadleaf Deciduous, Height: .1-.5m, Cover barely present

- 1.1 Acer saccharum (Sugar maple)
- +1 Prunus virginiana (Chokecherry)
- +1 Ribes cynosbati (Prickly gooseberry, dogberry)
- +1 Ribes triste (Swamp red currant)
- +1 Sambucus pubens (Red-berried Elder)

R.1 *Acer spicatum* (Mountain maple)
R.1 *Fraxinus nigra* (Black ash)
R.1 *Ribes cf. glandulosum* (Skunk currant)
R.1 *Sorbus decora* (Mountain-ash)

Graminoid, Height: .1-.5m, Cover barely present

+1 *Carex pensylvanica*
+1 Unknown or Indeterminable Plant
R.1 *Oryzopsis asperifolia* (Mountain rice-grass)

Forb, Height: .1-.5m, Cover barely present

1.1 *Viola pubescens*
+1 *Allium tricoccum* (Wild leek)
+1 *Anemone quinquefolia*
+1 *Arisaema triphyllum* (Jack-in-the-pulpit)
+1 *Athyrium angustum* (Lady fern)
+1 *Circaea alpina* (Small enchanter's nightshade)
+1 *Clintonia borealis* (Blue-bead lily)
+1 *Streptopus roseus* var. *longipes* (Rose twisted-stalk)
+1 *Viola selkirkii* (Great-spurred violet)
R.1 *Galium triflorum* (Three-flowered bedstraw)
R.1 *Osmorhiza claytonii* (Sweet cicely)
R.1 *Polygonatum pubescens* (Hairy Solomon's-seal)
R.1 *Taraxacum officinale* (Common dandelion)
R.1 *Trillium grandiflorum* (Large-flowered trillium)

MINNESOTA NATURAL HERITAGE & NONGAME RESEARCH PROGRAM
Department of Natural Resources
500 Lafayette Road
St. Paul, Minnesota 55155
(651) 296-2835

DNR RELEVE #:0100

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: **BAC-006** EO Rec #: **7986**
*Surveyor's ID Code: **CAE** (B. Coffin and D. Engstrom)
Date: **11** Month: **JUN** Year: **1982** (e.g. 04 JUL 1993)
CBS Site #: **1** or Site Name: **Magney - Snively forest**
DNR Ownership Code: **80** (City Park)
*NC Code: **MHN47a** (Sugar Maple-Basswood-(Bluebead Lily) Forest)
Commun. Ranking in Relve:**A** Stand typical of Commun. Type:_ Relve typical of Stand:_

LOCATIONAL INFORMATION

State Code: **MN** *County Code: **69** (St. Louis)
Quad Codes DNR: **L21B** Universal: **46092F2** (West Duluth)
Township: **049N** (e.g. 143N) Range: **15W** (e.g. 32W)
QORT: **NE** QRT: **NE** of Section **33**
Latitude: **46 degrees, 41 minutes, 25 seconds** LL/GPS registration:
Longitude: **92 degrees, 14 minutes, 35 seconds** *Accuracy: _ Marker: _

RELEVE INFORMATION

Relve Size (sq. m.): **400** Elev. (ft.): **1150** Slope: **05S** Slope Position: _
*ECS Subsection: **15** (Glacial Lake Superior Plain)
Minnesota Soil Atlas Mapping Unit: **LLWL**
*Geomorphic Unit: **58** (Automba Drumlin Area)

Remarks: **Largest old-growth N. hardwood stand in N. MN. Red oaks 163yrs-58cm dbh, 157 yrs-43cm dbh. Soils: deep silty or loamy, well-drained, light (MN Soil Atlas).**

OTHER DATA COLLECTED

Soils: **N** Forestry: **Y** o=old growth Water Chemistry: **N** Publication: **Y**
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Broadleaf Deciduous, Height: 20-35m, Cover patchy

2.1 Acer saccharum (Sugar maple)
1.1 Betula alleghaniensis
1.1 Tilia americana (Basswood)

Woody Broadleaf Deciduous, Height: 10-20m, Cover patchy

3.1 Acer saccharum (Sugar maple)

Woody Broadleaf Deciduous, Height: 5-10m, Cover barely present

R.1 Acer saccharum (Sugar maple)

Woody Broadleaf Deciduous, Height: 2-5m, Cover barely present

R.1 Acer saccharum (Sugar maple)
R.1 Ostrya virginiana (Ironwood, hop hornbeam)

Woody Broadleaf Deciduous, Height: .5-2m, Cover rare

1.1 Lonicera canadensis (Fly honeysuckle)
+.1 Acer saccharum (Sugar maple)
+.1 Acer spicatum (Mountain maple)
+.1 Corylus cornuta (Beaked hazelnut)
+.1 Ostrya virginiana (Ironwood, hop hornbeam)
+.1 Prunus virginiana (Chokecherry)
+.1 Quercus rubra (Common red oak)
+.1 Tilia americana (Basswood)
R.1 Betula alleghaniensis

Woody Broadleaf Deciduous, Height: .1-.5m, Cover rare

1.1 Acer saccharum (Sugar maple)

+1.1 Acer spicatum (Mountain maple)
+1.1 Fraxinus nigra (Black ash)
+1.1 Lonicera canadensis (Fly honeysuckle)
+1.1 Quercus rubra (Common red oak)
R.1 Sorbus decora (Mountain-ash)

Graminoid, Height: .1-.5m, Cover rare

2.1 Carex pedunculata 14
+1.1 Carex pensylvanica 15
+1.1 Oryzopsis asperifolia (Mountain rice-grass)
+1.1 Unknown or Indeterminable Plant 11

Forb, Height: .1-.5m, Cover continuous

2.1 Aralia nudicaulis (Wild sarsaparilla)
2.1 Osmorhiza claytonii (Sweet cicely)
1.1 Aster macrophyllus (Large-leaved aster)
1.1 Athyrium angustum (Lady fern)
1.1 Circaea alpina 12 (Small enchanter's nightshade)
1.1 Matteuccia struthiopteris var. pensylvanica (Ostrich fern)
1.1 Streptopus roseus var. longipes (Rose twisted-stalk)
1.1 Viola cf. sororia 17 (Common blue violet)
1.1 Viola pubescens
NON +1.1 Actaea pachypoda RA (White baneberry)
+1.1 Anemone quinquefolia
+1.1 Aster 16
+1.1 Clintonia borealis (Blue-bead lily)
+1.1 Galium triflorum (Three-flowered bedstraw)
+1.1 Hepatica americana (Round-lobed hepatica)
+1.1 Maianthemum canadense (Canada mayflower)
+1.1 Polygonatum pubescens (Hairy Solomon's-seal)
+1.1 Rubus pubescens (Dwarf blackberry)
+1.1 Solidago cf. flexicaulis 10 (Zig-zag goldenrod)
+1.1 Thelypteris phegopteris (Long beech-fern)
+1.1 Trillium grandiflorum (Large-flowered trillium)
+1.1 Trillium cernuum
R.1 Botrychium virginianum (Rattlesnake-fern)

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Department of Natural Resources
500 Lafayette Road
St. Paul, Minnesota 55155
(651) 296-2835

DNR RELEVE #:0106

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: **BAC-033** EO Rec #: **7986**
*Surveyor's ID Code: **CAE** (B. Coffin and D. Engstrom)
Date: **23** Month: **JUN** Year: **1984** (e.g. 04 JUL 1993)
CBS Site #: **1** or Site Name: **Magney - Snively forest**
DNR Ownership Code: **80** (City Park)
*NC Code: **MHN47a** (Sugar Maple-Basswood-(Bluebead Lily) Forest)
Commun. Ranking in Relve:**A** Stand typical of Commun. Type:_ Relve typical of Stand:_

LOCATIONAL INFORMATION

State Code: **MN** *County Code: **69** (St. Louis)
Quad Codes DNR: **L21B** Universal: **46092F2** (West Duluth)
Township: **049N** (e.g. 143N) Range: **15W** (e.g. 32W)
QQRT: **NW** QRT: **NE** of Section **33**
Latitude: **46 degrees, 41 minutes, 30 seconds** LL/GPS registration:
Longitude: **92 degrees, 14 minutes, 50 seconds** *Accuracy: _ Marker: _

RELEVE INFORMATION

Relve Size (sq. m.): **400** Elev. (ft.): **1230** Slope: **10SW** Slope Position: _
*ECS Subsection: **15** (Glacial Lake Superior Plain)
Minnesota Soil Atlas Mapping Unit: **LLWL**
*Geomorphic Unit: **58** (Automba Drumlin Area)

Remarks: **Largest old-growth N. hardwood stand in N. MN. Soils: deep silty or loamy, w-dr, light (MN Soil Atlas). Red oak aged at 163 yrs-58cm dbh. Ground layer: deadfall-3%, litter-3%, herbaceous-94%.**

OTHER DATA COLLECTED

Soils: **N** Forestry: **Y** o=old growth Water Chemistry: **N** Publication: **Y**
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Needleleaf Evergreen, Height: .5-2m, Cover patchy

R.1 Abies balsamea (Balsam fir)
R.1 Picea glauca (White spruce)

Woody Broadleaf Deciduous, Height: 20-35m, Cover patchy

+1.1 Acer saccharum (Sugar maple)
+1.1 Quercus rubra (Common red oak)
+1.1 Tilia americana (Basswood)
R.1 Betula alleghaniensis

Woody Broadleaf Deciduous, Height: 10-20m, Cover patchy

+1.1 Acer saccharum (Sugar maple)
+1.1 Quercus rubra (Common red oak)
+1.1 Tilia americana (Basswood)

Woody Broadleaf Deciduous, Height: 5-10m, Cover rare

+1.1 Acer saccharum (Sugar maple)

Woody Broadleaf Deciduous, Height: 2-5m, Cover patchy

2.1 Acer spicatum (Mountain maple)
1.1 Acer saccharum (Sugar maple)
1.1 Quercus rubra (Common red oak)

Woody Broadleaf Deciduous, Height: .5-2m, Cover patchy

2.1 Acer spicatum (Mountain maple)
2.1 Corylus cornuta (Beaked hazelnut)
1.1 Lonicera canadensis (Fly honeysuckle)
1.1 Quercus rubra (Common red oak)

Woody Broadleaf Deciduous, Height: .1-.5m, Cover rare

- +1 Cornus alternifolia (Pagoda dogwood)
- +1 Fraxinus pennsylvanica (Green ash)
- +1 Quercus rubra (Common red oak)
- +1 Ribes triste (Swamp red currant)
- +1 Tilia americana (Basswood)
- R.1 Ribes cynosbati (Prickly gooseberry, dogberry)
- R.1 Rubus strigosus
- R.1 Sorbus decora (Mountain-ash)

Graminoid, Height: .1-.5m, Cover interrupted

- 4.2 Carex pensylvanica
- 1.1 Oryzopsis asperifolia (Mountain rice-grass)
- +1 Unknown or Indeterminable Plant 02

Forb, Height: .1-.5m, Cover patchy

- 3.1 Clintonia borealis (Blue-bead lily)
- 1.1 Actaea rubra (Red baneberry)
- 1.1 Aster macrophyllus (Large-leaved aster)
- 1.1 Maianthemum canadense (Canada mayflower)
- 1.1 Trillium grandiflorum (Large-flowered trillium)
- 1.1 Viola pubescens
- NON +1 Actaea pachypoda RA (White baneberry)
- +1 Anemone quinquefolia var. bifolia
- +1 Aralia nudicaulis (Wild sarsaparilla)
- +1 Arisaema triphyllum (Jack-in-the-pulpit)
- +1 Athyrium angustum (Lady fern)
- +1 Dryopteris carthusiana (Spinulose shield fern)
- +1 Fragaria virginiana (Common strawberry)
- +1 Galium triflorum (Three-flowered bedstraw)
- +1 Gymnocarpium dryopteris (Oak fern)
- +1 Hieracium (Orange hawkweed)
- +1 Lycopodium dendroideum (Round-branched groundpine)
- +1 Polygonatum pubescens (Hairy Solomon's-seal)
- +1 Rubus pubescens (Dwarf blackberry)
- +1 Taraxacum officinale (Common dandelion)
- +1 Uvularia sessilifolia (Pale bellwort)
- +1 Viola incognita (Big-leaf white violet)

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Department of Natural Resources
500 Lafayette Road
St. Paul, Minnesota 55155
(651) 296-2835

DNR RELEVÉ #:0119

----- FINAL RELEVÉ REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relevé #: **BAC-040** EO Rec #: **7986**
*Surveyor's ID Code: **CAE** (B. Coffin and D. Engstrom)
Date: **29** Month: **JUN** Year: **1984** (e.g. 04 JUL 1993)
CBS Site #: **1** or Site Name: **Magney - Snively forest**
DNR Ownership Code: **80** (City Park)
*NC Code: **MHN47a** (Sugar Maple-Basswood-(Bluebead Lily) Forest)
Commun. Ranking in Relevé:**A** Stand typical of Commun. Type:___ Relevé typical of Stand:___

LOCATIONAL INFORMATION

State Code: **MN** *County Code: **69** (St. Louis)
Quad Codes DNR: **L21B** Universal: **46092F2** (West Duluth)
Township: **049N** (e.g. 143N) Range: **15W** (e.g. 32W)
QORT: **SW** QRT: **SE** of Section **28**
Latitude: **46 degrees, 41 minutes, 35 seconds** LL/GPS registration:
Longitude: **92 degrees, 14 minutes, 50 seconds** *Accuracy: ___ Marker: ___

RELEVÉ INFORMATION

Relevé Size (sq. m.): **400** Elev. (ft.): **1230** Slope: **05SE** Slope Position: ___
*ECS Subsection: **15** (Glacial Lake Superior Plain)
Minnesota Soil Atlas Mapping Unit: **LLWL**
*Geomorphic Unit: **58** (Automba Drumlin Area)

Remarks: **Largest old-growth N. hardwood stand in N. MN. Soils: coarse loamy, well-drained, gravelly sandy loam. Red oak aged at 163 yrs-58cm dbh Ground layer: herb-50%, woody-20%, deadfall-20%, litter-10%.**

OTHER DATA COLLECTED

Soils: **Y** Forestry: **Y** o=old growth Water Chemistry: **N** Publication: **Y**
y=forestry
* = Variables with computerized code dictionaries (See Relevé Handbook)

Woody Needleleaf Evergreen, Height: 20-35m, Cover rare
R.2 Pinus strobus (White pine)

Woody Broadleaf Deciduous, Height: 10-20m, Cover patchy
3.1 Acer saccharum (Sugar maple)
R.1 Tilia americana (Basswood)

Woody Broadleaf Deciduous, Height: 2-5m, Cover patchy
3.1 Acer saccharum (Sugar maple)
+1 Acer spicatum (Mountain maple)
+1 Corylus cornuta (Beaked hazelnut)
+1 Ostrya virginiana (Ironwood, hop hornbeam)

Woody Broadleaf Deciduous, Height: .5-2m, Cover patchy
3.1 Acer saccharum (Sugar maple)
+1 Acer spicatum (Mountain maple)
+1 Corylus cornuta (Beaked hazelnut)
+1 Ostrya virginiana (Ironwood, hop hornbeam)
+1 Quercus rubra (Common red oak)

Woody Broadleaf Deciduous, Height: .1-.5m, Cover rare
2.1 Acer saccharum (Sugar maple)
+1 Fraxinus nigra (Black ash)
+1 Lonicera canadensis (Fly honeysuckle)
+1 Rubus strigosus
+1 Tilia americana (Basswood)
R.1 Sorbus decora (Mountain-ash)

Graminoid, Height: .1-.5m, Cover patchy

- 3.2 Carex pensylvanica
- 1.2 Oryzopsis asperifolia (Mountain rice-grass)
- +2 Carex pedunculata
- +2 Unknown or Indeterminable Plant

Forb, Height: .1-.5m, Cover rare

- 1.1 Aster macrophyllus (Large-leaved aster)
- 1.1 Streptopus roseus var. longipes (Rose twisted-stalk)
- 1.1 Uvularia sessilifolia (Pale bellwort)
- NON +.1 Actaea pachypoda RA (White baneberry)
- +2 Allium tricoccum OP (Wild leek)
- +1 Anemone quinquefolia var. bifolia OP
- +1 Aralia nudicaulis (Wild sarsaparilla)
- +1 Circaea alpina (Small enchanter's nightshade)
- +1 Clintonia borealis (Blue-bead lily)
- +1 Dryopteris carthusiana (Spinulose shield fern)
- +1 Galium triflorum (Three-flowered bedstraw)
- +1 Lycopodium lucidulum (Shining clubmoss)
- +1 Lycopodium obscurum (Groundpine)
- +1 Osmorhiza claytonii (Sweet cicely)
- +1 Polygonatum pubescens (Hairy Solomon's-seal)
- +1 Smilacina racemosa OP (False Solomon's-seal)
- +1 Trillium grandiflorum (Large-flowered trillium)
- +1 Viola incognita (Big-leaf white violet)
- +1 Viola pubescens
- R.1 Epilobium angustifolium (Fireweed)
- R.1 Fragaria virginiana (Common strawberry)

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: EO Rec #: 7986
*Surveyor's ID Code: NPS (Nancy P. Sather)
Date: 18 Month: SEP Year: 1979 (e.g. 04 JUL 1993)
CBS Site #: 1 or Site Name: Magney - Snively forest
DNR Ownership Code: 00 (Private Ownership)
*NC Code: MHN47a (Sugar Maple-Basswood-(Bluebead Lily) Forest
Commun. Ranking in Relve: Stand typical of Commun. Type: Relve typical of Stand:

LOCATIONAL INFORMATION

State Code: MN *County Code: 69 (St. Louis)
Quad Codes DNR: L20A Universal: 46092F3 (Esko)
Township: 049N (e.g. 143N) Range: 15W (e.g. 32W)
QQRT: NW QRT: NW of Section 33
Latitude: 46 degrees, 41 minutes, 30 seconds LL/GPS registration:
Longitude: 92 degrees, 15 minutes, 22 seconds *Accuracy: Marker:

RELEVE INFORMATION

Relve Size (sq. m.): 400 Elev. (ft.): 1355 Slope: Slope Position:
*ECS Subsection: 15 (Glacial Lake Superior Plain)
Minnesota Soil Atlas Mapping Unit: LLWL
*Geomorphic Unit: 58 (Automba Drumlin Area)

Remarks: Sampled area is on crest of hill & appears more mature than downslope.
Used a X-country ski trail as access. This stand should be typed for
maple basswood, yellow birch (if not for maple basswood).

OTHER DATA COLLECTED

Soils: N Forestry: N o=old growth Water Chemistry: N Publication: N
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Needleleaf Evergreen, Height: .0-.5m, Cover almost absent
R.1 Picea glauca (White spruce)

Woody Broadleaf Deciduous, Height: 20-35m, Cover interrupted
2.1 Acer saccharum (Sugar maple)
2.1 Betula alleghaniensis
2.1 Tilia americana (Basswood)

Woody Broadleaf Deciduous, Height: 2-5m, Cover interrupted
3.2 Acer saccharum (Sugar maple)
+.1 Corylus cornuta (Beaked hazelnut)
+.1 Ostrya virginiana (Ironwood, hop hornbeam)
+.2 Tilia americana MS (Basswood)

Woody Broadleaf Deciduous, Height: .5-2m, Cover interrupted
3.2 Acer saccharum (Sugar maple)
2.2 Acer spicatum (Mountain maple)
+.2 Corylus cornuta (Beaked hazelnut)
+.2 Tilia americana MS (Basswood)
R.1 Rubus strigosus (Red raspberry)
R.1 Unknown or Indeterminable Plant

Woody Broadleaf Deciduous, Height: .0-.5m, Cover interrupted
2.2 Acer saccharum (Sugar maple)
1.2 Acer spicatum (Mountain maple)
1.2 Ribes (Currant; Gooseberry)
+.2 Lonicera cf. canadensis (Fly honeysuckle)
R.1 Ostrya virginiana (Ironwood, hop hornbeam)

Graminoid, Height: .0-.5m, Cover continuous

- + .2 Carex (Sedge)
- + .2 Oryzopsis asperifolia (Mountain rice-grass)

Forb, Height: .0-.5m, Cover continuous

- 3.2 Aralia nudicaulis (Wild sarsaparilla)
- 3.2 Viola cf. pubescens (Smooth yellow violet)
- 2.2 Allium tricoccum (Wild leek)
- 2.2 Solidago flexicaulis (Zig-zag goldenrod)
- 2.2 Uvularia cf. sessilifolia (Pale bellwort)
- 1.2 Sanguinaria canadensis (Bloodroot)
- NON + .1 Actaea pachypoda (White baneberry)
- + .2 Aster macrophyllus (Large-leaved aster)
- + .2 Athyrium angustum (Lady fern)
- + .2 Clintonia borealis (Blue-bead lily)
- + .2 Maianthemum canadense (Canada mayflower)
- + .2 Osmorhiza claytonii (Sweet cicely)
- + .2 Viola cf. renifolia (Kidney-leaf violet)
- R.1 Arisaema triphyllum (Jack-in-the-pulpit)

MINNESOTA NATURAL HERITAGE & NONGAME RESEARCH PROGRAM
Department of Natural Resources
500 Lafayette Road
St. Paul, Minnesota 55155
(651) 296-2835

DNR RELEVÉ # : 8293

----- FINAL RELEVÉ REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relevé #: **MJA03500** EO Rec #: **7986**
*Surveyor's ID Code: **MJA (Melissa J. Arikian)**
Date: **27** Month: **JUL** Year: **2000** (e.g. 04 JUL 1993)
CBS Site #: **1** or Site Name: **Magney - Snively forest**
DNR Ownership Code: **81 (City (Other Lands))**
*NC Code: **MHN47a (Sugar Maple-Basswood-(Bluebead Lily) Forest**
Commun. Ranking in Relevé: **B** Stand typical of Commun. Type: **_** Relevé typical of Stand: **_**

LOCATIONAL INFORMATION

State Code: **MN** *County Code: **69 (St. Louis)**
Quad Codes DNR: **L20A** Universal: **46092F3 (Esko)**
Township: **049N** (e.g. 143N) Range: **15W** (e.g. 32W)
QQRT: **SE** QRT: **SW** of Section **28**
Latitude: **46 degrees, 41 minutes, 37 seconds** LL/GPS registration:
Longitude: **92 degrees, 15 minutes, 11 seconds** *Accuracy: **_** Marker: **_**

RELEVÉ INFORMATION

Relevé Size (sq. m.): **400** Elev. (ft.): **1285** Slope: **04N** Slope Position: **_**
*ECS Subsection: **0**
Minnesota Soil Atlas Mapping Unit:
*Geomorphic Unit:

Remarks: **Placed to capture sugar maple comm on this summit; scattered lrg & sm
CWD, but no resulting canopy gaps nor undulating terrain. Many bare
soil patches & no humus layer- earthworms may be present.**

OTHER DATA COLLECTED

Soils: **N** Forestry: **N** o=old growth Water Chemistry: **N** Publication: **N**
y=forestry
* = Variables with computerized code dictionaries (See Relevé Handbook)

Woody Broadleaf Deciduous, Height: 2-20m, Cover continuous

- 4. Acer saccharum (Sugar maple)
- 3. Betula alleghaniensis
- + . Betula alleghaniensis DD
- + . Quercus rubra OP (Northern red oak)

Woody Broadleaf Deciduous, Height: .0-2m, Cover interrupted

- 3. Acer saccharum (Sugar maple)
- + . Acer spicatum (Mountain maple)
- + . Betula alleghaniensis SD
- + . Corylus cornuta (Beaked hazelnut)
- + . Fraxinus nigra (Black ash)
- + . Lonicera canadensis (Fly honeysuckle)
- + . Ostrya virginiana (Ironwood, hop hornbeam)
- + . Prunus virginiana (Chokecherry)
- + . Quercus rubra (Northern red oak)
- + . Ribes hirtellum (Swamp gooseberry)
- + . Sambucus canadensis (Common Elder)
- + . Sorbus americana (Mountain-ash)
- + . Tilia americana (Basswood)

Graminoid, Height: .0-.5m, Cover rare

- 2. Carex pensylvanica
- + . Carex cf. deweyana ST
- + . Oryzopsis asperifolia (Mountain rice-grass)

Forb, Height: .0-.5m, Cover rare

- 1. Clintonia borealis (Blue-bead lily)

- + . Allium tricoccum (Wild leek)
- + . Anemone quinquefolia
- + .2 Arisaema triphyllum (Jack-in-the-pulpit)
- + . Athyrium angustum (Lady fern)
- + . Caulophyllum thalictroides (Blue cohosh)

Forb, Height: .0-.5m, Cover rare (continued)

- + . Circaea alpina (Small enchanter's nightshade)
- + . Dryopteris carthusiana (Spinulose shield fern)
- + . Hieracium piloselloides (Hawkweed)
- + . Maianthemum canadense (Canada mayflower)
- + . Polygonatum pubescens (Hairy Solomon's-seal)
- + . Pyrola cf. elliptica ST (Common pyrola)
- + . Sanguinaria canadensis (Bloodroot)
- + . Smilacina racemosa (False Solomon's-seal)
- + . Solidago flexicaulis (Zig-zag goldenrod)
- + . Streptopus roseus (Rose twisted-stalk)
- + . Trientalis borealis (Starflower)
- + . Trillium grandiflorum (Large-flowered trillium)
- R. Actaea cf. rubra ST (Red baneberry)

Lichen/Moss, Height: .0-.5m, Cover barely present

- 1. Unknown moss (moss)

MINNESOTA NATURAL HERITAGE & NONGAME RESEARCH PROGRAM
Department of Natural Resources
500 Lafayette Road
St. Paul, Minnesota 55155
(651) 296-2835

DNR RELEVE #:8294

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: **MJA03600** EO Rec #: **0**
*Surveyor's ID Code: **MJA (Melissa J. Arikian)**
Date: **28** Month: **JUL** Year: **2000** (e.g. 04 JUL 1993)
CBS Site #: **1** or Site Name: **Magney - Snively forest**
DNR Ownership Code: **81 (City (Other Lands))**
*NC Code: **MHN47a (Sugar Maple-Basswood-(Bluebead Lily) Forest**
Commun. Ranking in Relve:**B** Stand typical of Commun. Type: **_** Relve typical of Stand: **_**

LOCATIONAL INFORMATION

State Code: **MN** *County Code: **69 (St. Louis)**
Quad Codes DNR: **L21B** Universal: **46092F2 (West Duluth)**
Township: **049N** (e.g. 143N) Range: **15W** (e.g. 32W)
QQRT: **SE** QRT: **SW** of Section **28**
Latitude: **46 degrees, 41 minutes, 39 seconds** LL/GPS registration:
Longitude: **92 degrees, 14 minutes, 56 seconds** *Accuracy: **_** Marker: **_**

RELEVE INFORMATION

Relve Size (sq. m.): **400** Elev. (ft.): **1268** Slope: **09NE** Slope Position: **_**
*ECS Subsection: **0**
Minnesota Soil Atlas Mapping Unit:
*Geomorphic Unit:

Remarks: **Placed to capture maple-basswood comm- also large associated y. birch (1-2' DBH). Lrg CWD, lrg pits along gently undulating terrain; no humus layer, earthworms present, bare soil patches.**

OTHER DATA COLLECTED

Soils: **N** Forestry: **N** o=old growth Water Chemistry: **N** Publication: **N**
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Broadleaf Deciduous, Height: 5-35m, Cover continuous

- 4. Acer saccharum (Sugar maple)
- 2. Betula alleghaniensis
- 2. Tilia americana (Basswood)

Woody Broadleaf Deciduous, Height: 2-5m, Cover continuous

- 4. Acer saccharum (Sugar maple)
- 1. Acer spicatum (Mountain maple)
- 1. Tilia americana (Basswood)
- + Tilia americana DD (Basswood)

Woody Broadleaf Deciduous, Height: .0-2m, Cover rare

- 2. Acer saccharum SD (Sugar maple)
- 1. Acer spicatum (Mountain maple)
- + Corylus cornuta (Beaked hazelnut)
- + Fraxinus nigra SD (Black ash)
- + Lonicera canadensis (Fly honeysuckle)
- + Ostrya virginiana (Ironwood, hop hornbeam)
- + Prunus virginiana (Chokecherry)
- + Ribes cf. triste ST (Swamp red currant)
- + Rubus strigosus (Red raspberry)
- + Tilia americana SP (Basswood)
- R. Quercus rubra SD (Northern red oak)
- R. Sambucus canadensis (Common Elder)

Graminoid, Height: .0-.5m, Cover barely present

- 1. Carex pensylvanica FR
- + Oryzopsis asperifolia (Mountain rice-grass)

Forb, Height: .0-.5m, Cover rare

- 1. Allium tricoccum (Wild leek)
- 1.2 Arisaema triphyllum (Jack-in-the-pulpit)
- 1. Thelypteris phegopteris (Long beech-fern)
- +. Actaea cf. rubra ST (Red baneberry)
- +. Anemone quinquefolia
- +. Asarum canadense (Wild ginger)
- +. Athyrium angustum (Lady fern)
- +.1 Botrychium multifidum (Leathery grape-fern)
- +. Clintonia borealis (Blue-bead lily)
- +. Hieracium ST (Hawkweed)
- +. Maianthemum canadense (Canada mayflower)
- +. Solidago flexicaulis (Zig-zag goldenrod)
- +. Uvularia sessilifolia (Pale bellwort)

Lichen/Moss, Height: .0-.5m, Cover barely present

- 1. Unknown or Indeterminable Plant (moss)

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(651) 296-2835

DNR RELEVE #:8295

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: **MJA03700** EO Rec #: **0**
*Surveyor's ID Code: **MJA (Melissa J. Arikian)**
Date: **28** Month: **JUL** Year: **2000** (e.g. 04 JUL 1993)
CBS Site #: **1** or Site Name: **Magney - Snively Forest**
DNR Ownership Code: **81 (City (Other Lands))**
*NC Code: **WFn55a Black Ash-Aspen-Balsam Poplar Swamp (Northeastern)**
Commun. Ranking in Relve:**B** Stand typical of Commun. Type:___ Relve typical of Stand:___

LOCATIONAL INFORMATION

State Code: **MN** *County Code: **69 (St. Louis)**
Quad Codes DNR: **L20A** Universal: **46092F3 (Esko)**
Township: **049N** (e.g. 143N) Range: **15W** (e.g. 32W)
QORT: **NE** QRT: **SW** of Section **28**
Latitude: **46 degrees, 41 minutes, 55 seconds** LL/GPS registration:
Longitude: **92 degrees, 15 minutes, 5 seconds** *Accuracy: ___ Marker: ___

RELEVE INFORMATION

Relve Size (sq. m.): **400** Elev. (ft.): **1144** Slope: **04SW** Slope Position: ___
*ECS Subsection: **0**
Minnesota Soil Atlas Mapping Unit:
*Geomorphic Unit: **01E (Agassiz Lacustrine Plain, Beltrami Is.)**

Remarks: **Placed to capture black ash/ white spruced floodplain community.**
Does not include adjacent creek bed. Some medium CWD.

OTHER DATA COLLECTED

Soils: **N** Forestry: **N** o=old growth Water Chemistry: **N** Publication: **N**
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Needleleaf Evergreen, Height: 2-20m, Cover patchy

- 3. *Picea glauca* (White spruce)
- 2. *Abies balsamea* (Balsam fir)

Woody Needleleaf Evergreen, Height: .0-2m, Cover barely present

- 1. *Picea glauca* (White spruce)
- +. *Abies balsamea* (Balsam fir)

Woody Broadleaf Deciduous, Height: 5-20m, Cover patchy

- 3. *Fraxinus nigra* (Black ash)
- 1. *Betula alleghaniensis*
- 1. *Betula papyrifera* OP (Paper birch)
- 1. *Populus tremuloides* (Quaking aspen)

Woody Broadleaf Deciduous, Height: 2-5m, Cover rare

- 2. *Fraxinus nigra* (Black ash)
- 1. *Acer saccharum* (Sugar maple)
- 1. *Betula alleghaniensis* DD

Woody Broadleaf Deciduous, Height: .0-2m, Cover rare

- 2. *Fraxinus nigra* (Black ash)
- 1. *Corylus cornuta* (Beaked hazelnut)
- 1. *Rubus pubescens* (Dwarf blackberry)
- +. *Acer rubrum* (Red maple)
- +. *Acer saccharum* (Sugar maple)
- +. *Acer spicatum* (Mountain maple)
- +. *Amelanchier* ST (Juneberry; Serviceberry; Saska)
- +. *Aralia racemosa* (American spikenard)

- + . *Betula alleghaniensis* SD
- + . *Cornus rugosa* (Round-leaved dogwood)
- + . *Diervilla lonicera* (Bush honeysuckle)
- + . *Lonicera canadensis* (Fly honeysuckle)
- + . *Populus tremuloides* (Quaking aspen)

Woody Broadleaf Deciduous, Height: .0-2m, Cover rare (continued)

- + . *Ribes cynosbati* (Prickly gooseberry, dogberry)
- + . *Ribes hirtellum* (Swamp gooseberry)
- + . *Ribes cf. triste* ST (Swamp red currant)
- + . *Rubus strigosus* (Red raspberry)
- + . *Sorbus americana* (Mountain-ash)
- + . *Viburnum trilobum* (High-bush cranberry)

Graminoid, Height: .0-.5m, Cover rare

- 2. *Calamagrostis canadensis* (Blue-joint)
- + . *Agrostis stolonifera* var. *major* (Redtop)
- + . *Brachyelytrum erectum* (Bearded short-husk)
- + . *Bromus ciliatus* (Fringed brome)
- + . *Carex brunnescens*
- + . *Carex canescens*
- + . *Carex deweyana*
- + . *Carex pensylvanica*
- + . *Carex stipata*
- + . *Poa palustris* (Fowl meadow grass)

Forb, Height: .0-.5m, Cover patchy

- 2. *Athyrium angustum* (Lady fern)
- 2. *Equisetum arvense* (Field horsetail)
- 1. *Aster macrophyllus* (Large-leaved aster)
- + . *Actaea rubra* (Red baneberry)
- + . *Agrimonia gryposepala* (Agrimony)
- + . *Anemone quinquefolia*
- + . *Aralia nudicaulis* (Wild sarsaparilla)
- + . *Arisaema triphyllum* (Jack-in-the-pulpit)
- + . *Asarum canadense* (Wild ginger)
- + . *Aster lateriflorus* (Side-flowering aster)
- + . *Aster cf. umbellatus* ST (Flat-topped aster)
- + . *Circaea alpina* (Small enchanter's nightshade)
- + . *Cirsium cf. muticum* ST (Swamp thistle)
- + . *Clintonia borealis* (Blue-bead lily)
- + . *Epilobium angustifolium* (Fireweed)
- + . *Equisetum sylvaticum* (Wood horsetail)
- + . *Fragaria vesca* (Wood strawberry)
- + . *Galium asprellum* (Rough bedstraw)
- + . *Geum aleppicum* (Yellow avens)
- + . *Gymnocarpium dryopteris* (Oak fern)
- + . *Hieracium aurantiacum* (Orange hawkweed)
- + . *Impatiens capensis* (Spotted touch-me-not, jewel-we)
- + . *Mertensia paniculata* ST (Tall lungwort)
- + . *Mitella nuda* (Miterwort, naked bishop's-cap)
- + . *Ranunculus cf. abortivus* ST (Kidney-leaf buttercup)
- + . *Sanicula marilandica* (Black snakeroot)
- + . *Streptopus roseus* (Rose twisted-stalk)
- + . *Taraxacum officinale* (Common dandelion)
- + . *Thalictrum dioicum* (Early meadow rue)
- + . *Thelypteris phegopteris* (Long beech-fern)
- + . *Trillium cernuum*
- + . *Trillium grandiflorum* (Large-flowered trillium)
- + . *Uvularia sessilifolia* (Pale bellwort)
- + . *Viola pubescens* (Smooth yellow violet)

Lichen/Moss, Height: .5-20m, Cover barely present

- 1. Unknown or Indeterminable Plant

Lichen/Moss, Height: .0-.5m, Cover rare

- 2. Unknown or Indeterminable Plant

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500 Lafayette Road
St. Paul, Minnesota 55155
(651) 296-2835

DNR RELEVE #:8296

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: **MJA03800** EO Rec #: 0
*Surveyor's ID Code: **MJA (Melissa J. Arikian)**
Date: **28** Month: **JUL** Year: **2000** (e.g. 04 JUL 1993)
CBS Site #: **3** or Site Name: **Elys Peak - Bardon Peak outcro**
DNR Ownership Code: **81 (City (Other Lands))**
*NC Code: **FDn33b Aspen-Birch Woodland**
Commun. Ranking in Relve:**B** Stand typical of Commun. Type:_ Relve typical of Stand:_

LOCATIONAL INFORMATION

State Code: **MN** *County Code: **69 (St. Louis)**
Quad Codes DNR: **L20A** Universal: **46092F3 (Esko)**
Township: **049N** (e.g. 143N) Range: **15W** (e.g. 32W)
QQRT: **SE** QRT: **NW** of Section **33**
Latitude: **46 degrees, 41 minutes, 10 seconds** LL/GPS registration:
Longitude: **92 degrees, 15 minutes, 5 seconds** *Accuracy: _ Marker: _

RELEVE INFORMATION

Relve Size (sq. m.): **400** Elev. (ft.): **1279** Slope: **15NW** Slope Position: _
*ECS Subsection: **0**
Minnesota Soil Atlas Mapping Unit:
*Geomorphic Unit:

Remarks: **Placed to capture red oak woodland near rocky summit of Ely's Peak.**
Very near groomed ski trails. Much of plot in exposed rock. Some small
and medium CWD.

OTHER DATA COLLECTED

Soils: **N** Forestry: **N** o=old growth Water Chemistry: **N** Publication: **N**
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Broadleaf Deciduous, Height: 2-5m, Cover interrupted

- 3. Quercus rubra (Northern red oak)
- 1. Acer saccharum (Sugar maple)
- 1. Betula papyrifera (Paper birch)
- 1. Populus tremuloides (Quaking aspen)
- 1. Tilia americana (Basswood)

Woody Broadleaf Deciduous, Height: .0-2m, Cover interrupted

- 3. Quercus rubra (Northern red oak)
- 2. Amelanchier ST (Juneberry; Serviceberry; Saska)
- 2. Diervilla lonicera (Bush honeysuckle)
- 1. Acer rubrum (Red maple)
- 1. Acer saccharum (Sugar maple)
- 1. Betula papyrifera (Paper birch)
- 1. Ribes cynosbati (Prickly gooseberry, dogberry)
- 1. Vaccinium angustifolium (Blueberry)
- + Cornus rugosa (Round-leaved dogwood)
- + Corylus cornuta (Beaked hazelnut)
- + Populus tremuloides (Quaking aspen)
- + Prunus virginiana (Chokecherry)
- + Salix ST (Willow)
- + Sambucus canadensis (Common Elder)
- + Tilia americana (Basswood)

Graminoid, Height: .0-.5m, Cover barely present

- 1. Calamagrostis canadensis (Blue-joint)
- 1. Poa pratensis (Kentucky bluegrass)

- + . Agropyron repens (Quack grass)
- + . Agrostis stolonifera var. major (Redtop)
- + . Oryzopsis asperifolia (Mountain rice-grass)

Forb, Height: .0-.5m, Cover interrupted

- 2. Aralia nudicaulis (Wild sarsaparilla)
- 2. Aster macrophyllus (Large-leaved aster)
- 1. Pteridium aquilinum (Bracken)
- 1. Solidago gigantea (Giant goldenrod)
- + . Achillea millefolium
- + . Anaphalis margaritacea (Pearly everlasting)
- + . Anemone canadensis (Canada anemone)
- + . Apocynum androsaemifolium (Spreading dogbane)
- + . Athyrium angustum (Lady fern)
- + . Cerastium fontana (Mouse-ear chickweed)
- + . Cornus canadensis (Bunchberry)
- + . Dryopteris carthusiana (Spinulose shield fern)
- + . Epilobium angustifolium (Fireweed)
- + . Fragaria virginiana (Common strawberry)
- + . Galium triflorum (Three-flowered bedstraw)
- + . Geum aleppicum (Yellow avens)
- + . Hieracium cf. aurantiacum ST (Orange hawkweed)
- + . Lathyrus ochroleucus (Pale vetchling)
- + . Maianthemum canadense (Canada mayflower)
- + . Medicago sativa (Alfalfa)
- + . Polygonatum pubescens (Hairy Solomon's-seal)
- + . Solidago flexicaulis (Zig-zag goldenrod)
- + . Trifolium pratense (Red clover)
- + . Trifolium repens (White clover)
- + . Trillium cf. cernuum ST
- + . Verbascum thapsus (Mullein)
- + . Vicia americana (American vetch)
- + . Viola pubescens (Smooth yellow violet)

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Department of Natural Resources
500 Lafayette Road
St. Paul, Minnesota 55155
(651) 296-2835

DNR RELEVE #:8297

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: **MJA03900** EO Rec #: **0**
*Surveyor's ID Code: **MJA** (Melissa J. Arikian)
Date: **28** Month: **JUL** Year: **2000** (e.g. 04 JUL 1993)
CBS Site #: **1** or Site Name: **Magney - Snively forest**
DNR Ownership Code: **81** (City (Other Lands))
*NC Code: **MHN47a** (Sugar Maple-Basswood-(Bluebead Lily) Forest)
Commun. Ranking in Relve:**B** Stand typical of Commun. Type:___ Relve typical of Stand:___

LOCATIONAL INFORMATION

State Code: **MN** *County Code: **69** (St. Louis)
Quad Codes DNR: **L21B** Universal: **46092F2** (West Duluth)
Township: **049N** (e.g. 143N) Range: **15W** (e.g. 32W)
QORT: **NW** QRT: **NE** of Section **33**
Latitude: **46 degrees, 41 minutes, 20 seconds** LL/GPS registration:
Longitude: **92 degrees, 14 minutes, 53 seconds** *Accuracy: ___ Marker: ___

RELEVE INFORMATION

Relve Size (sq. m.): **400** Elev. (ft.): **1294** Slope: **08NE** Slope Position: ___
*ECS Subsection: **0**
Minnesota Soil Atlas Mapping Unit:
*Geomorphic Unit:

Remarks: **Placed to capture old growth maple-basswood near Ely's Peak. Average canopy dominants have 1-1.5' DBH. Humus layer absent, many bare soil patches; lrg & sm CWD; undulating terrain.**

OTHER DATA COLLECTED

Soils: **N** Forestry: **N** o=old growth Water Chemistry: **N** Publication: **N**
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Broadleaf Deciduous, Height: 5-35m, Cover continuous

4. Acer saccharum (Sugar maple)
2. Tilia americana (Basswood)
1. Betula alleghaniensis

Woody Broadleaf Deciduous, Height: 2-5m, Cover interrupted

4. Acer saccharum (Sugar maple)
- +. Acer spicatum (Mountain maple)

Woody Broadleaf Deciduous, Height: .0-2m, Cover patchy

3. Acer saccharum SD (Sugar maple)
- +. Acer saccharum DD (Sugar maple)
- +. Acer spicatum (Mountain maple)
- +. Corylus cornuta (Beaked hazelnut)
- +. Lonicera canadensis (Fly honeysuckle)
- +. Ostrya virginiana (Ironwood, hop hornbeam)
- +. Prunus virginiana (Chokecherry)
- +. Ribes hirtellum (Swamp gooseberry)
- +. Tilia americana SP (Basswood)

Graminoid, Height: .0-.5m, Cover barely present

- +. Carex pensylvanica
- +. Oryzopsis asperifolia (Mountain rice-grass)

Forb, Height: .0-.5m, Cover rare

- +. Actaea cf. rubra ST (Red baneberry)
- +. Allium tricoccum (Wild leek)
- +. Arisaema triphyllum (Jack-in-the-pulpit)

- + . Clintonia borealis (Blue-bead lily)
- + . Maianthemum canadense (Canada mayflower)
- + . Polygonatum pubescens (Hairy Solomon's-seal)
- + . Solidago flexicaulis (Zig-zag goldenrod)

Forb, Height: .0-.5m, Cover rare (continued)

- + . Trillium cernuum
- + . Viola pubescens (Smooth yellow violet)

Lichen/Moss, Height: .0-.5m, Cover barely present

- 1. Unknown or Indeterminable Plant (moss)
- 1. Unknown or Indeterminable Plant

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St. Paul, Minnesota 55155
(651) 296-2835

DNR RELEVE #:8298

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: **MJA04000** EO Rec #: **0**
*Surveyor's ID Code: **MJA (Melissa J. Arikian)**
Date: **31** Month: **JUL** Year: **2000** (e.g. 04 JUL 1993)
CBS Site #: **1** or Site Name: **Magney - Snively forest**
DNR Ownership Code: **81 (City (Other Lands))**
*NC Code: **MHn46b Black Ash-Basswood Forest**
Commun. Ranking in Relve:**B** Stand typical of Commun. Type:___ Relve typical of Stand:___

LOCATIONAL INFORMATION

State Code: **MN** *County Code: **69 (St. Louis)**
Quad Codes DNR: **L21B** Universal: **46092F2 (West Duluth)**
Township: **049N** (e.g. 143N) Range: **15W** (e.g. 32W)
QQRT: **NW** QRT: **NE** of Section **33**
Latitude: **46 degrees, 41 minutes, 19 seconds** LL/GPS registration:
Longitude: **92 degrees, 14 minutes, 39 seconds** *Accuracy: ___ Marker: ___

RELEVE INFORMATION

Relve Size (sq. m.): **400** Elev. (ft.): **1140** Slope: **18E** Slope Position: ___
*ECS Subsection: **0**
Minnesota Soil Atlas Mapping Unit:
*Geomorphic Unit:

Remarks: **Placed to capture black ash-sugar maple comm. Includes sm gravelly creek which represents comm type in this area. Very little CWD. Adj area is either waterlogged soil or too far upland.**

OTHER DATA COLLECTED

Soils: **N** Forestry: **N** o=old growth Water Chemistry: **N** Publication: **N**
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Needleleaf Evergreen, Height: .0-.5m, Cover barely present
+. *Picea mariana* (Black spruce)

Woody Broadleaf Deciduous, Height: 2-35m, Cover interrupted
3. *Acer saccharum* (Sugar maple)
3. *Fraxinus nigra* (Black ash)
1. *Betula alleghaniensis*
1. *Quercus rubra* (Northern red oak)

Woody Broadleaf Deciduous, Height: .0-2m, Cover rare
2. *Fraxinus nigra* (Black ash)
1. *Acer saccharum* (Sugar maple)
1. *Alnus incana* (Speckled alder)
1. *Corylus cornuta* (Beaked hazelnut)
+. *Acer rubrum* (Red maple)
+. *Acer spicatum* (Mountain maple)
+. *Betula alleghaniensis*
+. *Lonicera canadensis* (Fly honeysuckle)
+. *Prunus virginiana* (Chokecherry)
+. *Quercus rubra* (Northern red oak)
+. *Ribes hirtellum* (Swamp gooseberry)

Graminoid, Height: .0-.5m, Cover barely present
+. *Agrostis stolonifera* (Redtop)
+. *Brachyelytrum erectum* (Bearded short-husk)
+. *Calamagrostis canadensis* (Blue-joint)
+. *Carex cf. brunnescens*
+. *Carex cf. canescens*

- + . Carex deweyana
- + . Carex stipata
- + . Carex vaginata
- + . Elymus hystrix (Bottlebrush grass)

Forb, Height: .0-.5m, Cover interrupted

- 2. Aster macrophyllus (Large-leaved aster)
- 2. Athyrium angustum (Lady fern)
- 2. Matteuccia struthiopteris (Ostrich fern)
- 2. Thelypteris phegopteris (Long beech-fern)
- 1.2 Arisaema triphyllum (Jack-in-the-pulpit)
- + . Actaea cf. rubra ST (Red baneberry)
- + . Allium tricoccum (Wild leek)
- + . Anemone quinquefolia
- + . Asarum canadense (Wild ginger)
- + . Aster cf. lateriflorus ST (Side-flowering aster)
- + . Caltha palustris (Marsh marigold)
- + . Dryopteris carthusiana (Spinulose shield fern)
- + . Equisetum palustre (Marsh horsetail)
- + . Galium triflorum (Three-flowered bedstraw)
- + . Geum cf. aleppicum ST (Yellow avens)
- + . Hieracium cf. aurantiacum ST (Orange hawkweed)
- + . Laportea canadensis (Wood nettle)
- + . Maianthemum canadense (Canada mayflower)
- + . Mitella nuda (Miterwort, naked bishop's-cap)
- + . Petasites sagittatus (Sweet coltsfoot)
- + . cf. Platanthera ST (Rein-Orchid; Fringed Orchid)
- + . Polygonum sagittatum (Arrow-leaved tearthumb)
- + . Prunella vulgaris (Heal-all)
- + . Pyrola rotundifolia (Round-leaved pyrola)
- + . Ranunculus recurvatus (Hooked crowfoot)
- + . Rubus pubescens (Dwarf blackberry)
- + . Solidago cf. canadensis ST
- + . Solidago flexicaulis (Zig-zag goldenrod)
- + . Taraxacum officinale ST (Common dandelion)
- + . Trillium cernuum
- + . Uvularia grandiflora (Yellow bellwort)
- + . Uvularia sessilifolia (Pale bellwort)
- + . Viola pubescens (Smooth yellow violet)

Lichen/Moss, Height: .0-.5m, Cover barely present

- 1. Unknown or Indeterminable Plant (moss)
- 1. Unknown or Indeterminable Plant

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500 Lafayette Road
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DNR RELEVE #:8299

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: **MJA04100** EO Rec #: **0**
*Surveyor's ID Code: **MJA (Melissa J. Arikian)**
Date: **27** Month: **JUL** Year: **2000** (e.g. 04 JUL 1993)
CBS Site #: **2** or Site Name: **Ely's Peak - Bardon Peak Outcrops**
DNR Ownership Code: **81 (City (Other Lands))**
*NC Code: **FDn33b Aspen-Birch Woodland**
Commun. Ranking in Relve:**B** Stand typical of Commun. Type:___ Relve typical of Stand:___

LOCATIONAL INFORMATION

State Code: **MN** *County Code: **69 (St. Louis)**
Quad Codes DNR: **L21B** Universal: **46092F2 (West Duluth)**
Township: **049N** (e.g. 143N) Range: **15W** (e.g. 32W)
QORT: **SW** QRT: **NW** of Section **34**
Latitude: **46 degrees, 41 minutes, 15 seconds** LL/GPS registration:
Longitude: **92 degrees, 13 minutes, 59 seconds** *Accuracy: ___ Marker: ___

RELEVE INFORMATION

Relve Size (sq. m.): **400** Elev. (ft.): **1273** Slope: **08E** Slope Position: ___
*ECS Subsection: **0**
Minnesota Soil Atlas Mapping Unit:
*Geomorphic Unit:

Remarks: **Placed to capture oak woodland on Barden's Peak. Placed SW from summit to avoid ski trail dist. Mixed decid. composition representative of this type in this area. Lrg, med, & sm CWD. Rocky terrain.**

OTHER DATA COLLECTED

Soils: **N** Forestry: **N** o=old growth Water Chemistry: **N** Publication: **N**
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Broadleaf Deciduous, Height: 2-10m, Cover patchy

- 2. *Ostrya virginiana* (Ironwood, hop hornbeam)
- 2. *Quercus rubra* (Northern red oak)
- 1. *Acer saccharum* (Sugar maple)
- 1. *Populus tremuloides* (Quaking aspen)
- + *Acer rubrum* (Red maple)
- + *Betula papyrifera* (Paper birch)
- + *Quercus rubra* DD (Northern red oak)

Woody Broadleaf Deciduous, Height: .0-2m, Cover interrupted

- 2. *Amelanchier* ST (Juneberry; Serviceberry; Saskia)
- 2. *Corylus cornuta* (Beaked hazelnut)
- 2. *Diervilla lonicera* (Bush honeysuckle)
- 1. *Alnus incana* (Speckled alder)
- 1. *Fraxinus nigra* (Black ash)
- 1. *Ostrya virginiana* (Ironwood, hop hornbeam)
- + *Lonicera hirsuta* (Hairy honeysuckle)
- + *Populus tremuloides* (Quaking aspen)
- + *Prunus virginiana* (Chokecherry)
- + *Ribes* cf. *cynosbati* (Prickly gooseberry, dogberry)
- + *Rosa* cf. *acicularis* ST (Prickly rose)
- + *Rubus parviflorus* (Thimbleberry)
- + *Rubus strigosus* (Red raspberry)
- + *Tilia americana* (Basswood)

Graminoid, Height: .0-.5m, Cover rare

- 2. *Calamagrostis canadensis* (Blue-joint)
- 1. *Brachyelytrum erectum* (Bearded short-husk)

- + . Agrostis stolonifera (Redtop)
- + . Oryzopsis asperifolia (Mountain rice-grass)
- + . Poa palustris (Fowl meadow grass)

Forb, Height: .0-.5m, Cover interrupted

- 2. Aster macrophyllus (Large-leaved aster)
- 2. Pteridium aquilinum (Bracken)
- 1. Aralia nudicaulis (Wild sarsaparilla)
- + . Achillea millefolium
- + . Actaea cf. rubra ST (Red baneberry)
- + . Anaphalis margaritacea (Pearly everlasting)
- + . Anemone canadensis (Canada anemone)
- + . Antennaria neglecta (Pussytoes)
- + . Apocynum androsaemifolium (Spreading dogbane)
- + . Athyrium angustum (Lady fern)
- + . Epilobium angustifolium (Fireweed)
- + . Fragaria virginiana (Common strawberry)
- + . Galium triflorum (Three-flowered bedstraw)
- + . Hieracium ST (Hawkweed)
- + . Lathyrus venosus (Veiny pea)
- + . Maianthemum canadense (Canada mayflower)
- + . Osmorhiza claytonii (Sweet cicely)
- + . Plantago major (Common plantain)
- + . Solidago cf. canadensis ST
- + . Solidago flexicaulis (Zig-zag goldenrod)
- + . Streptopus roseus (Rose twisted-stalk)
- + . Trifolium pratense (Red clover)
- + . Trillium cernuum
- + . Uvularia grandiflora (Yellow bellwort)
- + . Uvularia sessilifolia (Pale bellwort)
- + . Viola pubescens (Smooth yellow violet)
- R. Cerastium fontana (Mouse-ear chickweed)
- R. Sanicula marilandica (Black snakeroot)

Lichen/Moss, Height: .0-.5m, Cover rare

- 2. Unknown or Indeterminable Plant (moss)

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DNR RELEVE #:8300

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: **MJA04200** EO Rec #: **0**
*Surveyor's ID Code: **MJA (Melissa J. Arikian)**
Date: **27** Month: **JUL** Year: **2000** (e.g. 04 JUL 1993)
CBS Site #: **1** or Site Name: **Magney - Snively forest**
DNR Ownership Code: **81 (City (Other Lands))**
*NC Code: **MHn35b Red Oak-Sugar Maple-Basswood-(Bluebead Lily) Forest**
Commun. Ranking in Relve:**B** Stand typical of Commun. Type:___ Relve typical of Stand:___

LOCATIONAL INFORMATION

State Code: **MN** *County Code: **69 (St. Louis)**
Quad Codes DNR: **L21B** Universal: **46092F2 (West Duluth)**
Township: **049N** (e.g. 143N) Range: **15W** (e.g. 32W)
QQRT: **SE** QRT: **SW** of Section **27**
Latitude: **46 degrees, 41 minutes, 43 seconds** LL/GPS registration:
Longitude: **92 degrees, 13 minutes, 53 seconds** *Accuracy: ___ Marker: ___

RELEVE INFORMATION

Relve Size (sq. m.): **400** Elev. (ft.): **1158** Slope: **17E** Slope Position: ___
*ECS Subsection: **0**
Minnesota Soil Atlas Mapping Unit:
*Geomorphic Unit:

Remarks: **Very few sm-med sized CWD; placed to capture red oak/s. maple comm on this E-facing flope. No humus layer/ bare soil patches, some mid-aged maples have bullseye canker. Located off Skyline Drive.**

OTHER DATA COLLECTED

Soils: **N** Forestry: **N** o=old growth Water Chemistry: **N** Publication: **N**
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Broadleaf Deciduous, Height: 2-20m, Cover continuous

- 4. Acer saccharum (Sugar maple)
- 3. Quercus rubra (Northern red oak)
- 1. Populus tremuloides (Quaking aspen)

Woody Broadleaf Deciduous, Height: .0-2m, Cover rare

- 2. Corylus cornuta (Beaked hazelnut)
- 2. Rubus parviflorus (Thimbleberry)
- 1. Acer saccharum SD (Sugar maple)
- 1. Ostrya virginiana (Ironwood, hop hornbeam)
- +. Acer spicatum (Mountain maple)
- +. Diervilla lonicera (Bush honeysuckle)
- +. Fraxinus nigra (Black ash)
- +. Populus grandidentata SD (Big-toothed aspen)
- +. Populus tremuloides SD (Quaking aspen)
- +. Prunus virginiana (Chokecherry)
- +. Quercus rubra SD (Northern red oak)
- +. Ribes cf. cynosbati ST (Prickly gooseberry, dogberry)
- +. Ribes hirtellum (Swamp gooseberry)
- +. Ribes cf. triste ST (Swamp red currant)
- +. Tilia americana SD (Basswood)
- R. Cornus alternifolia (Pagoda dogwood)
- R. Sorbus americana (Mountain-ash)

Graminoid, Height: .0-.5m, Cover interrupted

- +. cf. Agrostis ST (Bent Grass)
- +. Carex pensylvanica
- +. Oryzopsis asperifolia (Mountain rice-grass)

Forb, Height: .0-.5m, Cover rare

- 1. Aster macrophyllus (Large-leaved aster)
- +. Actaea cf. rubra ST (Red baneberry)
- +. Anemone quinquefolia
- +. Arisaema triphyllum (Jack-in-the-pulpit)
- +. Aster cf. lateriflorus ST (Side-flowering aster)
- +. Athyrium angustum (Lady fern)
- +. Clintonia borealis (Blue-bead lily)
- +. Galium triflorum (Three-flowered bedstraw)
- +. Maianthemum canadense (Canada mayflower)
- +. Polygonatum pubescens (Hairy Solomon's-seal)
- +3 Pyrola elliptica (Common pyrola)
- +. Ranunculus recurvatus (Hooked crowfoot)
- +. Rubus pubescens (Dwarf blackberry)
- +. Smilacina racemosa (False Solomon's-seal)
- +. Solidago flexicaulis (Zig-zag goldenrod)
- +. Streptopus roseus (Rose twisted-stalk)
- +. Taraxacum officinale (Common dandelion)
- +. Trillium grandiflorum (Large-flowered trillium)
- +. Viola pubescens (Smooth yellow violet)
- R. Sanicula marilandica (Black snakeroot)

Lichen/Moss, Height: .0-.5m, Cover barely present

- +. Unknown or Indeterminable Plant (moss)

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DNR RELEVE #:8301

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: **MJA04300** EO Rec #: **0**
*Surveyor's ID Code: **MJA** (Melissa J. Arikian)
Date: **31** Month: **JUL** Year: **2000** (e.g. 04 JUL 1993)
CBS Site #: **1** or Site Name: **Magney - Snively forest**
DNR Ownership Code: **81** (City (Other Lands))
*NC Code: **WFn64a Black Ash-Conifer Swamp (Northeastern)**
Commun. Ranking in Relve:**B** Stand typical of Commun. Type:___ Relve typical of Stand:___

LOCATIONAL INFORMATION

State Code: **MN** *County Code: **69** (St. Louis)
Quad Codes DNR: **L21B** Universal: **46092F2** (West Duluth)
Township: **049N** (e.g. 143N) Range: **15W** (e.g. 32W)
QQRT: **NW** QRT: **NW** of Section **22**
Latitude: **46 degrees, 43 minutes, 9 seconds** LL/GPS registration:
Longitude: **92 degrees, 14 minutes, 5 seconds** *Accuracy: ___ Marker: ___

RELEVE INFORMATION

Relve Size (sq. m.): **400** Elev. (ft.): **1337** Slope: **04NE** Slope Position: ___
*ECS Subsection: **0**
Minnesota Soil Atlas Mapping Unit:
*Geomorphic Unit:

Remarks: **Placed within black ash swamp which is from one of the largest wetland patches in N ead of Magney-Snively LSA. Soils very mucky. Extremely thick under and mid story. Near snowmobile/ski trials.**

OTHER DATA COLLECTED

Soils: **N** Forestry: **N** o=old growth Water Chemistry: **N** Publication: **N**
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Broadleaf Deciduous, Height: 2-10m, Cover interrupted

- 3. Fraxinus nigra (Black ash)
- 2. Acer rubrum (Red maple)
- 2. Alnus incana ssp. rugosa (Speckled alder)

Woody Broadleaf Deciduous, Height: .0-2m, Cover patchy

- 2. Alnus incana ssp. rugosa (Speckled alder)
- 2. Fraxinus nigra (Black ash)
- 1. Corylus cornuta (Beaked hazelnut)
- + Acer rubrum (Red maple)
- + Amelanchier ST (Juneberry; Serviceberry; Saska)
- + Cornus stolonifera (Red-osier dogwood)
- + Lonicera canadensis (Fly honeysuckle)
- + Populus tremuloides (Quaking aspen)
- + Quercus rubra SD (Northern red oak)
- + Ribes cf. triste ST (Swamp red currant)
- + Rubus strigosus (Red raspberry)
- + Salix (Willow)
- + Sorbus americana (Mountain-ash)

Graminoid, Height: .0-2m, Cover patchy

- 3. Calamagrostis canadensis (Blue-joint)
- 1. Carex cf. brunnescens
- 1. Carex cf. canescens
- 1. Carex stipata
- + Scirpus cyperinus (Wool-grass)

Forb, Height: .0-.5m, Cover interrupted

- 2. *Onoclea sensibilis* (Sensitive fern)
- 1. *Aster macrophyllus* (Large-leaved aster)
- 1. *Athyrium angustum* (Lady fern)
- 1. *Caltha palustris* (Marsh marigold)
- 1. *Equisetum sylvaticum* (Wood horsetail)

Forb, Height: .0-.5m, Cover interrupted (continued)

- 1. *Iris versicolor* (Blue Flag)
- 1. *Thelypteris phegopteris* (Long beech-fern)
- 1. *Uvularia sessilifolia* (Pale bellwort)
- +. *Anemone quinquefolia*
- +. *Aralia nudicaulis* (Wild sarsaparilla)
- +. *Aster cf. umbellatus* ST (Flat-topped aster)
- +. *Clintonia borealis* (Blue-bead lily)
- +. *Coptis groenlandica* (Goldthread)
- +. *Cornus canadensis* (Bunchberry)
- +. *Dryopteris* ST (Shield-Fern; Wood-Fern)
- +. *Galium obtusum*
- +. *Impatiens capensis* (Spotted touch-me-not, jewel-we)
- +. *Lycopodium dendroideum* (Round-branched groundpine)
- +. *Maianthemum canadense* (Canada mayflower)
- +. *Osmunda cinnamomea* (Cinnamon fern)
- +. *cf. Pontederia* ST (Pickerel-weed)
- +. *Rubus pubescens* (Dwarf blackberry)
- +. *Scutellaria lateriflora* (Mad-dog skullcap)
- +. *Smilacina trifolia* (Three-leaved false Solomon's-s)
- +. *Stachys tenuifolia* (Rough hedge-nettle)
- +. *Trientalis borealis* (Starflower)
- +. Unknown or Indeterminable Plant ST
- +. *Viola pubescens* (Smooth yellow violet)

Lichen/Moss, Height: .0-.5m, Cover barely present

- 1. *Sphagnum* (moss)
- 1. Unknown or Indeterminable Plant (moss)

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DNR RELEVE #:8411

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: CR001 EO Rec #: 0
*Surveyor's ID Code: CR (Carol Reschke)
Date: 14 Month: JUL Year: 1999 (e.g. 04 JUL 1993)
CBS Site #: 1 or Site Name: Magney - Snively forest
DNR Ownership Code: 81 (City (Other Lands))
*NC Code: MHn47a (Sugar Maple-Basswood-(Bluebead Lily) Forest
Commun. Ranking in Relve:A Stand typical of Commun. Type:_ Relve typical of Stand:_

LOCATIONAL INFORMATION

State Code: MN *County Code: 69 (St. Louis)
Quad Codes DNR: L21B Universal: 46092F2 (West Duluth)
Township: 049N (e.g. 143N) Range: 15W (e.g. 32W)
QQRT: SW QRT: SE of Section 28
Latitude: 46 degrees, 41 minutes, 40 seconds LL/GPS registration:
Longitude: 92 degrees, 14 minutes, 47 seconds *Accuracy: _ Marker: _

RELEVE INFORMATION

Relve Size (sq. m.): 400 Elev. (ft.): 1240 Slope: 10SE Slope Position: _
*ECS Subsection: 0
Minnesota Soil Atlas Mapping Unit:
*Geomorphic Unit: 01E (Agassiz Lacustrine Plain, Beltrami Is.)

Remarks: SUGAR MAPLE-YELLOW BIRCH-RED OAK FOREST WITH SMALL AREA OF STANDING
WATER, CA 2-3% OF RELEVE, AFTER UNUSUALLY WET SUMMER. PRESENCE OF
BLACK ASH = THIS IS WET PATCH IN STAND.

OTHER DATA COLLECTED

Soils: N Forestry: N o=old growth Water Chemistry: N Publication: N
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Needleleaf Evergreen, Height: 10-20m, Cover almost absent
R.1 Abies balsamea (Balsam fir)

Woody Needleleaf Evergreen, Height: .0-2m, Cover barely present
+.1 Abies balsamea (Balsam fir)
+.1 Picea glauca (White spruce)
R.1 Taxus canadensis (Canada yew)

Woody Broadleaf Deciduous, Height: 20-35m, Cover interrupted
3.1 Acer saccharum (Sugar maple)
2.1 Betula alleghaniensis
2.1 Fraxinus nigra (Black ash)
2.1 Quercus rubra (Northern red oak)
R.1 Betula papyrifera (Paper birch)

Woody Broadleaf Deciduous, Height: 10-20m, Cover patchy
3.1 Acer saccharum (Sugar maple)
+.1 Betula alleghaniensis

Woody Broadleaf Deciduous, Height: 5-10m, Cover rare
+.1 Acer saccharum (Sugar maple)
+.1 Acer spicatum (Mountain maple)

Woody Broadleaf Deciduous, Height: 2-5m, Cover rare
2.2 Corylus cornuta (Beaked hazelnut)
+.1 Acer saccharum (Sugar maple)
+.1 Acer spicatum (Mountain maple)
+.1 Fraxinus nigra (Black ash)

Woody Broadleaf Deciduous, Height: .5-2m, Cover rare

- 2.1 *Acer saccharum* (Sugar maple)
- 2.2 *Corylus cornuta* (Beaked hazelnut)
- +1 *Fraxinus nigra* (Black ash)
- +1 *Quercus rubra* (Northern red oak)

Woody Broadleaf Deciduous, Height: .1-.5m, Cover patchy

- 3.1 *Acer saccharum* (Sugar maple)
- 1.1 *Acer spicatum* (Mountain maple)
- 1.1 *Lonicera canadensis* (Fly honeysuckle)
- 1.2 *Rubus pubescens* (Dwarf blackberry)
- +1 *Fraxinus nigra* (Black ash)
- +1 *Sorbus decora* (Mountain-ash)
- R.1 *Amelanchier* (Juneberry; Serviceberry; Saska)
- R.1 *Diervilla lonicera* (Bush honeysuckle)
- R.1 *Tilia americana* (Basswood)

Graminoid, Height: .1-.5m, Cover rare

- 2.3 *Carex pensylvanica*
- 1.1 *Brachyelytrum erectum* (Bearded short-husk)
- 1.1 *Carex intumescens*
- + *Carex* Group (Sedge)
- +1 *Oryzopsis asperifolia* (Mountain rice-grass)

Forb, Height: .1-2m, Cover interrupted

- 2.3 *Clintonia borealis* (Blue-bead lily)
- 2.3 *Equisetum sylvaticum* (Wood horsetail)
- 2.2 *Lycopodium annotinum* (Bristly clubmoss)
- 2.2 *Lycopodium dendroideum* (Round-branched groundpine)
- 1.1 *Aralia nudicaulis* (Wild sarsaparilla)
- 1.1 *Aster macrophyllus* (Large-leaved aster)
- 1.1 *Coptis groenlandica* (Goldthread)
- 1.1 *Maianthemum canadense* (Canada mayflower)
- 1. *Osmunda claytoniana* (Interrupted fern)
- 1.1 *Streptopus roseus* (Rose twisted-stalk)
- 1.1 *Trientalis borealis* (Starflower)
- +1 *Arisaema triphyllum* (Jack-in-the-pulpit)
- +1 *Athyrium angustum* (Lady fern)
- +1 *Dryopteris carthusiana* (Spinulose shield fern)
- +1 *Galium triflorum* (Three-flowered bedstraw)
- +1 *Lycopus uniflorus* (Northern bugleweed)
- +1 *Monotropa uniflora* (Indian pipe)
- +1 *Osmunda claytoniana* (Interrupted fern)
- +1 *Polygonatum pubescens* (Hairy Solomon's-seal)
- +1 *Trillium cernuum*
- +1 *Viola* cf. (Violet)

Lichen/Moss, Height: .0-.1m, Cover barely present

- 1. Unknown or Indeterminable Plant

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DNR RELEVE #:8413

----- FINAL RELEVE REPORT FORM, MINNESOTA VEGETATION DATABASE -----

GENERAL INFORMATION

Surveyor's Relve #: CR002 EO Rec #: 0
*Surveyor's ID Code: CR (Carol Reschke)
Date: 23 Month: SEP Year: 1999 (e.g. 04 JUL 1993)
CBS Site #: 1 or Site Name: Magney - Snively forest
DNR Ownership Code: 81 (City (Other Lands))
*NC Code: MHN47a (Sugar Maple-Basswood-(Bluebead Lily) Forest
Commun. Ranking in Relve:A Stand typical of Commun. Type:_ Relve typical of Stand:_

LOCATIONAL INFORMATION

State Code: MN *County Code: 69 (St. Louis)
Quad Codes DNR: L21B Universal: 46092F2 (West Duluth)
Township: 049N (e.g. 143N) Range: 15W (e.g. 32W)
QORT: SE QRT: NW of Section 22
Latitude: 46 degrees, 42 minutes, 49 seconds LL/GPS registration:
Longitude: 92 degrees, 13 minutes, 46 seconds *Accuracy: _ Marker: _

RELEVE INFORMATION

Relve Size (sq. m.): 400 Elev. (ft.): 1300 Slope: 08SE Slope Position: _
*ECS Subsection: 12 (North Shore Highlands)
Minnesota Soil Atlas Mapping Unit:
*Geomorphic Unit: 01E (Agassiz Lacustrine Plain, Beltrami Is.)

Remarks: OLD GROWTH SUGAR MAPLE-YEL BIRCH-BASSWOOD-RED OAK FOREST NEAR CREST OF
HILL, IN ROLLING TERRAIN. NO CUT STUMPS, NO BROWSE LINE, NO OBVIOUS
WORM ACTIVITY. AGE: OVER 160 YEARS.

OTHER DATA COLLECTED

Soils: N Forestry: O o=old growth Water Chemistry: N Publication: N
y=forestry
* = Variables with computerized code dictionaries (See Relve Handbook)

Woody Broadleaf Deciduous, Height: 20-35m, Cover continuous

- 4.1 Acer saccharum (Sugar maple)
- 3.1 Betula alleghaniensis
- 3.1 Quercus rubra (Northern red oak)
- 2.1 Tilia americana (Basswood)

Woody Broadleaf Deciduous, Height: 2-10m, Cover patchy

- 3.1 Acer saccharum (Sugar maple)
- + Betula alleghaniensis

Woody Broadleaf Deciduous, Height: .1-2m, Cover interrupted

- 4.1 Acer saccharum SD (Sugar maple)
- +1 Acer spicatum (Mountain maple)
- + Lonicera canadensis (Fly honeysuckle)
- + Quercus rubra (Northern red oak)

Forb, Height: .1-.5m, Cover rare

- 2. Clintonia borealis (Blue-bead lily)
- 1. Athyrium angustum (Lady fern)
- 1. Carex cf. arctata
- 1. Oryzopsis asperifolia (Mountain rice-grass)
- + Actaea cf. rubra (Red baneberry)
- + Aralia nudicaulis (Wild sarsaparilla)
- + Aster macrophyllus (Large-leaved aster)
- + Maianthemum canadense (Canada mayflower)
- + Solidago flexicaulis (Zig-zag goldenrod)
- + Streptopus roseus (Rose twisted-stalk)
- R. Anemone quinquefolia

Lichen/Moss, Height: .0-.1m, Cover barely present

- 1. Unknown or Indeterminable Plant

Appendix B: 2024 GEI Relevé Field Forms

Appendix Accessibility Statement: This appendix contains field data forms obtained from a third-party organization. These materials are included verbatim and have not been modified, and therefore may not conform to ADA accessibility requirements. All relevant data and interpretations derived from these forms are presented within the main report text. Inclusion of the original forms is intended solely as a methodological reference for future field efforts and is not required for interpretation of the report results.



Initial Scan	_____
Entered	_____
QC'd	_____
Edited	_____
Final Scan	_____

GENERAL INFORMATION

DNR RELIEVE # _____

Surveyor(s): Maggie Ross, Kelly Beaster, Cavan Denning, Rob Peterson
Surveyor's Relve #: 001 **Surveyor's Place Name:** Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other Minnesota Land Trust/City of Duluth
Purpose of Relve: ☒ Classification (R)are species habitat (M)onitoring (O)ther _____
Revisit: (Y)es ☒ No **Original DNR Relve #:**
Date: 14 **Month:** Aug **Year:** 2024 (e.g. 09 JUL 2004)
MBS Site #: **Ownership:** City of Duluth

Vegetation Group: ☒WU wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): MHn45b _ _ _ _ (White Cedar – Yellow Birch Forest)
NPC Ranking in Releve: B _
Stand Typical of NPC: ☒Yes (N)o (U)ncertain
 If ☐No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Releve Typical of Stand: ☒Yes (N)o
 If ☐No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary ☒Close to boundary (E)cotonal

UTM: _____ E }
 _____ N } (record in NAD83, Zone 15)

Permanent Marker: ☒ No (Y)es
 Marker Type / Placement: SW corner of plot

UTM Accuracy: _____ meters

Location Source: ☒ GPS (A)ir photo (T)opo map (L)iDAR (O)ther _____

County: St. Louis Township: 49 N Range: 15 W Section: 27 QORT: _____ of QORT: _____

Plot Size: 20 m x 20 m = 400 m²
Elevation: ft. **Slope:** (°) or 15-30 (%) **Aspect:** SE/LV (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
 (S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther
Rock Type: _____

		Depth of Layer		Texture ^A	Coarse Fragments	
		Top	Bottom		Type ^B	Volume ^C
Soil Layers	1:	0 cm	(>) ____ cm	_____	_____	_____
	2:	____ cm	(>) ____ cm	_____	_____	_____
	3:	____ cm	(>) ____ cm	_____	_____	_____
	4:	____ cm	(>) ____ cm	_____	_____	_____
	5:	____ cm	(>) ____ cm	_____	_____	_____
	6:	____ cm	(>) ____ cm	_____	_____	_____
	7:	____ cm	(>) ____ cm	_____	_____	_____
	8:	____ cm	(>) ____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Yellow birch found on walk in but not present in releve and generally not a lot at any location. Cedars cut
down in releve 10+ years ago. Moved from original plot location to find a more representative location
that fit the topography and aspect. B ranking due to worm impact and limited tree regeneration.

Basal Area & Tree Diameters					DBH List: (C)omplete (P)artial
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
<i>Pinus strobus</i>					60 cm
<i>Acer saccharum</i>					15 cm

Releve-Wide DBH Statistics

Prism Factor: Min: Max: Median:

Notes:

DBH is an estimate.

Photos Taken: (Y)es (N)o

DNR RELIVE #

Surveyor(s): Maggie Ross, Kelly Beaster, Cavan Denning, Rob Peterson **Surveyor's Releve #:** 001 **Date:** 08/14/2024
County: St. Louis **Surveyor's Place Name:** Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 7-8 i Ca	
	3 .	<i>Betula papyrifera</i>	
	2 .	<i>Acer rubra</i>	
	.		
	.	E-7-8r	
	2.	<i>Thuja occidentalis</i>	
	r .	<i>Picea glauca</i>	
	r .	<i>Pinus strobus</i>	
	.		
	.	D 5-6 r	
	+	<i>Acer saccharum</i>	
	r .	<i>Quercus rubra</i>	
	+	<i>Acer spicatum</i>	
	.		
	.	E 5-6 r	
	+	<i>Thuja occidentalis</i>	
	.		
	.	D 3-5 r	
	+	<i>Corylus cornuta</i>	
	r .	<i>Cornus rugosa</i>	
	r .	<i>Acer spicatum</i>	
	r .	<i>Prunus virginiana</i>	
	2 .	<i>Rubus parviflorus</i>	
	+	<i>Lonicera canadensis</i>	
	.		
	.	H 1-3 r	
	1 .	<i>Aralia nudicaulis</i>	
	+	<i>Trillium grandiflorum</i>	
	r .	<i>Actaea pachypoda</i>	
	1 .	<i>Gymnocarpium dryopteris</i>	
	1 .	<i>Maianthemum canadense</i>	
	1 .	<i>Maianthemum canadense</i>	
	+	<i>Arctium minus</i>	
	r .	<i>Prenanthes alba</i>	
	r .	<i>Clintonia borealis</i>	
	r .	<i>Actaea rubra</i>	
	r .	<i>Eurybia macrophylla</i>	
	r .	<i>Clematis virginiana</i>	
	1 .	<i>Polypodium virginianum</i>	
	1 .	<i>Dryopteris carthusiana</i>	

[illegible]

Life Form

B = broadleaf evergreen
D = broadleaf deciduous
E = needleleaf evergreen
G = graminoids
H = forbs
L = lichens
M = mosses & liverworts
C = climbers
K = stem succulents
F = floating-leaved
S = submerged
X = epiphytes

Height

Height

8 >35m

7 = 20-35m

6 = 10-20m

5 = 5-10m

4 = 2-5m

3 = 0.5-2m

2 = 0.1- 0.5m

1 = 0-0.1m

Cover

Group	Species
c	5 75-100%
i	4 50-75%
p	3 25-50%
r	2 5-25%
b	1-5%
a	<1%

Abundance

Abundance

1 <5% cover, many individuals
+ <5% cover, few (2-20) individuals
r <5% cover, single

Sociability

5 = extensive mat
4 = small colonies, broken mat
3 = large group, many plants
2 = small dense clumps
1 = growing singly

Reliability Code

Reliability Code

0 = variety certain
1 = cf. var./subsp.
2 = species certain
3 = species complex
4 = cf. species
5 = genus certain
6 = cf. genus
7 = unknown

Selected Remark Codes

DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 – 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Maggie Ross, Kelly Beaster

Surveyor's Relevé #: 002 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther MN Land Trust/City of Duluth

Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther

Revisit: (Y)es (N)o Original DNR Relevé #: _____

Date: 14 Month: 08 Year: 2024 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): MHN45b (White Cedar – Yellow Birch Forest)

NPC Ranking in Relevé: B

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther

Relevé Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: (N)o (Y)es

Marker Type / Placement: GPS point taken in SW corner of plot

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther

County: _____ Township: 49 N Range: 15 W Section: 27 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²

Elevation: _____ ft. Slope: _____ (°) or 25-35 (%) Aspect: N (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: No cedar present in relevé but cedar are present in the area.

Moved plot from proposed location because there were no cedar or yellow birch present. B ranking due to worm impact and low

cover of non-native species

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Relevé-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes:

No trees were measured

Photos Taken: (Y)es (N)o

DNR RELIVE

Surveyor(s): Maggie Ross & Kelly Beaster Surveyor's Releve #: 002 Date: 08/14/2024
County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D7-8i Ca	
2	3.1	Betula alleghaniensis	
2	2.1	Betula papyrifera	
2	r.1	Acer rubrum	
2	r.1	Quercus rubra	
	.		
	.	E7-8r Ca	
2	r.1	Picea glauca	
2	2.1	Abies balsamea	
	.		
	.	D5-6r	
2	2.1	Betula alleghaniensis	
2	r.1	Betula papyrifera	
	.		
2	.	E5-6b	
2	+.1	Abies balsamea	
	.		
	.	D3-4p	
2	r.1	Diervilla lonicera	
2	r.1	Viburnum opulus	
2	1.4	Rubus parviflorus	
2	2.1	Acer spicatum	
2	2.1	Corylus cornuta	
2	2.4	Lonicera canadensis	
2	r.1	Quercus rubra	
2	r.1	Acer saccharum	
2	+.1	Amelanchier sanguinea/spicata	
2	+.1	Sorbus decora	
2	+.1	Acer rubrum	
	.		
	.	E3-4p	
2	1.1	Taxus canadensis	
2	2.1	Picea glauca	
2	+.1	Pinus strobus	
2	+.1	Abies balsamea	
	.		
	.	G1-3b	
2	1.1	Carex pedunculata	
2	+.1	Oryzopsis asperifolia	
4	+.1	Carex gracillima	

[illegible]

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster

Surveyor's Relevé #: 003 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust

Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther _____

Revisit: (Y)es (N)o Original DNR Relevé #: 8411

Date: 19 ____ Month: 08 ____ Year: 2024 ____ (e.g. 09 JUL 2004)

MBS Site #: ____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): MHn47a ____ (Sugar Maple – Basswood – (Bluebead Lily) Forest)

NPC Ranking in Relevé: B ____

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relevé Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: (N)p (Y)es

Marker Type / Placement: SW corner of relevé plot

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther _____

County: St. Louis Township: 49 ____ N Range: 15 ____ Section: 28 QQRT: ____ of QRT: ____

PLOT INFORMATION

Plot Size: 20 ____ m x 20 ____ m = 400 ____ m²

Elevation: _____ ft. Slope: <5 ____ (°) or ____ (%) Aspect: E ____ (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: ____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: ____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: ____ cm

Depth to Gray Colors or Redox Features: ____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: ____ cm

Sphagnum Cover: ____ %

Depth of Standing Water: (>) ____ cm

pH of Surface Water: ____ ± ____

Average Depth to Bedrock: ____ cm

Exposed Rock: ____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Buckthorn seeding was pulled out by roots. B ranking due to wom impact and low cover of buckthorn

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1: 0 cm	(>) ____ cm			
Soil Layers	2: ____ cm	(>) ____ cm			
	3: ____ cm	(>) ____ cm			
	4: ____ cm	(>) ____ cm			
	5: ____ cm	(>) ____ cm			
	6: ____ cm	(>) ____ cm			
	7: ____ cm	(>) ____ cm			
	8: ____ cm	(>) ____ cm			

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave. DBH (cm)
Betula alleghaniensis				86.6; 46.0, 43.8
Acer rubrum				30.5, 29.0

Relevé-Wide DBH Statistics

Prism Factor: ____ Min: ____ Max: ____ Median: ____

Notes:

Plot was moved slightly south to exclude a vernal pool and to include a higher density of old growth yellow birch.

Photos Taken: (Y)es (N)o

DNR RELIVE #

Surveyor(s): Kelly Beaster Surveyor's Releve #: 003 Date: 08/19/24
County: St. Louis Surveyor's Place Name: Magney-Snively

[illegible][illegible]

Life Form

B = broadleaf evergreen
D = broadleaf deciduous
E = needleleaf evergreen
G = graminoids
H = forbs
L = lichens
M = mosses & liverworts
C = climbers
K = stem succulents
F = floating-leaved
S = submerged
X = epiphytes

Height

Height

8 >35m
7 = 20-35m
6 = 10-20m
5 = 5-10m
4 = 2-5m
3 = 0.5-2m
2 = 0.1- 0.5m
1 = 0-0.1m

Cover

Group	Species
c	5 75-100%
i	4 50-75%
p	3 25-50%
r	2 5-25%
b	1-5%
a	<1%

Abundance

Abundance

1 <5% cover, many individuals
+ <5% cover, few (2-20) individuals
r <5% cover, single

Sociability

5 = extensive mat
4 = small colonies, broken mat
3 = large group, many plants
2 = small dense clumps
1 = growing singly

Reliability Code

Reliability Code

0 = variety certain
1 = cf. var./subsp.
2 = species certain
3 = species complex
4 = cf. species
5 = genus certain
6 = cf. genus
7 = unknown

Selected Remark Codes

DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 – 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster

Surveyor's Relevé #: 004 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other

Purpose of Relevé: (C)lassification (R)are species habitat ☒ Monitoring (O)ther

Revisit: ☒ Yes (N)o Original DNR Relevé #: 0099; 0119

Date: 19 ____ Month: 08 ____ Year: 2024 ____ (e.g. 09 JUL 2004)

MBS Site #: ____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: ☒ WU wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): MHn47a ____ (Sugar Maple – Basswood – (Bluebead Lily) Forest)

NPC Ranking in Relevé: B ____

Stand Typical of NPC: ☒ Yes (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther

Relevé Typical of Stand: ☒ Yes (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary ☒ Close to boundary (E)cotonal

LOCATION INFORMATION

UTM: ____ E } (record in NAD83, Zone 15)
____ N }

Permanent Marker: ☒ No (Y)es

Marker Type / Placement: SW corner of relevé plot

UTM Accuracy: ____ meters

Location Source: ☒ GPS (A)ir photo (T)opo map (L)iDAR (O)ther

County: St. Louis Township: 49 ____ N Range: 15 W Section: 28 QQRT: ____ of QRT: ____

PLOT INFORMATION

Plot Size: 20 ____ m x 20 ____ m = 400 ____ m²

Elevation: ____ ft. Slope: 1-3 ____ (°) or ____ (%) Aspect: S ____ (e.g., N, NE, etc.; LV for level)

Topographic Context: ☒ Rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: ____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther

Humus Thickness: ____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: ____ cm

Depth to Gray Colors or Redox Features: ____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: ____ cm

Sphagnum Cover: ____ %

Depth of Standing Water: (>) ____ cm

pH of Surface Water: ____ ± ____

Average Depth to Bedrock: ____ cm

Exposed Rock: ____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther

Rock Type: ____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Three buckthorn seedlings were found and pulled. Large coarse woody debris and rotting stumps. B ranking because of worm impact and buckthorn.

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1: ____ cm	(>) ____ cm		____	____
Soil Layers	2: ____ cm	(>) ____ cm	____	____	____
	3: ____ cm	(>) ____ cm	____	____	____
	4: ____ cm	(>) ____ cm	____	____	____
	5: ____ cm	(>) ____ cm	____	____	____
	6: ____ cm	(>) ____ cm	____	____	____
	7: ____ cm	(>) ____ cm	____	____	____
	8: ____ cm	(>) ____ cm	____	____	____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SILC = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete ☒ Partial

Species	L/D	BA-1	BA-2	Ave. DBH (cm)
Quercus rubra				64.4, 63.5
Betula alleghaniensis				36.25, 38.7, 41.25 (dead), 52.1 (dying)

Relevé-Wide DBH Statistics

Prism Factor: ____ Min: ____ Max: ____ Median: ____

Notes:

Plot was moved just north of point to match site notes about old growth red oak. Largest trees in the area are in the plot except Tilia.

Photos Taken: (Y)es (N)o

DNR RELIVE

Surveyor(s): Kelly Beaster Surveyor's Releve #: 004 Date: 08/19/24
County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 7-8 i Ca	
	3 .	Betula alleghaniensis	
	2 .	Acer saccharum	
	.		
	.	D 6 r	
	2 .	Acer saccharum	
	2 .	Quercus rubra	
	r .	Ostrya virginiana	
	.		
	.	E 6 r	
	2 .	Picea glauca	
		D 4-5 p	
	2	Corylus cornuta	
	2	Quercus rubra	
	2	Acer saccharum	
	+	Fraxinus nigra	
	2	Lonicera canadensis	
	1	Tilia americana	
	+	Amelanchier laevis/interior	
	+	Rhamnus cathartica	
	r	Betula alleghaniensis	
		G 1-3 r	
	1	Oryzopsis asperifolia	
	2	Carex pensylvanica	
4	+	Agrostis stolonifera	
	+	Carex gracillima	
	r	Schizachne purpurascens	
	r	Carex deweyana	
		E 1-3 r	
	+ .	Thuja occidentalis	
	+ .	Pinus strobus	
	+ .	Abies balsamea	
	.		
	.		
	.		
	.		
	.		

[illegible]

Selected Remark Codes

B = broadleaf evergreen
D = broadleaf deciduous
E = needleleaf evergreen
G = graminoids
H = forbs
L = lichens
M = mosses & liverworts
C = climbers
K = stem succulents
F = floating-leaved
S = submerged
X = epiphytes

Height

- 8 >35m
- 7 = 20-35m
- 6 = 10-20m
- 5 = 5-10m
- 4 = 2-5m
- 3 = 0.5-2m
- 2 = 0.1- 0.5m
- 1 = 0-0.1m

Group	Species
c	5 75-100%
i	4 50-75%
p	3 25-50%
r	2 5-25%
b	1-5%
a	<1%

<u>Abundance</u>	
1	<5% cover
+	<5% cover
r	<5% cover

5 = extensive mat
4 = small colonies, broken mat
3 = large group, many plants
2 = small dense clumps
1 = growing singly

Reliability Code

- 0 = variety certain
- 1 = cf. var./subsp.
- 2 = species certain
- 3 = species complex
- 4 = cf. species
- 5 = genus certain
- 6 = cf. genus
- 7 = unknown

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan	_____
Entered	_____
QC'd	_____
Edited	_____
Final Scan	_____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____
Surveyor(s): Kelly Beaster
Surveyor's Relevé #: 005 **Surveyor's Place Name:** Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust
Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther _____
Revisit: (Y)es (N)o **Original DNR Relevé #:** 106
Date: 19 ____ **Month:** 08 **Year:** 2024 (e.g. 09 JUL 2004)
MBS Site #: _____ **Ownership:** City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): MHn47a (Sugar Maple – Basswood – (Bluebead Lily) Forest)
NPC Ranking in Relevé: B
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relevé Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther _____
County: St. Louis **Township:** 49 N **Range:** 15 **Section:** 33 **QORT:** ____ of **QRT:** ____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²
Elevation: _____ ft. **Slope:** 5-7 (°) or ____ (%) **Aspect:** E (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
1:	0 cm	(>) _____ cm	_____	_____	_____
2:	_____ cm	(>) _____ cm	_____	_____	_____
3:	_____ cm	(>) _____ cm	_____	_____	_____
4:	_____ cm	(>) _____ cm	_____	_____	_____
5:	_____ cm	(>) _____ cm	_____	_____	_____
6:	_____ cm	(>) _____ cm	_____	_____	_____
7:	_____ cm	(>) _____ cm	_____	_____	_____
8:	_____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Higher invasive species than other plots. There were six common buckthorn seedlings and 1 glossy buckthorn that were pulled. One common tansy was also pulled. The hawkweed was left because they are common in the understory and much of this forest. B ranking due to worm impact and non-native species.

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Quercus rubra					33, 35
Acer saccharum					50
Tilia americana					36.8, 33.7
Betula alleghaniensis					48
Ostrya virginiana					19.1

Relevé-Wide DBH Statistics

Prism Factor: _____ **Min:** _____ **Max:** _____ **Median:** _____

Notes:

Plot moved SW of original point to fit the description of the plant community including ground cover species, Tilia old growth, large red oak and sugar maple.

Photos Taken: (Y)es (N)o

DNR RELIVE

Surveyor(s): Kelly Beaster Surveyor's Releve #: 005 Date: 08/19/24
County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 7-8 c Ca	
	2 .	Tilia americana	
	2 .	Quercus rubra	
	3 .	Acer saccharum	
	2 .	Betula alleghaniensis	
	.		
	.	D 6 p	
	3 .	Acer saccharum	
	2 .	Ostrya virginiana	
	.		
	.	D 3-6 p	
	2.	Corylus cornuta	
	2.	Acer saccharum	
	2 .	Lonicera canadensis	
	1 .	Acer spicatum	
	2 .	Ostrya virginiana	
	.		
	.	E 1-3 r	
	2 .	Picea glauca	
	.		
	.	G 1-3 p	
	3 .	Carex pensylvanica	
	2 .	Oryzopsis asperifolia	
4	+	Carex gracillima	
	+	Carex pedunculata	
	r .	Carex deweyana	
	.		
	.	D 1-3 r	
	1 .	Acer saccharum	
	+	Fraxinus nigra	
	+	Ostrya virginiana	
	+	Acer rubrum	
	+	Tilia americana	
	+	Quercus rubra	
	r .	Frangula alnus	
	r .	Cornus rugosa	
	+	Corylus cornuta	
	+	Cornus racemosa	
	.		
	.		

[illegible]

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster

Surveyor's Relevé #: 006 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust

Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther _____

Revisit: (Y)es (N)o Original DNR Relevé #: 841

Date: 19 ____ Month: 08 ____ Year: 2024 ____ (e.g. 09 JUL 2004)

MBS Site #: ____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): MHn47a ____ (Sugar Maple – Basswood – (Bluebead Lily) Forest)

NPC Ranking in Relevé: B ____

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relevé Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: ____ E } (record in NAD83, Zone 15)
____ N }

Permanent Marker: (N)p (Y)es

Marker Type / Placement: SW corner of relevé plot

UTM Accuracy: ____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther _____

County: St. Louis Township: 49 ____ N Range: 15 ____ Section: 33 QQRT: ____ of QRT: ____

PLOT INFORMATION

Plot Size: 20 ____ m x 20 ____ m = 400 ____ m²

Elevation: ____ ft. Slope: ____ (°) or 1-2 ____ (%) Aspect: S ____ (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: ____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: ____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: ____ cm

Depth to Gray Colors or Redox Features: ____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: ____ cm

Sphagnum Cover: ____ %

Depth of Standing Water: (>) ____ cm

pH of Surface Water: ____ ± ____

Average Depth to Bedrock: ____ cm

Exposed Rock: ____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: White pines caged NW of plot, about 3-5 ft tall. Common buckthorn found in plot. Some bare patches of soil.
Minimal leaf material, maybe 1-2 years worth. B ranking because of worm impact and non-native species

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1: ____ cm	(>) ____ cm		____	____
Soil Layers	2: ____ cm	(>) ____ cm	____	____	____
	3: ____ cm	(>) ____ cm	____	____	____
	4: ____ cm	(>) ____ cm	____	____	____
	5: ____ cm	(>) ____ cm	____	____	____
	6: ____ cm	(>) ____ cm	____	____	____
	7: ____ cm	(>) ____ cm	____	____	____
	8: ____ cm	(>) ____ cm	____	____	____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave. DBH (cm)
Acer saccharum				29.2, 31.8
Betula alleghaniensis				69.9
Quercus rubra				59.7, 67.3

Relevé-Wide DBH Statistics

Prism Factor: ____ Min: ____ Max: ____ Median: ____

Notes:

Plot in same location as original survey. Point taken in SW corner but placed in best spot to capture representative community including old growth.

Photos Taken: (Y)es (N)o

DNR RELIVE

Surveyor(s): Kelly Beaster Surveyor's Releve #: 006 Date: 08/19/24
County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 7-8 c Ca	
	2 .	Betula alleghaniensis	
	3 .	Quercus rubra	
	4 .	Acer saccharum	
	.		
	.	D 6 r	
	2 .	Acer saccharum	
	.		
	.	D 4-5 r	
	2 .	Corylus cornuta	
	2 .	Acer saccharum	
	r .	Tilia americana	
	.		
	.	E 3-5	
	r .	Picea glauca	
	.		
	.	D 1-3 r	
	+ .	Acer saccharum	
	+ .	Diervilla lonicera	
	+ .	Fraxinus nigra	
	r .	Betula alleghaniensis	
	+ .	Tilia americana	
	+ .	Lonicera canadensis	
3	r .	Amelanchier laevis/interior	
	+ .	Rhamnus cathartica	
	r .	Cornus alternifolia	
	.		
	.	G 1-3 i	
	4 .	Carex pensylvanica	
	+ .	Carex arctata	
	+ .	Brachyelytrum aristosum	
	1 .	Carex pedunculata	
	+ .	Milium effusum	
	.		
	.	E 1-3 r	
	1 .	Picea glauca	
	r .	Abies balsamea	
	.		
	.		
	.		

[illegible]

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan	_____
Entered	_____
QC'd	_____
Edited	_____
Final Scan	_____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____
Surveyor(s): Kelly Beaster
Surveyor's Relve #: 007 **Surveyor's Place Name:** Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust
Purpose of Relve: (C)lassification (R)are species habitat (M)onitoring (O)ther _____
Revisit: (Y)es (N)o **Original DNR Relve #:** 8297
Date: 19 ____ **Month:** 08 **Year:** 2024 (e.g. 09 JUL 2004)
MBS Site #: _____ **Ownership:** City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): MHn47a (Sugar Maple – Basswood – (Bluebead Lily) Forest)
NPC Ranking in Relve: B
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relve Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther _____
County: St. Louis **Township:** 49 N **Range:** 15 **Section:** 33 **QORT:** ____ of **QRT:** ____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²
Elevation: _____ ft. **Slope:** 3-5 (°) or ____ (%) **Aspect:** S (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
HumusType: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
1:	0 cm	(>) _____ cm	_____	_____	_____
2:	_____ cm	(>) _____ cm	_____	_____	_____
3:	_____ cm	(>) _____ cm	_____	_____	_____
4:	_____ cm	(>) _____ cm	_____	_____	_____
5:	_____ cm	(>) _____ cm	_____	_____	_____
6:	_____ cm	(>) _____ cm	_____	_____	_____
7:	_____ cm	(>) _____ cm	_____	_____	_____
8:	_____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: High quality but low diversity site. Heavily shaded maple forest with spring ephemerals and a carpet of maple seedlings. A few common buckthorn seedlings pulled. In part of the plot, soil was mounded with boulders. It looked intentional and old with seedlings growing out of mounded soil. Could have just been an old growth tree that pulled material up, rotted. B ranking due to worm impact and buckthorn.

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Betula alleghaniensis					63.8
Acer saccharum					42.5, 58.7, 41.3, 41.9
Quercus rubra					46.4

Relve-Wide DBH Statistics

Prism Factor: _____ **Min:** _____ **Max:** _____ **Median:** _____

Notes:

Plot very near original point in SW corner of plot. From point to N, plot had old growth maple and yellow birch

Photos Taken: (Y)es (N)o

DNR RELIVE

Surveyor(s): Kelly Beaster Surveyor's Releve #: 007 Date: 08/19/24
County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 7-8 c Ca	
2	.	Betula alleghaniensis	
	5.	Acer saccharum	
2	.	Quercus rubra	
	.		
	.	D 6 r	
2	.	Acer saccharum	
	.		
	.	D 4-5 b	
1	.	Acer saccharum	
	.		
	.	D 1-3 c	
5	.	Acer saccharum	
	+	Quercus rubra	
r	.	Corylus cornuta	
	1.	Diervilla lonicera	
	+	Fraxinus nigra	
3	r	Amelanchier sanguinea/spicata	
	r	Betula alleghaniensis	
	r	Rhamnus cathartica	
	r	Cornus alternifolia	
	r	Ribes triste	
	r	Ribes hirtellum	
	.		
	.	H 1-3 r	
	+	Clintonia borealis	
	+	Hieracium aurantiacum	
1	.	Mainthemum canadense	
	+	Arisaema triphyllum	
	+	Taraxacum officinale	
	+	Allium tricoccum	
1	.	Athyrium felix-femina	
	r	Solidago flexicaulis	
	r	Solidago gigantea	
	+	Sanguinaria canadensis	
	r	Trillium grandiflorum	
	+	Phegopteris connectilis	
5	r	Viola heart shaped	
	.		
	.		

[illegible]

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____
Surveyor(s): Kelly Beaster
Surveyor's Relevé #: 008 **Surveyor's Place Name:** Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust
Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther _____
Revisit: (Y)es (N)o **Original DNR Relevé #:** _____
Date: 20 Month: 08 Year: 2024 (e.g. 09 JUL 2004)
MBS Site #: _____ **Ownership:** City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): W F n 5 5 a (Black Ash – Aspen – Balsam Poplar Swamp (Northeastern))
NPC Ranking in Relevé: B
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relevé Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther _____
County: St. Louis **Township:** 49 N **Range:** 15 **Section:** 28 **QORT:** _____ of **QRT:** _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²
Elevation: _____ ft. **Slope:** _____ (°) or 1 (%) **Aspect:** W (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: 7 %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____	_____		_____	_____
Soil Layers	1: 0 cm	(>) _____ cm	_____	_____	_____
	2: _____ cm	(>) _____ cm	_____	_____	_____
	3: _____ cm	(>) _____ cm	_____	_____	_____
	4: _____ cm	(>) _____ cm	_____	_____	_____
	5: _____ cm	(>) _____ cm	_____	_____	_____
	6: _____ cm	(>) _____ cm	_____	_____	_____
	7: _____ cm	(>) _____ cm	_____	_____	_____
	8: _____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SILCL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Lots of mossy hummocks. Plot moved from 8295 on other side of trail because point was upland aspen and white spruce.
Placement of plot was chosen based on presence of black ash and yellow birch and wetland species groundcover. Plant community was very small, reduced from original mapped zone. B rating due to presence of common buckthorn.

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Fraxinus nigra					40
Betula alleghaniensis					27.5, 20.3
Picea glauca					44.5

Relevé-Wide DBH Statistics

Prism Factor: _____ **Min:** _____ **Max:** _____ **Median:** _____

Notes:

Placing plot was difficult. Plot is indicative of community.

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster Surveyor's Relevé #: 008 Date: 08/20/24
 County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 7-8 p Ca	
2	.	Fraxinus nigra	
2	.	Betula alleghaniensis	
	.		
	.	E 7-8 a Ca	
r	.	Picea glauca	DD
	.		
	.	D 6 p	
2	.	Fraxinus nigra	
2	.	Betula alleghaniensis	
r	.	Betula papyrifera	
	.		
	.	E 6 r	
2	.	Abies balsamea	
r	.	Picea glauca	
	.		
	.	D 4 a	
+	.	Fraxinus nigra	
+	.	Rhamnus cathartica	
	.		
	.	D 1-3 r	
2	.	Corylus cornuta	
+	.	Rhamnus cathartica	
5	+	Amelanchier sp.	
+	.	Acer spicata	
+	.	Ribes triste	
+	.	Acer saccharum	
+	.	Ribes hirtellum	
+	.	Fraxinus nigra	
+	.	Rubus idaeus	
+	.	Quercus rubra	
+	.	Populus tremuloides	
+	.	Diervilla lonicera	
+	.	Cornus rugosa	
	.		
	.	G 1-3 r	
4	r	Agrostis stolonifera	
	+	Carex gracillima	
	+	Brachyelytrum aristosum	
	.		

ID	C.S	SPECIES NAME	REMARKS
	.	G 1-3 r (continued)	
+	.	Carex crinita	
2	.	Calamagrostis canadensis	
+	.	Carex brunescens	
+	.	Carex projecta	
	.		
	.	H 1-3 p	
r	.	Galium triflorum	
+	.	Caltha palustris	
r	.	Actaea rubra	
2	.	Athyrium filix-femina	
1	.	Equisetum arvense	
+	.	Symphyotrichum lateriflorum	
1	.	Rubus pubescens	
1	.	Equisetum sylvaticum	
+	.	Arisaema triphyllum	
+	.	Micranthes pensylvanica	
2	.	Doellingeria umbellata	
+	.	Bromus ciliata	
1	.	Phegopteris connectilis	
+	.	Taraxacum officinale	
+	.	Mitella nuda	
+	.	Impatiens capensis	
+	.	Mertensia paniculata	
+	.	Fragaria virginiana	
+	.	Viola pubescens	
+	.	Galium asprellum	
+	.	Dryopteris carthusiana	
1	.	Eurybia macrophylla	
+	.	Anemone quinquefolia	
+	.	Aralia nudicaulis	
r	.	Thalictrum dasycarpum	
r	.	Ranunculus recurvatus	
+	.	Stellaria longifolia	
+	.	Lysimachia borealis	
+	.	Maianthemum canadense	
+	.	Clintonia borealis	
+	.	Trillium cernuum	
+	.	Cornus canadensis	
r	.	Scutellaria lateriflorus	

Life Form

B = broadleaf evergreen
 D = broadleaf deciduous
 E = needleleaf evergreen
 G = graminoids
 H = forbs
 L = lichens
 M = mosses & liverworts
 C = climbers
 K = stem succulents
 F = floating-leaved
 S = submerged
 X = epiphytes

Height

8 >35m
 7 = 20-35m
 6 = 10-20m
 5 = 5-10m
 4 = 2-5m
 3 = 0.5-2m
 2 = 0.1- 0.5m
 1 = 0-0.1m

Cover

Group Species
 c 5 75-100%
 i 4 50-75%
 p 3 25-50%
 r 2 5-25%
 b 1-5%
 a <1%

Abundance

1 <5% cover, many individuals
 + <5% cover, few (2-20) individuals
 r <5% cover, single

Sociability

5 = extensive mat
 4 = small colonies, broken mat
 3 = large group, many plants
 2 = small dense clumps
 1 = growing singly

Reliability Code

0 = variety certain
 1 = cf. var./subsp.
 2 = species certain
 3 = species complex
 4 = cf. species
 5 = genus certain
 6 = cf. genus
 7 = unknown

Selected Remark Codes

DD = dead
 DY = dying
 GE = germinating
 SD = seedling
 SP = sprout (coppice)
 FR = fruiting
 OP = outside plot (<2m)
 ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")

DNR RELIVE #

Surveyor(s): Kelly Beaster Surveyor's Releve #: 008 Date: 08/20/24
County: St. Louis Surveyor's Place Name: Magney-Snively

[illegible][illegible]

Life Form

B = broadleaf evergreen
D = broadleaf deciduous
E = needleleaf evergreen
G = graminoids
H = forbs
L = lichens
M = mosses & liverworts
C = climbers
K = stem succulents
F = floating-leaved
S = submerged
X = epiphytes

Height

height

8 >35m
7 = 20-35m
6 = 10-20m
5 = 5-10m
4 = 2-5m
3 = 0.5-2m
2 = 0.1 - 0.5m
1 = 0-0.1m

Cover

Group	Species
c	5 75-100%
i	4 50-75%
p	3 25-50%
r	2 5-25%
b	1-5%
a	<1%

Abundance

1 <5% cover, many individuals
+ <5% cover, few (2-20) individuals
r <5% cover, single

Sociability

Sociability

- 5 = extensive mat
- 4 = small colonies, broken mat
- 3 = large group, many plants
- 2 = small dense clumps
- 1 = growing singly

Reliability Code

Reliability Code
0 = variety certain
1 = cf. var./subsp.
2 = species certain
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4 = cf. species
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6 = cf. genus
7 = unknown

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 – 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____

Surveyor(s): Kelly Beaster

Surveyor's Relieve #: 009 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust

Purpose of Relieve: (C)lassification (R)are species habitat (M)onitoring (O)ther

Revisit: (Y)es (N)o Original DNR Relieve #: 8 2 9 5

Date: 2 0 Month: 0 8 Year: 2 0 2 4 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): W F n 5 5 a (Black Ash - Aspen - Balsam Poplar Swamp (Northeastern)

NPC Ranking in Relieve: A

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther

Relieve Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: (N)p (Y)es

Marker Type / Placement: SW corner of relieve plot

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther

County: St. Louis Township: 49 N Range: 15 Section: 28 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²

Elevation: _____ ft. Slope: 0 (°) or _____ (%) Aspect: _____ (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ilic quartzite (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Not very wet but has wetland indicator species. Plot was moved to NW of original point to try to match notes about canopy

with black ash, yellow birch, and white spruce as main dominant species. Asarum was spotted on S side of ski trail but not in same

habitat. Otherwise site matched fairly well.

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1: _____ cm	(>) _____ cm		_____	_____
Soil Layers	2: _____ cm	(>) _____ cm	_____	_____	_____
	3: _____ cm	(>) _____ cm	_____	_____	_____
	4: _____ cm	(>) _____ cm	_____	_____	_____
	5: _____ cm	(>) _____ cm	_____	_____	_____
	6: _____ cm	(>) _____ cm	_____	_____	_____
	7: _____ cm	(>) _____ cm	_____	_____	_____
	8: _____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Betula alleghaniensis					34.3, 21.6, 10, 47.0
Quercus rubra					18.7
Picea glauca					41.3, 26.3
Fraxinus nigra					20.3, 12.7, 12.7

Relieve-Wide DBH Statistics

Prism Factor: _____

Min: _____ Max: _____ Median: _____

Notes:

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster Surveyor's Relevé #: 009 Date: 08/20/24
 County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 7-8 i Ca	
3	.	Betula alleghaniensis	
2	.	Fraxinus nigra	
1	.	Quercus rubra	
	.		
	.	E 7-8 r Ca	
2	.	Picea glauca	
	.		
	.	D 6 r	
2	.	Fraxinus nigra	
	.		
	.	D 4-5 r	
+	.	Fraxinus nigra	
2	.	Corylus cornuta	
2	.	Acer spicatum	
+	.	Alnus incana	
	.		
	.	E 4-5 a	
+	.	Picea glauca	
	.		
	.	D 1-5 b	
5	r	Amelanchier sp.	
	r	Populus tremuloides	
+	.	Rubus parviflorus	
+	.	Fraxinus nigra	
+	.	Acer spicatum	
+	.	Ribes triste	
r	.	Quercus rubra	
+	.	Rhamnus cathartica	
r	.	Diervilla lonicera	
	.		
	.	E 1-3 b	
+	.	Picea glauca	
+	.	Abies balsamea	
	.		
	.	G 1-3 b	
+	.	Glyceria striata	
1	.	Elymus hystrix	
+	.	Brachyletrum aristosum	
+	.	Bromus ciliatus	

ID	C.S	SPECIES NAME	REMARKS
	.	G 1-3 b (continued)	
1	.	Carex pedunculata	
+	.	Carex intumescens	
r	.	Carex gracillima	
2	.	Oryzopsis asperifolia	
+	.	Poa palustris	
	.		
	.	H 1-3 p	
+	.	Galium asprellum	
+	.	Micranthes pensylvanica	
1	.	Equisetum sylvaticum	
1	.	Aralia nudicaulis	
1	.	Solidago flexicaulis	
+	.	Ranunculus hispidus	
1	.	Rubus pubescens	
+	.	Doellingeria umbellata	
r	.	Prunella vulgaris	
+	.	Symphyotrichum lateriflorum	
1	.	Athyrium felix-femina	
+	.	Thalictrum dasycarpum	
+	.	Sanguinaria canadense	
2	.	Eurybia macrophylla	
+	.	Arisaema triphyllum	
+	.	Taraxacum officinale	
+	.	Circaea alpina	
+	.	Dryopteris carthusiana	
+	.	Lysimachia borealis	
+	.	Maianthemum canadense	
+	.	Hieracium aurantiacum	
+	.	Clintonia borealis	
+	.	Linnaea borealis	
+	.	Cornus canadensis	
+	.	Epilobium leptophyllum	
+	.	Mertensia paniculata	
+	.	Gymnocarpium dryopteris	
2	.	Solidago gigantea	
2	.	Matteuccia struthiopteris	
+	.	Trillium grandiflorum	
+	.	Fragaria virginiana	
+	.	Pyrola elliptica	

Life Form

B = broadleaf evergreen
 D = broadleaf deciduous
 E = needleleaf evergreen
 G = graminoids
 H = forbs
 L = lichens
 M = mosses & liverworts
 C = climbers
 K = stem succulents
 F = floating-leaved
 S = submerged
 X = epiphytes

Height

8 >35m
 7 = 20-35m
 6 = 10-20m
 5 = 5-10m
 4 = 2-5m
 3 = 0.5-2m
 2 = 0.1- 0.5m
 1 = 0-0.1m

Cover

Group Species
 c 5 75-100%
 i 4 50-75%
 p 3 25-50%
 r 2 5-25%
 b 1-5%
 a <1%

Abundance

1 <5% cover, many individuals
 + <5% cover, few (2-20) individuals
 r <5% cover, single

Sociability

5 = extensive mat
 4 = small colonies, broken mat
 3 = large group, many plants
 2 = small dense clumps
 1 = growing singly

Reliability Code

0 = variety certain
 1 = cf. var./subsp.
 2 = species certain
 3 = species complex
 4 = cf. species
 5 = genus certain
 6 = cf. genus
 7 = unknown

Selected Remark Codes

DD = dead
 DY = dying
 GE = germinating
 SD = seedling
 SP = sprout (coppice)
 FR = fruiting
 OP = outside plot (<2m)
 ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____
Surveyor(s): Kelly Beaster
Surveyor's Relevé #: 010 **Surveyor's Place Name:** Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other City of Duluth/Minnesota Land Trust
Purpose of Relevé: (C)lassification (R)are species habitat ☒ Monitoring (O)ther _____
Revisit: (Y)es ☒ No **Original DNR Relevé #:** _____
Date: 20 ____ **Month:** 08 ____ **Year:** 2024 ____ (e.g. 09 JUL 2004)
MBS Site #: _____ **Ownership:** City of Duluth

VEGETATION INFORMATION

Vegetation Group: ☒ WU wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): M H n 4 6 b _____ (Black Ash – Basswood Forest)
NPC Ranking in Relevé: B _____
Stand Typical of NPC: ☒ Yes (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relevé Typical of Stand: ☒ Yes (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: ☒ GPS (A)ir photo (T)opo map (L)iDAR (O)ther _____
County: St. Louis **Township:** 49 ____ N **Range:** 15 ____ **Section:** 28 ____ **QORT:** ____ of QRT: ____

PLOT INFORMATION

Plot Size: 20 ____ m x 20 ____ m = 400 ____ m²
Elevation: _____ ft. **Slope:** _____ (°) or 2 ____ (%) **Aspect:** S ____ (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle ☒ Lower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____	_____		_____	_____
Soil Layers	1:	0 cm (>) _____ cm	_____	_____	_____
	2:	_____ cm (>) _____ cm	_____	_____	_____
	3:	_____ cm (>) _____ cm	_____	_____	_____
	4:	_____ cm (>) _____ cm	_____	_____	_____
	5:	_____ cm (>) _____ cm	_____	_____	_____
	6:	_____ cm (>) _____ cm	_____	_____	_____
	7:	_____ cm (>) _____ cm	_____	_____	_____
	8:	_____ cm (>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Plot is characteristic of surrounding narrow band that follow small stream. Plot selected very close to original point.
B ranking due to worm impact and common buckthorn

Basal Area & Tree Diameters

DBH List: (C)omplete ☒ Partial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Fraxinus nigra					39.4, 8.75
Quercus rubra					14
Populus balsamifera					26.7

Relevé-Wide DBH Statistics

Prism Factor: _____ **Min:** _____ **Max:** _____ **Median:** _____

Notes:

Photos Taken: (Y)es (N)o

DNR RELIVE # _____

Surveyor(s): Kelly Beaster Surveyor's Relevé #: 010 Date: 08/20/24
County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 7-8 r Ca	
	2 .	Fraxinus nigra	
	2 .	Populus balsamifera	
	2 .	Acer saccharum	
	.		
	.	D 6 p	
	2 .	Quercus rubra	
	2 .	Populus balsamifera	
	2 .	Acer saccharum	
	2 .	Tilia americana	
	.		
	.	D 5 r	
	2 .	Betula alleghaniensis	
	.		
	.	D 1-3 r	
	+ .	Fraxinus nigra	
	+ .	Ribes triste	
	+ .	Acer spicatum	
	+ .	Corylus cornuta	
	+ .	Populus balsamifera	
	+ .	Tilia americana	
	r .	Sorbus decora	
	+ .	Acer saccharum	
	+ .	Rhamnus cathartica	
	+ .	Cornus alternifolia	
	.		
	.	G 1-3 r	
	+ .	Carex actata	
	+ .	Carex scoparia/projecta	
	1 .	Carex pedunculata	
	+ .	Glyceria striata	
	+ .	Oryzopsis asperifolia	
	r .	Schizachne purpurescens	
	r .	Poa palustris	
	r .	Carex crinita	
	r .	Carex stipata	
	.		
	.	E 1-3 a	
	r .	Picea glauca	
	.		

[illegible]

Selected Remark Codes

Selected Remark Codes

DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____

Surveyor(s): Kelly Beaster

Surveyor's Relve #: 011 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust

Purpose of Relve: (C)lassification (R)are species habitat (M)onitoring (O)ther

Revisit: (Y)es (N)o Original DNR Relve #: 8 2 9 8

Date: 2 0 Month: 0 8 Year: 2 0 2 4 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): M H n 4 6 b (Black Ash - Basswood Forest)

NPC Ranking in Relve: B

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther

Relve Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: (N)p (Y)es

Marker Type / Placement: SW corner of releve plot

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther

County: St. Louis Township: 49 N Range: 15 Section: 33 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²

Elevation: _____ ft. Slope: _____ (°) or 1-2 (%) Aspect: S (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: No buckthorn found in the plot. High quality plant community. Did not do an official soil probe, but a sample below the organic layer was very dark and silty loam and wet. B ranking because of earthworm impact.

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____ cm	(>) _____ cm		_____	_____
Soil Layers	1: _____ cm	(>) _____ cm	_____	_____	_____
	2: _____ cm	(>) _____ cm	_____	_____	_____
	3: _____ cm	(>) _____ cm	_____	_____	_____
	4: _____ cm	(>) _____ cm	_____	_____	_____
	5: _____ cm	(>) _____ cm	_____	_____	_____
	6: _____ cm	(>) _____ cm	_____	_____	_____
	7: _____ cm	(>) _____ cm	_____	_____	_____
	8: _____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Picea glauca					36.3
Betula alleghaniensis					25.5, 12.0
Fraxinus nigra					17.8
Quercus rubra					24.1, 11.4

Relve-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes:

Photos Taken: (Y)es (N)o

DNR RELIVE

Surveyor(s): Kelly Beaster Surveyor's Releve #: 011 Date: 08/20/24
County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 7-8p Ca	
	2.	Fraxinus nigra	
	2.	Betula alleghaniensis	
	2.	Quercus rubra	
	.		
	.	E 7-8 r Ca	
	2.	Picea glauca	
	.		
	.	D 6 r	
	2.	Fraxinus nigra	
	2.	Betula alleghaniensis	
	2.	Acer saccharum	
	2.	Tilia americana	
	.		
	.	E 1-3 r	
	2.	Picea glauca	
	r.	Abies balsamea	
	.		
	.	D 1-3 r	
	r.	Betula alleghaniensis	
	2.	Corylus cornuta	
	+	Quercus rubra	
	+	Ribes triste	
5	+	Amelanchier sp.	
	+	Fraxinus nigra	
	+	Acer saccharum	
	+	Acer spicatum	
	+	Lonicera canadensis	
	+	Prunus virginiana	
	.		
	.	G 1-3 p	
	+	Glyceria striata	
	+	Carex leptalea	
	1.	Carex projecta	
	1.	Carex pensylvanica	
	1.	Oryzopsis asperifolia	
	+	Carex pedunculata	
	+	Brachyeletrum aristosum	
	+	Carex intumescens	
	.		

[illegible]

Selected Remark Codes

DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster

Surveyor's Relevé #: 012 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust

Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther _____

Revisit: (Y)es (N)o Original DNR Relevé #: _____

Date: 21 Month: 08 Year: 2024 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): F D n 3 3 b (Aspen - Birch Woodland)

NPC Ranking in Relevé: C

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relevé Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: (N)p (Y)es

Marker Type / Placement: SW corner of relevé plot

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther _____

County: St. Louis Township: 49 N Range: 15 Section: 34 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²

Elevation: _____ ft. Slope: 5 (°) or _____ (%) Aspect: S (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliciclastic (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Plot was young but contained many the species indicative of FDn33b, though many ground cover species were low in abundance.

Overall, very impacted site due to invasion of buckthorn, honeysuckle, the and hellbovine orchid. C ranking because of these impacts

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____	_____		_____	_____
Soil Layers	1: 0 cm	(>) _____ cm	_____	_____	_____
	2: _____ cm	(>) _____ cm	_____	_____	_____
	3: _____ cm	(>) _____ cm	_____	_____	_____
	4: _____ cm	(>) _____ cm	_____	_____	_____
	5: _____ cm	(>) _____ cm	_____	_____	_____
	6: _____ cm	(>) _____ cm	_____	_____	_____
	7: _____ cm	(>) _____ cm	_____	_____	_____
	8: _____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave. DBH (cm)
Acer rubrum				23.5
Betula papyrifera				14.0
Fraxinus pensylvanica				14.6
Populus tremuloides				21.0

Relevé-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes:

Soil was compacted with little organic layer. Bedrock is very close to soil surface and can be observed as rock outcrops or boulders in and around the plot.

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster Surveyor's Relevé #: 012 Date: 08/21/24
 County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 6-7p Ca	
	.	Acer rubrum	
	.	Acer saccharum	
	.	Betula papyrifera	
	.	Populus tremuloides	
	.	Fraxinus pensylvanica	
	.		
	.	D 4-5 b	
	.	Acer saccharum	
	.	Fraxinus pensylvanica	
	.	Corylus cornuta	
	.	Betula papyrifera	
	.	Ostrya virginiana	
	.		
	.	E 1-3 a	
	.	Picea glauca	
	.		
	.	D 1-3 r	
	.	Corylus cornuta	
	.	Rhamnus cathartica	
	.	Fraxinus pensylvanica	
	.	Quercus rubra	
	.	Cornus sericea	
	.	Rubus parviflorum	
	.	Ribes hirtellum	
3	.	Amelanchier sanguinea/spicata	
	.	Tilia americana	
	.	Symphoricarpos albus	
	.	Ostrya virginiana	
	.	Ribes cynosbati	
	.	Populus tremuloides	
	.	Rosa blanda	
	.	Acer saccharum	
	.		
	.		
	.		
	.		
	.		
	.		
	.		
	.		

ID	C.S	SPECIES NAME	REMARKS
	.	H 1-3 r	
	.	Maianthemum canadense	
	.	Uvularia grandiflora	
	.	Trillium grandiflorum	
	.	Fragaria virginiana	
	.	Athyrium felix-femina	
5	.	Actaea	
	.	Pyrola elliptica	
	.	Symphyotrichum lateriflorum	
	.	Pyrola asarifolia	
	.	Aralia nudicaulis	
	.	Lonicera hirsuta	
	.	Lonicera X bella	
	.	Taraxacum officinale	
	.	Hieracium arantiacum	
	.	Solidago flexicaulis	
	.	Pteridium aquilinum	
	.	Anemone quinquefolia	
	.	Hepatica americana	
	.	Solidago canadensis	
	.	Uvularia sessifolia	
	.	Anemone cyndrilica	
	.	Hieracium umbellatum	
	.	Rubus pubescens	
	.	Ranunculus recurvatus	
	.	Equisetum arvense	
	.	Galium triflorum	
	.	Apocynum sibiricum	
	.	Geum canadense	
	.	Eurybia macrophylla	
	.	Epipactis helleborine	
	.		
	.	G 1-3 r	
	.	Carex pensylvanica	
	.	Carex pedunculata	
	.	Brachyletrum erectum	
	.	Oryzopsis asperifolia	
4	.	Agrostis stolonifera	
	.	Milium effusum	
	.		
	.	Carex gracillima	

Life Form

B = broadleaf evergreen
 D = broadleaf deciduous
 E = needleleaf evergreen
 G = graminoids
 H = forbs
 L = lichens
 M = mosses & liverworts
 C = climbers
 K = stem succulents
 F = floating-leaved
 S = submerged
 X = epiphytes

Height

8 >35m
 7 = 20-35m
 6 = 10-20m
 5 = 5-10m
 4 = 2-5m
 3 = 0.5-2m
 2 = 0.1- 0.5m
 1 = 0-0.1m

Cover

Group Species
 c 5 75-100%
 i 4 50-75%
 p 3 25-50%
 r 2 5-25%
 b 1-5%
 a <1%

Abundance

1 <5% cover, many individuals
 + <5% cover, few (2-20) individuals
 r <5% cover, single

Sociability

5 = extensive mat
 4 = small colonies, broken mat
 3 = large group, many plants
 2 = small dense clumps
 1 = growing singly

Reliability Code

0 = variety certain
 1 = cf. var./subsp.
 2 = species certain
 3 = species complex
 4 = cf. species
 5 = genus certain
 6 = cf. genus
 7 = unknown

Selected Remark Codes

DD = dead
 DY = dying
 GE = germinating
 SD = seedling
 SP = sprout (coppice)
 FR = fruiting
 OP = outside plot (<2m)
 ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster

Surveyor's Relevé #: 013 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other City of Duluth/Minnesota Land Trust

Purpose of Relevé: (C)lassification (R)are species habitat ☒ Monitoring (O)ther _____

Revisit: (Y)es ☒ No Original DNR Relevé #: _____

Date: 21 Month: 08 Year: 2024 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland ☒ (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): R O n 2 3 a _____ (Bedrock Shrubland (Inland))

NPC Ranking in Relevé: C

Stand Typical of NPC: ☒ Yes (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relevé Typical of Stand: ☒ Yes (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary ☒ (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: ☒ Yes

Marker Type / Placement: SW corner of relevé plot

UTM Accuracy: _____ meters

Location Source: ☒ GPS (A)ir photo (T)opo map (L)idar (O)ther _____

County: St. Louis Township: 49 N Range: 15 Section: 34 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²

Elevation: _____ ft. Slope: 15-25(°) or _____ (%) Aspect: S W (e.g., N, NE, etc.; LV for level)

Topographic Context: ☒ Crest ☒ Upper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliciclastic (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Plot moved from suggested location due to larger area without steep and inaccessible areas. Plot was placed in a 10x10 m because 20x20 would have covered some cliffs and inaccessible areas and plot covered low shrubs with an absence of tree cover.

C ranking due to non-native species cover

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____	_____		_____	_____
Soil Layers	1: 0 cm	(>) _____ cm	_____	_____	_____
	2: _____ cm	(>) _____ cm	_____	_____	_____
	3: _____ cm	(>) _____ cm	_____	_____	_____
	4: _____ cm	(>) _____ cm	_____	_____	_____
	5: _____ cm	(>) _____ cm	_____	_____	_____
	6: _____ cm	(>) _____ cm	_____	_____	_____
	7: _____ cm	(>) _____ cm	_____	_____	_____
	8: _____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Relevé-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes:

Photos Taken: (Y)es (N)o

DNR RELIVE #

Surveyor(s): Kelly Beaster Surveyor's Releve #: 013 Date: 08/21/24
County: St. Louis Surveyor's Place Name: Magney-Snively

[illegible][illegible]

Life Form

B = broadleaf evergreen
D = broadleaf deciduous
E = needleleaf evergreen
G = graminoids
H = forbs
L = lichens
M = mosses & liverworts
C = climbers
K = stem succulents
F = floating-leaved
S = submerged
X = epiphytes

Height

Height

- 8 >35m
- 7 = 20-35m
- 6 = 10-20m
- 5 = 5-10m
- 4 = 2-5m
- 3 = 0.5-2m
- 2 = 0.1- 0.5m
- 1 = 0-0.1m

Cover

Group	Species
c	5 75-100%
i	4 50-75%
p	3 25-50%
r	2 5-25%
b	1-5%
a	<1%

Abundance

1 <5% cover, many individuals
+ <5% cover, few (2-20) individuals
r <5% cover, single

Sociability

Sociability

- 5 = extensive mat
- 4 = small colonies, broken mat
- 3 = large group, many plants
- 2 = small dense clumps
- 1 = growing singly

Reliability Code

Reliability Code

0 = variety certain
1 = cf. var./subsp.
2 = species certain
3 = species complex
4 = cf. species
5 = genus certain
6 = cf. genus
7 = unknown

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 – 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____
Surveyor(s): Kelly Beaster
Surveyor's Relevé #: 014 Surveyor's Place Name: Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust
Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther _____
Revisit: (Y)es (N)o Original DNR Relevé #: _____
Date: 21 Month: 08 Year: 2024 (e.g. 09 JUL 2004)
MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): M H n 4 6 b (Black Ash – Basswood Forest)
NPC Ranking in Relevé: B
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relevé Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther _____
County: St. Louis Township: 49 N Range: 15 Section: 33 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²
Elevation: _____ ft. Slope: 5-10 (°) or _____ (%) Aspect: N (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)ype (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1:	0 cm (>) _____ cm	_____	_____	_____
	2:	_____ cm (>) _____ cm	_____	_____	_____
	3:	_____ cm (>) _____ cm	_____	_____	_____
	4:	_____ cm (>) _____ cm	_____	_____	_____
	5:	_____ cm (>) _____ cm	_____	_____	_____
	6:	_____ cm (>) _____ cm	_____	_____	_____
	7:	_____ cm (>) _____ cm	_____	_____	_____
	8:	_____ cm (>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Plot added to replace Sargent Creek which was actually black ash swamp. This forest has the basswood component and within the plot there was a very old basswood that has fallen and was rotting but some mature of the next generation were sprouting from the base. Earthworm castings present. B ranking due to earthworm impact and common buckthorn

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Quercus rubra					15.2, 35.6
Acer saccharum					31.75
Picea glauca					24.1
Tilia americana					22.9
Fraxinus nigra					43.2

Relevé-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes:

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster Surveyor's Relevé #: 014 Date: 08/21/24
 County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 7-8 p Ca	
1	.	Ostrya virginiana	
2	.	Fraxinus nigra	
2	.	Acer rubrum	
2	.	Acer saccharum	
2	.	Quercus rubra	
2	.	Tilia americana	
.	.		
.	.	E 7-8 b	
1	.	Picea glauca	
.	.		
.	.	D 6 b	
1	.	Acer saccharum	
.	.		
.	.	E 4 a	
+	.	Picea glauca	
.	.		
.	.	D 1-3 r	
+	.	Lonicera canadensis	
+	.	Acer saccharum	
+	.	Ostrya virginiana	
+	.	Fraxinus nigra	
+	.	Tilia americana	
+	.	Acer spicatum	
+	.	Diervilla lonicera	
+	.	Quercus rubra	
+	.	Acer rubrum	
+	.	Rhamnus cathartica	
r	.	Amelanchier laevis/interior	
r	.	Prunus virginiana	
.	.		
.	.	E 1-3 b	
+	.	Picea glauca	
r	.	Abies balsamea	
.	.		
.	.	D 4 r	
2	.	Corylus cornuta	
.	.		
.	.	H 1-3 r (continued)	
+	.	Solanum dulcamara	

ID	C.S	SPECIES NAME	REMARKS
	.	G 1-3 b	
+	.	Carex pedunculata	
+	.	Carex pensylvanica	
+	.	Oryzopsis asperifolia	
+	.	Elymus hystrix	
+	.	Carex gracillima	
+	.	Poa palustris	
3	r	Carex scoparia/projecta	
r	.	Glyceria striata	
.	.	H 1-3 r	
1	.	Osmunda claytoniana	
2	.	Athyrium filix-femina	
+	.	Hieracium arantiacum	
+	.	Arisaema triphyllum	
+	.	Taraxacum officinale	
+	.	Clintonia borealis	
+	.	Polygonatum pubescens	
+	.	Maianthemum canadense	
+	.	Dryopteris carthusiana	
+	.	Lysimachia borealis	
r	.	Solidago flexicaulis	
+	.	Symphyotrichum lateriflorum	
5	+	Actaea	
+	.	Aralia nudicaulis	
+	.	Ranunculus abortivus	
+	.	Equisetum sylvaticum	
+	.	Symphyotrichum lanceolatum	
+	.	Rubus pubescens	
+	.	Micranthes pensylvanica	
+	.	Circaea alpina	
+	.	Gymnocarpium dryopteris	
r	.	Ranunculus recurvatus	
+	.	Doellingeria umbellata	
+	.	Impatiens capensis	
1	.	Phegopteris connectilis	
+	.	Galium triflorum	
+	.	Valeriana officinalis	
r	.	Solidago canadensis	
r	.	Epilobium leptophyllum	
+	.	Mitella nuda	

Life Form

B = broadleaf evergreen
 D = broadleaf deciduous
 E = needleleaf evergreen
 G = graminoids
 H = forbs
 L = lichens
 M = mosses & liverworts
 C = climbers
 K = stem succulents
 F = floating-leaved
 S = submerged
 X = epiphytes

Height

8 >35m
 7 = 20-35m
 6 = 10-20m
 5 = 5-10m
 4 = 2-5m
 3 = 0.5-2m
 2 = 0.1- 0.5m
 1 = 0-0.1m

Cover

Group Species
 c 5 75-100%
 i 4 50-75%
 p 3 25-50%
 r 2 5-25%
 b 1-5%
 a <1%

Abundance

1 <5% cover, many individuals
 + <5% cover, few (2-20) individuals
 r <5% cover, single

Sociability

5 = extensive mat
 4 = small colonies, broken mat
 3 = large group, many plants
 2 = small dense clumps
 1 = growing singly

Reliability Code

0 = variety certain
 1 = cf. var./subsp.
 2 = species certain
 3 = species complex
 4 = cf. species
 5 = genus certain
 6 = cf. genus
 7 = unknown

Selected Remark Codes

DD = dead
 DY = dying
 GE = germinating
 SD = seedling
 SP = sprout (coppice)
 FR = fruiting
 OP = outside plot (<2m)
 ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____
Surveyor(s): Kelly Beaster
Surveyor's Relevé #: 015 **Surveyor's Place Name:** Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust
Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther _____
Revisit: (Y)es (N)o **Original DNR Relevé #:** _____
Date: 2 2 **Month:** 0 8 **Year:** 2 0 2 4 (e.g. 09 JUL 2004)
MBS Site #: _____ **Ownership:** City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): W F n 5 5 a (Black Ash – Aspen – Balsam Poplar Swamp (Northeastern))
NPC Ranking in Relevé: A
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relevé Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther _____
County: St. Louis **Township:** 49 N **Range:** 15 **Section:** 21 **QORT:** _____ of **QRT:** _____

PLOT INFORMATION

Plot Size: 2 0 m x 2 0 m = 4 0 0 m²
Elevation: _____ ft. **Slope:** 3-5 (°) or _____ (%) **Aspect:** N (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1: 0 cm	(>) ____ cm		_____	_____
	2: ____ cm	(>) ____ cm		_____	_____
	3: ____ cm	(>) ____ cm		_____	_____
	4: ____ cm	(>) ____ cm		_____	_____
	5: ____ cm	(>) ____ cm		_____	_____
	6: ____ cm	(>) ____ cm		_____	_____
	7: ____ cm	(>) ____ cm		_____	_____
	8: ____ cm	(>) ____ cm		_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Plot indicative of surrounding community and placed near original point. Not a resurvey. No invasive species nearby.

High quality northern wet ash swamp. Swamp to NW had been flooded by beavers and transitioned to meadow.

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Fraxinus nigra					38.1, 15.2
Betula alleghaniensis					45.7

Relevé-Wide DBH Statistics

Prism Factor: _____ **Min:** _____ **Max:** _____ **Median:** _____

Notes:

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster Surveyor's Relevé #: 015 Date: 08/22/24
 County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
.		D 7-8 i Ca	
4		Fraxinus nigra	
r		Betula alleghaniensis	
.			
.		D 6 r	
2		Fraxinus nigra	
2		Acer saccharum	
.			
.		E 6 r	
2		Picea glauca	
.			
.		D 4 r	
2		Corylus cornuta	
+		Alnus incana	
.			
.		E 1-3 a	
+		Picea glauca	
+		Abies balsamea	
.		D 1-3 b	
+		Rubus ideaus	
+		Fraxinus nigra	
r		Acer rubrum	
r		Acer saccharum	
+		Rhamnus cathartica	
+		Diervilla lonicera	
r		Cornus sericea	
r		Quercus rubra	
+		Acer spicatum	
r		Prunus virginiana	
+		Ribes triste	
+		Ribes hirtellum	
r		Cornus alternifolia	
r		Sorbus decora	
3	+	Amelanchier sanguinea/spicata	
.		G 1-3 r	
+		Calamagrostis canadensis	
2		Carex gracillima	
+		Carex pensylvanica	
r		Carex deweyana	
+		Elymus virginiana	

ID	C.S	SPECIES NAME	REMARKS
+	.	Carex projecta	
+	.	Carex stipata	
+	.	Juncus effusus	
+	.	Carex leptalea	
+	.	Carex pendunculata	
.		H 1-3 p	
2	.	Rubus pubescens	
+	.	Fragaria virginiana	
+	.	Dryopteris catusiana	
2	.	Athyrium filix-femina	
+	.	Equisetum arvense	
+	.	Equisetum sylvaticum	
+	.	Arisaema triphyllum	
+	.	Lysimachia borealis	
+	.	Pyrola asarifolia	
r	.	Taraxacum officinale	
+	.	Micranthes pensylvanica	
r	.	Eurybia macrophylla	
+	.	Potentilla norvegica	
r	.	Aneomone quinquefolia	
r	.	Mertensia paniculata	
r	.	Mitella nuda	
+	.	Maianthemum canadense	
+	.	Circaea alpina	
+	.	Galium triflorum	
+	.	Aralia nudicaulis	
+	.	Thalictrum dasycarpum	
1	.	Phegopteris connectilis	
+	.	Trillium cerneum	
+	.	Doellingeria umbellata	
r	.	Clintonia borealis	
+	.	Symphyotrichum lateriflorum	
+	.	Impatiens capensis	
r	.	Solidago flexicaulis	
r	.	Scutellaria gallericulata	
r	.	Persicaria sagittata	
r	.	Ranunculus recurvatus	
+	.	Pyrola elliptica	
r	.	Stachys hispidus	
r	.	Geum canadense	

Life Form

B = broadleaf evergreen
 D = broadleaf deciduous
 E = needleleaf evergreen
 G = graminoids
 H = forbs
 L = lichens
 M = mosses & liverworts
 C = climbers
 K = stem succulents
 F = floating-leaved
 S = submerged
 X = epiphytes

Height

8 >35m
 7 = 20-35m
 6 = 10-20m
 5 = 5-10m
 4 = 2-5m
 3 = 0.5-2m
 2 = 0.1- 0.5m
 1 = 0-0.1m

Cover

Group Species
 c 5 75-100%
 i 4 50-75%
 p 3 25-50%
 r 2 5-25%
 b 1-5%
 a <1%

Abundance

1 <5% cover, many individuals
 + <5% cover, few (2-20) individuals
 r <5% cover, single

Sociability

5 = extensive mat
 4 = small colonies, broken mat
 3 = large group, many plants
 2 = small dense clumps
 1 = growing singly

Reliability Code

0 = variety certain
 1 = cf. var./subsp.
 2 = species certain
 3 = species complex
 4 = cf. species
 5 = genus certain
 6 = cf. genus
 7 = unknown

Selected Remark Codes

DD = dead
 DY = dying
 GE = germinating
 SD = seedling
 SP = sprout (coppice)
 FR = fruiting
 OP = outside plot (<2m)
 ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____
Surveyor(s): Kelly Beaster
Surveyor's Relevé #: 016 **Surveyor's Place Name:** Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other City of Duluth/Minnesota Land Trust
Purpose of Relevé: (C)lassification (R)are species habitat ☒ Monitoring (O)ther _____
Revisit: (Y)es ☒ No **Original DNR Relevé #:** _____
Date: 2 2 **Month:** 0 8 **Year:** 2 0 2 4 (e.g. 09 JUL 2004)
MBS Site #: _____ **Ownership:** City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland ☒ WW wooded wetland (OW) open wetland
NPC Code (Name): W F n 6 4 a (Black Ash – Conifer Swamp (Northeastern))
NPC Ranking in Relevé: A
Stand Typical of NPC: ☒ Yes (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relevé Typical of Stand: ☒ Yes (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary ☒ Moderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: ☒ GPS (A)ir photo (T)opo map (L)iDAR (O)ther _____
County: St. Louis **Township:** 49 N **Range:** 15 **Section:** 28 **QORT:** _____ of **QRT:** _____

PLOT INFORMATION

Plot Size: 2 0 m x 2 0 m = 4 0 0 m²
Elevation: _____ ft. **Slope:** _____ (°) or _____ (%) **Aspect:** _____ (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle ☒ Lower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: 1 0 - 1 5 cm
Sphagnum Cover: 3 0 %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____	_____		_____	_____
Soil Layers	1:	0 cm (>) _____ cm	_____	_____	_____
	2:	_____ cm (>) _____ cm	_____	_____	_____
	3:	_____ cm (>) _____ cm	_____	_____	_____
	4:	_____ cm (>) _____ cm	_____	_____	_____
	5:	_____ cm (>) _____ cm	_____	_____	_____
	6:	_____ cm (>) _____ cm	_____	_____	_____
	7:	_____ cm (>) _____ cm	_____	_____	_____
	8:	_____ cm (>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Plot was very representative of community. Only missing canopy species was cedar which is missing from a lot of Mangey notably north of W Skyline in communities where it would be expected to grow.

Basal Area & Tree Diameters				DBH List: (C)omplete ☒ Partial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Picea glauca	DD				21.6
Acer rubrum					16.5
Betula alleghaniensis					15.2
Fraxinus nigra					10.1

Relevé-Wide DBH Statistics

Prism Factor: _____ **Min:** _____ **Max:** _____ **Median:** _____

Notes:

Photos Taken: (Y)es (N)o

DNR RELIVE

Surveyor(s): Kelly Beaster Surveyor's Releve #: 016 Date: 08/22/24
County: St. Louis Surveyor's Place Name: Magney-Snively

[illegible]

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____
Surveyor(s): Kelly Beaster
Surveyor's Relevé #: 017 Surveyor's Place Name: Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust
Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther _____
Revisit: (Y)es (N)o Original DNR Relevé #: _____
Date: 22 Month: 08 Year: 2024 (e.g. 09 JUL 2004)
MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): M H n 4 7 a _____ (Sugar Maple – Basswood – (Bluebead Lily) Forest)
NPC Ranking in Relevé: B _____
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relevé Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: (G)PS (A)ir photo (T)opo map (L)idar (O)ther _____
County: St. Louis Township: 49 N Range: 15 Section: 28 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²
Elevation: _____ ft. Slope: 3-5 (°) or _____ (%) Aspect: E (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____	_____		_____	_____
Soil Layers	1: 0 cm	(>) _____ cm	_____	_____	_____
	2: _____ cm	(>) _____ cm	_____	_____	_____
	3: _____ cm	(>) _____ cm	_____	_____	_____
	4: _____ cm	(>) _____ cm	_____	_____	_____
	5: _____ cm	(>) _____ cm	_____	_____	_____
	6: _____ cm	(>) _____ cm	_____	_____	_____
	7: _____ cm	(>) _____ cm	_____	_____	_____
	8: _____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Plot was placed on selected point as it was very characteristic of old growth maple basswood forest. Dense maple canopy with very little groundcover growing underneath. Likely has spring ephemerals and Claytonia caroliniana.

B rating due to earthworm impact.

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave. DBH (cm)
Acer saccharum				35.5, 25.4, 50.8

Relevé-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes:

Photos Taken: (Y)es (N)o

DNR RELIVE

Surveyor(s): Kelly Beaster Surveyor's Releve #: 017 Date: 08/22/24
County: St. Louis Surveyor's Place Name: Magney-Snively

[illegible]

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster

Surveyor's Relevé #: 018 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust

Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther _____

Revisit: (Y)es (N)o Original DNR Relevé #: 8 3 0 0

Date: 2 6 Month: 0 8 Year: 2 0 2 4 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): M H n 3 5 b (Red Oak – Sugar Maple – Basswood – (Bluebead Lily) Forest)

NPC Ranking in Relevé: C

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relevé Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: (N)p (Y)es

Marker Type / Placement: SW corner of relevé plot

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther _____

County: St. Louis Township: 49 N Range: 15 Section: 27 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 2 0 m x 2 0 m = 4 0 0 m²

Elevation: _____ ft. Slope: 15-20 (°) or _____ (%) Aspect: E (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Plot placed very close to original point. Old growth red oaks captured in plot. Some old growth basswood also present on hill/slope.

One has fallen within last few years (basswood). C rating because buckthorn is a problem at this site and earthworm castings common.

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____	_____		_____	_____
Soil Layers	1: 0 cm	(>) _____ cm	_____	_____	_____
	2: _____ cm	(>) _____ cm	_____	_____	_____
	3: _____ cm	(>) _____ cm	_____	_____	_____
	4: _____ cm	(>) _____ cm	_____	_____	_____
	5: _____ cm	(>) _____ cm	_____	_____	_____
	6: _____ cm	(>) _____ cm	_____	_____	_____
	7: _____ cm	(>) _____ cm	_____	_____	_____
	8: _____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Quercus rubra					41.3, 72.4

Relevé-Wide DBH Statistics

Prism Factor: _____

Min: _____ Max: _____ Median: _____

Notes:

Photos Taken: (Y)es (N)o

DNR RELIVE

Surveyor(s): Kelly Beaster Surveyor's Releve #: 018 Date: 08/26/24
County: St. Louis Surveyor's Place Name: Magney-Snively

[illegible]

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____
Surveyor(s): Kelly Beaster
Surveyor's Relevé #: 019 **Surveyor's Place Name:** Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other City of Duluth/Minnesota Land Trust
Purpose of Relevé: (C)lassification (R)are species habitat ☒ Monitoring (O)ther _____
Revisit: (Y)es ☒ No **Original DNR Relevé #:** _____
Date: 2 6 **Month:** 0 8 **Year:** 2 0 2 4 (e.g. 09 JUL 2004)
MBS Site #: _____ **Ownership:** City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland ☒ WW wooded wetland (OW) open wetland
NPC Code (Name): W F n 6 4 a _____ (Black Ash - Conifer Swamp (Northeastern))
NPC Ranking in Relevé: A _____
Stand Typical of NPC: ☒ Yes (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relevé Typical of Stand: ☒ Yes (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary ☒ Moderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: ☒ GPS (A)ir photo (T)opo map (L)iDAR (O)ther _____
County: St. Louis **Township:** 4 9 N **Range:** 1 5 W **Section:** 2 8 **QORT:** _____ of **QRT:** _____

PLOT INFORMATION

Plot Size: 2 0 m x 2 0 m = 4 0 0 m²
Elevation: _____ ft. **Slope:** _____ (°) or _____ (%) **Aspect:** _____ (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat ☒ Depression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: 2 0 cm
Sphagnum Cover: 1 2 %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1: _____ cm	(>) _____ cm		_____	_____
Soil Layers	2: _____ cm	(>) _____ cm	_____	_____	_____
	3: _____ cm	(>) _____ cm	_____	_____	_____
	4: _____ cm	(>) _____ cm	_____	_____	_____
	5: _____ cm	(>) _____ cm	_____	_____	_____
	6: _____ cm	(>) _____ cm	_____	_____	_____
	7: _____ cm	(>) _____ cm	_____	_____	_____
	8: _____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Placed plot as close to point as possible, but it could have been placed anywhere because plant community is very homogenous.

Basal Area & Tree Diameters				DBH List: (C)omplete ☒ Partial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Fraxinus nigra					15.8, 25.0
Betula alleghaniensis					41.3, 43.1
Acer rubrum					28

Relevé-Wide DBH Statistics

Prism Factor: _____ **Min:** _____ **Max:** _____ **Median:** _____

Notes:

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster Surveyor's Relevé #: 019 Date: 08/26/24
 County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	E 7 b Ca	
	1 .	Picea glauca	
	.		
	.	D 6-7 i Ca	
	2 .	Fraxinus nigra	
	3 .	Betula alleghaniensis	
	.		
	.	D 5 p	
	2 .	Acer saccharum	
	2 .	Betula alleghaniensis	
	2 .	Fraxinus nigra	
	.		
	.	E 5 b	
	1 .	Picea glauca	
	.		
	.	D 4 i	
	4 .	Alnus incana	
	4 .	Acer rubrum	
	1 .	Betula alleghaniensis	
	+ .	Ilex verticillata	
	.		
	.		
	.		
	.	E 1-3 b	
	+ .	Abies balsamea	
	+ .	Picea glauca	
	+ .	Pinus strobus	
	.		
	.	D 1-3 b	
	+ .	Frangula alnus	
	+ .	Quercus rubra	
	r .	Sorbus decora	
	+ .	Ilex verticillata	
	r .	Corylus cornuta	
	r .	Acer spicatum	
	.		
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ID	C.S	SPECIES NAME	REMARKS
	.	G 1-3 b	
	+ .	Carex canescens	
	1 .	Calamagrostis canadensis	
	+ .	Carex leptalea	
	r .	Glyceria striata	
	.		
	.	H 1-3 r	
	1 .	Coptis trifolia	
	2 .	Osmundastrum cinnamomeum	
	1 .	Maianthemum canadense	
	1 .	Rubus pubescens	
	+ .	Caltha palustris	
	+ .	Calla palustris	
	1 .	Maianthemum trifolium	
	r .	Spinulum annotinum	
	+ .	Lycopus uniflorus	
	+ .	Lysiamachia borealis	
	+ .	Symphyotrichum puniceum	
	+ .	Dryopteris carthusiana	
	+ .	Clintonia borealis	
	+ .	Cornus canadensis	
	+ .	Lysiamachia thyrsiflora	
	+ .	Iris versicolor	
	r .	Chelone glabra	
	+ .	Aralia nudicaulis	
	+ .	Equisetum sylvaticum	
	r .	Dryopteris cristata	
	r .	Doellingeria umbellata	
	r .	Onoclea sensibilis	
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Life Form

B = broadleaf evergreen
 D = broadleaf deciduous
 E = needleleaf evergreen
 G = graminoids
 H = forbs
 L = lichens
 M = mosses & liverworts
 C = climbers
 K = stem succulents
 F = floating-leaved
 S = submerged
 X = epiphytes

Height

8 >35m
 7 = 20-35m
 6 = 10-20m
 5 = 5-10m
 4 = 2-5m
 3 = 0.5-2m
 2 = 0.1- 0.5m
 1 = 0-0.1m

Cover

Group Species
 c 5 75-100%
 i 4 50-75%
 p 3 25-50%
 r 2 5-25%
 b 1-5%
 a <1%

Abundance

1 <5% cover, many individuals
 + <5% cover, few (2-20) individuals
 r <5% cover, single

Sociability

5 = extensive mat
 4 = small colonies, broken mat
 3 = large group, many plants
 2 = small dense clumps
 1 = growing singly

Reliability Code

0 = variety certain
 1 = cf. var./subsp.
 2 = species certain
 3 = species complex
 4 = cf. species
 5 = genus certain
 6 = cf. genus
 7 = unknown

Selected Remark Codes

DD = dead
 DY = dying
 GE = germinating
 SD = seedling
 SP = sprout (coppice)
 FR = fruiting
 OP = outside plot (<2m)
 ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster

Surveyor's Relevé #: 020 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust

Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther

Revisit: (Y)es (N)o Original DNR Relevé #: 841

Date: 2 6 Month: 0 8 Year: 2 0 2 4 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): W M n 8 2 b (Wet Meadow Bluejoint Subtype)

NPC Ranking in Relevé: C

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther

Relevé Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: (N)p (Y)es

Marker Type / Placement: SW corner of relevé plot

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther

County: St. Louis Township: 4 9 N Range: 1 5 Section: 2 8 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 2 0 m x 2 0 m = 4 0 0 m²

Elevation: _____ ft. Slope: _____ (°) or _____ (%) Aspect: _____ (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Plot placed very close to point. Homogenous meadow with fairly low diversity. No

sphagnum. C rating because heavily degraded with high Phalaris, some thistle, and new

introductions of invasives.

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Relevé-Wide DBH Statistics

Prism Factor: _____

Min: _____ Max: _____ Median: _____

Notes:

Photos Taken: (Y)es (N)o

DNR RELIVE #

Surveyor(s): Kelly Beaster Surveyor's Releve #: 020 Date: 08/26/24
County: St. Louis Surveyor's Place Name: Magney-Snively

[illegible][illegible]

Life Form

B = broadleaf evergreen
D = broadleaf deciduous
E = needleleaf evergreen
G = graminoids
H = forbs
L = lichens
M = mosses & liverworts
C = climbers
K = stem succulents
F = floating-leaved
S = submerged
X = epiphytes

Height

Height

- 8 >35m
- 7 = 20-35m
- 6 = 10-20m
- 5 = 5-10m
- 4 = 2-5m
- 3 = 0.5-2m
- 2 = 0.1- 0.5m
- 1 = 0-0.1m

Cover

Group	Species
c	5 75-100%
i	4 50-75%
p	3 25-50%
r	2 5-25%
b	1-5%
a	<1%
	Abundance
	1 <5% cover
	+ <5% cover
	r <5% cover

Sociability

5 = extensive mat
4 = small colonies, broken mat
3 = large group, many plants
2 = small dense clumps
1 = growing singly

Reliability Code

Reliability Code

0 = variety certain
1 = cf. var./subsp.
2 = species certain
3 = species complex
4 = cf. species
5 = genus certain
6 = cf. genus
7 = unknown

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 – 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster

Surveyor's Relevé #: 021 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust

Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther

Revisit: (Y)es (N)o Original DNR Relevé #: _____

Date: 26 Month: 08 Year: 2024 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): W M n 8 2 b (Wet Meadow Bluejoint Subtype)

NPC Ranking in Relevé: C

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther

Relevé Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: (N)p (Y)es

Marker Type / Placement: SW corner of relevé plot

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther

County: St. Louis Township: 49 N Range: 15 Section: 28 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²

Elevation: _____ ft. Slope: _____ (°) or _____ (%) Aspect: _____ (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ilicic quartzite (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Plot placed as close to point as possible. Fairly homogenous community but surrounded by pockets of thicket and black ash swamp.

C rating because of high cover of non-native species

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____	_____		_____	_____
Soil Layers	1: _____	(>) _____	_____	_____	_____
	2: _____	(>) _____	_____	_____	_____
	3: _____	(>) _____	_____	_____	_____
	4: _____	(>) _____	_____	_____	_____
	5: _____	(>) _____	_____	_____	_____
	6: _____	(>) _____	_____	_____	_____
	7: _____	(>) _____	_____	_____	_____
	8: _____	(>) _____	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Relevé-Wide DBH Statistics

Prism Factor: _____

Min: _____ Max: _____ Median: _____

Notes:

Photos Taken: (Y)es (N)o

DNR RELIVE #

Surveyor(s): Kelly Beaster Surveyor's Releve #: 021 Date: 08/26/24
County: St. Louis Surveyor's Place Name: Magney-Snively

[illegible][illegible]

Life Form

B = broadleaf evergreen
D = broadleaf deciduous
E = needleleaf evergreen
G = graminoids
H = forbs
L = lichens
M = mosses & liverworts
C = climbers
K = stem succulents
F = floating-leaved
S = submerged
X = epiphytes

Height

Height

8 >35m
7 = 20-35m
6 = 10-20m
5 = 5-10m
4 = 2-5m
3 = 0.5-2m
2 = 0.1- 0.5m
1 = 0-0.1m

Cover

Group	Species
c	5 75-100%
i	4 50-75%
p	3 25-50%
r	2 5-25%
b	1-5%
a	<1%

Abundance

1 <5% cover, many individuals
+ <5% cover, few (2-20) individuals
r <5% cover, single

Sociability

5 = extensive mat
4 = small colonies, broken mat
3 = large group, many plants
2 = small dense clumps
1 = growing singly

Reliability Code

Reliability Code
0 = variety certain
1 = cf. var./subsp.
2 = species certain
3 = species complex
4 = cf. species
5 = genus certain
6 = cf. genus
7 = unknown

Selected Remark Codes

DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____
Surveyor(s): Kelly Beaster, Maggie Ross
Surveyor's Relevé #: 022 **Surveyor's Place Name:** Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other City of Duluth/Minnesota Land Trust
Purpose of Relevé: (C)lassification (R)are species habitat ☒ (M)onitoring (O)ther _____
Revisit: (Y)es ☒ (N)o **Original DNR Relevé #:** _____
Date: 26 **Month:** 08 **Year:** 2024 (e.g. 09 JUL 2004)
MBS Site #: _____ **Ownership:** City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland ☒ (OW) open wetland
NPC Code (Name): F P n 7 3 a _____ (Alder Swamp)
NPC Ranking in Relevé: C
Stand Typical of NPC: ☒ (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relevé Typical of Stand: ☒ (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary ☒ (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: ☒ (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther _____
County: St. Louis **Township:** 4 9 N **Range:** 1 5 **Section:** 2 8 **QORT:** _____ of **QRT:** _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²
Elevation: _____ ft. **Slope:** _____ (°) or _____ (%) **Aspect:** _____ (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat ☒ (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1: 0 cm	(>) _____ cm		_____	_____
	2: _____ cm	(>) _____ cm		_____	_____
	3: _____ cm	(>) _____ cm		_____	_____
	4: _____ cm	(>) _____ cm		_____	_____
	5: _____ cm	(>) _____ cm		_____	_____
	6: _____ cm	(>) _____ cm		_____	_____
	7: _____ cm	(>) _____ cm		_____	_____
	8: _____ cm	(>) _____ cm		_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: C rating due to high cover of non-native species and low native diversity

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Releve-Wide DBH Statistics

Prism Factor: _____ **Min:** _____ **Max:** _____ **Median:** _____

Notes:

Photos Taken: (Y)es (N)o

DNR RELIVE

Surveyor(s): Kelly Beaster Surveyor's Releve #: 022 Date: 08/26/24
County: St. Louis Surveyor's Place Name: Magney-Snively

[illegible]

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan	_____
Entered	_____
QC'd	_____
Edited	_____
Final Scan	_____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster, Maggie Ross

Surveyor's Relevé #: 023 **Surveyor's Place Name:** Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other City of Duluth/Minnesota Land Trust

Purpose of Relevé: (C)lassification (R)are species habitat ☒ Monitoring (O)ther _____

Revisit: (Y)es ☒ No **Original DNR Relevé #:** _____

Date: 26 **Month:** 08 **Year:** 2024 (e.g. 09 JUL 2004)

MBS Site #: _____ **Ownership:** City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland ☒ (OW) open wetland

NPC Code (Name): F P n 7 3 a _____ (Alder Swamp)

NPC Ranking in Relevé: B

Stand Typical of NPC: ☒ Yes (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relevé Typical of Stand: ☒ Yes (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary ☒ (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

UTM Accuracy: _____ meters

Location Source: ☒ GPS (A)ir photo (T)opo map (L)iDAR (O)ther _____

County: St. Louis **Township:** 49 N **Range:** 15 **Section:** 28 **QORT:** _____ of **QRT:** _____

Permanent Marker: ☒ Yes

Marker Type / Placement: SW corner of relevé plot

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²

Elevation: _____ ft. **Slope:** _____ (°) or _____ (%) **Aspect:** _____ (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat ☒ (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well (S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____

Rock Type: _____

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
1:	0 cm	(>) _____ cm	_____	_____	_____
2:	_____ cm	(>) _____ cm	_____	_____	_____
3:	_____ cm	(>) _____ cm	_____	_____	_____
4:	_____ cm	(>) _____ cm	_____	_____	_____
5:	_____ cm	(>) _____ cm	_____	_____	_____
6:	_____ cm	(>) _____ cm	_____	_____	_____
7:	_____ cm	(>) _____ cm	_____	_____	_____
8:	_____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Plot selected to include alder thicket but not super representative of the community type because of taller canopy species like black ash and sugar maple in the community. Near ash swamp and upland communities. B rating due to low cover of non-native species

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Relevé-Wide DBH Statistics

Prism Factor: _____ **Min:** _____ **Max:** _____ **Median:** _____

Notes:

Photos Taken: (Y)es (N)o

DNR RELIVE

Surveyor(s): Kelly Beaster, Maggie Ross Surveyor's Releve #: 023 Date: 08/26/24
County: St. Louis Surveyor's Place Name: Magney-Snively

[illegible]

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

1 <5% cover, many individuals
+ <5% cover, few (2-20) individuals
r <5% cover, single

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____
Surveyor(s): Kelly Beaster
Surveyor's Relevé #: 024 Surveyor's Place Name: Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust
Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther _____
Revisit: (Y)es (N)o Original DNR Relevé #: _____
Date: 09 Month: 09 Year: 2024 (e.g. 09 JUL 2004)
MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): M H n 4 5 b (White Cedar – Yellow Birch Forest)
NPC Ranking in Relevé: B
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relevé Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther _____
County: St. Louis Township: 49 N Range: 15 Section: 29 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²
Elevation: _____ ft. Slope: 45 (°) or _____ (%) Aspect: NW (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____	_____		_____	_____
Soil Layers	1: 0 cm	(>) _____ cm	_____	_____	_____
	2: _____ cm	(>) _____ cm	_____	_____	_____
	3: _____ cm	(>) _____ cm	_____	_____	_____
	4: _____ cm	(>) _____ cm	_____	_____	_____
	5: _____ cm	(>) _____ cm	_____	_____	_____
	6: _____ cm	(>) _____ cm	_____	_____	_____
	7: _____ cm	(>) _____ cm	_____	_____	_____
	8: _____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Loamy soil with a decent layer of duff beneath consisting of cedar scales, pine needles, maple leaves, and seed husk material.
Plot selected based on understory species present, including Phegopteris, Aralia, Gymnocarpium, Carex pedunculata and the presence of
Acer saccharum in the subcanopy. It was challenging to capture correct habitat because a lot of area dropped off on cliff edges. The other
potential plant community this could be is FDn43c, but surrounding plant community on all sides is MHn47a with rich soil and the aspect keeps
the understory in the shade, keeping soil moist and cool. Forest ecosystem is very similar to Crosby-Manitou SP along Manitou River.
B rating due to earthworm impact.

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Acer saccharum					12.7
Thuja occidentalis					27.9, 20.3
Picea glauca					25.4
Pinus strobus					71.1

Relevé-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes:

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Kelly Beaster Surveyor's Relevé #: 024 Date: 09/09/24
 County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 7-8 a Ca	
	r .	Betula papyrifera	
	.		
	.	E 7-8 c Ca	
	2 .	Pinus strobus	
	3 .	Thuja occidentalis	
	2 .	Picea glauca	
	.		
	.	D 6 b	
	2 .	Acer saccharum	
	.		
	.	D 4-5 r	
	2 .	Corylus cornuta	
	2 .	Acer spicatum	
	+	Acer saccharum	
	+	Acer rubrum	
	+	Sorbus decora	
	.		
	.	D 1-3 r	
	+	Acer saccharum	
	2 .	Diervilla lonicera	
	2 .	Lonicera canadensis	
	+	Quercus rubra	
	r .	Fraxinus pensylvanica	
	r .	Rubus idaeus	
	r .	Amelanchier laevis/interior	
	+	Corylus cornuta	
	r .	Sorbus decora	
	+	Acer spicatum	
	+	Ostrya virginiana	
	r .	Ribes cynosbati	
	.		
	.	E 1-3 a	
	r .	Pinus strobus	
	r .	Thuja occidentalis	
	r .	Abies balsamea	
	.		
	.		
	.		
	.		
	.		

ID	C.S	SPECIES NAME	REMARKS
	.	G 1-3	
4	+	Agrostis stolonifera	
	+	Milium effusum	
2	.	Carex pedunculata	
	+	Oryzopsis asperifolia	
	+	Carex pensylvanica	
	+	Brachyletrum aristosum	
4	+	Poa alsodes	
	.		
	.	H 1-3 p	
2	.	Aralia nudicaulis	
	+	Maianthemum canadense	
2	.	Gymnocarpium dryopteris	
2	.	Dryopteris cathusiana	
	+	Clintonia borealis	
	+	Eurybia macrophylla	
	+	Circaea alpina	
	+	Schizachne purpureascens	
	+	Polypodium virginianum	
5	+	Actaea sp.	
	+	Uvularia sessifolia	
	+	Galeopsis tetrahit	
	r .	Aquilegia canadense	
	r .	Dicentra cucullaria	
	+	Streptopus lanceolatus	
	+	Athyrium felix-femina	
	+	Polygonatum pubescens	
	+	Hieracium arantiacum	
	r .	Trillium cernuum	
	+	Phegopteris connectilis	
	r .	Galium triflorum	
	+	Dryopteris intermedia	
5	r .	Viola cordate base	
5	r .	Viola heart shaped	
	+	Lysimachia borealis	
	.		
	.		
	.		
	.		
	.		

Life Form

B = broadleaf evergreen
 D = broadleaf deciduous
 E = needleleaf evergreen
 G = graminoids
 H = forbs
 L = lichens
 M = mosses & liverworts
 C = climbers
 K = stem succulents
 F = floating-leaved
 S = submerged
 X = epiphytes

Height

8 >35m
 7 = 20-35m
 6 = 10-20m
 5 = 5-10m
 4 = 2-5m
 3 = 0.5-2m
 2 = 0.1- 0.5m
 1 = 0-0.1m

Cover

Group Species
 c 5 75-100%
 i 4 50-75%
 p 3 25-50%
 r 2 5-25%
 b 1-5%
 a <1%

Abundance

1 <5% cover, many individuals
 + <5% cover, few (2-20) individuals
 r <5% cover, single

Sociability

5 = extensive mat
 4 = small colonies, broken mat
 3 = large group, many plants
 2 = small dense clumps
 1 = growing singly

Reliability Code

0 = variety certain
 1 = cf. var./subsp.
 2 = species certain
 3 = species complex
 4 = cf. species
 5 = genus certain
 6 = cf. genus
 7 = unknown

Selected Remark Codes

DD = dead
 DY = dying
 GE = germinating
 SD = seedling
 SP = sprout (coppice)
 FR = fruiting
 OP = outside plot (<2m)
 ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____
Surveyor(s): Maggie Ross
Surveyor's Relevé #: 025 Surveyor's Place Name: MN Land Trust/City of Duluth
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other _____
Purpose of Relevé: (C)lassification (R)are species habitat ☒ Monitoring (O)ther _____
Revisit: ☒ Yes (N)o Original DNR Relevé #: 8294 _____
Date: 19 Month: AUG Year: 2024 (e.g. 09 JUL 2004)
MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: ☒ (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): MHn47a _____ (Sugar Maple – Basswood – (Bluebead Lily) Forest)
NPC Ranking in Relevé: B _____
Stand Typical of NPC: ☒ Yes (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relevé Typical of Stand: ☒ Yes (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: ☒ (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: ☒ GPS (A)ir photo (T)opo map (L)idar (O)ther _____
County: St. Louis Township: 49 N Range: 15W Section: 28 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²
Elevation: _____ ft. Slope: 9 (°) or _____ (%) Aspect: NE (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression ☒ (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: ☒ Yes (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____	_____		_____	_____
Soil Layers	1: _____	0 cm (>) _____ cm	_____	_____	_____
	2: _____	_____ cm (>) _____ cm	_____	_____	_____
	3: _____	_____ cm (>) _____ cm	_____	_____	_____
	4: _____	_____ cm (>) _____ cm	_____	_____	_____
	5: _____	_____ cm (>) _____ cm	_____	_____	_____
	6: _____	_____ cm (>) _____ cm	_____	_____	_____
	7: _____	_____ cm (>) _____ cm	_____	_____	_____
	8: _____	_____ cm (>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: There is a large dead Tilia in the plot as CWD. There are a few large Tilia in the stand. Chose plot location to include old growth Yellow Birch and to exclude a wet area to the N and a trail and immature forest to the south. Gentle rolling topography
Lower ranking due to non-native species and earthworms.

Basal Area & Tree Diameters

DBH List: (C)omplete ☒ Partial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
BEAL					29
ACSA					16.5.5

Relevé-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes:

Photos Taken: ☒ Yes ☒ No

DNR RELIVE

Surveyor(s): Maggie Ross Surveyor's Relieve #: 025 Date: 8/19/24
County: St. Louis Surveyor's Place Name: Magney-Snively

[illegible][illegible]

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan	_____
Entered	_____
QC'd	_____
Edited	_____
Final Scan	_____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Maggie Ross

Surveyor's Relevé #: 026 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other _____

Purpose of Relevé: (C)lassification (R)are species habitat ☒ Monitoring (O)ther _____

Revisit: ☒ Yes (N)o Original DNR Relevé #: 8293

Date: 19 _____ Month: AUG Year: 2024 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: ☒ (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): MHn47a (_____ Sugar Maple – Basswood – (Bluebead Lily) Forest)

NPC Ranking in Relevé: B _____

Stand Typical of NPC: ☒ Yes (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relevé Typical of Stand: ☒ Yes (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: ☒ Far from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: ☒ No (Y)es

Marker Type / Placement: SW corner of plot

UTM Accuracy: _____ meters

Location Source: ☒ GPS (A)ir photo (T)opo map (L)IDAR (O)ther _____

County: _____ Township: 49 _____ N Range: 15 W Section: 28 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²

Elevation: _____ ft. Slope: 04 (°) or _____ (%) Aspect: N (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression ☒ Uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Place to capture red oak, maple, and yellow birch. High cover of Carex pensylvanica indicates earthworms have impacted the area. Patchy ground cover in areas. Lower ranking due to earthworms and high cover of Hawkweed and common buckthorn.

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____ cm	(>) _____ cm		_____	_____
Soil Layers	1: _____ cm	(>) _____ cm	_____	_____	_____
	2: _____ cm	(>) _____ cm	_____	_____	_____
	3: _____ cm	(>) _____ cm	_____	_____	_____
	4: _____ cm	(>) _____ cm	_____	_____	_____
	5: _____ cm	(>) _____ cm	_____	_____	_____
	6: _____ cm	(>) _____ cm	_____	_____	_____
	7: _____ cm	(>) _____ cm	_____	_____	_____
	8: _____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete ☒ Partial

Species	L/D	BA-1	BA-2	Ave. DBH (cm)
QURU				17.5
ACSA				4
ASSA				20
BEAL				17.1

Relevé-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes:

Other tree species had dbh <10 cm

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Maggie Ross Surveyor's Relevé #: 026 Date: 08/19/2024
 County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D7-8i Ca	
2	2 .1	Betula alleghaniensis	
2	4 .1	Acer saccharum	
2	r .1	Quercus rubra	
	.		
	.	D5-6i	
2	4 .1	Acer saccharum	
2	+ .1	Ostrya virginiana	
	.		
	.	D2-4p	
2	3 .1	Acer saccharum	
2	r .1	Sambucus canadensis	
2	+ .1	Quercus rubra	
2	+ .1	Ostrya virginiana	
2	r .1	Tilia americana	
2	2 .1	Lonicera canadensis	
2	+ .1	Rhamnus cathartica	
2	+ .1	Prunus virginiana	
2	+ .1	Corylus cornuta	
2	r .1	Cornus alternifolia	
2	+ .1	Fraxinus nigra	
2	r .1	Sorbus decora	
	.		
	.	G1-3i	
2	4 .4	Carex pensylvanica	
2	+ .1	Oryzopsis asperifolia	
4	1 .1	Carex dewyana	
2	+ .1	Carex arctata	
2	+ .1	Cinna latifolia	
2	+ .1	Millium effusum	
	.		
	.	E2a	
2	+ .1	Picea glauca	
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ID	C.S	SPECIES NAME	REMARKS
	.	H1-3p	
2	+ .1	Trillium grandiflorum	
2	2 .1	Clintonia borealis	
2	1 .1	Sanguinaria canadensis	
2	+ .1	Maianthemum racemosum	
2	+ .1	Taraxacum officinale	
5	2 .2	Hieracium sp.	
2	1 .1	Maianthemum canadense	
2	1 .1	Uvularia sessiflora	
2	1 .1	Symphyotrichum lateriflorum	
2	+ .1	Athyrium filix-femina	
2	+ .1	Actaea rubra	
2	+ .1	Solanum dulcamara	
3	+ .1	Viola pubescens/canadensis	
2	+ .1	Caulophyllum thalictroides	
2	+ .1	Arisaema triphyllum	
2	r .1	Galium triflorum	
2	+ .2	Polygonatum pubescens	
2	+ .1	Solidago flexicaulis	
2	+ .1	Dryopteris carthusiana	
2	r .1	Lysimachia borealis	
2	+ .1	Trillium cernuum	
2	+ .1	Streptopus lanceolatus	
2	+ .1	Ranunculus recurvatus	
2	+ .1	Eurybia macrophylla	
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Life Form	Height	Cover	Sociability	Reliability Code	Selected Remark Codes
B = broadleaf evergreen	8 >35m	Group Species	5 = extensive mat	0 = variety certain	DD = dead
D = broadleaf deciduous	7 = 20-35m	c 5 75-100%	4 = small colonies, broken mat	1 = cf. var./subsp.	DY = dying
E = needleleaf evergreen	6 = 10-20m	i 4 50-75%	3 = large group, many plants	2 = species certain	GE = germinating
G = graminoids	5 = 5-10m	p 3 25-50%	2 = small dense clumps	3 = species complex	SD = seedling
H = forbs	4 = 2-5m	r 2 5-25%	1 = growing singly	4 = cf. species	SP = sprout (coppice)
L = lichens	3 = 0.5-2m	b 1-5%		5 = genus certain	FR = fruiting
M = mosses & liverworts	2 = 0.1- 0.5m	a <1%		6 = cf. genus	OP = outside plot (<2m)
C = climbers	1 = 0-0.1m			7 = unknown	## = specimen collection #
K = stem succulents		Abundance			
F = floating-leaved		1 <5% cover, many individuals			
S = submerged		+ <5% cover, few (2-20) individuals			
X = epiphytes		r <5% cover, single			

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")



Initial Scan	_____
Entered	_____
QC'd	_____
Edited	_____
Final Scan	_____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____
Surveyor(s): Maggie Ross
Surveyor's Relve #: 027 **Surveyor's Place Name:** Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other City of Duluth / Minnesota Land Trust
Purpose of Relve: (C)lassification (R)are species habitat ☒ (M)onitoring (O)ther _____
Revisit: ☒ (Y)es (N)o **Original DNR Relve #:** 5639
Date: 19 **Month:** AUG **Year:** 2024 (e.g. 09 JUL 2004)
MBS Site #: _____ **Ownership:** City of Duluth

VEGETATION INFORMATION

Vegetation Group: ☒ (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): MHn47a (Sugar Maple – Basswood – (Bluebead Lily) Forest)
NPC Ranking in Relve: B
Stand Typical of NPC: ☒ (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relve Typical of Stand: ☒ (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: ☒ (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: ☒ (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther _____
County: _____ **Township:** 49 **N Range:** 15 **W Section:** 33 **QORT:** _____ of **QRT:** _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²
Elevation: _____ ft. **Slope:** _____ (°) or _____ (%) **Aspect:** LV (e.g., N, NE, etc.; LV for level)
Topographic Context: ☒ (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
HumusType: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
1:	0 cm	(>) _____ cm	_____	_____	_____
2:	_____ cm	(>) _____ cm	_____	_____	_____
3:	_____ cm	(>) _____ cm	_____	_____	_____
4:	_____ cm	(>) _____ cm	_____	_____	_____
5:	_____ cm	(>) _____ cm	_____	_____	_____
6:	_____ cm	(>) _____ cm	_____	_____	_____
7:	_____ cm	(>) _____ cm	_____	_____	_____
8:	_____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Placed to capture old growth maple, basswood, and yellow birch on the crest of hill. Some
earthworm impact and Buckthorn, so I gave it a B ranking. There is a high cover of sugar maple seedlings.

Basal Area & Tree Diameters				DBH List: (C)omplete ☒ (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
BEAL					26.5,26.8
ACSA					4.8,15.2
TIAM					22.4

Relve-Wide DBH Statistics

Prism Factor: _____ **Min:** _____ **Max:** _____ **Median:** _____

Notes:

Only one TIAM with DBH >10 cm

Photos Taken: (Y)es (N)o

DNR RELIVE #

Surveyor(s): Maggie Ross Surveyor's Relieve #: 027 Date: 8/19/24
County: St. Louis Surveyor's Place Name: Magney-Snively

[illegible][illegible]

Life Form

B = broadleaf evergreen
D = broadleaf deciduous
E = needleleaf evergreen
G = graminoids
H = forbs
L = lichens
M = mosses & liverworts
C = climbers
K = stem succulents
F = floating-leaved
S = submerged
X = epiphytes

Height

Height

8 >35m
7 = 20-35m
6 = 10-20m
5 = 5-10m
4 = 2-5m
3 = 0.5-2m
2 = 0.1- 0.5m
1 = 0-0.1m

Cover

Group	Species
c	5 75-100%
i	4 50-75%
p	3 25-50%
r	2 5-25%
b	1-5%
a	<1%

Abundance

Abundance

1 <5% cover, many individuals
+ <5% cover, few (2-20) individuals
r <5% cover, single

Sociability

Sociability

- 5 = extensive mat
- 4 = small colonies, broken mat
- 3 = large group, many plants
- 2 = small dense clumps
- 1 = growing singly

Reliability Code

Reliability Code

0 = variety certain
1 = cf. var./subsp.
2 = species certain
3 = species complex
4 = cf. species
5 = genus certain
6 = cf. genus
7 = unknown

Selected Remark Codes

DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 – 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Maggie Ross

Surveyor's Relevé #: 028

Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther Minnesota Land Trust/City of Duluth

Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther

Revisit: (Y)es (N)o Original DNR Relevé #: _____

Date: 19 Month: AUG Year: 2024 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): MHN47a (Northern Rich Mesic Hardwood Forest)

NPC Ranking in Relevé: B

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther

Relevé Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: (N)o (Y)es

Marker Type / Placement: SW corner of plot

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther

County: St. Louis Township: 49 N Range: 15 W Section: 33 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²

Elevation: _____ ft. Slope: 3 (°) or _____ (%) Aspect: SE/LV (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: High cover of young sugar maple seedlings with low cover of other grasses and forbs. Large coarse woody debris and old tip up mounds present. Lower ranking because of earthworm impact

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____ cm	(>) _____ cm	_____	_____	_____
Soil Layers	1: _____ cm	(>) _____ cm	_____	_____	_____
	2: _____ cm	(>) _____ cm	_____	_____	_____
	3: _____ cm	(>) _____ cm	_____	_____	_____
	4: _____ cm	(>) _____ cm	_____	_____	_____
	5: _____ cm	(>) _____ cm	_____	_____	_____
	6: _____ cm	(>) _____ cm	_____	_____	_____
	7: _____ cm	(>) _____ cm	_____	_____	_____
	8: _____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
TIAM					48.3
ACSA					43.7, 12.2

Relevé-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes:

Main trunk of Tilia is snapped but still has living branches. No other mature Tilia are in the plot but are present in surrounding stand.

Photos Taken: (Y)es (N)o

DNR RELIVE

Surveyor(s): Maggie Ross **Surveyor's Releve #:** 028 **Date:** 08/19/2024
County: St. Louis **Surveyor's Place Name:** Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 7-8 i Ca	
	r .	<i>Tilia americana</i>	
	4 .	<i>Acer saccharum</i>	
	.		
	.	D 5-6 i	
	4.	<i>Acer saccharum</i>	
	.		
	1 .	D 2-4 c	
	4 .	<i>Acer saccharum</i>	
	+	<i>Rhamnus cathartica</i>	
	1 .	<i>Lonicera canadensis</i>	
	+	<i>Prunus virginiana</i>	
	+	<i>Ribes cynosbati</i>	
	1 .	<i>Cornus alternifolia</i>	
	r .	<i>Quercus rubra</i>	
	+	<i>Tilia americana</i>	
3	+	<i>Amelanchier sang./spic.</i>	
	.		
	.	G 1-3 b	
	1 .	<i>Carex pedunculata</i>	
	1 .	<i>Carex pensylvanica</i>	
	.		
	.	F 1-3 p	
	+	<i>Anemone quinquefolia</i>	
	+	<i>Caulophyllum thalictroides</i>	
	+	<i>Lysimachia borealis</i>	
	2 .	<i>Athyrium felix-femina</i>	
	1 .	<i>Dryopteris carthusiana</i>	
	+	<i>Actaea rubra</i>	
	1 .	<i>Arisaema triphyllum</i>	
	1 .	<i>Phegopteris connectilis</i>	
	r .	<i>Taraxacum officinale</i>	
	1 .	<i>Allium tricocum</i>	
	r .	<i>Galeopsis tetrahit</i>	
5	+	<i>Hieracium sp.</i>	
	r .	<i>Symphytotrichum lateriflorum</i>	
	.		
	.		
	.		
	.		

[illegible]

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan	_____
Entered	_____
QC'd	_____
Edited	_____
Final Scan	_____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Maggie Ross

Surveyor's Relevé #: 029

Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other Minnesota Land Trust/City of Duluth

Purpose of Relevé: (C)lassification (R)are species habitat ☒ (M)onitoring (O)ther _____

Revisit: ☒ Yes (N)o Original DNR Relevé #: 8296

Date: 20 Month: Aug Year: 2024 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: ☒ WU wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): FDn33b _____ (Northern Dry-Mesic Mixed Woodland)

NPC Ranking in Relevé: C

Stand Typical of NPC: ☒ Yes (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relevé Typical of Stand: ☒ Yes (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary ☒ (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: ☒ No (Y)es

Marker Type / Placement: SW corner of plot

UTM Accuracy: _____ meters

Location Source: ☒ GPS (A)ir photo (T)opo map (L)IDAR (O)ther _____

County: St. Louis Township: 49 N Range: 15 W Section: 33 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²

Elevation: _____ ft. Slope: 15-20 (°) or _____ (%) Aspect: NE (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest ☒ (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Placed to capture oak forest . Areas of exposed rock. Stunted trees and a mix of FD and outcrop
understory species. C ranking becuase of earthworm impact and non native species

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____	_____		_____	_____
Soil Layers	1: _____	0 cm (>) _____ cm	_____	_____	_____
	2: _____	_____ cm (>) _____ cm	_____	_____	_____
	3: _____	_____ cm (>) _____ cm	_____	_____	_____
	4: _____	_____ cm (>) _____ cm	_____	_____	_____
	5: _____	_____ cm (>) _____ cm	_____	_____	_____
	6: _____	_____ cm (>) _____ cm	_____	_____	_____
	7: _____	_____ cm (>) _____ cm	_____	_____	_____
	8: _____	_____ cm (>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SILC = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete ☒ (P)artial

Species	L/D	BA-1	BA-2	Ave. DBH (cm)
QURU				24.1, 13.0
ACSA				10.0
TIAM				10.4
ACRU				10.4
POTR				10.1, 10

Relevé-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes:

The smallest and largest of each tree species >10 cm dbh was measured.

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Maggie Ross Surveyor's Relevé #: 029 Date: 08/19/2024
 County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 4-5 i	
3	.	<i>Quercus rubra</i>	
2	.	<i>Acer saccharum</i>	
2	.	<i>Populus tremuloides</i>	
2	.	<i>Tilia americana</i>	
2	.	<i>Ostrya virginiana</i>	
2	.	<i>Betula papyrifera</i>	
r	.	<i>Acer rubrum</i>	
.	.		
.	.	D 1-3 i	
r	.	<i>Tilia americana</i>	
1	.	<i>Quercus rubra</i>	
1	.	<i>Prunus virginiana</i>	
2	.	<i>Diervilla lonicera</i>	
3	.	<i>Cornus rugosa</i>	
2	.	<i>Ostrya virginiana</i>	
2	.	<i>Acer saccharum</i>	
+	.	<i>Alnus incana</i>	
+	.	<i>Salix humilis</i>	
5	1	<i>Ribes sp.</i>	
+	.	<i>Rhamnus cathartica</i>	
1	.	<i>Betula papyrifera</i>	
+	.	<i>Ribes cynosbati</i>	
1	.	<i>Vaccinium angustifolium</i>	
3	1	<i>Amelanchier sanguinea/spicata</i>	
r	.	<i>Sorbus decora</i>	
+	.	<i>Corylus cornuta</i>	
+	.	<i>Vaccinium myrtilloides</i>	
.	.		
.	.	E 4 a	
r	.	<i>Picea glauca</i>	
.	.		
.	.	E 2 a	
+	.	<i>Picea glauca</i>	
.	.		
.	.		
.	.		
.	.		
.	.	G 1-3 i	
1	.	<i>Carex pedunculata</i>	

ID	C.S	SPECIES NAME	REMARKS
.	.	G 1-3 i (continued)	
r	.	<i>Bromus ciliatus</i>	
1	.	<i>Carex pensylvanica</i>	
1	.	<i>Danthonia spicata</i>	
+	.	<i>Oryzopsis asperifolia</i>	
2	.	<i>Calamagrostis canadensis</i>	
2	.	<i>Poa pratensis</i>	
4	r	<i>Agrostis stolonifera</i>	
.	.	G 1-3 i	
r	.	<i>Anemone virginiana</i>	
2	.	<i>Eurybia macrophylla</i>	
1	.	<i>Solidago gigantea</i>	
1	.	<i>Achillea millefolium</i>	
+	.	<i>Verbascum thapsus</i>	
1	.	<i>Fragaria virginiana</i>	
1	.	<i>Athyrium filix-femina</i>	
+	.	<i>Viola pubescens/canadensis</i>	
5	1	<i>Hieracium sp.</i>	
+	.	<i>Aquilegia canadensis</i>	
+	.	<i>Anemone cylindrica</i>	
5	+	<i>Potentilla sp.</i>	
+	.	<i>Trillium grandiflorum</i>	
+	.	<i>Lathyrus ochroleucus</i>	
+	.	<i>Trillium grandiflorum</i>	
+	.	<i>Vicia americana</i>	
1	.	<i>Cornus canadensis</i>	
r	.	<i>Polypodium virginianum</i>	
+	.	<i>Trillium grandiflorum</i>	
+	.	<i>Chamerion angustifolium</i>	
1	.	<i>Pteridium aquilinum</i>	
+	.	<i>Hieracium umbellatum</i>	
+	.	<i>Apocynum androsaemifolium</i>	
1	.	<i>Antennaria parlinii</i>	
1	.	<i>Trifolium repens</i>	
+	.	<i>Aralia nudicaulis</i>	
+	.	<i>Erigeron strigosus</i>	
+	.	<i>Solidago altissima</i>	
+	.	<i>Solidago juncea</i>	
+	.	<i>Anaphalis margaritacea</i>	
+	.	<i>Trifolium pratense</i>	

Life Form

B = broadleaf evergreen
 D = broadleaf deciduous
 E = needleleaf evergreen
 G = graminoids
 H = forbs
 L = lichens
 M = mosses & liverworts
 C = climbers
 K = stem succulents
 F = floating-leaved
 S = submerged
 X = epiphytes

Height

8 >35m
 7 = 20-35m
 6 = 10-20m
 5 = 5-10m
 4 = 2-5m
 3 = 0.5-2m
 2 = 0.1- 0.5m
 1 = 0-0. 1m

Cover

Group Species
 c 5 75-100%
 i 4 50-75%
 p 3 25-50%
 r 2 5-25%
 b 1-5%
 a <1%

Abundance

1 <5% cover, many individuals
 + <5% cover, few (2-20) individuals
 r <5% cover, single

Sociability

5 = extensive mat
 4 = small colonies, broken mat
 3 = large group, many plants
 2 = small dense clumps
 1 = growing singly

Reliability Code

0 = variety certain
 1 = cf. var./subsp.
 2 = species certain
 3 = species complex
 4 = cf. species
 5 = genus certain
 6 = cf. genus
 7 = unknown

Selected Remark Codes

DD = dead
 DY = dying
 GE = germinating
 SD = seedling
 SP = sprout (coppice)
 FR = fruiting
 OP = outside plot (<2m)
 ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Maggie Ross

Surveyor's Relevé #: 030 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust

Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther _____

Revisit: (Y)es (N)o Original DNR Relevé #: _____

Date: 20 Month: 08 Year: 2024 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): F D n 3 3 b (Aspen - Birch Woodland)

NPC Ranking in Relevé: C

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relevé Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: (N)p (Y)es

Marker Type / Placement: SW corner of relevé plot

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther _____

County: St. Louis Township: 49 N Range: 15 Section: 33 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²

Elevation: _____ ft. Slope: 5-10 (°) or _____ (%) Aspect: E (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliciclastic (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Moved point to avoid ski trail. Hiking trail to SE where forest opens up to overlook. Gentle downward slope that becomes steeper east and west of plot. Lower ranking

due to earthworm impact and non-native species.

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1: _____ cm	(>) _____ cm		_____	_____
Soil Layers	2: _____ cm	(>) _____ cm	_____	_____	_____
	3: _____ cm	(>) _____ cm	_____	_____	_____
	4: _____ cm	(>) _____ cm	_____	_____	_____
	5: _____ cm	(>) _____ cm	_____	_____	_____
	6: _____ cm	(>) _____ cm	_____	_____	_____
	7: _____ cm	(>) _____ cm	_____	_____	_____
	8: _____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SILC = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Acer rubrum					15.7
Betula papyrifera					16.8, 19.0
Quercus rubra					31.8, 36.1

Relevé-Wide DBH Statistics

Prism Factor: _____

Min: _____ Max: _____ Median: _____

Notes:

Photos Taken: (Y)es (N)o

DNR RELIVE #

Surveyor(s): Maggie Ross Surveyor's Releve #: 030 Date: 08/20/24
County: St. Louis Surveyor's Place Name: Magney-Snively

[illegible][illegible]

Life Form

B = broadleaf evergreen
D = broadleaf deciduous
E = needleleaf evergreen
G = graminoids
H = forbs
L = lichens
M = mosses & liverworts
C = climbers
K = stem succulents
F = floating-leaved
S = submerged
X = epiphytes

Height

Height

8 >35m

7 = 20-35m

6 = 10-20m

5 = 5-10m

4 = 2-5m

3 = 0.5-2m

2 = 0.1- 0.5m

1 = 0-0.1m

Cover

Group	Species
c	5 75-100%
i	4 50-75%
p	3 25-50%
r	2 5-25%
b	1-5%
a	<1%

Abundance	
1	<5% cover
+	<5% cover
r	<5% cover

Sociability

5 = extensive mat
4 = small colonies, broken mat
3 = large group, many plants
2 = small dense clumps
1 = growing singly

Reliability Code

Reliability Code
0 = variety certain
1 = cf. var./subsp.
2 = species certain
3 = species complex
4 = cf. species
5 = genus certain
6 = cf. genus
7 = unknown

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____
Surveyor(s): Maggie Ross
Surveyor's Relevé #: 031 **Surveyor's Place Name:** Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other City of Duluth/Minnesota Land Trust
Purpose of Relevé: (C)lassification (R)are species habitat ☒ Monitoring (O)ther _____
Revisit: (Y)es ☒ No **Original DNR Relevé #:** _____
Date: 20 Month: 08 Year: 2024 (e.g. 09 JUL 2004)
MBS Site #: _____ **Ownership:** City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland ☒ (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): R0n23a (Bedrock Shrubland (Inland))
NPC Ranking in Relevé: B
Stand Typical of NPC: ☒ Yes (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relevé Typical of Stand: ☒ Yes (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary ☒ (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: ☒ GPS (A)ir photo (T)opo map (L)idar (O)ther _____
County: St. Louis **Township:** 49 N **Range:** 15 **Section:** 33 **QORT:** _____ of **QRT:** _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²
Elevation: _____ ft. **Slope:** 10-15 (°) or _____ (%) **Aspect:** SE (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest ☒ (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____
Rock Type: _____

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____	_____		_____	_____
Soil Layers	1:	0 cm (>) _____ cm	_____	_____	_____
	2:	_____ cm (>) _____ cm	_____	_____	_____
	3:	_____ cm (>) _____ cm	_____	_____	_____
	4:	_____ cm (>) _____ cm	_____	_____	_____
	5:	_____ cm (>) _____ cm	_____	_____	_____
	6:	_____ cm (>) _____ cm	_____	_____	_____
	7:	_____ cm (>) _____ cm	_____	_____	_____
	8:	_____ cm (>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Around 50% bare rock cover. Various moss and lichen species on rock surfaces. Area surrounding the plot have higher cover of trees and likely are EDn33. Invasive and non-native species present but at lower cover than other rock outcrop areas in the area. Lower ranking due to non-native species cover

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Relevé-Wide DBH Statistics

Prism Factor: _____ **Min:** _____ **Max:** _____ **Median:** _____

Notes:

No trees >10 cm dbh

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Maggie Ross Surveyor's Relevé #: 031 Date: 08/20/24
 County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 4 r	
2	.	Quercus rubra	
2	.	Populus tremuloides	
	.		
	.	D 1-3 p	
2	.	Cornus rugosa	
2	.	Rhus glabra	
r	.	Frangula alnus	
1	.	Vaccinium angustifolium	
+	.	Prunus virginiana	
+	.	Quercus rubra	
1	.	Diervilla lonicera	
+	.	Fraxinus nigra	
r	.	Ribes cynosbati	
r	.	Ostrya virginiana	
+	.	Rhamnus cathartica	
3	+	Amelachier sanguinea/spicata	
r	.	Acer saccharum	
+	.	Salix humilis	
r	.	Symphoricarpos albus	
r	.	Frangula alnus	
	.		
	.		
	.	E 2 a	
r	.	Picea glauca	
	.		
	.	G 1-3 r	
7	+	Unknown grass species	
	+	Poa compressa	
	+	Elymus repens	
1	.	Agrostis scabra	
2	.	Danthonia spicata	
2	.	Calamagrostis canadensis	
2	.	Poa compressa	
	.		
	.		
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ID	C.S	SPECIES NAME	REMARKS
	.	H 1-3 r	
+	.	Fragaria virginiana	
1	.	Heuchera richardsonii	
1	.	Antennaria neglecta	
1	.	Antennaria parlinii	
+	.	Aquilegia canadensis	
+	.	Achillea millefolium	
4	1	Solidago altissima	
4	+	Rubus alleghaniensis	
1	.	Symphytotrichum ciliolatum	
1	.	Trifolium repens	
1	.	Trifolium pratense	
+	.	Solidago juncea	
+	.	Verbascum thapsus	
1	.	Woodsia ilvensis	
+	.	Maianthemum canadense	
+	.	Eurybia macrophylla	
+	.	Lathyrus ochroleucus	
+	.	Vicia americana	
+	.	Anemone virginiana	
5	1	Hieracium sp.	
+	.	Anemone cylindrica	
+	.	Fallopia cilinodis	
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Life Form

B = broadleaf evergreen
 D = broadleaf deciduous
 E = needleleaf evergreen
 G = graminoids
 H = forbs
 L = lichens
 M = mosses & liverworts
 C = climbers
 K = stem succulents
 F = floating-leaved
 S = submerged
 X = epiphytes

Height

8 >35m
 7 = 20-35m
 6 = 10-20m
 5 = 5-10m
 4 = 2-5m
 3 = 0.5-2m
 2 = 0.1- 0.5m
 1 = 0-0.1m

Cover

Group Species
 c 5 75-100%
 i 4 50-75%
 p 3 25-50%
 r 2 5-25%
 b 1-5%
 a <1%

Abundance

1 <5% cover, many individuals
 + <5% cover, few (2-20) individuals
 r <5% cover, single

Sociability

5 = extensive mat
 4 = small colonies, broken mat
 3 = large group, many plants
 2 = small dense clumps
 1 = growing singly

Reliability Code

0 = variety certain
 1 = cf. var./subsp.
 2 = species certain
 3 = species complex
 4 = cf. species
 5 = genus certain
 6 = cf. genus
 7 = unknown

Selected Remark Codes

DD = dead
 DY = dying
 GE = germinating
 SD = seedling
 SP = sprout (coppice)
 FR = fruiting
 OP = outside plot (<2m)
 ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Maggie Ross

Surveyor's Relevé #: 032 Surveyor's Place Name: Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust

Purpose of Relevé: (C)lassification (R)are species habitat (M)onitoring (O)ther _____

Revisit: (Y)es (N)o Original DNR Relevé #: _____

Date: 2 2 Month: 0 8 Year: 2 0 2 4 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): M H n 3 5 b (Red Oak – Sugar Maple – Basswood – (Bluebead Lily) Forest)

NPC Ranking in Relevé: C

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relevé Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

Permanent Marker: (N)p (Y)es

Marker Type / Placement: SW corner of relevé plot

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther _____

County: St. Louis Township: 4 9 N Range: 1 5 Section: 3 3 QQRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 2 0 m x 2 0 m = 4 0 0 m²

Elevation: _____ ft. Slope: 20-30 (°) or _____ (%) Aspect: E (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Slope decreases and starts to flatten at eastern edge. Large boulders and exposed rock. Stand near areas of >50% cover of of common buckthorn. There are nearby patches of more open and young aspen stands, but plot is still representative overall of surrounding plant community. C ranking because of earthworm impact and high cover of common buckthorn

	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____	_____		_____	_____
Soil Layers	1: 0 cm	(>) _____ cm	_____	_____	_____
	2: _____ cm	(>) _____ cm	_____	_____	_____
	3: _____ cm	(>) _____ cm	_____	_____	_____
	4: _____ cm	(>) _____ cm	_____	_____	_____
	5: _____ cm	(>) _____ cm	_____	_____	_____
	6: _____ cm	(>) _____ cm	_____	_____	_____
	7: _____ cm	(>) _____ cm	_____	_____	_____
	8: _____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters

DBH List: (C)omplete (P)artial

Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Populus tremuloides					40.6, 15.5
Acer saccharum					26.7
Betula papyrifera					14.7, 15.0

Relevé-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes:

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Maggie Ross Surveyor's Relevé #: 032 Date: 08/22/24
 County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 6-8 i Ca	
3	.	Populus tremuloides	
+	.	Acer saccharum	
+	.	Betula papyrifera	
	.		
	.	D 5-6	
3	.	Populus tremuloides	
+	.	Acer saccharum	
2	.	Ostrya virginiana	
r	.	Quercus rubra	
r	.	Tilia americana	
	.		
	.	E 3 a	
r	.	Picea glauca	
	.		
	.	D 1-3 p	
3	.	Corylus cornuta	
2	.	Populus tremuloides	
2	.	Rhamnus cathartica	
+	.	Lonicera hirsuta	
+	.	Lonicera canadensis	
2	.	Diervilla lonicera	
+	.	Prunus virginiana	
+	.	Acer saccharum	
+	.	Quercus rubra	
1	.	Cornus rugosa	
2	.	Rubus parviflorus	
r	.	Acer spicatum	
r	.	Viburnum rafomesqueanum	
+	.	Fraxinus nigra	
+	.	Tilia americana	
3	+	Amelachier sanguinea/spicata	
	.		
	.	D 4 a	
3	r	Amelachier sanguinea/spicata	
+	.	Corynus cornuta	
+	.	Cornus rugosa	
	.		
	.	E 1 a	
r	.	Pinus strobus	

ID	C.S	SPECIES NAME	REMARKS
	.	H 1-3 p	
1	.	Hepatica americana	
2	.	Uvularia grandiflora	
1	.	Symphyotrichum lateriflorum	
5	1	Hieracium sp.	
1	.	Eurybia macrophylla	
5	+	Viola heart shaped	
2	.	Pteridium aquilinum	
+	.	Maianthemum canadense	
2	.	Aralia nudicaulis	
+	.	Maianthemum racemosum	
+	.	Actaea rubra	
2	.	Solidago flexicaulis	
+	.	Anemone quinquefolia	
+	.	Equisetum arvense	
+	.	Trillium grandiflorum	
+	.	Sanicula marilandica	
+	.	Ranunculus recurvatus	
r	.	Actaea pachypoda	
+	.	Lathyrus ochroleucus	
+	.	Anemone virginiana	
1	.	Solidago gigantea	
+	.	Streptopus lanceolatus	
1	.	Circaea alpina	
+	.	Taraxacum officinale	
+	.	Rubus pubescens	
+	.	Monotropa uniflora	
1	.	Athyrium felix-femina	
+	.	Galium triflorum	
4	+	Pyrola elliptica	
	.		
	.	G 1-3 r	
4	+	Agrostis stolonifera	
+	.	Millium effusum	
2	.	Carex pensylvanica	
1	.	Oryzopsis asperifolia	
1	.	Carex pendunculata	
1	.	Bromus ciliatus	
	.		
	.		

Life Form

B = broadleaf evergreen
 D = broadleaf deciduous
 E = needleleaf evergreen
 G = graminoids
 H = forbs
 L = lichens
 M = mosses & liverworts
 C = climbers
 K = stem succulents
 F = floating-leaved
 S = submerged
 X = epiphytes

Height

8 >35m
 7 = 20-35m
 6 = 10-20m
 5 = 5-10m
 4 = 2-5m
 3 = 0.5-2m
 2 = 0.1- 0.5m
 1 = 0-0.1m

Cover

Group Species
 c 5 75-100%
 i 4 50-75%
 p 3 25-50%
 r 2 5-25%
 b 1-5%
 a <1%
Abundance
 1 <5% cover, many individuals
 + <5% cover, few (2-20) individuals
 r <5% cover, single

Sociability

5 = extensive mat
 4 = small colonies, broken mat
 3 = large group, many plants
 2 = small dense clumps
 1 = growing singly

Reliability Code

0 = variety certain
 1 = cf. var./subsp.
 2 = species certain
 3 = species complex
 4 = cf. species
 5 = genus certain
 6 = cf. genus
 7 = unknown

Selected Remark Codes

DD = dead
 DY = dying
 GE = germinating
 SD = seedling
 SP = sprout (coppice)
 FR = fruiting
 OP = outside plot (<2m)
 ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")



Initial Scan	_____
Entered	_____
QC'd	_____
Edited	_____
Final Scan	_____

DNR RELEVÉ # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVÉ # _____
Surveyor(s): Maggie Ross
Surveyor's Relevé #: 033 **Surveyor's Place Name:** Magney-Snively
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M ☒ Other City of Duluth/Minnesota Land Trust
Purpose of Relevé: (C)lassification (R)are species habitat ☒ Monitoring (O)ther _____
Revisit: (Y)es ☒ No **Original DNR Relevé #:** _____
Date: 26 **Month:** 08 **Year:** 2024 (e.g. 09 JUL 2004)
MBS Site #: _____ **Ownership:** City of Duluth

VEGETATION INFORMATION

Vegetation Group: ☒ WU wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): M H n 3 5 b (Red Oak – Sugar Maple – Basswood – (Bluebead Lily) Forest)
NPC Ranking in Relevé: B
Stand Typical of NPC: ☒ Yes (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relevé Typical of Stand: ☒ Yes (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary ☒ Moderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }
UTM Accuracy: _____ meters
Location Source: ☒ GPS (A)ir photo (T)opo map (L)iDAR (O)ther _____
County: St. Louis **Township:** 49 N **Range:** 15 **Section:** 34 **QORT:** _____ of **QRT:** _____

PLOT INFORMATION

Plot Size: 20 m x 20 m = 400 m²
Elevation: _____ ft. **Slope:** _____ (°) or 5 (%) **Aspect:** NW (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest ☒ Upper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther _____
Rock Type: _____

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
1:	0 cm	(>) _____ cm	_____	_____	_____
2:	_____ cm	(>) _____ cm	_____	_____	_____
3:	_____ cm	(>) _____ cm	_____	_____	_____
4:	_____ cm	(>) _____ cm	_____	_____	_____
5:	_____ cm	(>) _____ cm	_____	_____	_____
6:	_____ cm	(>) _____ cm	_____	_____	_____
7:	_____ cm	(>) _____ cm	_____	_____	_____
8:	_____ cm	(>) _____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Undulating topography that begins to gently slope to NW. A few boulders and patches of bare ground.

Also with exposed rock with moss and lichen cover. Lower ranking because of buckthorn and earthworms.
Surrounding area seems to be a mix of MHn35 and MHn47. Moved proposed point because it was in a richer, likely MHn47 forest.

Basal Area & Tree Diameters				DBH List: (C)omplete ☒ Partial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Quercus rubra					58.9, 40.6
Acer saccharum					14.7, 22.9
Tilia americana					14.2
Acer rubrum					27.7
Ostrya virginiana					11.7

Relevé-Wide DBH Statistics

Prism Factor: _____ **Min:** _____ **Max:** _____ **Median:** _____

Notes:

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): Maggie Ross Surveyor's Relevé #: 033 Date: 08/26/24
 County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 7 r Ca	
	2 .	Quercus rubra	
	.		
	.	D 5-6 i	
	4 .	Acer saccharum	
	2 .	Tilia americana	
	2 .	Ostrya virginiana	
	2 .	Quercus rubra	
	r .	Acer rubrum	
	.		
	.	D 4 r	
	+ .	Corylus cornuta	
	r .	Ostrya virginiana	
	.		
	.	D 1-3 i	
	3 .	Corylus cornuta	
	+ .	Cornus alternifolia	
	+	Lonicera canadensis	
	2 .	Acer saccharum	
	+	Diervilla lonicera	
4	+	Ribes cynosbati	
	2 .	Rhamnus cathartica	
	+	Tilia americana	
5	r .	Betula sp.	SD
	+	Ostrya virginiana	
	+	Rubus ideaus	
3	+	Amelachier laevis/interior	
	+	Lonicera X bella	
	r .	Cornus rugosa	
	r .	Sorbus decora	
	+	Rubus parviflorus	
	r .	Fraxinus nigra	
	+	Ribes triste	
	r .	Quercus rubra	
	.		
	.	E 2-3 a	
	+	Picea glauca	
	.		
	.		
	.		

ID	C.S	SPECIES NAME	REMARKS
	.	H 1-3 i	
	2 .	Aralia nudicaulis	
	2 .	Solidago gigantea	
	+	Actaea rubra	
	3 .	Eurybia macrophylla	
	+	Symphyotrichum lateriflorum	
	2 .	Maianthemum canadense	
	+	Arisaema triphyllum	
	+	Trillium cerneum	
	1 .	Polygonatum pubescens	
	+	Lysiamachia borealis	
	1 .	Uvularia sessiflora	
	+	Fragaria virginiana	
	+	Ranunculus recurvatus	
4	+	Viola pubescens	
	+	Taraxacum officinale	
	+	Dryopteris catusiana	
	+	Solidago flexicaulis	
	+	Galium triflorum	
	+	Gymnocarpium dryopteris	
	+	Rubus pubescens	
5	+	Hieracium sp.	
	+	Lathyrus ochroleucus	
	+	Streptopus lanceolatus	
	+	Ranunculus abortivus	
	+	Athyrium felix-femina	
	.	G 1-3 p	
4	1 .	Agrostis stolonifera	
	+	Carex pedunculata	
	+	Milium effusum	
	1 .	Oryzopsis asperifolia	
	3 .	Carex pensylvanica	
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Life Form

B = broadleaf evergreen
 D = broadleaf deciduous
 E = needleleaf evergreen
 G = graminoids
 H = forbs
 L = lichens
 M = mosses & liverworts
 C = climbers
 K = stem succulents
 F = floating-leaved
 S = submerged
 X = epiphytes

Height

8 >35m
 7 = 20-35m
 6 = 10-20m
 5 = 5-10m
 4 = 2-5m
 3 = 0.5-2m
 2 = 0.1- 0.5m
 1 = 0-0.1m

Cover

Group Species
 c 5 75-100%
 i 4 50-75%
 p 3 25-50%
 r 2 5-25%
 b 1-5%
 a <1%
Abundance
 1 <5% cover, many individuals
 + <5% cover, few (2-20) individuals
 r <5% cover, single

Sociability

5 = extensive mat
 4 = small colonies, broken mat
 3 = large group, many plants
 2 = small dense clumps
 1 = growing singly

Reliability Code

0 = variety certain
 1 = cf. var./subsp.
 2 = species certain
 3 = species complex
 4 = cf. species
 5 = genus certain
 6 = cf. genus
 7 = unknown

Selected Remark Codes

DD = dead
 DY = dying
 GE = germinating
 SD = seedling
 SP = sprout (coppice)
 FR = fruiting
 OP = outside plot (<2m)
 ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6 - 9p, Ca")



Initial Scan	_____
Entered	_____
QC'd	_____
Edited	_____
Final Scan	_____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____

Surveyor(s): Maggie Ross

Surveyor's Relve #: 034 **Surveyor's Place Name:** Magney-Snively

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther City of Duluth/Minnesota Land Trust

Purpose of Relve: (C)lassification (R)are species habitat (M)onitoring (O)ther _____

Revisit: (Y)es (N)o **Original DNR Relve #:** 8 2 9 9

Date: 2 6 **Month:** 0 8 **Year:** 2 0 2 4 (e.g. 09 JUL 2004)

MBS Site #: _____ **Ownership:** City of Duluth

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): F D n 3 3 a _____ (Aspen – Birch Woodland)

NPC Ranking in Relve: C

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relve Typical of Stand: (Y)es (N)p

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther Black ash component present that is not representative of stand

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: _____ E } (record in NAD83, Zone 15)
_____ N }

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)iDAR (O)ther _____

County: St. Louis **Township:** 49 N **Range:** 15 **Section:** 34 **QORT:** _____ of **QRT:** _____

Permanent Marker: (N)p (Y)es

Marker Type / Placement: SW corner of releve plot

PLOT INFORMATION

Plot Size: 2 0 m x 2 0 m = 4 0 0 m²

Elevation: _____ ft. **Slope:** 8 (°) or _____ (%) **Aspect:** E (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well (S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ilicic (O)ther

Rock Type: _____

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
1:	0 cm	(>) _____ cm			
2:	_____ cm	(>) _____ cm			
3:	_____ cm	(>) _____ cm			
4:	_____ cm	(>) _____ cm			
5:	_____ cm	(>) _____ cm			
6:	_____ cm	(>) _____ cm			
7:	_____ cm	(>) _____ cm			
8:	_____ cm	(>) _____ cm			

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: High cover of pennsylvania sedge and buckthorn. Young black ash throughout and some mature trees concentrated in NE quadrat. Worm impactged. DNR releve had slightly different species composition indicative of a more exposed community, which I was not able to find within an approx. 50 meter radius of the point. It is possible that the canopy has closed since the time of the survey and species composition has subsequently shifted. Lower ranking because of earthworm impact and non native species

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)
Quercus rubra					33.3, 42.9
Acer saccharum					21.6, 24.13
Ostrya virginiana					14.0
Populus tremuloides					15.7
Fraxinus nigra					12.2
Acer rubrum					29.5, 28.5

Releve-Wide DBH Statistics

Prism Factor: _____ **Min:** _____ **Max:** _____ **Median:** _____

Notes:

The main branch of Tilia is snapped, with just a few living branches. There is a standing dead paper birch which I did not measure but dbh was >10 cm, and one living that was <10 cm dbh.

Photos Taken: (Y)es (N)o

DNR RELIVE

Surveyor(s): Maggie Ross Surveyor's Releve #: 034 Date: 08/26/24
County: St. Louis Surveyor's Place Name: Magney-Snively

ID	C.S	SPECIES NAME	REMARKS
	.	D 6-7 i Ca	
3	.	Quercus rubra	
	3 .	Populus tremuloides	
	2 .	Acer saccharum	
	+ .	Tilia americana	
	2.	Acer rubrum	
	2 .	Ostrya virginiana	
	+ .	Fraxinus nigra	
	.		
	.	D 5 p	
	2 .	Fraxinus nigra	
	2 .	Ostrya virginiana	
	r .	Betula papyrifera	
	.		
	.	D 4 r	
	2 .	Corylus cornuta	
	1 .	Fraxinus nigra	
	r .	Ostrya virginiana	
	.		
	.	D 1-3 i	
	+ .	Fraxinus nigra	
	3 .	Rhamnus cathartica	
	2.	Corylus cornuta	
	+ .	Populus tremuloides	
	+ .	Betula papyrifera	
	1 .	Acer saccharum	
	+ .	Quercus rubra	
3	+	Amelanchier laevis/interior	
	1.	Rubus ideaus	
	+	Acer rubrum	
	1.	Diervilla lonicera	
3	+	Amelachier sanguinea/spicata	
4	+	Ribes cynosbati	
	+ .	Tilia americana	
	+ .	Lonicera X bella	
	.		
	.	E 3 a	
	r .	Picea glauca	
	.		
	.		

[illegible]

Selected Remark Codes

Selected Remark Codes
DD = dead
DY = dying
GE = germinating
SD = seedling
SP = sprout (coppice)
FR = fruiting
OP = outside plot (<2m)
= specimen collection

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")

Appendix C: Photographic Log

Magney Snively Native Plant Community Survey Photographic Log

DATE: August 14, 2024
LATITUDE: 46.70286364
LONGITUDE: -92.22396781
DIRECTION: East
TYPE: General
NATIVE PLANT COMMUNITY: MHn45b
PHOTO BY: CD



Figure 1: GEI Relevé 001, MHn45b habitat. Taken near SW corner of plot.

Photographic Log

DATE: August 14, 2024
LATITUDE: 46.70338015
LONGITUDE: -92.22897672
DIRECTION: West
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn45b
PHOTO BY: KB



Figure 2: GEI Relevé 002, Cedar - yellow birch community lacking cedar

DATE: August 19, 2024
LATITUDE: 46.69435146
LONGITUDE: -92.24671524
DIRECTION: South
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn47a
PHOTO BY: KB



Figure 3: GEI Relevé 003, Yellow birch dominant

Photographic Log

DATE: August 19, 2024
LATITUDE: 46.69316268
LONGITUDE: -92.24737096
DIRECTION: East
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn47a
PHOTO BY: KB



Figure 4: GEI Relevé 004, Old growth red oak and yellow birch

DATE: August 19, 2024
LATITUDE: 46.69134375
LONGITUDE: -92.247539
DIRECTION: South
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn47a
PHOTO BY: KB



Figure 5: GEI Relevé 005, Hardwood forest

Photographic Log

DATE: August 19, 2024
LATITUDE: 46.69034035
LONGITUDE: -92.24322947
DIRECTION: West
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn47a
PHOTO BY: KB



Figure 6: GEI Relevé 006, Yellow birch and red oak dominant

DATE: August 19, 2024
LATITUDE: 46.68886202
LONGITUDE: -92.24809777
DIRECTION: East
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn47a
PHOTO BY: KB



Figure 7: GEI Relevé 007, Mature to old growth maple forest

Photographic Log

DATE: August 20, 2024
LATITUDE: 46.69736482
LONGITUDE: -92.25226559
DIRECTION: North
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: WFn55a
PHOTO BY: KB



Figure 8: GEI Relevé 008, Black ash and yellow birch dominant

DATE: August 20, 2024
LATITUDE: 46.6992345
LONGITUDE: -92.25287702
DIRECTION: North
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: WFn55a
PHOTO BY: KB



Figure 9: GEI Relevé 009, Yellow birch and black ash dominant

Photographic Log

DATE: AUGUST 20, 2024
LATITUDE: 46.70105524
LONGITUDE: -92.2502997
DIRECTION: North
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn46b
PHOTO BY: KB



Figure 10: GEI Relevé 010, Black ash, oak, balsam poplar

DATE: September 9, 2024
LATITUDE: 46.6884679
LONGITUDE: -92.2443553
DIRECTION: North
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn46b
PHOTO BY: KB



Figure 11: GEI Relevé 011

Photographic Log

DATE: August 22, 2024
LATITUDE: 46.68548138
LONGITUDE: -92.24445482
DIRECTION: East
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: FDn33b
PHOTO BY: MR



Figure 12: GEI Relevé 012

DATE: August 21, 2024
LATITUDE: 46.6828324
LONGITUDE: -92.23604036
DIRECTION: South
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: ROn23a
PHOTO BY: KB



Figure 13: GEI Relevé, Open bedrock outcrop with shrubs

Photographic Log

DATE: August 29, 2024
LATITUDE: 46.6895360
LONGITUDE: -92.2459781
DIRECTION: North
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn46b
PHOTO BY: KB



Figure 14:GEI Relevé 014

DATE: August 22, 2024
LATITUDE: 46.70888583
LONGITUDE: -92.2479753
DIRECTION: North
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: WFn55a
PHOTO BY: KB



Figure 15:GEI Relevé, Black ash dominant swamp

Photographic Log

DATE: August 22, 2024
LATITUDE: 46.70436235
LONGITUDE: -92.24802595
DIRECTION: North
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: WFn64a
PHOTO BY: KB



Figure 16: GEI Relevé 016, Black ash, alder, balsam, and spruce with red maple

DATE: August 22, 2024
LATITUDE: 46.70405915
LONGITUDE: -92.24035309
DIRECTION: South
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: Maple forest MHn47a
PHOTO BY: KB



Figure 17: GEI Relevé, Mid to old growth maple forest with allium and Sanguinaria in understory

Photographic Log

DATE: August 26, 2024
LATITUDE: 46.69497423
LONGITUDE: -92.2315784
DIRECTION: South
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn35b
PHOTO BY: KB



Figure 18: GEI Relevé, Old growth oak

DATE: August 26, 2024
LATITUDE: 46.69697775
LONGITUDE: -92.23847184
DIRECTION: Northeast
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: WFn64a very wet black ash with dense alder.
PHOTO BY: KB



Figure 19: GEI Relevé 019, Dense undergrowth

Photographic Log

DATE: August 29, 2024
LATITUDE: 46.82361207
LONGITUDE: -92.07963244
DIRECTION: West
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: WMn82b
PHOTO BY: KB



Figure 20: GEI Relevé 020, Wet meadow bluejoint subtype

DATE: September 9, 2024
LATITUDE: 46.80985594
LONGITUDE: -92.0856889
DIRECTION: Southeast
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: WMn82b
PHOTO BY: KB



Figure 21: GEI Relevé 021

Photographic Log

DATE: August 26, 2024
LATITUDE: 46.70147976
LONGITUDE: -92.24684878
DIRECTION: Northwest
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: FPh73a
PHOTO BY: MR



Figure 22: GEI Relevé 022

DATE: August 26, 2024
LATITUDE: 46.70204201
LONGITUDE: -92.2471995
DIRECTION: North
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: FPh73a
PHOTO BY: KB



Figure 23: GEI Relevé 023

Photographic Log

DATE: September 9, 2024
LATITUDE: 46.69350707
LONGITUDE: -92.25836691
DIRECTION: North
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn45b
PHOTO BY: KB



Figure 24: GEI Relevé 024, Cedar mesic upland

DATE: August 19, 2024
LATITUDE: 46.69385316
LONGITUDE: -92.2492145
DIRECTION: East
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn47a
PHOTO BY: MR



Figure 25: GEI Relevé 025

Photographic Log

DATE: August 19, 2024
LATITUDE: 46.69370969
LONGITUDE: -92.25302138
DIRECTION: West
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn47a
PHOTO BY: MR



Figure 26:GEI Relevé 026

DATE: August 19, 2024
LATITUDE: 46.69149114
LONGITUDE: -92.2569736
DIRECTION: Northeast
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn47a
PHOTO BY: MR



Figure 27:GEI Relevé 027

Photographic Log

DATE: August 19, 2024
LATITUDE: 46.69015122
LONGITUDE: -92.25105373
DIRECTION: Northeast
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn47a
PHOTO BY: MR



Figure 28:GEI Relevé 028

DATE: August 20, 2024
LATITUDE: 46.6860351
LONGITUDE: -92.25168148
DIRECTION: North
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: FDn33b
PHOTO BY: MR



Figure 29:GEI Relevé 029

Photographic Log

DATE: August 20, 2024
LATITUDE: 46.68562887
LONGITUDE: -92.250336
DIRECTION: East
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: FDn33b
PHOTO BY: MR



Figure 30:GEI Relevé 030

DATE: August 20, 2024
LATITUDE: 46.68574697
LONGITUDE: -92.24664181
DIRECTION: East
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: ROn23a
PHOTO BY: MR



Figure 31:GEI Relevé 031

Photographic Log

DATE: August 22, 2024
LATITUDE: 46.68548138
LONGITUDE: -92.24445482
DIRECTION: West
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn35b
PHOTO BY: MR



Figure 32:GEI Relevé 032

DATE: August 26, 2024
LATITUDE: 46.69014137
LONGITUDE: -92.23419369
DIRECTION: Northwest
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: MHn35b
PHOTO BY: MR



Figure 33:GEI Relevé 033

Photographic Log

DATE: August 26, 2024
LATITUDE: 46.68742282
LONGITUDE: -92.23315461
DIRECTION: Northeast
TYPE: Native Plant Community
NATIVE PLANT COMMUNITY: FDn33b
PHOTO BY: MR



Figure 34:GEI Relevé 034

DATE: August 16, 2024
LATITUDE: 46.68485627
LONGITUDE: -92.23531376
DIRECTION: North
TYPE: Rare Plant
SPECIES: Sheperdia canadensis
PHOTO BY: RP



Figure 35:1 individual

Photographic Log

DATE: August 19, 2024
LATITUDE: 46.68661816
LONGITUDE: -92.23538915
DIRECTION: North
TYPE: Rare Plant
SPECIES: *Shepherdia canadensis*
PHOTO BY: KB



Figure 36: Roadside, dry, sunny habitat

DATE: August 21, 2024
LATITUDE: 46.68408073
LONGITUDE: -92.23578259
DIRECTION: Northeast
TYPE: Rare Plant
SPECIES: *Shepherdia canadensis*
PHOTO BY: KB



Figure 37: Small plant with smaller individuals close by

Photographic Log

DATE: August 16, 2024
LATITUDE: 46.68901981
LONGITUDE: -92.25820426
DIRECTION: North
TYPE: Rare Plant
SPECIES: *Actaea pachypoda*
PHOTO BY: RP



Figure 38: *Actaea pachypoda* fruiting

DATE: August 15, 2024
LATITUDE: 46.70125137
LONGITUDE: -92.23532862
DIRECTION: North
TYPE: Rare Plant
SPECIES: *Carex gynandra*
PHOTO BY: RP



Figure 39: Black ash - Conifer Swamp (Northeastern) inclusion with *C. gynandra*

Photographic Log

DATE: May 13, 2025
LATITUDE: 46.70125137
LONGITUDE: -92.23532862
DIRECTION: North
TYPE: Rare Plant
SPECIES: *Claytonia caroliniana*
PHOTO BY: MR



Figure 40: Spring ephemeral, Carolina spring beauty (*Claytonia caroliniana*)

DATE: May 13, 2025
LATITUDE: 46.70125137
LONGITUDE: -92.23532862
DIRECTION: North
TYPE: Rare Plant
SPECIES: *Adoxa moschatellina*
PHOTO BY: MR



Figure 41: Spring ephemeral, moschatel (*Adoxa moschatellina*)

Photographic Log

DATE: MAY 15, 2025
LATITUDE: 46.70125137
LONGITUDE: -92.23532862
DIRECTION: North
TYPE: Vernal Pool
PHOTO BY:MR



Figure 42: Typical vernal pool

DATE: August 14, 2024
LATITUDE: 46.70303732
LONGITUDE: -92.22816207
DIRECTION: North
TYPE: Invasive Species
SPECIES: Epipactis hellebore
PHOTO BY:CD



Figure 43: 1 individual helleborine orchid

Photographic Log

DATE: August 21, 2024
LATITUDE: 46.68432229
LONGITUDE: -92.23670321
DIRECTION: West
TYPE: Invasive Species
SPECIES: *Epipactis hellebore*
PHOTO BY: KB



Figure 44: 5 individuals found and pulled

DATE: August 21, 2024
LATITUDE: 46.68347747
LONGITUDE: -92.23637793
DIRECTION: North
TYPE: Rare Plant
SPECIES: *Shepherdia canadensis*
PHOTO BY: KB



Figure 45: Healthy, robust plant growing beside Siberian peashrub

Photographic Log

DATE: August 15, 2024
LATITUDE: 46.69996475
LONGITUDE: -92.23033877
DIRECTION: North
TYPE: Invasive Species
SPECIES: *Veronica officinalis*
PHOTO BY: CD



Figure 46: Heath speedwell

DATE: August 16, 2024
LATITUDE: 46.69730348
LONGITUDE: -92.22802456
DIRECTION: East
TYPE: Invasive Species
SPECIES: *Rhamnus cathartica*
PHOTO BY: KB



Figure 47: Mature specimen

Photographic Log

DATE: August 21, 2024
LATITUDE: 46.68411588
LONGITUDE: -92.23545681
DIRECTION: East
TYPE: Invasive Species
SPECIES: Rhamnus cathartica and Lonicera morrowii
PHOTO BY: KB



Figure 48: Infestation of buckthorn saplings with exotic honeysuckle

DATE: August 28, 2024
LATITUDE: 46.68160886
LONGITUDE: -92.23155716
DIRECTION: Northeast
TYPE: Invasive Species
SPECIES: Rhamnus cathartica and Lonicera morrowii
PHOTO BY: RP



Figure 49: Mature buckthorn and honeysuckle surrounding bedrock outcroppings

Photographic Log

DATE: August 28, 2024
LATITUDE: 46.6806059
LONGITUDE: -92.23303368
DIRECTION: West
TYPE: Invasive Species
SPECIES: Rhamnus cathartica
PHOTO BY: RP



Figure 50: 40 to 50% buckthorn in the understory

DATE: August 15, 2024
LATITUDE: 46.70120522
LONGITUDE: -92.2475039
DIRECTION: South
TYPE: Invasive Species
SPECIES: Rhamnus cathartica and Lonicera morrowii
PHOTO BY: RP



Figure 51: Female buckthorn with fruit and exotic honeysuckle

Photographic Log

DATE: August 15, 2024
LATITUDE: 46.70153883
LONGITUDE: -92.24774397
DIRECTION: South
TYPE: Invasive Species
SPECIES: Tanacetum vulgare and Lonicera sp.
PHOTO BY: RP



Figure 52: Tansy next to exotic honeysuckle

DATE: August 16, 2024
LATITUDE: 46.68690254
LONGITUDE: -92.2314666
DIRECTION: South
TYPE: Rare Plant
SPECIES: cotoneaster sp.
PHOTO BY: RP



Figure 53: 4 individuals of cotoneaster

Photographic Log

DATE: August 16, 2024
LATITUDE: 46.6934311
LONGITUDE: -92.25604137
DIRECTION: North
TYPE: Invasive Species
SPECIES: *Berberis thunbergii*
PHOTO BY: RP



Figure 54: Japanese barberry, 2 individuals

DATE: September 10, 2024
LATITUDE: 46.70346646
LONGITUDE: -92.2311234
DIRECTION: North
TYPE: Invasive Species
SPECIES: *Euonymus alatus*
PHOTO BY: KB



Figure 55: Winged burning-bush

Photographic Log

DATE: August 15, 2024
LATITUDE: 46.70145035
LONGITUDE: -92.24719603
DIRECTION: East
TYPE: Invasive Species
SPECIES: *Salix fragilis*
PHOTO BY: RP



Figure 56: Crack willow canopy

DATE: September 12, 2024
LATITUDE: 46.68754833
LONGITUDE: -92.24837633
DIRECTION: Northeast
TYPE: Invasive Species
PHOTO BY: MR



Figure 57: Invasive species trail Plot 29. Typical ski trail habitat. Buckthorn, dandelion, hawkweed, Kentucky bluegrass, bittersweet nightshade, and buttercup present.

Photographic Log

DATE: September 12, 2024
LATITUDE: 46.68787672
LONGITUDE: -92.23219512
DIRECTION: North
TYPE: Invasive Species
PHOTO BY: MR



Figure 58: Invasive species trail Plot 6. Typical Superior Hiking Trail habitat. Buckthorn, clover, hawkweed, and plantain present.

DATE: September 10, 2024
LATITUDE: 46.70241946
LONGITUDE: -92.22388707
DIRECTION: South
TYPE: Invasive Species
PHOTO BY: MR

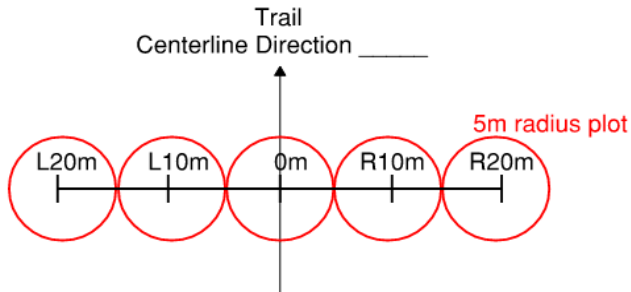


Figure 59: Invasive species trail Plot 11. Typical snowmobile trail/ski trail intersection habitat. Buckthorn and hawkweed present.

Appendix D: Trail Sampling Transect Data

Appendix Accessibility Statement: This appendix contains field data forms obtained from a third-party organization. These materials are included verbatim and have not been modified, and therefore may not conform to ADA accessibility requirements. All relevant data and interpretations derived from these forms are presented within the main report text. Inclusion of the original forms is intended solely as a methodological reference for future field efforts and is not required for interpretation of the report results.

Trail Point ID: 01	Date: September 10, 2024
Surveyor: M. Ross	Time: 11:30
Plant Community Type:	MHn35b



Sampling Transect Schematic

Direction	E
-----------	---

[illegible][illegible]

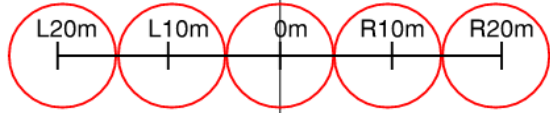
Comments
Left side has significant bare ground and large boulders. Intersects with old trail @ R15 m.

[illegible][illegible][illegible]

Surveyor: M. Ross

Time: 11:33

Plant Community Type: MHn35b



Sampling Transect Schematic

Direction

W

[illegible][illegible]

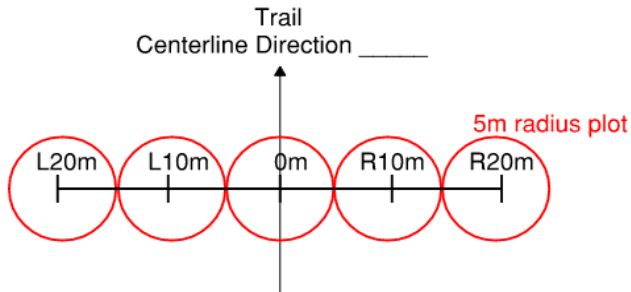
Comments
0m on R side with gravel until aprox. 4 meters. Line ends about 3 meters from SHT on R side. Steep slope to trail left.

[illegible][illegible][illegible]

Trail Point ID: 03	Date: September 10, 2024
Surveyor: Rob Peterson	Time: 15:40
Plant Community Type: FDn33b	

[illegible][illegible][illegible]

Trail Point ID: 04	Date: September 12, 2024
Surveyor: M. Ross	Time: 11:30
Plant Community Type:	MHn47a



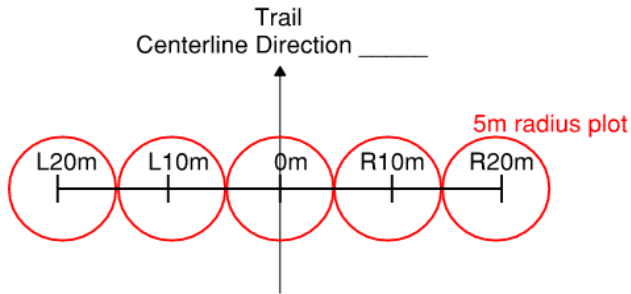
Sampling Transect Schematic

Direction N

Comments
Much wetter to R @ 15 m with ash component. Forgot to record cover for Om

[illegible][illegible][illegible][illegible][illegible]

Trail Point ID: 05-2	Date: September 12, 2024
Surveyor: M. Ross	Time: 13:30
Plant Community Type: MHn47a	



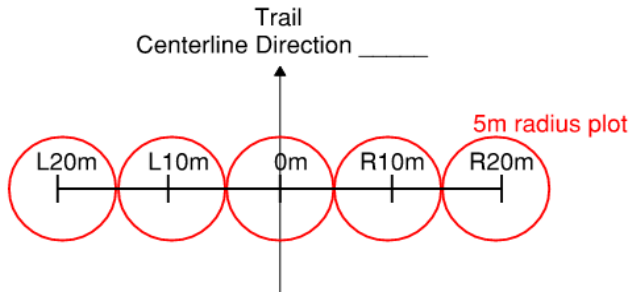
Sampling Transect Schematic

Direction W

Comments
Redid plot 5 about 20 m from point to avoid intersecting with SHT.

[illegible][illegible][illegible][illegible][illegible]

Trail Point ID: 06	Date: September 12, 2024
Surveyor: M. Ross	Time: 9:15
Plant Community Type: ROn23a	



Sampling Transect Schematic

Direction N

[illegible][illegible]

Comments
Moved point to avoid coming close to SHT to the west (left) line. Several mature buckthorn trees along the trail and interior. Mapped as outcrop but area has >25% tree cover. Area is a moasic of outcrop and FD.

[illegible]

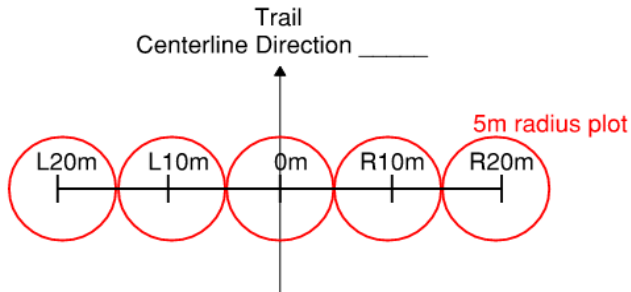
Plot R10m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	40
<i>Lonicera X bella</i>	honeysuckle	25
<i>Hieracium sp.</i>	hawkweed	20
<i>Phleum pratense</i>	timothy	10
<i>Poa pratensis</i>	kentucky bluegrass	10
<i>Trifolium pratense</i>	clover	1

[illegible]

Trail Point ID: 07	Date: September 10, 2024
Surveyor: M. Ross	Time: 9:15
Plant Community Type: MHn35b	

[illegible][illegible][illegible]

Trail Point ID: 08	Date: September 10, 2024
Surveyor: M. Ross	Time: 13:30
Plant Community Type: MHn47a	



Sampling Transect Schematic

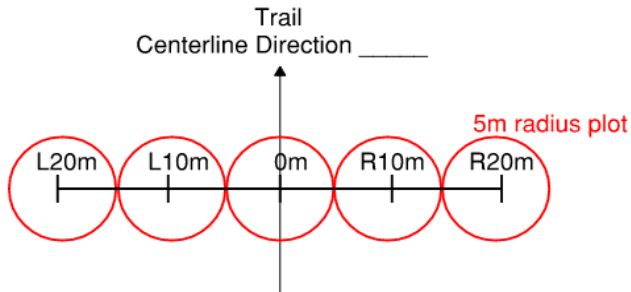
Direction S

[illegible][illegible]

Comments
High penn sedge cover

[illegible][illegible][illegible]

Trail Point ID: 09	Date: September 10, 2024
Surveyor: M. Ross	Time: 13:00
Plant Community Type:	MHn35b

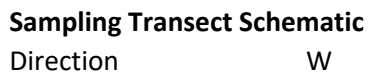


Sampling Transect Schematic
Direction S

[illegible][illegible]

Comments
Steep downhill to trail L

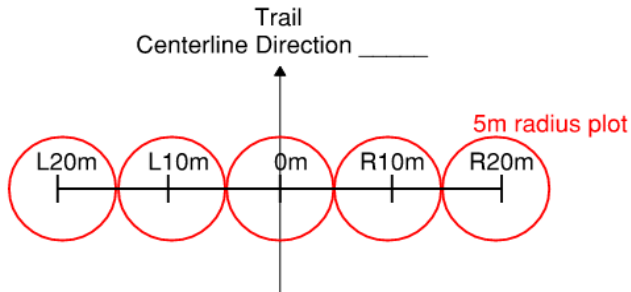
[illegible][illegible][illegible]

[illegible][illegible][illegible]

Trail Point ID: 11 Date: September 10, 2024

Surveyor: M. Ross Time: 10:15

Plant Community Type: MHn45



Sampling Transect Schematic

Direction

W

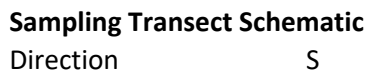
[illegible][illegible]

Comments

[illegible][illegible][illegible]

Trail Point ID: 12	Date: September 10, 2024
Surveyor: R. Peterson	Time: 12:00
Plant Community Type: FDn33b	

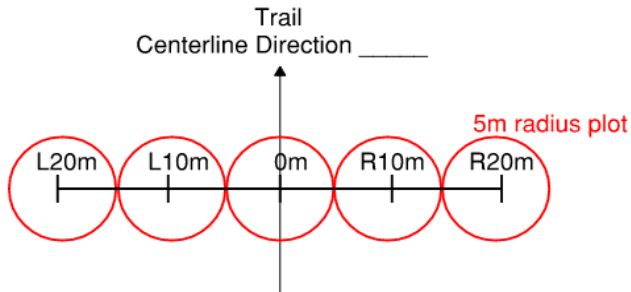
[illegible][illegible][illegible]



Plot 0m		
Scientific Name	Common Name	% Cover
<i>Melilotus officinalis</i>	yellow sweet clover	5
<i>Lonicera tatarica</i>	honeysuckle	2
<i>Centaurea stoebe</i>	spotted knapweed	3
<i>Hieracium aurantiacum</i>	hawkweed	2
<i>Rhamnus cathartica</i>	common buckthorn	10

[illegible][illegible]

Trail Point ID: 14	Date: September 10, 2024
Surveyor: R. Peterson	Time: 11:19
Plant Community Type:	FDn33b



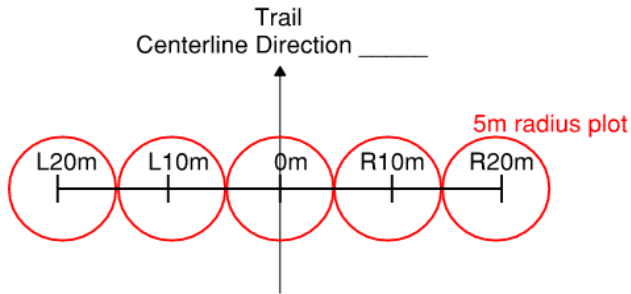
Sampling Transect Schematic

Direction S

Comments
R 20 has seed bearing buckthorn plants

[illegible][illegible][illegible][illegible][illegible]

Trail Point ID: 15	Date: September 10, 2024
Surveyor: R. Peterson	Time: 10:15
Plant Community Type:	MHn35b



Sampling Transect Schematic
Direction

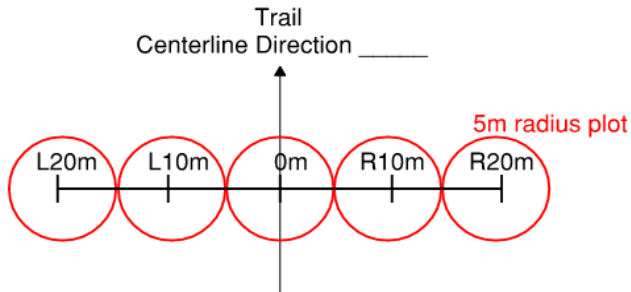
Comments
L20 m terminates adjacent to an unsactioned trail.

Plot 0m		
Scientific Name	Common Name	% Cover
<i>Hieracium aurantiacum</i>	hawkweed	3
<i>Campanula rapunculoides</i>	creeping bellflower	1
<i>Rhamnus cathartica</i>	common buckthorn	2
<i>Tanacetum vulgare</i>	Tansy	1
<i>Taraxacum officinale</i>	dandelion	3
<i>Sonchus arvensis</i>	perennial sow-thistle	2

[illegible][illegible][illegible][illegible]

[illegible]

Trail Point ID: 17	Date: September 10, 2024
Surveyor: R. Peterson	Time: 13:20
Plant Community Type:	MHn35b

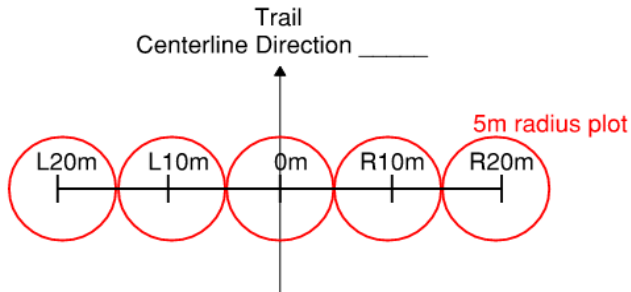


Sampling Transect Schematic
Direction

Comments
Skyline parkway close to intersection with SHT.

[illegible][illegible][illegible][illegible][illegible]

Trail Point ID: 18	Date: September 10, 2024
Surveyor: R. Peterson	Time: 13:40
Plant Community Type:	MHn35b



Sampling Transect Schematic

Direction S

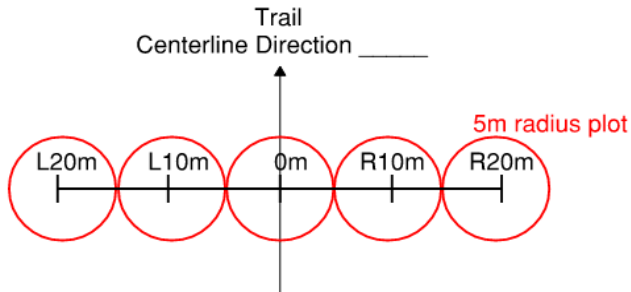
Comments

[illegible][illegible][illegible][illegible][illegible]

Trail Point ID: 19	Date: September 10, 2024
Surveyor: R. Peterson	Time: 13:53
Plant Community Type: MHn35b	

[illegible][illegible][illegible]

Trail Point ID: 20	Date: September 10, 2024
Surveyor: R. Peterson	Time: 14:05
Plant Community Type: ROn23a	



Sampling Transect Schematic

Direction S

Comments
Seed bearing buckthorn at L20m

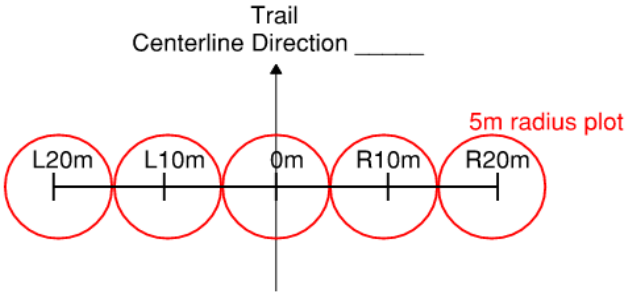
Plot 0m		
Scientific Name	Common Name	% Cover
<i>Melilotus officinalis</i>	yellow sweet clover	10
<i>Rhamnus cathartica</i>	common buckthorn	2
<i>Bromus inermis</i>	smooth brome	1
<i>Lonicera tatarica</i>	honeysuckle	5
<i>Timothy pratense</i>	timothy	1
<i>Poa pratensis</i>	kentucky bluegrass	2
<i>Trifolium aureum</i>	golden clover	1
<i>Medicago lupulina</i>	black medick	2
<i>Trifolium pratense</i>	red clover	2

[illegible][illegible][illegible][illegible]

Trail Point ID: 21 Date: September 10, 2024

Surveyor: R. Peterson Time: 14:27

Plant Community Type: ROn23a/FDn33b



Sampling Transect Schematic

Direction

W

Plot L10m

[illegible]

Plot L20m

[illegible]

Plot R10m

[illegible]

Plot R20m

[illegible]

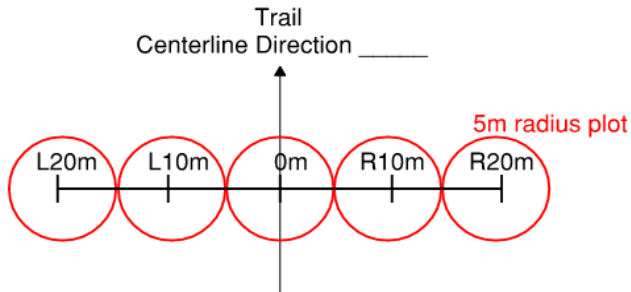
Comments

Adjacent to parking turnout and SHT. Cover not given for
Rhamnus cathartica R20m

Plot 0m

Scientific Name	Common Name	% Cover
<i>Centaurea stoebe</i>	spotted knapweed	3
<i>Hieracium aurantiacum</i>	hawkweed	2
<i>Bromus inermis</i>	smooth brome	1
<i>Tanacetum vulgare</i>	tansy	2
<i>Melilotus officinalis</i>	yellow sweet clover	5
<i>Phleum pratense</i>	timothy	1
<i>Poa pratensis</i>	kentucky bluegrass	2
<i>Trifolium aureum</i>	golden clover	2

Trail Point ID: 22	Date: September 10, 2024
Surveyor: R. Peterson	Time: 14:40
Plant Community Type:	MHn35b/MHn47a



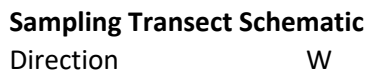
Sampling Transect Schematic
Direction W

[illegible][illegible]

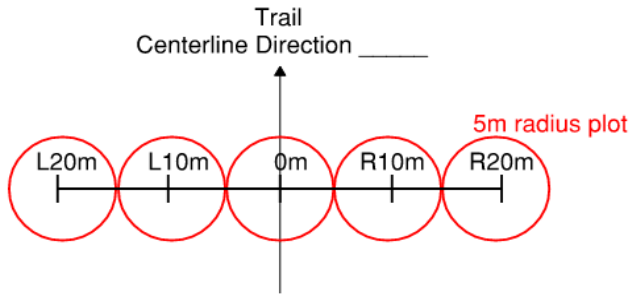
Comments

Plot 0m		
Scientific Name	Common Name	% Cover
<i>Campanula rapunculoides</i>	creeping bellflower	1
<i>Melilotus officinalis</i>	yellow sweet clover	2
<i>Trifolium repens</i>	white clover	2
<i>Poa pratensis</i>	kentucky bluegrass	2
<i>Phleum pratense</i>	timothy	1
<i>Taraxacum officinale</i>	dandelion	1

[illegible][illegible]

[illegible][illegible][illegible]

Trail Point ID: 24	Date: September 10, 2024
Surveyor: R. Peterson	Time: 15:11
Plant Community Type: MHN47a	



Sampling Transect Schematic

Direction W

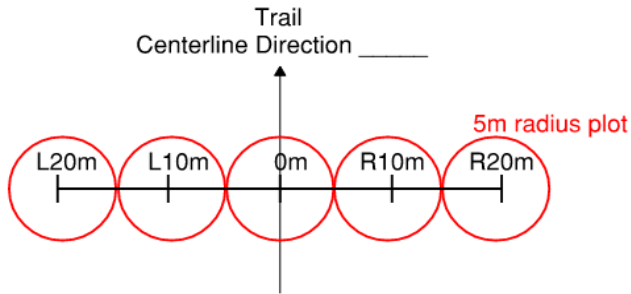
Comments

[illegible][illegible][illegible][illegible][illegible]

Trail Point ID: 25 Date: September 10, 2024

Surveyor: R. Peterson Time: 15:25

Plant Community Type: MHn47a



Sampling Transect Schematic

Direction

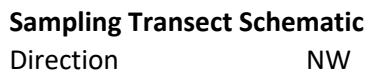
W

[illegible][illegible]

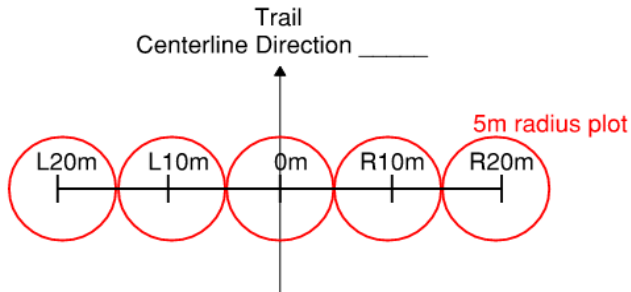
Comments

[illegible][illegible][illegible]

[illegible]

[illegible][illegible][illegible]

Trail Point ID: 28	Date: September 12, 2024
Surveyor: M. Ross	Time: 15:30
Plant Community Type:	MHn47a



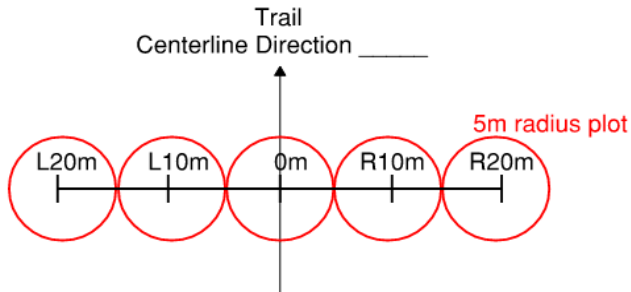
Sampling Transect Schematic
Direction W

Comments	

[illegible][illegible][illegible][illegible][illegible]

[illegible]

Trail Point ID: 30	Date: September 10, 2024
Surveyor: M. Ross	Time: 15:30
Plant Community Type: FDn33b	



Sampling Transect Schematic

Direction N

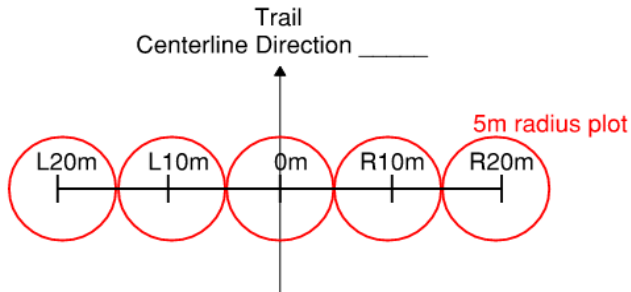
[illegible][illegible]

Comments
Cover values not recorded for 0m. Plot R comes within 25 m of a trail to the north

Plot 0m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	
<i>Hieracium aurantiacum</i>	hawkweed	
<i>Taraxacum officinale</i>	dandelion	
<i>Lonicera X bella</i>	honeysuckle	
<i>Trifolium pratense</i>	red clover	

[illegible][illegible]

Trail Point ID: 31	Date: September 12, 2024
Surveyor: M. Ross	Time: 15:00
Plant Community Type:	MHn47a



Sampling Transect Schematic

Direction	E
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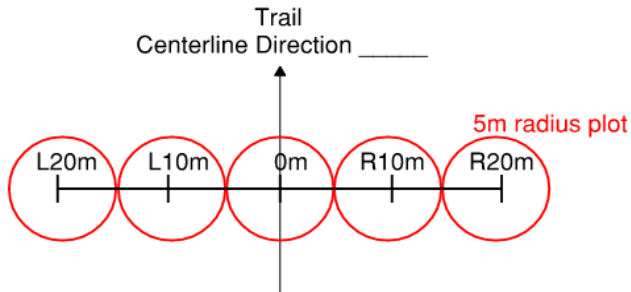
[illegible][illegible]

Comments
Left transect runs parallel to and about 10-15 m north of horse trail.

Plot 0m		
Scientific Name	Common Name	% Cover
<i>Taraxacum officinale</i>	dandelion	15
<i>Galeopsis tetrahit</i>	hemp nettle	2
<i>Plantago major</i>	plantain	5
<i>Ranunculus acris</i>	buttercup	5
<i>Poa pratensis</i>	kentucky bluegrass	10
<i>Hieracium aurantiacum</i>	hawkweed	5

[illegible][illegible]

Trail Point ID: 32	Date: September 10, 2024
Surveyor: M. Ross	Time: 15:30
Plant Community Type: MHN47a	



Sampling Transect Schematic

Direction N

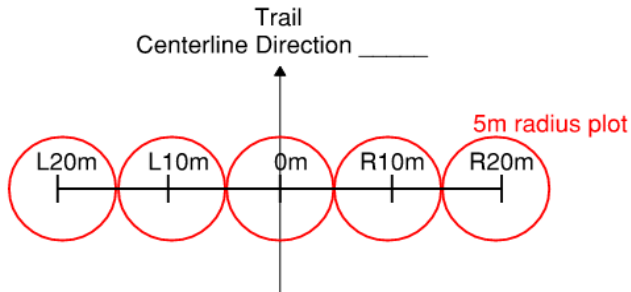
[illegible][illegible]

Comments
Plot R wetter than L, possibly ash swamp N of line

Plot 0m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	2
<i>Hieracium aurantiacum</i>	hawkweed	15
<i>Taraxacum officinale</i>	dandelion	5
<i>Plantago major</i>	plantain	2
<i>Ranunculus acris</i>	buttercup	2

[illegible][illegible]

Trail Point ID: 33 Date: September 10, 2024
 Surveyor: M. Ross Time: 14:00
 Plant Community Type: MHn35b



Sampling Transect Schematic
 Direction N

Plot L10m		
Scientific Name	Common Name	% Cover
<i>Taraxacum officinale</i>	dandelion	1
<i>Hieracium aurantiacum</i>	hawkweed	1

Plot L20m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	1
<i>Solanum dulcamara</i>	bittersweet nightshade	1
<i>Taraxacum officinale</i>	dandelion	1

Comments
Ash swamp trail L. Intersects with SHT at Plot R 21 meters

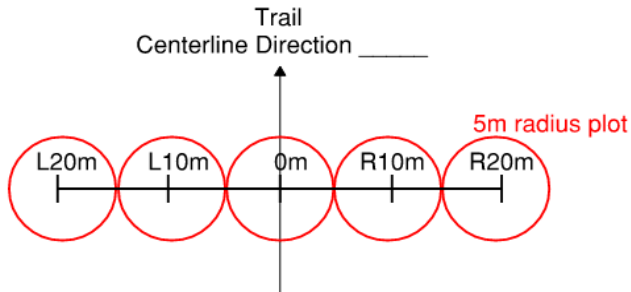
Plot 0m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	1
<i>Hieracium aurantiacum</i>	hawkweed	1
<i>Taraxacum officinale</i>	dandelion	1
<i>Myosotis scorpiodes</i>	forget me not	2
<i>Ranunculus acris</i>	buttercup	5

Plot R10m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	5
<i>Hieracium aurantiacum</i>	hawkweed	2
<i>Taraxacum officinale</i>	dandelion	2

Plot R20m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	1
<i>Hieracium aurantiacum</i>	hawkweed	1
<i>Taraxacum officinale</i>	dandelion	10
<i>Lonicera morrowii</i>	honeysuckle	2
<i>Lonicera X bella</i>	honeysuckle	2
<i>Plantago major</i>	plantain	1

[illegible]

Trail Point ID: 35	Date: September 12, 2024
Surveyor: M. Ross	Time: 14:15
Plant Community Type:	MHn47a



Sampling Transect Schematic

Direction N

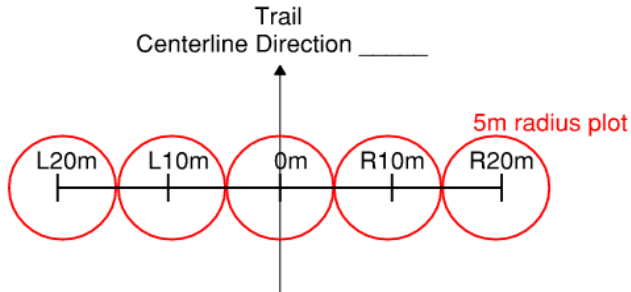
Comments
Dense lady fern and ostrich fern cover trail left

Plot 0m		
Scientific Name	Common Name	% Cover
<i>Galeopsis tetrahit</i>	hemp nettle	2
<i>Plantago major</i>	plantain	2
<i>Taraxacum officinale</i>	dandelion	2
<i>Arctium minus</i>	burdock	1
<i>Trifolium pratense</i>	red clover	5
<i>Tanacetum vulgare</i>	tansy	2

[illegible][illegible][illegible][illegible]

[illegible][illegible][illegible]

Trail Point ID: 37 Date: September 10, 2024
 Surveyor: K. Beaster Time: 3:40
 Plant Community Type: MHn47a



Sampling Transect Schematic
 Direction NW

Comments

Plot 0m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	6
<i>Trifolium arvense</i>	red clover	1
<i>Ranunculus acris</i>	buttercup	1
<i>Hieracium aurantiacum</i>	orange hawkweed	1
<i>Valeriana officinale</i>	common valerian	1

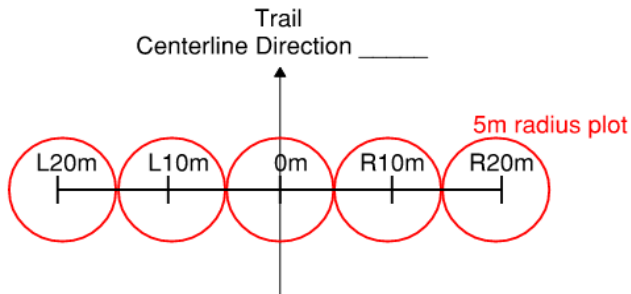
Plot L10m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	3
<i>Taraxicum officinale</i>	dandelion	r/1

Plot R10m		
Scientific Name	Common Name	% Cover
<i>Hieracium aurantiacum</i>	orange hawkweed	2
<i>Taraxicum officinale</i>	dandelion	1
<i>Rhamnus cathartica</i>	common buckthorn	4

Plot L20m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	2

Plot R20m		
Scientific Name	Common Name	% Cover
<i>Lonicera tatarica</i>	tatarian honeysuckle	15
<i>Hieracium aurantiacum</i>	orange hawkweed	1
<i>Solanum dulcarum</i>	bitersweet nightshade	1
<i>Taraxicum officinale</i>	dandelion	1
<i>Rhamnus cathartica</i>	common buckthorn	4

Trail Point ID: 38	Date: September 10, 2024
Surveyor: K. Beaster	Time: 2:30
Plant Community Type:	MHn47a

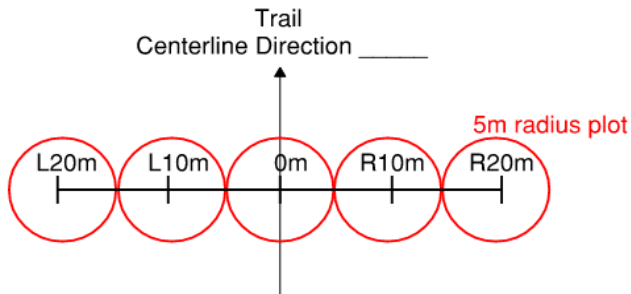


Sampling Transect Schematic
Direction SW

Comments
large, mature, old growth buckthorn just outside of survey plot on left around 30m from trail. Seedlings all around beneath.

[illegible][illegible][illegible][illegible][illegible]

Trail Point ID: 39	Date: September 10, 2024
Surveyor: K. Beaster	Time: 3:02
Plant Community Type:	MHn47a



Sampling Transect Schematic
Direction E

Comments

Plot 0m		
Scientific Name	Common Name	% Cover
<i>Hieracium aurantiacum</i>	hawkweed	1
<i>Taraxicum officinale</i>	dandelion	1
<i>Ranunculus acris</i>	buttercup	1
<i>Rhamnus cathartica</i>	common buckthorn	1
<i>Trifolium arvense</i>	red clover	2

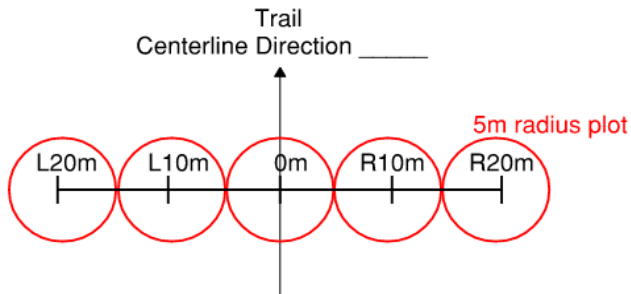
[illegible][illegible][illegible][illegible]

[illegible]

Trail Point ID: 41	Date: September 10, 2024
Surveyor: K. Beaster	Time: 3:19
Plant Community Type: MHn47a	

[illegible][illegible][illegible]

Trail Point ID: 42	Date: September 10, 2024
Surveyor: K. Beaster	Time: 2:08
Plant Community Type:	MHn47a



Sampling Transect Schematic
Direction SE

Comments
buckthorn seedlings becoming saplings

Plot 0m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	2
<i>Ranunculus acris</i>	buttercup	1
<i>Plantago major</i>	plantain	1
<i>Myosotis scorpioides</i>	forget me not	30
<i>Taraxicum officinale</i>	dandelion	1
<i>Galeopsis tetrahit</i>	hemp nettle	1

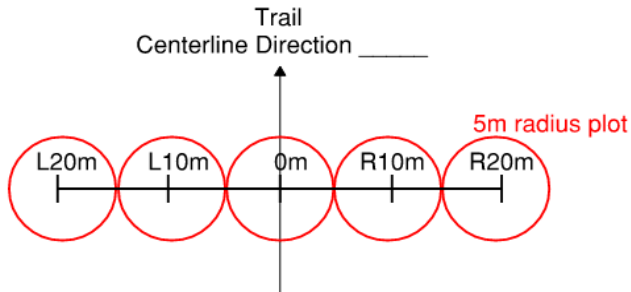
[illegible][illegible][illegible][illegible]

Diagram illustrating the layout of a 5m radius plot along a trail centerline. The trail centerline is marked with distances from the center point (0m) to the edges of the plots: L20m, L10m, 0m, R10m, and R20m. The plots are labeled as 5m radius plots.

Trail Point ID: 44	Date: September 10, 2024
Surveyor: K. Beaster	Time: 1:48
Plant Community Type: WFn64	

[illegible][illegible][illegible]

Trail Point ID: 45	Date: September 10, 2024
Surveyor: K. Beaster	Time: 11:33
Plant Community Type:	MHn47a

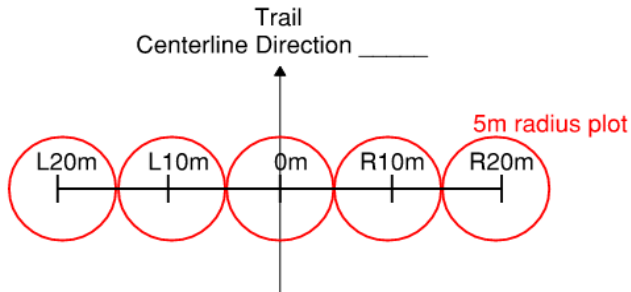


Sampling Transect Schematic
Direction SW

Comments

[illegible][illegible][illegible][illegible][illegible]

Trail Point ID: 46	Date: September 10, 2024
Surveyor: K. Beaster	Time: 1:06
Plant Community Type:	MHn47a



Sampling Transect Schematic
Direction W

Comments
very open understory in adjacent forest. Minimal impacts. High quality.

Plot 0m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	1
<i>Plantago major</i>	plantain	1
<i>Myosotis scorpiodes</i>	forget me not	1
<i>Taraxicum officinale</i>	dandelion	1
<i>Ranunculus acris</i>	buttercup	1

[illegible][illegible][illegible][illegible]

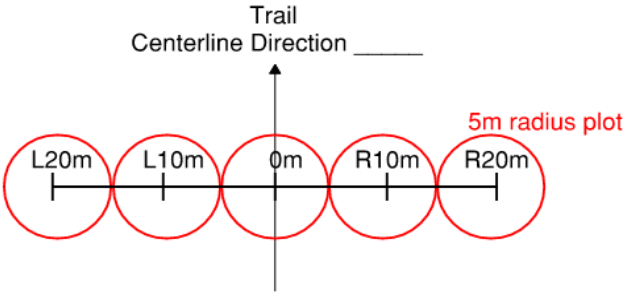
Trail Point ID: 47

Date: September 10, 2024

Surveyor: K. Beaster

Time: 1:24

Plant Community Type: MHn47a



Sampling Transect Schematic

Direction W

Comments

Plot 0m		
Scientific Name	Common Name	% Cover
<i>Taraxicum officinale</i>	dandelion	1
<i>Tanacetum vulgare</i>	tansy	1
<i>Rhamnus cathartica</i>	common buckthorn	1
<i>Hieracium aurantiacum</i>	orange hawkweed	1
<i>Plantago major</i>	plantain	1
<i>Myosotis scorpioides</i>	forget me not	1
<i>Ranunculus acris</i>	buttercup	1

Plot L10m		
Scientific Name	Common Name	% Cover
<i>Taraxicum officinale</i>	dandelion	1

Plot R10m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	1
<i>Hieracium aurantiacum</i>	orange hawkweed	1
<i>Veronica officinale</i>	common speedwell	1
<i>Taraxicum officinale</i>	dandelion	1

Plot L20m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	1
<i>Taraxicum officinale</i>	dandelion	1

Plot R20m		
Scientific Name	Common Name	% Cover
<i>Rhamnus cathartica</i>	common buckthorn	1
<i>Hieracium aurantiacum</i>	orange hawkweed	1
<i>Taraxicum officinale</i>	dandelion	1

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Appendix C: Magney-Snively Natural Area: An Assessment of Stream Health

JULY 2025

Magney-Snively Natural Area: An Assessment of Stream Health



A report describing specific restoration and protection opportunities aimed at improving stream health within the Magney-Snively Natural Area



Prepared for: Minnesota Land Trust

394 Lake Ave South, Suite 404A, Duluth, MN 55802

Prepared by: South St. Louis Soil and Water Conservation District

4215 Enterprise Circle, Duluth MN 55811

Authors:

Tim Beaster, South St. Louis County SWCD

Contributors/acknowledgements

Andy Kasun, South St. Louis County SWCD

Kyle Hildebrandt, South St. Louis County SWCD

Cover photo: Stewart Creek flows through a bedrock gorge in Magney-Snively Natural Area

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EXECUTIVE SUMMARY

This report presents a comprehensive assessment of stream health in the Magney-Snively Natural Area, located within the City of Duluth, Minnesota. The project evaluated the ecological condition of Stewart Creek and Sargent Creek—two designated trout streams that support naturally reproducing populations of native Brook Trout. The purpose of the assessment was to inform protection and restoration priorities for these coldwater systems as part of the ongoing update to the Magney-Snively Natural Area Management Plan.

The assessment focused on five key components of stream health: Connectivity, Water Quality, Biology, Hydrology, and Geomorphology. Fieldwork and analysis were conducted in 2024 and 2025, with findings summarized in this report.

Key findings include:

- **Connectivity:** Six aquatic organism passage barriers were identified, including perched culverts and private dams. These structures restrict fish movement, disrupt sediment transport, and degrade habitat continuity.
- **Water Quality:** Stream temperature monitoring during baseflow conditions revealed critical coldwater inputs, including several springs that help maintain Brook Trout habitat. Sargent Creek exhibited generally cold and stable temperatures, while Stewart Creek showed more variability and sensitivity to warming.
- **Biology:** Brook Trout redd surveys confirmed active spawning within both streams, although suitable spawning habitat is limited to distinct gravel-rich reaches.
- **Hydrology:** Flow measurements showed that a small number of springs provide a disproportionately large share of baseflow. In Stewart Creek, one spring contributed over 30% of the total baseflow within the assessment area.
- **Geomorphology:** Most of the stream segments within the Magney-Snively Natural Area were found to be stable and well-connected to their floodplains. However, a severely incised reach of Stewart Creek downstream of an abandoned dam showed significant erosion, channel degradation, and disconnection from its floodplain.

Recommendations include:

- Replacing full or partial barrier culverts using geomorphic design principles.
- Where feasible, fully removing impoundments should be prioritized to restore connectivity and reduce thermal loading.
- Protecting and enhancing groundwater recharge in the vicinity of coldwater springs will be essential for maintaining stream health and reducing thermal stress under climate change. Protection of these areas is also crucial for Brook Trout reproductive success.
- Implementing reforestation with native conifers to increase snowmelt infiltration and improve summer baseflows.

- Restoring the channel and floodplain in the vicinity of an abandoned dam to restore connectivity and improve spawning habitat. A concept plan was proposed to reuse impounded sediment to reconstruct the incised channel and reestablish floodplain connectivity.
- Incorporating these findings into the City of Duluth’s updated management plan for the Magney-Snively Natural Area.

This assessment provides actionable data and site-specific restoration opportunities to improve the resilience, ecological integrity, and coldwater habitat of two of Duluth’s most protected urban trout streams. Implementation of the recommended actions will enhance the area’s capacity to support native Brook Trout and adapt to future climate and land use pressures.

INTRODUCTION

The Magney-Snively Natural Area is a critical ecological asset within the City of Duluth. Encompassing nearly 1,800 acres, this natural area north of Bardon’s Peak is well-known for its old growth hardwood forest. This forest was the original justification for setting this land aside for protection:

“A far-sighted person can see that forested areas of northern Minnesota are fast-dwindling, and that in not more than 10 years a stand of timber of this size will be almost a novelty... I should like to see this wood land left in its natural state...” - Samuel Snively, Mayor of Duluth, Minnesota, 1921 (Dierkins & Nelson, 2017).

In addition to the old growth hardwoods, the area also contains a diverse landscape of wetlands, streams, uplands, and bedrock outcrops, making Magney-Snively Natural Area perhaps the most ecologically significant and high-quality natural area in an urban setting within Minnesota. The natural area encompasses the headwaters portions of two of Duluth’s fourteen Minnesota Department of Natural Resources (MNDNR)-designated trout streams: Stewart Creek and Sargent Creek. These streams have naturally-reproducing, native Brook Trout populations that are dependent on stable cold water and suitable habitat.

The management plan for the Magney-Snively Natural Area is currently being updated by the City of Duluth and Minnesota Land Trust. The current management plan does not contain much detail about Stewart and Sargent Creeks or the priorities for managing these streams within the natural area. The goal of this project was to fill critical data gaps and complete a stream health assessment of these coldwater streams within the area of interest (AOI), defined as the area within and upstream of the Magney-Snively Natural Area (Figure 1). This stream assessment will inform the protection and restoration priorities of the Magney-Snively Natural Area Management Plan.

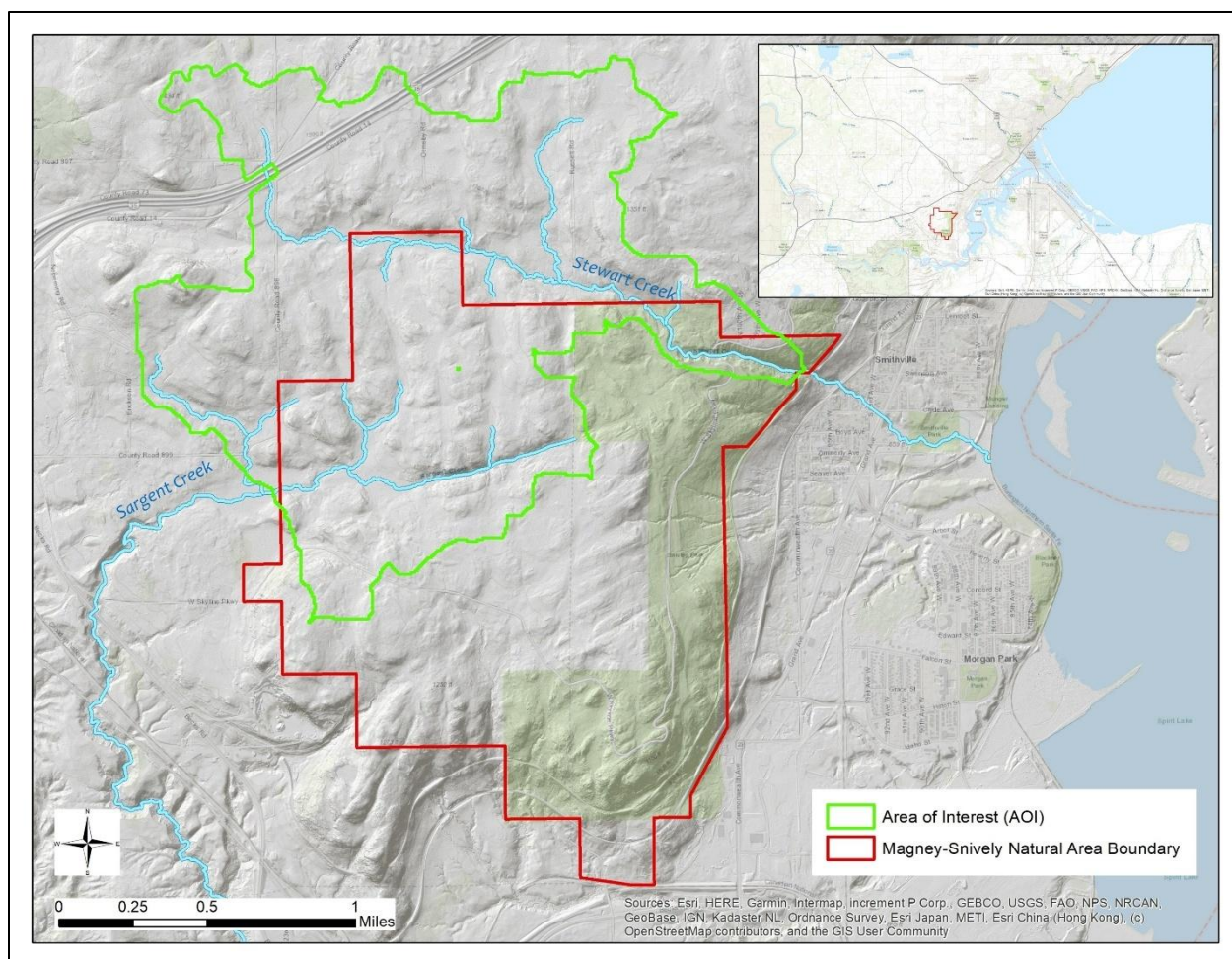


Figure 1: Map of the Magney-Snively Natural Area and the assessment area of interest.

METHODS AND DATA COLLECTION

This assessment included data compilation as well as data collection relating to each of the five components of stream/watershed health: connectivity, water quality, biology, hydrology, and geomorphology. A comprehensive dataset for each component could not be collected due to time and budgetary constraints, therefore for each component we chose to investigate one element that was deemed to be most critical to Brook Trout resilience within these streams.

3.1 BACKGROUND INFORMATION COMPILATION

Previous assessments from the Minnesota Pollution Control Agency (MPCA) and MNDNR, as well as aerial photos of the area were compiled to establish baseline conditions. These data sources, listed below, provided key insights into historical conditions, previous monitoring efforts, and known problem areas, and also helped identify critical data gaps.

Data sources included:

- Final Duluth Urban Area Watershed Restoration and Protection Strategy (MN Pollution Control Agency, 2020)
- Duluth Urban Streams: An Implementation Focused Assessment of Four Watersheds (South St. Louis SWCD, 2020)
- Geomorphic Characteristics, Processes, and Responses of Duluth-Area Streams to the June 2012 Flood, Minnesota (United States Geological Survey, 2016)
- Sargent Creek Fisheries Management Plan (MN Department of Natural Resources, Undated)
- Minnesota Historic Aerial Photos (University of Minnesota, 2025). Georeferenced historic aerial photos are shown in Appendix A.

3.2 CONNECTIVITY METHODS

For Connectivity, the element that was investigated was longitudinal connectivity. Anthropogenic barriers to longitudinal connectivity, such as dams and undersized culverts, are a detriment to stream health because they unnaturally disrupt movement of fish upstream and transport of sediment and nutrients downstream. Keystone species like Brook Trout need to be able to migrate to find thermal refuge, spawning grounds, and over-wintering habitat, and anthropogenic barriers to migration can pose serious threats to Brook Trout. There is an urgent need to identify, prioritize, and replace these barriers to ensure that Brook Trout within the Magney-Snively Natural Area are resilient in the face of a warming climate and its potential impacts.

DNR assessment methods were employed to evaluate culverts and other potential fish passage barriers within the AOI. Each barrier was assessed for physical condition, fish passage functionality, and degree of restriction. Assessments considered factors such as perch height, culvert diameter, water depth, and flow velocity to determine whether barriers impeded aquatic organism movement. Photo documentation was conducted for all identified barriers, and locations were mapped for future reference.



Stream Survey

Stream Crossing Basic Assessment Form

All units are to be entered in feet. * = Mandatory field to complete

Location: Observer*: _____ Date*: ____/____/____ County: _____
Stream name*: _____ UTM*: * N _____ E _____

Road/Path/Railway name*: _____

Notes: _____

Notes (continued): _____

Crossing:

Crossing type*: ☐ Span Bridge

Total span* (sum of culverts): _____

☐ Culvert(s) Num. (if multiple): _____

Outlet drop*: _____

☐ Ford

Crossing properly aligned*? ☐ Y ☐ N

Other: _____

Check alignment with aerial photos?: ☐ Y ☐ N

Openings* (left to right, facing downstream)

	Opening 1	Opening 2	Opening 3	Opening 4
Type*	☐ Thalweg ☐ Offset ☐ Floodplain	☐ Thalweg ☐ Offset ☐ Floodplain	☐ Thalweg ☐ Offset ☐ Floodplain	☐ Thalweg ☐ Offset ☐ Floodplain
Shape*	☐ Circular ☐ Box ☐ Pipe Arch ☐ Ellipse ☐ Open bottom arch	☐ Circular ☐ Box ☐ Pipe Arch ☐ Ellipse ☐ Open bottom arch	☐ Circular ☐ Box ☐ Pipe Arch ☐ Ellipse ☐ Open bottom arch	☐ Circular ☐ Box ☐ Pipe Arch ☐ Ellipse ☐ Open bottom arch
Material*	☐ CMP ☐ SMP ☐ Concrete ☐ Wood ☐ Plastic ☐ Other	☐ CMP ☐ SMP ☐ Concrete ☐ Wood ☐ Plastic ☐ Other	☐ CMP ☐ SMP ☐ Concrete ☐ Wood ☐ Plastic ☐ Other	☐ CMP ☐ SMP ☐ Concrete ☐ Wood ☐ Plastic ☐ Other
Length*				
Width*				
Height*				

Water depth				
Substrate present?*	☐ Y ☐ N	☐ Y ☐ N	☐ Y ☐ N	☐ Y ☐ N
% plugged*				

Stream:

Bankfull width*: _____

Bankfull estimate confidence*: ☐ High ☐ Medium ☐ Low

Scour Pool*: ☐ Y ☐ N

Upstream pool*: ☐ Y ☐ N

Upstream bars/deposition*: ☐ Y ☐ N

Bank erosion caused by crossing*: ☐ Y ☐ N Upstream Pfankuch Condition: ☐ Stable ☐ Mod. Unstable ☐ Unstable

Summary:

Barrier to fish passage at some flows*? ☐ Y ☐ N Stream stability impact*: ☐ Y ☐ N Priority: ☐ High ☐ Med. ☐ Low

Limiting factor for passage*: ☐ Outlet drop ☐ Velocity ☐ Depth ☐ Substrate

Recommended corrective actions*: _____

Photos: Crossing, upstream and downstream views; Stream, upstream and downstream views from crossing

Figure 2: MNDNR stream crossing assessment form.

3.3 WATER QUALITY METHODS

Water temperature was monitored for the Water Quality component. Trout streams in general are defined by their cold water. Brook Trout, Minnesota's only native stream trout, are a *coldwater obligate* species, meaning that they are particularly reliant on cold water. Colder water holds more dissolved oxygen, which is crucial for Brook Trout to breathe and support their metabolism. In general, Brook Trout prefer water temperatures that are between 7.8 and 20 degrees Celcius (C). Below is a table of criteria used by the MN DNR and Minnesota Pollution Control Agency (MPCA) to define Brook Trout growth, stress, and lethal temperature ranges (MN Pollution Control Agency, 2018).

Classification	Temperature Range (°C)	Description
Growth	7.8 to 20.0 °C	Temperature range favorable for growth
Stress	>20.0 to 25.0 °C	Stress and avoidance behaviors
Lethal	>25.0 °C	Mortality can be expected at prolonged exposure

We are able to identify the locations of critical thermal refuge areas for Brook Trout within the Magney-Snively Natural Area by monitoring water temperatures on hot summer days during baseflow conditions. This is the period of time when northern Minnesota trout streams are most likely to warm up into the “stress” and “lethal” ranges for Brook Trout. The presence of cold groundwater seeps and springs and thermal refuge areas can be much easier to detect during these conditions.

Longitudinal stream temperature measurements were collected with thermometers at pre-determined locations in 300-foot intervals (Figure 3) on July 26 and August 2, 2024. Measurements were collected in representative locations in well-mixed, flowing portions of the streams. Each data point was recorded with GPS coordinates to provide precise spatial reference. Special emphasis was placed on identifying locations where tributaries or groundwater seeps provided critical coldwater inputs. Ambient air temperatures were also monitored during this effort in order to compare to stream temperatures.

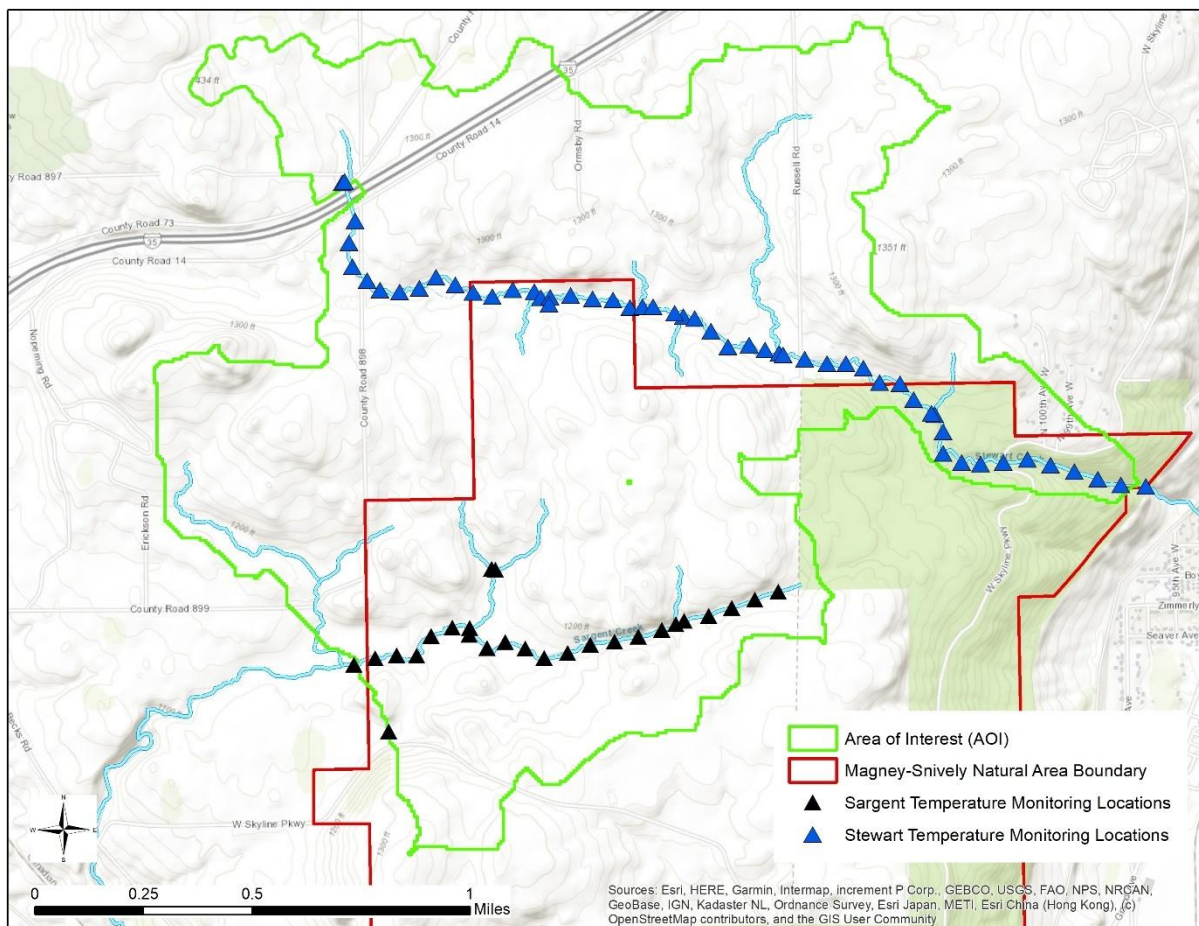


Figure 3: Map of temperature monitoring locations on Stewart Creek and Sargent Creek.

3.4 BIOLOGY METHODS

For Biology, the element of investigation was the location of spawning grounds within these streams. Spawning grounds provide the specific habitat necessary for Brook Trout reproduction, including cold, oxygen-rich water and suitable gravel substrate for egg incubation and protection from predators. The quality of spawning grounds affects egg incubation, hatching, and the survival of young fish, and significantly impacts the success of Brook Trout reproduction within a stream. The prioritization of protection areas within Sargent Creek and Stewart Creek is made easier by identifying the reaches of stream where Brook Trout perform this essential step of their life cycle.

Brook Trout typically spawn in October or November, therefore redd surveys were conducted on October 7 and 11, 2024, to identify spawning grounds within the AOI. Surveys involved wading stream reaches in the downstream-to-upstream direction and documenting the location of redds. Brook Trout redds can be visually identified by depressions or cleaned patches of small (pea-sized to slightly larger) gravel in shallow water (Figure 4). These areas are typically brighter and cleaner than the surrounding riverbed due to the trout removing silt and debris while digging their nests. Spawning trout may also be

present on or near the redds. Once identified, these locations were mapped using GPS. Stewart Creek observations were complicated by heavy leaf cover that obscured the channel bed during the survey period, introducing some uncertainty into the results.



Figure 4: Photo of a Brook Trout nest, or redd.

3.5 HYDROLOGY METHODS

Baseflow discharge was examined for the Hydrology component. Groundwater contributions to the stream from seeps and springs primarily drive streamflow during baseflow conditions. Groundwater is insulated from atmospheric temperatures and usually flows out of the ground at a stable temperature, which in the summer is cold relative to surface water temperatures, and in the winter is relatively warm. In general, the more groundwater contributions a stream has, the better the conditions will be for Brook Trout, because groundwater sustains streamflow and permits migration, maintains stable water temperatures and oxygen levels, delivers essential nutrients to the stream, prevents winter ice-anchoring, and provides the conditions that are ideal for egg development and incubation. All of these factors are vital for Brook Trout growth and survival, particularly in the face of warming temperatures and potential reduced water quality.

By measuring baseflow discharge at various locations within these watersheds, we are able to isolate the areas on the landscape that are disproportionately infiltrating precipitation and snowmelt, and thus disproportionately contributing groundwater to these trout streams. Flow measurements were recorded using a SonTek FlowTracker2 handheld Acoustic Doppler Velocimeter on October 1 and 2, 2024, at key locations along both streams to quantify baseflow discharge conditions (Figure 5). Measurements were taken at various points, including key tributary outlets and groundwater springs, to assess the relative contributions of each input to overall stream flow. Methods for collecting flow measurements followed a standard operating procedure for wadeable sites (Sauk River Watershed District, 2014) and will be not discussed at length here.

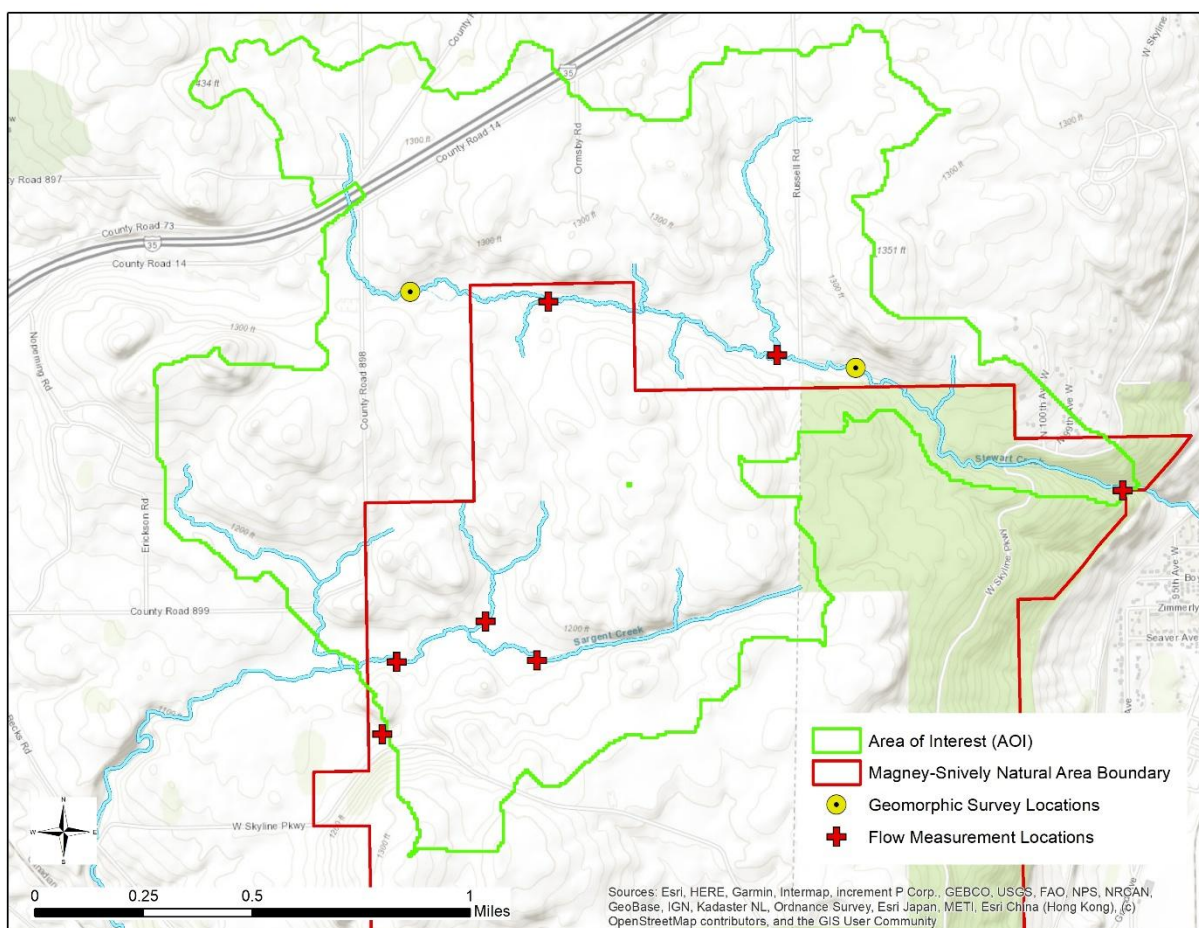


Figure 5: Map of baseflow discharge measurements and geomorphic survey locations on Stewart Creek and Sargent Creek.

3.6 GEOMORPHOLOGY METHODS

For the Geomorphology component, the element of investigation was floodplain connection. A trout stream's lateral connection to its floodplain is critically important for the stream's overall health, because it directly affects hydrology, water quality, habitat diversity, and ecosystem resilience. Floodplain connection allows high flows during floods to spread out, reducing stream power and velocity. This lowers the risk of streambank erosion and downstream flooding, and also helps recharge groundwater, which is critical for maintaining cold baseflows. Floodplains act as natural filters, trapping fine sediments and excess nutrients during overbank flood events. This prevents sedimentation of spawning gravels and limits algal blooms, both of which degrade trout habitat. A connected floodplain also promotes the development of diverse habitat features like side channels and backwaters. These features provide refuge for juvenile trout and forage species during floods and rearing areas with abundant food sources. Over time, connected floodplains support dynamic habitat complexity, which is key for sustaining trout through different life stages.

The Geomorphology investigation included qualitative assessments of floodplain connection and channel stability, using results from past assessments, analysis of LiDAR data, as well as field reconnaissance. A quantitative assessment of floodplain connection was accomplished through field surveys and software analysis. The field surveys were completed with a Trimble survey-grade GPS unit and collected latitude, longitude and elevation coordinate data in sub-centimeter accuracy. These surveys followed standard protocols for wadeable stream surveys (McDonald, Starkey, Gregory, & Riley, 2018), and included channel cross-sections and longitudinal profiles of the streams in two representative locations (Figure 5) in Stewart Creek to demonstrate channel/floodplain dynamics and identify restoration needs.

RESULTS AND RECOMMENDATIONS

4.1 CONNECTIVITY RESULTS AND RECOMMENDATIONS

Six aquatic organism passage barriers were identified within the Area of Interest. These barriers included three perched and/or undersized culverts outside of the Magney-Snively Natural Area, one perched and undersized culvert within the Magney-Snively Natural Area, one active private dam on a Sargent Creek tributary and one abandoned private dam on Stewart Creek. Locations of these barriers are shown in Figure 6 and images of each are shown in Figure 7. These structures are creating significant barriers to fish passage, fragmenting aquatic habitat, altering natural sediment transport, and impairing the overall ecological function of Sargent Creek and Stewart Creek. Addressing these structures through replacement or removal is a high priority for restoring full connectivity, improving habitat quality, and increasing resilience for Brook Trout and other native aquatic species within Magney Snively Natural Area.

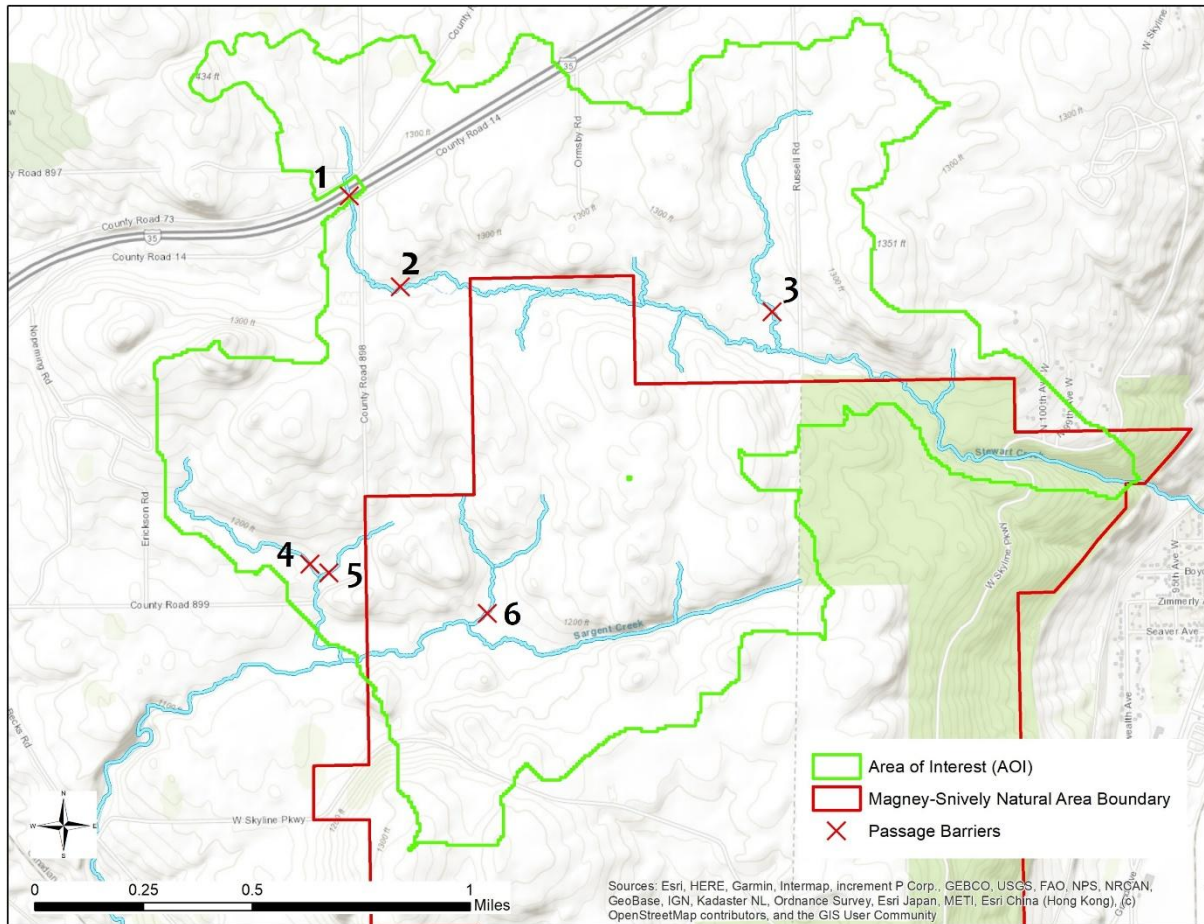


Figure 6: Map of connectivity barriers within the AOI.



Figure 7: Images of the six passage barriers within the AOI.

Culvert Recommendations

Removal or replacement of the identified undersized and/or perched culverts is recommended to improve aquatic organism passage. Crossing replacement engineering plans should follow MNDNR-accepted geomorphic design strategies such as *MESBOAC* (Leete, 2014), which stands for:

Match culvert width to bankfull stream width.
Extend culvert length through the side slope toe of the road.
Set culvert slope the same as stream slope.
Bury the culvert.
Offset multiple culverts.
Align the culvert with the stream channel.
Consider headcuts and cutoffs.

Private Dam Restoration Alternatives and Recommendations

1. Stewart Creek Abandoned Dam

The condition of the private dam at this site indicates that it has been abandoned for quite some time. See Section 4.5 for recommendations regarding this dam.

2. Sargent Creek Tributary Dam

Alternative #1 – Highest Priority: Full dam removal. Unlike the Stewart Creek dam, this dam on an unnamed tributary to Sargent Creek is an active and maintained dam. Full removal is a less likely alternative because the landowner would need to be convinced to remove a structure that they spent considerable funds to build.

There are a few alternatives to consider if the landowner cannot be convinced to fully remove their dam. These alternatives only partially address the impairments caused by the dam, but may still be worth pursuing if feasible and cost-effective.

Alternative #2 – Medium Priority: Bottom-withdrawal structure. In order to mitigate the effects of warm surface water discharging to the stream, a bottom withdrawal water control structure could be installed. The structure would have a pipe extending from the deepest and coldest part of the pond and would convey water to a stop log-type structure (Figure 8). The goal would be to take flow from the cold water in the bottom of the pond and discharge to the stream in the same location as the current surface outlet. The structure could also be used to drain the impoundment periodically if needed due to removable stop logs that are part of the operation of the structure.

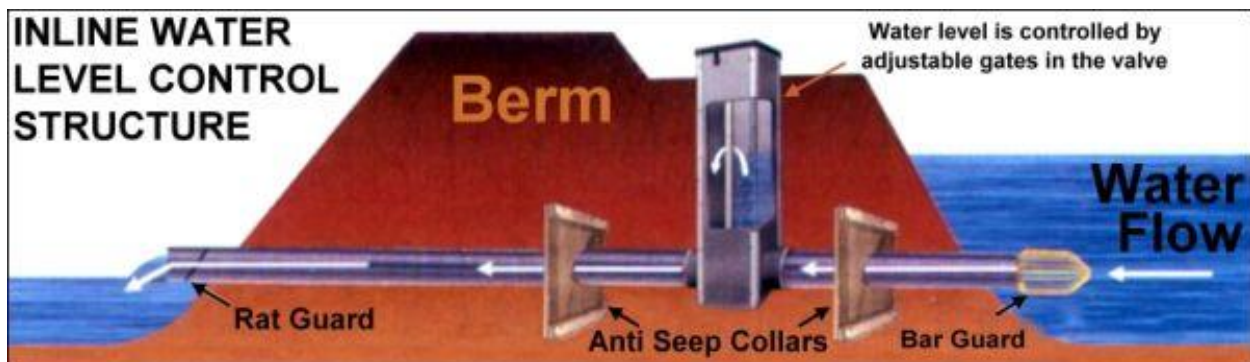


Figure 8: Conceptual image of a bottom withdrawal structure (Keppler, 2011).

Alternative #3 – Lowest Priority: Installation of a rock arch rapids or similar structure (Figure 9). This style of restoration approach maintains the impoundment and installs a long set of rapids below the dam. This allows fish to move upstream by reducing water speeds. However, the importance of restoring fish passage at this location is lessened because there is minimal habitat upstream of this dam due to its location in the headwaters of this tributary. Additionally, the rock arch rapids alternative does nothing to address the impoundment’s warming impact, causing this to be the lowest priority restoration alternative for the dam.



Figure 9: A rock arch rapids on the Willow River in Pine County, MN. Photo courtesy of the MN DNR.

4.2 WATER QUALITY RESULTS AND RECOMMENDATIONS

Results from the longitudinal water temperature monitoring are shown in Figure 10, Figure 12 and Figure 13. Figure 10 shows stream reaches ideal for Brook Trout, with suitable temperatures highlighted in green and stressful zones in orange. Observed groundwater seeps were mapped as blue stars.

Sargent Creek

Stream temperatures in Sargent Creek were consistent and relatively cold. In almost all locations temperatures were within the “growth” range (7.8-20.0° C) for Brook Trout (Figure 10), even on a day when ambient air temperatures were between 25° and 30° Celsius. While no significant springs were observed flowing into Sargent Creek within the AOI, we can assume that the generally low temperatures in Sargent Creek are influenced by consistent groundwater inputs along its length. One significant

groundwater spring was identified, though it flows into Sargent Creek outside of the AOI and downstream of Becks Rd. The temperature of this spring was recorded to be 16° Celsius. This spring is discussed further in Section 4.4 – Hydrology Results. The only location where the water temperature was recorded to be in the Brook Trout stress range (20.0-25.0° C) was in an abandoned beaver impoundment at the downstream-most site. This area is wide and shallow and thus water temperatures are more susceptible to atmospheric warming.

Recommendations for maintaining cold water temperatures in Sargent Creek within Magney Snively are limited due to the intact watershed and riparian corridor within the Natural Area. One option would be to actively manage the watershed's forest to encourage the growth of more native conifers like White Cedar and White Pine. These tree species are not as common as they were in pre-European settlement times because heavy browse pressure from White-tailed Deer prevents natural reproduction in most locations. These deer used to be rare in northern Minnesota (MN DNR, 2025) but are now present in large numbers within Duluth. More conifers would increase the shading of the forest floor in late winter and early spring, slowing down snowmelt rates and causing more infiltration. This in turn would lead to a greater contribution of groundwater to the stream in the summer months and would increase the likelihood that stream temperatures stay cold in the face of climate change. Care must be taken to ensure that conifer plantings are consistent with the native plant communities in each location.

An additional recommendation for reducing stream temperatures in Sargent Creek is to implement Restoration Alternative #1 or #2 for the private dam and impoundment on the tributary to Sargent Creek (previously discussed in Section 4.1). This impoundment is likely having a warming impact on stream temperatures, but unfortunately upstream access could not be obtained due to private land therefore temperature monitoring could not be completed on this tributary.

Stewart Creek

Stream temperatures in Stewart Creek were warmer and generally much more variable compared to Sargent Creek. The stream temperature was within the stressful range for Brook Trout for substantial stretches, including upstream of the Magney Snively Natural Area boundary near Lindahl Road, upstream of the Russell Road tributary, and upstream of Skyline Parkway (Figure 10). However, suitable water temperatures were recorded in many locations as well - most notably in two reaches of stream within the Magney Snively Natural Area. In the first, water temperatures abruptly dropped over 3.0 degrees Celsius between monitoring stations, and stayed relatively cold for more than 1500 feet downstream before warming back up into the Brook Trout stress range. This precipitous drop in stream temperatures can be directly attributed to a groundwater spring with significant discharge that was observed flowing into Stewart Creek at this location (see Section 4.4 for more details regarding discharge of this spring). The temperature of this spring was recorded at an extremely cold temperature of 7.8° C (46° F), indicating a deep groundwater source. The other reach of Stewart Creek that contained suitable water temperatures for Brook Trout was in the bedrock gorge downstream of Skyline Parkway. This reach probably does not have much for groundwater inputs, but the gorge is deep and well-shaded, which helps to keep stream temperatures low. Ambient temperatures during the Stewart Creek temperature monitoring outing ranged between 26.5° and 29.3° Celsius.

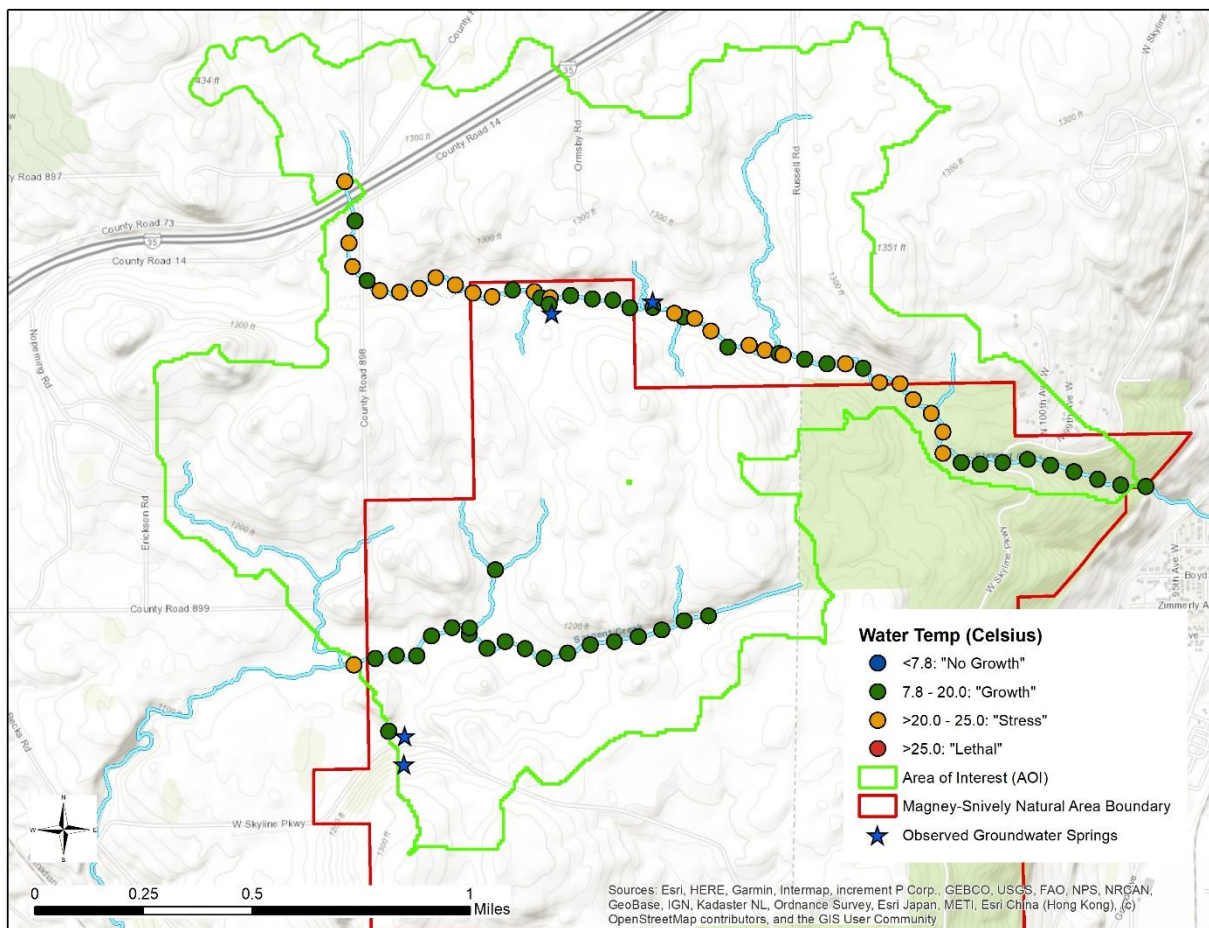


Figure 10: Map of temperature monitoring results.

Similar to Sargent Creek, recommendations for reducing water temperatures in Stewart Creek are somewhat limited due to the intact character of the watershed and its forest. The conifer planting strategy described above could also be pursued within the Stewart Creek watershed. This strategy could be especially impactful within and around the drainage area of the groundwater spring discussed above, as long as the conifer species chosen are consistent with the native plant communities present within that area. Plant ecologists should be consulted prior to any large-scale tree planting activity within the Magney Snively Natural Area.

Stewart Creek – Honorable Mention

An additional recommendation to improve water quality and aesthetics in Stewart Creek is to remove the portable toilet that has been placed in Stewart Creek just downstream of Lindahl Rd (Figure 11).



Figure 11: Photo of a portable toilet that is in Stewart Creek just downstream of Lindahl Rd.

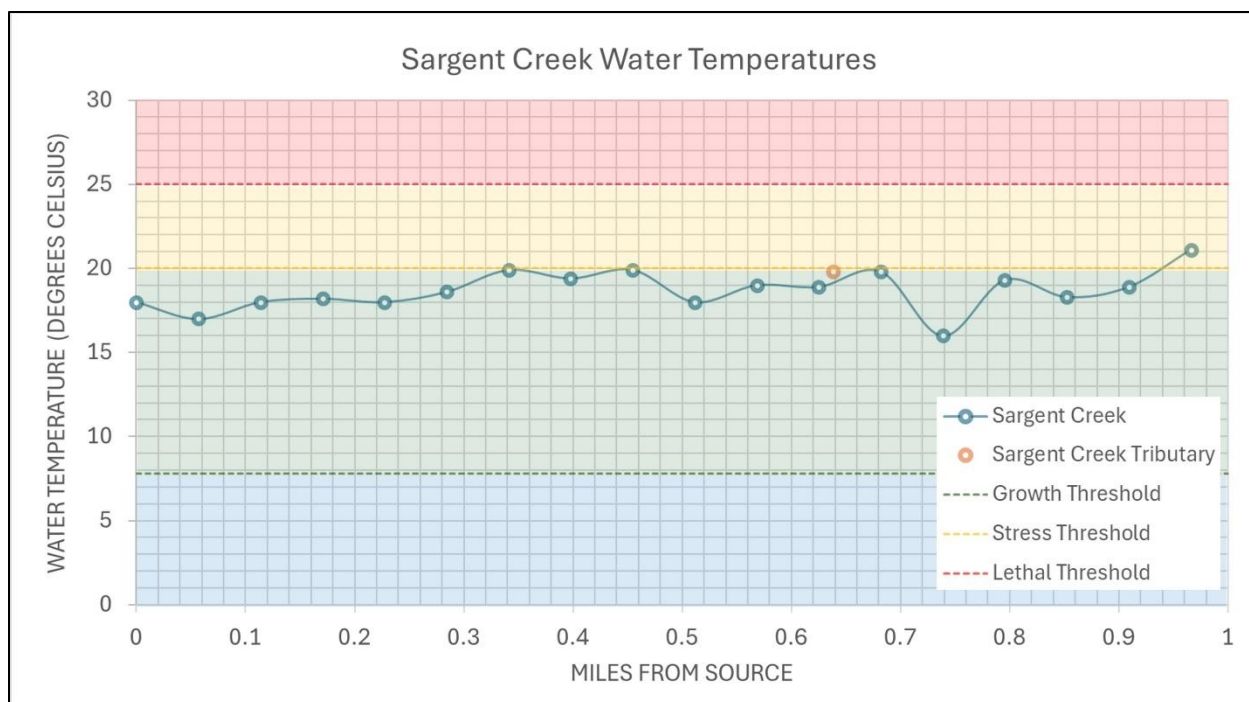


Figure 12: Graph of longitudinal stream temperatures in Sargent Creek within the AOI.

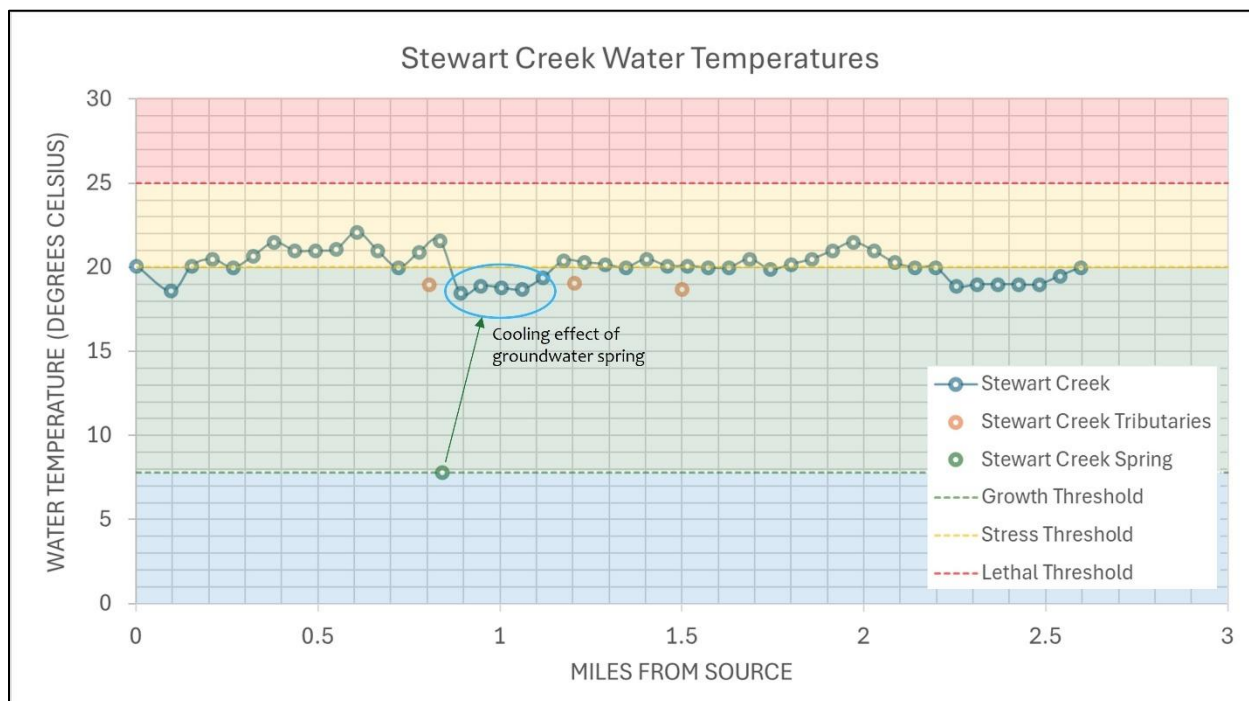


Figure 13: Graph of longitudinal stream temperatures in Stewart Creek within the AOI.

4.3 BIOLOGY RESULTS AND RECOMMENDATIONS

On October 7 and 11, 2024, Brook Trout redd surveys were conducted on Stewart Creek and Sargent Creek mainstem reaches within the AOI. There was unfortunately limited visibility in portions of Stewart Creek due to heavy leaf cover during the survey (Figure 14). Despite this, multiple spawning sites were identified, indicating successful reproduction in both streams. The observed locations of the redds are shown in the attached map as pink dots (Figure 15). In general, not all areas are suitable for Brook Trout to spawn. For Brook Trout to successfully spawn they need to make their nests in clean, well-oxygenated gravel beds in reaches of stream that are reasonably protected from destructive floods (i.e. gentle gradients with well-connected floodplains). As expected, observed redds were clustered in only a few distinct stream reaches that met these conditions.



Figure 14: Photo of leaf cover on portions of Stewart Creek during the redd survey.

In Sargent Creek within the AOI redds were observed in only one reach just upstream of the Natural Area boundary. This reach has a gravel bed, a riffle-pool bed morphology and is located in an area where the valley narrows, perhaps causing groundwater to upwell and providing a consistent source of oxygenated water to incubating eggs. In Stewart Creek redds were observed in gravel-dominated

reaches upstream of the Russel Road tributary and upstream of Skyline Parkway, although (as already mentioned) redds may have been obscured by leaf cover.

Given the intact nature of these watersheds, recommendations to protect Brook Trout spawning habitat within the Magney Snively Natural Area are focused on 1) reducing fine sediments, which smother nests and reduce the amount of oxygen that eggs receive, and 2) increasing baseflow discharge in these streams. There are not a great deal of opportunities to reduce fine sediment pollution in these systems because they are so intact. However, there is one reach of Stewart Creek just downstream of the private dam (described above) that is severely incised, eroding, and disproportionately contributing sediment to the stream. Restoring this reach and reconnecting its floodplain would decrease fine sediment pollution in Stewart Creek. This opportunity is described further in Sections 4.1 and 4.5. The recommendation to increase baseflow discharge would require planting conifers and is described in Section 4.2.

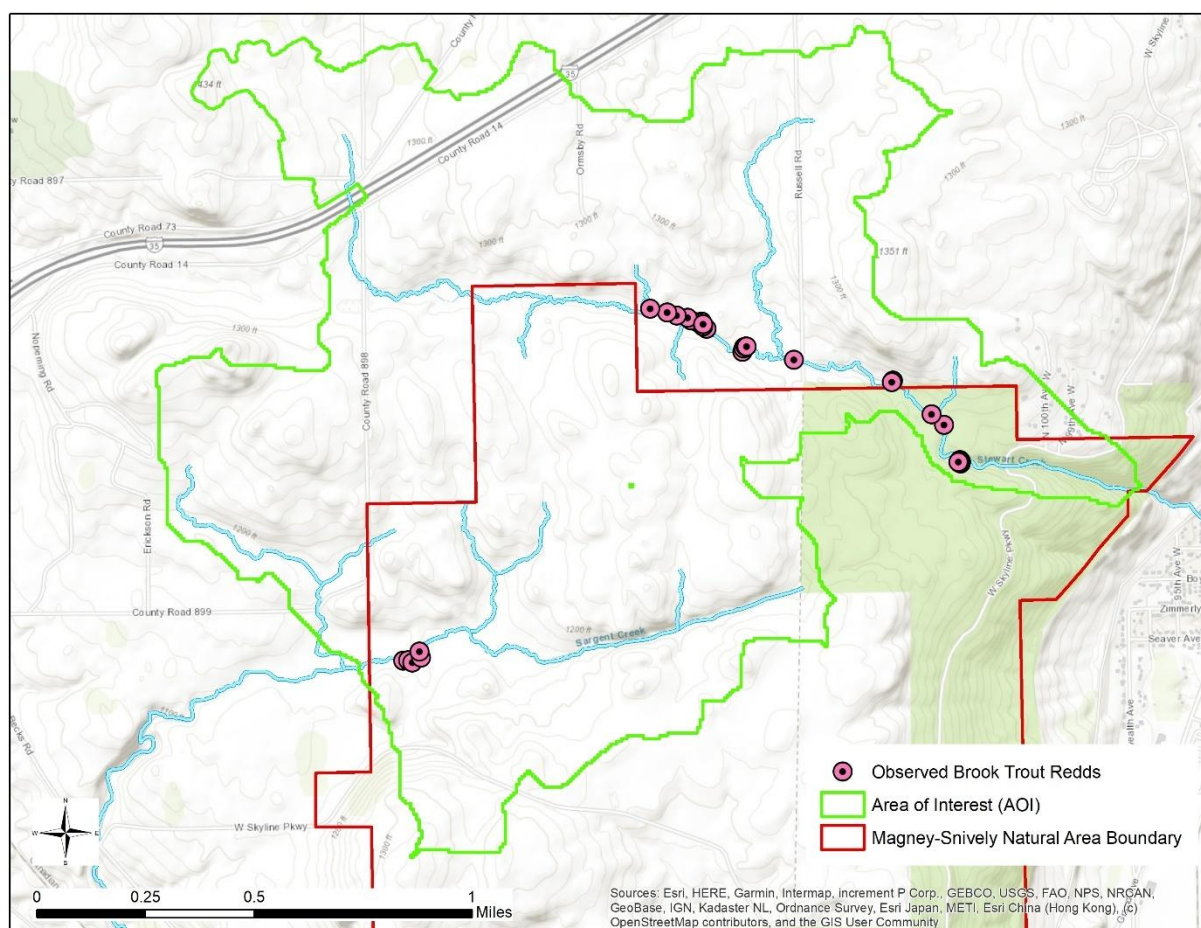


Figure 15: Map of observed Brook Trout redd locations within the AOI.

4.4 HYDROLOGY RESULTS AND RECOMMENDATIONS

The attached map (Figure 16) shows the flow rate recorded at each station in gallons/minute (GPM) as well as the proportionate contribution of each station's sub-watershed in gallons/minute/acre. Flow measurements indicate that baseflow in both Stewart Creek and Sargent Creek are primarily driven by a few localized springs. These springs represent significant contributions to downstream flows and are critical to sustaining coldwater habitat.

For Sargent Creek, the identified spring contributes 12 gallons/minute (0.29 gal/min/acre), compared to an overall flow rate of 23 gallons/minute (0.033 gal/min/acre) where Sargent Creek exits the AOI, although it should be noted that this spring does not flow into Sargent Creek within the AOI but rather downstream of the Munger Trail.

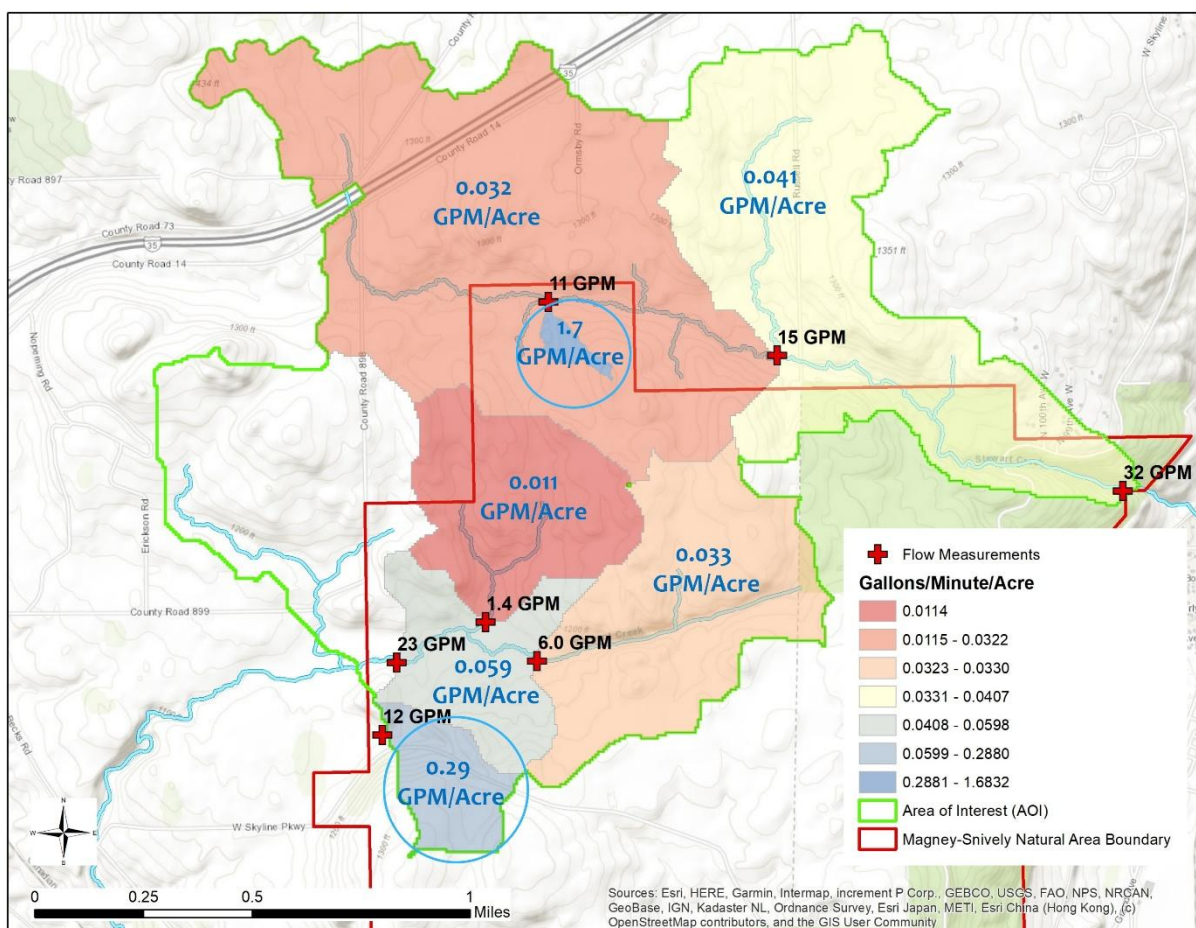
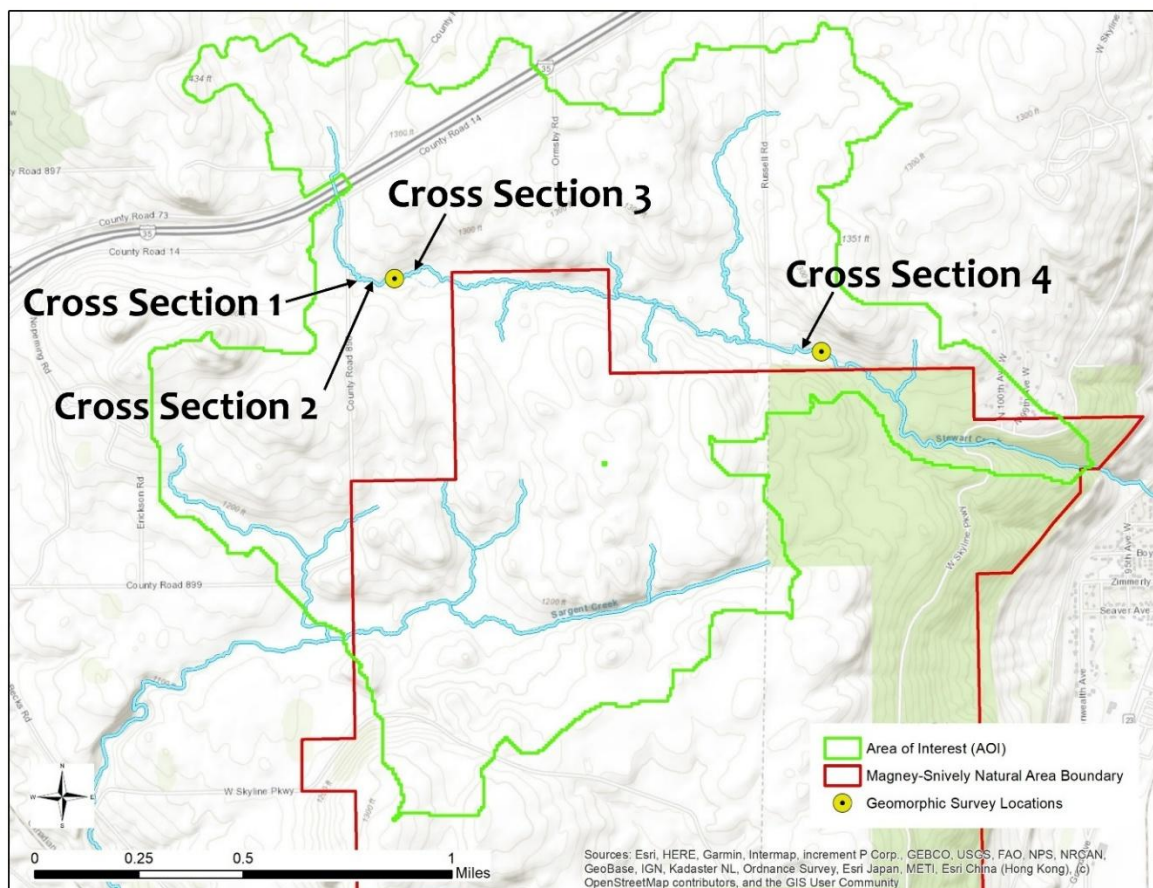


Figure 16: Map of flow measurement results, showing relative contributions from each drainage area.

In Stewart Creek, the identified spring contributes 11 gallons/minute (1.7 gal/min/acre), compared to an overall flow rate of 32 gallons/minute (0.026 gal/min/acre) where Stewart Creek exits the AOI. This one

groundwater source, with a surficial drainage area of 6.6 acres, represents 34% of the total baseflow in Stewart Creek within the Magney-Snively Natural Area.

4.5 GEOMORPHOLOGY RESULTS AND RECOMMENDATIONS



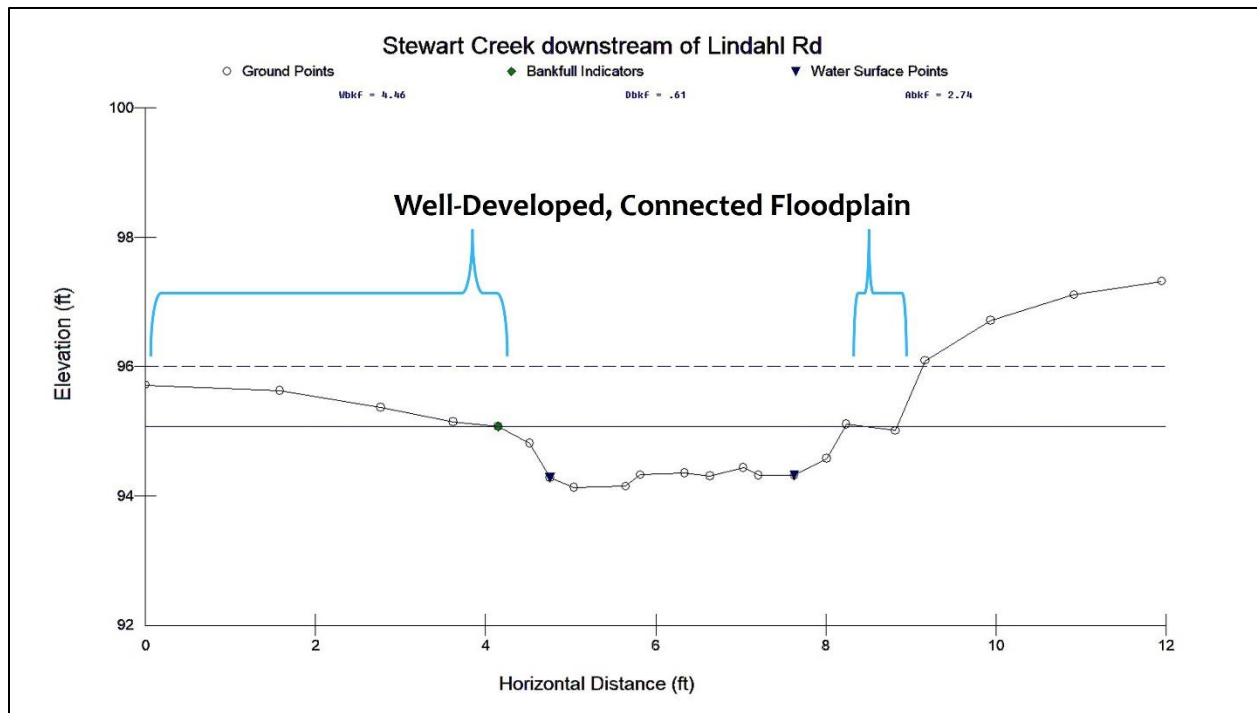


Figure 18: Cross-Section 1, showing stable Stewart Creek condition upstream of the dam influence.



Figure 19: Photo showing stable condition of Stewart Creek at site of Cross-Section 1.

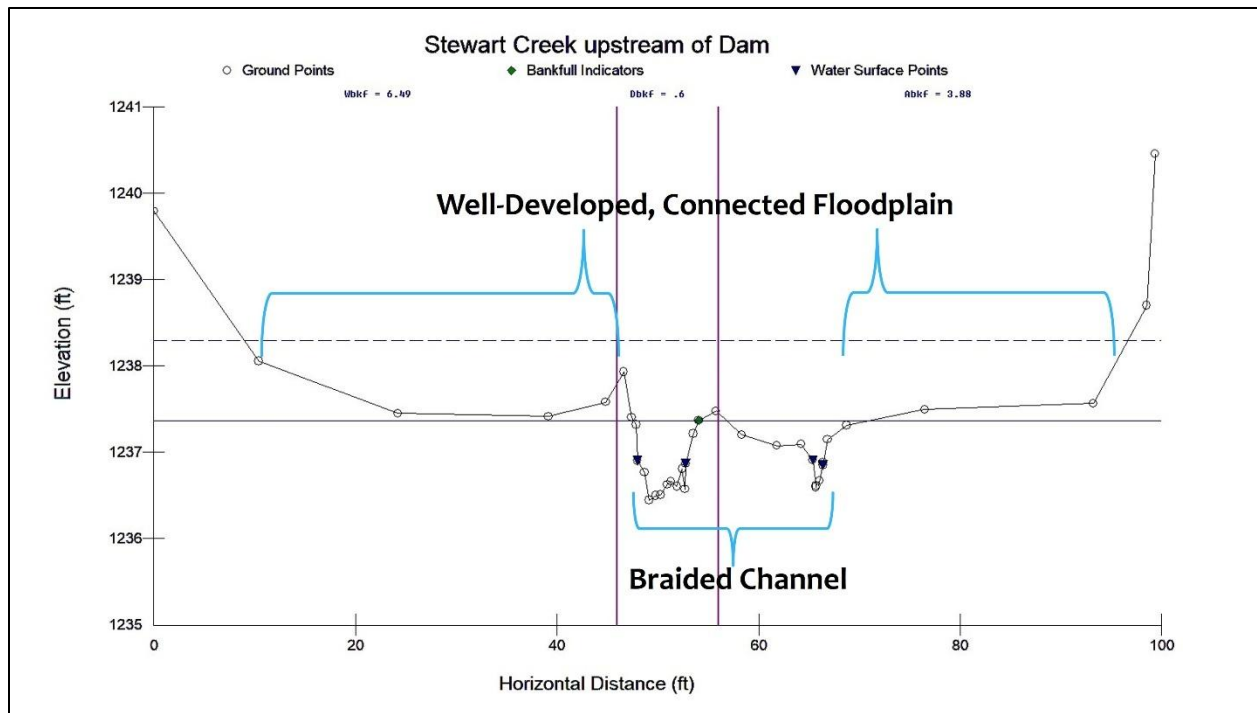


Figure 20: Cross-Section 2, showing braided channel within the old Stewart Creek impoundment.



Figure 21: Photo showing aggraded condition of Stewart Creek at site of Cross-Section 2.

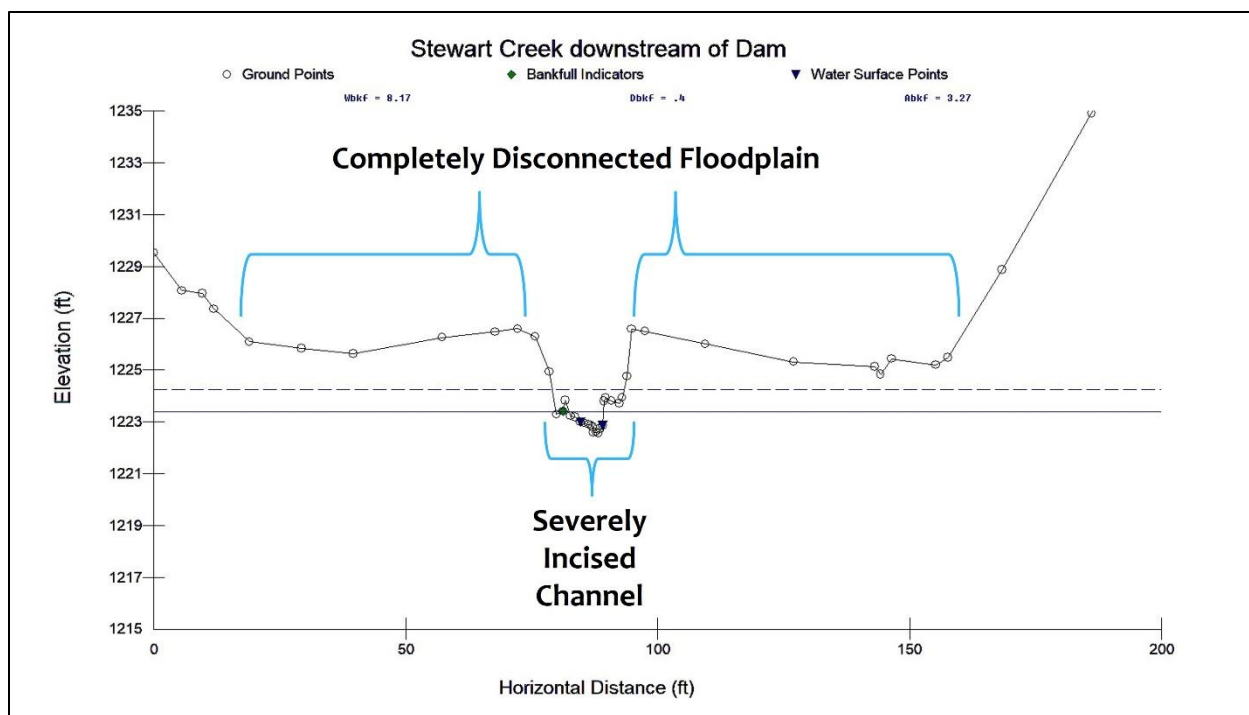


Figure 22: Cross-Section 3, showing severely incised Stewart Creek channel downstream of the dam.



Figure 23: Photo showing erosion and poor condition of Stewart Creek at site of Cross-Section 3.

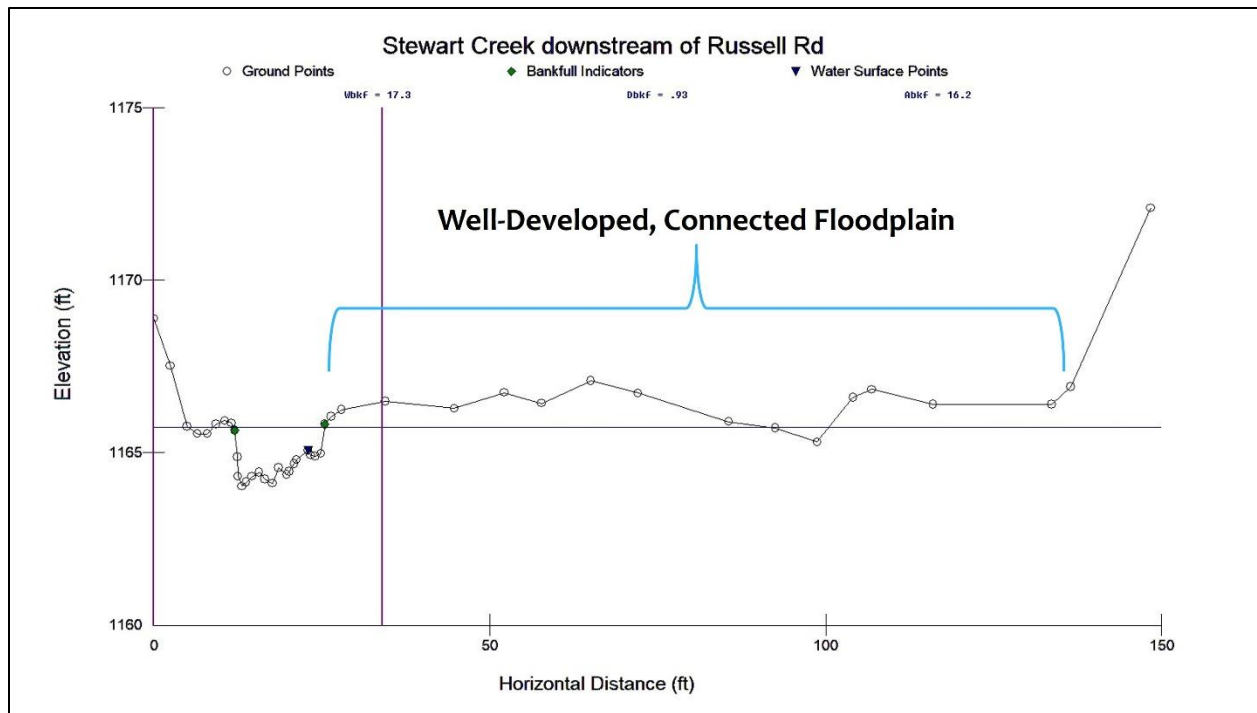


Figure 24: Cross-Section 4, showing representative, stable Stewart Creek channel.



Figure 25: Photo showing stable representative condition of Stewart Creek at site of Cross-Section 4

Software analysis of these two reaches show the degree to which the dam has caused Stewart Creek to depart from a stable condition. Upstream of the former impoundment and the influence of the dam, the stream channel at the location of Cross-Section #1 is stable: stream banks are not eroding, there is quality habitat, and the stream has good connection to a well-vegetated floodplain (Figure 18 and Figure 19). Moving downstream to the location of Cross-Section #2, the impoundment has captured the stream's sediment since the dam was built and has completely filled in with sand and fine sediment, leaving a shallow and braided stream channel where habitat quality is poor (Figure 20 and Figure 21).

Downstream of the dam at the location of Cross-Section #3, Stewart Creek has become severely incised and disconnected from its floodplain due to the sediment starvation caused by the impoundment. The outcome of this incision is that large floods are completely contained within the channel, resulting in severe bank erosion and habitat degradation (Figure 22 and Figure 23). The degree to which the channel is incised lessens in the downstream direction until eventually Stewart Creek again becomes connected to its floodplain and resumes a stable form. This is the more representative condition of Stewart Creek and is shown in Figure 24 and Figure 25.

Longitudinal profiles of these two reaches of Stewart Creek are shown in Appendix B.

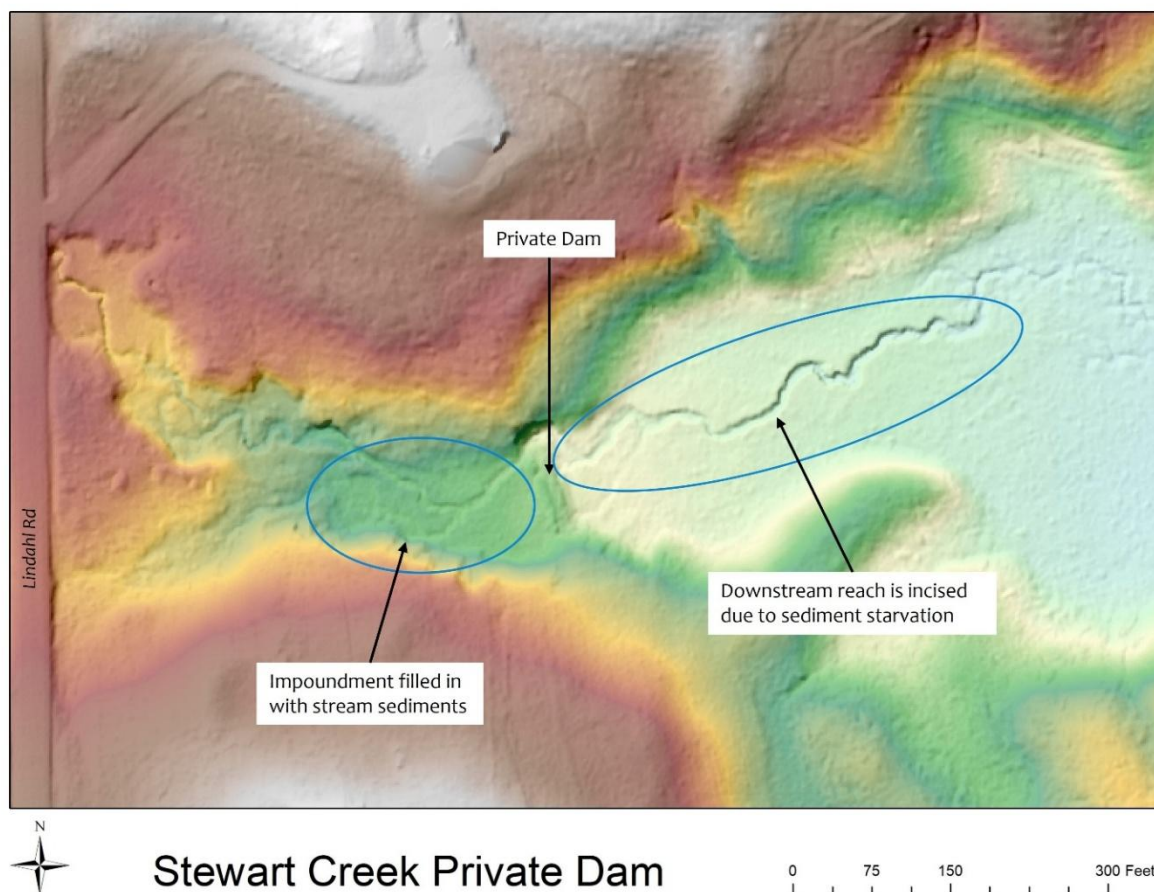


Figure 26: Map of the private dam on Stewart Creek, just downstream of Lindahl Road.

Complete removal of this dam and restoration of the stream channel is the only viable alternative at this location. This option would fully restore natural stream processes, eliminate the fish passage barrier, and allow for unimpeded sediment and nutrient transport. Full removal would also help reestablish floodplain connection and enhance long-term channel stability. In concept, restoration of this reach would involve removing the dam prism entirely, and using natural channel design techniques to utilize the prism material and impounded sediment as a resource to raise and reshape the incised downstream channel. Long-term stability would rely on the reestablishment of native riparian vegetation on the floodplain.

CONCLUSION

Despite the relatively intact nature of Stewart Creek and Sargent Creek within the Magney-Snively Natural Area, several key stressors have been documented. These include barriers to aquatic organism passage, thermal stress due to impoundments and reduced baseflows, fine sediment impacts to spawning habitat, and severe channel incision in localized areas. The presence of naturally-reproducing Brook Trout, high-quality groundwater inputs, and well-connected floodplain segments highlights the ecological potential of this system and underscores the importance of active stewardship.

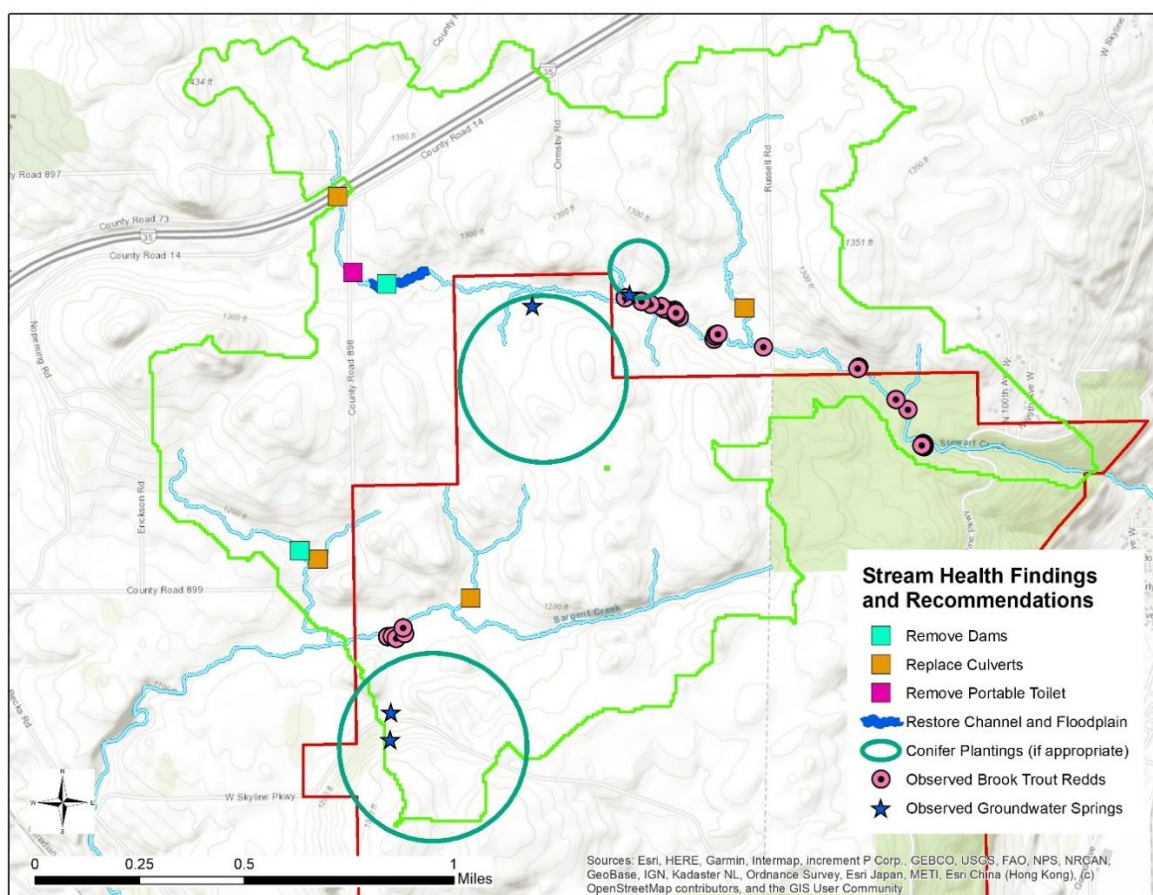


Figure 27: Map summarizing the findings and recommendations contained in this report.

The findings and recommendations in this report (summarized in Figure 27) are intended to inform both near-term project planning and long-term management strategies for the Magney-Snively Natural Area.

Restoration concept plans, such as culvert replacements using MESBOAC methods or dam removal with sediment reuse to restore channel elevation and floodplain connection, offer a blueprint for specific interventions that would yield measurable ecological benefits. Similarly, opportunities to enhance baseflow and thermal resilience through native conifer plantings or land protection in critical recharge areas can serve as relatively low-cost climate adaptation strategies.

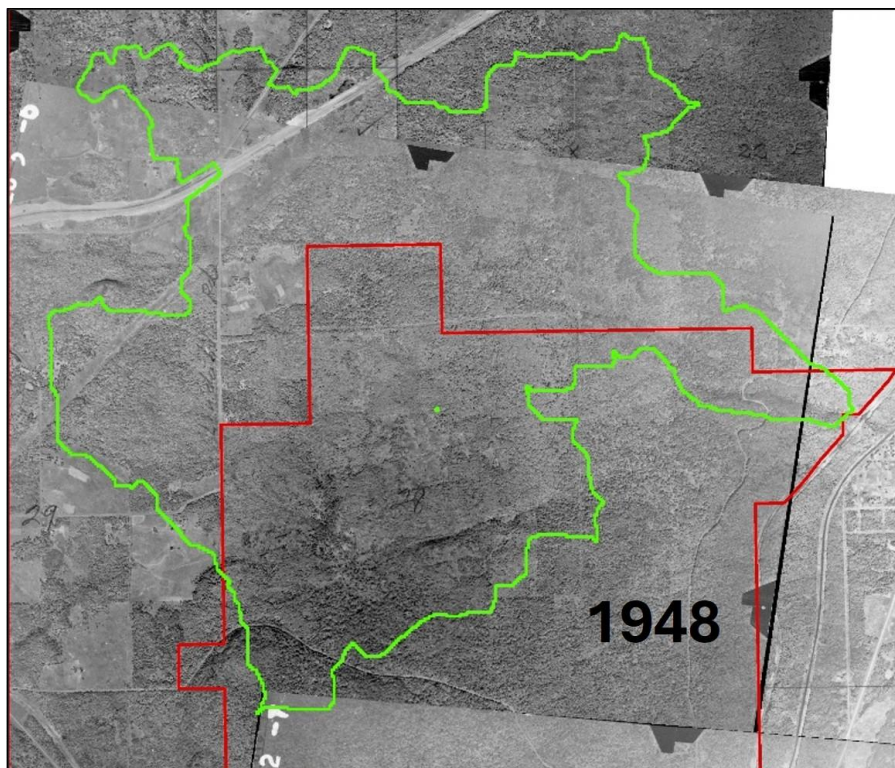
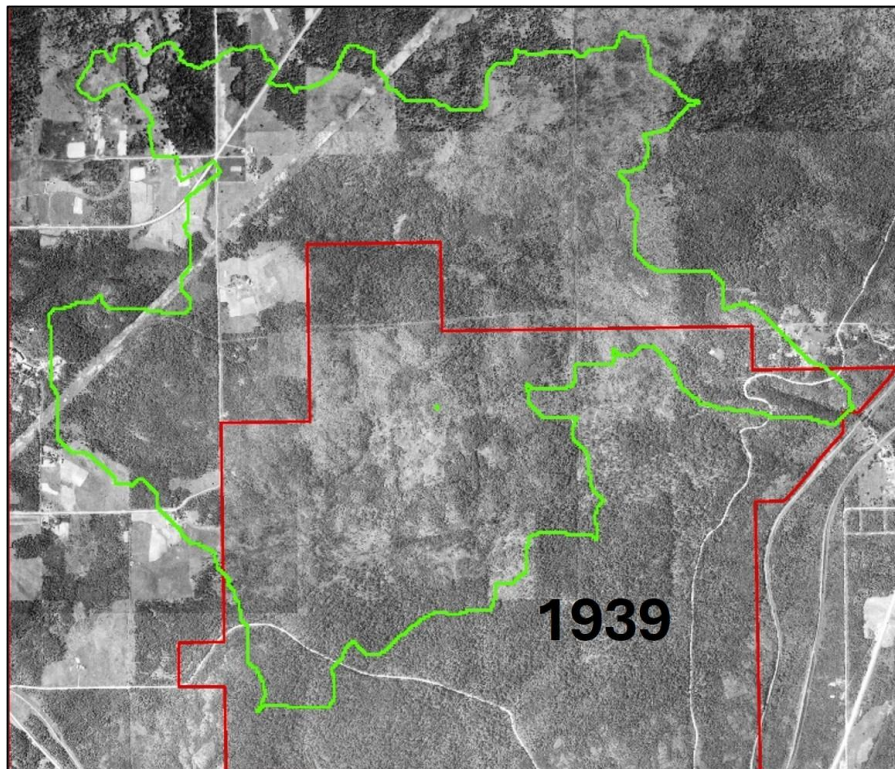
Moving forward, continued coordination among the City of Duluth, Minnesota Land Trust, MN DNR, South St. Louis SWCD, private landowners, and other conservation partners will be essential. Implementing the restoration and protection priorities identified in this assessment will help ensure that Stewart and Sargent Creeks remain healthy, functioning coldwater systems that support Brook Trout and enrich the broader ecological integrity of the Magney-Snively landscape.

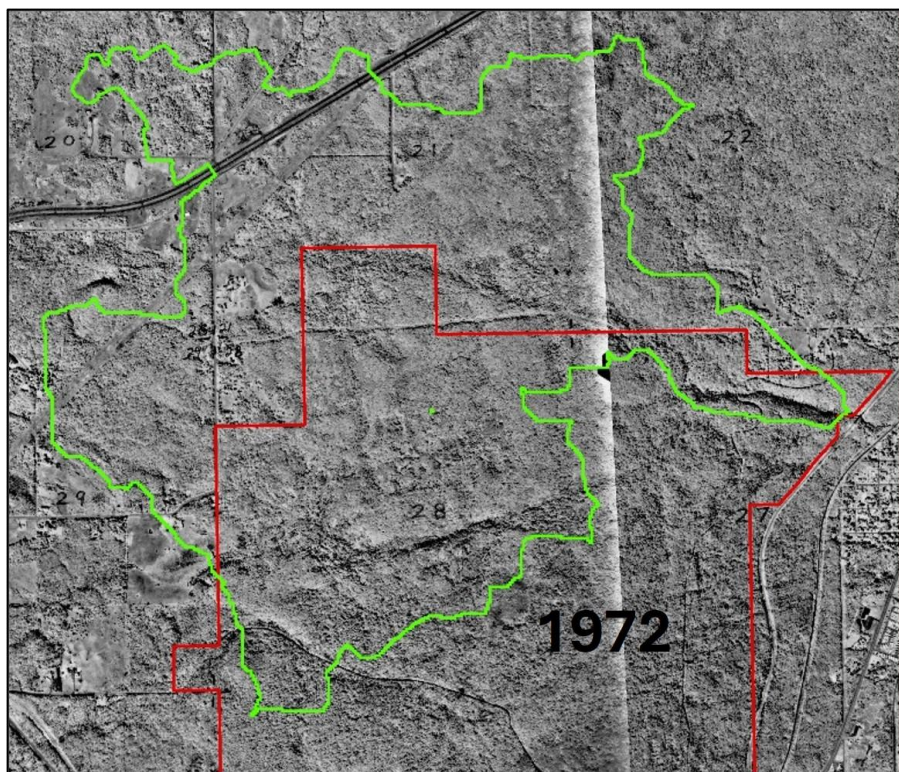
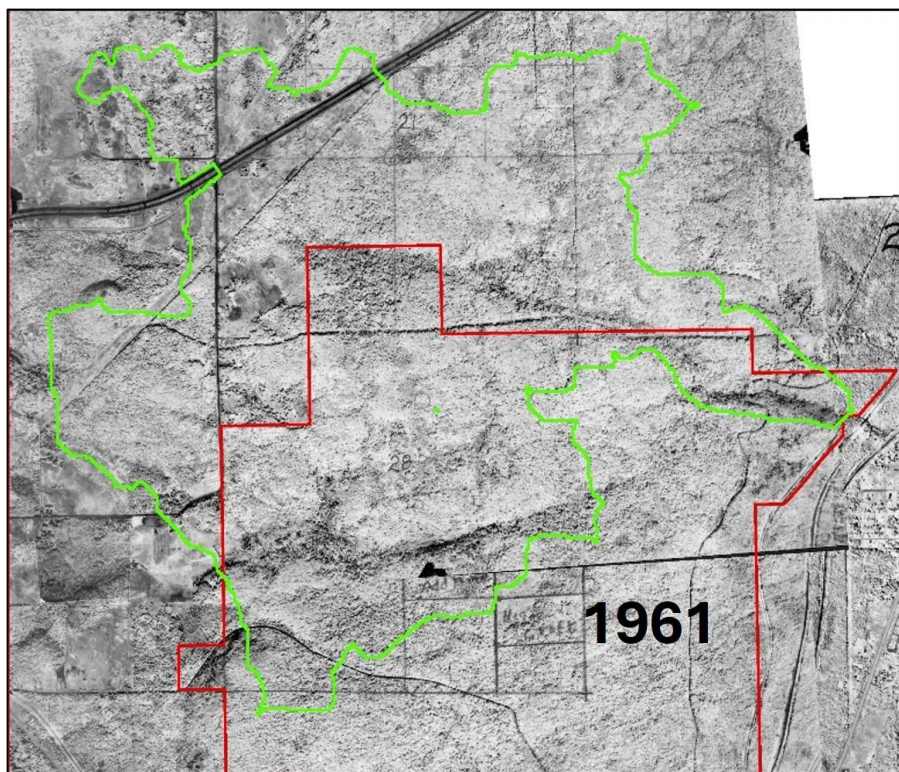
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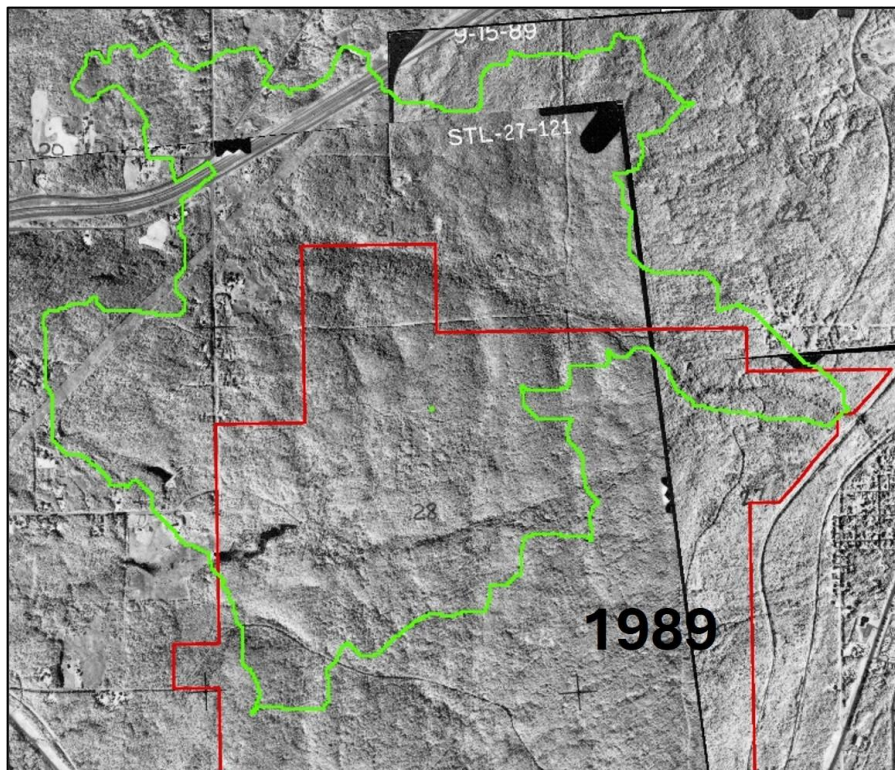
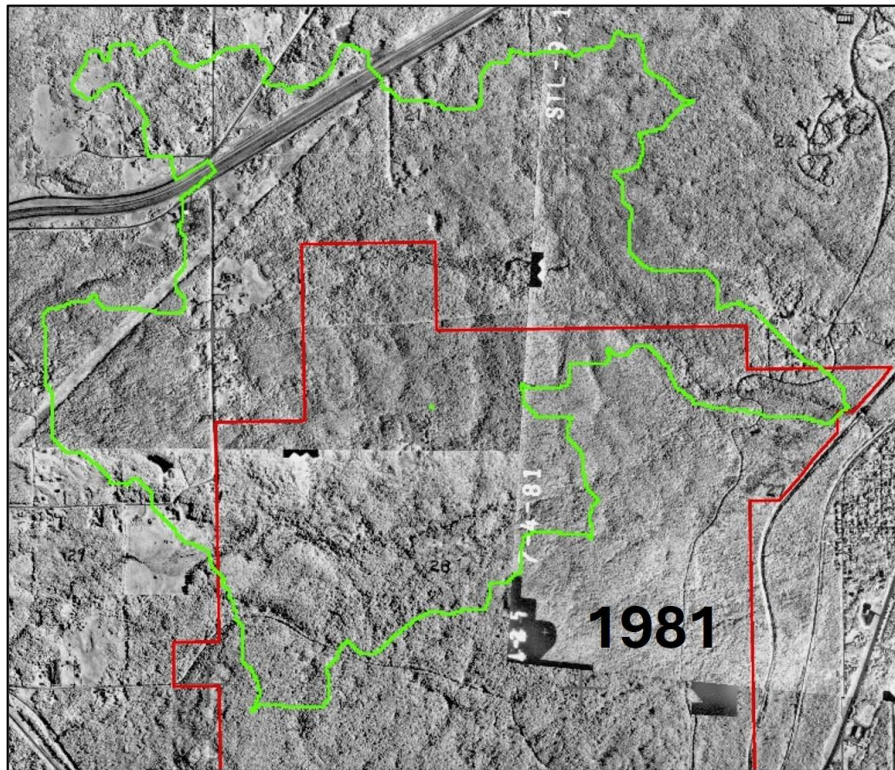
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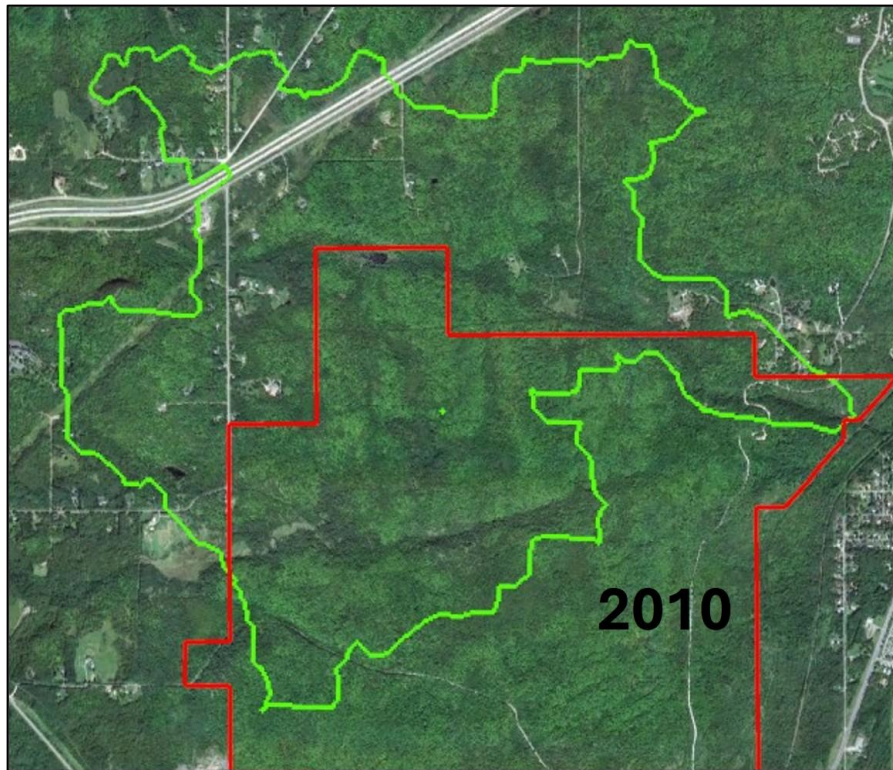
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APPENDIX A: GEOREFERENCED HISTORIC PHOTOS OF THE MAGNEY-SNIVELY NATURAL AREA

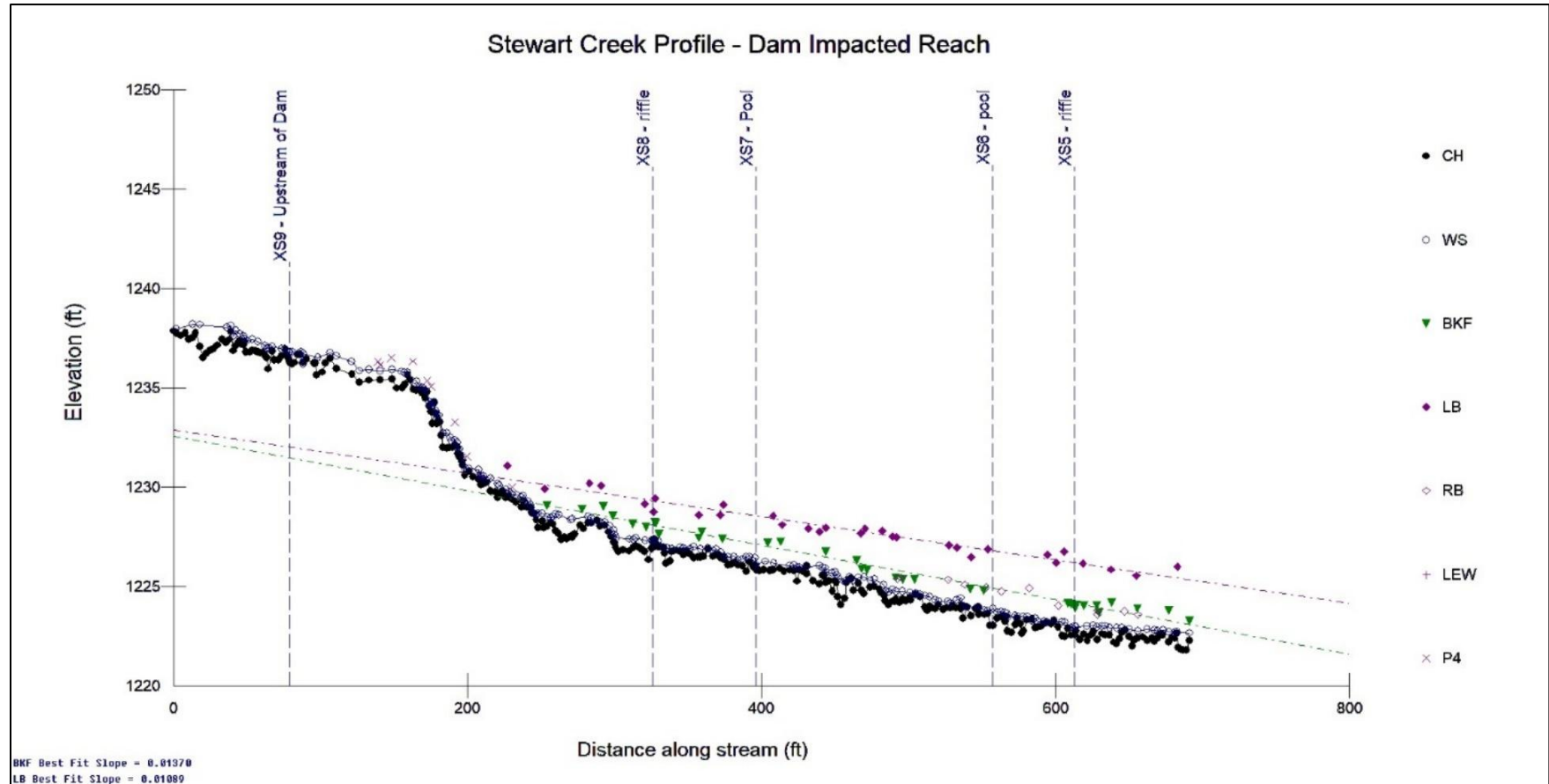


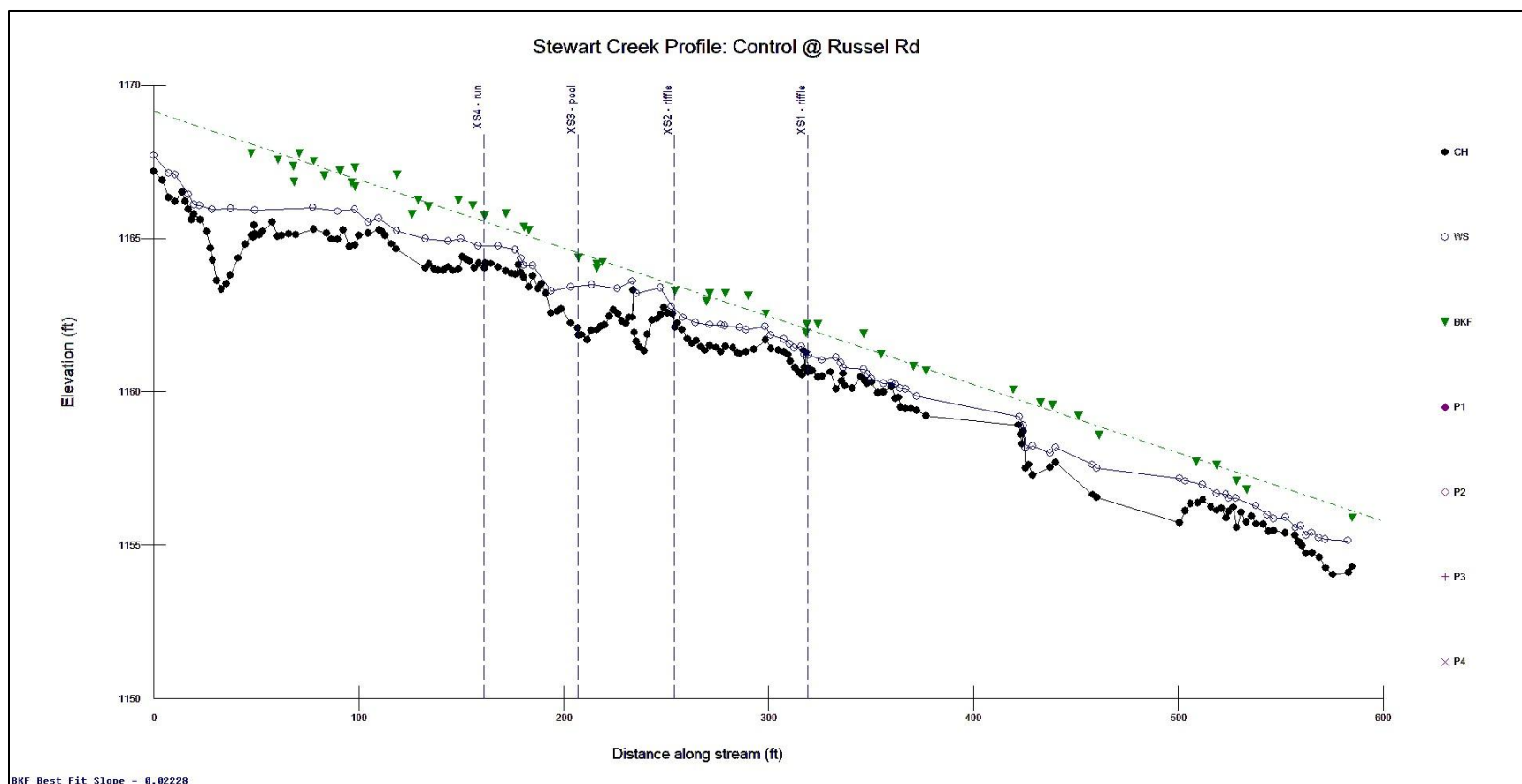






APPENDIX B: SURVEYED LONGITUDINAL PROFILES OF STEWART CREEK





**Appendix D: Magney–Snively Natural Area: Management and Avian Monitoring
Report, 2024–2025**

Technical Report

Magney–Snively Natural Area: Management and Avian Monitoring Report, 2024–2025

Submitted by:

Alexis Grinde and Reid Siebers

Date:

January 16th, 2026

Report Number:

NRRI/TR-2026/43

Funding:

Minnesota Land Trust

Technical Report Information

Recommended Citation

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Keywords

Forest interior birds, Mesic hardwood forest, Habitat connectivity and fragmentation, Migratory stopover habitat, Conservation-focused forest management

Contact

Natural Resources Research Institute, University of Minnesota, Duluth
5013 Miller Trunk Highway, Duluth, MN 55811-1442

Telephone: 218.788.2694; **Email:** nrri-reports@umn.edu; **Website:** <http://www.nrri.umn.edu>

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Introduction

Magney–Snively Natural Area represents one of the most intact examples of mesic hardwood forest remaining along the Lake Superior basin, providing structurally complex habitat that is increasingly rare in the surrounding landscape. Much of the forest occurs as mature to old stands with closed canopies, large trees, and well-developed understories: conditions that support forest-interior birds and other wildlife that depend on stable microclimates and extensive interior habitat. Embedded within this forest matrix are vernal pools and stream corridors that increase habitat heterogeneity and productivity. Vernal pools provide seasonal aquatic habitat for amphibians and support diverse aquatic insects that contribute to forest food webs, supplying important prey resources for breeding birds. Together, these hydrologic features enhance habitat quality for species of conservation significance, including Canada Warbler, by increasing prey availability and maintaining moist, structurally diverse forest conditions.

Despite the high quality of habitat within Magney–Snively, forest bird populations across northeastern Minnesota continue to be threatened by habitat loss and degradation in the surrounding region. While outright forest conversion has the most immediate impacts, forest fragmentation caused by development, roads, utility corridors, and resource extraction increasingly reduces habitat quality by creating edges that elevate predation, competition, and brood parasitism. In this context, Magney–Snively’s large, contiguous forest blocks are especially important for maintaining interior forest conditions that are increasingly uncommon across the broader landscape.

Migratory birds using the Lake Superior ridgeline are affected by habitat loss throughout their annual cycle, including on breeding grounds, along migration routes, and on wintering areas. Located within a major migratory corridor, Magney–Snively supports both breeding territories and critical stopover habitat where birds rest and refuel during migration. Maintaining high-quality breeding habitat at Magney–Snively can help offset habitat losses elsewhere by increasing reproductive success and improving the condition of birds entering migration. Invasive species and climate change further compound these pressures. Non-native insects and plants can alter forest composition by reducing the abundance of native tree species that support insects and provide nesting and foraging resources for birds. Many forest birds rely heavily on insect prey, particularly caterpillars, to raise young, and the loss of key native tree groups can have cascading effects on forest food webs. Climate change is already influencing forest bird habitat through shifts in tree species distributions, altered disturbance regimes, and changes in the timing of biological events. Increasing temperatures, variable precipitation, and more frequent extreme weather events heighten vulnerability to pests and disease and can disrupt the synchrony between breeding birds and peak food availability. Additional pressures, including predation by free-ranging cats, pesticide exposure, and collisions with buildings and vehicles, contribute to widespread bird declines but occur largely beyond the direct control of forest managers. In contrast, forest management at Magney–Snively offers a meaningful opportunity to mitigate many of these threats locally. By maintaining large forest interiors, protecting native biodiversity, and sustaining structurally complex forests with intact hydrologic features, Magney–Snively functions as a regional stronghold for breeding and migrating birds and represents a high-priority area for conservation-focused forest management.

Methods

To assess avian habitat use and community composition across Magney–Snively Natural Area, systematic bird surveys were conducted during the breeding season and during spring and fall migration periods in 2024 and 2025. These surveys were designed to document species presence, distribution, and relative abundance across restored and unrestored forest conditions and to identify habitat features associated with breeding and migratory stopover use.

Line transect surveys were conducted along approximately 6,800 meters of established walking trails within Magney–Snively Natural Area (**Figure 1**) to assess breeding and migratory bird use of forest habitats. Transects followed existing trail corridors to ensure consistent access and repeatability across survey periods. The dominant cover type is sugar maple-basswood, however, unique habitats such as lowland shrub and black ash were targeted for inclusion within the survey transect (**Figure 2**). Observers surveyed transect lines at a standardized pace of approximately 6 m per minute and recorded all birds detected on or adjacent to the transect. For each observation, detection type (e.g., singing, calling, or visual) and estimated distance from the transect line were recorded. Bird observations were documented using a combination of paper datasheets and the ArcGIS Collector application on iPads to capture spatial locations of detections. Surveys were conducted by trained observers beginning approximately 0.5 hours before sunrise and continuing up to 5 hours after sunrise under suitable weather conditions, including low wind ($<15 \text{ km hr}^{-1}$) and little or no precipitation. Line transect surveys were conducted during three survey periods: May surveys targeted spring migration, June surveys focused on peak breeding bird activity, and September surveys documented fall migrants. All bird species detected within 100 m of the transect line were included in analyses, with breeding season data used to assess breeding bird communities and migration surveys used to evaluate seasonal habitat use during stopover.

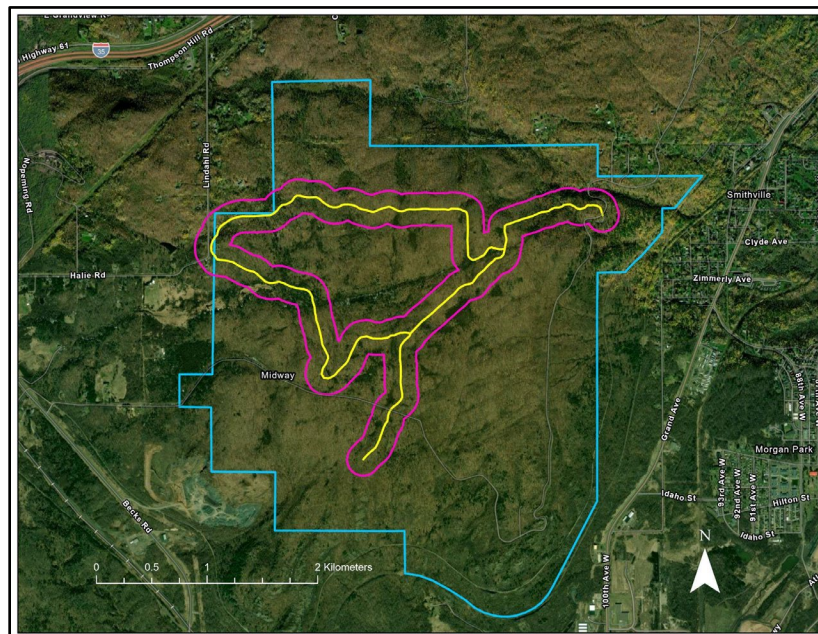


Figure 1. Line transect survey site map for the Magney–Snively Natural Area, showing the Magney–Snively boundary (blue), survey trail (yellow), and 100 m buffer (pink) used to define the survey detection area within which bird observations were analyzed.

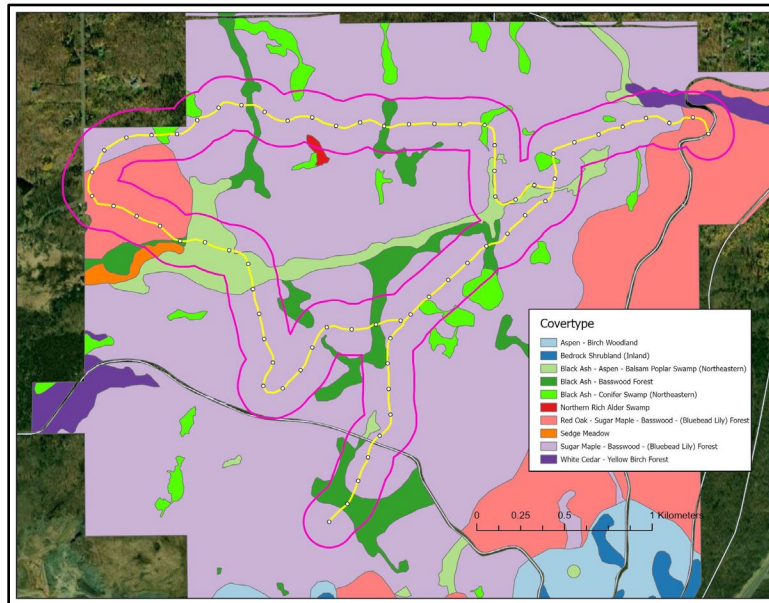


Figure 2. Native plant community of the Magney-Snively Natural Area, derived from GEI's native plant community shapefile (2024).

Results

Bird survey results from Magney–Snively Natural Area illustrate how forest structure and habitat composition influence avian community composition, relative abundance, and habitat use across spring migration, the breeding season, and fall migration. Seasonal differences in species occurrence and abundance highlight the role of the site as both breeding habitat and migratory stopover for forest birds and provide critical information for informing forest management and conservation planning. Results are presented by seasonal period and summarize data collected during spring, summer, and fall line-transect surveys conducted in 2024 and 2025 (**Appendix A**). Values reported represent mean detection rates averaged across survey years and are expressed as observations per 100 m.

Spring Migration (May)

Across all transects, detections totaled 6.77 per 100 m, representing 47 bird species detected within 100 m during spring migration surveys. This period coincided with peak movement of resident and short-distance migratory species, as well as the onset of early breeding activity. The most frequently observed species (by density per 100 m) included Ovenbird (1.07), Red-eyed Vireo (1.03), and Least Flycatcher (1.01), reflecting a mixture of migrants passing through the area and individuals establishing breeding territories. Spatial patterns of these detections are shown in Figure 3, which highlights spring bird density hotspots across the survey area, while a complete list of species observed during spring migration is provided in Appendix A.

Breeding Season (June)

Overall, 5.65 detections per 100 m, representing 40 species, were recorded within 100 m of transects during the breeding season (**Appendix A**). The most abundant breeding-season species included Least Flycatcher (0.99), Red-eyed Vireo (0.93), Ovenbird (0.85), Veery (0.40), and Black-throated Green Warbler (0.29)—each occurring at densities ≥ 0.28 individuals per 100 m. Ovenbird was among the more frequently detected species, with an average density of 0.85 individuals per 100 m. Breeding-season density patterns and areas of concentrated bird use are shown in Figure 4, depicting breeding bird density hotspots.

Fall Migration (September)

Fall migration line-transect surveys documented 1.40 detections per 100 m, representing 22 bird species within 100 m of transects. Species detections during this period reflected a combination of southbound migratory species and resident birds using the area for foraging and stopover habitat. Frequently detected species included Yellow-rumped Warbler (Myrtle) (0.28), Black-capped Chickadee (0.23), and White-throated Sparrow (0.23), many of which are known to use forested habitats along the Lake Superior region as migratory stopover sites. Fall distribution patterns and relative density hotspots are presented in Figure 5, illustrating areas of concentrated bird use during fall migration.

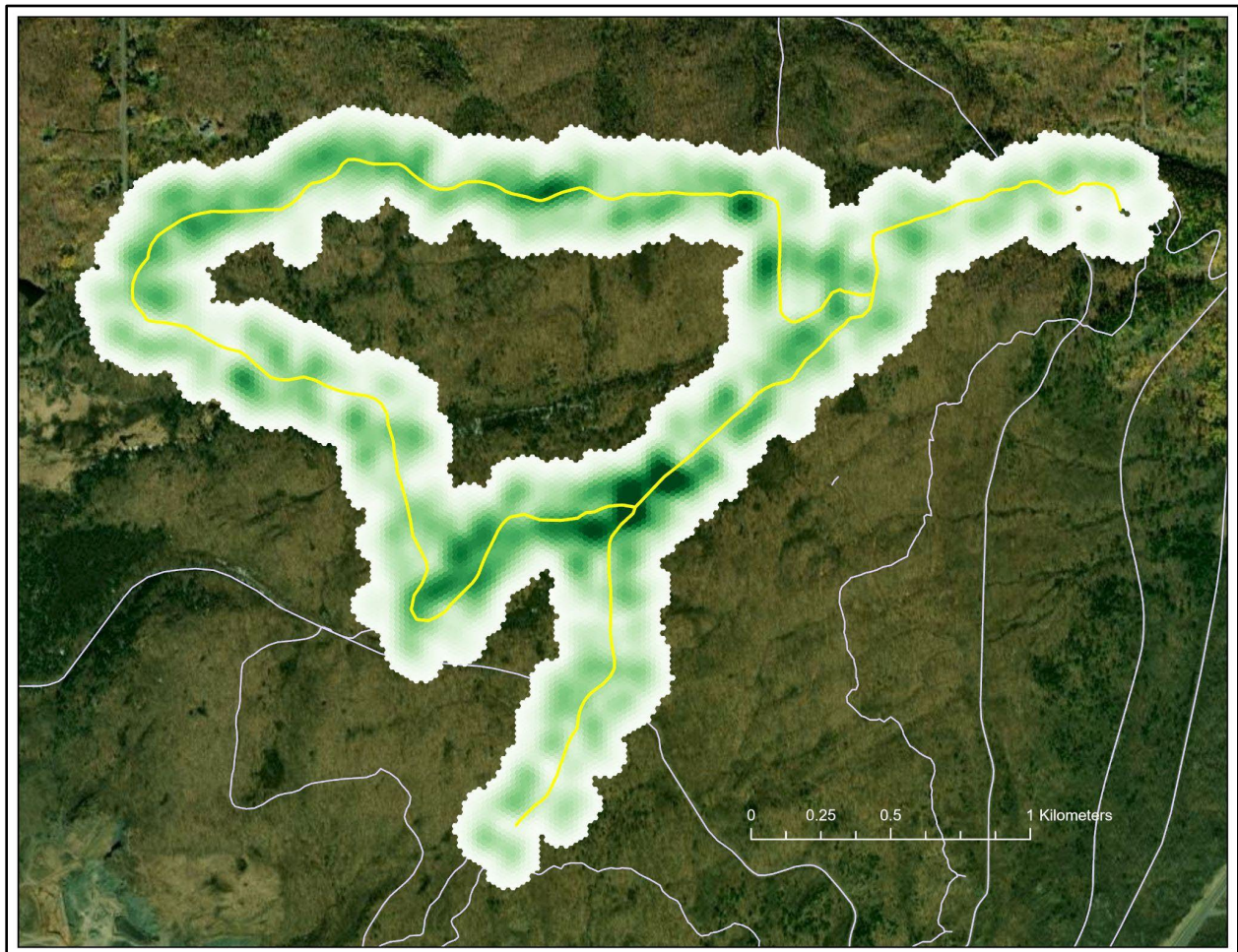


Figure 3. Spring bird density hotspots. Spatial distribution of bird detections recorded during spring migration (May), illustrating relative density hotspots across the survey area based on detections within 100 m of line transects. Hotspots reflect areas of concentrated use by a mix of migratory individuals and birds initiating breeding territories.

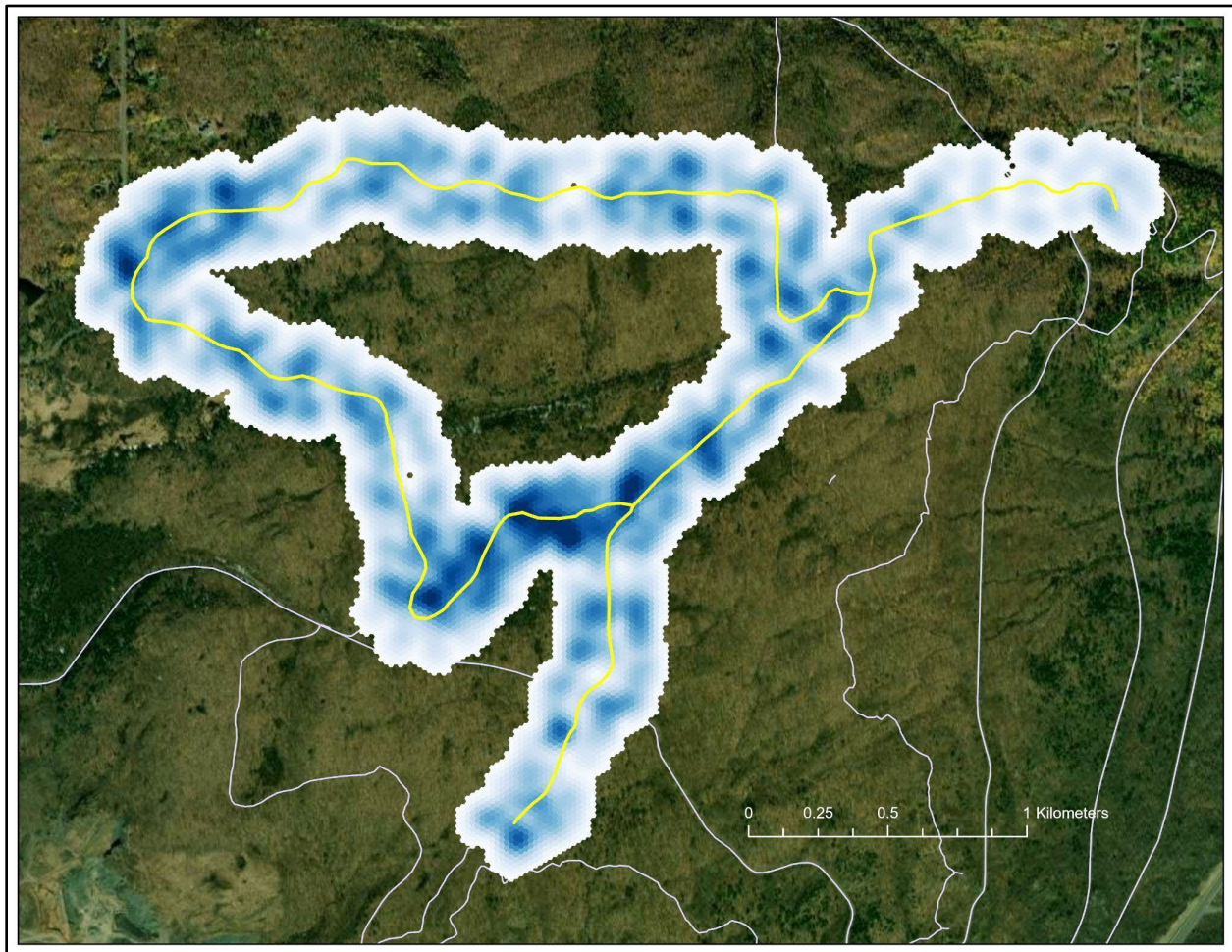


Figure 4. Breeding bird density hotspots. Spatial distribution of bird detections recorded during the breeding season (June), illustrating relative density hotspots across the survey area based on detections within 100 m of line transects. Hotspots reflect areas of concentrated breeding-season activity and territory use by forest birds.

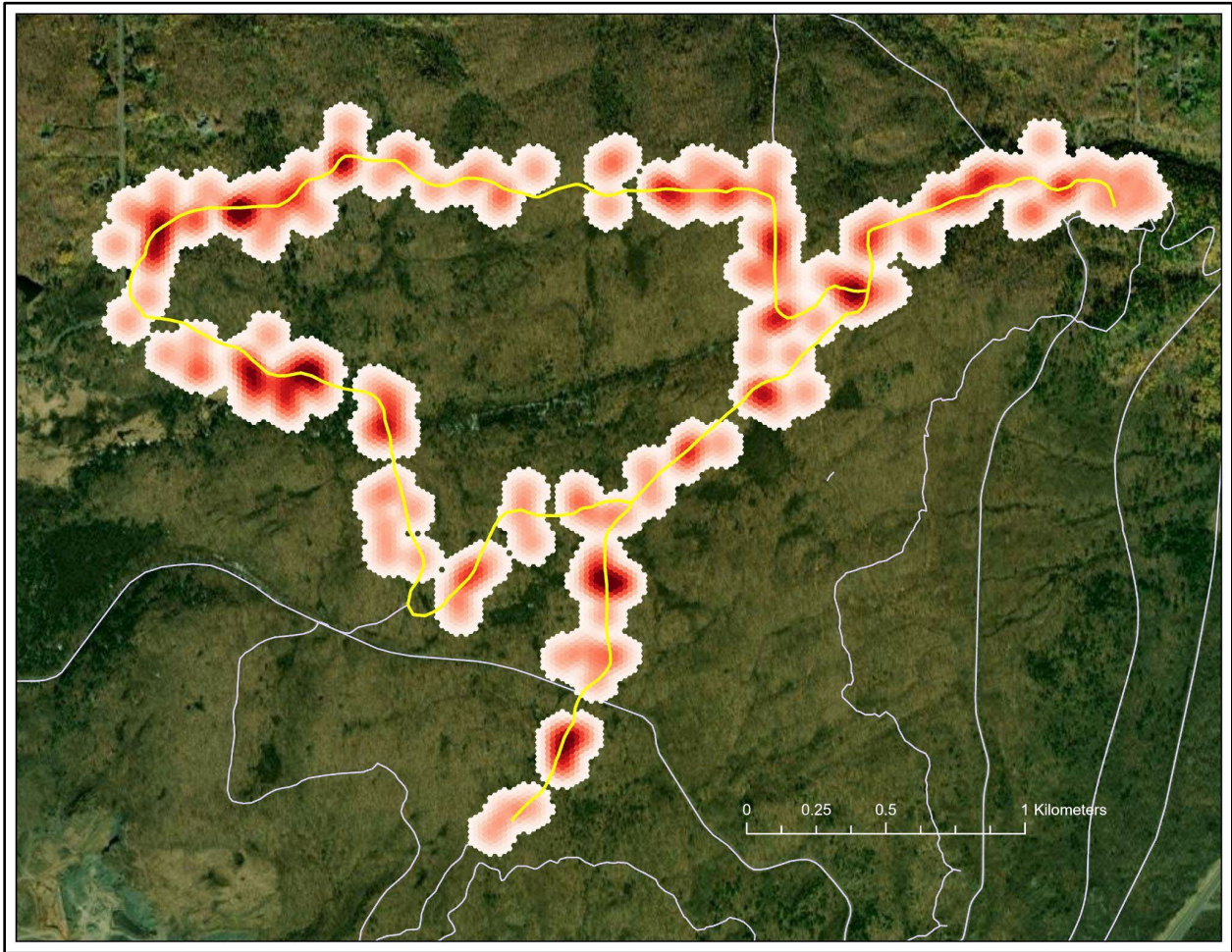


Figure 5. Fall bird density hotspots. Spatial distribution of bird detections recorded during fall migration (September), illustrating relative density hotspots across the survey area based on detections within 100 m of line transects. Hotspots reflect areas of concentrated use by southbound migrants and resident birds utilizing the site for foraging and stopover habitat.

Species of conservation significance

Several species detected during surveys at Magney–Snively Natural Area are of conservation concern or serve as important indicators of forest condition and habitat quality. Seasonal patterns of occurrence and relative abundance provide insight into the site's role as breeding habitat, migratory stopover, and structurally complex forest refuge for both priority and representative forest bird species.

Canada Warbler was detected during both spring migration and the breeding season, with mean densities of 0.06 detections per 100 m in May (**Figure 6**) and 0.13 detections per 100 m in June (**Figure 7**). This increase from spring to summer suggests local territory establishment or breeding-season residency rather than transient passage alone. Regionally, it is a focal species for the Upper Mississippi River and Great Lakes Region Joint Venture due to long-term, though variable, population declines across its breeding range. Canada Warbler is closely associated with structurally complex forests with dense shrub or subcanopy layers, and its consistent presence aligns with broader patterns observed in the dataset highlighting the importance of well-developed understory conditions during the breeding season.

Golden-winged Warbler was detected at low densities but across multiple seasons, with mean densities of 0.007 detections per 100 m in spring (**Figure 6**) and 0.015 detections per 100 m during the breeding season (**Figure 7**). As a Minnesota stronghold species, even low detection rates are meaningful, and seasonal persistence suggests use of the area for breeding or territory establishment, particularly within shrub-rich or early successional forest elements embedded in the broader deciduous landscape. Although not state-listed in Minnesota due to its relative abundance, Golden-winged Warbler is designated a Species in Greatest Conservation Need, placed on the Partners in Flight Red Watch List, and identified as a focal species for the Upper Mississippi River and Great Lakes Region Joint Venture due to ongoing population declines.

Wood Thrush was detected only during spring migration, with a mean density of 0.015 detections per 100 m (**Figure 6**), and was not observed during breeding-season surveys. This pattern suggests the site may function primarily as migratory habitat or exploratory breeding habitat near the edge of the species' regional breeding distribution rather than supporting established breeding territories within the survey year. Spring detections nonetheless indicate that forest structure and landscape context provide suitable conditions for use by this forest-interior species during migration. Wood Thrush has experienced significant, widespread population declines and is recognized as a conservation priority at multiple scales, including designation as a Species in Greatest Conservation Need in Minnesota, a Midwest Bird of Management Concern by the U.S. Fish and Wildlife Service, a focal species for the Upper Mississippi River and Great Lakes Region Joint Venture, and placement on the Partners in Flight Yellow Watch List with a high Continental Concern Score.

Veery was detected at similarly high densities during both spring and the breeding season, with mean densities of 0.41 detections per 100 m in spring (**Figure 6**) and 0.40 detections per 100 m in June (**Figure 7**). In contrast, Veery was absent during fall migration surveys. As a species strongly associated with mesic deciduous forests, riparian areas, and dense understory vegetation, the relatively high breeding-season density of Veery indicates suitable breeding habitat characterized by moist soils, closed canopy conditions, and well-developed shrub layers. Its seasonal restriction to summer further supports interpretation of the site as functioning as breeding habitat rather than migratory stopover for this species. In Minnesota, Veery is designated a Species in Greatest Conservation Need due to long-term population declines and

the state's importance in supporting a substantial portion of the species' breeding population, and it is also recognized by Audubon Minnesota as a Minnesota Stewardship Species.

Least Flycatcher was among the most abundant and consistently detected species across spring and summer surveys. Mean densities were 1.01 detections per 100 m during spring migration and 0.99 detections per 100 m during the breeding season, making it the most abundant breeding-season species recorded (**Figure 9**). This consistency reflects widespread territory establishment within deciduous forest stands and indicates that canopy and subcanopy structure typical of mature hardwood forests is well represented across the site (**Figure 9**). Least Flycatcher serves as a strong indicator of breeding-season forest structure and provides an important baseline for interpreting relative abundance of less common species. Despite this local abundance, Least Flycatcher is classified as a Common Bird in Steep Decline, with a Continental Concern Score of 11/20, reflecting population declines of more than 50% across its range, and it has been identified as a regional stewardship species due to declines in boreal hardwood transition forests of northern Minnesota, Michigan, and Wisconsin.

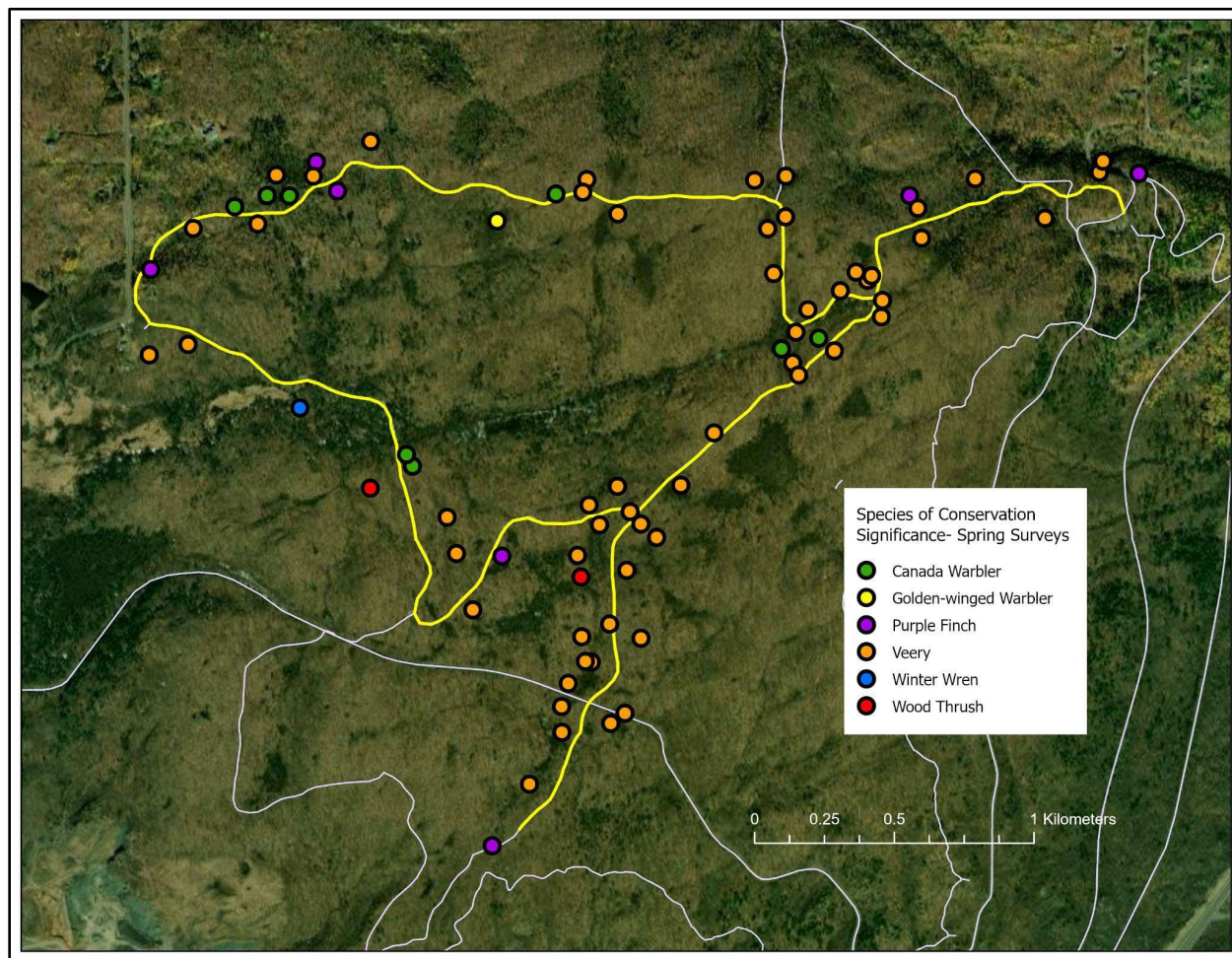


Figure 6. Species of conservation significance detected within 100 m of line transects during spring migration surveys in 2024 and 2025.

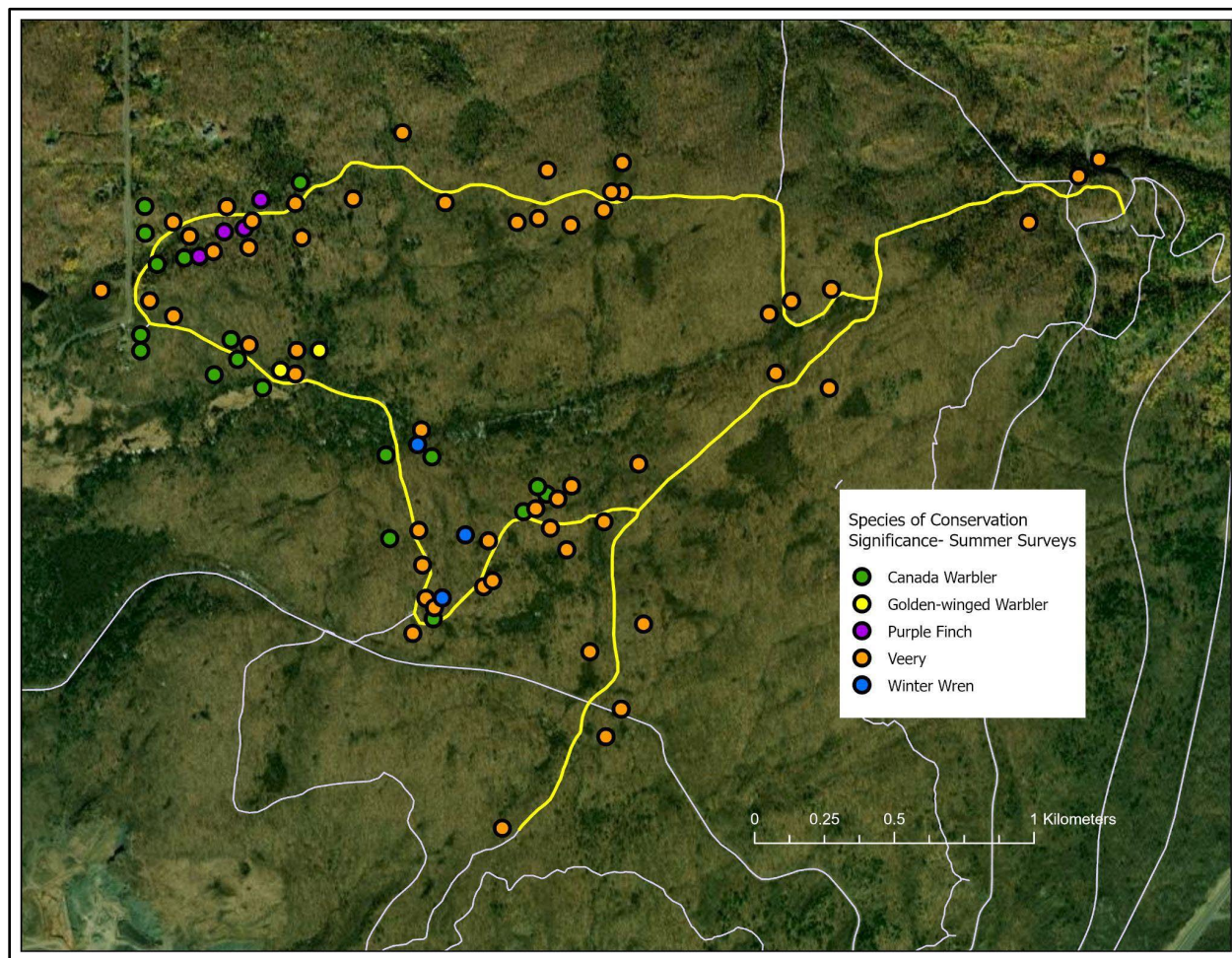


Figure 7. Species of conservation significance detected within 100 m of line transects during summer breeding season surveys in 2024 and 2025.

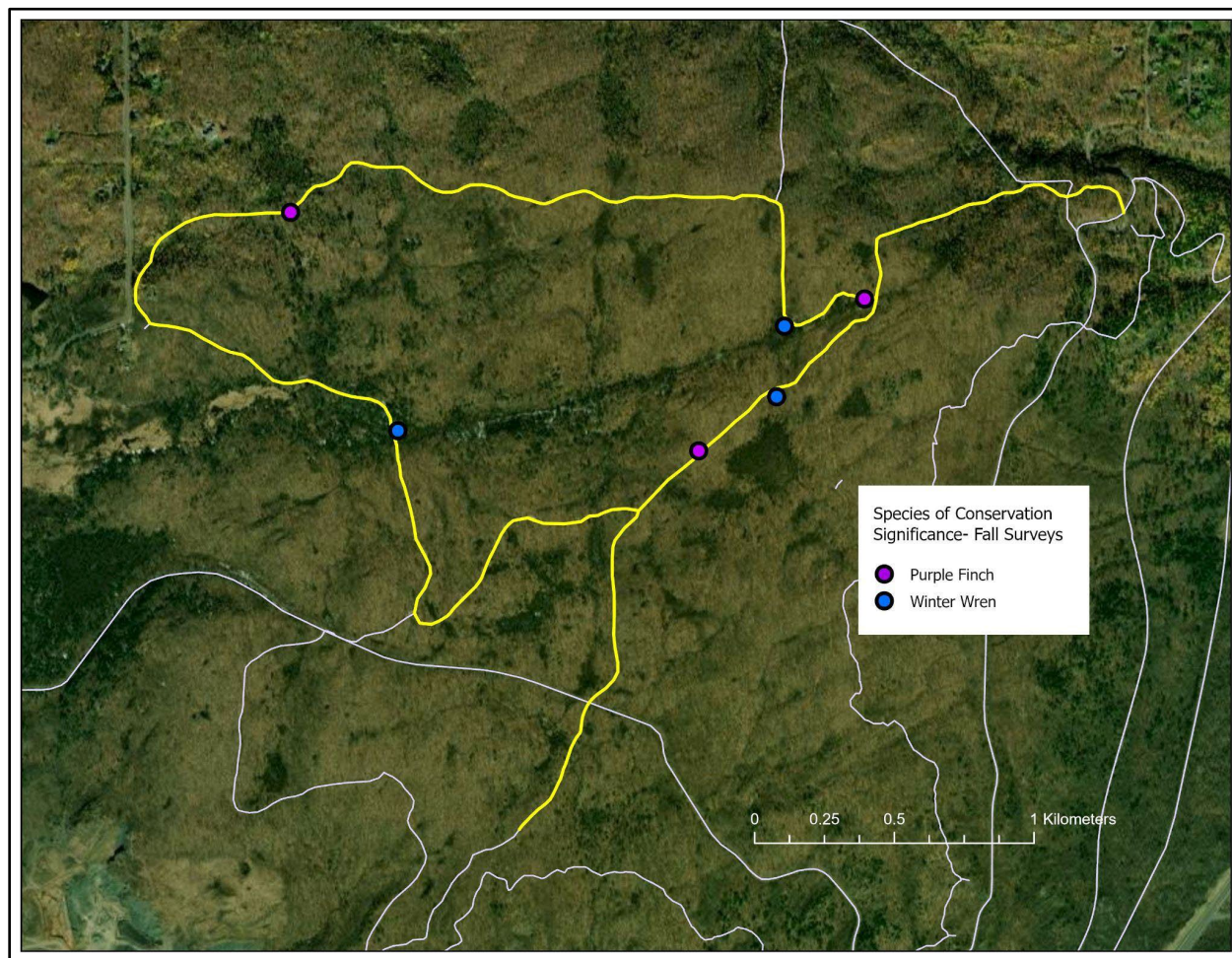


Figure 8. Species of conservation significance detected within 100 m of line transects during fall migration surveys in 2024 and 2025.

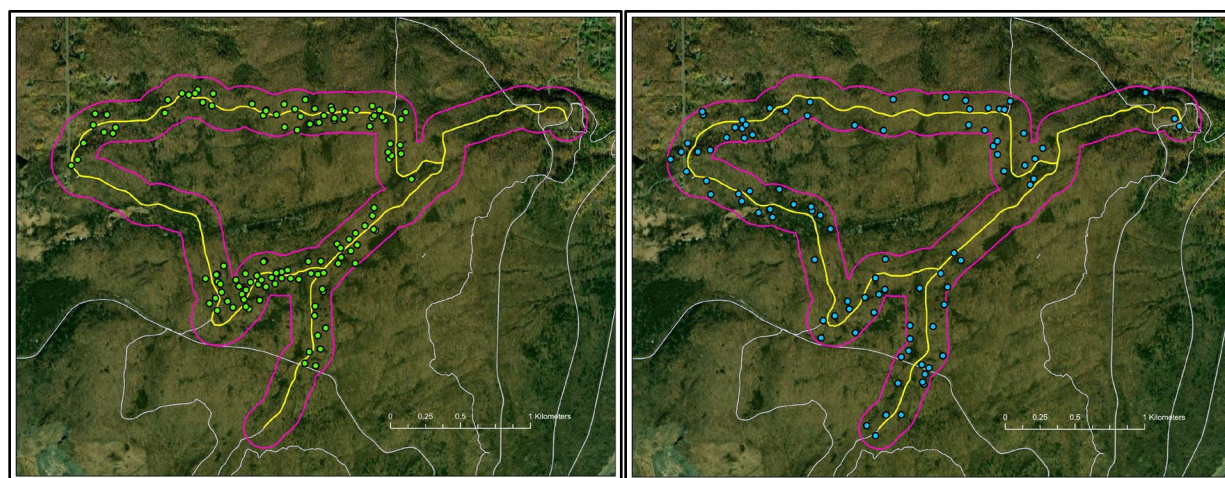


Figure 9. Least Flycatcher observations during spring (green) and summer (blue) transect surveys in 2024 and 2025. No Least Flycatchers were detected during fall migration surveys.

Winter Wren was detected at low densities across seasons, with mean densities of 0.007 detections per 100 m in spring (**Figure 6**), 0.022 detections per 100 m during the breeding season (**Figure 7**), and 0.022 detections per 100 m in fall (**Figure 8**). Although uncommon, Winter Wren detections are ecologically informative, as the species is closely tied to structurally complex forests containing abundant coarse woody debris, dense understory, and moist microhabitats. Its presence suggests localized patches of high structural complexity, particularly within lowland or conifer-influenced forest elements. Despite generally stable rangewide population trends, regional declines and sensitivity to habitat loss have led to its designation as a Species in Greatest Conservation Need in Minnesota, underscoring the importance of continued monitoring where mature forest habitats are declining.

Purple Finch was detected at low densities during spring and summer, with mean densities of 0.044 detections per 100 m in spring (**Appendix A**) and 0.029 detections per 100 m during the breeding season (**Figure 7**), and was not detected during fall surveys in this dataset. This pattern is consistent with the species' association with mixed and coniferous forest types and its variable use of northern forest landscapes outside the core breeding period. Although not abundant, Purple Finch detections contribute to evidence that mixed-forest elements within the site provide resources for species associated with conifer structure and seed availability. Despite being listed as *Least Concern* globally, Purple Finch populations have declined substantially, including an estimated 32% decline since the late 1960s, leading to its designation as a Species in Greatest Conservation Need in Minnesota due to documented regional and rangewide population declines.

Habitat relationships and seasonal use

Interpretation of habitat relationships and seasonal patterns of bird use is grounded in field observations from this study and informed by guild-based associations of the species observed, including breeding vegetation and nest-site preferences, and supported by established literature on species-specific habitat associations, life-history traits, and forest structural requirements (**Appendix A**). Patterns of species occurrence and abundance observed across seasons show strong associations with forest structure, vegetation type, and vertical complexity within the survey area, with mean detection densities providing quantitative support for these relationships and clarifying how different forest components contribute to avian use throughout the annual cycle.

Deciduous forest habitats supported the highest overall bird use, particularly during spring migration and the breeding season. Species strongly associated with mature deciduous and mesic forest conditions occurred at moderate to high densities during summer surveys, indicating active territory establishment and breeding. Least Flycatcher, a canopy- and subcanopy-associated deciduous forest breeder, was detected at mean densities of 1.01 detections per 100 m in May and 0.99 detections per 100 m in June, making it the most abundant species recorded during the breeding season. Veery, which is closely tied to moist deciduous forests with dense understory vegetation, occurred at mean densities of 0.41 detections per 100 m in spring and 0.40 detections per 100 m in summer, further indicating that mesic forest interiors with well-developed shrub layers provide high-quality breeding habitat.

Subcanopy and shrub-associated species showed clear seasonal signals, particularly during the breeding season, emphasizing the importance of vertical structural complexity. Canada Warbler, a species of conservation significance strongly associated with dense shrub and subcanopy layers, increased from a mean density of 0.06 detections per 100 m in spring to 0.13 detections per 100 m during the breeding season, consistent with local territory establishment.

Similarly, Golden-winged Warbler, which relies on shrub-rich and early successional forest elements, was detected at mean densities of 0.007 detections per 100 m in spring and 0.015 detections per 100 m in summer, indicating repeated seasonal use of these structurally complex habitats.

Forest interior and ground-associated species further reflect habitat quality within closed-canopy stands. Wood Thrush, a forest-interior species of conservation significance, was detected during spring migration at a mean density of 0.015 detections per 100 m but was not observed during breeding-season surveys. This pattern suggests that while forest structure may be suitable for migratory use or exploratory breeding, sustained breeding territories were not established within the survey year.

Lowland, conifer-influenced, and structurally complex forest elements contributed disproportionately to detections of species associated with coarse woody debris, moist microhabitats, and conifer structure. Winter Wren, a species strongly tied to dense understory and downed woody material, was detected at mean densities of 0.007 detections per 100 m in spring, 0.022 detections per 100 m in summer, and 0.022 detections per 100 m in fall. Although densities were low, repeated detections across seasons indicate localized patches of high structural complexity, particularly within lowland or conifer-influenced habitats. Purple Finch, associated with mixed and coniferous forest types, occurred at mean densities of 0.044 detections per 100 m in spring and 0.029 detections per 100 m during the breeding season, highlighting the importance of conifer and mixed-forest components within the broader deciduous-dominated landscape.

Discussion

Bird community composition and detection rates varied predictably across seasons, reflecting shifts in migratory behavior, breeding activity, and habitat use within the study area. Spring migration surveys documented the highest overall detection rates and species richness, coinciding with peak movement of resident species, short-distance migrants, and the arrival of long-distance Neotropical migrants initiating territory establishment. The prominence of forest-interior and canopy-associated species during this period indicates that the site functions simultaneously as migratory habitat and early-season breeding habitat for a diverse assemblage of forest birds. Although several dominant forest species persisted across spring and summer, including Least Flycatcher, Ovenbird, and Red-eyed Vireo, many species were detected in only a single season. This pattern of strong seasonal turnover with limited redundancy suggests that the site supports a temporally partitioned bird community, with different species relying on the same landscape at different stages of the annual cycle rather than a static assemblage of year-round occupants.

During the breeding season, overall detections declined modestly relative to spring, but species composition shifted toward a community dominated by territorial breeders. Continued high densities of species such as Least Flycatcher, Red-eyed Vireo, Ovenbird, and Veery indicate widespread establishment of breeding territories and confirm the availability of suitable breeding habitat across multiple forest strata. Species richness remained relatively high in June, suggesting that the site supports a diverse breeding bird community rather than a small subset of dominant species.

In contrast, fall migration surveys documented substantially lower detection rates and reduced species richness. However, the decline in detections per 100 m outpaced the decline in species

richness, suggesting reduced abundance or detectability rather than complete loss of species. This pattern is consistent with post-breeding behavior, reduced vocal activity, and more dispersed movement during southbound migration. Species detected in fall were primarily short-distance migrants and residents known to use northern forested landscapes as foraging and stopover habitat, indicating that the site continues to provide functional habitat later in the season, albeit for a more selective subset of species.

The detection of multiple species of conservation significance across seasons highlights the conservation value of the site despite relatively low densities for some taxa. Canada Warbler and Golden-winged Warbler were detected in both spring and summer, with increased densities during the breeding season, suggesting local territory establishment rather than incidental passage. These patterns are particularly notable given both species' reliance on structurally complex habitats with dense shrub and subcanopy layers, features that are often reduced or homogenized in managed forest landscapes. Wood Thrush was detected only during spring migration, suggesting that the site may function as migratory habitat. Collectively, these observations suggest that the site contributes to regional conservation objectives by supporting habitat conditions relevant to multiple priority species across different stages of the annual cycle.

Patterns of species abundance and seasonal occurrence strongly indicate that habitat structure and vertical complexity are key drivers of avian use within the study area. Deciduous forest habitats supported the highest overall bird use, particularly during spring migration and the breeding season, and were characterized by high densities of canopy-, subcanopy-, and ground-associated breeders. The dominance of Least Flycatcher, Ovenbird, and Red-eyed Vireo reflects closed-canopy, hardwood-dominated forest conditions with intact forest interiors and well-developed subcanopy structure. Least Flycatcher in particular was highly abundant across spring and summer surveys, underscoring the importance of large, contiguous deciduous forest stands for this species, which has experienced regional declines associated with forest fragmentation. Despite lower overall species richness in fall, representation across multiple migration strategies, nesting guilds, and vegetation associations indicate that functional diversity remained relatively high. This suggests that the site continues to provide ecologically meaningful habitat outside the breeding season, supporting foraging, stopover, and transient use even as detectability declines.

Nesting guild composition showed a strong seasonal signal, with subcanopy and shrub-nesting species accounting for the highest cumulative detections during the breeding season. This pattern emphasizes the importance of vertical structural complexity, including dense understory vegetation, canopy gaps, and edge environments in supporting breeding birds within otherwise mature forest stands. Increased breeding-season densities of Canada Warbler and Golden-winged Warbler further highlight the value of shrub-rich and early successional elements embedded within the broader deciduous forest matrix.

Lowland, conifer-influenced, and structurally complex forest elements, while supporting fewer detections overall, contributed disproportionately to the presence of species associated with coarse woody debris, moist microhabitats, and conifer structure. Winter Wren detections across all seasons, though low in density, indicate localized patches of high structural complexity, such as areas with abundant downed wood and dense understory. Similarly, detections of Purple Finch during spring and summer underscore the value of mixed and coniferous forest components within the broader deciduous-dominated landscape. The presence of multiple woodpecker species across surveys provides additional evidence of habitat quality, indicating the availability of large trees, snags, and coarse woody debris that provide nesting and foraging

substrates. High spring detections of Yellow-bellied Sapsucker are consistent with mature forest conditions and suitable sap trees, reinforcing the interpretation that interior forest structure remains largely intact.

During the breeding season, species richness was higher in areas associated with riparian corridors and vernal pools, underscoring the importance of hydrologic features in enhancing habitat quality within mature forest landscapes. These areas likely provide increased insect availability, moist microclimates, and greater structural heterogeneity, benefiting both common forest breeders and species of conservation concern such as Canada Warbler. Together, these patterns indicate that mature hardwood forests, particularly when embedded within intact landscapes containing riparian features and seasonal wetlands, provide high-quality habitat for a diverse assemblage of forest birds.

Within this hydrologic context, forested wetlands, particularly black ash–dominated systems, represent a critical but highly vulnerable habitat component within the study area. These systems contribute disproportionately to vertical structure, hydrologic regulation, and dense understory conditions that support species associated with moist microhabitats and structural complexity, including Canada Warbler and Winter Wren. The detection of these species, even at low densities, underscores the functional importance of forested wetlands embedded within the broader upland forest matrix. Emerald Ash Borer poses a substantial and imminent threat to the persistence of forested wetland structure across the region. Widespread ash mortality is expected to result in canopy loss, altered hydrology, and shifts toward shrub-dominated or open wetland conditions, with cascading effects on forest-dependent bird species. While some early successional or shrub-associated species may temporarily benefit, long-term loss of tree cover is likely to reduce habitat suitability for forest interior and subcanopy-nesting birds and diminish the functional diversity currently supported by these systems. Proactive management of ash-dominated forested wetlands should therefore be considered a high priority for restoration and adaptation actions. Underplanting with alternative, flood-tolerant tree species represents a key strategy for maintaining forested wetland conditions and preventing conversion to non-forested states following ash decline. Maintaining canopy continuity and vertical structure within these systems will be critical for sustaining habitat features that support both common breeding species and species of conservation significance.

Taken together, these results demonstrate that the site functions as a seasonally dynamic landscape supporting migratory stopover, breeding residency, and structurally specialized forest birds across the annual cycle. High breeding-season densities of deciduous forest specialists, consistent use of shrub-rich habitats by conservation-priority species, and repeated detections of species associated with lowland, conifer-influenced, and forested wetland elements indicate that habitat heterogeneity and vertical structural complexity are central drivers of avian use. Management actions that prioritize retention of mature hardwood forest, maintenance of well-developed shrub and subcanopy layers, protection of riparian corridors and seasonal wetlands, and proactive adaptation of ash-dominated forested wetlands are likely to provide the greatest benefit. In particular, early intervention through underplanting and structural retention in forested wetlands can help preserve forest conditions, buffer against Emerald Ash Borer impacts, and sustain habitat value for forest birds of both regional conservation concern and broader ecological importance.

Forest Management Recommendations for Birds at Magney-Snively Natural Area

Forest management at Magney–Snively Natural Area should maintain large, contiguous mature forest while deliberately increasing structural and compositional diversity to enhance ecological resilience and support a broader suite of forest birds. Although the site contains high-quality hardwood forest, much of the landscape is relatively uniform in age and species composition, and introducing fine-scale heterogeneity that emulates natural disturbance can diversify habitat conditions and strengthen food webs. Research in northern hardwood forests shows that small, spatially dispersed canopy gaps increase structural complexity and promote early-successional and shrub-associated species, including species of conservation significance, while many mature forest species persist at the landscape scale. Applied thoughtfully at Magney–Snively, such modest disturbance can enhance habitat heterogeneity and long-term ecosystem resilience without compromising the integrity of forest interiors essential for forest-dependent birds.

In addition to upland forest management, forested wetlands, particularly black ash–dominated systems, warrant targeted, climate-forward intervention. Emerald Ash Borer poses a significant threat to the long-term persistence of these systems, with widespread ash mortality expected to lead to canopy loss, altered hydrology, and conversion to shrub- or open-wetland conditions if no action is taken. While some shrub-associated birds may temporarily benefit, long-term loss of forested wetland structure would reduce habitat suitability for forest interior, subcanopy, and lowland-associated species and diminish overall ecosystem resilience.

To maintain forested wetlands as forested systems, proactive underplanting with flood-tolerant, climate-adapted tree species should be prioritized. Species such as swamp white oak, silver maple, red maple, and other hydrologically tolerant hardwoods can help sustain canopy cover, vertical structure, and compositional diversity following ash decline. Underplanting should be implemented strategically to increase species redundancy, promote long-term canopy replacement, and buffer these systems against future stressors associated with climate change. Maintaining forested wetland structure through active intervention will be critical for preserving habitat features that support birds associated with moist microclimates, dense understory conditions, and high structural complexity.

Recommended management actions: Management actions at Magney–Snively should emulate natural disturbance processes while retaining key habitat features that support birds across seasons.

Specific recommendations include:

- **Maintain large, contiguous upland forest patches** to support forest-interior bird species and minimize edge effects. Management should avoid unnecessary fragmentation and preserve connectivity across the landscape.
- **Apply uneven-aged management where appropriate**, using single-tree or small group selection to maintain continuous canopy cover while creating small, dispersed gaps. These gaps increase light availability, promote shrub and understory development, and enhance foraging and nesting habitat without substantially increasing fragmentation.
- **Increase compositional diversity through climate-forward planting**, particularly in forested wetlands and lowland areas vulnerable to Emerald Ash Borer. Underplanting with flood-tolerant, climate-adapted species such as swamp white oak should be

prioritized to maintain forest structure, enhance long-term resilience, and prevent conversion to non-forested states.

- **Retain and promote mixed forest composition**, including scattered conifers within hardwood stands. Conifer inclusions provide thermal cover, winter roosting habitat, and early-season shelter for birds, while also contributing to compositional diversity and climate resilience.
- **Retain or create snags, cavity trees, and coarse woody debris** during management activities. These features are essential for cavity-nesting birds, support diverse invertebrate communities, and contribute to overall forest structural complexity.
- **Control invasive plant and animal species** to maintain native forest structure and food webs. Management activities should minimize soil disturbance and include strict equipment-cleaning protocols to prevent the spread of invasive earthworms, which can alter forest floor conditions critical to ground- and shrub-nesting birds.

Conclusions

Birds provide a sensitive and integrative measure of forest condition, responding to changes in vegetation structure, food availability, and landscape connectivity across multiple spatial and temporal scales. The baseline avian surveys conducted prior to restoration establish critical reference conditions for Magney–Snively Natural Area and the St. Louis River corridor, allowing future changes in bird community composition and habitat use to be evaluated as restoration progresses. By tracking responses of breeding and migratory birds over time, these data enable managers to assess whether management and restoration actions are achieving desired habitat outcomes and to adjust strategies accordingly. Using birds as indicators to guide forest management offers a practical, science-based framework for adaptive management, ensuring that restoration efforts by the City of Duluth and Minnesota Land Trust promote climate-resilient forests and sustain high-quality habitat for birds and other wildlife into the future.

Appendix A

Appendix A. Common name, migration strategy, nest site, typical habitat, and abundance (observations per 100 m) of species observed at Magney–Snively during spring, summer, and fall transect surveys in 2024 and 2025. Species marked with an asterisk (*) are species of conservation interest.

Common Name	Migration Strategy	Nest Site	Breeding Vegetation Type	Spring	Summer	Fall
American Crow	Short-distance migrant	Canopy	Deciduous forest	0.015	0.037	0.000
American Goldfinch	Short-distance migrant	Subcanopy or Shrub	Fields and meadows	0.088	0.007	0.000
American Redstart	Long-distance migrant	Subcanopy or Shrub	Early-successional mixed	0.316	0.199	0.007
American Robin	Short-distance migrant	Subcanopy or Shrub	Fields and meadows	0.471	0.199	0.066
Baltimore Oriole	Long-distance migrant	Canopy	Deciduous forest	0.000	0.007	0.000
Black-and-white Warbler	Long-distance migrant	Ground	Mixed forest	0.118	0.059	0.000
Blackburnian Warbler	Long-distance migrant	Canopy	Coniferous forest	0.074	0.000	0.000
Black-capped Chickadee	Permanent Resident	Cavity, Hole, or Bank	Deciduous forest	0.316	0.257	0.228
Black-throated Green Warbler	Long-distance migrant	Subcanopy or Shrub	Mixed forest	0.596	0.287	0.000
Blue Jay	Permanent Resident	Canopy	Deciduous forest	0.206	0.103	0.132
Blue-headed Vireo	Short-distance migrant	Canopy	Lowland coniferous forest	0.000	0.000	0.007
Broad-winged Hawk	Long-distance migrant	Canopy	Mixed forest	0.000	0.007	0.000
Brown Creeper	Short-distance migrant	Cavity, Hole, or Bank	Deciduous forest	0.007	0.022	0.088
Brown-headed Cowbird	Short-distance migrant	Nest Parasite	Fields and meadows	0.007	0.000	0.000
Canada Warbler*	Long-distance migrant	Ground	Mixed forest	0.059	0.132	0.000

Cedar Waxwing	Short-distance migrant	Subcanopy or Shrub	Ponds, lakes, rivers, streams	0.015	0.000	0.000
Chestnut-sided Warbler	Long-distance migrant	Subcanopy or Shrub	Early-successional mixed	0.044	0.162	0.000
Chipping Sparrow	Short-distance migrant	Canopy	Coniferous forest	0.000	0.007	0.000
Common Raven	Permanent Resident	Canopy	Coniferous forest	0.000	0.007	0.000
Common Yellowthroat	Long-distance migrant	Ground	Shrub swamp	0.029	0.000	0.000
Downy Woodpecker	Permanent Resident	Cavity, Hole, or Bank	Deciduous forest	0.022	0.088	0.029
Eastern Wood-Pewee	Long-distance migrant	Canopy	Mixed forest	0.037	0.140	0.000
Golden-crowned Kinglet	Short-distance migrant	Canopy	Coniferous forest	0.000	0.000	0.051
Golden-winged Warbler*	Long-distance migrant	Ground	Early-successional mixed	0.007	0.015	0.000
Great Crested Flycatcher	Long-distance migrant	Cavity, Hole, or Bank	Deciduous forest	0.015	0.044	0.000
Hairy Woodpecker	Permanent Resident	Cavity, Hole, or Bank	Deciduous forest	0.037	0.000	0.037
Hermit Thrush	Short-distance migrant	Ground	Mixed forest	0.147	0.096	0.059
House Wren	Short-distance migrant	Cavity, Hole, or Bank	Fields and meadows	0.007	0.000	0.000
Indigo Bunting	Long-distance migrant	Shrub	Open woodlands	0.007	0.015	0.000
Least Flycatcher*	Long-distance migrant	Subcanopy or Shrub	Deciduous forest	1.007	0.985	0.000
Magnolia Warbler	Long-distance migrant	Subcanopy or Shrub	Coniferous forest	0.007	0.007	0.000
Mourning Warbler	Long-distance migrant	Ground	Early-successional mixed	0.022	0.000	0.000
Nashville Warbler	Long-distance migrant	Ground	Lowland coniferous forest	0.162	0.110	0.007
Northern Flicker (Yellow-shafted)	Short-distance migrant	Cavity, Hole, or Bank	Fields and meadows	0.015	0.044	0.000

Ovenbird	Long-distance migrant	Ground	Deciduous forest	1.074	0.853	0.007
Palm Warbler (Western)	Long-distance migrant	Ground	Lowland coniferous forest	0.000	0.000	0.015
Pileated Woodpecker	Permanent Resident	Cavity, Hole, or Bank	Deciduous forest	0.022	0.007	0.000
Purple Finch*	Short-distance migrant	Canopy	Mixed forest	0.044	0.029	0.000
Red-bellied Woodpecker	Short-distance migrant	Cavity, Hole, or Bank	Forests	0.015	0.000	0.007
Red-breasted Nuthatch	Permanent Resident	Cavity, Hole, or Bank	Coniferous forest	0.044	0.051	0.015
Red-eyed Vireo	Long-distance migrant	Subcanopy or Shrub	Deciduous forest	1.029	0.934	0.000
Rose-breasted Grosbeak	Long-distance migrant	Subcanopy or Shrub	Deciduous forest	0.029	0.029	0.007
Ruby-crowned Kinglet	Short-distance migrant	Canopy	Coniferous forest	0.000	0.000	0.051
Ruffed Grouse	Permanent Resident	Ground	Deciduous forest	0.007	0.022	0.000
Scarlet Tanager	Long-distance migrant	Canopy	Deciduous forest	0.022	0.022	0.000
Song Sparrow	Short-distance migrant	Ground	Fields and meadows	0.000	0.007	0.000
Swamp Sparrow	Short-distance migrant	Ground	Shrub swamp	0.007	0.000	0.000
Tennessee Warbler	Short-distance migrant	Ground	Fields and meadows	0.007	0.000	0.000
Veery*	Long-distance migrant	Ground	Deciduous forest	0.412	0.397	0.000
White-breasted Nuthatch	Permanent Resident	Cavity, Hole, or Bank	Deciduous forest	0.037	0.081	0.037
White-throated Sparrow	Short-distance migrant	Ground	Early-successional mixed	0.044	0.074	0.228
Winter Wren*	Short-distance migrant	Ground	Lowland coniferous forest	0.007	0.022	0.022
Wood Thrush*	Long-distance migrant	Subcanopy or Shrub	Deciduous forest	0.015	0.000	0.000

Yellow Warbler	Long-distance migrant	Subcanopy or Shrub	Shrub swamp	0.015	0.000	0.000
Yellow-bellied Sapsucker	Short-distance migrant	Cavity, Hole, or Bank	Deciduous forest	0.081	0.081	0.015
Yellow-rumped Warbler (Myrtle)	Short-distance migrant	Canopy	Coniferous forest	0.007	0.000	0.279
Yellow-throated Vireo	Long-distance migrant	Canopy	Deciduous forest	0.000	0.007	0.000

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Appendix E: Magney Trees Planted 2025

Magney Trees Planted 2025

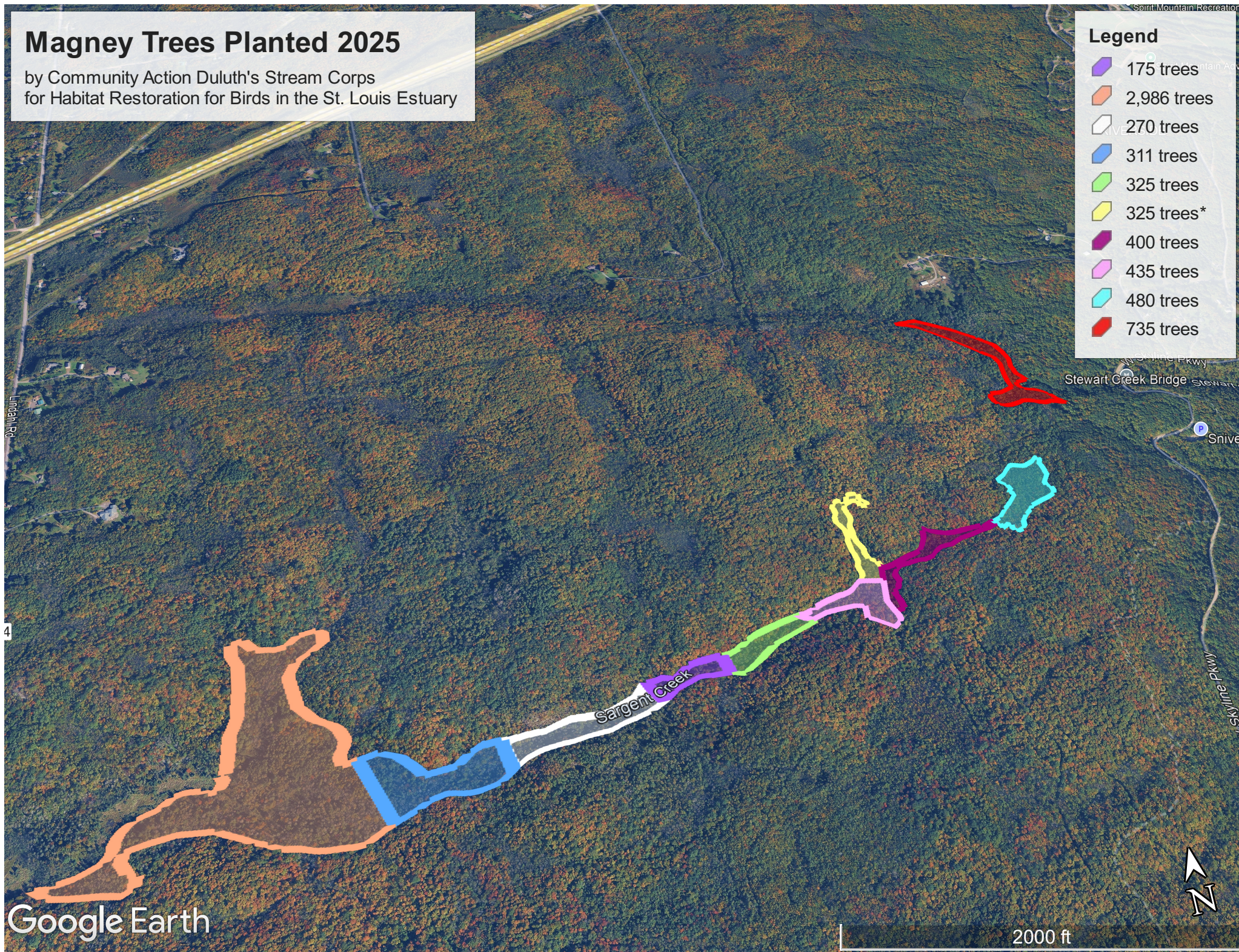
by Community Action Duluth's Stream Corps
for Habitat Restoration for Birds in the St. Louis Estuary

Legend

- 175 trees
- 2,986 trees
- 270 trees
- 311 trees
- 325 trees
- 325 trees*
- 400 trees
- 435 trees
- 480 trees
- 735 trees

Google Earth

2000 ft



Appendix F: Resolutions - Natural Resources Commission, Planning Commission, City Council - Approving Updated Management Plan