Rare Plant Surveys for the Michigan Department of Transportation: M-30 at the Tittabawassee River. Project #212036, Midland County

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Cover: Beak grass in the Tittabawassee River floodplain at the southeast corner of its intersection with M-30, by P.J. Higman.

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Abstract

Meander surveys were conducted for rare plant species along the M-30 right-of-way (ROW) from just north of the bridge over the Tittabawassee River and south to West Wackerly Rd. Mid- and late-season surveys were conducted targeting state threatened beak grass (*Diarrhena obovata*) and forked aster (*Eurybia furcata*), and state special concern broad-leaved puccoon (*Lithospermum latifolium*). Suitable habitat was found at the southeast junction of M-30 and the Tittabawassee River floodplain, and a small population of beak grass was documented. Forked aster and broad-leaved puccoon were not found, despite extensive searching. Measures to protect the floodplain by minimizing disturbance that facilitates invasion and sedimentation are recommended. Immediate control of reed canary grass, invasive reed, and narrow-leaved cat-tail are recommended now while they are largely restricted to the edge of the floodplain.

An isolated occurrence of invasive glossy buckthorn was mapped in a seepy area at the northwest corner of West Wackerly Rd. at the south end of the project area. Coordination with the landowner to determine the extent of this population beyond the project area, and treatment is recommended.

Removal of the considerable amount of trash and debris under the bridge and along the edges of the floodplain, likely deposited during the May 2002 flood is recommended

Introduction

Surveys were conducted for potential rare plant occurrences along the M-30 right-of-way in the vicinity of the Tittabawassee River in Midland County during August-October 2021. This project focuses on bridges that were damaged due to the Midland flooding in May 2020. These structures require additional rip rap at the piers and scour protection at the water's edge and will require the creation of haul roads for equipment and people under the bridge. The project area starts at East Wackerly Rd. just south of the Sanford Food Center and continues south along M-30 across the Pere Marquette Rail Trail and the Tittabawassee River, and south approximately one mile to West Wackerly Rd. (Fig. 1). These surveys are required to ensure regulatory compliance with the state and federal endangered species acts.

Figure 1. Project location showing the survey area in yellow and beak grass documented in 2021 in red. Previously documented beak grass is shown in purple west of the project area.

Methods

A review of the Michigan Natural Heritage database was conducted to identify species listed as federal or state Endangered or Threatened, or state Special Concern, that have been previously documented within a two-mile radius of the project area. Three species were identified as

survey targets (Table 1). Aerial imagery of the project area was reviewed to determine areas in the project area that clearly lack suitable habitat (commercial, residential, developed, mowed, maintained, or cropped areas) and areas with potentially suitable habitat for target species. Aerial maps with the project location and the previously documented rare species occurrences were georeferenced and loaded onto a Samsung tablet with a Field Maps application. This enabled surveyors to view their location and documented rare species occurrences on the map as they were moving through the project area.

Table 1: Species targeted for survey, their status, and optimal survey period.

Scientific name	Common name	Listing Status		Optimal survey period
		State	Federal	
Diarrhena obovata	beak grass	T	*	mid-August-September
Eurybia furcata	forked aster	T	*	September
Lithospermum latifolium	broad-leaved puccoon	SC	*	mid-May-July

SC: State Special Concern; T: State Threatened; E: State Endangered; *: Not Listed

Surveys were timed to coincide as much as possible with the flowering periods of the target species when they are most easily detected. They were conducted on foot by meander survey, with a focus on suitable habitat for the target species. However, surveyors aimed to survey all microhabitats along the corridor in case other rarities are present, but not yet documented.

Surveyors recorded general habitat conditions, dominant plant species, and populations of rare plant species and notable invasive species throughout the project area. Notable invasive plant species include those for which management by MDOT can likely make a significant impact by containing their spread. If a notable invasive species was found that did not occur commonly throughout the project area, it was mapped using the Midwest Invasive Species Information Network (MISIN) phone app. Rare plant occurrences were mapped as GPS points using a Samsung tablet, and shapefiles were delivered to MDOT after each survey period. Points and associated data for rare plant occurrences were entered into Survey123 for upload to the Michigan Natural Heritage Database, Biotics.

Mid-season surveys were conducted on August 5th, 2021, and focused on all three target species. This captured only the very tail end of the flowering period for broad-leaved puccoon, but this species has distinctive leaves with two to three very prominent, parallel veins and the white, bony fruits are visible after flowering. All three species were targeted again in late-season surveys, which were conducted during two stops at the site on September 11th and October 9th, 2021.

Results

Overview

Suitable floodplain forest habitat for the three target species occurs at the southeast junction of M-30 and the Tittabawassee River floodplain at the north end of the project and a small population of beak grass was documented there (Fig. 1). Forked aster and broad-leaved puccoon were not found, despite extensive searching. This area is the western edge of a floodplain forest that extends eastward and has occurrences of these species beyond the project area.

The remainder of the corridor is primarily dry-mesic southern forest edges and oak barrens-like openings that slope down to a wet ditch along the edge of M-30. The forests have nice structure with mostly native species, while the slopes and wet ditches have a significant component of invasive species in many areas, including invasive phragmites, narrow-leaved cat-tail, and crown vetch. However, there are seepy areas in the wet ditches with a diversity of native species. An isolated occurrence of invasive glossy buckthorn was mapped at the northwest corner of West Wackerly Rd. at the southwest end of the project area.

Descriptions of Survey Segments

<u>Survey Area 1</u>: Openings north of Tittabawassee River, east, west and under the bridge.

These are disturbed open lands directly surrounding the bridge over the paved Pere Marquette Rail Trail which parallels the Tittabawassee River (Figs. 2-6). Vegetation is a highly diverse mix of native species including staghorn sumac (*Rhus typhina)*, riverbank grape (*Vitis riparia*), spreading dogbane (*Apocynum androsaemifolium*), New England aster (*Symphyotrichum novae-angliae*), *Symphyotrichum lateriflorum*, tall and late goldenrod (*Solidago altissima, S. gigantea*), common beggar-ticks (*Bidens frondosa*), common milkweed (*Asclepias syriaca*), and big bluestem (*Andropogon gerardii*), interspersed with many non-native species such as wild carrot (*Daucus carota*), wild parsnip (*Pastinaca sativa*), sweet clover (Melilotus sp.), mulleins (*Verbascum blattaria*, *V. thapsus*), tall fescue (*Lolium arundinaceum*), Kentucky bluegrass (*Poa pratensis*), smooth brome (Bromus inermis), and quack grass (*Agropyron repens*).

Figure 2. Open areas border the east side of the rail trail bridge (facing west).

Figure 3. Opening on the west side of the bridge (facing south along M-30).

Figure 4. Openings at the northeast corner of the Tittabawassee Bridge by the Rail Trail.

Figure 5. Native and non-native forbs and grasses under the bridge north of river.

Figure 6. New England aster under the Rail Trail Bridge north of the river.

<u>Survey Area 2</u>: Young forest at the northwest corner of the project area.

Here is a canopied young forest on an upland slope from the river, with white oak (*Quercus alba*) and basswood (*Tilia americana*) in the overstory, and ash (*Fraxinus americana*), black cherry (*Prunus serotina*), sassafras (*Sassafras albidum*), bladder-nut (*Ptelea trifolia*), and red-osier dogwood (*Cornus stolonifera*) in the understory and shrub layer (Figs. 7, 8). It is invaded by non-native multiflora rose (*Rosa multiflora*), Tartarian honeysuckle (*Lonicera tatarica*), common buckthorn, and Japanese barberry. The ground flora includes scouring and common rush (*Equisetum hyemale, E. arvense)*), Canada mayflower (*Maianthemum canadense*), heart-leaved, and calico aster (*Symphyotrichum cordifolium, S. lateriflorum*), late goldenrod, purple meadow-rue (*Thalictrum dasycarpum*), wild geranium (*Geranium maculata*).

Figure 7. Young woodland on slope on the northwest side of the Tittabawassee River.

Figure 8. Bladdernut in the young forest north of the river.

Survey Area 3: Floodplain forest at the southeast junction of M-30 and the Tittabawassee River.

This area is the western edge of a floodplain forest with components of mesic forest. It extends eastward along the river (Fig. 9). The canopy is diverse with silver maple (*Acer saccharinum*), sugar maple (*Acer saccharum*), swamp white, red, and white oak (*Quercus bicolor, Q. rubra*), Q. alba), (*Carya cordiformis*)

bitternut hickory, and big-tooth aspen (*Populus grandidentata).* The understory and shrub layers are similarly diverse, although relatively open, with American elm (*Ulmus americana*), red maple (*Acer rubrum*), green ash (*Fraxinus pensylvanica*) ironwood (*Ostrya virginiana*), basswood (*Tilia americana*), white birch (*Betula papyrifera*), witch hazel (*Hamamelis virginiana*), prickly gooseberry (*Ribes cynosbati*), poison ivy (*Toxicodendron radicans*), riverbank grape, and Virginia creeper (*Parthenocissus quinquefolius*).

Figure 9. Floodplain forest at the southeast junction of M-30 and the Tittabawassee River.

The ground layer is rich with wild geranium, downy Solomon seal (*Polyonatum pubescens*), false spikenard (*Maianthemum racemosum*), white lettuce (*Prenanthes alba*), bluebead lily (*Clintonia borealis*), heart-leaved aster, zig-zag and rough-leaved goldenrod (*Solidago ulmifolia, S. rugosa*), jumpseed (*Persicaria virginiana*), wintergreen (*Gaultheria procumbens*), wild madder (*Galium obtusum*), and fragrant bedstraw (*Galium triflorum*), wood sage (*Teucreum canadense*). In wetter zones clearweed (*Pilea* sp.), false nettle (*Boehmeria cylindrica*), nodding beggar-ticks (*Bidens cernua*), monkey flower (*Mimulus ringens*), and great blue lobelia (*Lobelia siphilitica*) are found. Pockets of ferns also occur here also including lady fern (*Athyrium filix-femina*), bulblet fern (*Cystopteris bulbifera*), sensitive fern (*Onoclea sensibilis*), and ostrich fern (*Matteuccia struthiopteris*), along with many sedges (*Carex intumescens*, *C. grayi, C. gracillima, C. pensylvanica)*, and grasses such as Virginia wild rye (*Elymus virginica*)*,* white grass (*Leersia virginica*)*,* fringed brome (*Bromus ciliatus),* wood reedgrass (*Cinna arundinacea*), and bottlebrush grass (*Elymus hystrix*).

This floodplain forest provides the only suitable habitat for the target species in the project area, and several patches of state threatened beak grass (*Diarrhena obovata*) were documented near the eastern edge of the ROW. (Figs. 10, 11) Broad-leaved puccoon and forked aster were not found here despite extensive searching.

The forest becomes weedier towards the highway as the canopy thins and incursions of invasive autumn olive (*Elaeagnus umbellata*), narrow-leaved cat-tail (*Typha angustifolia*) and phragmites (*Phragmites australis* subsp. *australis*), and reed canary grass (*Phalaris arundinacea*) are just beginning to move into the canopied forest (Fig. 12,). Few invasive species were observed in the interior of the floodplain; however, several patches of Japanese barberry (*Berberis thunbergii*) and moneywort (*Lysimachia nummularia*) were noted. There is extensive disturbance and a huge amount of trash along the edges of the wooded zone—likely carried and deposited there during the May 2020 flood (Fig 13).

Figure 10. The slightly off-set mid-vein of beakgrass.

Figure 11. State threatened beakgrass was found in the floodplain forest.

Figure 12. Invasive reed starting to spread into the floodplain.

Figure 13. Trash and debris were strewn around the edge of the floodplain forest.

Survey Area 4: Disturbed opening on the west side of the Tittabawassee River.

The west side of the bridge is a highly disturbed opening dominated by non-native grasses such as tall fescue, brome grass, foxtail, (*Setaria* sp.), red-top (*Agrostis gigantea*), and scattered autumn olive and occasional Scotch pine that dominates west of the ROW (Fig. 14). Some native species are scattered here including grass-leaved goldenrod (*Euthamia graminifolia*), tall and late goldenrod, blue vervain (*Verbena hastata*), common milkweed, and an occasional clump of Indian grass. A few native trees occur at the south bank of the river (Fig. 15).

Figure 14. Highly disturbed opening on the west side of the Tittabawassee River Bridge.

Figure 15. A few native trees occur along the south bank of the Tittabawassee River.

At the southern edge of the opening there is a small area of lowland forest that merges into an abrupt zone of dead ash (Fig 16).

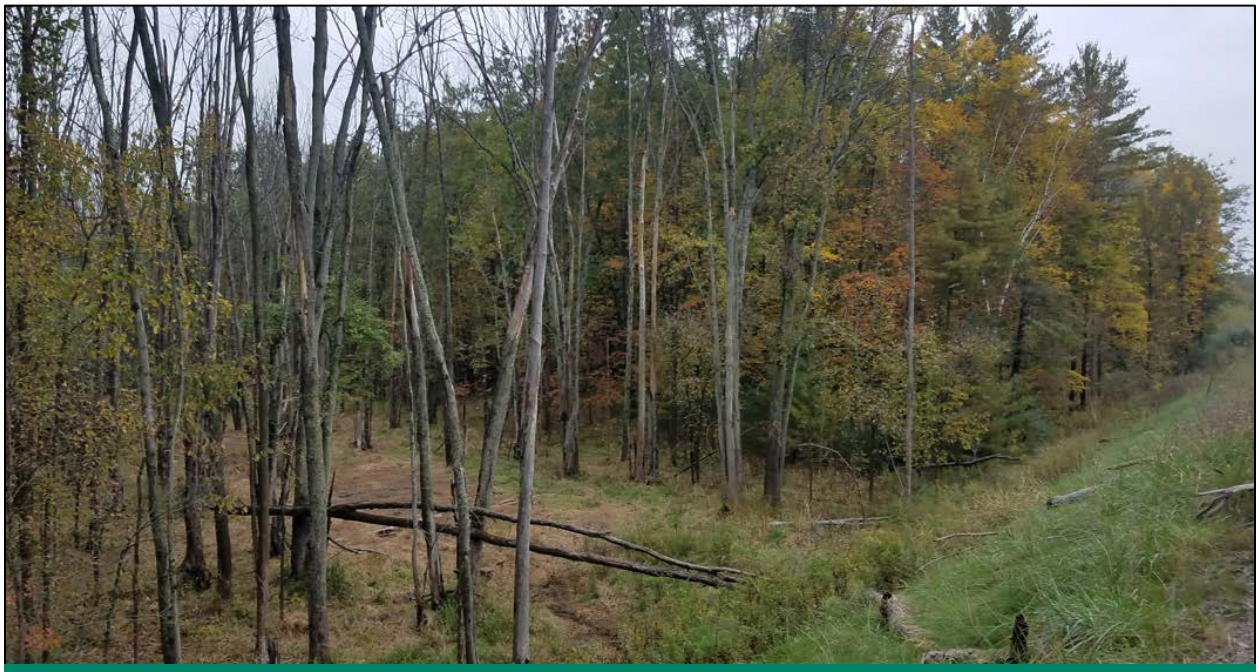

Figure 16. A zone of dead ash on the west side of M-30 just south of the Tittabawassee Bridge.

<u>Survey Area 5</u>: Power Line at south end of project area.

A power line runs through the project area just north of West Wackerly Rd. at the southern end of the project. The west side has a matrix of prairie grasses including big bluestem and Indian grass, while the east side is undergoing invasion by non-native cat-tails (Figs. 17, 18).

Figure 17. Prairie grasses and weeds under the power line west of M-30.

Figure 18. Non-native cat-tail invasion under the power line east of M-30.

Survey Area 6: Dry-mesic forest edges south of the Tittabawassee River Bridge.

Most of the ROW south of the bridge is dominated by dry-mesic forest edges with pin oak (*Quercus ellipsoidalis*), red oak, red and white pine (*Pinus resinosa, P. strobus*) in the overstory, and black cherry, red maple, witch hazel, serviceberry (*Amelanchier*. sp.), huckleberry (*Gaylussacia baccata*) and bracken fern (*Pteridium aquilinium*) in the understory (Figs 19). These forests have nice structure and predominantly native species. A strip of open vegetation borders the forest dominated by non-native fescues (*Festuca* spp.), smooth brome, reed-canary grass, and Kentucky bluegrass (Poa pratensis), and non-native forbs such as sweet clover (*Melilotus* spp.) crown vet, and spotted knapweed. Native forbs are occasionally interspersed including flat-topped white aster (*Doellingeria umbellata*) and New England aster. No habitat for the target species was detected, and no other rarities were observed in these forests.

Figure 19. Forested edges and grass-dominated borders along M-30 south of the bridge.

Survey Area 7. Wet ditches along shoulder of M-30.

Wet ditches bisect the grass-dominated edges of the highway throughout most of the ROW Some are dominated by dense infestations of non-native phragmites or narrow-leaved-cat-tails, especially on the west side (Fig. 20). Others are seepy zones dominated by native species including Joe-pye weed (*Eutrochium maculatum*), boneset (*Eupatorium perfoliatum*), monkey flower (*Mimulus ringens*) , bulrush (*Schoenoplectus* spp.), rushes (*Juncus* sp.), and sedges including Carex retrorsa and *Carex vulpinoidea* (Fig. 21).

Figure 20. Wet ditch dominated by invasive phragmites along M-30.

Figure 21. Monkey flower, *Carex retrorsa*, and *Carex vulpinoidea* in a wet ditch.

Figure 22. Marsh fern in wet seep at the southwest corner of the project area.

Figure 23. Swamp dewberry in wet seep at the southwest corner of the project area.

Figure 24. Michigan holly in wet seep at the southwest corner of the project area.

Figure 25. Glossy buckthorn in wet seep at the southwest corner of the project area.

Survey area 8: Wet seeps at the southwest end of the project area.

The southwest corner of the project area has some wetland seeps with wetland ferns such as royal fern (*Osmunda regalis*), cinnamon fern (*Osmundastrum cinnamomeum*), marsh fern (*Thelypteris palustris*; Fig 22) and wetland shrubs including swamp dewberry (*Rubus hispidus*; Fig. 23), meadowsweet (*Spiraea alba*), and Michigan holly (*Ilex verticillata;* 24). A lone occurrence of the highly invasive glossy buckthorn (*Frangula alnus*) was also documented here (Fig. 25).

Discussion

Protection of the floodplain forest with state threatened beakgrass is the highest priority for this project. This area is the western end of a floodplain forest that extends eastward along the river and harbors additional rare plant occurrences outside of the project area. Disturbance here should be minimized as much as possible so that the beak grass is sustained and pathways for invasion and sedimentation are not created, ultimately degrading the heart of the floodplain. Invasive reed canary grass, invasive phragmites, and autumn olive are beginning to make their way into the forest and immediate treatment of these species is recommended while they are still mostly restricted to the edge of the forest.

An isolated occurrence of invasive glossy buckthorn was mapped at the northwest corner of West Wackerly Rd. at the south end of the project area. Coordination with the landowner to determine and treat the extent of the population is recommended.

There is a considerable amount of trash and debris under the bridge and along the edges of the floodplain that were likely deposited during the flood in May 2020. Removal is recommended.

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