Surveys of Coastal and Riparian Systems in Charlevoix, Antrim, Kalkaska, and Emmet Counties, Michigan, USA: *2023 Addendum*

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Charlevoix, Antrim, Kalkaska, and Emmet Cooperative Invasive Species Management Area

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This version of the report has had the fine-scale location information for federally and state listed species removed, so that it could be distributed publicly without risk to listed species. This redacted version is available for public distribution on MNFI website: https://mnfi.anr.msu.edu/publications/reports.

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Cover: Julie McLaughlin hiking into a wet meadow along Green River in Jordan Valley State Forest, Antrim County, Michigan on June 29, 2022. Photograph by Rachel Hackett.

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Executive Summary

Coastal and riparian areas face pressures that can affect the quantity, quality, and function of their larger ecosystem from shoreline development and modification, infrastructure, invasive species, to climate change. Land management and restoration are critical for preservation and resilience of ecosystems with great importance to water quality, watershed health, and biodiversity conservation. The purpose of this project is to assist the Charlevoix, Antrim, Kalkaska, and Emmet Counties Cooperative Invasive Species Management Area (CAKE CISMA) and partners to 1) identify Great Lakes coastal and riparian areas that should be prioritized for protection and restoration, and 2) document populations of invasive species that are commonly treated or new to the area. Michigan Natural Features Inventory surveyed coastal and riparian natural communities owned or managed by Grand Traverse Regional Land Conservancy, Little Traverse Bay Band of Odawa Indians, Little Traverse Conservancy, and Michigan Department of Natural Resources in the CAKE CISMA for rare and listed plant species, rare and high-quality natural communities, and invasive species threats. Michigan Natural Features Inventory documented new records and updated previously documented records of listed species and natural communities in the Michigan Natural Heritage Database and collected coordinates and abundances of target invasive plant species.

Several areas and species occurrences were marked for follow-up survey in 2023: Jordan River Fen, Jordan River Shrub Thicket, Warner Creek Fen, round-leaved orchis (*Amerorchis rotundifolia*) at [redacted], and possible Pumpell's brome (*Bromus pumpellianus*) at [redacted]. On June 15, 2023, an additional 33 native plant species and no non-native species were documented in Warner Creek Fen, increasing the species richness to 132 and FQI to 60.9. On June 20, 2023, seven non-native species including bush honeysuckle (*Lonicera morrowii*) were documented between Jordan River Fen and Shrub Thicket. We failed to find round-leaved orchis at [redacted] on July 7, 2023. We identified the brome species on the sand dune at [redacted] to be smooth brome (*Bromus inermis*). The information gathered in 2023 provides more details for management planning of these areas, but it did not significantly alter the management recommendations from the 2022 report for the areas (Hackett et al. 2023).

Acknowledgements

Funding for this project was provided through Great Lakes Restoration Initiative – Forest Restoration: Restoring Northern Lake Michigan's Resilient Coastal and Riparian Habitats 22-DG-11094200-035 through a subaward from Antrim County Conservation District. Other partners on the project assisted with objectives and property logistics and information: Lindsey Bona-Eggeman, CAKE CISMA; Amy Lipson, Little Traverse Conservancy; Fields Ratliff, Grand Traverse Regional Land Conservancy; Derek Hartline, Little Traverse Bay Band of Odawa Indians; Noah Jansen, formerly of Little Traverse Bay Band of Odawa Indians; and Lucas Merrick, Michigan Department of Natural Resources. We also thank Phyllis J Higman, Michigan Natural Features Inventory (retired) and Kirk Acharya, formally of CAKE CISMA, for their work in developing the proposal. Administrative support was provided by Debra Richardson, Ashley Adkins, and Sarah Carter.

Introduction

For the North American Great Lakes, one of the world's largest freshwater ecosystems, the state of Michigan, USA, is in a unique place of ecological importance and stewardship. Michigan has approximately 35% of the 15,131 km (9,402 miles) of Great Lakes coastline and the entirety of Michigan drains into the Great Lakes Basin. Stewardship of natural areas in Michigan protects this vital North American resource.

Coastal and riparian areas face pressures that can affect the quantity, quality, and function of their larger ecosystem from shoreline development and modification, infrastructure, invasive species, to climate change. Because of its uniqueness in the world, the Great Lakes coastline is also home to many endemic species. Organizations throughout the region are tasked to protect the functions, services, and species of the Great Lakes with stewardship actions in their areas. These organizations seek the information and tools to formulate efficient ways to combat threats, restore or enhance ecologically important habitats, and protect ecologically important and high-quality natural communities and species. Stewardship of coastal and riparian natural areas can increase ecosystem resiliency to disturbance and climate change.

The purpose of this project is to assist the Charlevoix, Antrim, Kalkaska, and Emmet Counties Cooperative Invasive Species Management Area (CAKE CISMA) and partners to 1) identify Great Lakes coastal and riparian areas that should be prioritized for protection and restoration, and 2) document populations of invasive species that are commonly treated or new to the area. MNFI surveyed coastal and riparian natural communities owned or managed by Grand Traverse Regional Land Conservancy (GTRLC), Little Traverse Bay Band of Odawa Indians (LTBB), Little Traverse Conservancy (LTC), and Michigan Department of Natural Resources (MDNR) in the CAKE CISMA for rare and listed plant species, rare and high-quality natural communities, and invasive species threats.

Our efforts for the 2023 addendum were to report on five areas or species in 2023 that were either overlooked or required further survey in addition to the 2022 surveys (Hackett et al. 2023). New information gathered would add details for the development of future management plans.

Methods

Study Area

The surveys focused on Great Lakes coastal and riparian natural communities in Charlevoix, Antrim, Kalkaska, and Emmet Counties, excluding islands, in Michigan, USA. These counties cover ecoregion section VII Northern Lacustrine-Influenced Lower Michigan and subsections of Highplains, Leelanau and Grand Traverse Peninsula, and Presque Isle (Figure 1; Albert 1995). The elevation in this ecoregion ranges from 177 to 526 m (580 to 1,725 ft). Like the rest of Michigan, the ecoregion's geology is glacially influenced. Lake Michigan and Lake Huron strongly influence the climate in the coastal regions of this area contributing to greater snowfall (up to 356 cm [140 in]), cooler springs and longer growing seasons (up to 150 days) than the relatively higher elevations of the inland highplains. The climate makes the coastal areas suitable for commercial fruit production. The inland highplains have more extreme temperatures and spring freeze risk. Soils range greatly in the ecoregion from dune sands to clay. Vegetation prior to European settlement (circa 1800) consisted of mostly forest and swamps with open wetland and sand dune habitats. Major rivers in the area include Boardman, Jordan, and Manistee Rivers.

For 2023, five areas were identified that needed further community or rare species survey: Jordan River Fen, Jordan River Shrub Thicket, Warner Creek Fen, [redacted]. Jordan River Fen and Jordan River Shrub Thicket were overlooked for an Element Occurrence (EO) revisit survey in 2022 (Hackett et al. 2023). Warner Creek Fen was designated as a new northern fen EO in 2022. The initial survey was conducted in September 2022. Cyperaceae and Ericaceae plant species are more easily detected in the early summer, so it was marked for a revisit in 2023 to detect more plant species, including rare ones.

[redacted] is a site documented to have once contained the list species round-leaved orchis (*Amerorchis rotundifolia*). This population has not been observed since 1981, and we failed to find it in 2022. Given the difficulty to detect the species and its narrow flowering period, we surveyed again in 2023. At [redacted] in 2022, a population of brome grass (*Bromus* sp.) was observed on the sand dune near the boardwalk lookout platform. The individuals were possibly too far senesced to confirm the population as the State threatened Pumpell's brome (*Bromus pumpellianus*) or as smooth brome (*Bromus inermis*). We recommended a visit earlier in the season in 2023 for identification.

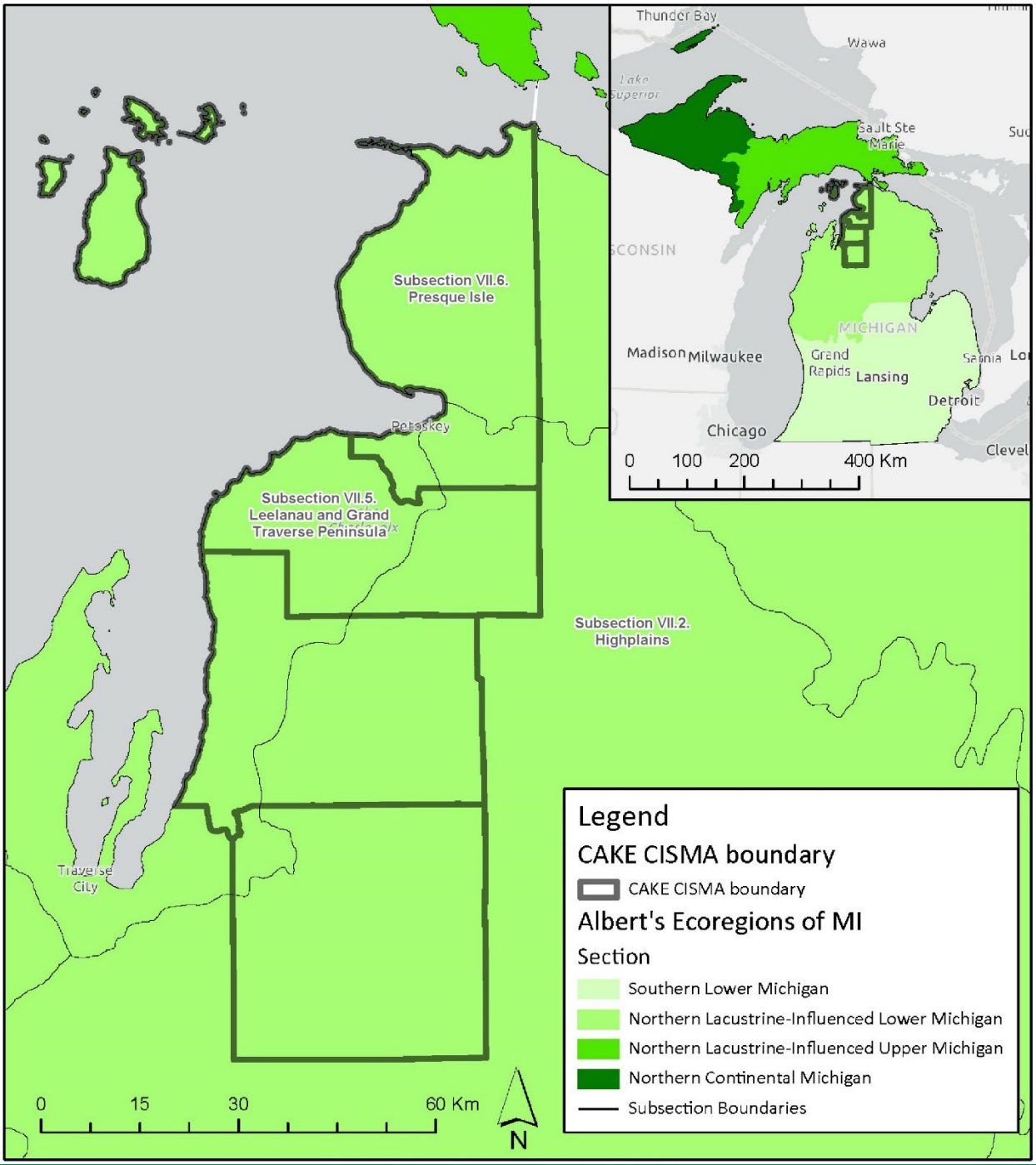

Figure 1. Boundaries of Albert's Ecoregion subsections of the Northern Lacustrine-Influenced Lower Peninsula in the CAKE CISMA region. Inset displays Albert's Ecoregions in Michigan (Albert 1995).

Previously Documented Element Occurrences

The Michigan Natural Heritage Database houses records and documentation of Michigan's high quality and/or rare natural communities and federally- and state-listed plant and animal species, and it is managed by MNFI. Each record of a natural community or species is called an element occurrence (EO; Appendix A: Definitions, NatureServe Terminology and Ranks). Contained in each record is spatial information, directions, EO description, survey dates, surveyors, documentation related to the EO (e.g., report, herbarium specimen, report form), any additional data, and a ranking based on its quality, size, landscape context, and viability of the species population or community. Three documented community EOs, one plant species EO, and one possible plant species EO were surveyed in 2023 (Table 1).

Table 1. List of element occurrences (EO) of natural communities and listed plant visited in 2023. Plant species EOID is a unique identifier for each EO in the Michigan Natural Heritage Database. FCS Key is a unique identifier for MDNR forest stands. EO Ranks are explained in Appendix A: Definitions, NatureServe Terminology and Ranks (MNFI 2023).

Name	EO ID	EO Rank	Property Name / FCS Key	Last Observed Date
Northern fen	26388	BC	Warner Creek Fen (52048006)	2023-06-15
Northern fen	18798	C	Jordan River Fen (52049043)	2023-06-20
Northern shrub thicket	18797	B	Jordan River [shrub thicket] (52049033)	2023-06-20
Round-leaved orchis (*Amerorchis rotundifolia*)	6758	CD	[redacted]	1981-07-14
Possible Pumpell's brome (*Bromus pumpellianus*)	NA	NA	[redacted]	NA

Field Survey

Community EO/ERA revisit

An EO/ERA revisit survey was conducted for sites visited in 2023. This type of survey consists of a qualitative meander survey ensuring adequate observation of representative features (e.g. riverbank, tributaries, stand interior, stand boundaries) and any stand variations as determined by aerial imagery interpretation (e.g., canopy coverage, species composition, crown size, tree density, disturbances such as windthrow). Data recorded include invasive species extent and density, dominant/abundant species, soil profiles and pH, tree sizes, and changes in surrounding landscape, threats, and community condition.

Rare plant species surveys

Rare species surveys were conducted during an optimal detection period. When the location of the population was unknown, meander surveys were conducted in suitable habitat based on species descriptions, habits, associated species, and notes from previous surveyors. When the location was known, samples were examined in the field for distinguishing characteristics.

Results

Survey Results

The three natural communities were visited on June 15 or 20, 2023, and the plant species were visited on July 7, 2023. At Jordan River Road communities, seven invasive species were documented and 11 points will be submitted to MISIN. No invasive species were documented at Warner Creek Fen, but an additional 33 native plant species were documented to increase the FQI score to 60.9 and species richness to 132.

We failed to find round-leaved orchis at [redacted] on July 7, 2023, after searching for over three hours in suitable habitat. The brome grass at [redacted] was identified as smooth brome, a common non-native grass.

The following site summaries were updated with information gathered from 2023 surveys. More information about the natural community types in this report can be found in Appendix C: Michigan Coastal and Riparian Natural Communities. More detailed descriptions of natural community global rank, state rank, and element occurrence rank can be found in Appendix A: Definitions, NatureServe Terminology and Ranks.

Jordan River Road, Antrim County
Compartment | Stand(s): 52049| 033, 043

Landowner/Manager: State Forest (Forest Resource Division)

Size: 25.1 acres

Location: On Jordan River Road west of US Highway 131, between the intersection of Jordan River Road with Big Marsh Road and Jordan River Road with Pinney Bridge Road (Figure 2).

Survey Type(s): EO revisit

Natural Community Type(s): Northern fen, northern shrub thicket (Figure 3)

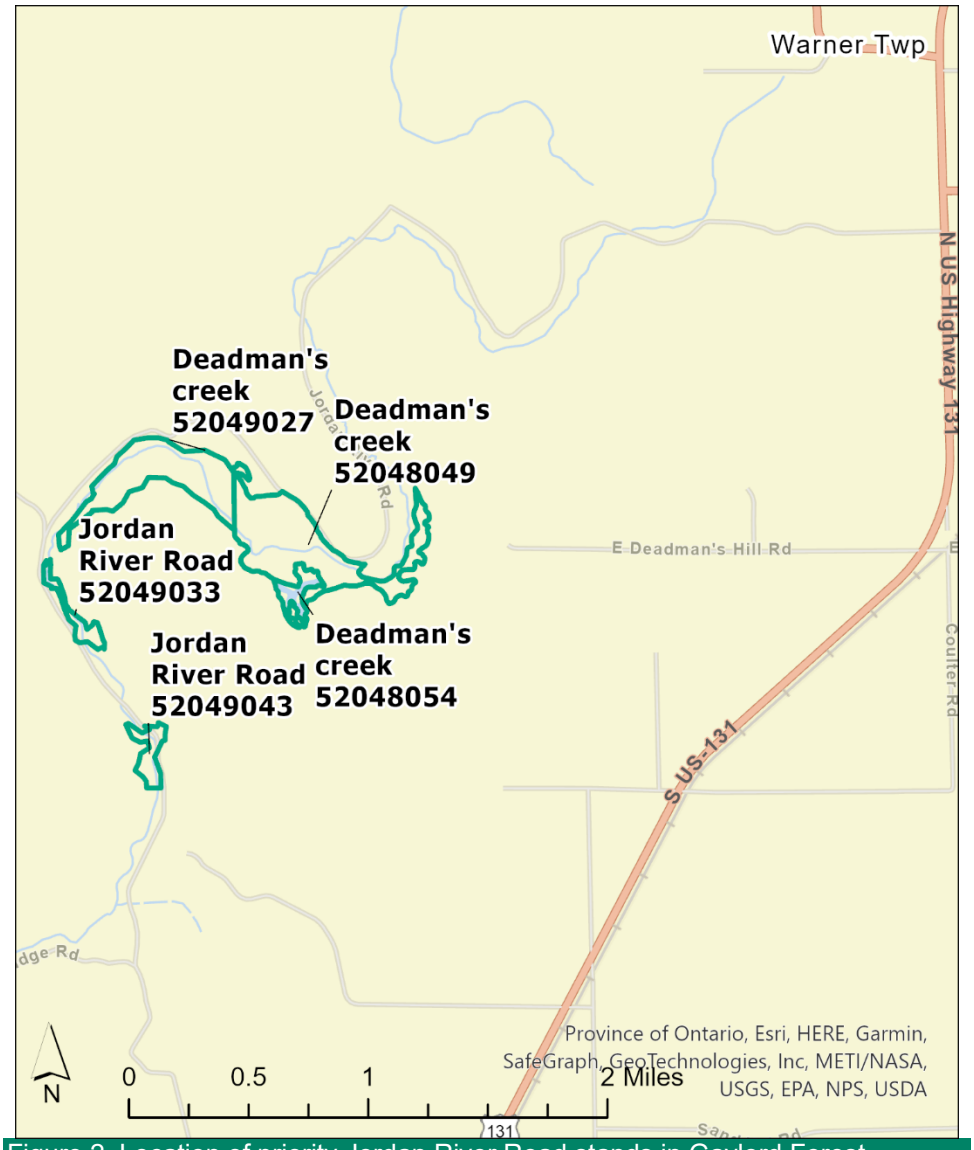

Figure 2. Location of priority Jordan River Road stands in Gaylord Forest Management Unit, Compartment 52049 in Antrim County, Michigan, USA.

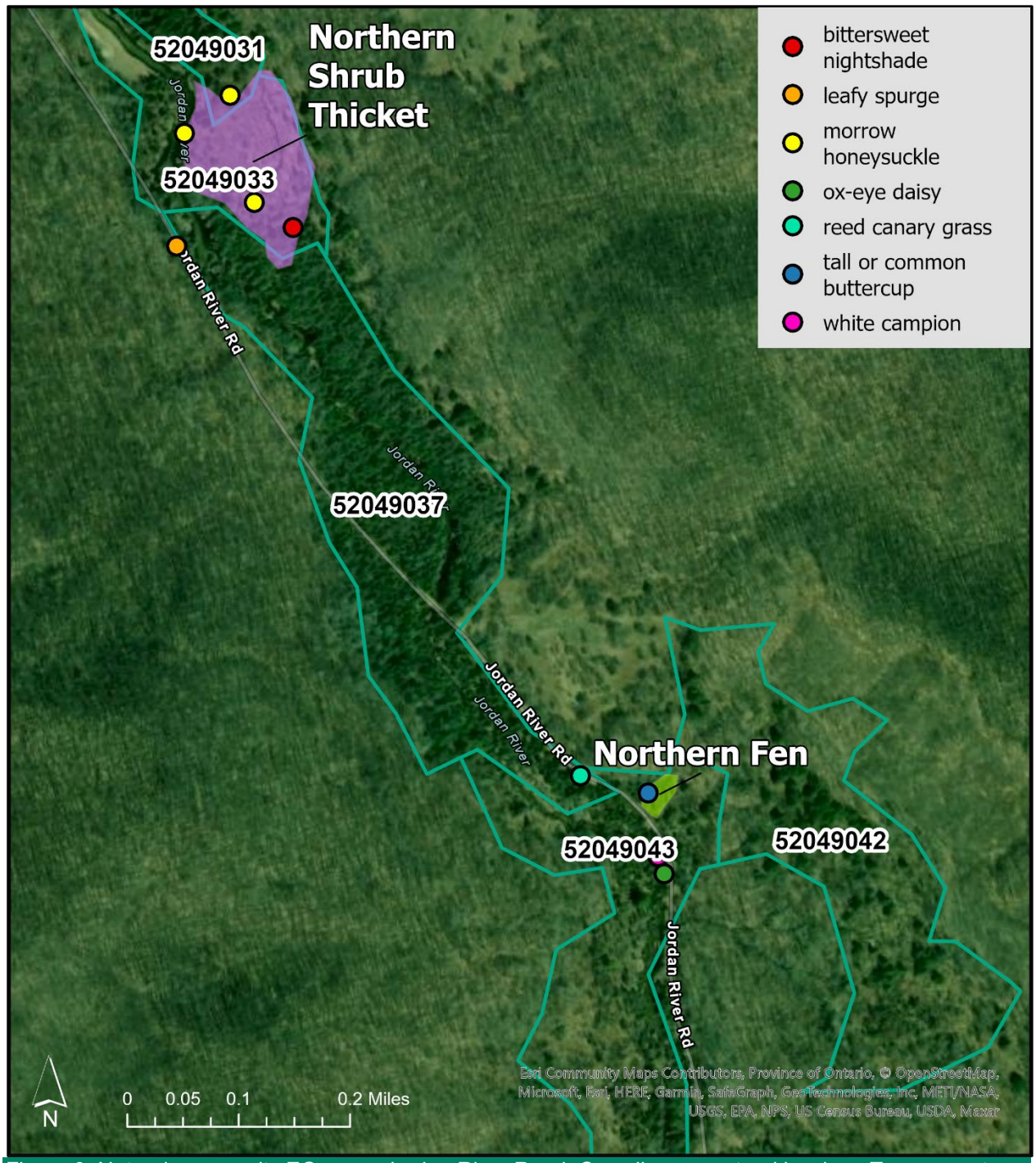

Figure 3. Natural community EOs near Jordan River Road. Cyan lines are stand borders. Transparent purple represents northern shrub thicket EO, and the transparent green area represents the northern fen EO. Each dot is an observed invasive species described in legend.

Natural Community Type: Northern fen
Rank: G3 S3

EO Identification Number: 18798 (Jordan River Fen)

EO Size: 0.26 acres

EO Rank and Justification: C. There is a small patch of sloping northern fen in Gaylord Forest Management Unit, Compartment 49, stand 42. The site has high plant diversity and distinct ecological zonation due to gradients in soil and water chemistry. Species composition and zonation patterned by natural processes. Drainage associated with Jordan River is dominated by rich conifer swamp and surrounding moraines are dominated by mature northern hardwoods, managed by Gaylord Forest Management Unit.

Complex is within part of a large block of unfragmented state forest managed for timber production, wildlife, recreation, and biodiversity. A dirt road winds along the bottom of the Jordan River Valley and hiking trails occur within the wetlands and in the surrounding upland forest. Rivers and streams within the Jordan River Valley experience significant foot traffic from anglers.

EO Data: Scattered and stunted conifers include tamarack (*Larix laricina*) and black spruce (*Picea mariana*). Canopy closure ranges from 5-15%. The tall shrub layer comprises 10-15% of the area and is characterized by speckled alder (*Alnus incana*), tamarack, and slender willow (*Salix petiolaris*). The low shrub layer comprises 20-40% of the area and is characterized by red-osier dogwood (*Cornus sericea*), alder-leaved buckthorn (*Rhamnus alnifolia*), willows (*Salix* spp.), tamarack, and northern white cedar (*Thuja occidentalis*). Characteristic ground cover species include sedges (*Carex* spp., *C. flava, C. sterilis*), rough-leaved goldenrod (*Solidago patula, S. rugosa*), marsh fern (*Thelypteris palustris*), bog lobelia (*Lobelia kalmii*), wild strawberry (*Fragaria virginiana*), joe-pye-weed (*Eutrochium maculatum*), boneset (*Eupatorium perfoliatum*), broad-leaved cattail (*Typha latifolia*), swamp aster (*Symphyotrichum* sp.), northern bugle weed (*Lycopus uniflorus*), grass-leaved goldenrod (*Euthamia graminifolia*), grass-of-Parnassus (*Parnassia glauca*), fringed brome (*Bromus ciliatus*), and wild mint (*Mentha canadensis*). Several small rivulets flowed through the fen (Figure 4).

The soils are characterized by deep, saturated peats (> 1 m; pH 7.4-7.7).

2023 Addendum: Tall buttercup (*Ranunculus acris*) was found sparsely throughout the fen. Other invasive species were found along the roadside including: leafy spurge (*Euphorbia virgata*), ox-eye daisy (*Leucanthemum vulgare*), reed canary grass (*Phalaris arundinacea*), and white campion (*Silene latifolia*). Yellow lady-slipper (*Cypripedium parviflorum*) was blooming during the visit (Figure 5).

Figure 4. Rivulet flowing through Jordan River Fen (EO ID 18798) on June 20, 2023. Photograph by Julie McLaughlin.

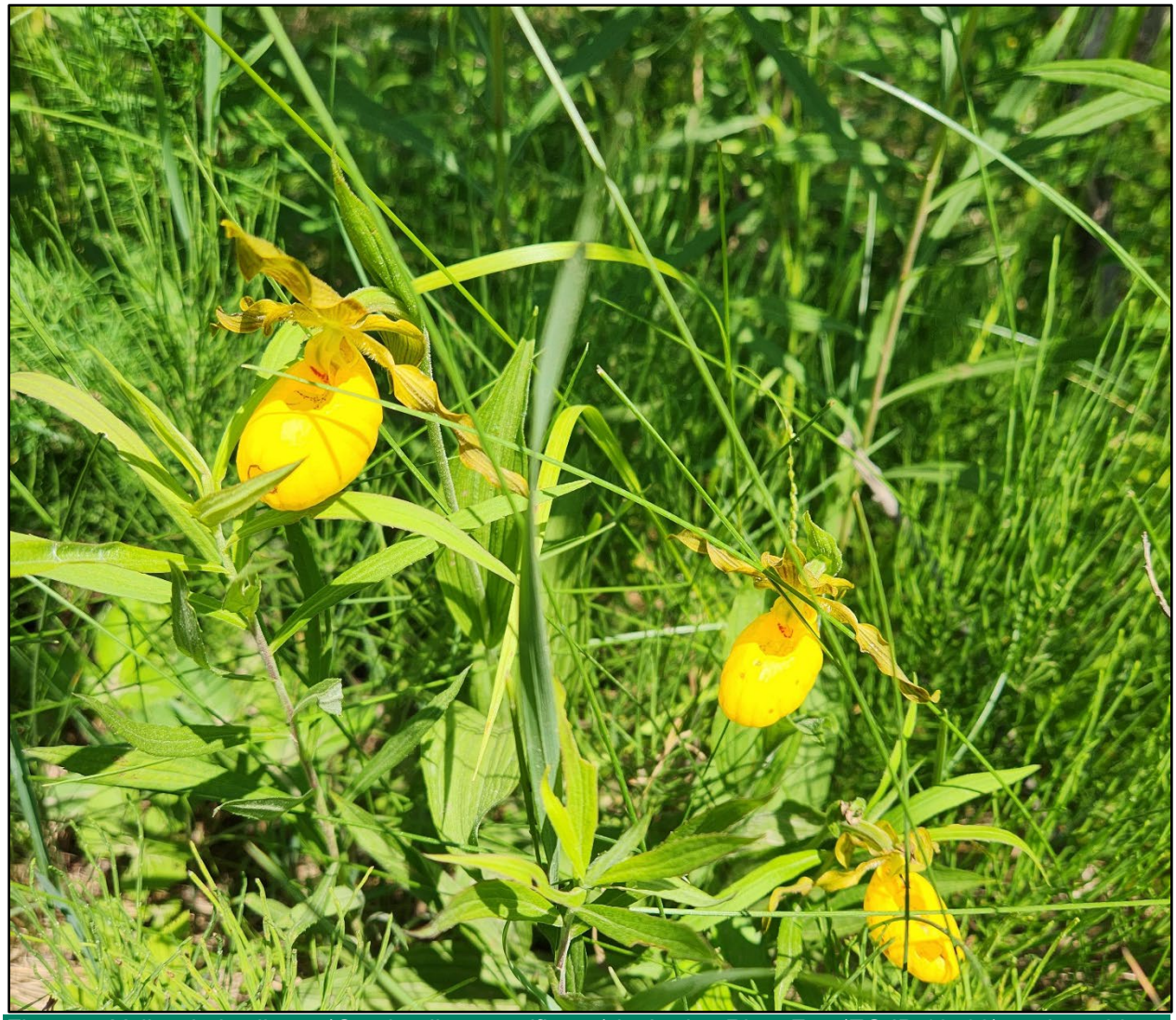

Figure 5. Yellow lady-slipper (*Cypripedium parviflorum*) in Jordan River Fen (EO ID 18798) on June 20, 2023. Photograph by Julie McLaughlin.

Natural Community Type: Northern shrub thicket
Rank: G4 S5

EO Identification Number: 18797 (Jordan River)

EO Size: 4.2 acres

EO Rank and Justification: B**.** Small pocket of northern shrub thicket occurring along riparian area within the Jordan River Valley surrounded by steep end moraines. Species composition and structure driven by natural processes. Drainage associated with Jordan River is dominated by rich conifer swamp and surrounding moraines are dominated by mature northern hardwoods, managed by Gaylord Forest Management Unit.

Complex is within part of a large block of unfragmented state forest managed for timber production, wildlife, recreation, and biodiversity. A dirt road winds along the bottom of the Jordan River Valley and hiking trails occur within the wetlands and in the surrounding upland forest. Rivers and streams within the Jordan River Valley experience significant foot traffic from anglers.

EO Data: Northern shrub thicket is dominated by dense speckled alder (*Alnus incana*) with tall shrub associates including red-osier dogwood (*Cornus sericea*), slender willow (*Salix petiolaris*), and cherry (*Prunus* spp.). Scattered overstory species include tamarack (*Larix laricina*), red maple (*Acer rubrum*), northern white cedar (*Thuja occidentalis*), and black ash (*Fraxinus nigra*). The low shrub layer is characterized by meadowsweet (*Spiraea alba*), wild red raspberry (*Rubus strigosus*), and alder-leaved buckthorn (*Rhamnus alnifolia*). Characteristic ground cover species include tussock sedge (Carex stricta), bluejoint grass (*Calamagrostis canadensis*), rough-leaved goldenrod (*Solidago rugosa*), joe-pye-weed (*Eutrochium maculatum*), purple avens (*Geum rivale*), marsh skullcap (*Scutellaria galericulata*), marsh fern (*Thelypteris palustris*), purple meadow-rue (*Thalictrum dasycarpum*), broad-leaved cattail (*Typha latifolia*), wild mint (*Mentha canadensis*), dwarf raspberry (*Rubus pubescens*), and sensitive fern (*Onoclea sensibilis*; Figure 6).

The soils are characterized by deep (> 1 m), saturated peats (pH 7.2-7.5).

2023 Addendum: Honeysuckle shrubs (*Lonicera morrowii*) and bittersweet nightshade (*Solanum dulcamara*) were sparce in density throughout the thicket.

Figure 6. Jordan River northern shrub thicket (EO ID18797) is dominated by speckled alder, dogwood, sedges, and ferns.

Management Recommendations

The main management recommendations are to allow natural processes to operate unhindered and to retain an intact buffer of natural communities surrounding the wetlands to minimize the threat of hydrological alteration. Reducing local deer densities is also recommended. Monitor and treat invasive species, especially near Jordan River Road and frequently used footpaths. Within the Northern Fen, tall buttercup was observed throughout the EO in 2023. Other common invasive species were documented along the road adjacent to the fen habitat. Within the northern shrub thicket EO, honeysuckle shrubs and bittersweet nightshade were documented with a sparce density in the area.

Management Priority Rank: Medium

Warner Creek, Antrim County

Compartment | Stand(s): 52048|006, 001, 004, 010, 014, 017; 52047|010, 011, 012

Landowner/Manager: State Forest (Forest Resource Division)

Size: 174.4 acres

Location: West of US 131 on M-32 is Warner Creek Pathway Trailhead, part of North Country Trail network. Hike west then south on trail. (Figure 7).

Survey Type(s): Evaluate for EO status, invasive plant species surveys

Natural Community Type(s): Northern fen, northern shrub thicket, northern wet meadow, rich conifer swamp (Figure 8)

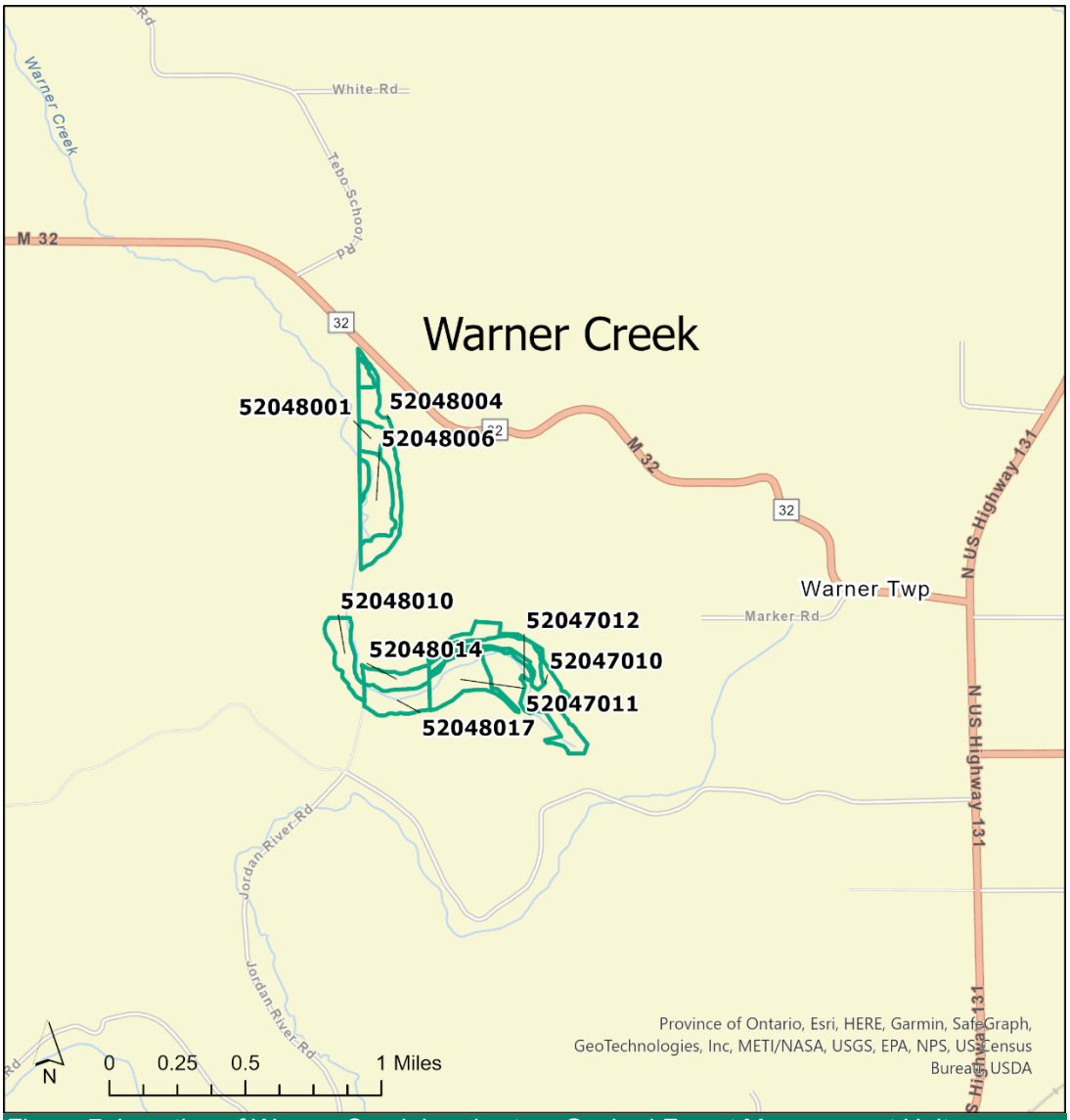

Figure 7. Location of Warner Creek headwaters Gaylord Forest Management Unit, Compartments 52047 and 52048 on State Lands in Antrim County, Michigan, USA.

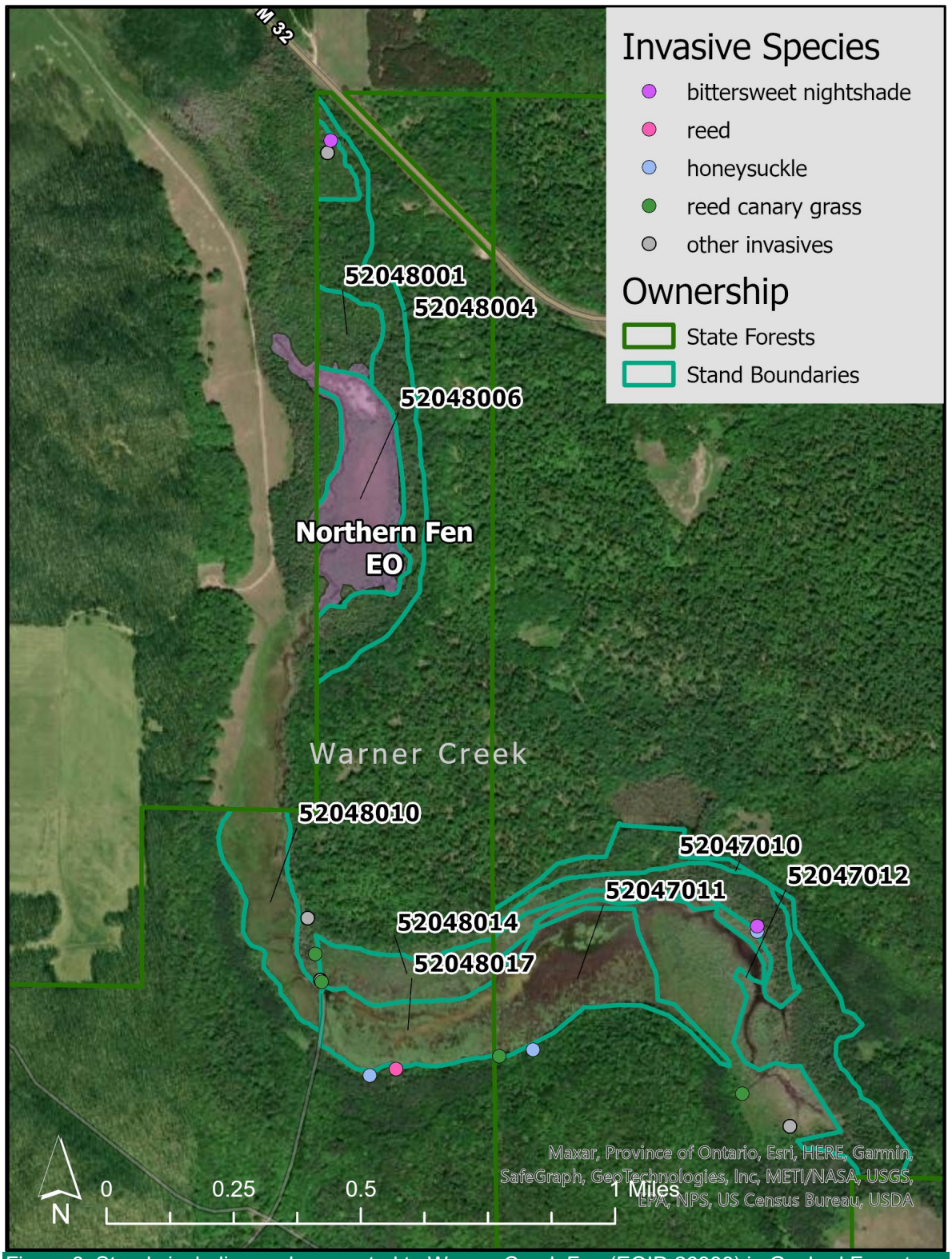

Figure 8. Stands including and connected to Warner Creek Fen (EOID 26388) in Gaylord Forest Management Unit, Compartments 52048 and 52047. Cyan lines are stand borders. Green lines are State Forest boundaries. The transparent purple area is the northern fen EO. Each dot is an observed invasive species described in legend.

Natural Community Type: Northern Fen
Compartment | Stand(s): 52048|006

Rank: G3 S3

EO Identification Number: 26388 (Warner Creek Fen)

EO Size: 21.0 acres

EO Rank and Justification: BC. Northern fen with high quality species, high FQA (60.9). Although no invasive species were present, invasive reed (*Phragmites australis* ssp. *australis*) and reed canary grass (*Phalaris arundinacea*) were present upstream. Evidence of deer restricted to periphery. Beaver active in area, including at northern and southern ends of the fen. Private lands about 50 m to west. Complex is within part of a block of unfragmented state forest managed for timber production, wildlife, recreation, and biodiversity. Surrounding upland forest and swamps managed by MDNR Gaylord Forest Management Unit and have been logged. Hiking trail 100m to the east.

EO Data: Northern fen is mostly on a riverine island formed by Warner Creek west of Warner Creek Pathway, which connects to North Country Trail network. Sedge family (Cyperaceae) dominant with species dominance varying throughout and tree and *Sphagnum* moss mounds. Most of the diversity is in the north with marly, mud flats and *Sphagnum*-Cedar mounds (Figure 9; Figure 10). Tree species were northern white-cedar (*Thuja occidentalis*), tamarack (*Larix laricina*), and white pine (*Pinus strobus*). The trees in the mounds were approximately 35 years old, DBH was mostly 7.0 – 8.0 cm, but some reached 29.0 cm.

Southern area transitions sharply from tussock and Buxbaum sedge (*Carex stricta, C. buxbaumii*) dominance to twig-rush (*Cladium marsicoides*) and shrubby cinquefoil (*Dasiphora fruticosa*) with wire sedge (*C. lasiocarpa*) throughout. The change in dominant vegetation caused the color change seen on imagery. Some beaver activity (Figure 11). No invasive plant species observed, but some upstream: invasive reed, reed canary grass.

A plant species list can be found in Appendix D: Plant Species List.

Sphagnum mounds have approximately 31.0 cm of black organic peat (pH 7.5), above gray, gritty, sandy clay marl (pH 8.4). Marl zone had approximately 19.0 cm of fibric peat (pH 8.0) over gray marl (pH 8.2). Most Cyperaceae dominated zones had 14.5 – 18.0 cm of fibric peat (pH 7.0 – 7.7) over 18.5 cm to greater than 80 cm of hemic peat (pH 7.3-7.5) over marl (pH 8.0). The large area dominated by twig rush and wire sedge was comprised of only 8.5 cm of fibric peat (pH 7.5) over 20.5 cm of hemic peat (pH 7.2), over marl (pH 8.2).

2023 Addendum: The spring visit in 2023 resulted in observations of an additional 33 native species and no non-native species. This raised the FQA score from 51.7 to 60.9 and species richness to 132. Areas with FQIs greater than 50 represent a significant

component of Michigan's native biodiversity and natural landscapes (Herman et al. 2001). Most of the additions were spring bloomers like Cyperaceae, Ericaceae and *Viola*, but there were also additions of species in transitional areas from fen to rich conifer swamp (e.g., *Trientalis borealis, Maianthemum canadense*). No listed species or non-native species were observed. The plant species list in Appendix D: Plant Species List was updated to include those species.

Management Recommendations

No invasive plant species were observed within the EO boundaries. Figure 8 contains points of invasive species observed upstream from EO: reed canary grass and invasive reed. Currently managed and old trails among stands act as another pathway for invasive species. Treat invasive species in stages upstream from EO. Monitor and treat invasive species along trails, creek, and beaver dams. Hydrology may be altered by beaver activity.

Management Priority Rank: High

Figure 9. Marl zone in northern portion of northern fen EOID 26388 on September 2, 2022. Photograph by Rachel Hackett.

Figure 10. Marl zone in northern portion of northern fen EOID 26388 on June 15, 2023. Photograph by Rachel Hackett.

Figure 11. Beaver dam at the northern end of the fen near private property on June 15, 2023. Photograph by Rachel Hackett.

[redacted], Emmet County

Landowner/Manager: Little Traverse Conservancy

Size: 35.9 acres

Location: East of Petoskey near Round and Crooked Lakes. West of Bellmer Road north of the Bellmer and Burke Road intersection (Figure 12).

Survey Type(s): EO/ERA Revisit

Natural Community Type(s): Northern fen, rich conifer swamp (Figure 13)

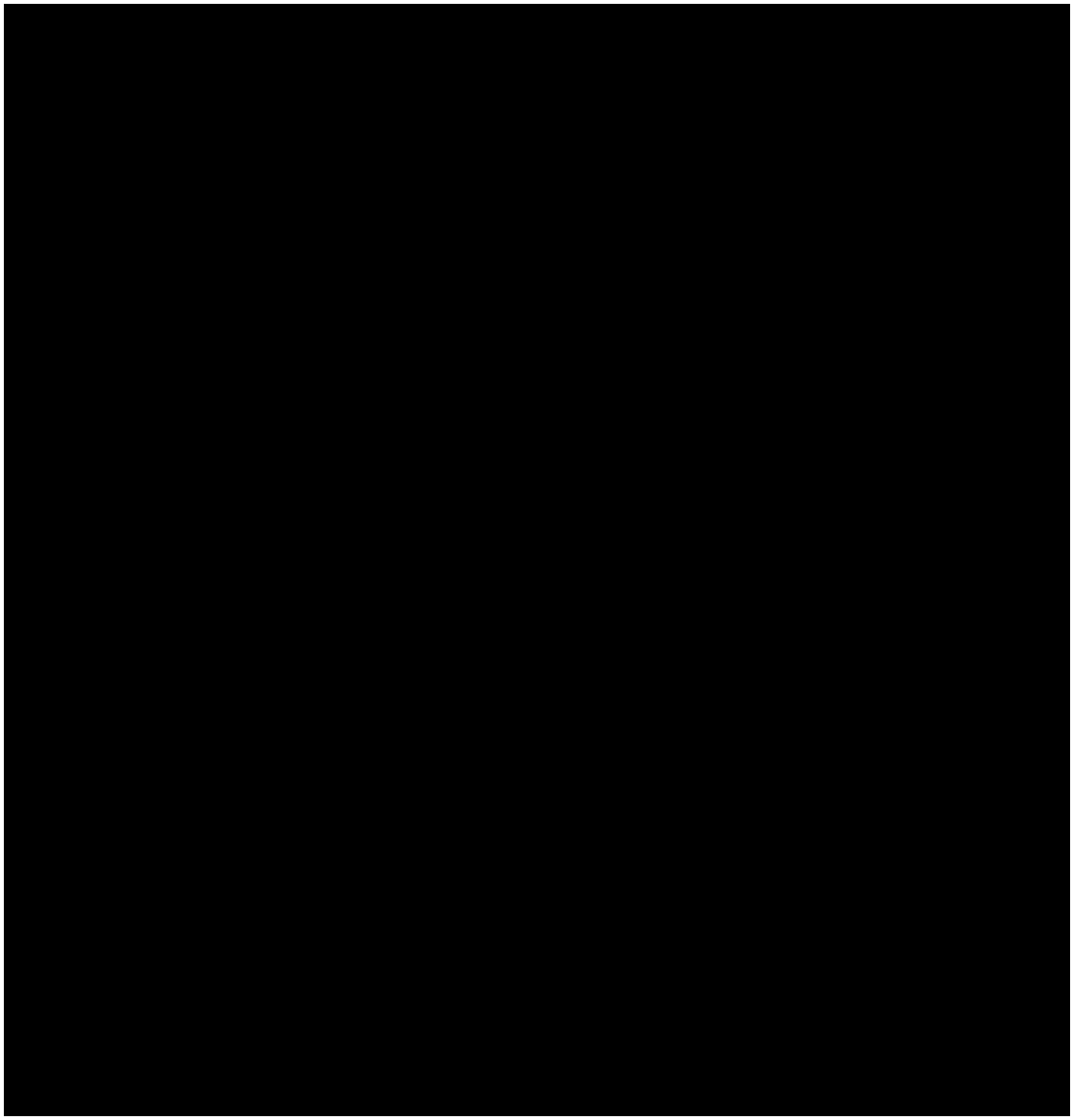

Figure 12. Location of [redacted] in Emmet County, Michigan, USA.

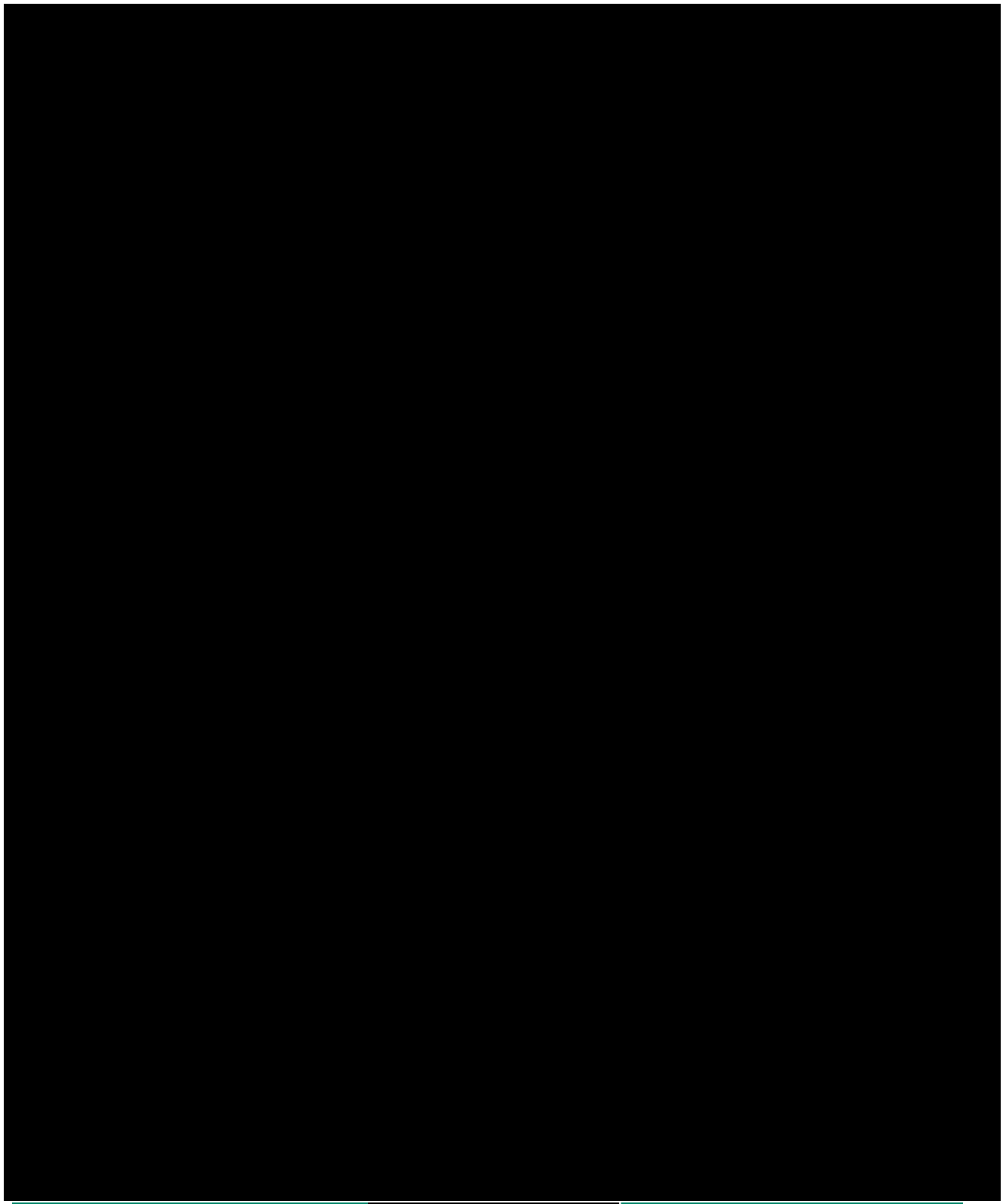

Figure 13. Northern fen (EOID 2169) in [redacted]. Yellow lines are the property borders, transparent yellow represents the northern fen EO. Each dot is an observed invasive species described in legend.

***Amerochis rotundifolia*, small round-leafed orchis**
Rank: G5 S1

EO Identification Number: 6758 (Orchis Fen)

Survey data: Failed to find on July 7, 2023, after effort of 3 hours. Habitat appeared suitable and located areas with typical associated species and those listed in most recent observation (e.g., *Carex leptalea*, *Cypripedium parviflorim*, *C. reginae*, *Maiathemum trifolium*, *Picea mariana*, *Platanthera clavellata*, *Rhamnus alnifolia*, *Typha* sp., *Thuja occidentalis*, *Thelypteris palustris*, *Vaccinium oxycoccos*), but no individual was found. This species is reasonably hard to detect, but it has not been observed in this location since July 14, 1981, when it was fruiting.

Flooding in recent years contributed to greater cattail (*Typha* sp.) dominance in south. This may have reduced or altered habitat. European marsh thistle (*Cirsium palustre*) was common, occasional glossy buckthorn (*Frangula alnus*) in suitable habitat.

[redacted], Emmet County

Landowner/Manager: Little Traverse Conservancy

Size: 36.5 acres

Location: West of Harbor Springs; turn off M-119/North Lake Shore Drive/Tunnel of Trees Scenic Heritage Route on Lower Shore Drive. Preserves are on the southwest side of the road (Figure 14).

Survey Type(s): Invasive species survey, plant EO revisit

Natural Community Type(s): Open dunes, rich conifer swamp, hardwood-conifer swamp (Figure 15)

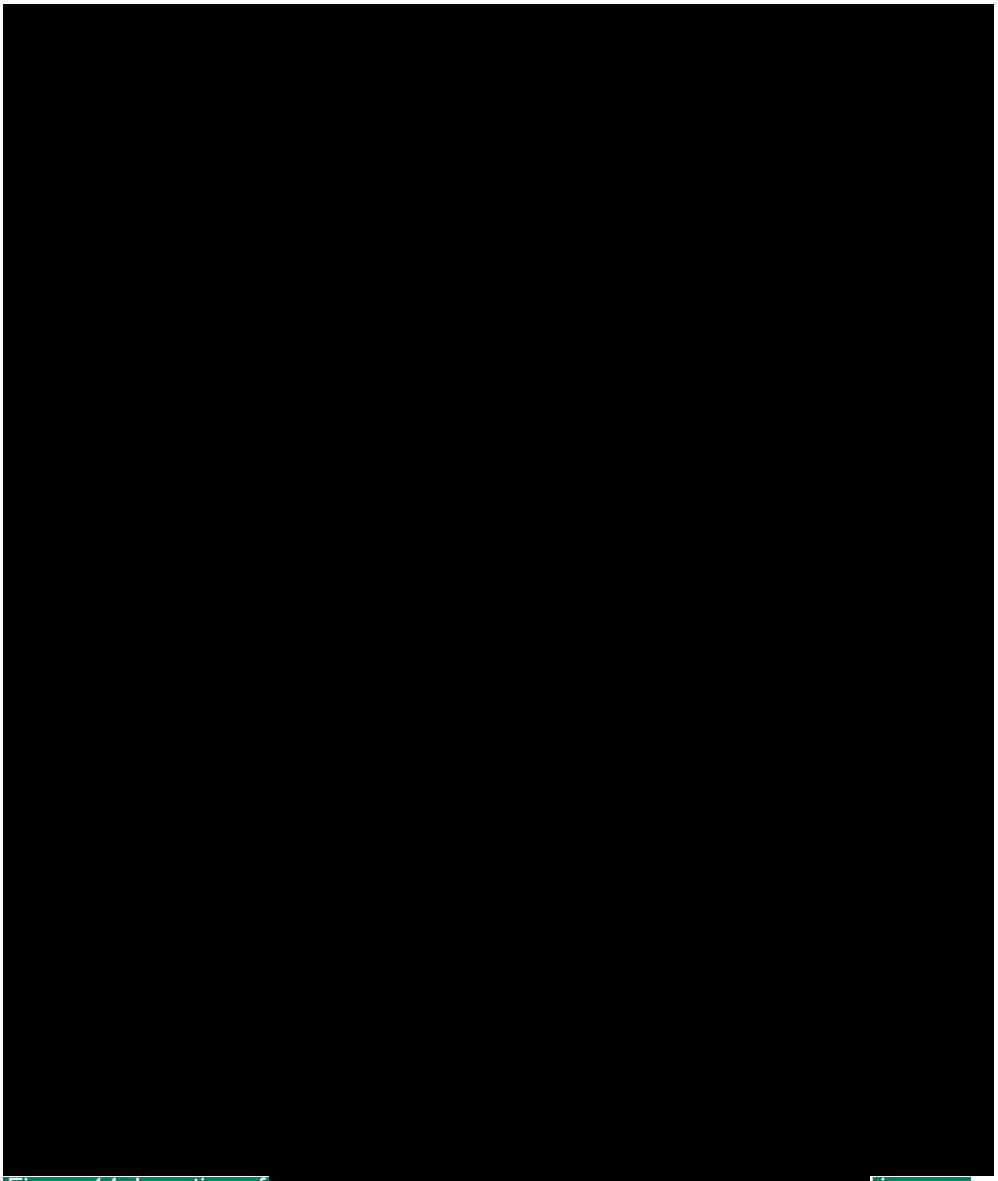

Figure 14. Location of [redacted] in Emmet County, Michigan, USA.

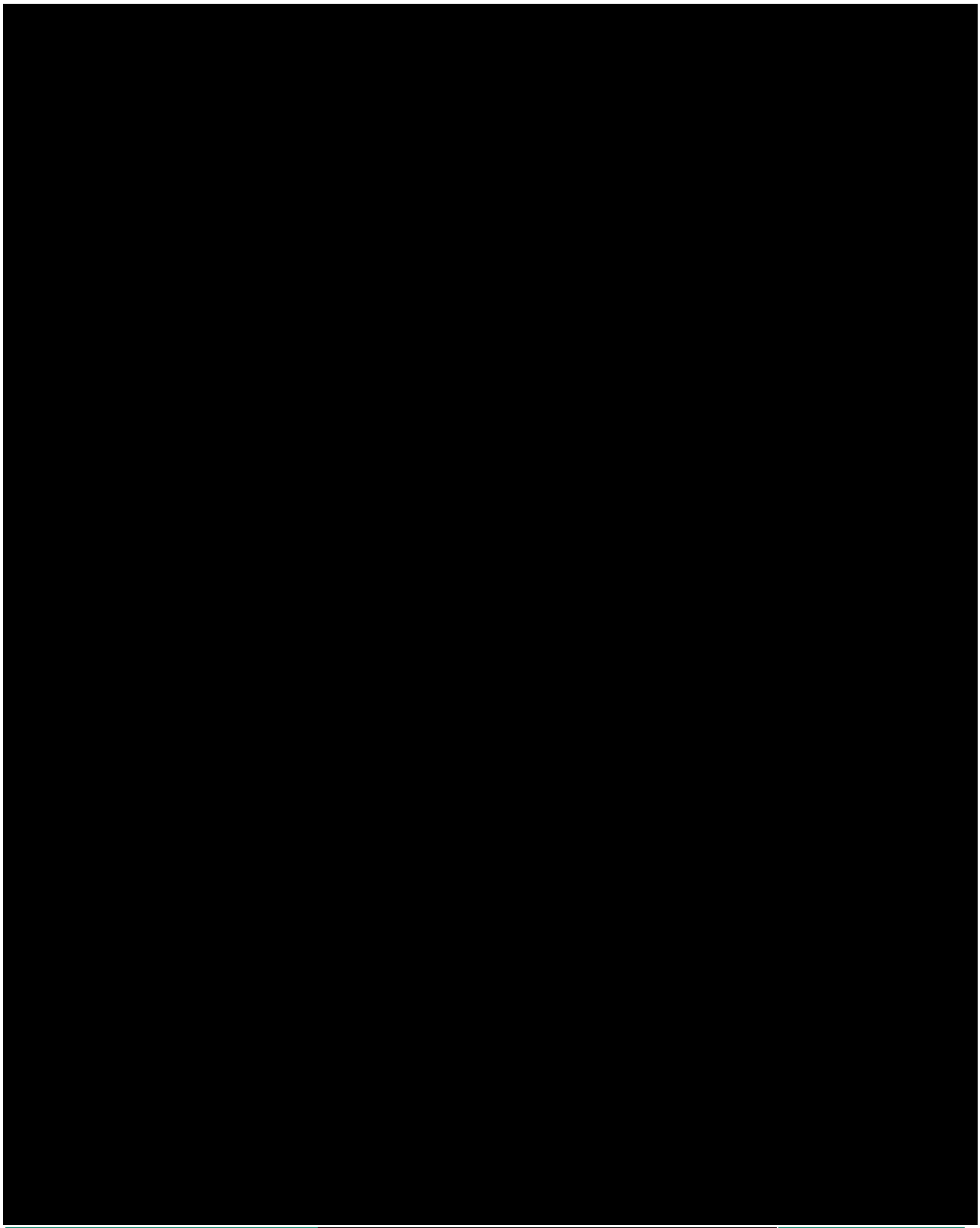

Figure 15. Natural communities at [redacted]: transparent teal is hardwood-conifer swamp, transparent purple is rich conifer swamp, and transparent yellow is open dunes. Each dot is an observed invasive species described in legend.

***Bromus pumpellianus*, Pumpelly's brome**
Rank: G5T5 S2

EO Identification Number: NA

Survey data: Preserve was visited on July 7, 2023. Patch of brome grass observed in 2022 was not Pumpelly's brome, but the widespread non-native smooth brome (*B. inermis*). Specimens lacked the hairs on the upper side of leaves and appropriate parts of the floret, which would have been fully developed at time of observation.

Discussion

Land management and restoration are critical for preservation and resilience of ecosystems with great importance to water quality, watershed health, and biodiversity conservation. Upon completion of 2022 surveys, a need for further information on the five locations listed was identified. This information provides an ecological foundation for developing plans for biodiversity stewardship, monitoring, and implementing landscape-level biodiversity planning to prioritize management efforts throughout the four-county region. Threats to the ecological integrity of the stands and immediate management recommendations were presented to guide managers to make efficient and effective plans with the resources they have available.

The new information gathered in 2023 provided more detail for planning management efforts, but the overall management recommendation for these areas were not altered.

Literature Cited

Albert, D. A. 1995. Regional Landscape Ecosystems of Michigan, Minnesota, and Wisconsin: A Working Map and Classification. Gen. Tech. Rep. NC-178. St. Paul, MN, USA. <https://doi.org/10.2737/NC-GTR-178>. Accessed December 2022.

Albert, D. A., J. G. Cohen, M. A. Kost, B. S. Slaughter, H. D. Enander. 2008. Distribution Maps of Michigan's Natural Communities. Michigan Natural Features Inventory, Report No. 2008-01, Lansing, MI.

Cohen, J.G.. 2011. Natural Community Surveys of Potential Biodiversity Stewardship Areas. Michigan Natural Features Inventory, Report Number 2011-08, Lansing, MI.

Cohen, J. G., M. A. Kost, B. S. Slaughter, D. A. Albert. 2015. A Field Guide to the Natural Communities of Michigan. Michigan State University Press, East Lansing, Michigan, USA.

Cole-Wick, AA, R. A. Hackett, H. D. Enander, C. M. Wilton, and J. G. Cohen. 2021. Invasive Species Management Plan for the Saginaw Chippewa Indian Tribe. Michigan Natural Features Inventory, Report No. 2021-03, Lansing, MI.

Hackett, R. A., E. A. Haber, J. B. McLaughlin, C. M. Wilton. 2023. Surveys of Coastal and Riparian systems in Charlevoix, Antrim, Kalkaska, and Emmet Counties, Michigan, USA. Michigan Natural Features Inventory, Report No. 2023-01, Lansing, MI.

Herman, K., L. A. Masters, M. R. Penskar, A. A. Reznicek, G. S. Wilhelm, W. W. Brodovich, and K. P. Gardiner. 2001. Floristic Quality Assessment With Wetland Categories and Examples of Computer Applications for the State of Michigan. Michigan Department of Natural Resources, Wildlife Division, Natural Heritage Program 1: 1–28.

Kost, M. A., D. A. Albert, J. G. Cohen, B. S. Slaughter, R. K. Schillo, C. R. Weber, K. A. Chapman. 2007. Natural Communities of Michigan: Classification and Description. Michigan Natural Features Inventory, Report No. 2007-21, Lansing, MI.

Michigan Natural Features Inventory [MNFI]. 2023. Biotics 5 - Michigan's Natural Heritage Database. Lansing, Michigan, USA [accessed 20 January 2023].
NatureServe. 2021a. Biotics 5 online help. Definitions of NatureServe Conservation Status Ranks. NatureServe, Arlington, Virginia, USA. Website <https://help.natureserve.org/biotics/>. Accessed 20 February 2021.
NatureServe. 2021b. Biotics 5 online help: EO Definitions of EO Ranks and Origin Subranks. *NatureServe, Arlington, Virginia, USA*. Website <https://help.natureserve.org/biotics/>. Accessed 28 June 2021.
Reznicek, A. A., M. R. Penskar, B. S. Walters, B. S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net

Appendix A: Definitions, NatureServe Terminology and Ranks

This appendix contains Michigan Department of Natural Resources (MDNR) terms, NatureServe and Natural Heritage Program terminology and descriptions for global, state, and element occurrence ranks (NatureServe 2021a, 2021b). Global and state ranks are assigned at a species- or natural community-level. Element occurrence ranks are assigned at a population- or stand-level.

Table A - 1. Additional definitions of terms and abbreviations used in report. Table modified from Cole-Wick et al. 2021.

Term	Description
Element Occurrence (EO)	A record of a listed species or natural community in a Natural Heritage Database that can contribute to the survival or persistence of that element
Ecological Reference Area (ERA)	A designation given by the MDNR to State Forest, State Parks, or State Wildlife Areas to denote High Conservation Value Area (as defined by the Forest Stewardship Council certification standard) and are Forests with Exceptional Conservation Value (as defined by the Sustainable Forestry Initiative certification standard). They are high quality functioning, ecosystems influenced by natural ecological processes where biological conservation is emphasized and achieved through management and/or restoration
Forest Compartment Stand Key (FCS Key)	Unique identifier for a Michigan State Forest Stand developed from numerical codes of given to the region, district, management unit, compartment, and stand
Natural Community	An assemblage of interacting plants, animals, and other organisms that repeatedly occur under similar environmental conditions across the landscape and is predominantly structured by natural processes rather than modern anthropogenic disturbances, such as timber harvest, alterations to hydrology, and fire suppression. Historically, indigenous peoples were an integral part of Michigan's natural communities with many natural community types being maintained by native management practices such as prescribed fire.
Natural Heritage Database	A repository of records documenting location, status, and characteristics of rare plant populations, animal populations, and natural communities in a designated region
Stand	Polygons representing a relatively homogeneous area of a similar land cover type and age

Table A - 2. Explanation of state and global status ranks for natural communities. Abridged table developed by NatureServe (2021a).

Status	Description	Explanation
S1	Critically Imperiled	At very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.
S2	Imperiled	At high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S3	Vulnerable	At moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
S4	Apparently secure	At a fairly low risk of extirpation in the jurisdiction due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
S5	Secure	At very low or no risk of extirpation in the jurisdiction due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.
G1	Critically Imperiled	At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
G2	Imperiled	At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
G3	Vulnerable	At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
G4	Apparently secure	At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
G5	Secure	At very low risk or extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.
GU	Unrankable	Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. NOTE: Whenever possible (when the range of uncertainty is three consecutive ranks or less), a range rank (e.g., G2G3) should be used to delineate the limits (range) of uncertainty.

Table A - 3. Definitions of basic EO Ranks for species and natural communities as defined by NatureServe. Abridged table developed by NatureServe (2021b)

Rank	Definition
A	Excellent estimated viability - Based on current information on EO rank factors (i.e., condition, size, and landscape context) for the EO, it is believed to have an excellent probability of persisting, if current conditions prevail, for a defined period of time, typically 20-100 years (for communities, persistence within the bounds of natural disturbance regimes).
B	Good estimated viability - Based on current information on EO rank factors (i.e., condition, size, and landscape context) for the EO, it is believed to have a good probability of persisting, if current conditions prevail, for a defined period of time, typically 20-100 years (for communities, persistence within the bounds of natural disturbance regimes).
C	Fair estimated viability - Based on current information on EO rank factors (i.e., condition, size, and landscape context) for the EO, it is believed to have a fair probability of persisting, if current conditions prevail, for a defined period of time, typically 20-100 years (for communities, persistence within the bounds of natural disturbance regimes).
D	Poor estimated viability - Based on current information on EO rank factors (i.e., condition, size, and landscape context) for the EO, it is believed to have a poor probability of persisting, if current conditions prevail, for a defined period of time, typically 20-100 years (for communities, persistence within the bounds of natural disturbance regimes).
E	Verified Extant - EO has been recently verified as still existing, but sufficient information on the factors used to estimate viability of the occurrence has not yet been obtained. Use of the E rank should be reserved for those situations where the occurrence is thought to be extant, but an A, B, C, D, or range rank cannot be assigned.
H	Historical - There is a lack of recent[1] field information verifying the continued existence of the EO, such as when the occurrence is based only on historical collections data, or when the occurrence was ranked A, B, C, D, or E at one time and is later, without field survey work, considered to be possibly extirpated due to general habitat loss or degradation of the environment in the area.
F	Failed to find - EO has not been found despite a search by an experienced observer at a time and under conditions appropriate for the Element at a location where it was previously reported, but that still might be confirmed to exist at that location with additional field survey efforts. For EOs with vague locational information, the search must include areas of appropriate habitat within the range of locational uncertainty. An F rank, when applicable, supersedes an A, B, C, D, E, or H rank.
X	Extirpated - There is documented destruction of the habitat or environment of the EO, or persuasive evidence of its eradication based on adequate survey (i .e. , thorough or repeated survey efforts by one or more experienced observers at times and under conditions appropriate for the Element at that location).
U	Unrankable - An EO rank cannot be assigned due to lack of sufficient information on the occurrence.
NR	Not Ranked - An EO rank has not yet been assigned to the occurrence.

[1] The term recent is generally interpreted as follows: […] For plants or communities, there has been a field survey of the occurrence within the last 20 to 40 years. This higher maximum time limit is based upon the assumption that occurrences of these Elements generally have the potential to persist at a given location for longer periods of time due to plant biology and community dynamics. However, landscape factors must also be considered; thus, areas with more anthropogenic impacts on the environment will be at the lower end of the range, and less-impacted areas will be at the higher end. These time frames represent suggested maximum limits, however the actual time period for historical EOs may vary according to the biology of the Element and the specific landscape context of each occurrence (including anthropogenic alteration of the environment).

Appendix C: Michigan Coastal and Riparian Natural Communities of Northern Lower Michigan

This appendix contains abbreviated descriptions and information about the coastal and riparian natural communities encountered for this survey. Community overviews are described in Kost et al. 2007 and Cohen et al. 2015. Ecoregion community maps are taken from Albert et al. 2008.

Table C - 1. List of Michigan coastal and riparian natural communities encountered during this project. Global and State Rank refers to the global and subnational rarity of each community (See Appendix A: Definitions, NatureServe Terminology and Ranks).

Natural Community	Global Rank	State Rank	Page
Northern fen	G3	S3	32
Northern shrub thicket	G4	S5	33
Open dune	G3	S3	34
Rich conifer swamp	G4	S3	35

Northern fen

G3 S3

Overview: Northern fen is a sedge- and rush-dominated wetland occurring on neutral to moderately alkaline saturated peat and/or marl influenced by groundwater rich in calcium and magnesium carbonates. The community occurs north of the climatic tension zone and is found primarily where calcareous bedrock underlies a thin mantle of glacial drift on flat areas or shallow depressions of glacial outwash and glacial lakeplains and also in kettle depressions on pitted outwash and moraines Northern fens can be found in the northern Lower and eastern Upper Peninsulas of Michigan.

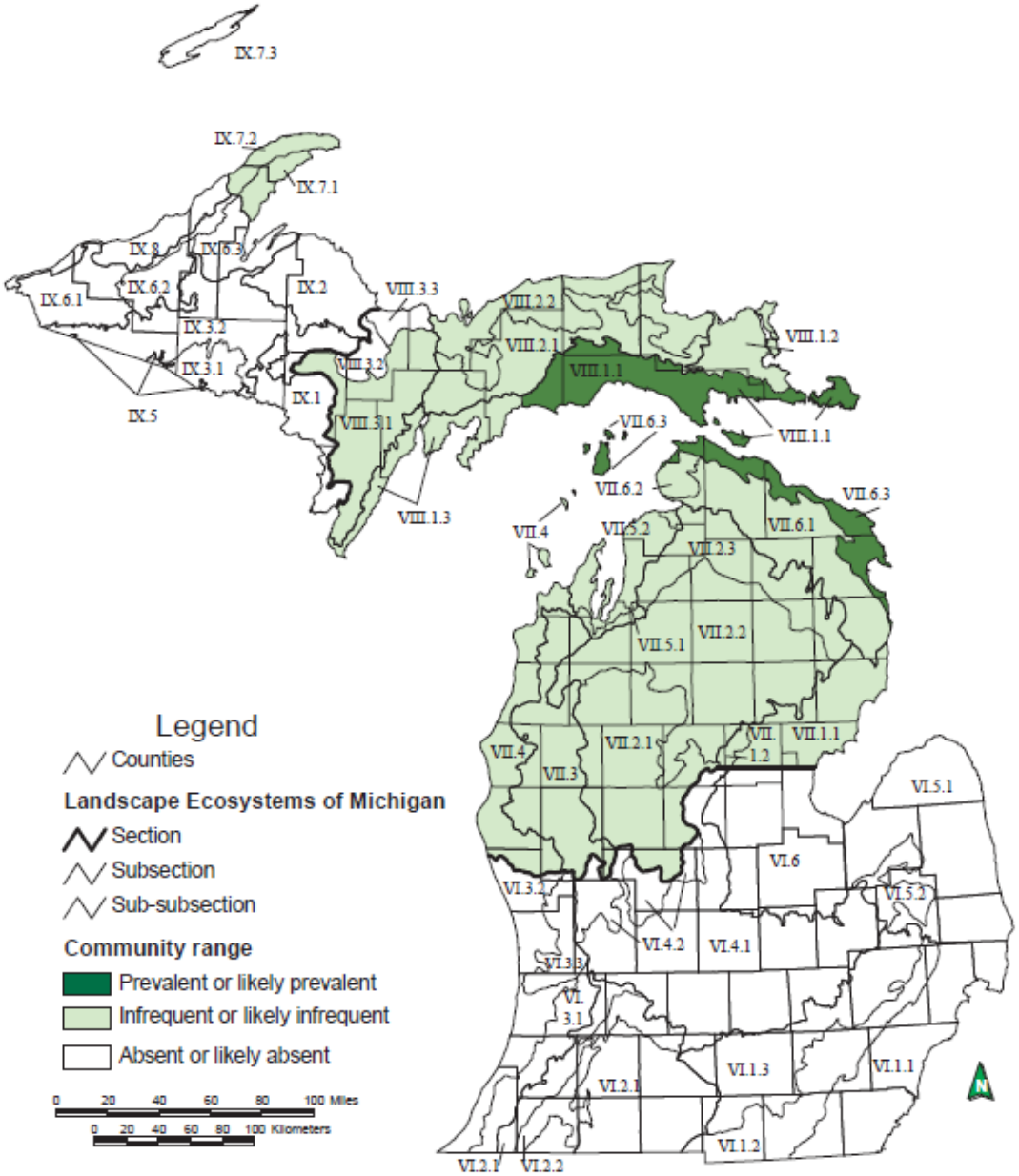

Figure C - 1. Distribution of northern fen in Michigan.

Northern shrub thicket

G4 S5

Overview: Northern shrub thicket is a shrub-dominated wetland located north of the climatic tension zone, typically occurring along streams, but also adjacent to lakes and beaver floodings. The saturated, nutrient-rich, organic soils are composed of sapric peat or less frequently mineral soil, typically with medium acid to neutral pH. Succession to closed-canopy swamp forest is slowed by fluctuating water tables, beaver flooding, and windthrow. Northern shrub thickets are overwhelmingly dominated by speckled alder (*Alnus incana*).

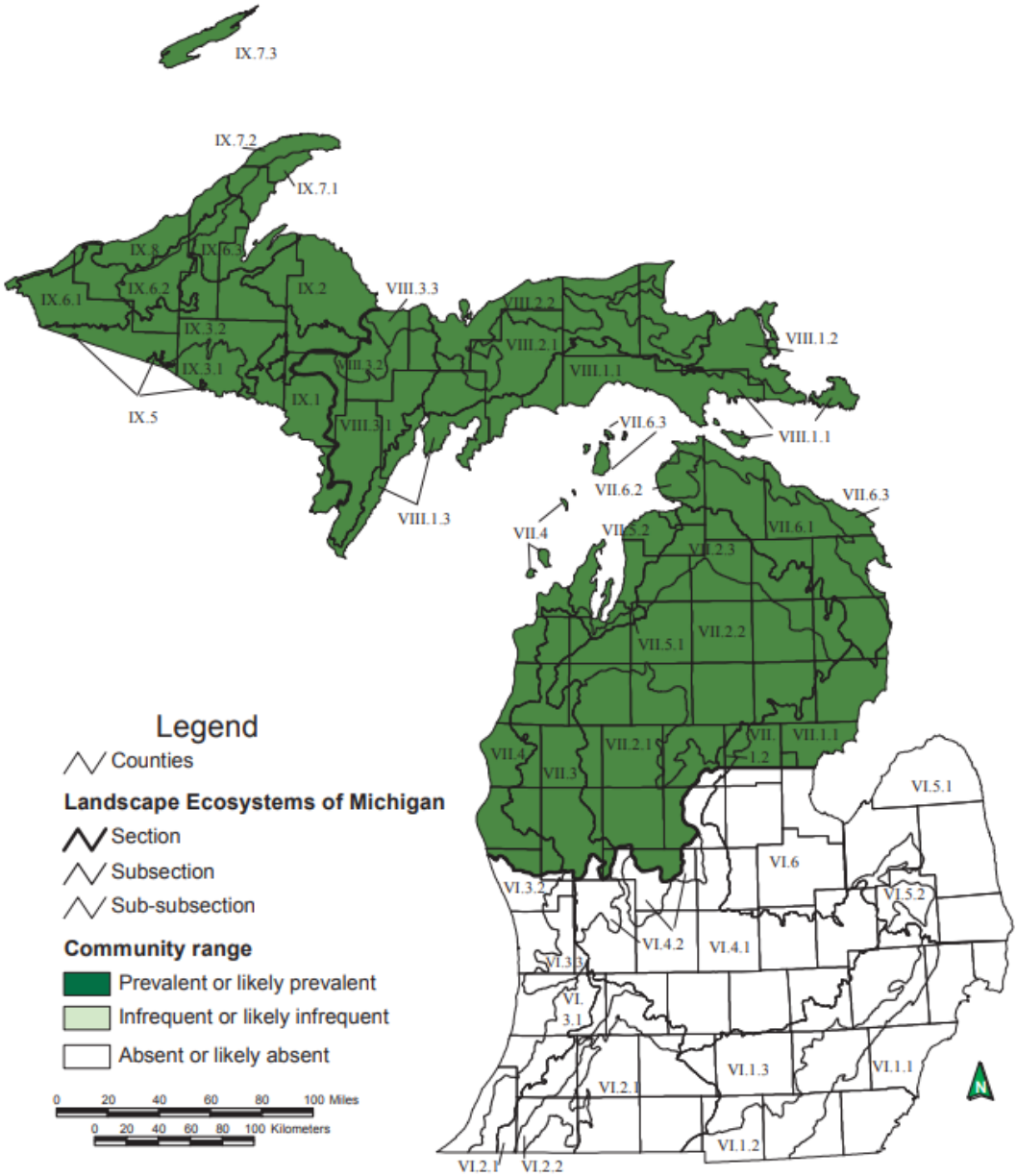

Figure C - 2. Distribution of northern shrub thicket in Michigan.

Open dunes

G3 S3

Overview: Open dunes is a grass- and shrub-dominated multi-seral community located on wind-deposited sand formations near the shorelines of the Great Lakes. Dune formation and the patterning of vegetation are strongly affected by lake-driven winds. The greatest concentration of open dunes occurs along the eastern and northern shorelines of Lake Michigan, with the largest dunes along the eastern shoreline due to the prevailing southwest winds.

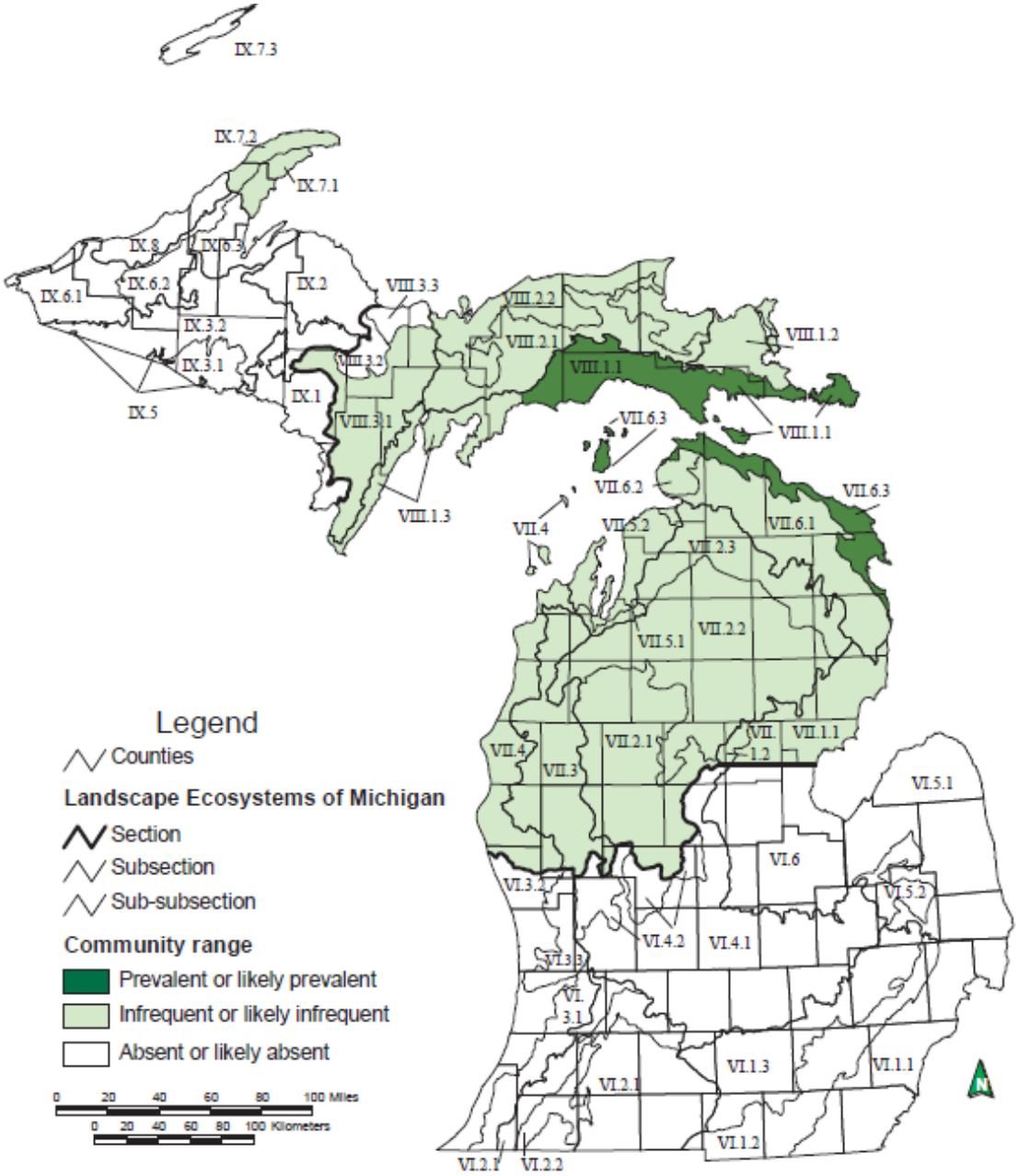

Figure C - 3. Distribution of open dunes in Michigan.

Rich conifer swamp

G4 S3

Overview: Rich conifer swamp is a groundwater-infl uenced, minerotrophic, forested wetland dominated by northern white-cedar (*Thuja occidentalis*) that occurs on organic soils (i.e., peat) primarily north of the climatic tension zone in the northern Lower and Upper Peninsulas. Rich conifer swamp occurs in outwash channels, outwash plains, glacial lakeplains, and in depressions on coarse- to medium-textured ground moraines. It is common in outwash channels of drumlin fields and where groundwater seeps occur at the bases of moraines. Rich conifer swamp typically occurs in association with lakes and cold, groundwater-fed streams. It also occurs along the Great Lakes shoreline in old abandoned embayments and in swales between former beach ridges where it may be part of a wooded dune and swale complex. Windthrow is common, especially on broad, poorly drained sites. Fire was historically infrequent. Rich conifer swamp is characterized by diverse microtopography and ground cover. The community is also referred to as cedar swamp.

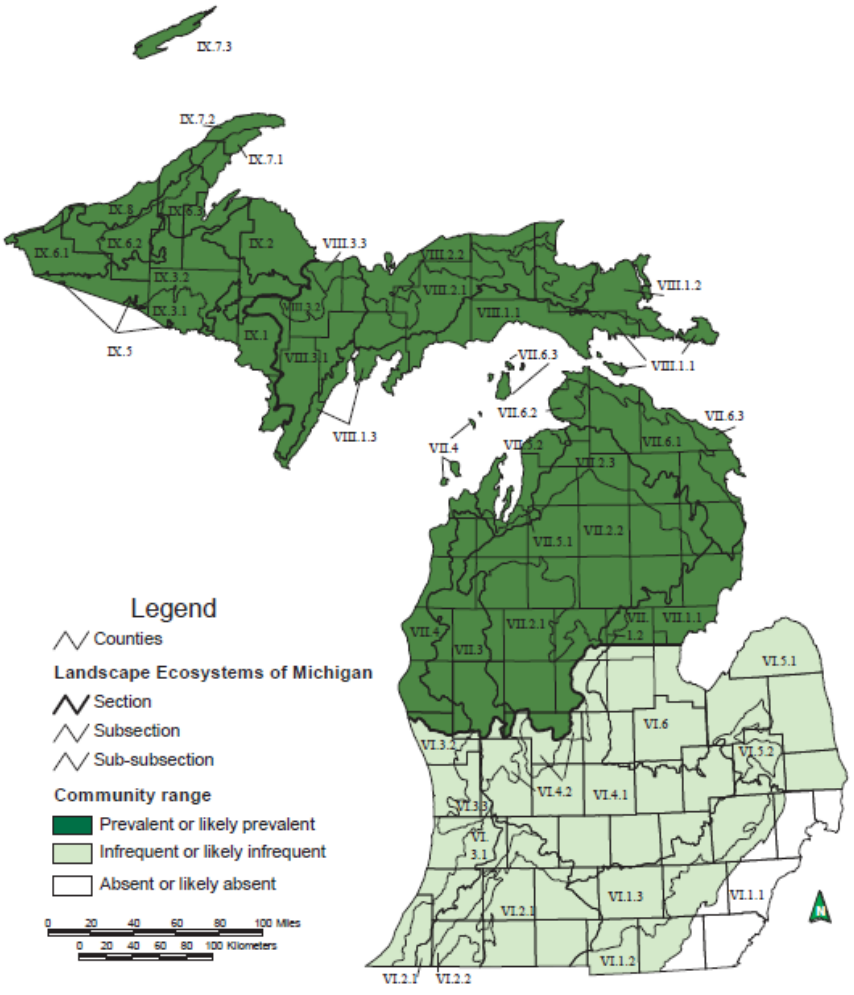

Figure C - 4. Distribution of rich conifer swamp in Michigan.

Appendix D: Plant Species List

This appendix contains an updated plant species list for Warner Creek fen (EOID 26388). Stand lists are not all comprehensive, but they were based on the surveys conducted at the time and information available in other survey records (Cohen 2011, 2021, 2022, MNFI 2023; Hackett et al. 2023). A digital file of this updated list with the 2022 plant lists including additional columns was also updated and submitted as supplemental material to this report addendum for easier sorting by partners.

Taxonomy from Michigan Flora (Reznicek et al. 2014) was used.

Reznicek, AA, MR Penskar, B. S. Walters, B. S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. http://michiganflora.net

StandID	Site Name	EOID	*SCIENTIFIC_NAME*	COMMON_NAME	RFSS	NNIP	Note
52048006	Warner Creek Fen	26388	*Abies balsamea*	BALSAM FIR			
52048006	Warner Creek Fen	26388	*Acer rubrum*	RED MAPLE			
52048006	Warner Creek Fen	26388	*Agalinis purpurea*	PURPLE FALSE FOXGLOVE			
52048006	Warner Creek Fen	26388	*Amelanchier sanguinea*	ROUND-LEAVED SERVICEBER			
52048006	Warner Creek Fen	26388	*Andromeda glaucophylla*	BOG-ROSEMARY			
52048006	Warner Creek Fen	26388	*Aronia prunifolia*	CHOKEBERRY			
52048006	Warner Creek Fen	26388	*Asclepias incarnata*	SWAMP MILKWEED			
52048006	Warner Creek Fen	26388	*Bidens cernua*	NODDING BEGGAR-TICKS			
52048006	Warner Creek Fen	26388	*Bidens connata*	PURPLE-STEMMED TICKSEED			
52048006	Warner Creek Fen	26388	*Bromus ciliatus*	FRINGED BROME			
52048006	Warner Creek Fen	26388	*Calamagrostis canadensis*	BLUE-JOINT			
52048006	Warner Creek Fen	26388	*Caltha palustris*	MARSH-MARIGOLD, COWSLI			
52048006	Warner Creek Fen	26388	*Campanula aparinoides*	MARSH BELLFLOWER			
52048006	Warner Creek Fen	26388	*Carex aquatilis*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex aurea*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex buxbaumii*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex castanea*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex cryptolepis*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex diandra*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex flava*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex hystericina*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex interior*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex lasiocarpa*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex leptalea*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex prairea*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex sterilis*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex stricta*	SEDGE			
52048006	Warner Creek Fen	26388	*Carex viridula*	SEDGE			
52048006	Warner Creek Fen	26388	*Chamaedaphne calyculata*	LEATHERLEAF			
52048006	Warner Creek Fen	26388	*Cicuta bulbifera*	WATER HEMLOCK			
52048006	Warner Creek Fen	26388	*Cinna latifolia*	WOOD REEDGRASS			
52048006	Warner Creek Fen	26388	*Cirsium muticum*	SWAMP THISTLE			
52048006	Warner Creek Fen	26388	*Cladium mariscoides*	TWIG-RUSH			
52048006	Warner Creek Fen	26388	*Coptis trifolia*	GOLDTHREAD			
52048006	Warner Creek Fen	26388	*Cornus foemina*	GRAY DOGWOOD			
52048006	Warner Creek Fen	26388	*Cornus sericea*	RED-OSIER			
52048006	Warner Creek Fen	26388	*Cypripedium parviflorum*	YELLOW LADY-SLIPPER			
52048006	Warner Creek Fen	26388	*Cypripedium reginae*	SHOWY LADY-SLIPPER			
52048006	Warner Creek Fen	26388	*Dasiphora fruticosa*	SHRUBBY CINQUEFOIL			
52048006	Warner Creek Fen	26388	*Drosera rotundifolia*	ROUND-LEAVED SUNDEW			

StandID	Site Name	EOID	*SCIENTIFIC_NAME*	COMMON_NAME	RFSS	NNIP	Note
52048006	Warner Creek Fen	26388	*Dryopteris cristata*	CRESTED SHIELD FERN			
52048006	Warner Creek Fen	26388	*Eleocharis elliptica*	GOLDEN-SEEDED SPIKE RUSH			
52048006	Warner Creek Fen	26388	*Eleocharis intermedia*	SPIKE-RUSH			
52048006	Warner Creek Fen	26388	*Eleocharis palustris*	SPIKE-RUSH			
52048006	Warner Creek Fen	26388	*Eleocharis rostellata*	SPIKE-RUSH			
52048006	Warner Creek Fen	26388	*Epilobium ciliatum*	WILLOW-HERB			
52048006	Warner Creek Fen	26388	*Epilobium coloratum*	CINNAMON WILLOW-HERB			
52048006	Warner Creek Fen	26388	*Equisetum palustre*	MARSH HORSETAIL			
52048006	Warner Creek Fen	26388	*Eriophorum angustifolium*	NARROW-LEAVED COTTON-G			
52048006	Warner Creek Fen	26388	*Eriophorum viridicarinatum*	GREEN-KEELED COTTON-GRA			
52048006	Warner Creek Fen	26388	*Eupatorium perfoliatum*	BONESET			
52048006	Warner Creek Fen	26388	*Eutrochium maculatum*	JOE-PYE-WEED			
52048006	Warner Creek Fen	26388	*Fragaria virginiana*	WILD STRAWBERRY			
52048006	Warner Creek Fen	26388	*Fraxinus pennsylvanica*	GREEN ASH, RED ASH			Sapling
52048006	Warner Creek Fen	26388	*Galium asprellum*	ROUGH BEDSTRAW			
52048006	Warner Creek Fen	26388	*Gaultheria hispidula*	CREEPING-SNOWBERRY			
52048006	Warner Creek Fen	26388	*Gaultheria procumbens*	TEABERRY, WINTERGREEN			
52048006	Warner Creek Fen	26388	*Geum rivale*	PURPLE AVENS			
52048006	Warner Creek Fen	26388	*Glyceria striata*	FOWL MANNA GRASS			
52048006	Warner Creek Fen	26388	*Gymnocarpium dryopteris*	OAK FERN			
52048006	Warner Creek Fen	26388	*Hieracium*	HAWKWEED		0	
52048006	Warner Creek Fen	26388	*Ilex verticillata*	MICHIGAN HOLLY, WINTERB			
52048006	Warner Creek Fen	26388	*Impatiens capensis*	SPOTTED TOUCH-ME-NOT			
52048006	Warner Creek Fen	26388	*Iris versicolor*	WILD BLUE FLAG			
52048006	Warner Creek Fen	26388	*Juncus brachycephalus*	RUSH			
52048006	Warner Creek Fen	26388	*Juncus effusus*	SOFT-STEMMED RUSH			
52048006	Warner Creek Fen	26388	*Larix laricina*	LARCH, TAMARACK			DBH 8 cm
52048006	Warner Creek Fen	26388	*Linnaea borealis*	TWINFLOWER			
52048006	Warner Creek Fen	26388	*Lobelia kalmii*	KALM'S LOBELIA, BROOK LOB			
52048006	Warner Creek Fen	26388	*Lonicera canadensis*	CANADIAN FLY HONEYSUCKL			
52048006	Warner Creek Fen	26388	*Lycopus americanus*	COMMON WATER HOREHOU			
52048006	Warner Creek Fen	26388	*Lycopus uniflorus*	NORTHERN BUGLE WEED			
52048006	Warner Creek Fen	26388	*Maianthemum canadense*	WILD LILY-OF-THE-VALLEY, C			
52048006	Warner Creek Fen	26388	*Menyanthes trifoliata*	BUCKBEAN, BOGBEAN			
52048006	Warner Creek Fen	26388	*Mitella nuda*	NAKED MITERWORT			
52048006	Warner Creek Fen	26388	*Muhlenbergia glomerata*	MARSH WILD-TIMOTHY			
52048006	Warner Creek Fen	26388	*Muhlenbergia mexicana*	LEAFY SATIN GRASS			
52048006	Warner Creek Fen	26388	*Myrica gale*	SWEET GALE			
52048006	Warner Creek Fen	26388	*Nuphar variegata*	YELLOW POND-LILY			
52048006	Warner Creek Fen	26388	*Nymphaea odorata*	SWEET-SCENTED WATERLILY			

StandID	Site Name	EOID	*SCIENTIFIC_NAME*	COMMON_NAME	RFSS	NNIP	Note
52048006	Warner Creek Fen	26388	*Onoclea sensibilis*	SENSITIVE FERN			
52048006	Warner Creek Fen	26388	*Osmunda regalis*	ROYAL FERN			
52048006	Warner Creek Fen	26388	*Osmundastrum cinnamomeum*	CINNAMON FERN			
52048006	Warner Creek Fen	26388	*Packera paupercula*	NORTHERN RAGWORT, BALS			
52048006	Warner Creek Fen	26388	*Parnassia glauca*	GRASS-OF-PARNASSUS			
52048006	Warner Creek Fen	26388	*Persicaria amphibia*	WATER SMARTWEED			
52048006	Warner Creek Fen	26388	*Physocarpus opulifolius*	NINEBARK			
52048006	Warner Creek Fen	26388	*Picea mariana*	BLACK SPRUCE			
52048006	Warner Creek Fen	26388	*Pinus strobus*	WHITE PINE			DBH 26 cm; 23.7 cm
52048006	Warner Creek Fen	26388	*Platanthera huronensis*	LAKE HURON GREEN ORCHID			
52048006	Warner Creek Fen	26388	*Poa palustris*	FOWL MEADOW GRASS			
52048006	Warner Creek Fen	26388	*Potentilla anserina*	SILVERWEED			
52048006	Warner Creek Fen	26388	*Prunus serotina*	WILD BLACK CHERRY			
52048006	Warner Creek Fen	26388	*Pteridium aquilinum*	BRACKEN FERN			
52048006	Warner Creek Fen	26388	*Rhamnus alnifolia*	ALDER-LEAVED BUCKTHORN			
52048006	Warner Creek Fen	26388	*Rosa palustris*	SWAMP ROSE			
52048006	Warner Creek Fen	26388	*Rubus allegheniensis*	COMMON BLACKBERRY			
52048006	Warner Creek Fen	26388	*Rubus hispidus*	SWAMP DEWBERRY			
52048006	Warner Creek Fen	26388	*Rubus pubescens*	DWARF RASPBERRY			
52048006	Warner Creek Fen	26388	*Rubus setosus*	BRISTLY BLACKBERRY			
52048006	Warner Creek Fen	26388	*Rubus strigosus*	WILD RED RASPBERRY			
52048006	Warner Creek Fen	26388	*Salix*	WILLOW		0	
52048006	Warner Creek Fen	26388	*Salix bebbiana*	BEAKED WILLOW, BEBB'S WI			
52048006	Warner Creek Fen	26388	*Salix candida*	SAGE WILLOW, HOARY WILL			
52048006	Warner Creek Fen	26388	*Salix discolor*	PUSSY WILLOW			
52048006	Warner Creek Fen	26388	*Sarracenia purpurea*	PITCHER-PLANT			
52048006	Warner Creek Fen	26388	*Schoenoplectus tabernaemontani*	SOFTSTEM BULRUSH			
52048006	Warner Creek Fen	26388	*Scutellaria galericulata*	MARSH SKULLCAP			
52048006	Warner Creek Fen	26388	*Solidago gigantea*	LATE GOLDENROD			
52048006	Warner Creek Fen	26388	*Solidago patula*	ROUGH-LEAVED GOLDENROI			
52048006	Warner Creek Fen	26388	*Solidago rugosa*	ROUGH-LEAVED GOLDENROI			
52048006	Warner Creek Fen	26388	*Solidago uliginosa*	BOG GOLDENROD			
52048006	Warner Creek Fen	26388	*Sphagnum*	Sphagnum moss		0	
52048006	Warner Creek Fen	26388	*Spiraea alba*	MEADOWSWEET			
52048006	Warner Creek Fen	26388	*Spiranthes cernua*	NODDING LADIES'-TRESSES			
52048006	Warner Creek Fen	26388	*Symphyotrichum boreale*	RUSH ASTER, NORTHERN BO			
52048006	Warner Creek Fen	26388	*Symphyotrichum lanceolatum*	PANICLED ASTER			
52048006	Warner Creek Fen	26388	*Symphyotrichum lateriflorum*	CALICO ASTER			

StandID	Site Name	EOID	*SCIENTIFIC_NAME*	COMMON_NAME	RFSS	NNIP	Note
52048006	Warner Creek Fen	26388	*Symphyotrichum puniceum*	SWAMP ASTER, PURPLE-STEI			
52048006	Warner Creek Fen	26388	*Thelypteris palustris*	MARSH FERN			
52048006	Warner Creek Fen	26388	*Thuja occidentalis*	WHITE-CEDAR			30 ring, +/- 35 years old; DBH 16.9 cm, most 7cm, largest 29 cm
52048006	Warner Creek Fen	26388	*Tiarella cordifolia*	FOAMFLOWER, FALSE MITER			
52048006	Warner Creek Fen	26388	*Triadenum fraseri*	MARSH ST. JOHN'S-WORT			
52048006	Warner Creek Fen	26388	*Trichophorum alpinum*	BULRUSH			
52048006	Warner Creek Fen	26388	*Trichophorum cespitosum*	BULRUSH			
52048006	Warner Creek Fen	26388	*Trientalis borealis*	STAR-FLOWER			
52048006	Warner Creek Fen	26388	*Triglochin maritima*	COMMON BOG ARROW-GRA			
52048006	Warner Creek Fen	26388	*Typha latifolia*	COMMON CAT-TAIL, BROAD-			
52048006	Warner Creek Fen	26388	*Utricularia intermedia*	FLAT-LEAVED BLADDERWOR			
52048006	Warner Creek Fen	26388	*Utricularia vulgaris*	COMMON BLADDERWORT			
52048006	Warner Creek Fen	26388	*Vaccinium macrocarpon*	LARGE CRANBERRY			
52048006	Warner Creek Fen	26388	*Vaccinium myrtilloides*	VELVETLEAF BLUEBERRY, CA			
52048006	Warner Creek Fen	26388	*Vaccinium oxycoccos*	SMALL CRANBERRY			
52048006	Warner Creek Fen	26388	*Viola macloskeyi*	SMOOTH WHITE VIOLET			
52048006	Warner Creek Fen	26388	*Viola nephrophylla*	NORTHERN BOG VIOLET			