Rare Plant Surveys for the Michigan Department of Transportation: US-2 Cut River (208607) and Brevort Lake Rd. (203752), Mackinac County, Michigan

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Prepared For:

Michigan Department of Transportation

12/7/20

MNFI Report No. 2020-21

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Suggested Citation:

Spieles, J.B, and P.J. Higman. 2020. Rare Plant Surveys for the Michigan Department of Transportation: US-2 Cut River (208607) and Brevort Lake Rd. (203752), Mackinac County, Michigan. Report No. 2020-21. Lansing, MI.

Cover: Signature open dune along US-2. Photo by Jodi B Spieles.

Table of Contents

List of Tables

List of Figures

List of Appendices

Introduction

This report provides a summary of rare plant surveys conducted along two portions of the US-2 right-of-way in Mackinac County. Project 203752 is in the vicinity of Brevort Lake, starting just east of Wildwood Lane and extending approximately eight miles to just east of Brevort Lake Rd. Project 208607 extends approximately 2.6 miles, from the Cut River Bridge to Worth Rd. (Figure 1). Surveys are required prior to reconstruction and rehabilitation of these portions of the highway to ensure regulatory compliance for the state and federal endangered species acts.

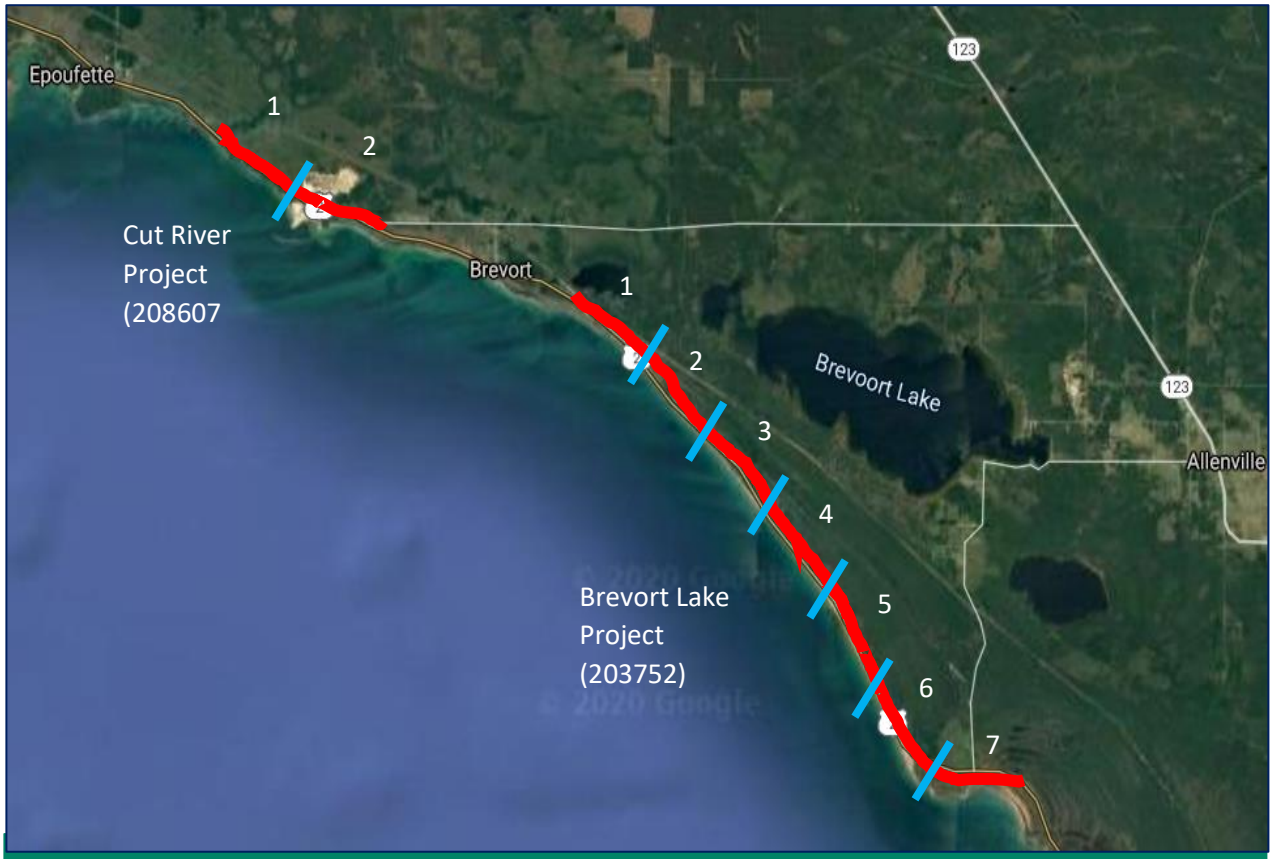

Figure 1. Project locations and survey segments along US-2 in Mackinac County, Michigan.

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, with potential to occur in the survey areas outlined in red in Figure 1. Seven early flowering species and nine late-flowering species were identified as survey targets for both projects (Tables 1 and 2).

Table 1. Species targeted during early-season surveys.		
Scientific Name	Common Name	Listing Status
Botrychium spathulatum	spatulate moonwort	*SC*
Calypso bulbosa	calypso orchid	T
Cypripedium arietinum	ram's head lady-slipper	*T*
Iris lacustris	dwarf-lake iris	LT, T
Pinguicula vulgaris	butterwort	SC
Stellaria longipes	stitchwort	SC
Tetraneuris herbacea	lakeside daisy	LE, E

*LE: Federally threatened; E: State endangered; LT: Federally threatened; T: State threatened; SC: State special concern

Table 2. Species targeted during late-season surveys.		
Scientific Name	**Common Name**	**Listing Status**
Cirsium pitcheri	Pitcher's thistle	LT, T
Corispermum pallasii	bugseed	Proposed SC
Huperzia selago	fir clubmoss	SC
Lycopodiella subappressa	northern clubmoss	SC
Mimulus michiganensis	Michigan monkey-flower	LE, E
Pterospora andromedea	pine-drops	T
Solidago houghtonii	Houghton's goldenrod	LT, T
Tanacetum bipinnatum	Lake Huron tansy	T

*LE: Federally threatened; E: State endangered; LT: Federally threatened; T: State threatened; SC: State special concern

Aerial maps with the project locations and previously mapped element occurrences near the proejct area were georeferenced and loaded onto the Samsung tablets wih Avenza maps for use in the field. The surveyor was able to view their location on the map as they were moivng through the project area. These photos were reviewed to delineate stretches of the right-of-way that clearly lack suitable habitat (commercial, residential, developed, mowed, maintained or cropped areas) and areas with apparently suitable habtat for target species. Based upon this initial assessment, meander surveys were conducted throughout the entire right-of-way for each project, with more detailed surveys in areas with the most suitable habitat.

Element occurrences were mapped as GPS points, lines or polygons using Samsung tablets, and then downloaded and sent to MNFI for reporting to MDOT after each survey period. Maps of the rare species occurrences were created as figures for this report and shapefiles were delivered with this report.

Results

Cut River to Worth Road

Segment 1

This segment is dominated by non-native grasses including smooth brome (*Bromus inermis*), Kentucky bluegrass (*Poa pratensis*), bentgrass (*Agrostis* sp.) and reed canary grass (*Phalaris arundinacea*), and non-native forbs including black-bindweed (*Fallopia* sp.), common ragweed (*Ambrosia artemisiifolia*), yellow and white sweet clover (*Melilotus officinalis* & *M. albus*), and spotted knapweed (*Centaurea stoebe*). Some native plants are intermixed, becoming more common and sometimes dominant further from the right-of-way. These include wild red raspberry (*Rubus strigosus*), goldenrods (*Solidago* spp.) common milkweed (*Asclepias syriaca*), wild sarsaparilla (*Aralia nudicaulis*), and large-leaved aster (*Eurybia macrophylla*). On the south side there were two areas of concern with invasive species including leafy spurge (*Euphorbia virgata; Figure 2)* and Canada thistle (*Cirsium arvense; (Figure 3)*. No listed species were observed in this segment during surveys.

Figure 2. North side with brome grass.

Figure 3. South side with black bindweed.

Figure 4. Dense patch of leafy spurge.

Figure 5. Dense patch of Canada thistle.

Segment 2

This segment is similar to Segment 1 with mostly non-native species (Figure 6). On the outside of the ROW toward the forested edge, large patches of wild red raspberry (*Rubus strigosus*; Figure 7) and bush honeysuckle (*Diervilla lonicera*) occur. No listed plants were observed in this segment during this survey.

Figure 6. Non-native grasses dominate.

Figure 7. Dense patch of wild raspberry.

Wildwood to Brevort Lake Rd.

This area ranged from high-quality open dunes with predominantly native species to areas that are dominated by weedy non-native species. Eight occurrences of Lake Huron tansy and 19 occurrences of Pitcher's thistle were mapped in this segment (Figure 8).

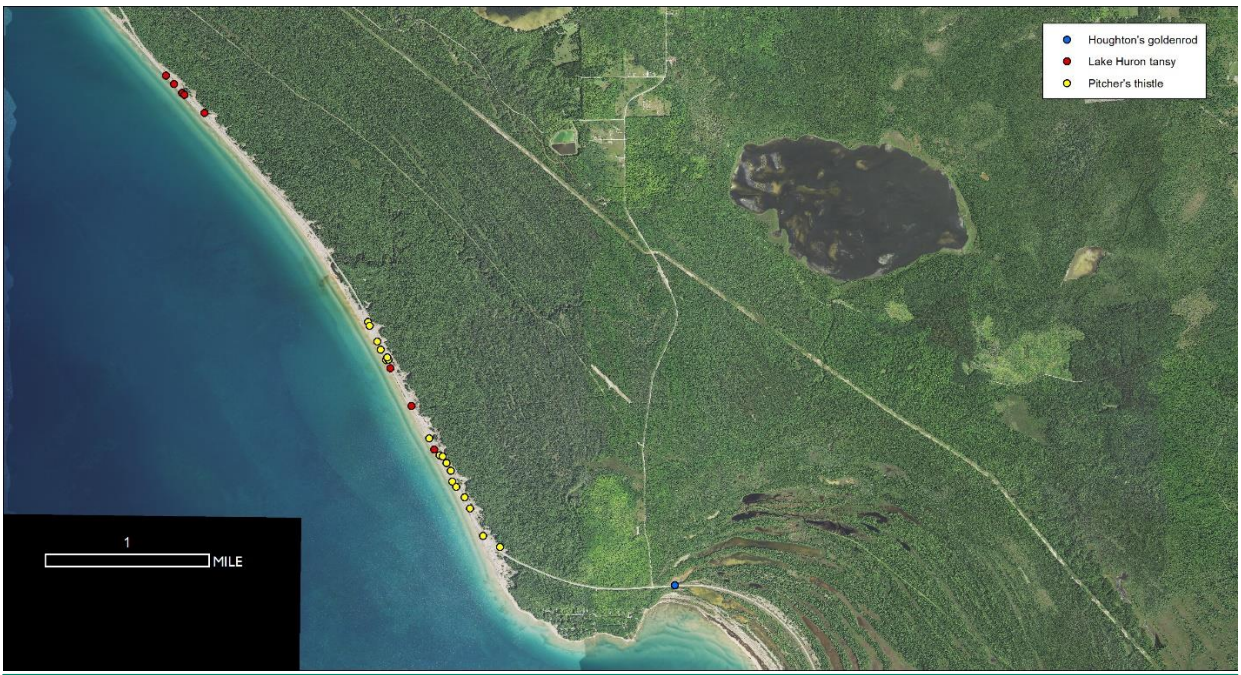

Figure 8. Locations of rare species observed during surveys in 2020.

Segment 1

The north side of this segment slopes steeply upward to mesic northern forest and is dominated by non-native species including smooth brome (*Bromus inermis*), bentgrass (*Agrostis* sp.), rye grass (*Lolium perenne*), white sweet clover (*Melilotus albus*), common ragweed (*Ambrosia artemisiifolia*), and crown vetch (*Securigera varia*). Native species on the north side include horsetail (*Equisetum* sp.), wild rose (*Rosa* sp.), cherry (*Prunus* sp.), large-leaved aster (*Eurybia macrophylla*), poison ivy (*Toxicodendron rydbergii*), and common milkweed (*Asclepias syriaca*). The south side has a narrow strip of degraded open dune with a rocky border at the Lakeward edge. It is dominated by a mix of native and non-native species including sand cherry (*Prunus pumila*), common milkweed (*Asclepias syriaca*), wormwood (*Artemesia campestris*) horsetail (*Equisetum* sp.), spotted knapweed (*Centaurea stoebe*), smooth brome grass (*Bromus inermis*) and sweet clover (*Melilotis alba.*).

No listed plant species were observed in this segment during this survey.

Figure 9. Sloping right-of-way.

Figure 10. Narrow dune strip with rocks.

Segment 2

This segment is very similar to Segment 1, dominated by non-native species such as smooth brome, bentgrass, rye grass, white sweet clover, and common plantain (*Plantago major*). The right-of-way is mostly surrounded by mesic forest with the exception of the northwestern portion which is open dune both in and outside the right-of-way. The highway runs very close to the shoreline here. Native species in the dune include sand cherry, beach grass (*Ammophila breviligulata*), sand reed grass (*Calamovilfa longifolia*), common milkweed, wormwood, and horsetail. Non-native spotted knapweed and smooth brome grass are present. Closer to the highway edge, silverweed (*Potentilla anserina*), ragweed, and white sweet clover alternate in dominance.

No listed plants were observed in this segment during this survey.

Figure 11. Sloping right-of-way.

Figure 12. Silverweed next to US-2.

Segment 3

Portions of this segment on the north side of US-2 contain superb examples of northern Lake Michigan open dunes natural community, dominated by native plants such as sand cherry beach grass, sand reed grass, common milkweed, wormwood, and horsetail (Figure 13). Non-native spotted knapweed and smooth brome grass occur sporadically. Closer to the highway edge silverweed, ragweed, and white sweet clover alternate in dominance. In the northern portion of this segment, the right-of-way is bordered by mesic northern forest, and other species become dominant in the right-of-way including, wild rose, bracken fern (*Pteridium aquilinum*), goldenrods, wild sarsaparilla, large-leaved aster, poison ivy, starry false solomon-seal (*Maianthemum stellatum*), and non-native sow thistle (*Sonchus* sp.). On the south side of US-2, there is a lot of gravel mixed in with the dune sands and it is primarily dominated by non-native plants.

Five occurrences of Lake Huron tansy were mapped in the open dunes, including four on the southwest side and one on the northeast side of US-2 (Figure 8, Figure 14). One of these lies just outside the survey area (Appendix 1).

Figure 13. Open dune with native species.

Figure 14. A patch of Lake Huron tansy.

Segment 4

This entire segment is a superb example of northern Lake Michigan open dunes natural community (Figure 15). Dominant plant species are primarily native, including sand cherry, beach grass, sand reed grass, common milkweed, and wormwood, with occasional spotted knapweed and smooth brome grass. Closer to the highway edge, silverweed, ragweed, and white sweet clover alternate in dominance. The south side of US-2 is similar to segment 3 with a lot of gravel mixed in with the dune sands and it is primarily dominated by non-native plants.

One occurrence of Pitcher's thistle was mapped on the southwest side of US-2 in this segment (Figure 8, Figure 16, Appendix 1).

Figure 15. High quality open dune.

Figure 16. Pitcher's thistle on the dune.

Segment 5

This segment is a continuation of high-quality open dune dominated by native sand cherry, beach grass, common milkweed, and wormwood, with some infestations of spotted knapweed and smooth brome grass (Figure 17). The northern portion of this segment is forested at the edge of the right-of-way and species observed along this edge include poison ivy, wild rose, red-raspberry, and meadow rue. Closer to the highway, large patches of silverweed, ragweed, and white sweet clover dominate.

Seven occurrences of Pitcher's thistle and two of Lake Huron tansy were mapped in this area. The majority of these are on the southwest side of US-2, but a few Pitcher's thistle plants were observed on the northeast side as well (Figure 8, 18 and 19).

Figure 17. High quality open dunes.

Figure 18. Pitcher's thistle along US-2.

Figure 19. Lake Huron tansy along US-2.

Segment 6

This entire segment is a continuation of high-quality open dunes dominated by species similar to those in segments 4 and 5, including sand cherry, beach grass, sand reed grass, common milkweed, and wormwood, with some non-native spotted knapweed. Closer to the edge of the highway, non-native plants such as spotted knapweed, chicory (*Cichorium intybus*), common ragweed and white sweet clover are more common.

Sixteen occurrences of Pitcher's thistle and one occurrence of Lake Huron tansy were mapped in this segment (Figure 8). The majority of these are on the southwest side of US-2, but a few pitcher's thistle plants occur on the northeast side. Several occurrences lie just outside the project survey area (Appendix 1).

Figure 20. Pitcher's thistle in open dunes.

Figure 21. Weedy edge on lakeside.

Segment 7

This segment is dominated by non-native grasses and forbs including smooth brome Kentucky bluegrass and rye grass, chicory, Queen Anne's lace (*Daucus carota*), wild parsnip (*Pastinaca sativa*), crown vetch, common ragweed, yellow and white sweet clover, and spotted knapweed. There are occasional patches where little bluestem (*Schizachyrium scoparium*) dominates. Native plant species are intermixed and become more common and sometimes dominant further from right-of-way. These include wild red raspberry, goldenrods, common milkweed, wild sarsaparilla, large-leaved aster, poison ivy, starry false solomon-seal, and meadow rue (*Thalictrum* sp.). On the north side of US-2, just east of Brevort Lake Rd., there is a nice open dune area outside of right-of-way, with little bluestem, bearberry (*Arctostaphylos uva-ursi*), common juniper (*Juniperus communis*), and creeping juniper (*Juniperus horizontalis*). There are beautiful interdunal wetland ponds with sedge meadow and shrub edges east of the project zone. These areas harbor numerous rare plant occurrences, including an extensive population of Houghton's goldenrod (*Solidago houghtonii*). Some scattered Houghton's goldenrod was observed within the project area (Figure 8, 22). West of these occurrences on the south side of the highway is a large area where wild parsnip is dominant.

Two occurrences of Houghton's goldenrod were mapped in this segment during this survey (Figure 8, 22).

Figure 22. Houghton's goldenrod.

Discussion

US-2 is one of the most traveled highways in Michigan's Upper Peninsula and is exceptional for its open dunes, wooded dune and swales, sand and gravel beaches, and Great Lakes marshes, along with the many rare species associated with them. It is not often that travelers have an opportunity to experience Michigan's most vulnerable natural features so conveniently from their vehicles as can be done along US-2. The fact that these occurrences persist, is a testament to the role that MDOT plays in sustaining them. However, high impact invasive species such as spotted knapweed, wild parsnip, sweet clovers and leafy spurge are well established in both project areas, and any disturbance without attention to these invaders, will facilitate their spread into the remaining highest quality areas. It is essential that all appropriate measures be taken to limit their spread during construction, in order to protect this treasured and iconic Upper Peninsula landscape.

Acknowledgements

We thank David Schuen at MDOT for the opportunity to conduct these surveys and for coordinating this work. Ashley Adkins, Brian Klatt, and Nancy Toben provided administrative assistance.

Appendix 1. Summary of GPS Data for Rare Plant Occurrences.

The following table provides summary data for the GPS data captured during surveys for the US-2 Brevort Lake project. It includes survey segment (Figure 23), GPS Label, scientific name of species mapped, date of observation, number of plants and their phenology, and a detailed description of their location. Shapefiles were delivered with this report.

Appendix 1. Summary of GPS Data for Rare Plant Occurrences

Segment	Label	Species	Date Observed	# of Plants, Phenology	Within ROW	Habitat description	Lat/Long
3	LHT 1	Tanacetum bipinnatum	7/28/20	27 plants, 2 flowering	Y	Southwest of US2, 3m from asphalt edge, in a clump; with yarrow, spotted knapweed, and chicory	45.97348 -84.95747
3	LHT 2	Tanacetum bipinnatum	7/28/20	120 plants, 70 flowering	Y	Southwest of US2, 2.5m from asphalt edge, in a dense clump; with bentgrass, and spotted knapweed	45.97271 -84.95645
3	LHT 3	Tanacetum bipinnatum	7/28/20	70 plants, 47 flowering	Y	Southwest of US2, 3-6m from asphalt edge, scattered in an area 2m x 5m; with beach grass, wormwood and spotted knapweed	45.97192 -84.95545
3	LHT 4	Tanacetum bipinnatum	7/28/20	50 plants, 27 flowering	Y	Southwest of US2, 2.5m from asphalt edge, in a clump; with beach grass, wormwood and spotted knapweed	45.97175 -84.95516
3	LHT 5	Tanacetum bipinnatum	7/28/20	12 plants, 3 flowering	N	Northeast of US2, 5-6m from asphalt edge, scattered in an area 1m x 2m; with beach grass and wormwood	45.97015 -84.95265
4	PT patch 1	Cirsium pitcheri	7/27/20	Approximately 40 plants	Y	A track or polygon around patch of plants from 2m to 30m southwest of asphalt edge; with beach grass, wormwood, spotted knapweed, and sand cherry	45.95847 -84.93824
5	PT 1	Cirsium pitcheri	7/27/20	1 flowering plant	Y	Southwest of US2,3m from asphalt edge; with beach grass and knapweed	45.95149 -84.93223
5	PT 2	Cirsium pitcheri	7/27/20	4 plants, 0 flowering	Y	Southwest of US2, in an area 3m x 3m, 4-6m from asphalt edge; with beach grass and knapweed	45.95116 -84.93203
5	PT 3	Cirsium pitcheri	7/27/20	9 plants, 3 flowering	Y	Southwest of US2, in an area 3m x 5m, 1-5m from asphalt edge; with beach grass and knapweed	45.94973 -84.93110

Segment	Label	Species	Date Observed	# of Plants, Phenology	Within ROW	Habitat description	Lat/Long
5	PT 4	Cirsium pitcheri	7/27/20	4 plants, 1 flowering	Y	Southwest of US2, in an area 2m x 5m, 1-4m from asphalt edge; with beach grass and knapweed	45.94903 -84.93066
5	PT 5	Cirsium pitcheri	7/27/20	5 plants, 1 flowering	Y	Southwest of US2, in an area 2m x 4m, 1-3m from asphalt edge; with beach grass, knapweed, and wormwood	45.94810 -84.93003
5	PT 6	Cirsium pitcheri	7/27/20	1 plant	Y	Northeast of US2, 4m from asphalt edge; with beach grass and wormwood	45.94813 -84.92971
5	PT 7	Cirsium pitcheri	7/27/20	4 plants, 1 flowering	Y	Northeast of US2, in an area 3m x 3m, 1-4m from asphalt edge; with beach grass and white sweet clover	45.94833 -84.92985
5	LHT 1	Tanacetum bipinnatum	7/27/20	20 plants, 2 flowering	N	Southwest of US2, in an area 2m x 10m, 10-12m from asphalt edge; with beach grass and knapweed	45.94737 -84.92951
5	LHT 2	Tanacetum bipinnatum	7/27/20	100 plants, 15 flowering	Y	Southwest of US2, in a clump 1m x 2m, 1-2m from asphalt edge; with beach grass and knapweed	45.94401 -84.92689
6	PT 1	Cirsium pitcheri	7/23/20	20 plants, 2 flowers	N	Southwest of US2, in an open sandy area about 2m x 3m, about 10m from asphalt edge; with beach grass, wormwood, and spotted knapweed	45.94111 -84.92468
6	PT 2	Cirsium pitcheri	7/23/20	12 plants	Y	Southwest of US2, in a 1m x 2m open sandy area only 1-3m from asphalt edge; with beach grass, wormwood, and spotted knapweed	45.93963 -84.92339
6	PT 3	Cirsium pitcheri	7/23/20	10 plants, 3 flowering	N	Southwest of US2, in a 2m x 3m open sandy area 25m from asphalt edge; with beach grass, wormwood, and spotted knapweed	45.93729 -84.92182
6	PT 4	Cirsium pitcheri	7/23/20	5 plants, 1 flowering	N	Southwest of US2, in a 1m x 2m open sandy area 10m from asphalt edge; with beach grass, wormwood, and spotted knapweed	45.93682 -84.92135

Segment	Label	Species	Date Observed	# of Plants, Phenology	Within ROW	Habitat description	Lat/Long
6	PT 5	Cirsium pitcheri	7/23/20	10 plants, 3 flowering	N	Southwest of US2, in a 2m x 5m open sandy area, 15m from asphalt edge; with beach grass, wormwood, spotted knapweed	45.93246 -84.91803
6	LHT 1	Tanacetum bipinnatum	7/23/20	25 plants, 3 flowering	N	Southwest of US2, 20m from asphalt edge, in an open sandy area 6m x 4m; with spotted knapweed, wormwood, and beach grass	45.94015 -84.92405
6	PT 6	Cirsium pitcheri	7/23/20	3 plants	N	Northeast of US2, in a 2m x 1m open sandy area, 30m from asphalt edge; with beach grass, wormwood, spotted knapweed	45.93144 -84.91590
6	PT 7	Cirsium pitcheri	7/23/20	1 plant	Y	Northeast of US2, 5m from asphalt edge; with beach grass, wormwood, and spotted knapweed	45.93489 -84.91961
6	PT 8	Cirsium pitcheri	7/23/20	4 plants, 1 flowering	Y	Northeast of US2, 1m from asphalt edge; with beach grass, wormwood, and spotted knapweed	45.93588 -84.92029
6	PT 9	Cirsium pitcheri	7/23/20	3 plants	N	Northeast of US2, 10m from asphalt edge; with beach grass, wormwood, and spotted knapweed	45.93823 -84.92201
6	PT 10	Cirsium pitcheri	7/23/20	5 plants, 1 flowering	Y	Northeast of US2, 1m from asphalt edge, in an area 1m x 4m; with beach grass, wormwood, spotted knapweed, and white sweet clover	45.93893 -84.92253
6	PT 11	Cirsium pitcheri	7/23/20	9 plants, 2 flowering	Y	Northeast of US2, 1m from asphalt edge, in an area 1m x 10m; with beach grass, wormwood, spotted knapweed, and white sweet clover	45.93953 -84.92302
6	PT patch 1	Cirsium pitcheri	7/23/20	Approximately 30 plants	Y	Polygon around patch of plants from 2m to 10m from asphalt edge; with beach grass, wormwood, spotted knapweed, and sand cherry	45.93958 -84.92356

Segment	Label	Species	Date Observed	# of Plants, Phenology	Within ROW	Habitat description	Lat/Long
6	PT patch 2	Cirsium pitcheri	7/23/20	Approximately 50 plants	Y	Polygon around patch of plants from 2m to 13m from asphalt edge; with beach grass, wormwood, spotted knapweed, and sand cherry	45.93905 -84.92311
6	PT patch 3	Cirsium pitcheri	7/23/20	Approximately 25 plants	Y	Polygon around patch of plants from 2m to 13m from asphalt edge; with beach grass, wormwood, spotted knapweed, and sand cherry	45.93844 -84.92268
6	PT patch 4	Cirsium pitcheri	7/23/20	Approximately 35 plants, 15 flowering	Y	Polygon around patch of plants from 1m to 15m from asphalt edge; with beach grass, wormwood, spotted knapweed, and sand cherry	45.93656 -84.92126
6	PT patch 5	Cirsium pitcheri	7/23/20	Approximately 200 plants, 40 flowering	Y	Polygon around large patch of plants from 1m to 15m from asphalt edge; with beach grass, milkweed, wormwood, spotted knapweed, and sand cherry	45.93408 -84.91955
7	HG1	Solidago houghtonii	9/15/20	2 flowering plants	Y	North of US2, 2m from asphalt edge; with spruce, little bluestem, starry false-solomon-seal, aster	45.92785 -84.89380
7	HG2 Track	Solidago houghtonii	9/15/20	33 flowering plants	Y	Linear patch delineated with Track (Houghton's goldenrod 2) within 1m, and 3m south of asphalt edge; with cedar, spruce, strawberry, aster, vetch, and parsnip.	45.92772 -84.89289