

Rare Plant Species Surveys for the Michigan Department of Transportation: I-94 near Stevensville



Prepared By:

Tyler J. Bassett
Michigan Natural Features Inventory
Michigan State University Extension
P.O. Box 30444
Lansing, MI 48909-7944

Prepared For:

Michigan Department of Transportation

12/01/2020

MNFI Report No. 2020-27

Suggested Citation:

Bassett, T.J. 2020. Rare Plant Species Surveys for the Michigan Department of Transportation: I-94 near Stevensville. Michigan Natural Features Inventory, Report No. 2020-27, Lansing, MI.

Copyright 2020 Michigan State University Board of Trustees. MSU Extension programs and materials are open to all without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, marital status or family status.

Cover: Narrow-leaved cattail (*Typha angustifolia*) adjacent to small wet-mesic prairie at Puetz Rd. crossing.

Table of Contents

Introduction and Methods.....	1
Results and Discussion.....	3
Section # 1: Western extent to Puetz Road	3
Section # 2: Puetz Road to Red Arrow Highway (Exit 23)	3
Section # 3: Red Arrow Highway cloverleaf to railroad tracks	6
Section # 4: Railroad tracks to Hickory Creek.....	8
Section # 5: Hickory Creek to Glenlord Road	9
Section # 6: Glenlord Road to Lincoln Avenue	10
Section # 7: Lincoln Avenue to M-63 (Exit 27)	10
Section # 8: M-63 cloverleaf and westbound off ramp	11
Section # 9: Exit 27 on/off ramp to St. Joseph River.....	12
Section # 10: St. Joseph River to M-139 (Exit 28)	12
Acknowledgements.....	14

List of Tables

Table 1. Species targeted during surveys.	1
Table 2. Priority invasive species.....	3

List of Figures

Figure 1. Project area along I-94 in Berrien County, highlighted in red	2
Figure 2. Location of section boundaries and priority invasive species	4
Figure 3. Open dune on northside of Section 2, with prickly pear cactus in foreground	5
Figure 4. Degraded wet-mesic prairie above seepage zone in northside of Section 2	5
Figure 5. Chinese wisteria spreading into Section 2 from adjacent private property	6
Figure 6. Swale on northside of Section 3 dominated by tree-of-heaven	7

Figure 7. Wet swale in southeast cloverleaf of Red Arrow Highway interchange	8
Figure 8. Wooded slope along northside of Section 4 with staghorn sumac and prickly pear	8
Figure 9. Small sandy slope on southside of Section 4 with dry prairie species.....	9
Figure 10. Long stretch of Kentucky bluegrass and smooth brome in southside of Section 6 ...	10
Figure 11. Degraded wet-mesic prairie in M-63 cloverleaf	11
Figure 12. Mixed native and non-native clay grassland in southside of Section 9.....	12
Figure 13. Sedge-dominated seep and swale along northside of section 10	13
Figure 14. Thicket with reed canary grass in floodplain, northside of section 10	14

Appendix

Appendix A. Vascular plant species recorded from Puetz Road and M-63 Prairies.....	15
---	----

Introduction and Methods

We conducted threatened and endangered plant species surveys along approximately seven miles of I-94, from just north of the John Beers Rd exit (Exit 22), north and east across the St. Joseph River to Townline Road (Exit 28) (Figure 1). These surveys were conducted to ensure compliance related with MDOT Project 132824, involving pavement reconstruction of I-94 lanes and interchange ramps, and structure work on eight bridges and one culvert.

A review of the Michigan Natural Heritage database was conducted to identify species listed as endangered, threatened or special concern with potential to occur in the survey area outlined in red in Figures 1 and 2. Ten species were identified as targets (Table 1). No Federally-listed species were identified as potential targets.

A total of 10 vascular plant species, listed as Threatened (T), Endangered (E), or Special Concern (SC) by the Endangered Species Act of the State of Michigan (Part 365 of PA 451, 1994 Michigan Natural Resources and Environmental Protection Act), were identified during the Environmental Review process and targeted during these surveys (Table 1). Surveys were timed to coincide with sufficient to optimal survey periods for these species, and occurred in spring (May 26 and 28, 2020) and mid-summer (July 8, 2020). While 4 of the 10 species are best identified during late summer surveys, suitable habitat for these species was not found during earlier surveys. These surveys specifically targeted prairie trillium (*Trillium recurvatum*, T), twinleaf (*Jeffersonia diphylla*, T), and large-flowered leafcup (*Smallanthus* [*Polymnia*] *uvedalia*, T) during spring surveys; ginseng (*Panax quinquefolius*, T) and crane fly orchid (*Tipularia discolor*, E) during mid-season surveys; short-fruited rush (*Juncus brachycarpus*, T), spotted pondweed (*Potamogeton pulcher*, E), trailing wild bean (*Strophostyles helvula*, SC), rose-pink (*Sabatia angularis*, T) and prairie (white) false indigo (*Baptisia lactea*, SC) would normally be targeted during late summer surveys.

Table 1. Species targeted during surveys.

Scientific Name	Common Name	Listing Status	Target Season
<i>Baptisia lactea</i>	prairie false indigo	SC	Late
<i>Jeffersonia diphylla</i>	twinleaf	T	Early
<i>Juncus brachycarpus</i>	short-fruited rush	T	Late
<i>Panax quinquefolius</i>	ginseng	T	Mid
<i>Potamogeton pulcher</i>	spotted pondweed	E	Late
<i>Sabatia angularis</i>	rose-pink	T	Late
<i>Smallanthus uvedalia</i>	large-flowered leafcup	T	Early
<i>Strophostyles helvula</i>	trailing wild bean	SC	Late
<i>Tipularia discolor</i>	crane fly orchid	E	Mid
<i>Trillium recurvatum</i>	prairie trillium	T	Early

Surveys were conducted by meander survey along each side of I-94, focusing on suitable habitat within the 20-ft (6- m) right-of-way along the highway and within on/off ramp cloverleaves for the target species. I recorded general habitat conditions, dominant plant species, and

populations of rare and notable plant invasive species in ten sections of I-94, demarcated by road- and stream-crossings. Notable plant invasive species include all non-native, invasive plants for which management by MDOT can make a significant impact on containing their spread along the I-94 corridor. When rare plant occurrences and notable invasive species populations were found, they were marked with GPS points using a Samsung tablet.



Figure 1. Project area along I-94 in Berrien County, highlighted in red

Results and Discussion

No threatened and endangered plant species were observed during these surveys. Most sections were dominated largely by exotic and invasive grasses Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*) and others. Below we refer to this typical dominate vegetation simply as “Eurasian grassland species.” Occasional sections included native vegetation, including degraded sand dunes, wet-mesic prairie, and floodplain forest (Hickory Creek and St. Joseph River) communities. Below, I briefly summarize the vegetation of each section (see Figure 2), and note the presence of priority invasive species, which include tree-of-heaven (*Ailanthus altissima*), teasel (*Dipsacus fullonum* and *D. laciniata*), Japanese knotweed (*Fallopia japonica*), invasive Phragmites (*Phragmites australis*), black locust (*Robinia pseudoacacia*), and seaside goldenrod (*Solidago sempervirens*) (Figure 2, Table 2).

Table 2. Priority invasive species		
Scientific Name	Common Name	Stretches (see text for description)
<i>Ailanthus altissima</i>	Tree-of-heaven	1, 2, 3, 7, 10
<i>Conium maculatum</i>	Poison hemlock	3, 4
<i>Dipsacus</i> spp.	Teasel	2, 3, 7, 8 (not GPSd)
<i>Fallopia japonica</i>	Japanese knotweed	3
<i>Phragmites australis</i>	Common reed	5, 7, 8, 9, 10
<i>Robinia pseudoacacia</i>	Black locust	2, 3, 6
<i>Solidago sempervirens</i>	Seaside goldenrod	9

Section # 1: Western extent to Puetz Road

The median west of Puetz Rd is a narrow, mowed, and dominated by Eurasian grassland species. Priority invasive species include tree-of-heaven.

Section # 2: Puetz Road to Red Arrow Highway (Exit 23)

North side. This section is largely dominated by Eurasian grassland species., but also contains a small open dune community (Figure 3) and a wet-mesic prairie community (Figure 4). The dune is dominated by marram grass (*Ammophila breviligulata*), with some characteristic native species such as little bluestem (*Schizachyrium scoparium*), showy goldenrod (*Solidago speciosa*), and prickly pear (*Opuntia humifusa*) occasional. The widespread invasive spotted knapweed (*Centaurea stoebe*) was abundant. I also collected the first specimen of Chinese wisteria (*Wisteria sinensis*) in Berrien County, near the dune (Figure 5). The wet-mesic prairie community, while severely degraded, was exceptionally diverse. The soils were very clayey, and a small seep formed along the downhill side. This small prairie was dominated by the native scouring rush (*Equisetum laevigatum*), Torrey’s rush (*Juncus torreyi*), Dudley’s rush (*Juncus dudleyi*), meadow sedge (*Carex granularis*) and a non-native rush (*Juncus compressus*). I

recorded a total of 37 vascular plant species in this small prairie, including 31 native species (Appendix A). Narrow-leaved cattail (*Typha angustifolia*) is invading this prairie from the east.





Figure 3. Open dune on northside of Section 2, with prickly pear cactus in foreground



Figure 4. Degraded wet-mesic prairie above seepage zone in northside of Section 2

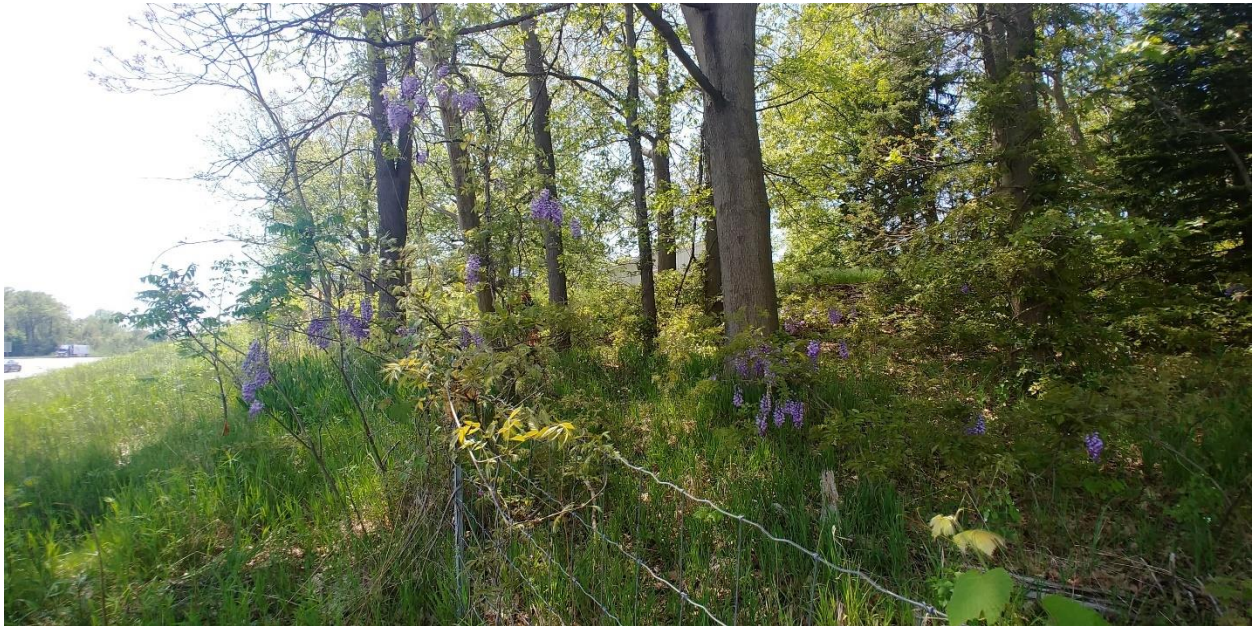


Figure 5. Chinese wisteria spreading into Section 2 from adjacent private property

South side. The vegetation in this section included areas dominated by Eurasian grassland species, including a sandy stretch with a large population of prickly pear, Pennsylvania sedge (*Carex pensylvanica*) and the invasive vine (*Celastrus orbiculata*). Steeper slopes supported thickets of staghorn sumac (*Rhus typhina*), sassafras (*Sassafras albidum*), and box-elder (*Acer negundo*), with several goldenrod species (*Solidago gigantea*, *S. rugosa*, *S. altissima*), poison-ivy (*Toxicodendron radicans*), and a large patch of myrtle (*Vinca minor*) spreading from an adjacent yard. A small swale in this section was dominated by cattails (*Typha* sp.), invasive Canada thistle (*Cirsium arvense*), gray dogwood (*Cornus foemina*), and cottonwood (*Populus tremuloides*).

Priority invasive species include tree-of-heaven, black locust, and teasel.

Section # 3: Red Arrow Highway cloverleaf to railroad tracks

Northside. The vegetation in this section, including both the northeast and northwest portions of the cloverleaf, is dominated by Eurasian grassland species. There is a small area of groundwater seepage in the northeast portion of the cloverleaf with sedges (*Carex scoparia*, *C. vulpinoidea*) and rushes (*Juncus effusus*, *J. dudleyi*), which spills into a swale that extends to the east with several woody invasive species, including tree-of-heaven, black locust, common buckthorn (*Rhamnus cathartica*), Siberian elm (*Ulmus pumila*), and Amur honeysuckle (*Lonicera*

maackii) (Figure 6). The rapidly spreading invasive poison hemlock (*Conium maculatum*) is noteworthy in the northwest portion of the cloverleaf.



Figure 6. Swale on northside of Section 3 dominated by tree-of-heaven

Southside. The vegetation in this section, including both the southeast and southwest portions of the cloverleaf, is dominated by Eurasian grassland species. Areas to the east of the cloverleaf are on a steep slope with tree-of-heaven, staghorn sumac, sassafras, and scattered poison hemlock. Closer to the exit, a large population of Japanese knotweed occupies the slope above a moist swale with cattails, poison-ivy, reed canary grass (*Phalaris arundinacea*), and native *Phragmites* (*Phragmites americanus*). The southeast portion of the clover leaf supports a low swale (Figure 7) dominated by a spike-rush (*Eleocharis erythropoda*), rushes (*Juncus effusus*, *Juncus dudleyi*), and sedges (*Carex scoparia*, *C. molesta*, *C. vulpinoidea*).

Priority invasive species include tree-of-heaven, teasel, black locust, Japanese knotweed, and poison hemlock.



Figure 7. Wet swale in southeast cloverleaf of Red Arrow Highway interchange

Section # 4: Railroad tracks to Hickory Creek

Northside. This section was characterized by wooded slopes and swales. The wooded slopes occupy a small dune, dominated by Eurasian grassland species with Siberian crab (*Malus baccata*), staghorn sumac, Lombardy poplar (*Populus nigra* “Italica”), and prickly pear (Figure 8). The swale occupies steep slopes above a flowing stream down to the railroad with cottonwood, sassafras, American germander (*Teucrium canadense*), and water hemlock (*Cicuta maculata*).



Figure 8. Wooded slope along northside of Section 4 with staghorn sumac and prickly pear

Southside. This section is dominated by Eurasian grassland species, although a high sandy slope supports a few native dry prairie species (Figure 9), including spiderwort (*Tradescantia ohiensis*), pasture rose (*Rosa carolina*), and poverty grass (*Danthonia spicata*). Clumps of trees and shrubs are occasional.



Figure 9. Small sandy slope on southside of Section 4 with dry prairie species

Priority invasive species include poison hemlock.

Section # 5: Hickory Creek to Glenlord Road

Northside. A swale, dominated by spike-rush, cattail, and reed canary grass, runs along the bottom of a steep shrub-dominated slope in this section. The slope is dominated by Japanese honeysuckle (*Lonicera japonica*), autumn olive (*Elaeagnus umbellata*), and sassafras

Southside. A swale also runs along the bottom of a steep slope for much of this section. This swale is dominated by spike-rush, cattails, common reed and scouring rush, but sedges () are also common and spread up the slope. The upper portion of the slope is dominated by autumn olive and bush honeysuckle (*Lonicera tatarica*), and a mixed canopy of sugar maple (*Acer saccharum*) and walnut (*Juglans nigra*).

Priority invasive species include common reed.

Section # 6: Glenlord Road to Lincoln Avenue

Northside. This section is dominated by Eurasian grassland species with patches of autumn olive. Very sandy just west of Lincoln Ave for about ¼ mile. A small swale with dense cattails occurs east of Cleveland Ave.

Southside. Eurasian grassland species dominate this section (Figure 10), and both autumn olive and Austrian pine (*Pinus nigra*) are dense in portions. Sedges cover the hillside immediately east of Glenlord Road. A patch of black locust occurs near the intersection with Washington Ave.

Priority invasive species include black locust.



Figure 10. Long stretch of Kentucky bluegrass and smooth brome in southside of Section 6

Section # 7: Lincoln Avenue to M-63 (Exit 27)

Northside. This section is dominated by dense cover of Eurasian grassland species. Dense patches of Austrian pine, autumn olive, and white mulberry (*Morus alba*) are occasional. Teasel is common.

Southside. This section is similar to the northside of the I-94.

Priority invasive species include teasel.

Section # 8: M-63 cloverleaf and westbound off ramp

Northside. Large portions of the cloverleaf are dominated by Eurasian grassland species with teasel common and Canada thistle (*Cirsium arvense*) occasional. Toward the east and in portions of the cloverleaf support a degraded wet-mesic prairie with heavy clay soils (Figure 11). This prairie was dominated by a mixture of Eurasian grassland species and native sedges and grasses, including several sedges (*Carex* spp) and rushes (*Juncus* spp), and native prairie grasses such as little bluestem (*Schizachyrium scoparium*) and Indian grass (*Sorghastrum nutans*). I made the first collection of Bush's sedge (*Carex bushii*) for Berrien County in this location. I recorded 51 vascular plant species in this prairie, including 37 native plant species (see Appendix A).



Figure 11. Degraded wet-mesic prairie in M-63 cloverleaf

Southside. This section was dominated by Eurasian grassland species, with occasional patches of cattails and common reed.

Priority invasive species include common reed and teasel.

Section # 9: Exit 27 on/off ramp to St. Joseph River

Northside. This section was characterized by a mix of Eurasian grassland species, and low ground sloping toward the St. Joseph River, dominated by native and invasive common reed, scouring rush, and cattails, with purple loosestrife (*Lythrum salicaria*) and seaside goldenrod (*Solidago sempervirens*) occurring closer to the river. A wooded edge on the north boundary supported a few native floodplain species, including wingstem (*Verbesina alternifolia*) and Virginia waterleaf (*Hydrophyllum virginianum*).

Southside. This section supports Eurasian grassland species, and a mix of other native and weedy species that thrive in heavy clay (Figure 12). Co-dominant species include tall fescue (*Schenodorus pratensis*), redtop (*Agrostis gigantea*). A swale in this section was dominated by cattails and common reed, with Dudley's rush and woolly sedge (*Carex pellita*) common.



Figure 12. Mixed native and non-native clay grassland in southside of Section 9

Priority invasive species including common reed and seaside goldenrod.

Section # 10: St. Joseph River to M-139 (Exit 28)

Northside. Toward the east, this section is dominated by Eurasian grassland species with clumps of Austrian pine and autumn olive. Closer to the river, a swale forms below a small seep (Figure 13), supporting a mix of native and exotic wetland species such as tussock sedge (*Carex stricta*), narrow-leaved cattail, sweetgrass (*Anthoxanthum hirta*), prairie cordgrass

(*Spartina pectinata*), and water chestnut (*Nasturtium officinale*). A slope above the St. Joseph River floodplain slope is dominated by invasive honeysuckle species and poison-ivy, but native floodplain species such as black snakeroot (*Sanicula odorata*), sweet Joe-Pye weed (*Eutrochium purpureum*), and wild garlic (*Allium canadense*) are occasional. Within the floodplain and adjacent to Benton Township Park, a thicket of cottonwood and black willow supports a few native shrub and understory species such as common elderberry (*Sambucus canadensis*), red maple (*Acer rubrum*), spotted touch-me-not (*Impatiens capensis*), and Canada anemone (*Anemone canadensis*), although reed canary grass is dominant (Figure 14).



Figure 13. Sedge-dominated seep and swale along northside of section 10

Southside. This section is dominated by Eurasian grassland species, as well as some thickets with bush honeysuckle and sassafras. An adjacent swale is dominated by reed canary grass and cattails. A small area of exposed clay soil and supports a patch of switchgrass.

Priority invasive species include tree-of-heaven and common reed.



Figure 14. Thicket with reed canary grass in floodplain, northside of section 10

Acknowledgements

I thank David Schuen at MDOT for project funding and coordination. Phyllis Higman of MNFI provided project coordination. Ashley Adkins, Brian Klatt, and Nancy Toben of MNFI provided administrative assistance.

Appendix A: Vascular plant species recorded from Puetz Road and M-63 Prairies

<u>Scientific Name</u>	<u>Common Name</u>	<u>Origin</u>	<u>C</u>	<u>W</u>	<u>Puetz Rd</u>	<u>M-63</u>
<i>Agrostis gigantea</i>	redtop	non-native	0	-3	X	X
<i>Antennaria parlinii</i>	smooth pussytoes	native	2	5		X
<i>Apocynum cannabinum</i>	indian-hemp	native	3	0	X	
<i>Asclepias incarnata</i>	swamp milkweed	native	6	-5		X
<i>Asclepias syriaca</i>	common milkweed	native	1	5	X	
<i>Asclepias tuberosa</i>	butterfly-weed	native	5	5	X	
<i>Asclepias verticillata</i>	whorled milkweed	native	1	5	X	
<i>Calamovilfa longifolia</i>	sand reed grass	native	10	5	X	
<i>Carex bebbii</i>	sedge	native	4	-5		X
<i>Carex bushii</i>	bushs sedge	non-native	0	0		X
<i>Carex diandra</i>	sedge	native	8	-5	X	
<i>Carex granularis</i>	sedge	native	2	-3	X	X
<i>Carex molesta</i>	sedge	native	2	0		X
<i>Carex scoparia</i>	sedge	native	4	-3	X	
<i>Carex tenera</i>	sedge	native	4	0	X	
<i>Centaurea stoebe</i>	spotted knapweed	non-native	0	5		X
<i>Centaureum erythraea</i>	forking centaury	non-native	0	0		X
<i>Coreopsis lanceolata</i>	sand coreopsis	native	8	3		X
<i>Cornus foemina</i>	gray dogwood	native	1	0	X	
<i>Dichanthelium implicatum</i>	panic grass	native	3	0		X
<i>Dichanthelium oligosanthes</i>	panic grass	native	5	3	X	X
<i>Dipsacus fullonum</i>	wild teasel	non-native	0	3	X	X
<i>Elaeagnus umbellata</i>	autumn-olive	non-native	0	3		X
<i>Eleocharis erythropoda</i>	spike-rush	native	4	-5		X
<i>Equisetum hyemale</i>	scouring rush	native	2	0		X
<i>Equisetum laevigatum</i>	smooth scouring rush	native	2	-3	X	
<i>Erigeron philadelphicus</i>	philadelphia fleabane	native	2	0	X	
<i>Erigeron strigosus</i>	daisy fleabane	native	4	3	X	
<i>Eupatorium serotinum</i>	late boneset	non-native	0	0	X	X
<i>Euphorbia corollata</i>	flowering spurge	native	4	5		X
<i>Euthamia caroliniana</i>	lakes flat-topped goldenrod	native	10	-3	X	
<i>Euthamia graminifolia</i>	grass-leaved goldenrod	native	3	0		X
<i>Festuca trachyphylla</i>	sheep fescue	non-native	0	5		X
<i>Fragaria virginiana</i>	wild strawberry	native	2	3	X	
<i>Juncus compressus</i>	rush	non-native	0	-3	X	
<i>Juncus dudleyi</i>	dudleys rush	native	1	-3	X	X
<i>Juncus torreyi</i>	torreys rush	native	4	-3	X	X
<i>Juniperus communis</i>	common or ground juniper	native	4	3		X

Scientific Name	Common Name	Origin	C	W	Puetz Rd	M-63
<i>Juniperus virginiana</i>	red-cedar	native	3	3		X
<i>Lonicera japonica</i>	japanese honeysuckle	non-native	0	3		X
<i>Lonicera tatarica</i>	tartarian honeysuckle	non-native	0	3		X
<i>Lycopus uniflorus</i>	northern bugle weed	native	2	-5		X
<i>Melilotus albus</i>	white sweet-clover	non-native	0	3	X	
<i>Melilotus officinalis</i>	yellow sweet-clover	non-native	0	3	X	
<i>Monarda fistulosa</i>	wild-bergamot	native	2	3	X	X
<i>Panicum virgatum</i>	switch grass	native	4	0	X	X
<i>Phalaris arundinacea</i>	reed canary grass	native	0	-3		X
<i>Poa pratensis</i>	kentucky bluegrass	non-native	0	3		X
<i>Prunella vulgaris</i>	self-heal	native	0	0		X
<i>Ratibida pinnata</i>	yellow coneflower	native	4	5	X	X
<i>Rosa carolina</i>	pasture rose	native	4	3		X
<i>Rosa multiflora</i>	multiflora rose	non-native	0	3		X
<i>Rubus flagellaris</i>	northern dewberry	native	1	3		X
<i>Rudbeckia hirta</i>	black-eyed susan	native	1	3	X	X
<i>Salix exigua</i>	sandbar willow	native	1	-3	X	
<i>Schizachyrium scoparium</i>	little bluestem	native	5	3	X	X
<i>Scirpus atrovirens</i>	bulrush	native	3	-5		X
<i>Solidago altissima</i>	tall goldenrod	native	1	3		X
<i>Solidago juncea</i>	early goldenrod	native	3	5		X
<i>Solidago nemoralis</i>	old-field goldenrod	native	2	5	X	X
<i>Solidago rugosa</i>	rough-leaved goldenrod	native	3	0		X
<i>Sorghastrum nutans</i>	indian grass	native	6	3		X
<i>Symphyotrichum ericoides</i>	heath aster	native	3	3	X	
<i>Symphyotrichum novae-angliae</i>	new england aster	native	3	-3	X	X
<i>Symphyotrichum oolentangiense</i>	prairie heart-leaved aster	native	4	5	X	
<i>Symphyotrichum pilosum</i>	hairy aster	native	1	3	X	
<i>Symphyotrichum urophyllum</i>	arrow-leaved aster	native	2	5	X	
<i>Teucrium canadense</i>	wood-sage	native	4	-3		X
<i>Thuja occidentalis</i>	arbor vitae	native	4	-3		X
<i>Toxicodendron radicans</i>	poison-ivy	native	2	0		X
<i>Tripsidium ravennae</i>	ravenna grass	non-native	0	5		X
<i>Typha angustifolia</i>	narrow-leaved cat-tail	non-native	0	-5		X
<i>Vernonia missurica</i>	missouri ironweed	native	4	0	X	X
		NATIVE:			31	37
		NON-NATIVE:			6	14
		TOTAL:			37	51

C: Coefficient of Conservatism (0-10 for native species, with increasing fidelity to pre-European settlement habitat; non-native species are not assigned coefficients of conservatism); W: Wetland coefficient (-5 to 5 for all species, with decreasing fidelity to wetlands; W= -5 indicates obligate wetland species and W= 5 indicates obligate upland species)