

# Rare Plant Species Surveys for the Michigan Department of Transportation: US-23 in Ann Arbor, Washtenaw County. MDOT Project No. 211155.



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Cover photo: *Carex bromoides* in hardwood swamp along US-23 on-ramp off M-15 (Section 1-A). Photo by Amanda K. Klain.

All photos in this report were taken by Amanda K. Klain.

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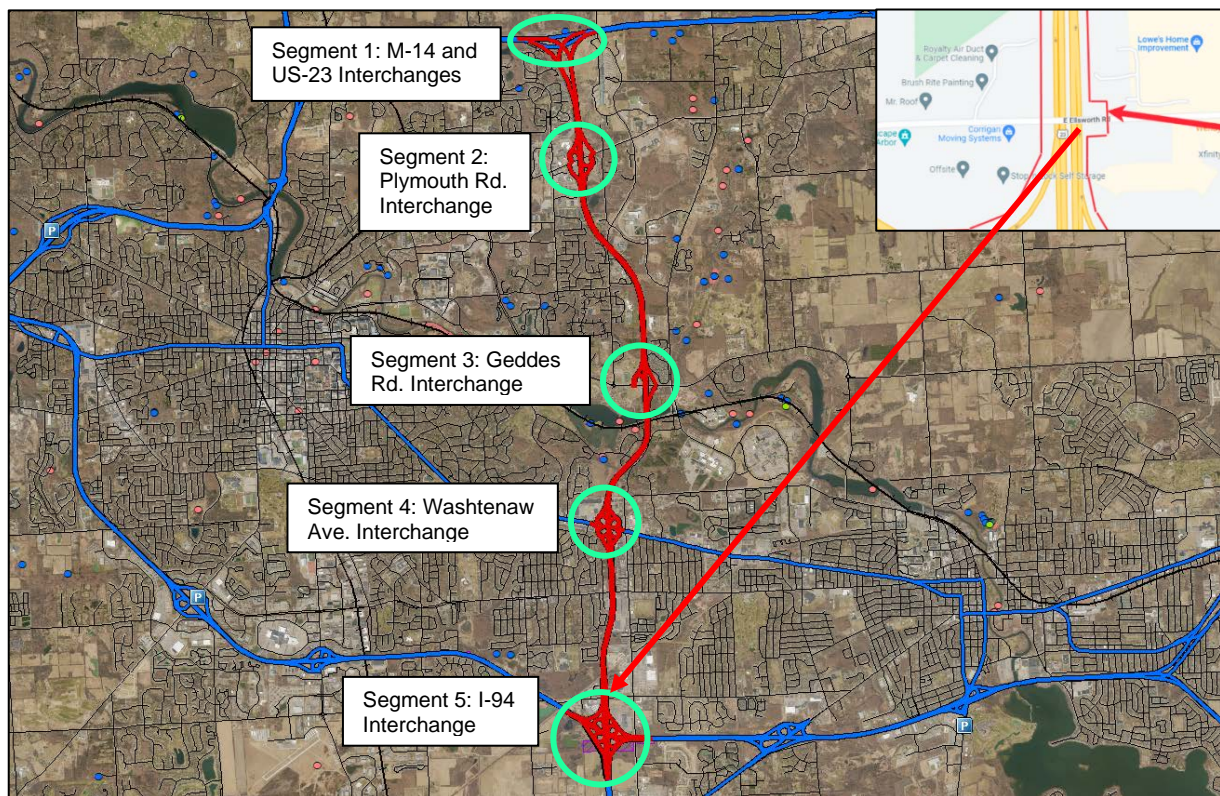


# Abstract

MDOT Project # 211155 was surveyed for rare plant species in the 2022 field season to assess potential impacts of road improvement projects. The project area consists of five interchanges of US-23 in Ann Arbor, Washtenaw County, Michigan. These interchanges were found to be generally disturbed and many areas are infested with non-native invasive species. There are pockets of higher quality habitats, but they occur as isolated fragments. State threatened rattlesnake-master (*Eryngium yuccifolium*) and state extirpated purple coneflower (*Echinacea purpurea*) were found in Segment 1-I, but most likely they are introduced.

# Introduction

This report provides a summary of rare plant surveys conducted along US-23 interchanges from M-14 to I-94 in Ann Arbor, Washtenaw County. This project is an expansion of MDOT Project #200841 (Klain & Higman 2021) and is along the same seven-mile stretch but with the addition of the five interchanges and the Ellsworth Bridge, which are the focus of this report (Fig. 1). Surveys were conducted to ensure compliance related with MDOT Project #211155, involving complete and potential bridge replacements throughout the entire corridor.



**Figure 1.** Overview map of US-23 project area in red, showing survey segments circled in green and inset map of the Ellsworth Bridge survey area in upper right.

# Methods

A review of the Michigan Natural Heritage database was conducted for natural communities, federal and state listed plants, and state special concern plants that have been previously documented within a two-mile radius of the project area. Forty-one rare plant species have been previously documented within the two-mile radius of the project corridor. Twenty species are historical records that have not been observed since 1937, seven were reported between 1959 and 2001, eleven have been recorded in the last twenty years, and three lack observation dates (Table 1). Surveys were focused on these target species; however, all suitable habitat was checked for rare plants in case other species have not yet been documented in the area.

**Table 1.** Documented occurrences of rare plant species within a two-mile radius of the project area.

Latin name	Common name	State status*	Target season	Last year observed
<i>Agrimonia rostellata</i>	beaked agrimony	T	early	2012
<i>Angelica venenosa</i>	hairy Angelica	SC	mid	1924
<i>Asclepias purpurascens</i>	purple milkweed	T	mid	2018
<i>Asclepius sullivantii</i>	Sullivant's milkweed	T	mid	2013
<i>Carex trichocarpa</i>	hairy-fruited sedge	SC	early	1937
<i>Chelone obliqua</i>	purple turtlehead	E	mid	2013
<i>Chenopodium standleyanum</i>	woodland goosefoot	SC	mid	1959
<i>Conioselinum chinense</i>	hemlock-parsley	SC	mid	2011
<i>Corispermum americanum</i>	American bugseed	SC	mid	2001
<i>Cypripedium candidum</i>	white lady slipper	T	mid	1960
<i>Dichanthelium leibergii</i>	Leiberg's panic grass	T	mid	2011
<i>Endodeca serpentaria</i>	Virginia snakeroot	T	mid	recent
<i>Euonymus atropurpureus</i>	wahoo	SC	early-late	unknown
<i>Galearis spectabilis</i>	showy orchis	T	mid	1894
<i>Gentiana alba</i>	white gentian	E	mid	1906
<i>Gentianella quinquefolia</i>	stiff gentian	T	late	2012
<i>Geum virginiana</i>	white avens	SC	mid	1895
<i>Helianthus hirsutus</i>	whiskered sunflower	SC	mid	1868
<i>Hybanthus concolor</i>	green violet	T	early	1919
<i>Hydrastis canadensis</i>	goldenseal	T	early-late	2018
<i>Jeffersonia diphylla</i>	twin leaf	SC	early	1924
<i>Justicia americana</i>	water willow	T	mid-late	2017
<i>Lechea minor</i>	least pinweed	T	mid-late	1924
<i>Morus rubra</i>	red mulberry	T	early-late	1880
<i>Muhlenbergia richardsonii</i>	mat muhly	T	mid-late	1981
<i>Panax quinquefolius</i>	ginseng	T	early-late	1867
<i>Paronychia fastigiata</i>	low-forked chickweed	X	mid-late	1909
<i>Polemonium reptans</i>	Jacob's ladder	T	early	1982

<i>Potentilla canadensis</i>	Canada cinquefoil	SC	early-late	1963
<i>Prunus umbellata</i>	Alleghany plum	SC	early-late	2011
<i>Ranunculus rhomboideus</i>	prairie buttercup	T	early	1924
<i>Sanguisorba canadensis</i>	American burnet	E	mid-late	unknown
<i>Scleria triglomerata</i>	tall nut rush	SC	early-mid	1838
<i>Silphium laciniatus</i>	compass plant	T	mid-late	1928
<i>Spiranthes ovalis</i>	lesser ladies'-tresses	T	late	1997
<i>Strophostyles helvula</i>	trailing wild bean	SC	mid-late	1924
<i>Symphotrichum praealtum</i>	willow aster	SC	mid-late	unknown
<i>Tradescantia virginiana</i>	Virginia spiderwort	SC	early	1918
<i>Trichophorum clintonii</i>	Clinton's bullrush	SC	early	1935
<i>Trillium sessile</i>	toadshade	T	early	1924
<i>Valeriana edulis var. ciliata</i>	edible valerian	T	early	1860
* T = threatened; SC = special concern; E = endangered; X = extirpated				

Satellite maps showing the survey boundaries and all documented rare species within the two-mile radius were developed using Field Maps. These were georeferenced and loaded onto a Samsung tablet with the Field Maps application for use in the field. This enabled surveyors to view their location and occurrences of natural features while surveying.

The project corridor was walked using the meander survey method along all parts of the survey boundaries paying attention to high quality areas. Early, mid-late and late season surveys were conducted and timed to coincide with sufficient-to-optimal survey periods for the target species. Early season surveys were conducted on June 2, 3, 14, 16, and 17, 2022, mid-late season surveys on August 26, 30, and September 1, 2022, and late season surveys on November 12, 2022. Surveys are described by segment, each corresponding to one of the five interchange area (Fig. 1). General habitat conditions, dominant plant species, non-native invasive species, and any other notable features were recorded and are described for each segment.

## Results

The surveys revealed that much of the ROW and interchange habitats are disturbed with scattered pockets of successional meadows, wet meadow remnants, mature forests, and some species with moderate-to-high coefficient of conservatism (CoC) values (Table 2). Higher quality areas occur as isolated fragments within a disturbed and highly invaded matrix. A pocket of prairie species was found in Segment 1-I, including occurrences of state threatened rattlesnake-master (*Eryngium yuccifolium*) and purple coneflower (*Echinacea purpurea*).

The most common grasses dominating the rights-of-way are Eurasian species, including smooth brome grass (*Bromus inermis*), squirrel-tail grass (*Hordeum jubatum*), fescues (*Lolium arundinaceum*, *L. perenne*), reed canary grass (*Phalaris arundinacea*), and Kentucky bluegrass (*Poa pratensis*). Shrub thickets abound, consisting mainly of gray dogwood (*Cornus foemina*) and non-native common buckthorn (*Rhamnus cathartica*), autumn olive (*Elaeagnus umbellata*), honeysuckles (*Lonicera* spp.), and Callery pear (*Pyrus calleryana*). Tree species vary through-



out the project area and are discussed by segment below. A list of the most commonly observed non-native invasive species are shown in Table 3.

<b>Table 2. Species with moderate-to-high coefficient of conservatism values in the project area.</b>			
<b>Latin name</b>	<b>Common name</b>	<b>CoC value*</b>	<b>Location</b>
<i>Agalinis purpurea</i>	purple false foxglove	7	Segment 3
<i>Asclepias exaltata</i>	poke milkweed	6	Segment 1-B
<i>Cardamine concatenata</i>	cut-leaved toothwort	5	Segment 1-A
<i>Carex bromoides</i>	sedge	6	Segment 1-A
<i>Carex tetanica</i>	sedge	9	Segment 1-D
<i>Carya cordiformis</i>	bitternut hickory	5	Segment 1-A, 1-B
<i>Erythronium americanum</i>	yellow trout lily	5	Segment 1-A, 1-B
<i>Euonymus obovatus</i>	running strawberry bush	5	Segment 1-B
<i>Fagus grandifolia</i>	beech	6	Segment 1-A, 1-B
<i>Lespedeza violacea</i>	bush-clover	7	Segment 5
<i>Menispermum canadense</i>	moonseed	6	Segment 1-A
<i>Oxypolis rigidior</i>	cowbane	6	Segment 1-A
<i>Polygala verticillata</i>	whorled milkwort	5	Segment 1-G
<i>Polystichum acrostichoides</i>	Christmas fern	6	Segment 1-A
<i>Pycnanthemum tenuifolium</i>	slender mountain mint	6	Segment 3
<i>Quercus macrocarpa</i>	bur oak	5	Segment 1-A, 1-B
<i>Sanguinaria canadensis</i>	bloodroot	5	Segment 1-A, 1-B
<i>Schoenoplectus pungens</i>	threesquare	5	Segment 5
<i>Tilia americana</i>	basswood	5	Segment 1-A, 1-B
*Coefficient of Conservatism: Ranges from 0-10 for native species with increasing fidelity to habitat present prior to widespread European settlement. 0: low fidelity; 10: high fidelity.			

<b>Table 3. Most common invasive species in the project area.</b>			
<b>Latin name</b>	<b>Common name</b>	<b>Density</b>	<b>Location</b>
<i>Bromus inermis</i>	smooth brome	abundant	widespread
<i>Cirsium arvense</i>	Canada thistle	frequent	widespread
<i>Dipsacus fullonum</i>	wild teasel	abundant	widespread
<i>Dipsacus laciniatus</i>	cut-leaf teasel	abundant	widespread
<i>Elaeagnus umbellata</i>	autumn-olive	abundant	widespread
<i>Lonicera spp.</i>	Eurasian honeysuckle	abundant	widespread
<i>Lythrum salicaria</i>	purple loosestrife	abundant	widespread
<i>Phragmites australis</i> ssp. <i>australis</i>	phragmites	abundant	widespread
<i>Pyrus calleryana</i>	Callery pear	abundant	widespread
<i>Rhamnus cathartica</i>	common buckthorn	abundant	widespread
<i>Securigera varia</i>	crown vetch	abundant	widespread
<i>Solidago sempervirens</i>	seaside goldenrod	frequent	widespread
<i>Typha angustifolia</i>	narrow-leaved cat-tail	abundant	widespread



## Descriptions of plant communities by survey segment

### Segment 1: All interchanges at US-23 and M-14

Nine areas (A-I) were designated at this complex and busy interchange (Fig. 2). The general habitats are successional old-field vegetation, scattered wet prairie pockets, non-native shrub thickets, and wet ditch swales dominated by narrow-leaved cat-tail (*Typha angustifolia*), non-native phragmites (*Phragmites australis* ssp. *australis*), rush (*Juncus compressus*), seaside goldenrod (*Solidago sempervirens*), and teasel (*Dipsacus fullonum*, *D. laciniatus*) (Fig. 3). Several interesting native species were also observed including sawtooth sunflower (*Helianthus grosseserratus*; Fig. 4), hedge bindweed (*Calystegia sepium*), and whorled milkwort (*Polygala verticillata*).



**Figure 2.** Segment 1 showing designated areas A through I and location of state threatened rattlesnake-master and state extirpated purple coneflower (green star) and location of hybrid cat-tail (*Typha xglauca*) (pink star).

**Segments 1-A and 1-B:** Mature beech-maple forest and hardwood swamps were found along the right-of-way fence in 1-A, and as the main natural feature in section 1-B (Fig. 5 and cover photo). There is a diverse and native ground flora which is referenced in Table 2, including beech (*Fagus grandifolia*), bur oak (*Quercus macrocarpa*), sedge (*Carex bromoides*), cowbane (*Oxypolis rigidior*), Christmas fern (*Polystichum acrostichoides*), yellow trout lilies (*Erythronium americanum*), common trillium (*Trillium grandiflorum*), and bloodroot (*Sanguinaria canadensis*).





**Figure 3.** Characteristic wet ditch zones and dense shrubs along right-of-way.



**Figure 4.** Sawtooth sunflower (*Helianthus grosseserratus*) in Segment 1-G.



**Figure 5.** Hardwood swamp in Segment 1-B.



**Figure 6.** Sedge and rush dominated meadow in Segment 1-D.

**Segment 1-D:** This section is a characteristic non-native wet ditch zone dominated by non-native cat-tails, with a dense teasel infestation on the perimeter. There is also an isolated swath of sedge meadow where an uncommon sedge (*Carex tetanica*; CoC-9) was observed, along with more common sedge species (*Carex* spp., *Scirpus* spp.) and several rushes (*Juncus* spp.) (Fig. 6).

**Segment 1-I:** State threatened rattlesnake-master (Fig. 7) and state extirpated purple cone-flower were located within an open gravelly habitat at the west edge of the segment, north of M-14. They occur with many other prairie species, including yellow cone-flower (*Ratibida pinnata*), Riddell's goldenrod (*Solidago riddellii*), and big bluestem (*Andropogon gerardii*). State threatened Sullivant's milkweed (*Asclepias sullivantii*) has been previously documented within a two-mile radius of the project area but was not found at this location. An isolated occurrence of invasive hybrid cat-tail (*Typha x glauca*; Fig. 8) poses a threat to this prairie pocket (Fig. 2: pink star).





**Figure 7.** Rattlesnake-master (*Eryngium yuccifolium*) in Segment 1-I.



**Figure 8.** Hybrid cat-tail (*Typha x glauca*) observed in Segment 1-I.

**Segments 1-C, 1-E, 1-F, and 1-G:** These sections are dominated by weedy successional old field vegetation and wet ditch zones with non-native phragmites and narrow-leaved cat-tail. Other common invasive species in these areas include wild and cut-leaf teasel, crown-vetch (*Securigera varia*), and purple loosestrife (*Lythrum salicaria*).

Small groves of native and non-native trees and shrubs are scattered in the old fields, including Scotch pine (*Pinus sylvestris*), cottonwood (*Populus deltoides*), red cedar (*Juniperus virginiana*), staghorn sumac (*Rhus typhina*), and large amounts of autumn olive and common buckthorn. Wetland species such as swamp milkweed (*Asclepias incarnata*), ninebark (*Physocarpus opulifolius*), and prickly ash (*Zanthoxylum americanum*) were scattered in the low areas. No suitable habitat for rare species was found.

## Segment 2: All interchanges at Plymouth Road and US-23



**Figure 9.** Unsuitable habitat in Segment 2.

The majority of the interchange contains unsuitable habitat for rare species (Fig. 9). It is fairly open, with substantial amounts of Callery pear and a dense shrub zone along the fence. Open areas are dominated by Eurasian grasses, sweet clovers, and teasel, though there are pockets of native species, including common milkweed (*Asclepias syriaca*), butterfly-weed (*A. tuberosa*), blue-eyed grass (*Sisyrinchium angustifolium*), and goldenrods (*Solidago speciosa*, *S. nemoralis*).

Occasional trees in this segment include red pine (*Pinus resinosa*), black walnut (*Juglans nigra*), black locust (*Robinia pseudoacacia*), and Siberian elm (*Ulmus pumila*).



**Figure 10.** Possible hybrid of prairie-dock and compass plant (*Silphium terebinthinaceum* x *S. laciniatum* (state threatened), in Segment 2.

A possible hybrid of prairie-dock and compass plant (*Silphium terebinthinaceum* x *S. laciniatum* (state-threatened) was observed near the Park-n-Ride in the SW quadrant of the interchange (Fig. 10). Within a population of roughly 50 prairie-dock, two had deeply lobed basal leaves indicating possibly hybrid origin. Diagnostic flowers of the two unique plants were collected but could not be definitively determined to be the hybrid.

Native big bluestem, black-eyed Susan, and goldenrods were observed in the rights-of-ways directly adjacent to the highways; however, crown vetch, Canada thistle (*Cirsium arvense*), and teasel dominate in these zones (Fig. 11).



**Figure 11.** Typical teasel (*Dipsacus fullonum*, *D. laciniatus*) infestations in Segment 2, seen throughout all the interchanges.

### **Segment 3. All interchanges at Geddes Road and US-23, except the southwest cloverleaf.**

The Geddes interchange is composed of a mostly open successional meadow habitat with scattered red pine and red cedar, purple top (*Tridens flavus*), big bluestem, and New England aster (*Symphyotrichum novae-angliae*). Scattered non-native phragmites, glossy buckthorn, dense teasel, and purple loosestrife are common. Some interesting wet prairie species were observed in the southeast interchange, including purple false foxglove (*Agalinis purpurea*; Fig. 12), slender mountain mint (*Pycnanthemum tenuifolium*), and wing-stem (*Verbesina alternifolia*; Fig. 13). Dominant shrubs include Callery pear, autumn olive, common buckthorn, and gray dogwood. Smoke-tree (*Cotinus coggygria*) is abundant along the southeast off-ramp fence-line.





**Figure 12.** Purple false foxglove (*Agalinis purpurea*), an unlikely urban roadside occurrence in the Geddes Road interchange.



**Figure 13.** Somewhat uncommon wing-stem (*Verbesina alternifolia*) in the Geddes Road interchange.

#### **Segment 4: All interchanges at Washtenaw Ave.**

These interchanges are similar to the rest of the corridor with a mix of native and non-native species, and the characteristic zones of Eurasian grasses, wet ditches, successional meadows, some wet prairie species, shrub thickets, and some mature tree swaths along the fence line.



In the southeast, Swift Drain runs through a densely vegetated shrub thicket with dense zones of non-native phragmites and narrow-leaved cat-tail (Fig. 14).

**Figure 14** Swift Drain running through the Washtenaw Ave. interchange.



**Segment 5: All interchanges at I-94 and US-23, including the Ellsworth Bridge portion.**

Ellsworth Bridge: The area around the bridge is steeply sloped, highly disturbed and unsuitable habitat for any target species. The vegetation is a tangle of non-native invasive species including common buckthorn, smooth brome, Canada thistle, and black locust (Fig. 15).

**Figure 15.** *Unsuitable habitat at Ellsworth Bridge and US-23.*



North and South Interchanges: The interchange rights-of-way are mostly open disturbed habitats with characteristic non-native wet ditch swales dominated by non-native cat-tails. Various sedges (*Carex* spp., *Scirpus* spp., *Eleocharis* spp.) occur in isolated and sparse patches in the wetter areas, along with purple loosestrife and seaside goldenrod.



**Figure 16.** *Characteristic vegetation in the Segment 5 interchange.*

Dense teasel, Canada thistle, and common buckthorn infestations occur throughout the dryer open disturbed areas, and Norway maple (*Acer platanoides*), pin oak (*Quercus ellipsoidalis*), and red pine are scattered (Fig. 16).

Bush-clover (*Lespedeza violacea*), a species with a high coefficient of conservatism (7), was observed in several patches (Fig. 17).



Along portions of the on and off ramps there are pockets of mature woods with native trees including red maple, white and red oak (*Quercus rubra*, *Q. alba*), and hickories (*Carya* spp.), with a sub-canopy of common buckthorn. Associated native woodland ground flora persists.

**Figure 17.** Bush-clover (*Lespedeza violacea*), a highly conservative species, was observed in several patches in Segment 5.

## Discussion

The highest quality areas are the beech-maple forest and hardwood swamps in Segment 1-A and 1-B, and the sedge meadow in Segment 1-D, which should be preserved as much as possible because of their conservation value. Likewise, disturbance to the small, isolated old-field successional and wet prairie communities scattered throughout the project area should be limited as much as possible. Since the rights-of-way are highly infested with invasive species, emphasis should be placed on decontamination of vehicles when moving from site to site.

The state-threatened rattlesnake-master and state-extirpated purple coneflower observed in Segment 1-I are presumably introduced. Naturally occurring populations of purple coneflower have not been documented in Michigan since the late 1800's, and rattlesnake-master has only been found introduced in southeast Michigan (Michigan Flora Online 2022). Both species are commonly used in restoration and wildflower projects in Michigan, and these occurrences were possibly introduced through a wildflower seed mix.

## References

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