

Rare Plant Species Surveys for the Michigan Department of Transportation: I-75 and M-134, Mackinac County.

MDOT project No. 211318



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Cover: Clockwise from top left: state threatened Black crowberry (*Empetrum nigrum*) in a degraded peatland near the I-75/M-123 interchange; state and federal threatened Houghton's goldenrod (*Solidago houghtonii*) along the margin of the onramp from M-123 to northbound I-75 (photo taken by T. Bassett); the M-134 bridge over the Pine River.

All photos in this report, unless otherwise stated in captions, were taken by E. Haber.

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Abstract

Three localities comprising the footprint for MDOT Project 211318 in Mackinac County were surveyed for rare plant species and suitable habitat during the spring and summer of 2022 to assess potential impacts of road improvement projects. The three sections in the project area are: 1) the interchange between I-75 and M-123, including medians and on/offramps, 2) the I-75 (northbound and southbound) FFR3127 bridge crossing over the Carp River, and 3) the M-134 bridge over the Pine River. These three sections were surveyed three times over the growing season, with visits corresponding to capturing early, mid, and late-season phenology of rare plant species. A small subset of a larger population of state threatened black crowberry (*Empetrum nigrum*) was observed growing in the northwest quadrant of the I-75/M-123 interchange in a degraded northern fen. Occurrences of the state and federal threatened Houghton's goldenrod (*Solidago houghtonii*) were observed in all four quadrants and the northern median of the I-75/M-123 interchange, extending the known distribution of a previously documented Houghton's goldenrod population southward for 0.4 miles. The black crowberry sub-population is severely threatened by degradation of its habitat from eutrophication, altered hydrology, and invasive species. The Houghton's goldenrod populations within the project area are part of a larger population and are threatened by construction impacts, ROW maintenance, and invasive species. Occurrences of culturally significant sweetgrass (*Anthoxanthum hirtum*) were found in Sections 1 (I-75/M-123 interchange) and 2 (FFR3127 bridge crossing over the Carp River).

To sustain the black crowberry within the northwest quadrant of Section 1, control of hybrid cattail and nutrient-laden runoff into the wetland will be required and are recommended. However, this wetland is already highly degraded, and funds might be better spent protecting and restoring intact wetlands near and within the project area. Black crowberry also occurs in the high-quality wetland to the north of Section 1, west of southbound I-75. Protecting this wetland from runoff and managing invasive species found within and nearby the wetland is necessary to maintain the black crowberry population there. Mowing of Houghton's goldenrod should not be conducted after July 15 to minimize impacts to reproduction, and treatment of the occurrences of common buckthorn, common reed, and glossy buckthorn in the northeast quadrant should be implemented now while they are still small, to prevent them from invading Houghton's goldenrod habitat. Runoff should also be controlled throughout the remainder of Section 1 to sustain the higher quality habitat for this species. In Sections one and two, herbicide spraying near known occurrences of culturally important sweetgrass should be prohibited and mowing schedules should be communicated and coordinated with the Mackinac Bands of Chippewa and Ottawa Indians. In Section two, treatment of invasive species in mowed areas in the ROW and on the banks of the Carp River is recommended. Due to the abundance of invasive species in Section three, focus should be placed on preventing pathways of spread by construction activities and equipment decontamination when moving from site to site. This includes avoiding disturbance to the riverbed to prevent fragmentation and spread of invasive Eurasian watermilfoil. Care is advised during construction activities to limit runoff into the Pine River and to not disturb swallows nesting in the beams underneath the bridge.

Introduction and Methods

A summary of rare plant surveys for MDOT project area 211318 is presented in this report. These surveys are required for this project to ensure compliance with regulations regarding potential impacts of road improvement projects on rare species. The project area is located at two sections on I-75 and one section on M-134 in Mackinac County. The two sections on I-75 consist of the I-75/M-123 interchange, including the bridge, medians, and on/off ramps, and the FFR3127 I-75 bridge over the Carp River, including portions of northbound and southbound I-75 to the north and south of the bridge. The section on M-134 consists of the bridge over the Pine River and includes several hundred meters of highway to the east and west of the bridge. Construction will focus on rehabilitation of the bridges at each section, with substructure and deck repair, pier work, rip-rap installation, access road construction, grading, and downslope work.

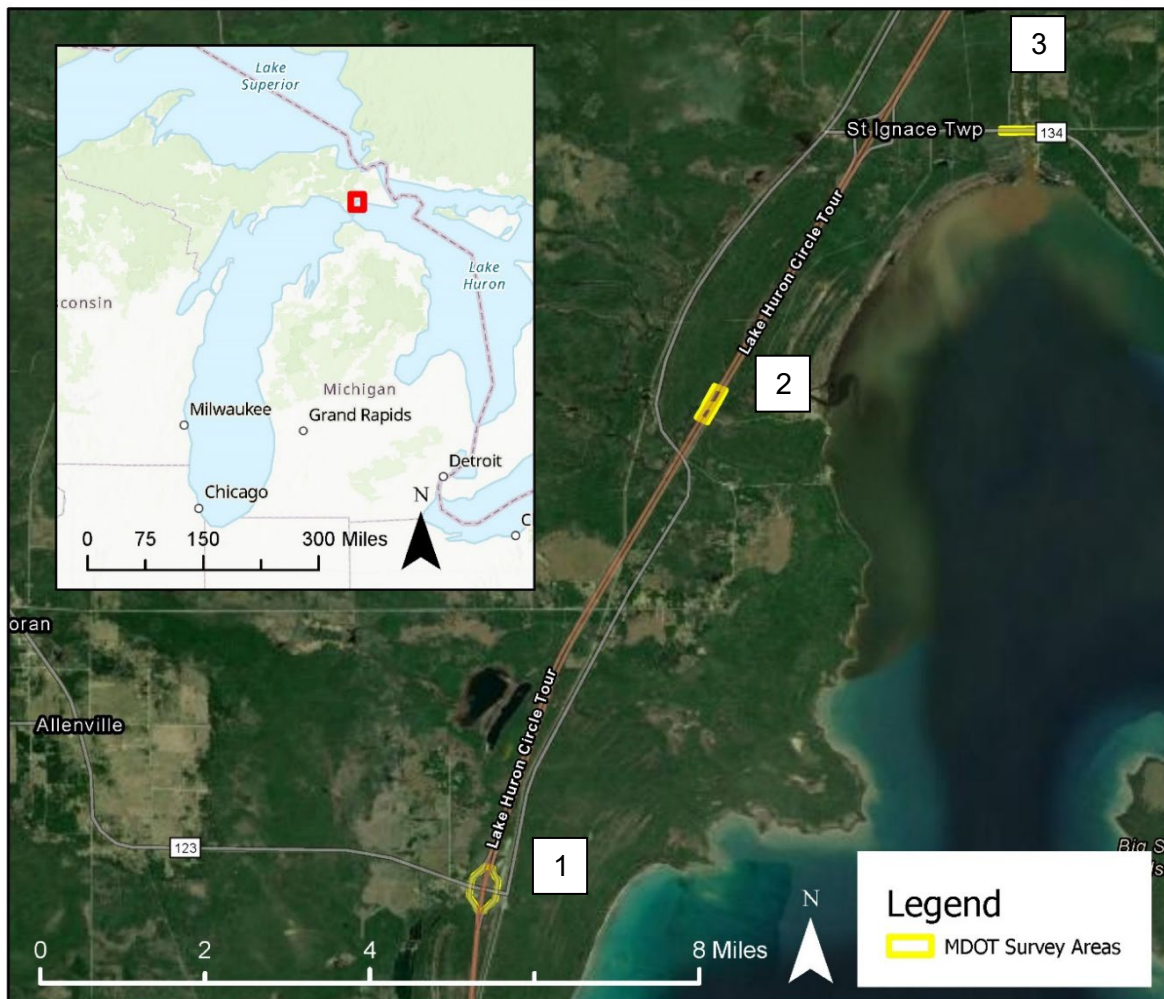


Figure 1. Overview map of MDOT project area 211318. This project area is located in Michigan's eastern Upper Peninsula in Mackinac County just north of St. Ignace (red rectangle in inset map). The individual section footprints are highlighted in yellow. Section 1 is the I-75/M-123 interchange. Section 2 is the I-75 FFR3127 bridge crossing over the Carp River. Section 3 is the M-134 bridge crossing over the Pine River.

The Michigan Natural Heritage Database (Michigan Natural Features Inventory 2023) was queried to identify previously documented occurrences of rare plant species¹ and high-quality natural communities within a two-mile buffer of Sections 1 and 3 (Table 1) and within a 5-mile buffer of Section 2 (Table 2), as requested by MDOT. The larger five-mile radius was requested for Section 2 because it lies within significant zones of natural habitat where no known rare plant surveys have been previously conducted. Surveys of all three sections were guided by these 15 focal species and targeted their suitable habitat. However, suitable habitat for any rare species was also surveyed in case other rare species might occur in the project area that have not yet been documented. While state special concern species do not have legal protection, MDOT treats them as if they do and they are included as focal species for our surveys.

Table 1. Previously documented occurrences of rare plant species within 2 miles of Sections 1-3 in the project area.

Latin name	Common name	Status*	Target season	Last observed**
<i>Calypso bulbosa</i>	calypso or fairy-slipper	T	mid-spring – early summer	2014
<i>Carex scirpoidea</i>	bulrush sedge	T	early – late summer	2016
<i>Carex wiedandii</i>	Wiegand's sedge	SC	early – mid summer	1995
<i>Cypripedium arietinum</i>	ram's head lady's-slipper	SC	mid-spring – early summer	2016
<i>Empetrum nigrum</i>	black crowberry	T	mid – late summer	2016
<i>Erigeron hyssopifolius</i>	hyssop-leaved fleabane	T	early – mid summer	2012
<i>Pinguicula vulgaris</i>	butterwort	SC	early – late summer	2016
<i>Platanthera unalascensis</i>	Alaska orchid	SC	mid – late summer	1993
<i>Pterospora andromedea</i>	pine-drops	T	early summer – mid autumn	2009
<i>Solidago houghtonii</i>	Houghton's goldenrod	LT	late summer – mid autumn	2012
<i>Tanacetum bipinnatum</i>	Lake Huron Tansy	T	mid – late summer	1952
<i>Zizia aptera</i>	prairie golden Alexanders	T	early – mid summer	1986
*T = state threatened; SC = state special concern; LT = federal threatened				
**Date the occurrence was last seen prior to surveys for this project.				

Table 2. Additional rare species previously documented within 5 miles of Section 2 in the project area.

Latin name	Common name	Status*	Target season	Last observed**
<i>Asplenium viride</i>	green spleenwort	SC	early summer – mid-autumn	2021
<i>Gymnocarpium robertianum</i>	limestone oak fern	T	early summer – mid-autumn	2021
<i>Muhlenbergia richardsonis</i>	mat muhly	T	mid-summer – mid- autumn	2016
*T = state threatened; SC = state special concern				
**Date the occurrence was last seen prior to surveys for this project.				

¹ State and federal threatened and endangered status are codified under Part 365 of PA 451, 1994 Michigan Natural Resources and Environmental Protection Act. State special concern and presumed extirpated status are NatureServe designations for species that appear to be declining, and those that are presumed extirpated, based on extensive searching of historical sites.

Surveys were conducted during optimal survey windows for the focal species, typically during flowering and fruiting periods, to maximize the chances of detecting them. Records of rare species that are best detected in early, mid, and late-season have been previously documented in all three sections, thus three surveys were conducted in each of the three sections in 2022. Early surveys were conducted on May 26-27, mid-season surveys on July 27-28, and the late season survey on August 3.

The majority of the focal species occur in shoreline and northern forested habitats such as wooded dune and swale complexes, bedrock lakeshores (volcanic and limestone), calcareous cliffs and outcroppings, boreal forest, and cedar swamps. Some may occur in acidic peatland natural communities such as bogs, poor conifer swamps, and muskegs, while others may occur in fen natural communities. These habitats were the targets for foot surveys and were identified through aerial photo interpretation and visual encounters in the field.

Table 3. General habitat preferences of all rare species previously documented within the buffer zones for Sections 1-3 of the project area.

Latin name	Common name	#*	General habitat preference
<i>Asplenium viride</i>	green spleenwort	1	limestone cliffs and boulders in hardwood/conifer-dominated uplands
<i>Calypso bulbosa</i>	calypso	1	spruce-balsam fir-cedar swamps boreal forest, and great lakes shorelines in calcareous substrates
<i>Carex scirpoidea</i>	bulrush sedge	3	alvar and limestone pavement/cobble and northern fens with marl
<i>Carex wiegandii</i>	Wiegand's sedge	1	peatlands, open bogs, and transition zones between poor conifer swamps and sedge meadows
<i>Cypripedium arietinum</i>	ram's head lady's slipper	1	cedar-balsam fir-spruce beach ridges and forests near the great lakes shoreline
<i>Empetrum nigrum</i>	black crowberry	3	marly northern fens with <i>Sphagnum</i> hummocks
<i>Erigeron hyssopifolius</i>	hyssop-leaved fleabane	3	northern fens and marly openings within cedar swamps
<i>Gymnocarpium robertianum</i>	limestone oak fern	1	cedar swamps and limestone glades/boulders
<i>Muhlenbergia richardsonis</i>	mat muhly	1	limestone pavement and northern fens
<i>Pinguicula vulgaris</i>	butterwort	6	wet, marly depressions and fens along great lakes shorelines
<i>Platanthera unalascensis</i>	Alaska orchid	1	coastal conifer (cedar-balsam fir-spruce) forests and glades
<i>Pterospora andromedea</i>	pine-drops	1	moist woods dominated by pines or mixed conifers, Great Lakes shorelines, boreal forest
<i>Solidago houghtonii</i>	Houghton's goldenrod	6	interdunal wetlands and limestone glades
<i>Tanacetum bipinnatum</i>	Lake Huron tansy	1	great lakes shorelines in open dunes, shores and beaches with sands and rocks
<i>Zizia aptera</i>	Prairie golden Alexanders	1	disturbed clearings in the Upper Peninsula; steep, gravelly, west or south-facing hillsides in the Lower Peninsula

*# = The number of occurrences within 2 miles of Sections 1 and 3, and within 5 miles of Section 2.

The survey area boundaries and previously documented rare species occurrences were overlaid on aerial imagery, georeferenced, and uploaded into Field Maps on a Samsung tablet for use in the field. This enabled surveyors to see their location in relation to previously documented rare species occurrences while surveying on foot.

Rare plant occurrences were recorded using Survey 123 to capture GPS points, the number of plants, and their status. These data were uploaded into the Michigan Natural Heritage Database (MNFI 2023). Isolated occurrences of high-impact invasive species were mapped using the Midwest Invasive Species Information Network (MISIN) phone app (MISIN 2023). High-quality habitats, other non-listed but important plant species found, and any other noteworthy observations were also recorded. Shapefiles for rare species occurrences were provided to MDOT after each survey period and for invasive species at the project end.

Results and Discussion

Descriptions of plant communities by section

The vegetation and habitat characteristics found in this project area are summarized in the following sections that correspond with those mapped in Figure 1. A description of the habitats and dominant plant species, rare species, invasive species, and any other noteworthy plant species encountered are presented for each section. All three sections contain bridges built between 1957-1963, which need repairs and refurbishment and are the focus of construction activities (Fig. 2).



Figure 2. Plaques commemorating the construction of the three bridges in this project area. a) The M-123 bridge over I-75 in Section 1 (1963); b) The I-75 bridge over the Carp River in Section 2 (1963); and c) The M-134 bridge over the Pine River in Section 3 (1957).

Section 1: I-75/M-123 Interchange

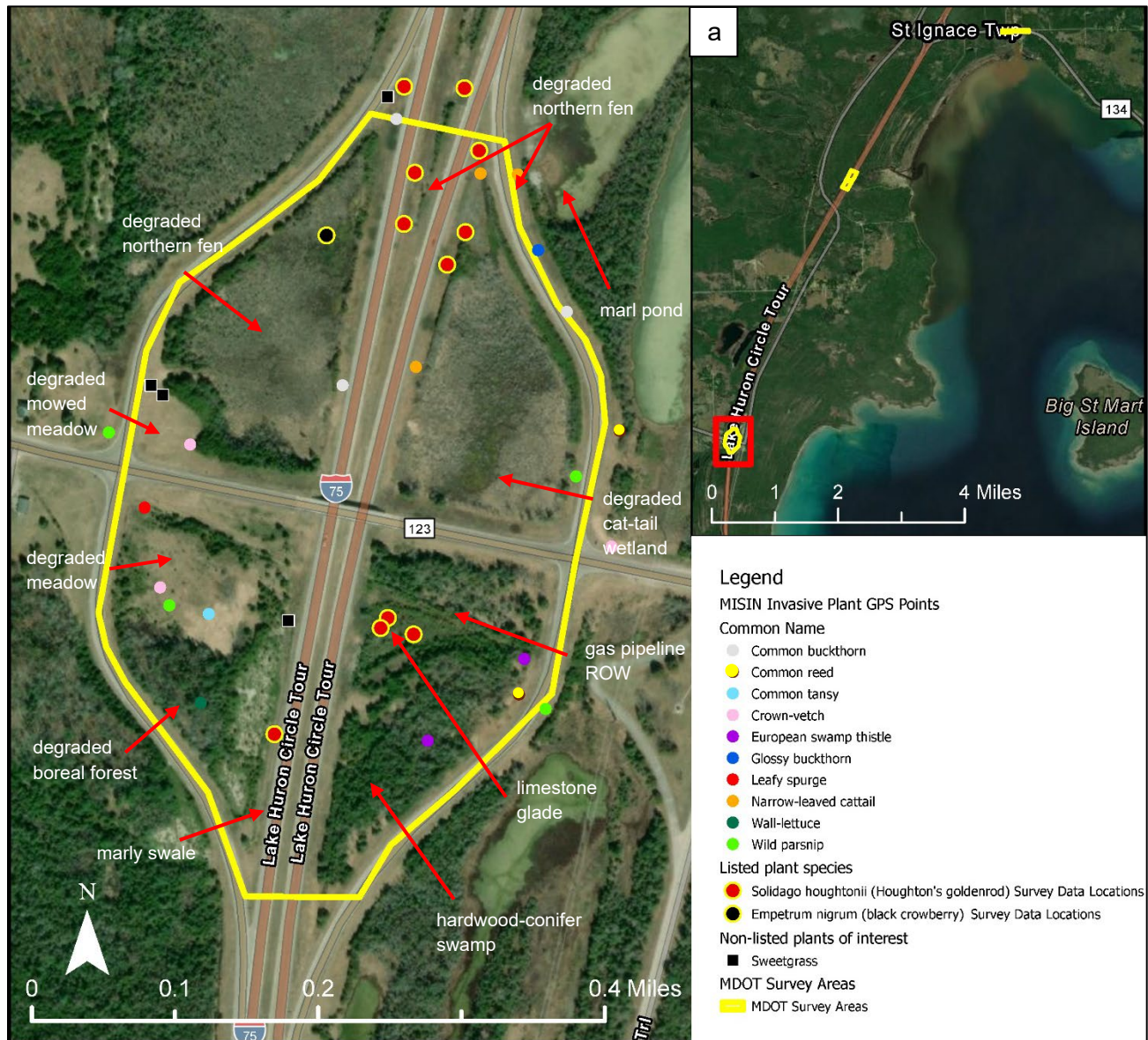


Figure 3. Overview map of Section 1 (I-75/M-123 intersection) showing the locations of invasive plant species, listed species, and non-listed species of interest. Inset a) shows the location of Section 1 outlined with a red box within the regional context of MDOT project area 211318.

Section 1 consists of the M-123 intersection with I-75 and associated on- and off-ramp areas (Fig. 3). Results for this section are described by each of the four quadrants of the intersection: northwest, northeast, southeast, and southwest. Because of the known sensitive habitats and rare species observations adjacent to this section, the entire section was surveyed by foot during each of the three survey visits. Invasive species were prevalent throughout this section. Isolated, high-impact invasive species points are shown in Figure 3 and Table 4 provides narrative descriptions of where they occurred.

Table 2. Narrative descriptions of locations and abundances of priority invasive species found in Section 1 at the I-75/M-123 Interchange		
Latin name	Common name	General location in ROW
<i>Centaurea stoebe</i>	spotted knapweed	Throughout Section 1 in non-forested upland habitats
<i>Cirsium arvense</i>	Canada thistle	Scattered throughout Section 1 in non-forested habitats
<i>Euphorbia virgata</i>	leafy spurge	Dry, mowed areas along roadsides
<i>Frangula alnus</i>	glossy buckthorn	A single plant found to the east of northbound I-75 onramp
<i>Melilotus albus</i>	white sweet clover	Scattered throughout Section 1 in non-forested upland habitats
<i>Mycelis muralis</i>	wall-lettuce	Near boulders in woodland in southwest quadrant of Section 1
<i>Pastinaca sativa</i>	wild parsnip	Throughout Section 1 in non-forested upland habitats
<i>Phalaris arundinacea</i>	reed canary grass	In wet areas, primarily in ditches along roadsides
<i>Phragmites australis</i> subsp. <i>australis</i>	common reed	One patch east of the northbound I-75 onramp and one patch along the shore of the marl pond to the east of the northbound I-75 offramp
<i>Rhamnus cathartica</i>	common buckthorn	Found in the northwest and northeast quadrants of the intersection
<i>Securigera varia</i>	crown-vetch	Dry roadside along M-123 in northwest quadrant and meadow in southwest quadrant of Section 1
<i>Typha angustifolia</i>	narrow-leaved cat-tail	In wet areas, primarily in ditches along roadsides
<i>Typha xglauca</i>	hybrid cat-tail	In wet areas, primarily in ditches along roadsides. Extensive fields of hybrid cat-tail in the northwest and northeast quadrants of Section 1
Species with Bolded names are high priority for early detection and rapid treatment		

Northwest Quadrant

The northwest quadrant of the I-75/M-123 interchange consists of the area between southbound I-75 and the offramp from southbound I-75 to M-123 to the north of M-123 (Fig. 3). Two types of habitat were observed here: a degraded mowed meadow near the intersection between the offramp and M-123, and a degraded, marly northern fen with *Sphagnum* hummocks surrounded by northern white cedars (*Thuja occidentalis*) between southbound I-75 and the southbound I-75 offramp to M-123.

The degraded meadow habitat contains abundant invasive species; those of highest concern are crown-vetch (*Securigera varia*; Fig. 3, Fig. 4a) and wild parsnip (*Pastinaca sativa*; Fig. 3). Sweetgrass (*Anthoxanthum hirtum*; Fig. 4b) occurs in two locations in this quadrant: a large patch near the intersection between the southbound offramp from I-75 and M-123 and at the apex of the median at the beginning of the southbound offramp (Fig. 3). Although sweetgrass is not a rare species in Michigan, it is culturally important, and care should be taken to adjust mowing schedules and invasive plant management to protect the sweetgrass populations.



Figure 4. Highlighted plant species in the degraded mowed meadow habitat in the northwest quadrant. a) Invasive crown-vetch (*Securigera varia*) and b) Culturally important sweetgrass (*Anthoxanthum hirtum*).

The degraded northern fen has *Sphagnum* hummocks and covers the majority of the northwest quadrant. It has been severely degraded by aggressive invasion of hybrid cat-tail (*Typha xglauca*; Fig. 5a); so much so that the persistence of fen and bog species in this quadrant is under substantial threat. Aside from hybrid cat-tail, the northern fen retains remnants of characteristic vegetation on *Sphagnum* hummocks, including leatherleaf (*Chamaedaphne calyculata*), pitcher plant (*Sarracenia purpurea*), small cranberry (*Vaccinium oxycoccos*), Labrador tea (*Rhododendron groenlandicum*), round-leaved sundew (*Drosera rotundifolia*), tamarack (*Larix laricina*), and black spruce (*Picea mariana*). A small occurrence of state threatened black crowberry (*Empetrum nigrum*; Fig. 5b) was documented in the hummocks and is discussed further at the end of the quadrant descriptions for this section (page 13).

An estimated 250 stems of federal and state threatened Houghton's goldenrod (*Solidago houghtonii*) were found in two patches in the median between northbound and southbound I-75 at the northeast corner of this quadrant, and an estimated 25 stems were documented to the west of southbound I-75 just north of the survey zone (Fig. 3). Houghton's goldenrod was found in the other quadrants of this section also and is discussed as one large population at the end of the quadrant descriptions for this section (page 15).



Figure 5. Highlighted plant species in the highly degraded northern fen habitat in the northwest quadrant. a) Invasive hybrid cattail (*Typha x glauca*) is the dominant plant species in this habitat. b) State threatened black crowberry (*Empetrum nigrum*) stem (center) growing on a *Sphagnum* hummock.

Northeast Quadrant, including the median between northbound and southbound I-75

This quadrant consists of the area between northbound I-75 and the onramp to northbound I-75 from M-123, to the north of M-123 (Fig. 3). It also includes the median between northbound and southbound I-75 to the north of M-123. Three types of habitat were observed in this quadrant: a highly degraded cat-tail wetland, two areas of northern fen, and a marl pond.

The cat-tail wetland is similar to the degraded northern fen in the northwest quadrant, but it has deteriorated much more. The hydrological alteration is more severe, resulting in dead tamarack trees perched on top of flooded *Sphagnum* hummocks, and invasive hybrid cat-tail (*Typha x glauca*) is much denser and has effectively outcompeted most of the remaining native bog and northern fen species (Fig. 6a).

A northern fen community occurs in the median between northbound and southbound I-75, and in the northern-most tip of the area between northbound I-75 and the onramp to northbound I-75, continuing to the east of the northern tip of the onramp. Characteristic plant species of northern fen were observed in these areas, including shrubby cinquefoil (*Dasiphora fruticosa*), Indian paintbrush (*Castilleja coccinea*; Fig. 6b), false asphodel (*Triantha glutinosa*), sedges (including *Carex crawei*), Ohio goldenrod (*Solidago ohioensis*), grass-of-Parnassus (*Parnassia glauca*), little bluestem (*Schizachyrium scoparium*), twig-rush (*Cladium mariscoides*), balsam ragwort, (*Packera paupercula*), and Kalm's lobelia (*Lobelia kalmii*).

Approximately 50 stems of Houghton's goldenrod were observed growing in the northern fen at three points adjacent to northbound I-75 (Fig. 3). This species is discussed further at the end of this section description (page 15). Invasive species are a threat to these fens, with spotted knapweed (*Centaurea stoebe*) and wild parsnip (*Pastinaca sativa*) being the most abundant.



Figure 6. Highlighted habitat and plant species in the northeast quadrant. a) An opening where a powerline ROW traverses a highly degraded cat-tail wetland. The habitat is dominated by invasive hybrid cat-tail (*Typha xglauca*) and dead tamarack (*Larix laricina*) trees can be seen in the center of the wetland. b) Intact yet degraded northern fen habitat occurs at the northern apex of this quadrant and typical northern fen species, such as Indian paintbrush (*Castilleja coccinea*) are frequent here.

A large marl pond lies to the northeast of this quadrant mostly outside of the project area. This pond is very high quality and construction activities within or near it may negatively impact it (Fig. 7). Although no rare species were found in or on the shores of the marl pond, there is suitable habitat for state threatened butterwort (*Pinguicula vulgaris*) here. Spike-rush (*Eleocharis rostellata*), common bog arrow-grass (*Triglochin maritima*), Indian paintbrush, grass-of-Parnassus (*Parnassia glauca*), and pitcher plant are all frequent along the shoreline.

Of immediate concern is a patch of invasive reed (*Phragmites australis* subsp. *australis*) growing near the intersection of the onramp to northbound I-75 and M-123 (Fig. 3). Without control, it will almost certainly expand to create dense zones of vegetation around the shores of the marl pond as well as other wetlands throughout all the quadrants in this section and will displace native vegetation. A single stem of glossy buckthorn (*Frangula alnus*) and one small patch of common buckthorn (*Rhamnus cathartica*) were also observed east of the I-75 onramp and are likely to expand into these wetlands as well. All three of these infestations are still small, and rapid, informed control is recommended to avoid exponential increases in costs if left untreated. Measures to prevent runoff from entering into the pond should also be taken during construction.



Figure 7. High-quality marl pond just outside of the northeast quadrant. This area is very sensitive ecologically and should be protected from runoff and invasive species. Nearby small patches of invasive common reed, glossy buckthorn and common buckthorn are recommended for immediate control.

Southeast Quadrant

The southeast quadrant of the I-75/M-123 interchange consists of the area between northbound I-75 and the offramp from northbound I-75 onto M-123, to the south of M-123 (Fig. 3). Two types of habitat were observed in this quadrant: a limestone bedrock glade and a hardwood-conifer swamp. The limestone bedrock glade is dominated by northern white cedar (*Thuja occidentalis*) and white spruce (*Picea glauca*), with many characteristic ground layer species, including Ohio goldenrod, shrubby cinquefoil, little bluestem, Indian paintbrush, bastard toadflax (*Comandra umbellata*), panic grass (*Dichanthelium implicatum*), rush (*Juncus balticus*), poverty grass (*Danthonia spicata*), and grass-leaved goldenrod (*Euthamia graminifolia*).

The hardwood-conifer swamp is patchy and has a wet ditch on the western side. Portions are dominated by conifer species including northern white cedar (Fig. 8a) and tamarack, and other portions are dominated by trembling aspen (*Populus grandidentata*), balsam poplar (*Populus balsamifera*), and balsam fir (*Abies balsamea*). The ground layer is sparse with sedges (*Carex eburnea*, *C. pedunculata*, and *C. aquatilis* in the ditch) and mosses as the most frequently observed plants. A few vernal pools, mossy boulders, and a ditch were also observed.

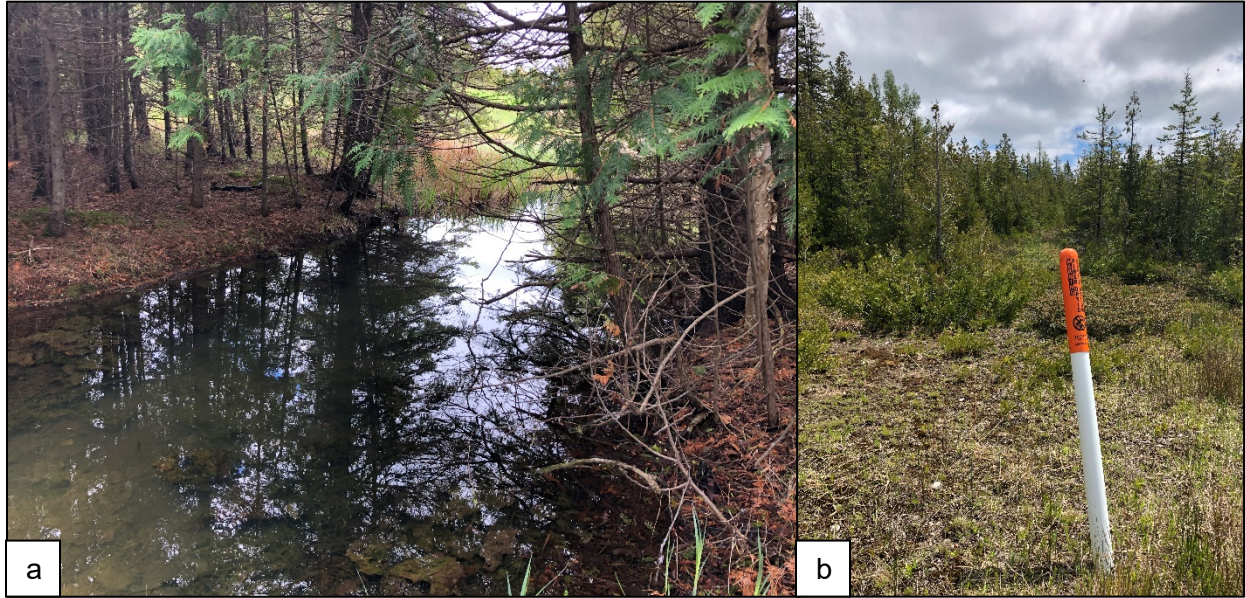


Figure 8. Highlighted habitats in the southeast quadrant. a) A hardwood-conifer swamp covers the majority of the forested area in this quadrant and a ditch runs through the western part of this forested wetland. b) A gas pipeline ROW runs east/west through the northern part of this quadrant. A limestone bedrock glade natural community exists in the western side of the pipeline ROW and hosts a population of state and federally threatened Houghton’s goldenrod (*Solidago houghtonii*).

An estimated 150 stems of Houghton’s goldenrod were observed growing in three patches in the limestone glade just to the south of a gas pipeline ROW (Fig. 3, Fig. 8b) in this quadrant. This species occurs in all four quadrants of this section and is discussed as part of a larger population at the end of this section description (page 15).

Southwest Quadrant

The southwest quadrant of the I-75/M-123 interchange consists of the area between southbound I-75 and the onramp from M-123 to southbound I-75, to the south of M-123 (Fig. 3). Three types of habitat were observed in this quadrant: a degraded boreal forest community, a degraded meadow, and a marly swale in a shallow ditch paralleling the freeway.

The degraded boreal forest community occurs on top of a hill near the center of this quadrant. The canopy contains white spruce (*Picea glauca*), balsam fir (*Abies balsamea*), northern white cedar (*Thuja occidentalis*), and bigtooth aspen (*Populus grandidentata*). The understory is mossy with a rich, though degraded, spring flora including common trillium (*Trillium grandiflorum*), yellow trout lily (*Erythronium americanum*), wild leek (*Allium tricoccum*), two-leaved toothwort (*Cardamine diphylla*), and yellow violet (*Viola pubescens*). A boulder field with mossy boulders occurs in the center of this forest. The boulders show signs of human disturbance (e.g., trash) and invasive wall-lettuce (*Mycelis muralis*; Fig. 3) and king-devil (*Hieracium caespitosum*) were growing on them (Fig. 9a). Toward the eastern edge of this forest, the canopy thins out and smaller northern white cedars become frequent over exposed limestone on a steep, east-facing slope.

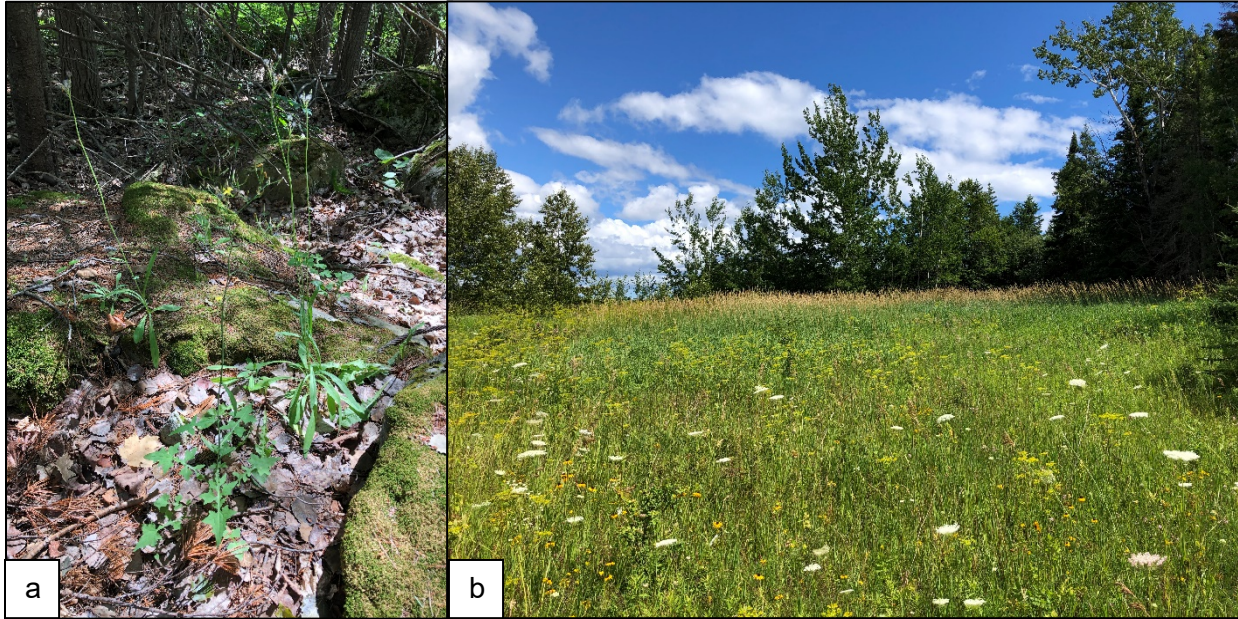


Figure 9. Highlighted plant species and habitat in the southwest quadrant. a) Invasive wall-lettuce (*Mycelis muralis*) and king-devil (*Hieracium caespitosum*) growing on mossy limestone boulders in the degraded boreal forest community. b) A degraded meadow in the northern part of the southwest quadrant hosts numerous invasive species such as wild parsnip (*Pastinaca sativa*), Queen Anne's lace (*Daucus carota*), and reed canary grass (*Phalaris arundinacea*).

Vegetation in the degraded meadow consists mainly of weedy and invasive herbaceous species with scattered woody shrubs and small trees (Fig. 9b). Herbaceous species include non-native smooth brome (*Bromus inermis*), Queen Anne's lace (*Daucus carota*), common tansy (*Tanacetum vulgare*; Fig. 3), common St. John's wort (*Hypericum perforatum*), spotted knapweed (*Centaurea stoebe*), narrow-leaved plantain (*Plantago lanceolata*), crown-vetch (*Securigera varia*; Fig. 3), wild parsnip (*Pastinaca sativa*; Fig. 3), and oxeye daisy (*Leucanthemum vulgare*). A large monoculture of invasive reed canary grass covers much of the southern and eastern sides of the meadow. Woody species such as wild rose (*Rosa blanda*), common juniper (*Juniperus communis*), hawthorn (*Crataegus* sp.), and northern white cedar (*Thuja occidentalis*) are scattered throughout. Some native herbaceous species persist here, especially in the western part of the meadow, including bastard toadflax, black-eyed Susan (*Rudbeckia hirta*), and wood lily (*Lilium philadelphicum*).

A patch of about 10 stems of Houghton's goldenrod was found in a marly swale in the ditch running parallel to southbound I-75 (Fig 3). This species is discussed as part of a larger population below (page 15). The culturally significant sweetgrass (*Anthoxanthum hirtum*; Fig. 3) was also observed in this swale. The presence of both Houghton's goldenrod and sweetgrass in this swale make it a priority for protection. Erosion control should be installed to limit runoff from flowing into this swale during construction activities.

Rare plants documented in Section 1

State threatened black crowberry (*Empetrum nigrum*)

Location and abundance

Approximately 30 stems of black crowberry (*Empetrum nigrum*) were observed growing on two hummocks within the northernmost part of the degraded northern fen in the northwest quadrant of Section 1 (Fig 5b, Fig 10, Table 5). No additional occurrences of black crowberry were observed despite additional transect surveys. It is difficult to determine how many individual plants these 30 stems correspond to because of its multi-stemmed growth habit. The minimum number of plants in this population is two, since they were found on two separate hummocks, and the maximum number of individuals in this population is 30. Only a single flower bud was observed in this population; the rest of the stems were vegetative.

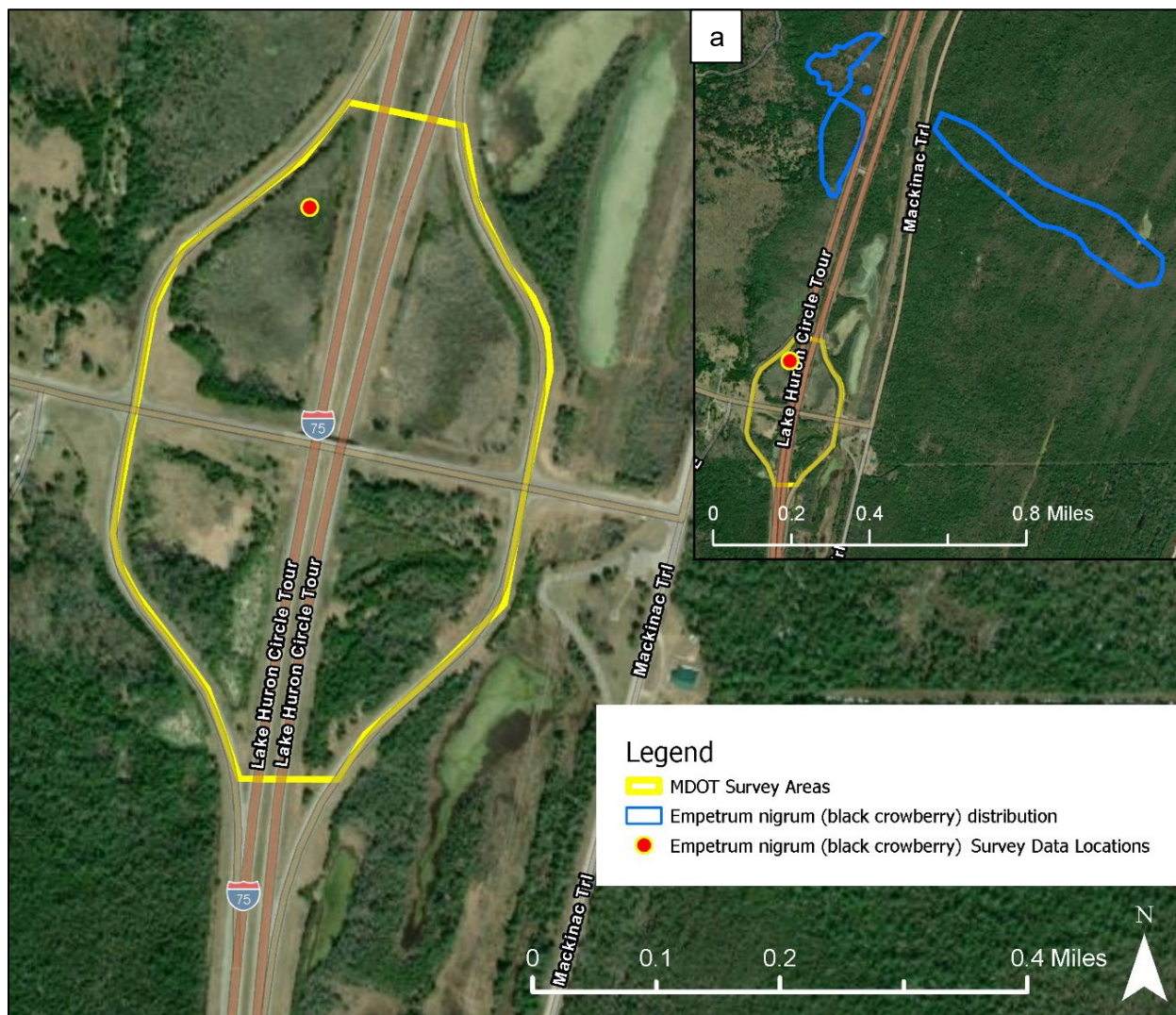


Figure 10. Intersection between I-75 and M123 showing the location of the black crowberry (*Empetrum nigrum*) population found during the second site visit. Map inset a) zooms out to show the location of the black crowberry observation found in the second site visit in relation to nearby known populations of this species (blue polygons).

Table 5. GPS coordinates for the black crowberry (*Empetrum nigrum*) population in Section 1.

Latin name	Common name	Latitude	Longitude
<i>Empetrum nigrum</i>	Black crowberry	45.966281723	-85.752217662

Habitat

This location retains some elements of black crowberry's typical habitat in Mackinac County: *Sphagnum* hummocks emerging from a marly northern fen (Penskar and Crispen 2009). These plants lie within 0.7 miles of a larger, previously documented black crowberry population to the north and east (Fig. 10a). They are probably remnants from this larger population that likely extended southward prior to interruption by the highway. Hybrid cat-tail is growing both on the *Sphagnum* hummocks with the crowberry and within adjacent marl pools, creating areas of very dense vegetation and duff (Fig. 5a). Hardstem bulrush (*Schoenoplectus acutus*) is frequent in the marl pools, along with submersed musk-grasses (*Chara* spp.).

Threats and recommendations

The remnant of northern fen with black crowberry has been significantly degraded by hybrid cat-tail invasion, hydrological alteration, and run-off from road salt chemicals and sediment. Hybrid cat-tail produces shade which impacts black crowberry's ability to reproduce by suppressing flower production. It also produces large amounts of leaf litter which adds nutrients to the nutrient-poor *Sphagnum* hummocks in the northern fen, altering the competitive ability of species adapted to low nutrient levels. Hydrological modification of the wetland likely occurred when the highway and offramp were constructed; this caused the wetland to be cut off from the rest of the nearby fen, allowing water runoff to accumulate within the constrained area. Runoff from the nearby highway and offramp also contains road salt chemicals and sediment, which can impact the water chemistry of the sensitive marly northern fen. These combined threats and the small number of plants observed with only one flower result in poor estimated viability for this observation and it unlikely that it can persist in the long term in this area.

It is critical for the persistence of this small population of black crowberry that hybrid cat-tail be managed, and individual plants be protected during construction. In addition, the use of road salt and sand should be reassessed in this area of the I-75/M-123 interchange because of the potential for cascading impacts from changes in water chemistry and sediments to the sensitive northern fen ecosystem. Controlling the invasive cat-tail and managing runoff in this wetland will be ongoing needs if the hydrological connection between this wetland and the wetland to the northwest of the southbound I-75 offramp is not restored. However, if hydrological connection between the degraded wetland where the black crowberry was found and the higher quality wetland to the northwest of the southbound I-75 offramp is restored, then water-borne pollutants from the degraded wetland could enter into the higher quality wetland. Therefore, resources allocated to protection and restoration activities for the wetland to the west of southbound I-75 may be better spent to protect the integrity of that wetland, than by trying to restore the degraded wetland within the project area. Such activities could include permanent erosion protection barriers and control of invasive wetland plant species.

State and federal threatened Houghton's goldenrod (*Solidago houghtonii*)

Location and abundance

A large population of state and federal threatened Houghton's goldenrod (*Solidago houghtonii*) was observed in all four quadrants of the I-75/M-123 interchange, although the plants were concentrated in the northern third of the intersection area, especially in the median between northbound and southbound I-75 at the northern terminus of the survey area (Fig. 11, Table 6). The newly-documented Houghton's goldenrod plants are part of a larger population adjacent to and north of the I-75/M-123 intersection (Fig. 11a). These new observations extend the known distribution of the adjacent Houghton's goldenrod population southward for 0.4 miles.

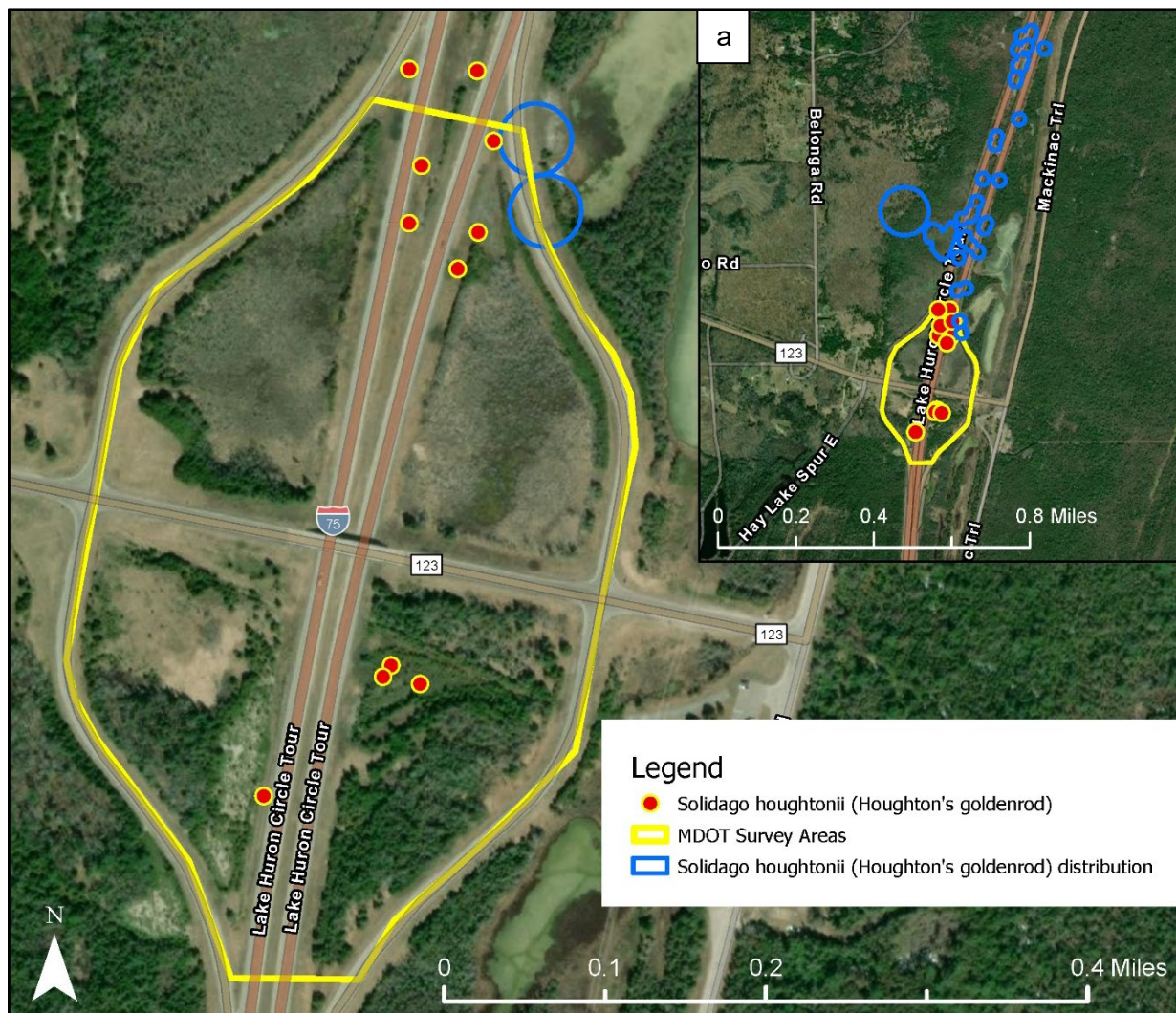


Figure 11. Intersection between I-75 and M-123 showing the locations (red dots with yellow outline) of the Houghton's goldenrod (*Solidago houghtonii*) populations found during the third section visit. Map inset a) zooms out to show the location of the Houghton's goldenrod populations found in the third section visit in relation to nearby known populations of this species (blue polygons).

An estimated 485 stems of Houghton’s goldenrod were found within Section 1 (Table 6). In the northern apex of the northwestern quadrant, an estimated 25 stems were documented and just south of these, an estimated 250 plants were found in two patches in the median between northbound and southbound I-75. An estimate of 50 plants were found at three points in the northern part of the northeast quadrant. In the southeast quadrant, an estimate of 150 plants were found at three points in a limestone glade. Finally, in the southwest quadrant, an estimated 10 plants were found in a swale at one point adjacent to southbound I-75.

Table 6. GPS coordinates and estimated stem counts for the <i>Solidago houghtonii</i> (Houghton’s goldenrod) observations in Section 1. The count of the number of stems is aggregated for several groups of GPS coordinates.				
Latin name	Common name	Latitude	Longitude	No. of Stems (Estimate)
<i>Solidago houghtonii</i>	Houghton’s goldenrod	45.96365917	-84.7516464	100
<i>Solidago houghtonii</i>	Houghton’s goldenrod	45.96358843	-84.75171913	
<i>Solidago houghtonii</i>	Houghton’s goldenrod	45.96354407	-84.75138617	50
<i>Solidago houghtonii</i>	Houghton’s goldenrod	45.962844392	-84.752791188	10
<i>Solidago houghtonii</i>	Houghton’s goldenrod	45.96642096	-84.751484	250
<i>Solidago houghtonii</i>	Houghton’s goldenrod	45.966779929	-84.751373779	
<i>Solidago houghtonii</i>	Houghton’s goldenrod	45.96737203	-84.7508728	
<i>Solidago houghtonii</i>	Houghton’s goldenrod	45.9673835	-84.75148225	25
<i>Solidago houghtonii</i>	Houghton’s goldenrod	45.966934023	-84.750724825	50
<i>Solidago houghtonii</i>	Houghton’s goldenrod	45.96613557	-84.75104706	
<i>Solidago houghtonii</i>	Houghton’s goldenrod	45.966364	-84.75086336	

Habitat

The majority of the Houghton’s goldenrod plants were observed within and adjacent to the median at the northern end of the survey area in a northern fen (Fig. 11). Species associates here include various goldenrods: *Solidago ohioensis* (Ohio goldenrod), *S. rugosa* (rough-leaved goldenrod), *S. altissima* (tall goldenrod), *S. uliginosa* (bog goldenrod), spike-rush (*Eleocharis rostellata*), and shrubby cinquefoil (*Dasiphora fruticosa*). Several plants in the southwest quadrant were observed growing in a swale dominated by little bluestem (*Schizachyrium scoparium*), black-eyed Susan (*Rudbeckia hirta*), northern white cedar (*Thuja occidentalis*), and bristle-leaf sedge (*Carex eburnea*). The limestone bedrock glade with approximately 150 plants in the southeast quadrant is comprised of sparse northern white cedar and white spruce with a sparse ground layer (approximately 60% cover) dominated by mosses, with Ohio goldenrod (*Solidago ohioensis*), shrubby cinquefoil (*Dasiphora fruticosa*), little bluestem (*Schizachyrium scoparium*), Indian paintbrush (*Castilleja coccinea*), bastard toadflax (*Comandra umbellata*), and panic grass (*Dichanthelium implicatum*).

Threats and recommendations

Although the population of Houghton’s goldenrod in this section is part of a larger and likely stable population, due to the proximity to the freeway, its habitat in the project area is subject to disturbances (Fig. 13). Mowing schedules during the growing season must be sensitive to the phenology of this species. Mowing later in the growing season will limit reproduction by cutting

off flowering shoots, resulting in limited seed set. It is recommended that mowing in areas with known Houghton's goldenrod not be done after July 15. Additionally, runoff from the freeway has the potential to alter the calcareous soils required by Houghton's goldenrod and favor other species (Penskar and Crispin 1996). It is important to evaluate drainage flows from the pavement and any construction areas to ensure that runoff does not affect areas where Houghton's goldenrod is growing.



Figure 12. Northern fen community containing a large subpopulation of Houghton's goldenrod (*Solidago houghtonii*) in the median between northbound and southbound I-75 at the northern terminus of Section 1. Photo taken by T. Bassett.

Invasive species also pose a threat to Houghton's goldenrod in this section. Wild parsnip (*Pastinaca sativa*) is present in Section 1 near where Houghton's goldenrod grows and creates dense patches of vegetation that can out-compete native species (Fig. 13b). Because wild parsnip flowering stems can reach heights of up to 2 meters, the species will shade out other species with shorter growth habits such as Houghton's goldenrod. Wild parsnip can also be harmful to humans, due to phytotoxicity, causing serious rashes where skin is exposed to plant sap and sunlight. Control of this species is recommended along with preventative action during construction and maintenance activities to reduce spread of wild parsnip and other invasive plants in this section or nearby.

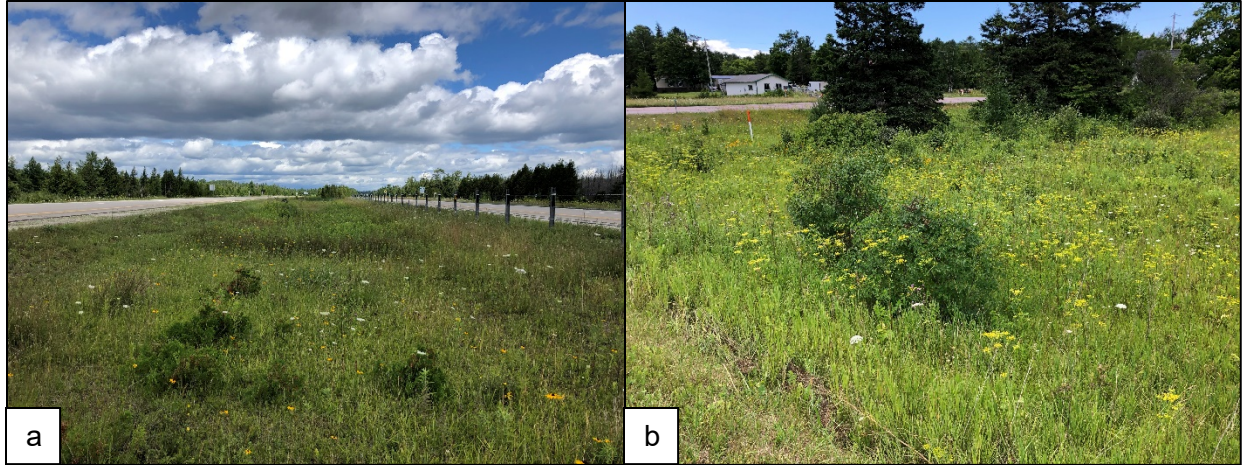


Figure 13. Potential threats to the Houghton's goldenrod (*Solidago houghtonii*) population within the Section 1. a) A large number of Houghton's goldenrod stems were found in the median between northbound and southbound I-75 to the north of M-123. This median is narrow and is influenced by runoff accumulation from the nearby pavement. b) Aggressive invasive wild parsnip (*Pastinaca sativa*) grows abundantly in the northwest quadrant of the intersection, as illustrated in this photo by the yellow flowering heads.

Two patches of the invasive subspecies of common reed (*Phragmites australis* subsp. *australis*) were observed in Section 1 (Fig. 3). This species successfully colonizes wetlands and creates a dense monoculture of tall culms that effectively out compete native wetland vegetation. The reed found in Section 1 should be controlled immediately to prevent it from spreading into habitat where Houghton's goldenrod is growing. Hybrid cat-tail (*Typha xglauca*) dominates the inundated centers of the northeast and northwest cloverleaves. Hybrid cat-tail poses a threat if this aggressively rhizomatous species expands into areas occupied by Houghton's goldenrod. Nutrient and salt runoff from the highway favor hybrid cat-tail and its spread is likely to happen quickly. Small occurrences of glossy buckthorn and common buckthorn were also documented in the vicinity of this section and immediate cost-effective control of these species is recommended now, while these occurrences are still small. Finally, spotted knapweed (*Centaurea stoebe*) was observed at low density associated with Houghton's goldenrod, and may become a threat over the long term.

Section 2: FFR3127 Bridge Crossing over the Carp River

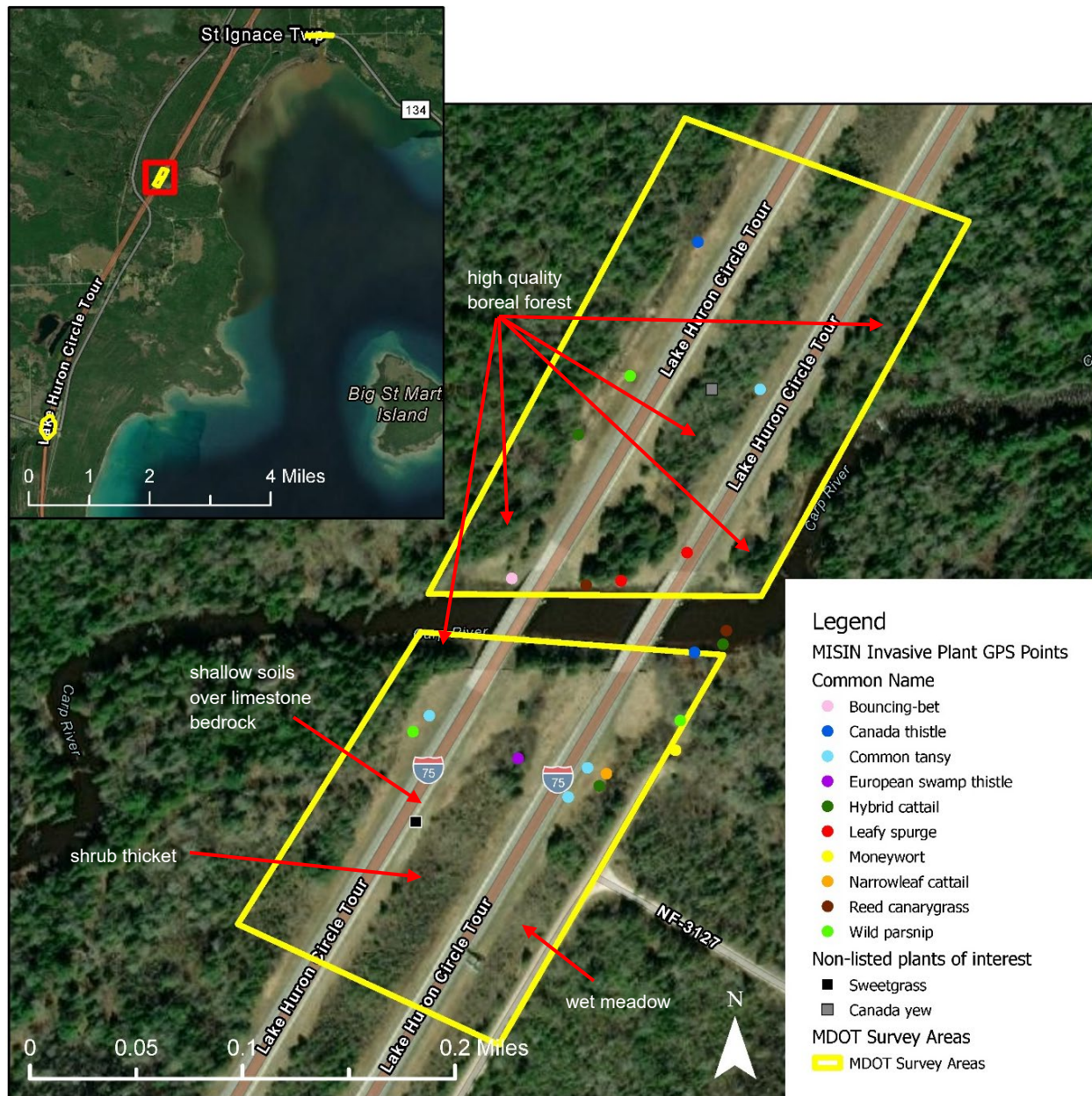


Figure 14. Overview map of Section 2 (FFR3127 bridge crossing) showing the locations of invasive plant species and non-listed species of interest. Inset a) shows the location of Section 2 outlined with a red box within the regional context of MDOT project area 211318.

Section 2 consists of the FFR3127 bridge crossing over the Carp River, extending northward for 0.25 miles, and extending southward for 0.2 miles (Fig. 14). The entire survey area was surveyed by foot during each of the three section visits. No rare species were observed in this section and invasive species were prevalent in mowed areas. See Figure 14 for GPS points of some invasive species observations and Table 7 for narrative descriptions of locations and abundances of priority invasive species.

Table 7. Narrative descriptions of the locations and abundances of priority invasive species found in Section 2.

Latin name	Common name	General location in ROW
<i>Centaurea stoebe</i>	spotted knapweed	Throughout Section 2 in non-forested upland habitats
<i>Cirsium arvense</i>	Canada thistle	Scattered throughout Section 2 in non-forested habitats
<i>Cirsium palustre</i>	European swamp thistle	In open wet ditches along highway margins
<i>Euphorbia virgata</i>	leafy spurge	Dry, mowed areas along roadsides
<i>Melilotus albus</i>	white sweet clover	Scattered throughout Section 2 in non-forested upland habitats
<i>Pastinaca sativa</i>	wild parsnip	Throughout Section 2 in non-forested upland habitats
<i>Phalaris arundinacea</i>	reed canary grass	In wet areas, primarily in ditches along highway margins
<i>Saponaria officinalis</i>	soapwort	A single patch observed under the bridge on the north bank of the river
<i>Tanacetum vulgare</i>	common tansy	Three patches found in the southern half of the Section 2
<i>Typha angustifolia</i>	narrow-leaved cat-tail	In wet areas, primarily in ditches along roadsides
<i>Typha xglauca</i>	hybrid cat-tail	In wet areas, primarily in ditches along roadsides, as well as along the riverbank near the bridge

The habitat to the south of the bridge crossing consists primarily of herbaceous and shrub-dominated wetlands with scattered trees (Fig. 15a). Native and non-native cat-tails are prevalent, especially in open-canopy areas. Elsewhere, the graminoid stratum is dominated by diverse sedges (*Carex aquatilis* being the most frequent), reed canary grass (*Phalaris arundinacea*), rushes (*Juncus* spp.), and Canada bluejoint (*Calamagrostis canadensis*). Common herbaceous wetland species observed include Joe-Pye-weed (*Eutrochium maculatum*), rough-leaved goldenrod (*Solidago rugosa*), smooth swamp aster (*Symphyotrichum firmum*), and sensitive fern (*Onoclea sensibilis*). The shrub stratum is dominated by willows (*Salix* spp.), pale dogwood (*Cornus amomum*), and speckled alder (*Alnus incana*). Scattered groves of tamarack (*Larix laricina*), white spruce (*Picea glauca*), balsam poplar (*Populus balsamifera*), red maple (*Acer rubrum*), and cedar (*Thuja occidentalis*) are also present.

A small area of shallow soils over limestone bedrock occurs in the median east of southbound I-75 and south of the FFR3127 bridge crossing, and provides potentially suitable habitat for bulrush sedge, mat muhly, and Houghton's goldenrod. None of these or any other rare species were found at this location; however, a large population of culturally important sweetgrass was observed growing from near the margin of the pavement eastward and slightly down the slope toward the center of the median (Fig. 14, Fig. 15b). Nearby invasive wild parsnip poses a threat to the sweetgrass and control of this species is recommended. Care should be taken to ensure that the sweetgrass is not harmed by herbicide application.

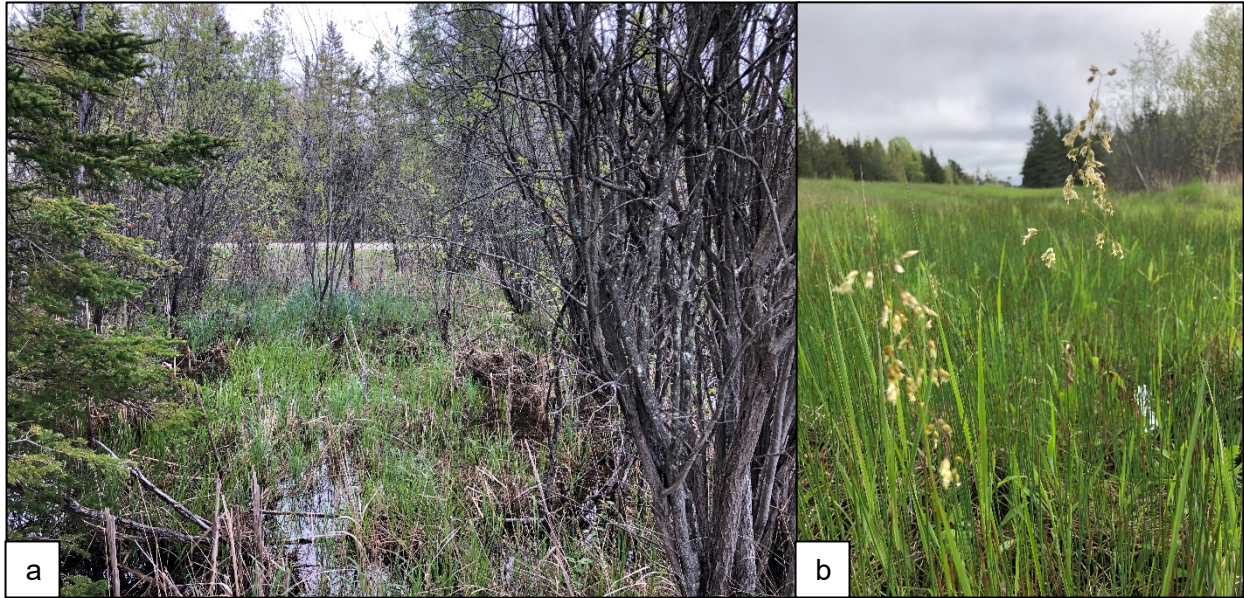


Figure 15. Highlighted habitat and plant species in the southern half of Section 2. a) Open-canopy wetlands are prevalent in this half of the section, with sedges and cat-tails dominating the herbaceous layer. b) Culturally important sweetgrass (*Anthoxanthum hirtum*) grows in shallow soils over limestone bedrock near the margin of southbound I-75.

The northern half of Section 2 contains boreal forest which is contiguous with the Hiawatha National Forest and provides potential habitat for calypso orchid, ram's-head orchid, Alaska orchid, and pine-drops. High-quality forested patches were found in several areas: 1) the southern shore of the Carp River to the west of southbound I-75; 2) the northern shore of the Carp River to the west of southbound I-75; 3) the median between northbound and southbound I-75 to the north of the Carp River, and 4) the area to the east of northbound I-75 north of the Carp River (Fig. 14).

The canopy in the boreal forest community consists of balsam fir (*Abies balsamea*), white spruce (*Picea glauca*), balsam poplar (*Populus balsamifera*), northern white cedar (*Thuja occidentalis*), and some very large white pine (*Pinus strobus*). The understory in this community contains wild sarsaparilla (*Aralia nudicaulis*), bluebead-lily (*Clintonia borealis*), bunchberry (*Cornus canadensis*), diverse sedges (e.g., *Carex intumescens*, *C. pedunculata*), diverse ferns (e.g., *Athyrium filix-femina*, *Phegopteris connectilis*, *Pteridium aquilinum*), Canada mayflower (*Maianthemum canadense*), starflower (*Trientalis borealis*), and low sweet blueberry (*Vaccinium angustifolium*) (Fig. 16a).

A small population of Canada yew (*Taxus canadensis*) was observed in the median between northbound and southbound I-75 to the north of the Carp River (Fig. 14, Fig. 16b). This species is very sensitive to high deer densities and often disappears when browsing pressure is too high. It is notable that a population of Canada yew, albeit with evidence of browse, was observed in Section 2.

Although no rare plants were found in these high quality boreal forest areas within the project boundary, because of their quality and contiguity with the Hiawatha National Forest, they provide a buffer to the protected forest and impacts to these areas should be avoided.



Figure 16. Highlighted plant species in the northern half of Section 2. a) Understory vegetation in the boreal forest natural community consists of diverse ferns, including northern beech-fern (*Phegopteris connectilis*), as well as bunchberry (*Cornus canadensis*) and starflower (*Trientalis borealis*). b) Canada yew (*Taxus canadensis*) grows in the median between northbound and southbound I-75.

The steep slopes leading down to both shores of the Carp River at the bridge crossing (Fig. 17a) have diverse native vegetation, including Joe-Pye weed (*Eutrochium maculatum*), early meadow-rue (*Thalictrum dioicum*), bulrush (*Scirpus atrovirens*), and speckled alder (*Alnus incana*), with some areas of shallow aquatic and mudflat vegetation consisting of reed manna grass (*Glyceria grandis*), common arrowhead (*Sagittaria latifolia*), water horsetail (*Equisetum fluviatile*), common waterweed (*Elodea canadensis*), Richardson's pondweed (*Potamogeton richardsonii*), and small bur-reed (*Sparganium natans*) (Fig.17b). Along the south bank of the river are several invasive species of concern: hybrid cat-tail (*Typha xglauca*; Fig. 14), reed canary grass (*Phalaris arundinacea*; Fig.14), and Canada thistle (*Cirsium arvense*; Fig. 14). These populations should be controlled before construction begins on the bridge because disturbances to the nearby area underneath the bridge will create suitable habitat for these invasive species to spread into.

Many invasive plant species were encountered throughout this section (Table 7) but non-native cat-tails (*Typha angustifolia* and *Typha xglauca*; Fig. 14) were the most frequently observed and are growing in the open wetland areas primarily to the south of the Carp River. Several large patches of these species threaten to expand into the more diverse wet meadow and shrub thicket communities nearby. European swamp thistle (*Cirsium palustre*) is prevalent in open wet ditches along the highway margins (Fig. 14) and Canada thistle (*Cirsium arvense*) is scattered throughout this section in non-forested habitats, both lowland and upland (Fig. 14). Wild parsnip (*Pastinaca sativa*) is frequent in dry, mowed upland habitats (Fig. 14). These invasive species are already prevalent in the nearby landscape but require management in order to maintain the high level of native plant diversity observed in this section.



Figure 17. Highlighted habitat and plant species on the banks of the Carp River. a) Steep slopes on the south shore of the Carp River are covered with early meadow-rue (*Thalictrum dioicum*) and ostrich fern (*Matteuccia struthiopteris*). b) Riverbank vegetation on shallow mudflats includes common arrowhead (*Sagittaria latifolia*) and Richardson's pondweed (*Potamogeton richardsonii*).

Section 3: M-134 Bridge Crossing over the Pine River

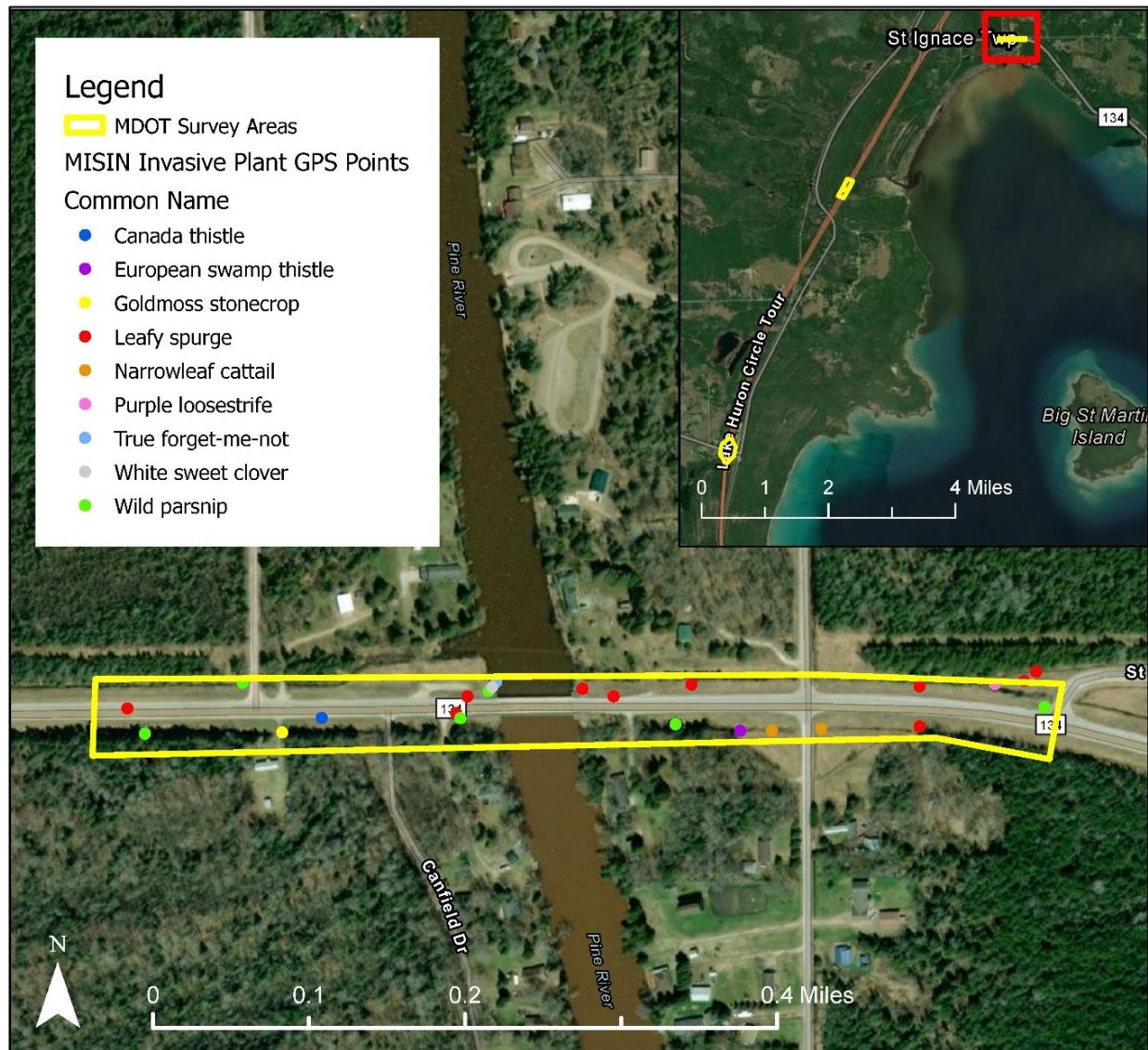


Figure 18. Overview map of Section 3 (M-134 bridge crossing over the Pine River) showing the locations of invasive plant species observed during visits. Inset a) shows the location of Section 3 outlined with a red box within the regional context of MDOT project area 211318.

Section 3 consists of the M-134 bridge crossing over the Pine River. It extends eastward 0.3 miles until the intersection between M-134 and St. Ignace Road and extends westward along M-134 for 0.25 miles (Fig. 18). The entire survey area was surveyed by foot during each of the three section visits. While occurrences of calypso orchid, ram’s-head lady’s-slipper orchid, and butterwort have been observed near this section, no suitable habitat for these species was observed and no rare plants were found in this section.

The vegetation in the ROW is highly modified, consisting of mowed meadows and wetlands within a low-density residential area, and invasive species are prevalent (Table 8). Leafy spurge (*Euphorbia virgata*; Fig. 18) and wild parsnip (*Pastinaca sativa*; Fig. 18) were prevalent in upland, mowed habitats. Wild parsnip is so dense near the parking lot to the west of the Pine

River bridge that it impedes access to the riverbank (Fig. 19a). White sweet clover (*Melilotus albus*; Fig. 18), Canada thistle (*Cirsium arvense*; Fig. 18), and spotted knapweed (*Centaurea stoebe*) were also frequently observed. Snowmobile trails were observed on both sides of M-134, the maintenance of these trails contributes to disturbance in the ROW.

Table 8. Narrative descriptions of locations and abundances of priority invasive species in Section 3.

Latin name	Common name	General location in ROW
<i>Centaurea stoebe</i>	spotted knapweed	Throughout Section 3 in non-forested upland habitats
<i>Cirsium arvense</i>	Canada thistle	Scattered throughout Section 3 in non-forested habitats
<i>Euphorbia virgata</i>	leafy spurge	Dry, mowed areas along roadsides
<i>Melilotus albus</i>	white sweet clover	Scattered throughout Section 3 in non-forested upland habitats
<i>Myosotis scorpioides</i>	forget-me-not	One location on the riverbank to the northwest of the bridge crossing
<i>Myriophyllum spicatum</i>	Eurasian water-milfoil	Growing in the Pine River near the bridge crossing
<i>Pastinaca sativa</i>	wild parsnip	Throughout Section 3 in non-forested upland habitats
<i>Phalaris arundinacea</i>	reed canary grass	In wet areas, primarily in ditches along roadsides
<i>Typha angustifolia</i>	narrow-leaved cat-tail	In wet areas, primarily in ditches along roadsides
<i>Typha xglauca</i>	hybrid cat-tail	In wet areas, primarily in ditches along roadsides

Ditches with wetland vegetation parallel both sides of M-134. The ditch along the south side of M-134 has an open canopy near N. Pine River Rd with emergent invasive cat-tails (*Typha angustifolia*, Fig. 18; *Typha xglauca*, Fig. 19b), purple loosestrife (*Lythrum salicaria*; Fig. 18) and reed canary grass (*Phalaris arundinacea*) dominating the ground layer in some areas. Elsewhere along the south side of M-134 the canopy over the ditch consists of northern white cedar (*Thuja occidentalis*) with blue flag (*Iris versicolor*), sensitive fern (*Onoclea sensibilis*), and cursed crowfoot (*Ranunculus sceleratus*) frequent in the ditch (Fig. 19c). The ditch on the north side of M-134 has a more open canopy with speckled alder (*Alnus incana*) and some smaller cedar trees present, especially in the western side of this section (Fig. 19d).

The bridge over the Pine River is old and is showing signs of wear (Fig. 20). Although the need for renovation of this bridge is clear, care must be taken during construction activities to not harm nearby sensitive species. Swallows were observed nesting on the beams under the bridge during the second survey. Construction activities should either be started before nesting season for these birds, or barriers should be installed to deter the birds from nesting under the bridge to avoid harming adults and young. Care must also be taken to avoid sediment runoff into the Pine River during construction activities.



Figure 19. Highlighted plant species and habitats in project Section 3. a) Dense wild parsnip (*Pastinaca sativa*) impedes access to the Pine River. b) Invasive hybrid cattail (*Typha x glauca*) in an open roadside ditch. c) Northern white cedar (*Thuja occidentalis*) canopy over the ditch on the south side of M134. d) Speckled alder (*Alnus incana*) leafing out over a ditch on the north side of M134 near the western terminus of the project section.



Figure 20. The condition of the M-134 bridge crossing over the Pine River is deteriorating. Crumbling concrete and cracks in the retaining wall were observed.

The mouth of the Pine River lies 0.6 miles to the south of the bridge, and sensitive wetland habitat occurs on either side of the river mouth. Sedimentation could impair these sensitive wetland habitats by introducing excess nutrients into the area and affecting water clarity and quality. Eurasian water-milfoil (*Myriophyllum spicatum*), an aquatic invasive plant, was observed growing in the Pine River near the bridge crossing. Disturbance of the riverbed near the bridge should be avoided in order to minimize fragmentation and spread of this species downstream.

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