

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning



Prepared by:
Bradford S. Slaughter and David L. Cuthrell

Michigan Natural Features Inventory
PO Box 13036, Lansing, MI 48901-3036

For:
US Fish & Wildlife Service
East Lansing Field Office
Assistance Agreement Number: # F12AC00208

24 August 2015
Report Number 2015-13

Suggested Citation:

Slaughter, B.S. and D.L. Cuthrell. 2015. Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning. Michigan Natural Features Inventory Report No. 2015-13 Lansing, MI. xx pp. + appendix.

Copyright 2015 Michigan State University Board of Trustees.

Michigan State University Extension programs and materials are open to all without regard to race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientations, marital status, or family status.

Cover photograph: Flowering Pitcher's thistle, *Cirsium pitcheri*, Meinert Park, Muskegon County, Michigan. Photographed by David Cuthrell.

ABSTRACT

The objective of this project was to conduct methodical, prioritized status assessments for the federally threatened Pitcher's thistle (*Cirsium pitcheri* (Torr.) Torr. & A. Gray) to address information needs and data gaps critical for recovery planning and development of five-year reviews. Preliminary analysis of the Michigan natural heritage database (MNHD), which represents the most comprehensive state-wide distribution and status information for *C. pitcheri*, demonstrates that many occurrences have not been assessed since the mid-1990s or earlier. This project was designed to address critical information gaps for *C. pitcheri* occurrences, including updated data on population size(s), habitat condition, precise spatial extent, and threats, through the utilization of systematic field inventories.

A total of 62 sites were surveyed during the 2012 – 2015 field seasons. All flowering and non-flowering plants were counted, for a total of 80,810 *C. pitcheri* individuals corresponding to 4,794 GPS points. GPS tracks and data points were captured to assess site-specific distribution patterns, which allowed us to improve and update spatial representation in the MNHD. We also completed threat assessments for all 62 sites. These document and score such factors as presence of invasive species, deer herbivory, off-road vehicle damage and foot traffic, and presence and scale of sand mining and other infrastructure developments. These threat assessments can be sorted to help prioritize and more efficiently plan site-specific treatments that can address the most critical issues facing the long-term viability of individual *C. pitcheri* populations.

One emerging threat, the invasive weevil *Larinus planus*, was located at several *C. pitcheri* sites in Lower Michigan, and at almost every dune site supporting Canada thistle (*Cirsium arvense*). No invasive weevils were found at any of the Upper Michigan sites. Future assessments will help determine if *L. planus* colonizes these sites and sites on the Great Lakes islands.

INTRODUCTION

Pitcher's thistle (*Cirsium pitcheri* (Torr.) Torr. & A. Gray) is a monocarpic thistle endemic to sandy shorelines in the Great Lakes region. *C. pitcheri* is federally threatened and state-listed as endangered or threatened throughout its range in the United States. In Canada, *C. pitcheri* is listed as a species of Special Concern (NatureServe 2015). *C. pitcheri* is a colonizer of open sand habitat in early- to mid-successional vegetation maintained by intermediate levels of disturbance (Bowles et al. 1993). Most extant populations occur in Michigan, which has more than 170 occurrences documented in the MNHD. This paper reviews the Michigan distribution and status of *C. pitcheri* in Michigan, and summarizes some of the current threats to these Michigan populations. The objectives of this project were to:

- Provide the USFWS with contemporary status information for the Federal and State Threatened Pitcher's thistle by addressing critical data gaps and surveying and updating selected Michigan occurrences to facilitate recovery planning and five-year reviews
- Acquire relevant data on significant threats during population censuses and status surveys
- Visit Pitcher's thistle occurrences to detect the possible presence of two invasive, highly destructive, weevil species now known to occur in Michigan
- Provide information that can be used for a variety of recovery planning activities such as:
 - Determining when the species meets delisting criteria specified in recovery plans
 - Preparing Five-year Reviews and ascertaining population trend information
 - Reviewing permits and participating in Section 6 consultations
 - Evaluating and prioritizing future land acquisitions
 - Refining and/or developing species critical habitat designations
 - Providing information for Habitat Conservation Plans (HCPs) and safe harbor agreements

METHODS

Site Selection

The MNHD was used as the basis for site selection. *Cirsium pitcheri* occurrence polygon layers were overlaid on recent aerial imagery, topographic map layers, and ownership layers (plat maps) to assist navigation in the field. In addition, previously compiled site-specific reports, data forms, notes, and other materials, where available, were included in the field packets. Sites were prioritized in consultation with staff from the USFWS East Lansing Ecological Services Field Office, with emphasis on visiting sites that were last surveyed in the mid-1990s or earlier.

Field Surveys

We conducted meander surveys throughout appropriate dune habitat at each site, collecting geospatial data for each flowering and non-flowering *Cirsium pitcheri* individual using hand-held GPS units such as the AshTech MobileMapper, paired with a customized data collection application developed for ArcPad software. Survey tracks were spaced no wider than 10 – 15 meters apart to help ensure that all thistles were counted at each site. All GPS tracks were saved for future reference and to aid follow-up monitoring. Sites were surveyed in southern Michigan in 2012 beginning in early to mid-June, and as late as early August in northern Lower Michigan and eastern Upper Michigan during 2013 – 2015. Surveys were primarily conducted when all life stages of *C. pitcheri* were evident and to coincide with peak flowering. At each site, in addition to the collection of geospatial and count data, vegetation was characterized by completing a dune species checklist (Appendix 1) and potential threats to the habitat and *C. pitcheri* populations were recorded and scored (Appendix 2).

Element Occurrence Updates

Following field surveys, element occurrence records for each surveyed *C. pitcheri* population were updated with population data, threats, and refined spatial representations. All surveyed occurrences were assigned a new element occurrence rank based on criteria developed for the most recent USFWS Five-year Review (USFWS 2010).

RESULTS

Sites

Over the course of three field seasons (2012 – 2015), a total of 62 sites were visited, representing approximately 36% of the ca. 172 occurrences mapped and tracked by MNFI (some previously separate occurrences were grouped following 2012 – 2015 surveys). These sites occurred primarily in four areas: (1) southwestern Lower Michigan, from Berrien County north to Muskegon County; (2) northern Lower Michigan, from Charlevoix County to Alcona County; (3) the Thumb (Huron County); and (4) the eastern Upper Peninsula, from central Mackinac County east to Chippewa County (mainland) (Figure A).

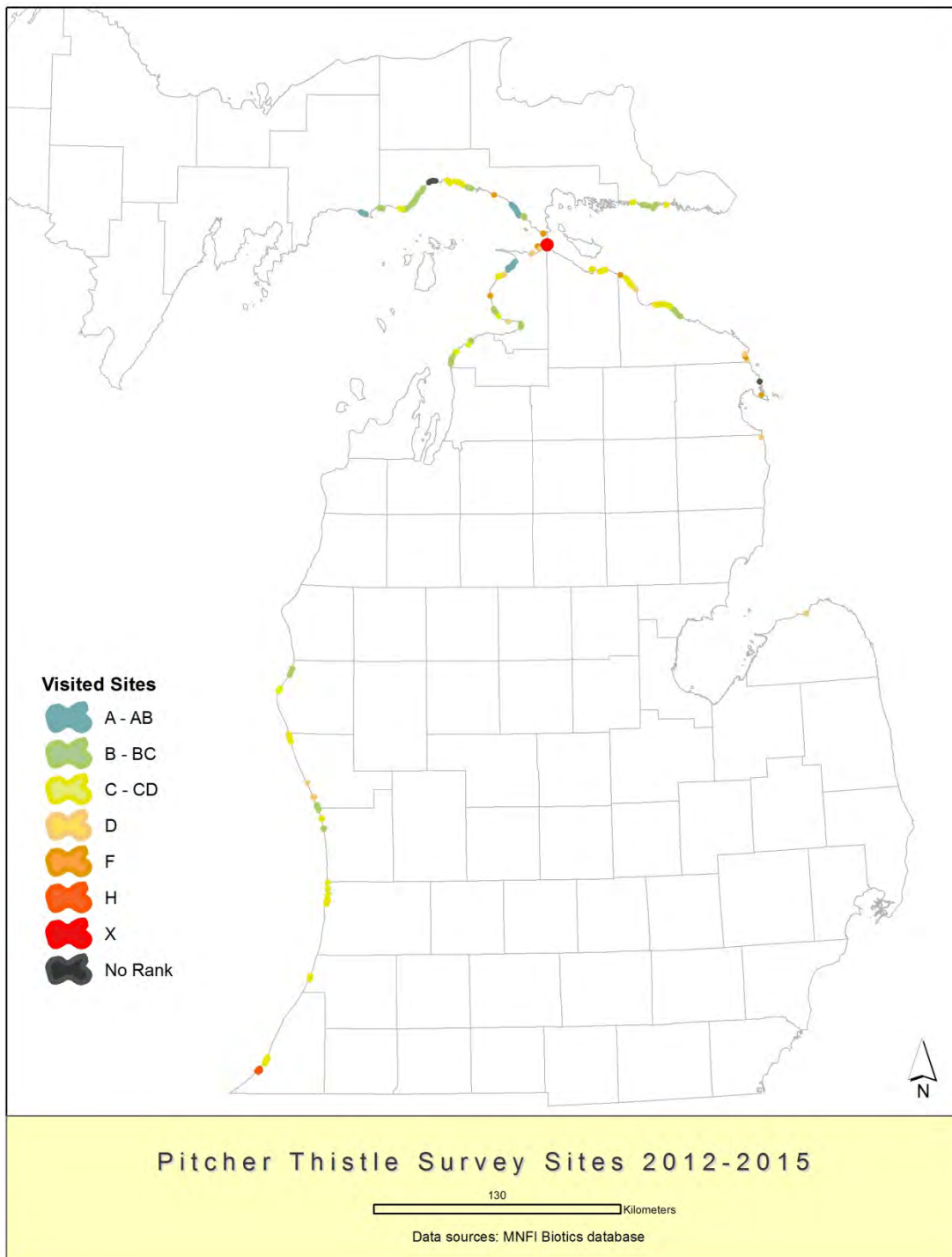


Figure A. Distribution and element occurrence (EO) ranks for 62 *Cirsium pitcheri* populations surveyed between 2012 and 2015.
Counts

A total of 80,810 individual *Cirsium pitcheri* were counted, including 28,937 fertile plants and 51,963 rosettes. Site counts ranged from 0 plants at 10 sites to >1,000 plants at 17 sites, including >10,000 plants at two sites (Figure B). Nine of the 10 largest populations surveyed are in extreme northern Lower Michigan or eastern Upper Michigan, with generally smaller populations in southern Lower Michigan. We were unable to relocate previously documented populations at 11 of the 62 sites (18%).

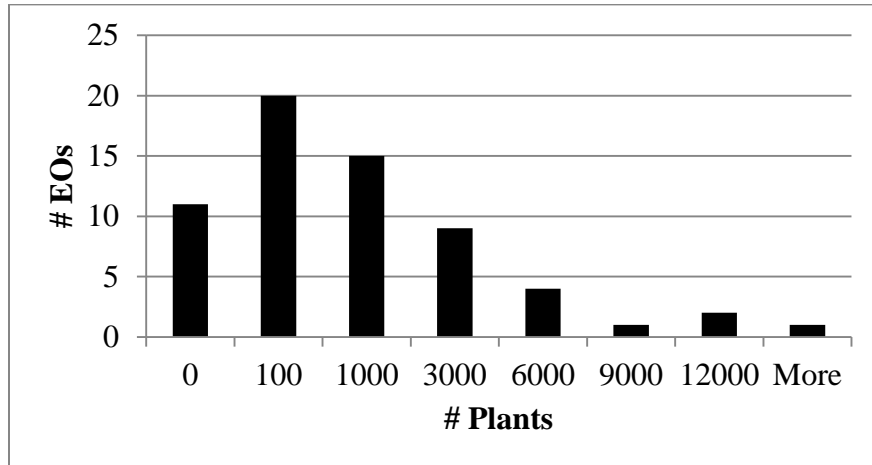


Figure B. Population size distribution for 62 *Cirsium pitcheri* sites surveyed between 2012 and 2015.

Element Occurrence Ranks

Ca. 44 of 62 occurrences (71%) were re-ranked following 2012 – 2015 field surveys. The majority of occurrence ranks were downgraded (Figure A), although some of the downward-adjusted ranks are the result of a more consistent application of element occurrence rank standards, based largely on the criteria outlined in USFWS (2010). Among the 62 occurrences surveyed, there are none considered to be of “excellent viability,” although three occurrences are still considered to be of “excellent to good viability” (Figure C).

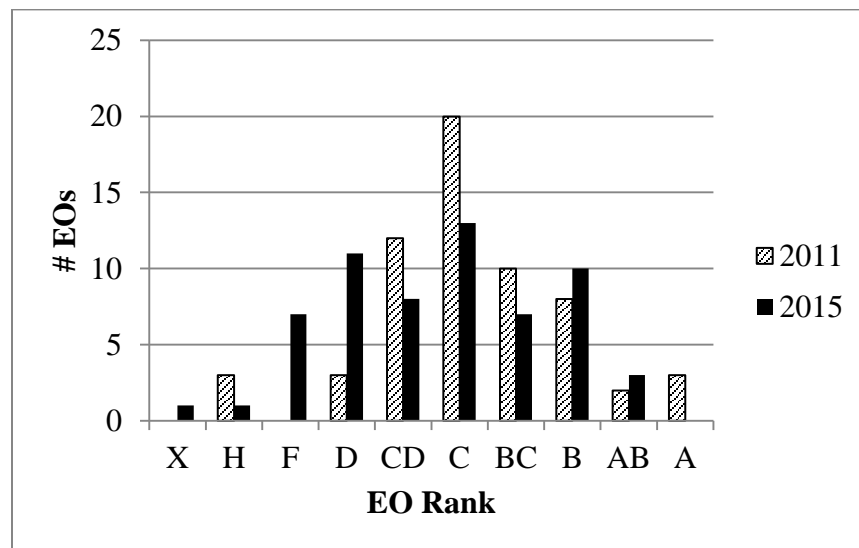


Figure C. Element occurrence (EO) rank distribution, pre-survey and post-survey, for 62 *Cirsium pitcheri* sites surveyed between 2012 and 2015.

Threat Assessments

The primary threats noted were invasive plants (especially spotted knapweed, *Centaurea stoebe*) and recreational use of the dunes, both vehicular and foot traffic. These threats were nearly ubiquitous. Of likely greater concern is the colonization of several Lower Michigan sites by the non-native weevil *Larinus planus*, a species spread in the central United States to control weedy rangeland thistles that has since spread to the Great Lakes region. This species reduces seed production in *C. pitcheri* by approximately 50%, and has the potential to cause at least localized extirpation of the species in its natural habitats (Havens et al. 2012).

DISCUSSION

We will continue surveys of the remaining *C. pitcheri* populations in 2016 under a new grant, focusing on populations occurring on Great Lakes islands and the remainder of the Upper Peninsula. We hope to survey the majority of remaining *C. pitcheri* populations over the next several years, after which we will analyze the full data set and make recommendations.

ACKNOWLEDGMENTS

We thank the USFWS GLRI Endangered Species Program for funding this comprehensive effort to survey known Pitcher's thistle locations throughout Michigan. We thank Barb Hosler, Vince Cavalieri, Tameka Dandridge, and Scott Hicks from the USFWS East Lansing Ecological Services Field Office for their support and guidance on study design, prioritization of sites for survey, and financial support. Special thanks are due to Barb Hosler for overseeing this project and Mike Penskar (MNFI Lead Botanist Emeritus) for securing initial funds and conducting field surveys. This project relied on field data collected by many present and former MNFI field scientists, especially John Paskus, Mike Penskar, Phyllis Higman, Wilf Previant, and Pete Badra. Finally, we thank the following MNFI colleagues: Rebecca Rogers assisted with database management; Helen Enander offered technological support and helped produce the maps; and Sue Ridge, Nancy Toben, and Brian Klatt provided administrative support.

LITERATURE CITED

- Havens, K., C. L. Jolls, J. E. Marik, P. Vitt, A. K. McEachern, and D. Kind. 2012. Effects of a non-native biocontrol weevil, *Larinus planus*, and other emerging threats on populations of the federally threatened Pitcher's thistle, *Cirsium pitcheri*. *Biological Conservation* 155: 202-211.
- NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://explorer.natureserve.org>. (Accessed: August 24, 2015).
- U.S. Fish and Wildlife Service, Midwest Region. 2010. Pitcher's thistle (*Cirsium pitcheri*): 5-year review: Summary and evaluation. USFWS, East Lansing Field Office, East Lansing, Mich. 29 pp.

Appendix 1. Open Dunes Vascular Plant Species Checklist.

Open Dunes Checklist Site name: _____ Surveyors: _____ Date: _____

D = dominant, co-dominant A= abundant C= common U= uncommon R=rare I= characteristic LD= locally dominant LC= locally common E= exotic

Abies balsamea	GYPSOPHILA PANICULATA	Populus balsamifera	TRIFOLIUM SPP.
Acer rubrum	GYPSOPHILA SCORZONER.	Populus deltoides	Tsuga canadensis
Acer saccharum	Hamelis virginiana	Populus grandidentata	Vaccinium angustifolium
ACHILLEA MILLEFOLIUM	HIERACIUM AURANTIACUM	POPULUS NIGRA V. ITAL.	Vaccinium myrtilloides
Agropyron dasystachyum	HIERACIUM CAESPITOSUM	Populus tremuloides	VERBASCUM THAPSUS
AGROPYRON REPENS	HIERACIUM SPP.	PRUNELLA VULGARIS	VIBURNUM OPULUS
Agropyron trachycaulum	Hudsonia tomentosa	Prunus pumila	Vitis riparia
AGROSTIS GIGANTEA	Hypericum kalmianum	Prunus serotina	Zizadenus glaucus
Ammonitilla breviliculata	HYPERICUM PERFORATUM	Prunus virginiana	TRIFOLIUM SPP.
Andropogon scoparius	Juncus balticus	Ptelea trifoliata	Tsuga canadensis
Anemone multifida	Juniperus communis	Pteridium aquilinum	Vaccinium angustifolium
Arabis lyrata	Juniperus horizontalis	Crabapple fasciculata	Vaccinium myrtilloides
ARCTIUM MINUS	Juniperus virginiana	Quercus nigra	VERBASCUM THAPSUS
Arctostaphylos uva-ursi	Koeleria macrantha	Quercus spp.	VIBURNUM OPULUS
Artemisia campestris	Larix laricina	RHAMNUS CATHARTICA	Vitis riparia
Asclepias syriaca	Lathyrus japonicus	RHAMNUS FRANGULA	Zizadenus glaucus
Asclepia viridiflora	LEONURUS CARDIACA	Rhus spp.	TRIFOLIUM SPP.
Asclepias spp.	LEYMUS ARENARIUS	ROBINIA PSEUDOACACIA	Tsuga canadensis
BARBAREA VULGARIS	LINARIA VULGARIS	Rosa acicularis	Vaccinium angustifolium
BERBERIS INCANA	Lithospermum carolinense	Rosa blanda	Vaccinium myrtilloides
Betula papyrifera	LONICERA XBELLA	Rosa carolina	VERBASCUM THAPSUS
BROMUS INERMIS	LONICERA JAPONICA	ROSA MULTIFLORA	VIBURNUM OPULUS
Calcile edentula	LONICERA MORROWII	Rubus alleghaniensis	Vitis riparia
Calamovilfa longifolia	LONICERA TATARICA	Rubus flagellaris	Zizadenus glaucus
Campanula anarinoidea	MEDICAGO LUPULINA	Rubus hispida	TRIFOLIUM SPP.
CELASTRUS ORBICULATUS	Melanopyrum lineare	Rumex acetosella	Tsuga canadensis
Celastrus scandens	MILILEOTUS ALBA	RUMEX CRISPUS	Vaccinium angustifolium
CENTAUREA STOEBE	MELILEOTUS OFFICINALIS	Salix cordata	Vaccinium myrtilloides
CHRYSANTHEMUM LEUC.	Monarda fistulosa	Salix exigua	VERBASCUM THAPSUS
CICHOBIUM INTYBIUS	Monarda punctata	Salix myricoides	VIBURNUM OPULUS
CIRSIIUM ARVENSE	MORUS ALBA	SALIX PURPUREA	Vitis riparia
Cirsium palustre	Oenothera biennis	Salix serotima	Zizadenus glaucus
CIRSIIUM VULGARE	Panicum virgatum	Salix spp.	
Coreopsis lanceolata	Panicum spp.	SAPONARIA OFFICINALIS	
CORONILLA VARIA	PASTINACA SATIVA	Sassifras albidum	
Cornus stolonifera	PHALARIS ARUNDINACEA	Schoenoplectus pungens	
CYCLOLOMA ATRIPLICI.	PHLEUM PRATENSE	SEDUM ACRE	
Cyperus schweinitzii	Phragmites australis	Shepherdia canadensis	
DAUCUS CAROTA	PHRAGMITES AUSTRALIS	SILENE VULGARIS	
Deschampsia flexuosa	Physocarpus opulifolius	Smilacina stellata	
Dicentelium communianum	Picea glauca	Solidago altissima	
ELAEAGNUS UMBELLATA	Pinus bankiana	Solidago simplex (spatulata)	
Elymus canadensis	PINUS NIGRA	Solidago spp.	
EPIPACTUS HELLERORINE	Pinus resinosa	SONCHUS SPP.	
Equisetum hyemale	Pinus strobus	Sphenopholis intermedia	
ERUCASTRUM GALLICUM	PINUS SYLVESTRIS	TANACETUM VULGARE	
Euphorbia corollata	PLANTAGO SPP.	Tanacetum huronense	
Euphorbia polvecomifolia	POA COMPRESSA	TARAXACUM OFFICINALE	
EUPHORBIA SPP.	POA SPP.	Thuja occidentalis	
Euthamia graminifolia	Polygonella articulata	Tilia americana	
Fagus grandifolia	Polygonum cuspidatum	TORILIS JAPONICA	
FESTUCA ARUNDINACEA	POLYGONUM SPP.	Toxicodendron radicans	
Festuca saximontana	Potentilla anserina	Toxicodendron rvlberarii	
Festuca spp.	Potentilla fruticosa	TRAGOPOGON DUBIUS	
Fragaria virginiana	POPULUS ALBA	TRIFOLIUM PRATENSE	

Created 6/6/2012

Threats Assessment – GLRI Surveys

Surveyor(s): _____ Date: _____

Survey site: _____

Threat	Severity	Scope	Reversibility	Threat Score	Comments
Invasive Species					
Deer Herbivory					
ORV Activity					
Foot Traffic/ Rec. Activity					
Hydrologic Alteration					
Infrastructure/ Trail Development					
Water Quality/ Contamination					

Rank each observed threat in terms of Severity, Scope, and Reversibility on a scale of 1 to 5. Severity is the level of damage to the site and a score of 1 means the site is slightly damaged and a score of 5 means the site has been extensively damaged. Scope is the geographic extent of impact and a score of 1 means the threat occupies a trace area within the site and a score of 5 means the threat is ubiquitous. Reversibility is the probability of controlling the threat and reversing the damage and a score of 1 means the threat can be easily controlled and a score of 5 means the threat is unlikely to be controlled. Threat Score is a sum of the rankings for Severity, Scope, and Reversibility.

Severity:

- 5: Without action, the community will likely be destroyed or eliminated (beyond restoration) within 10-15 years
- 4: Without action, the community will likely be seriously degraded (potentially lowered by 1 EO Rank) within 10-15 years
- 3: Without action, the community will likely be moderately degraded (potentially lowered by 1/2 EO Rank) within 10-15 years
- 2: Without action, the community will likely be slightly impaired by this threat within 10-15 years
- 1: Without action, the community may be slightly impaired by this threat within 15+ years
- 0: No threat

Scope:

- 5: Threat impacts the entire community EO (90%+)
- 4: Threat impacts large portions of the community EO (roughly 50-89%)
- 3: Threat impacts moderate portions of the community EO (roughly 15-49%)
- 2: Threat impacts localized portions of the community EO (roughly 5-14%, possibly in several scattered small patches)
- 1: Threat impacts only one small patch within or on the edge of the community EO, or is currently outside EO in the vicinity but likely to impact EO within the next 10 years
- 0: No threat

Reversibility:

- 5: Threat is not reversible (e.g., parking lot/paving)
- 4: Threat is reversible but not practically affordable without major investment of \$ and time (potentially hundreds of thousands of dollars or full time staff effort)
- 3: Threat is reversible but moderately difficult and requires a fair investment of \$ and/or time (potentially tens of thousands of dollars or 2+ weeks of staff time/year)
- 2: Threat is reversible at relatively low cost (potentially several days of staff time/year or up to a few thousand dollars)
- 1: Threat is easily reversible with only a few hours of effort (potentially annually) by a small group of people such as volunteers or state workers
- 0: No threat


Appendix 3

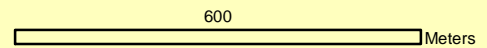


Site Name: Naubinway East

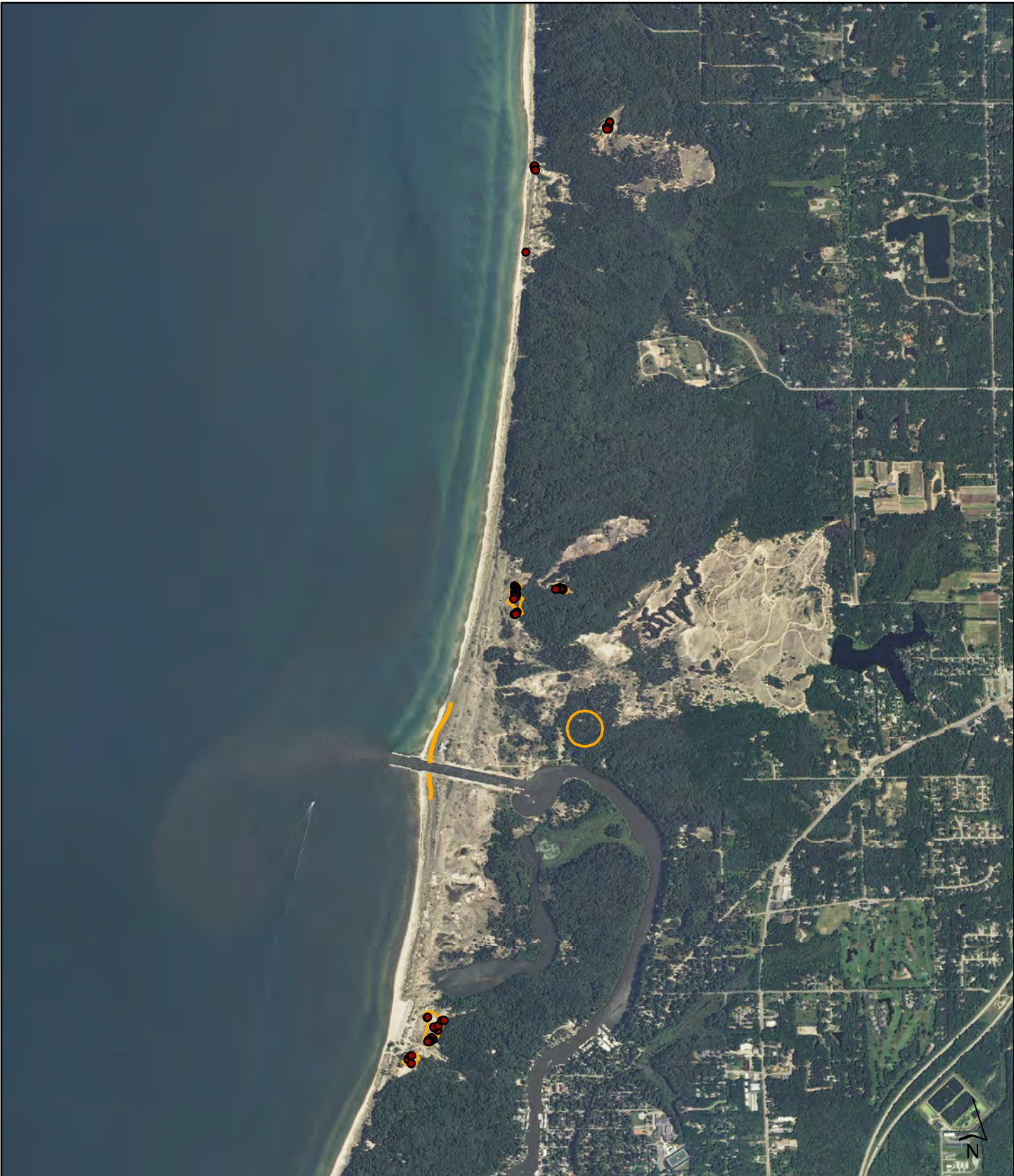
EO #: 3	Number of mature plants:	110
EO Rank old: C	Number of immature plants:	138
EO Rank new: C	Occupied acreage:	6.2

● Field GPS points

 Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 9



Site Name: Saugatuck Dunes

EO #:	4	Number of mature plants:	32
EO Rank old:	C	Number of immature plants:	177
EO Rank new:	C	Occupied acreage:	17.1

● Field GPS points

○ Occupied acreage

1,600

_____ Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 10

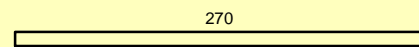


Site Name: Charlevoix City Beach

EO #: 6	Number of mature plants: 65
EO Rank old: D	Number of immature plants: 405
EO Rank new: CD	Occupied acreage: 1.7

● Field GPS points

 Occupied acreage

 270 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 11

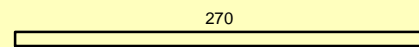


Site Name: Kitchel Dunes

EO #: 8	Number of mature plants:	23
EO Rank old: C	Number of immature plants:	83
EO Rank new: C	Occupied acreage:	41.5

● Field GPS points

 Occupied acreage

 270 Meters


Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 12

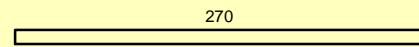


Site Name: Huron Bay

EO #: 12	Number of mature plants:	0
EO Rank old: CD	Number of immature plants:	0
EO Rank new:	Occupied acreage:	7.7

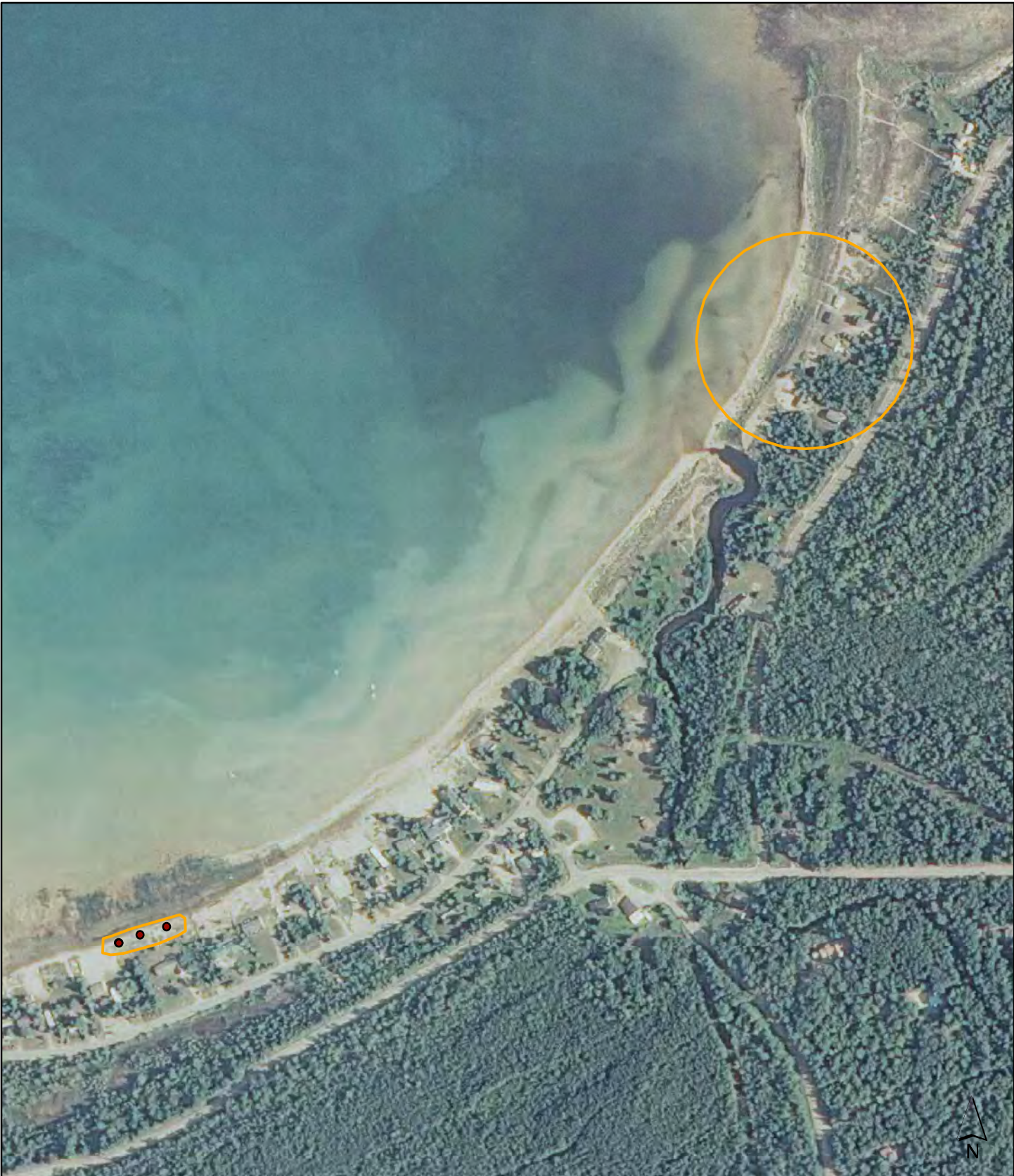
● Field GPS points

 Occupied acreage

 270 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 13

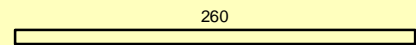


Site Name: Cecil Bay

EO #: 14	Number of mature plants:	4
EO Rank old: C	Number of immature plants:	5
EO Rank new: D	Occupied acreage:	8.1

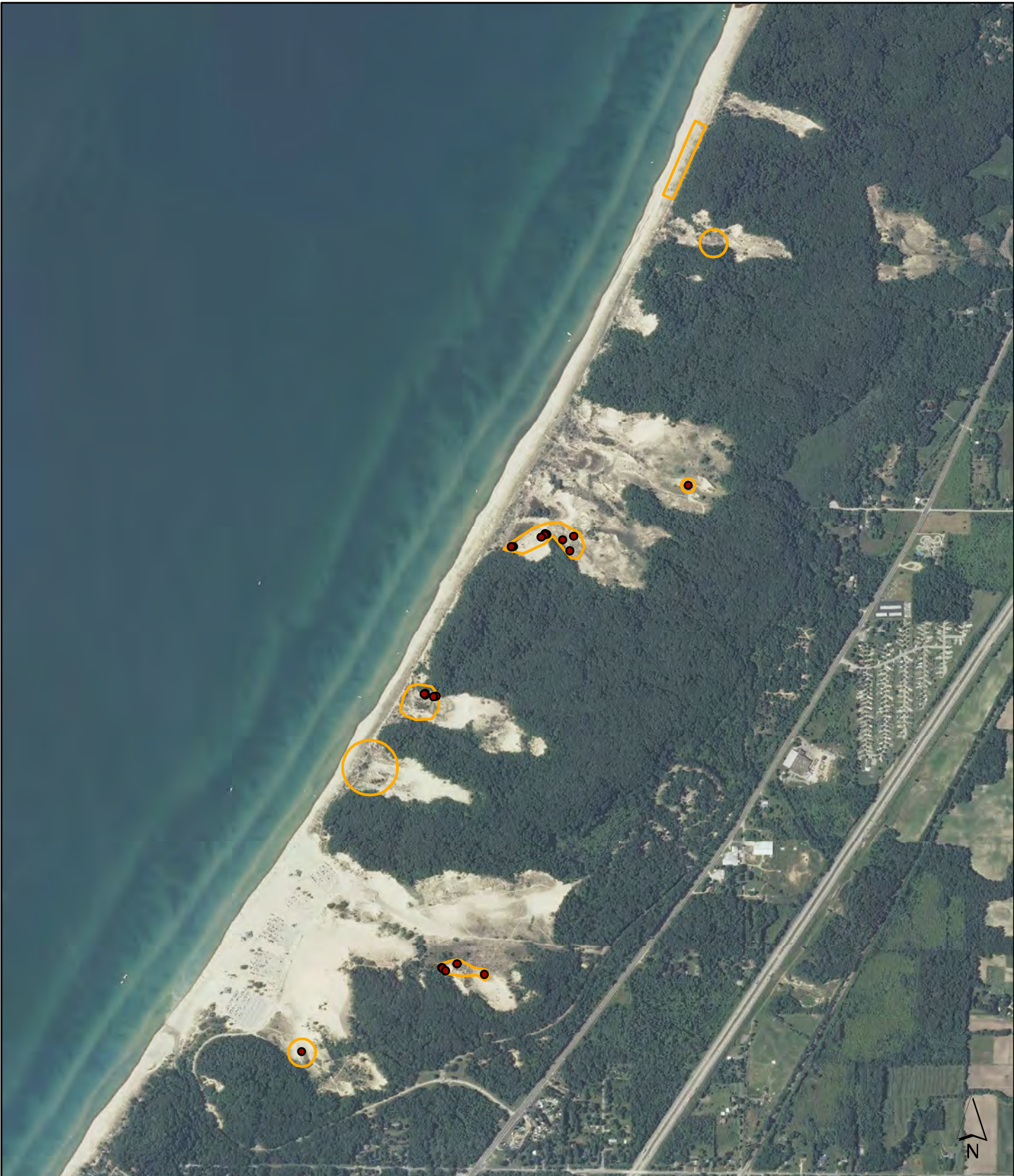
● Field GPS points

 Occupied acreage

 260 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 14

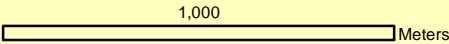


Site Name: Warren Dunes

EO #: 16	Number of mature plants: 9
EO Rank old: BC	Number of immature plants: 39
EO Rank new: CD	Occupied acreage: 25.1

● Field GPS points

○ Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 15



Site Name: Sturgeon Bay South, Sturgeon Point

EO #: 22	Number of mature plants: 6059
EO Rank old: BC	Number of immature plants: 6771
EO Rank new: AB	Occupied acreage: 190.2

● Field GPS points

○ Occupied acreage

1,400 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 16

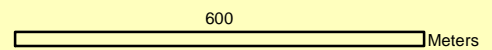


Site Name: Seiners-Scott Point (Scott-Cozy Point)

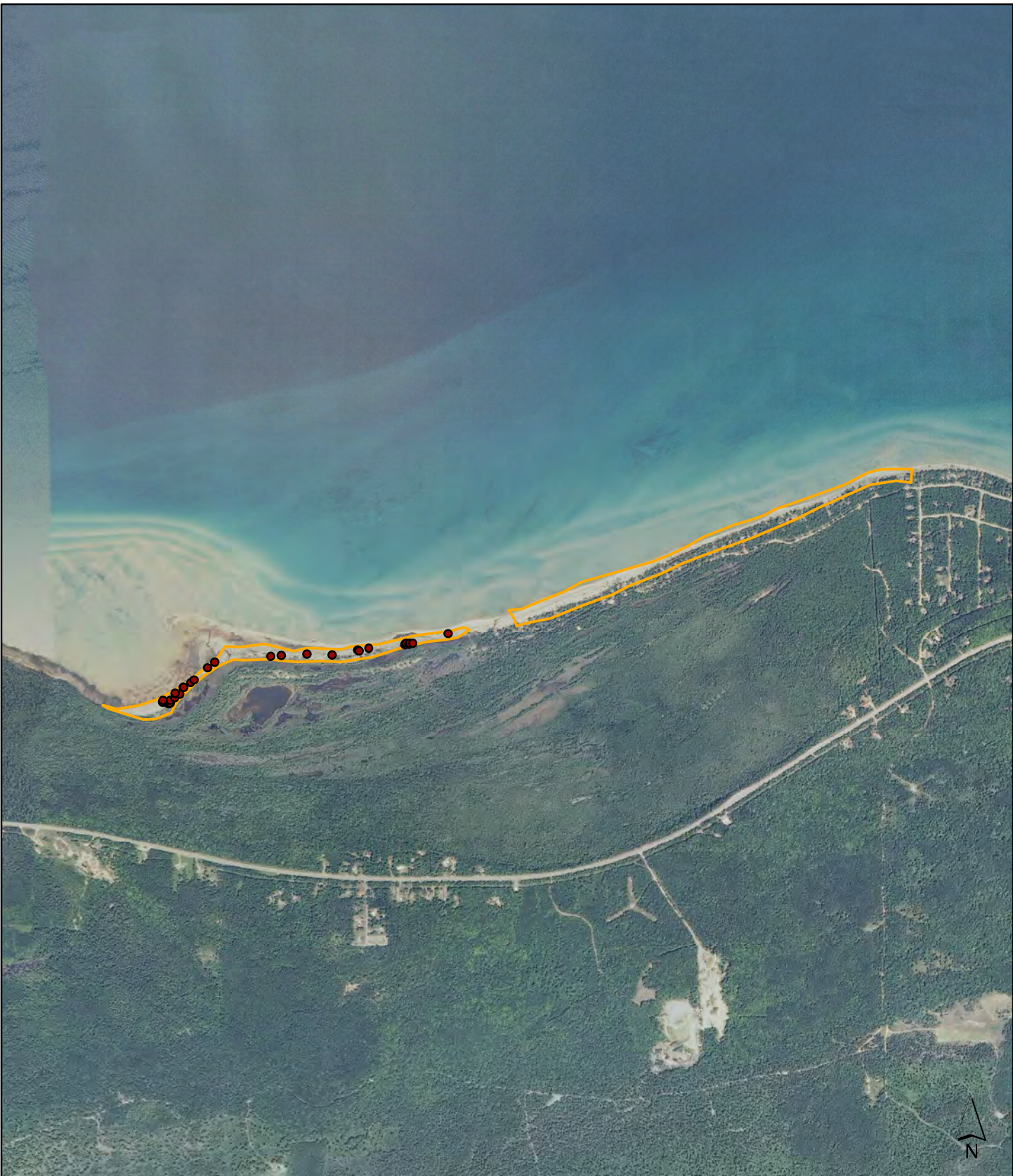
EO #: 23	Number of mature plants: 567
EO Rank old: A	Number of immature plants: 1813
EO Rank new: BC	Occupied acreage: 14.1

● Field GPS points

○ Occupied acreage




Data sources: 2010 NAIP imagery, MNFI Biotics database

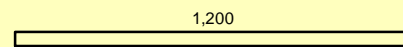


Site Name: Grass Bay

EO #: 24	Number of mature plants:	33
EO Rank old: BC	Number of immature plants:	26
EO Rank new: C	Occupied acreage:	50.1

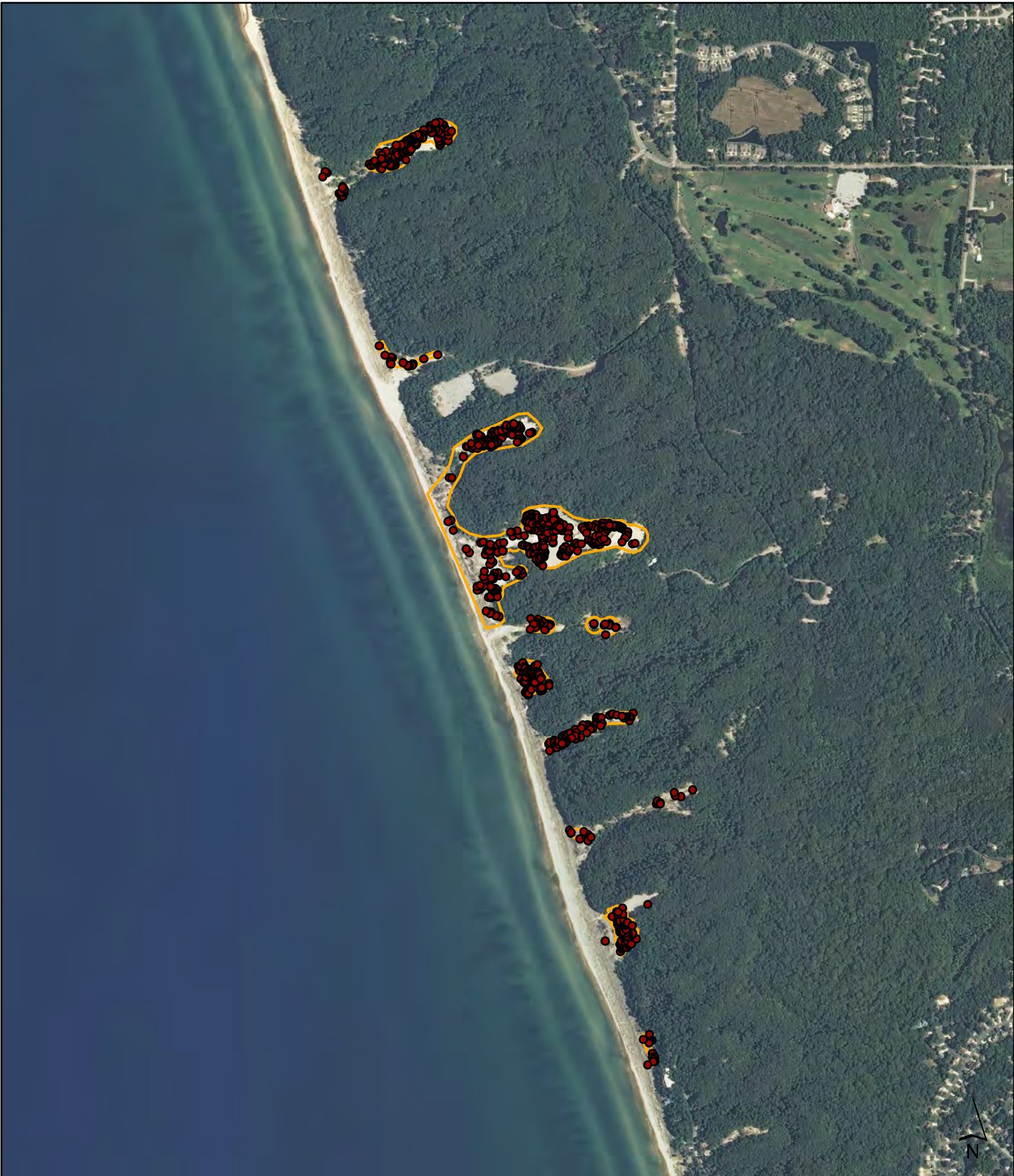
● Field GPS points

 Occupied acreage

 1,200 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 18



Site Name: Hoffmaster State Park

EO #: 25	Number of mature plants:	1100
EO Rank old: AB	Number of immature plants:	1293
EO Rank new: B	Occupied acreage:	46.4

● Field GPS points

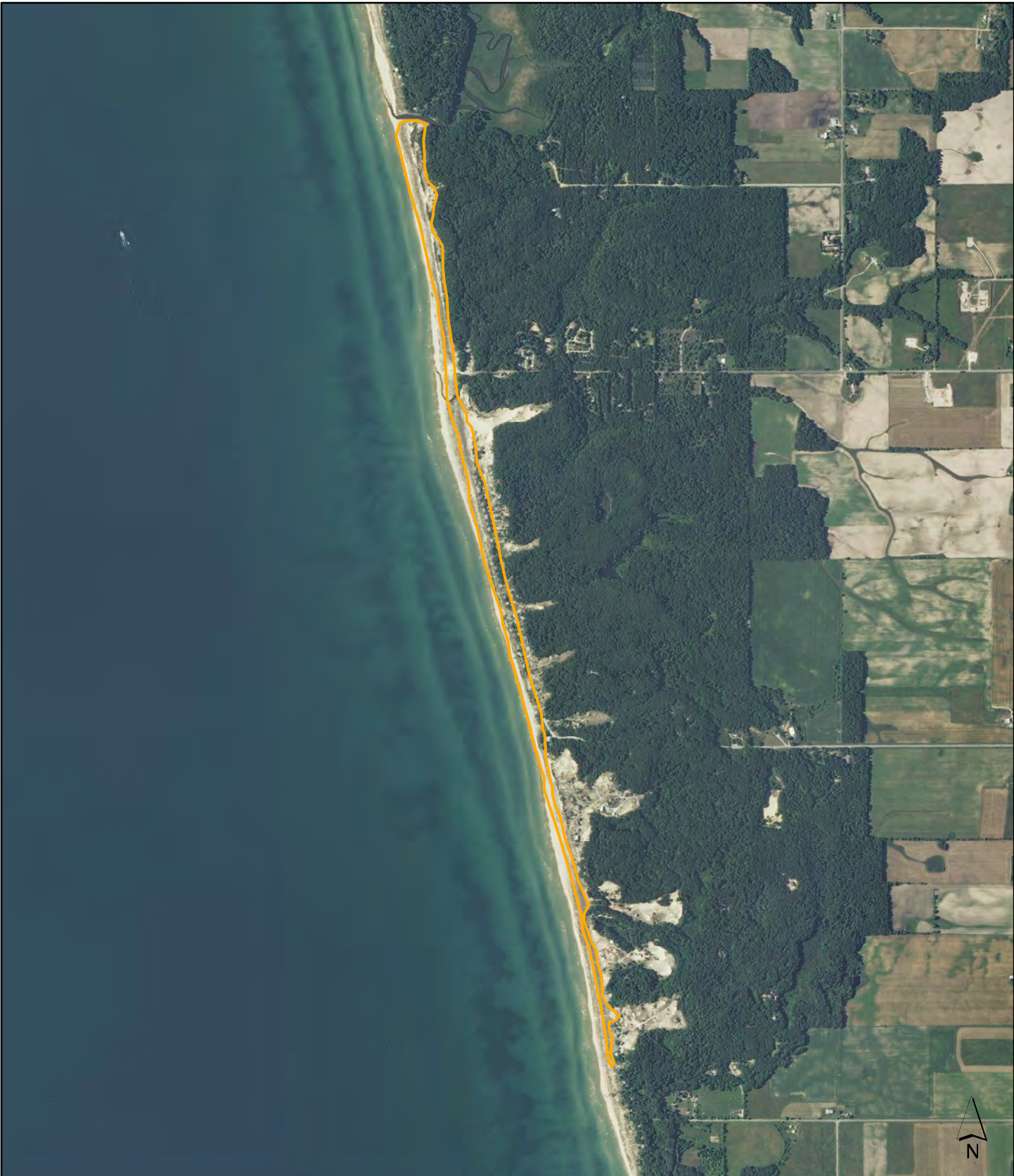
○ Occupied acreage

910

Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 19

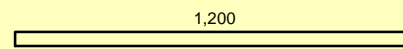


Site Name: Meinert Park

EO #: 26	Number of mature plants: 60
EO Rank old: C	Number of immature plants: 158
EO Rank new: C	Occupied acreage: 51.9

● Field GPS points

 Occupied acreage


 1,200 Meters

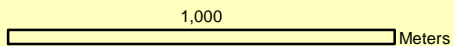
Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 20



Site Name: Pentwater Dunes

EO #: 30	Number of mature plants:	328
EO Rank old: CD	Number of immature plants:	751
EO Rank new: BC	Occupied acreage:	18.9

● Field GPS points
 Occupied acreage




Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 21

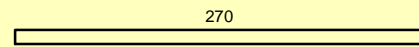


Site Name: Pointe LaBarbe

EO #: 37	Number of mature plants:	0
EO Rank old: CD	Number of immature plants:	0
EO Rank new: F	Occupied acreage:	30.9

● Field GPS points

 Occupied acreage

 270 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 22

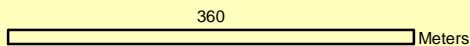


Site Name: Pointe aux Chenes

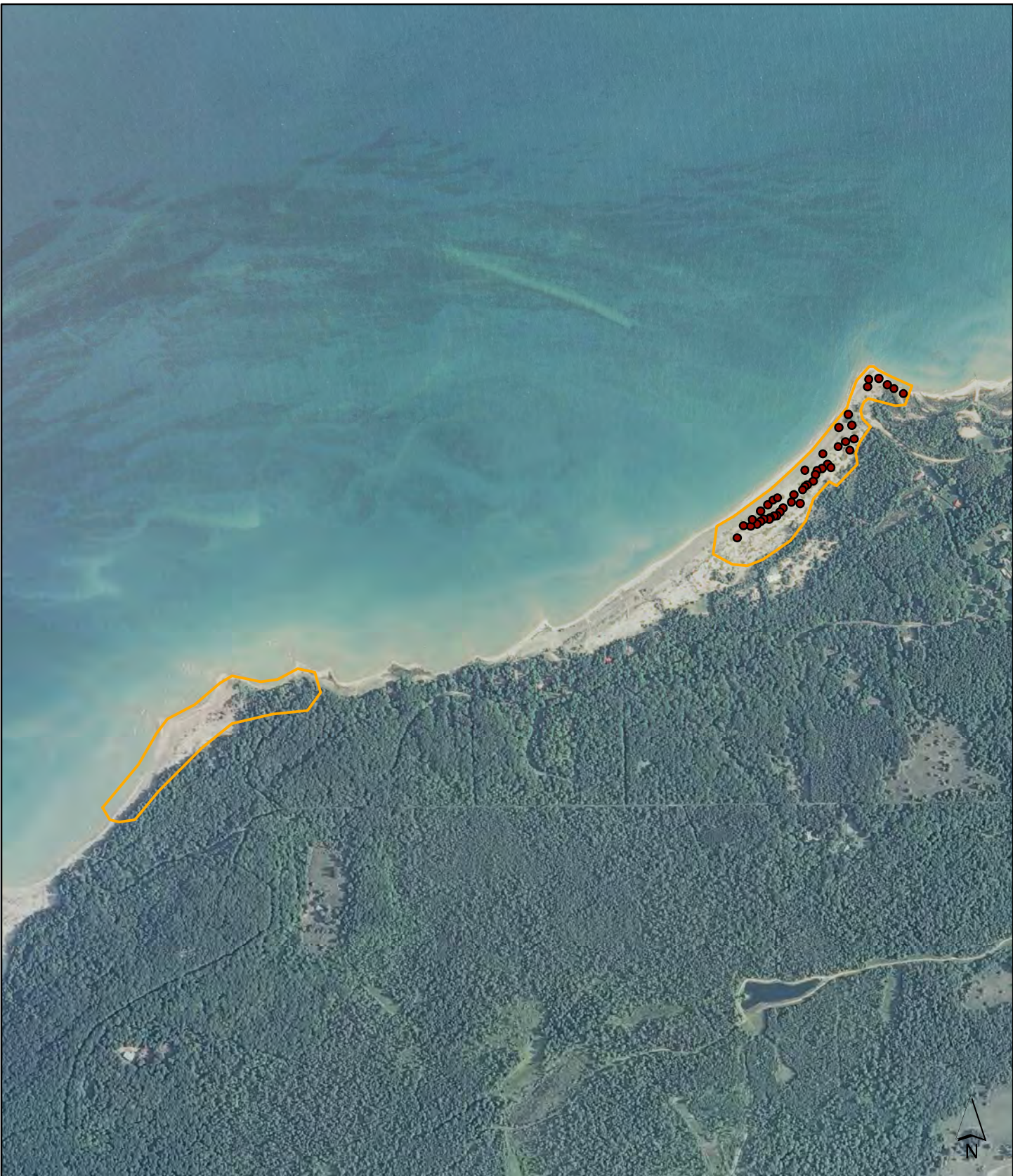
EO #: 49	Number of mature plants: 784
EO Rank old: AB	Number of immature plants: 2358
EO Rank new: B	Occupied acreage: 63.3

● Field GPS points

○ Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 23

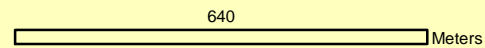


Site Name: McCort Hill, Cross Village West

EO #: 50	Number of mature plants:	588
EO Rank old: C	Number of immature plants:	310
EO Rank new: C	Occupied acreage:	23.7

● Field GPS points

○ Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 24

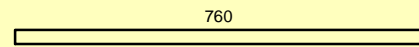


Site Name: Hughes Point

EO #: 55	Number of mature plants: 1063
EO Rank old: A	Number of immature plants: 2352
EO Rank new: B	Occupied acreage: 76

● Field GPS points

 Occupied acreage

 760 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 25

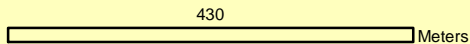


Site Name: Stevenson Point

EO #: 63	Number of mature plants:	34
EO Rank old: CD	Number of immature plants:	32
EO Rank new: CD	Occupied acreage:	2

● Field GPS points

○ Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 26



Site Name: Muskegon State Park

EO #: 64	Number of mature plants:	6
EO Rank old: C	Number of immature plants:	2
EO Rank new: D	Occupied acreage:	0.2

● Field GPS points

○ Occupied acreage

270 Meters


Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 27

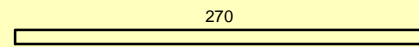


Site Name: Trail's End Bay/Cecil Bay/Johnson Point

EO #: 66	Number of mature plants:	5
EO Rank old: C	Number of immature plants:	4
EO Rank new: D	Occupied acreage:	1.7

● Field GPS points

 Occupied acreage

 270 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 28

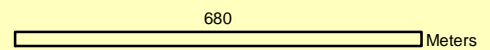


Site Name: St. Vital Bay

EO #: 67	Number of mature plants: 1064
EO Rank old: BC	Number of immature plants: 4361
EO Rank new: B	Occupied acreage: 39.5

● Field GPS points

○ Occupied acreage




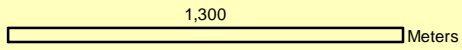
Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 29



Site Name: Albany Creek Mouth

EO #: 70	Number of mature plants: 1597
EO Rank old: BC	Number of immature plants: 5691
EO Rank new: B	Occupied acreage: 47.2

● Field GPS points
 Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database

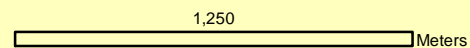


Site Name: Huron Beach North

EO #: 71	Number of mature plants:	32
EO Rank old: B	Number of immature plants:	32
EO Rank new: C	Occupied acreage:	43.8

● Field GPS points

○ Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 31

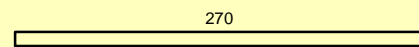


Site Name: Grace North

EO #: 72	Number of mature plants:	2
EO Rank old: BC	Number of immature plants:	2
EO Rank new: D	Occupied acreage:	1.6

● Field GPS points

 Occupied acreage

 270 Meters


Data sources: 2010 NAIP imagery, MNFI Biotics database
Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 32

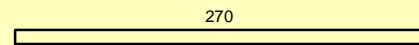


Site Name: Wycamp Creek Mouth

EO #: 73	Number of mature plants:	8
EO Rank old: C	Number of immature plants:	23
EO Rank new: D	Occupied acreage:	0.3

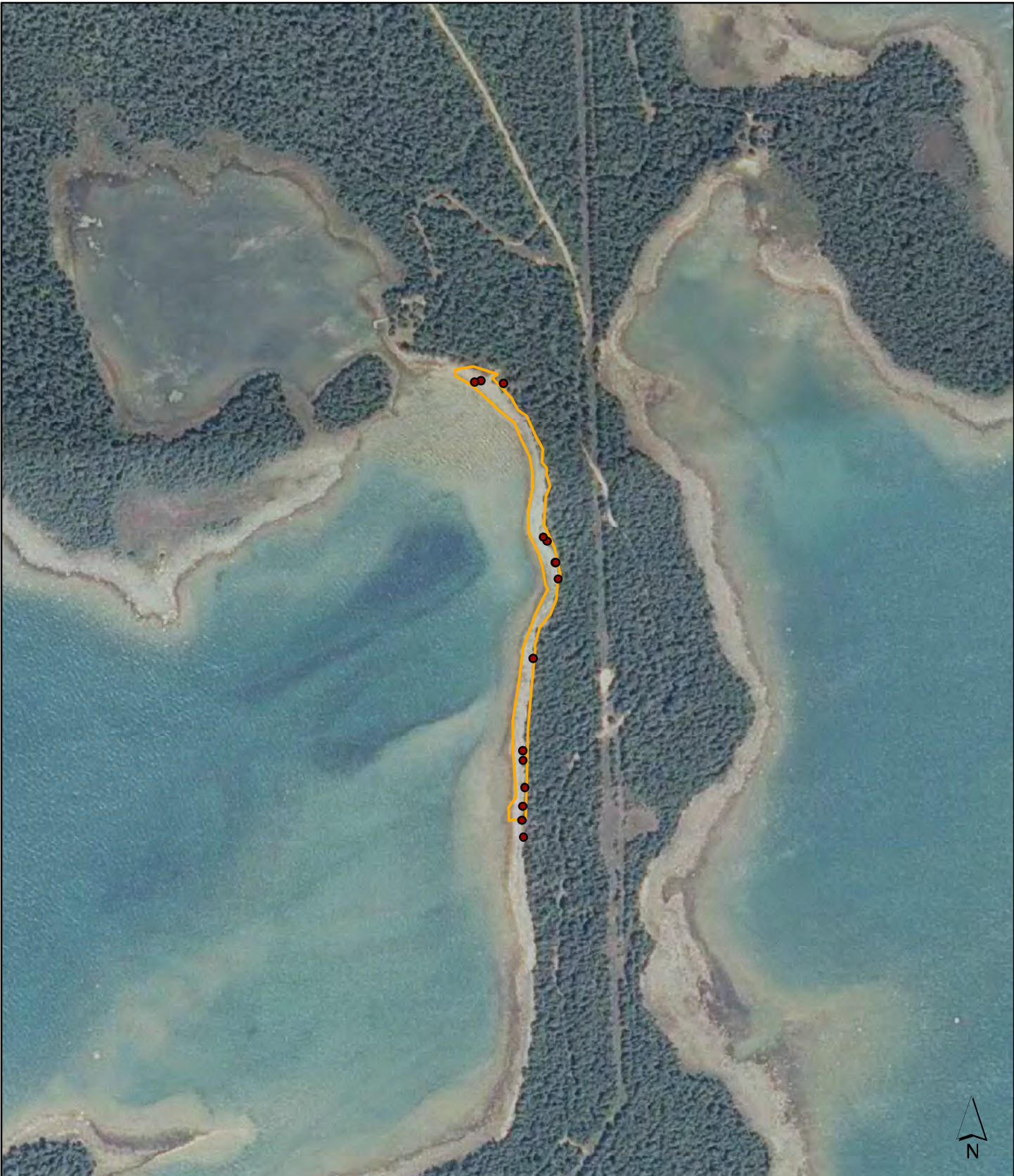
● Field GPS points

 Occupied acreage

 270 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 33

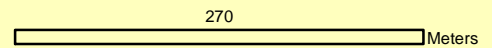


Site Name: Point Detour

EO #: 74	Number of mature plants:	5
EO Rank old: CD	Number of immature plants:	62
EO Rank new: CD	Occupied acreage:	1.6

● Field GPS points

○ Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 34

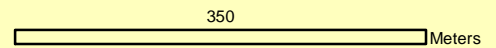


Site Name: Fisherman's Island State Park

EO #: 75	Number of mature plants:	208
EO Rank old: B	Number of immature plants:	213
EO Rank new: C	Occupied acreage:	32

● Field GPS points

○ Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 35



Site Name: Mt. McSauba Recreational Area

EO #: 77	Number of mature plants:	2120
EO Rank old: BC	Number of immature plants:	2364
EO Rank new: B	Occupied acreage:	29.8

● Field GPS points

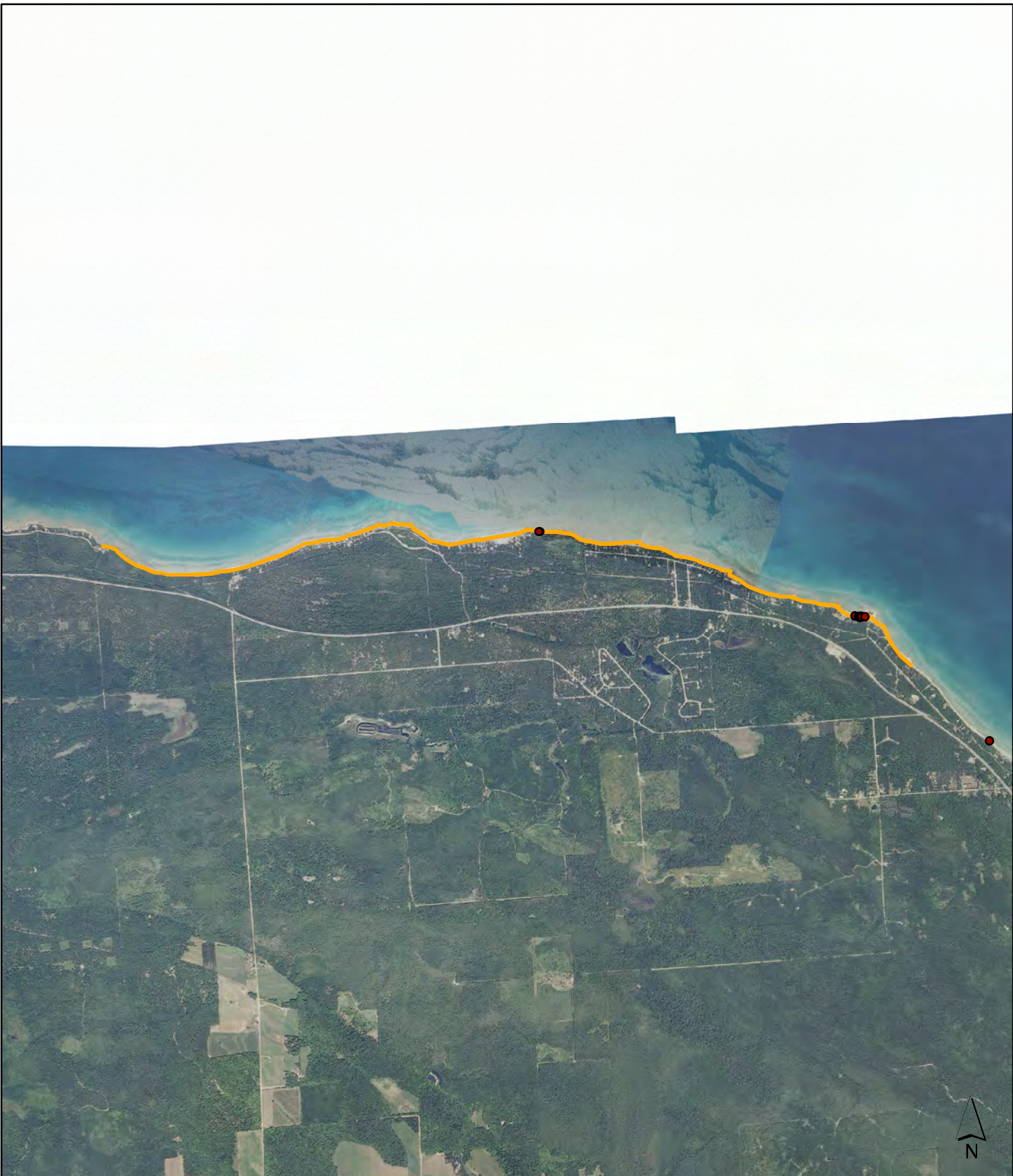
○ Occupied acreage

340

————— Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 36

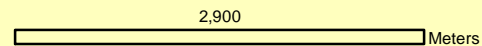


Site Name: Evergreen Beach - 40 Mile Point

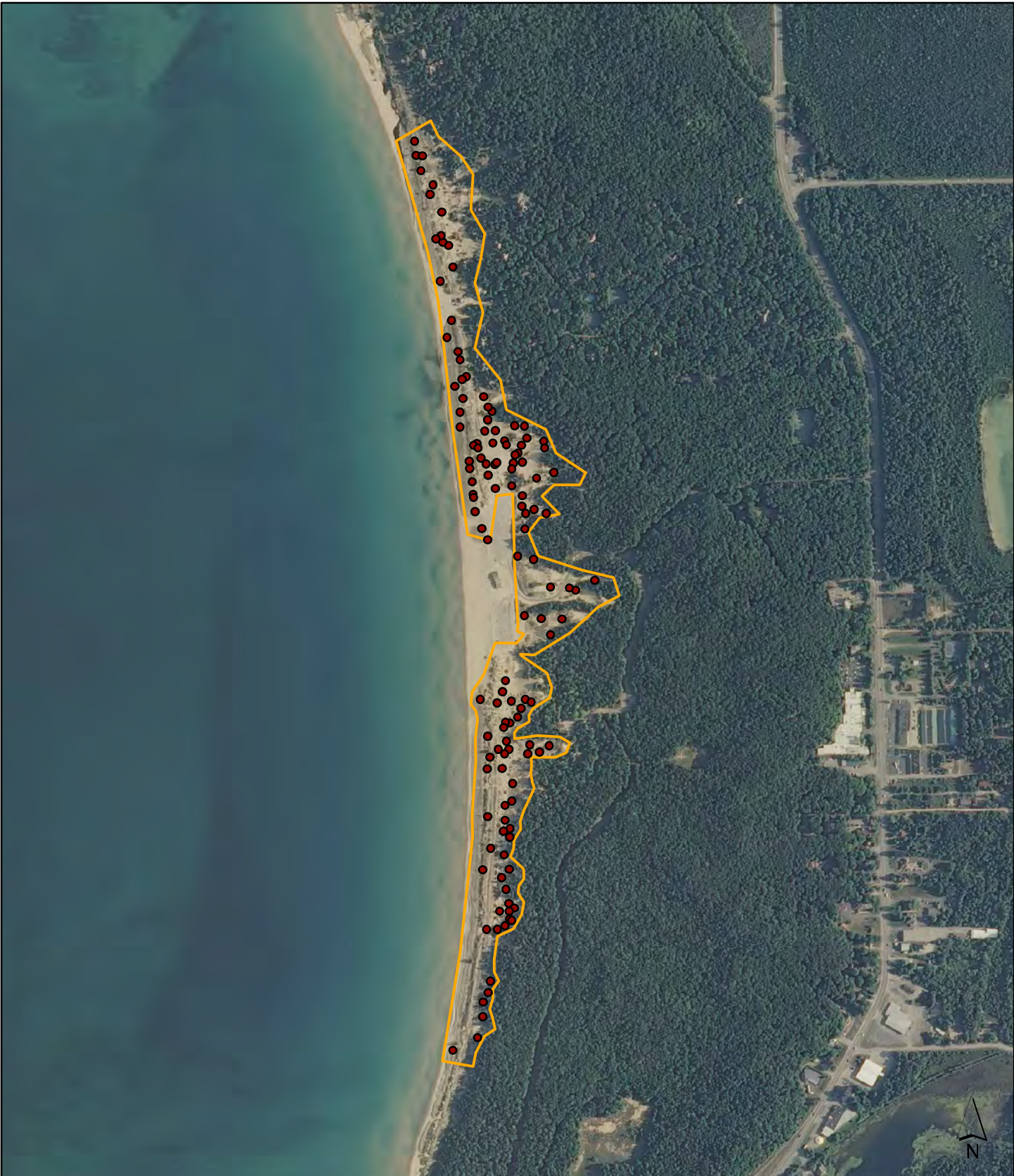
EO #: 78	Number of mature plants:	14
EO Rank old: B	Number of immature plants:	27
EO Rank new: C	Occupied acreage:	28.8

● Field GPS points

 Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database



Site Name: Paige Creek

EO #: 79	Number of mature plants:	1120
EO Rank old: B	Number of immature plants:	1533
EO Rank new: B	Occupied acreage:	53.6

● Field GPS points

○ Occupied acreage

580

————— Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 38

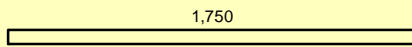


Site Name: Hoeft State Park

EO #: 83	Number of mature plants: 598
EO Rank old: B	Number of immature plants: 1751
EO Rank new: B	Occupied acreage: 36.5

● Field GPS points

 Occupied acreage

 1,750 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 39



Site Name: Besser Natural Area

EO #: 85	Number of mature plants:	5
EO Rank old: BC	Number of immature plants:	27
EO Rank new: D	Occupied acreage:	1.3

● Field GPS points

🟡 Occupied acreage

270 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 40

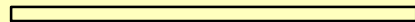


Site Name: Saginaw Bay

EO #: 89	Number of mature plants:	2
EO Rank old: CD	Number of immature plants:	0
EO Rank new: D	Occupied acreage:	53.6

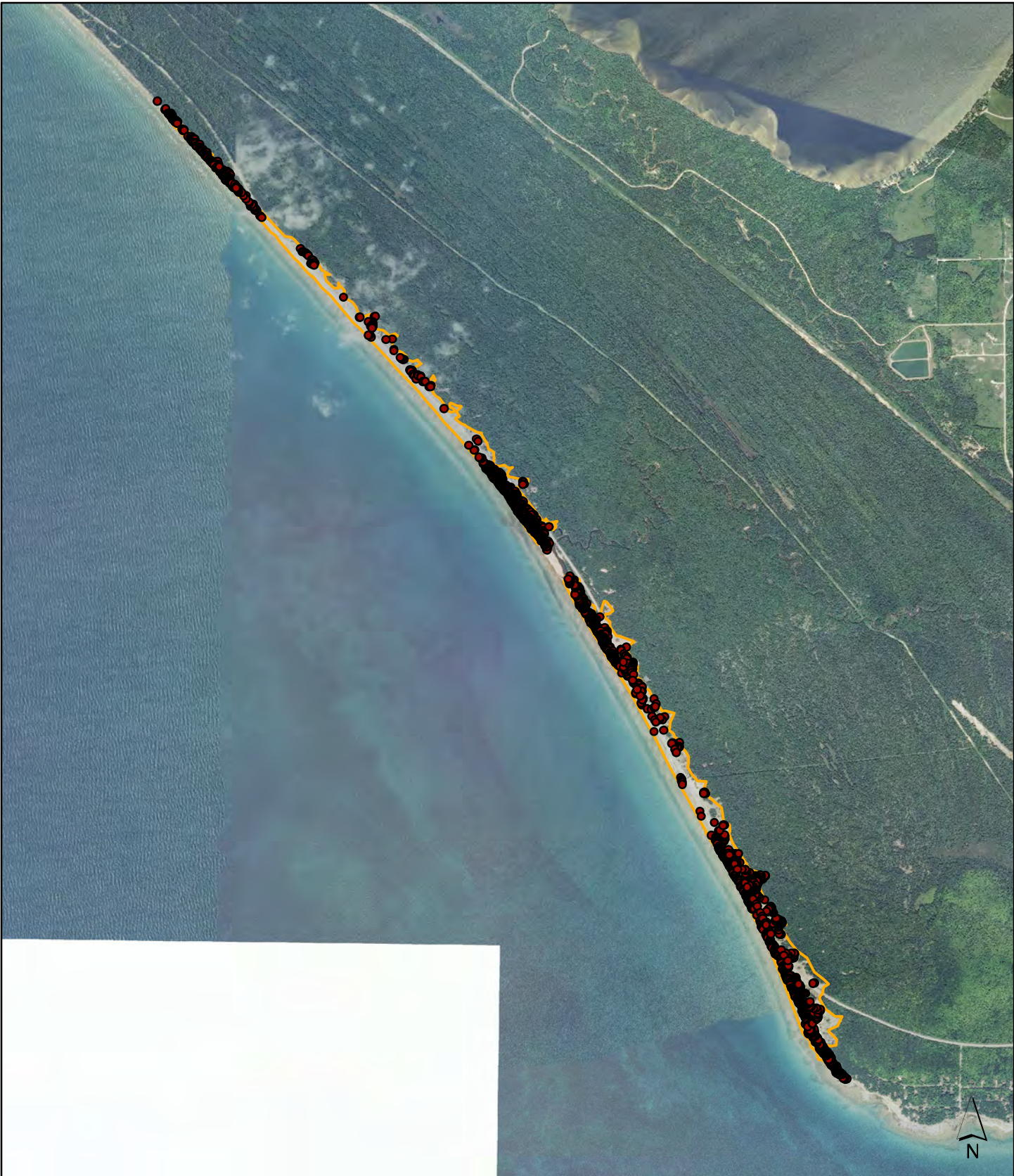
● Field GPS points

 Occupied acreage

 280 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 41



Site Name: Brevort Dunes

EO #: 90	Number of mature plants: 3546
EO Rank old: A	Number of immature plants: 8542
EO Rank new: AB	Occupied acreage: 188.5

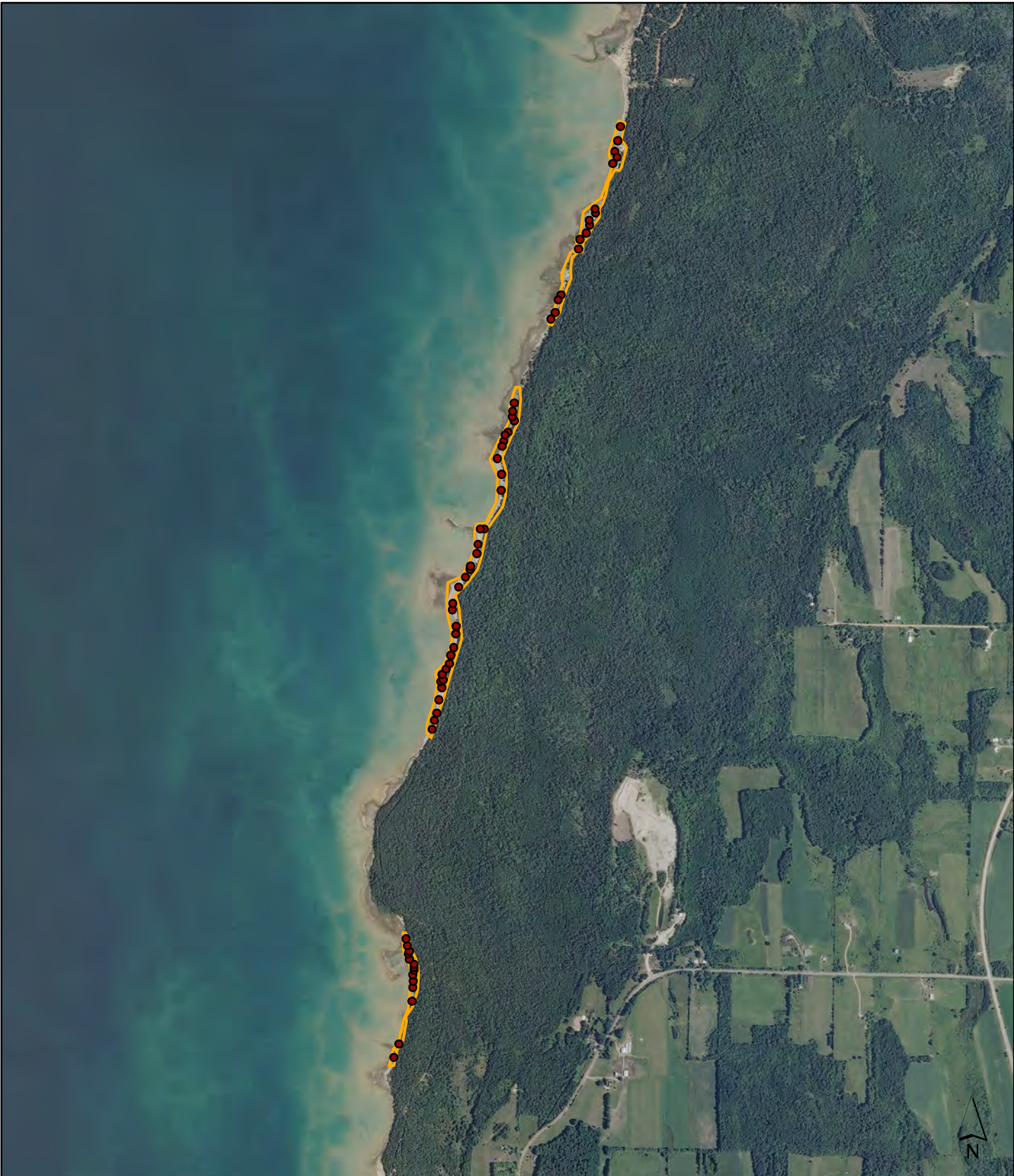
● Field GPS points

○ Occupied acreage

1,800 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 42



Site Name: Norwood

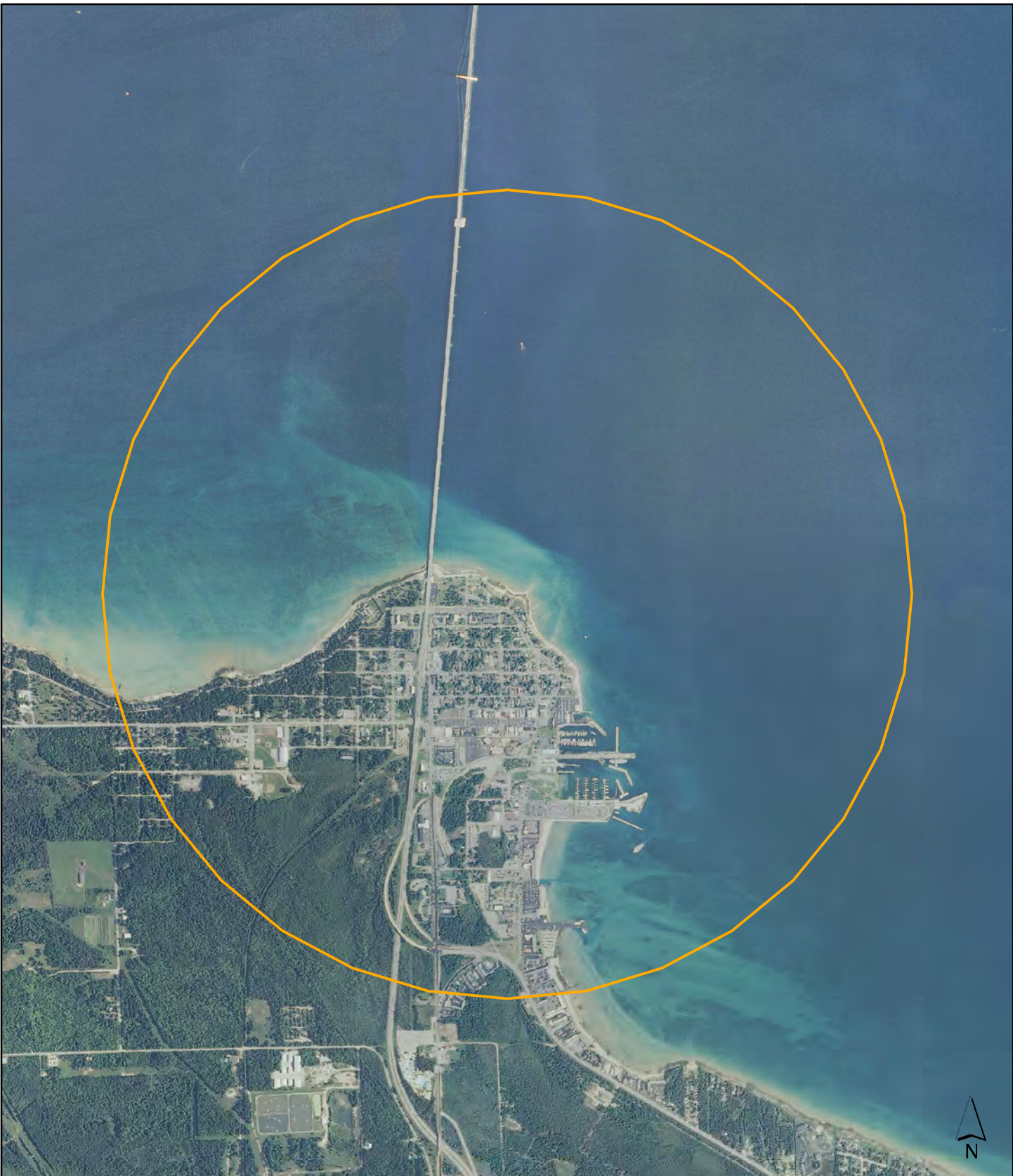
EO #: 93	Number of mature plants:	163
EO Rank old: BC	Number of immature plants:	332
EO Rank new: BC	Occupied acreage:	29.7

● Field GPS points

○ Occupied acreage

1,300 Meters


Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 43

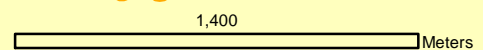


Site Name: Mackinaw City

EO #: 94	Number of mature plants:	0
EO Rank old: H	Number of immature plants:	0
EO Rank new: X	Occupied acreage:	3,085.3

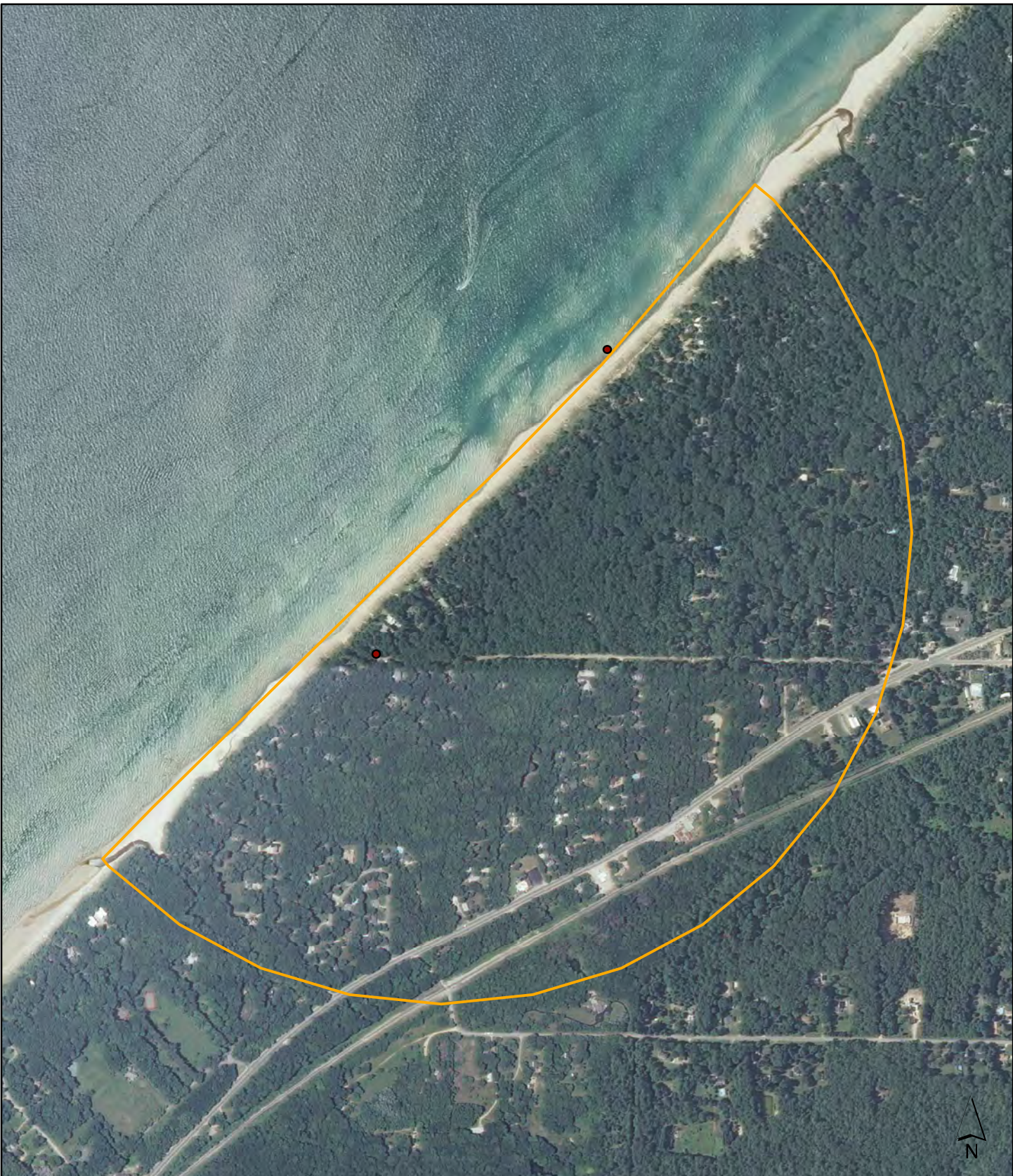
● Field GPS points

 Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 44

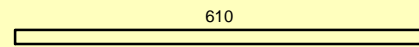


Site Name: Harbert

EO #: 97	Number of mature plants:	0
EO Rank old: H	Number of immature plants:	0
EO Rank new: H	Occupied acreage:	395.4

● Field GPS points

 Occupied acreage

 610 Meters

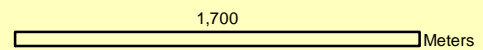
Data sources: 2010 NAIP imagery, MNFI Biotics database
Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 45



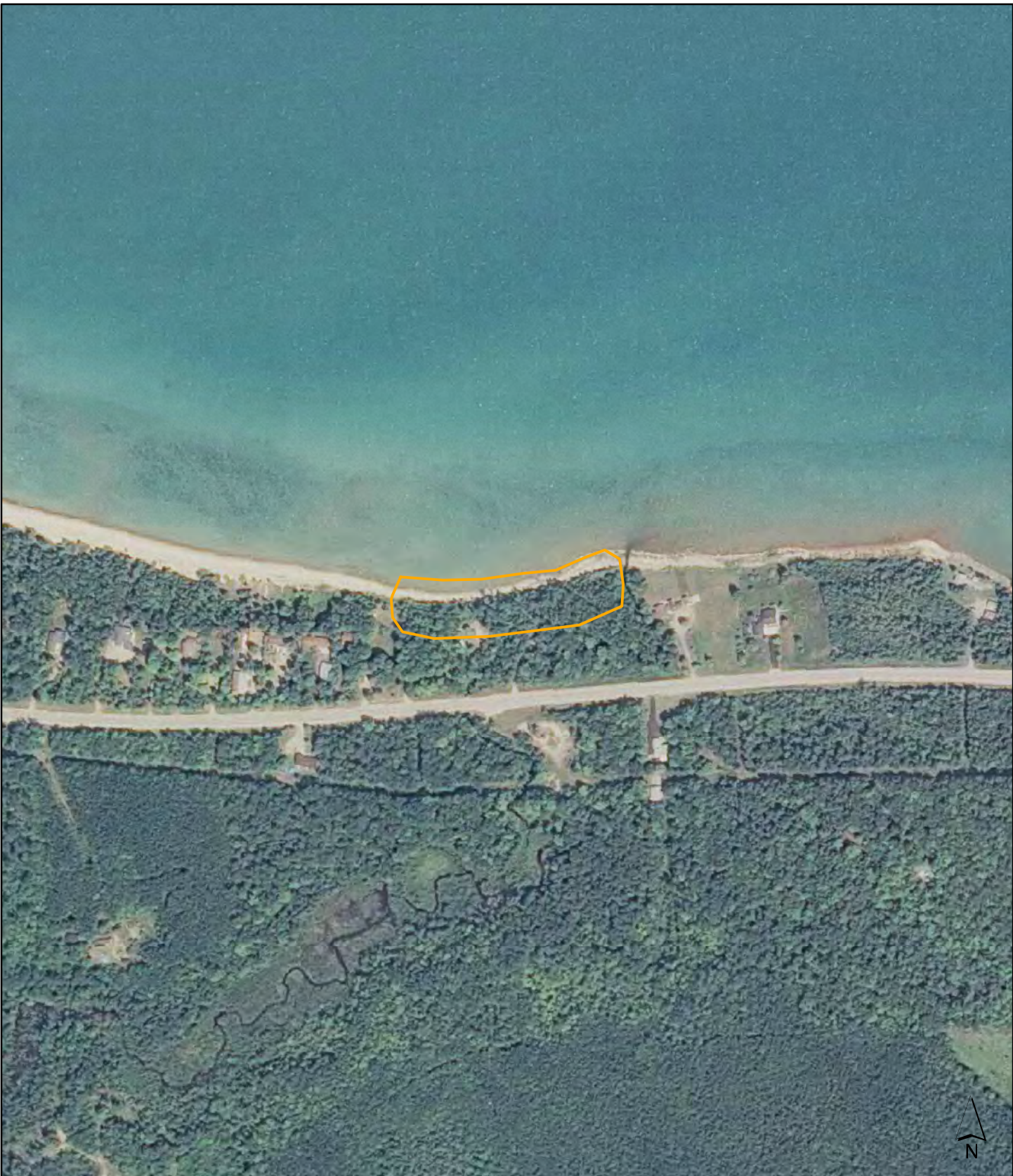
Site Name: Big Knob Campground

EO #: 100	Number of mature plants:	114
EO Rank old: B	Number of immature plants:	399
EO Rank new: B	Occupied acreage:	51.5

- Field GPS points
- Occupied acreage




Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 46

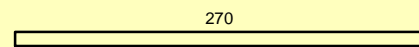


Site Name: Nine Mile Point

EO #: 102	Number of mature plants:	0
EO Rank old: C	Number of immature plants:	0
EO Rank new: F	Occupied acreage:	2.9

● Field GPS points

 Occupied acreage

 270 Meters


Data sources: 2010 NAIP imagery, MNFI Biotics database

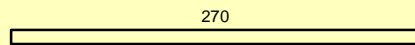


Site Name: Harbor Point

EO #: 103	Number of mature plants:	18
EO Rank old: H	Number of immature plants:	21
EO Rank new: D	Occupied acreage:	1.8

● Field GPS points

 Occupied acreage

 270 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 48

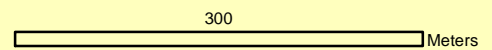


Site Name: Cheboygan State Park

EO #: 106	Number of mature plants:	13
EO Rank old: C	Number of immature plants:	30
EO Rank new: CD	Occupied acreage:	20.7

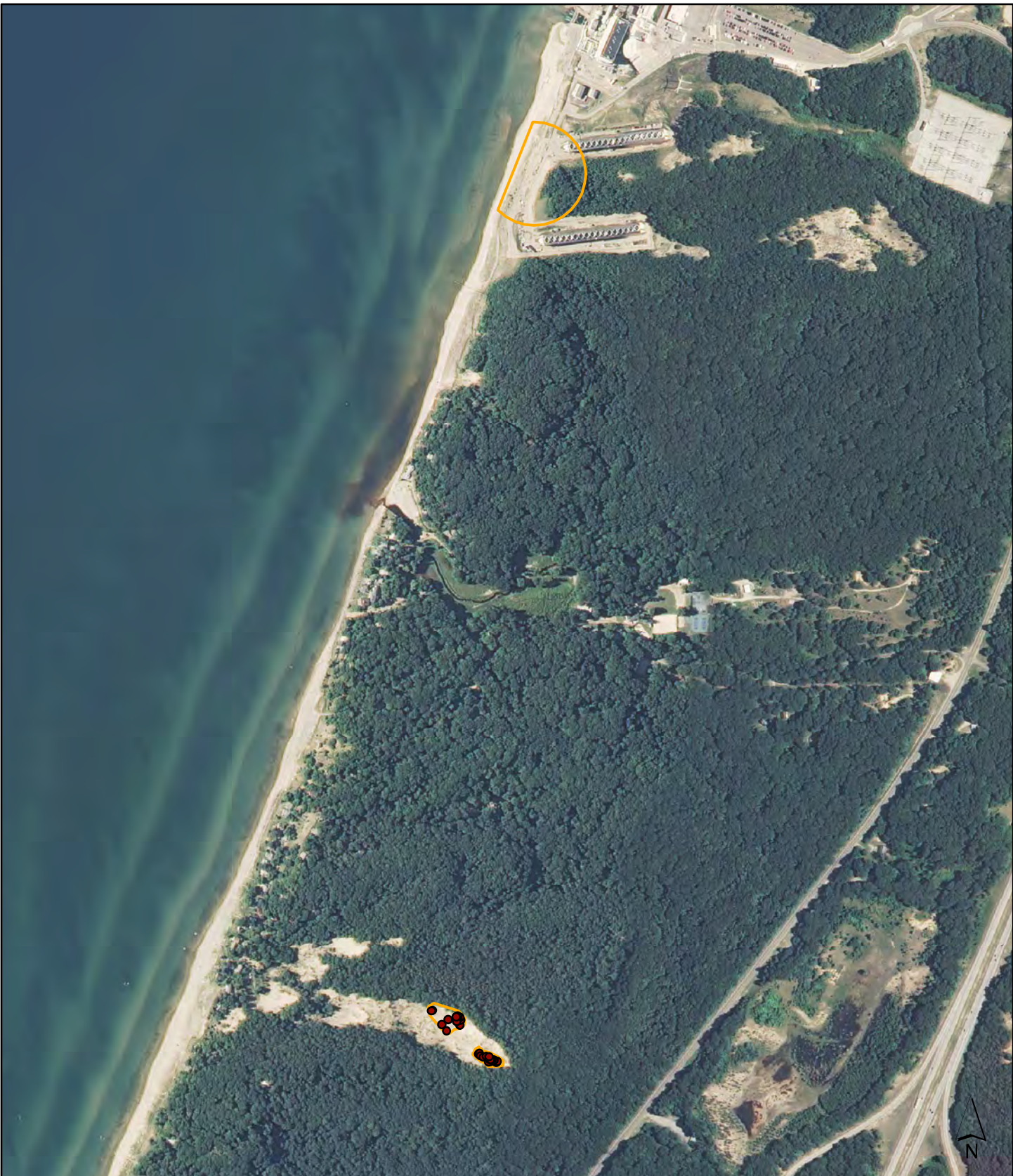
● Field GPS points

○ Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 49



Site Name: Covert

EO #: 109	Number of mature plants:	13
EO Rank old: B	Number of immature plants:	68
EO Rank new: CD	Occupied acreage:	6.7

● Field GPS points

○ Occupied acreage

560 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 50

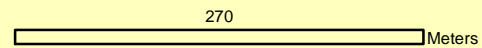


Site Name: Gilligan Lake Dunes

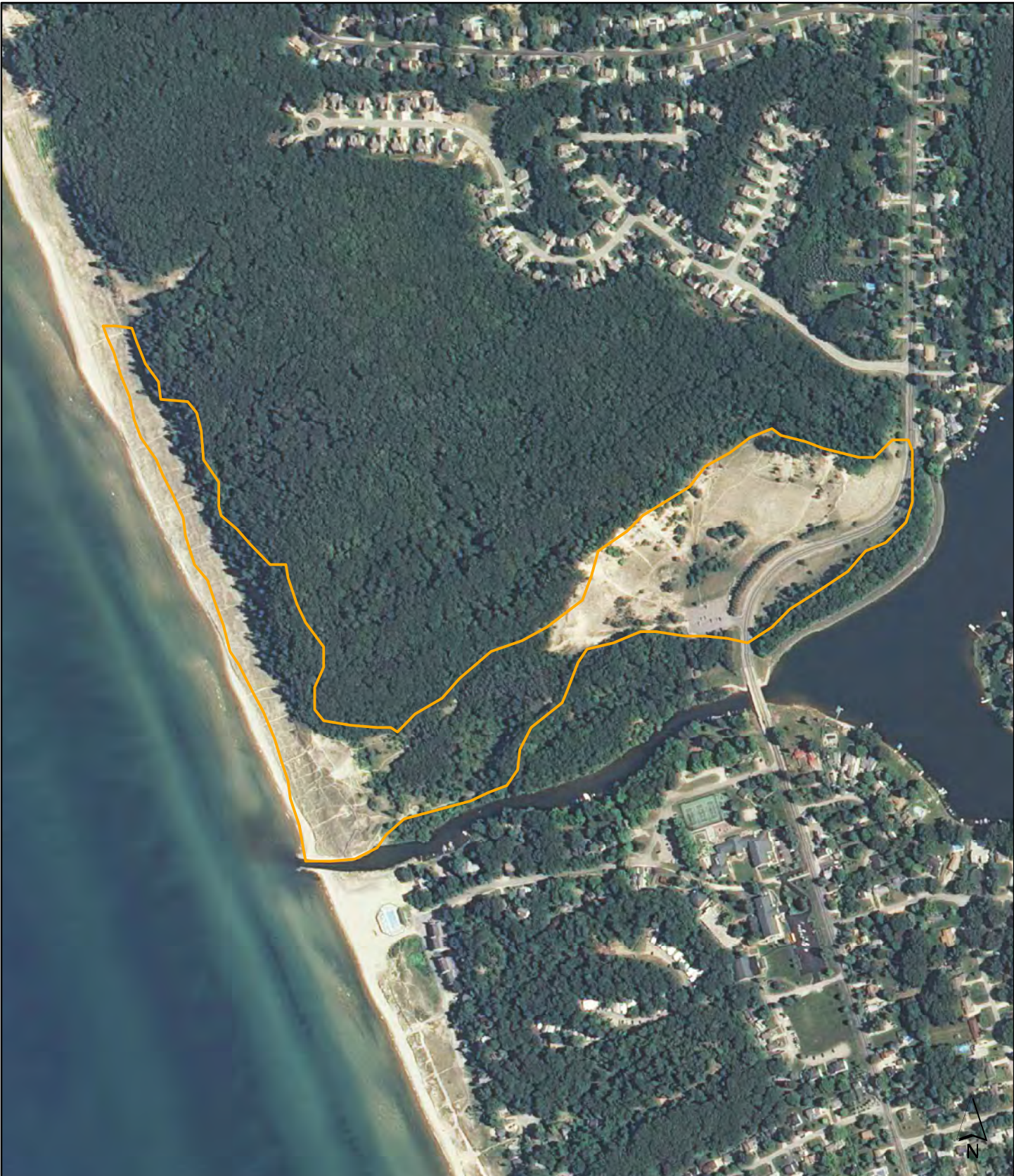
EO #: 112	Number of mature plants:	10
EO Rank old: CD	Number of immature plants:	37
EO Rank new: CD	Occupied acreage:	1.6

● Field GPS points

○ Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database

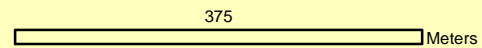


Site Name: Mona Shores School Forest

EO #: 113	Number of mature plants:	16
EO Rank old: CD	Number of immature plants:	0
EO Rank new: D	Occupied acreage:	43.4

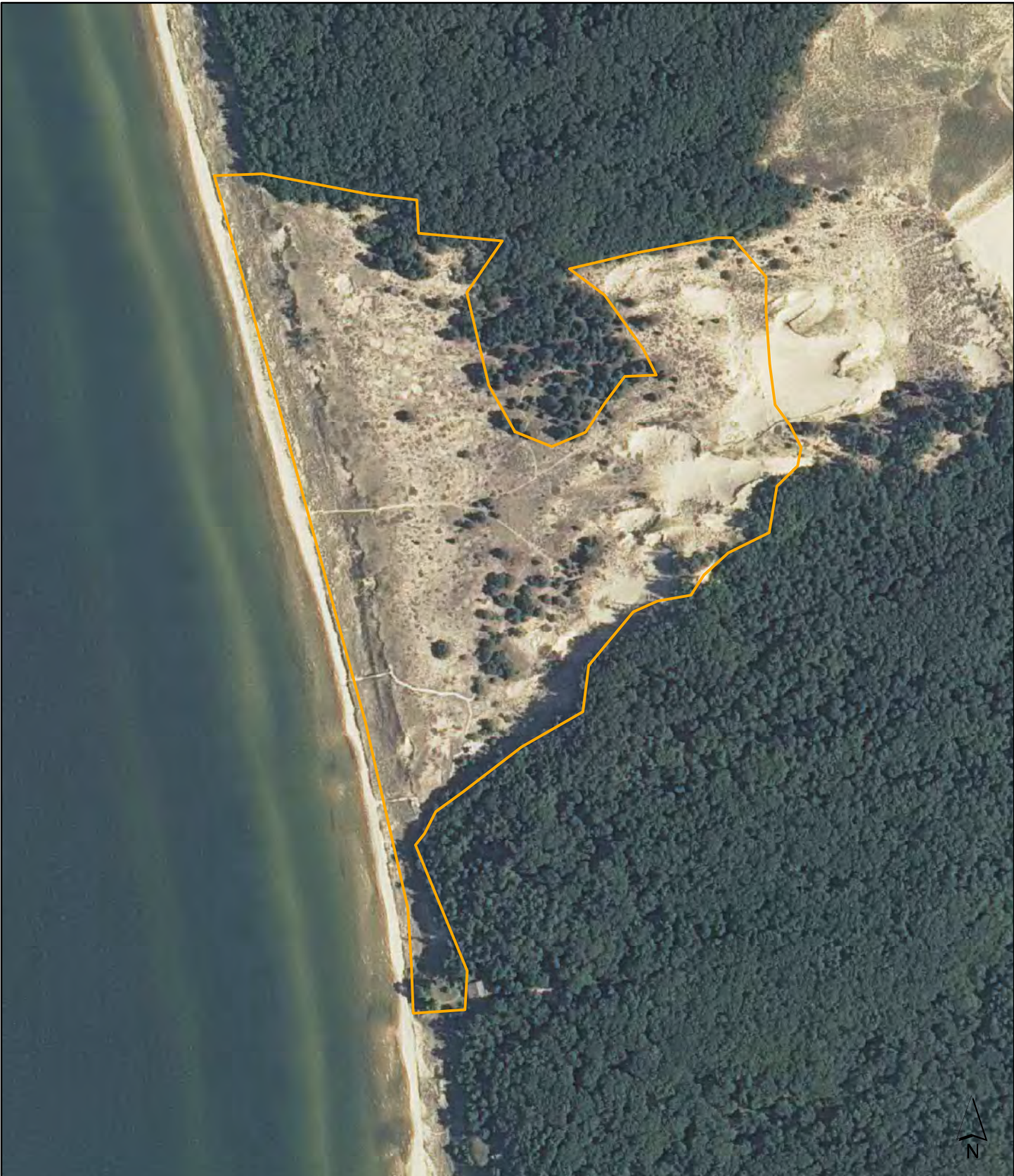
● Field GPS points

🟡 Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 52

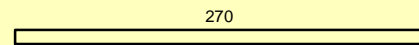


Site Name: Rosy Mound

EO #: 115	Number of mature plants:	156
EO Rank old: CD	Number of immature plants:	685
EO Rank new: BC	Occupied acreage:	45.4

● Field GPS points

 Occupied acreage

 270 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

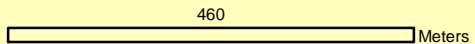


Site Name: Little Point Sable

EO #: 116	Number of mature plants:	72
EO Rank old: CD	Number of immature plants:	143
EO Rank new: C	Occupied acreage:	85.6

● Field GPS points

○ Occupied acreage




Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 54

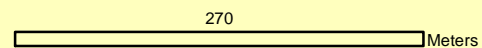


Site Name: Thorne Swift Preserve

EO #: 119	Number of mature plants:	113
EO Rank old: C	Number of immature plants:	68
EO Rank new: C	Occupied acreage:	3.5

● Field GPS points

 Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 55

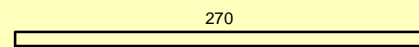


Site Name: Johnson Point

EO #: 121	Number of mature plants:	0
EO Rank old: CD	Number of immature plants:	0
EO Rank new: F	Occupied acreage:	14.8

● Field GPS points

 Occupied acreage

 270 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 56

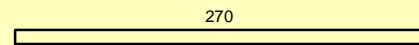


Site Name: Manitou Payment Highbanks

EO #: 124	Number of mature plants:	0
EO Rank old: D	Number of immature plants:	0
EO Rank new: F	Occupied acreage:	2.6

● Field GPS points

 Occupied acreage

 270 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 57

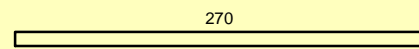


Site Name: Negwegon State Park

EO #: 127	Number of mature plants:	0
EO Rank old: C	Number of immature plants:	3
EO Rank new: D	Occupied acreage:	1.7

● Field GPS points

 Occupied acreage

 270 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database
Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 58



Site Name: McNeil Creek

EO #: 130	Number of mature plants: 488
EO Rank old: C	Number of immature plants: 1071
EO Rank new: BC	Occupied acreage: 16.5

● Field GPS points

○ Occupied acreage

825

————— Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 59

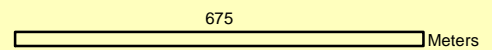


Site Name: Seven Mile Point

EO #: 132	Number of mature plants:	863
EO Rank old: D	Number of immature plants:	485
EO Rank new: BC	Occupied acreage:	24.5

● Field GPS points

○ Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 60

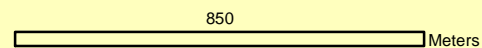


Site Name: West Epoufette

EO #: 133	Number of mature plants: 414
EO Rank old: C	Number of immature plants: 615
EO Rank new: BC	Occupied acreage: 20.3

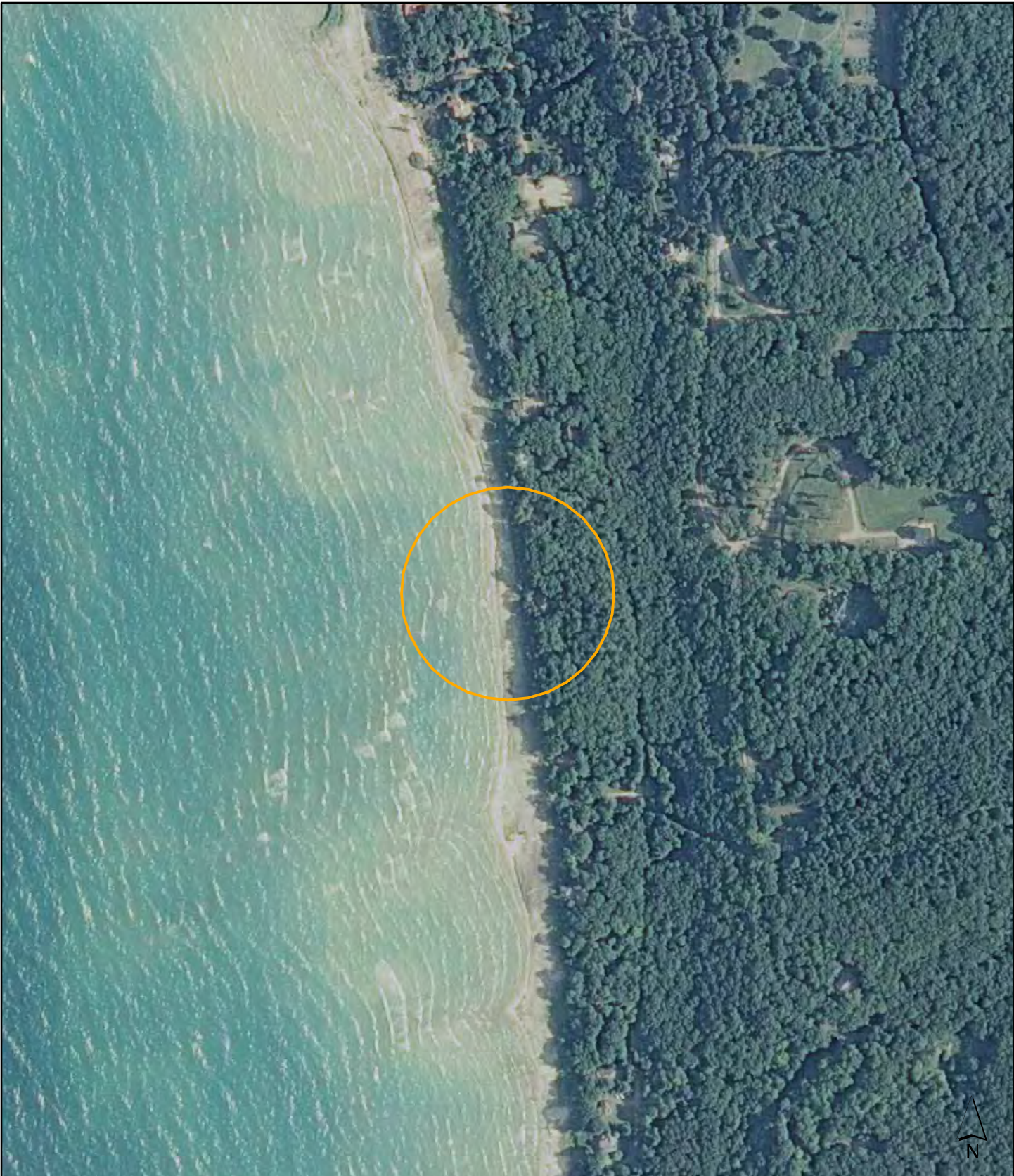
● Field GPS points

○ Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 61

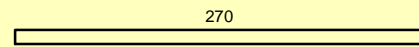


Site Name: Middle Village South

EO #: 136	Number of mature plants:	0
EO Rank old: CD	Number of immature plants:	0
EO Rank new: F	Occupied acreage:	7.7

● Field GPS points

 Occupied acreage

 270 Meters


Data sources: 2010 NAIP imagery, MNFI Biotics database
Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 62

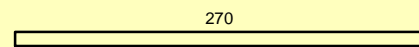


Site Name: Rockport North

EO #: 140	Number of mature plants:	4
EO Rank old: C	Number of immature plants:	14
EO Rank new: D	Occupied acreage:	0.3

● Field GPS points

 Occupied acreage

 270 Meters


Data sources: 2010 NAIP imagery, MNFI Biotics database

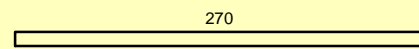


Site Name: Besser Natural Area South

EO #: 141	Number of mature plants:	0
EO Rank old: C	Number of immature plants:	0
EO Rank new: F	Occupied acreage:	2.7

● Field GPS points

 Occupied acreage

 270 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database


Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 64

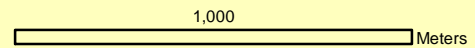


Site Name: Lake Superior State Forest Dunes

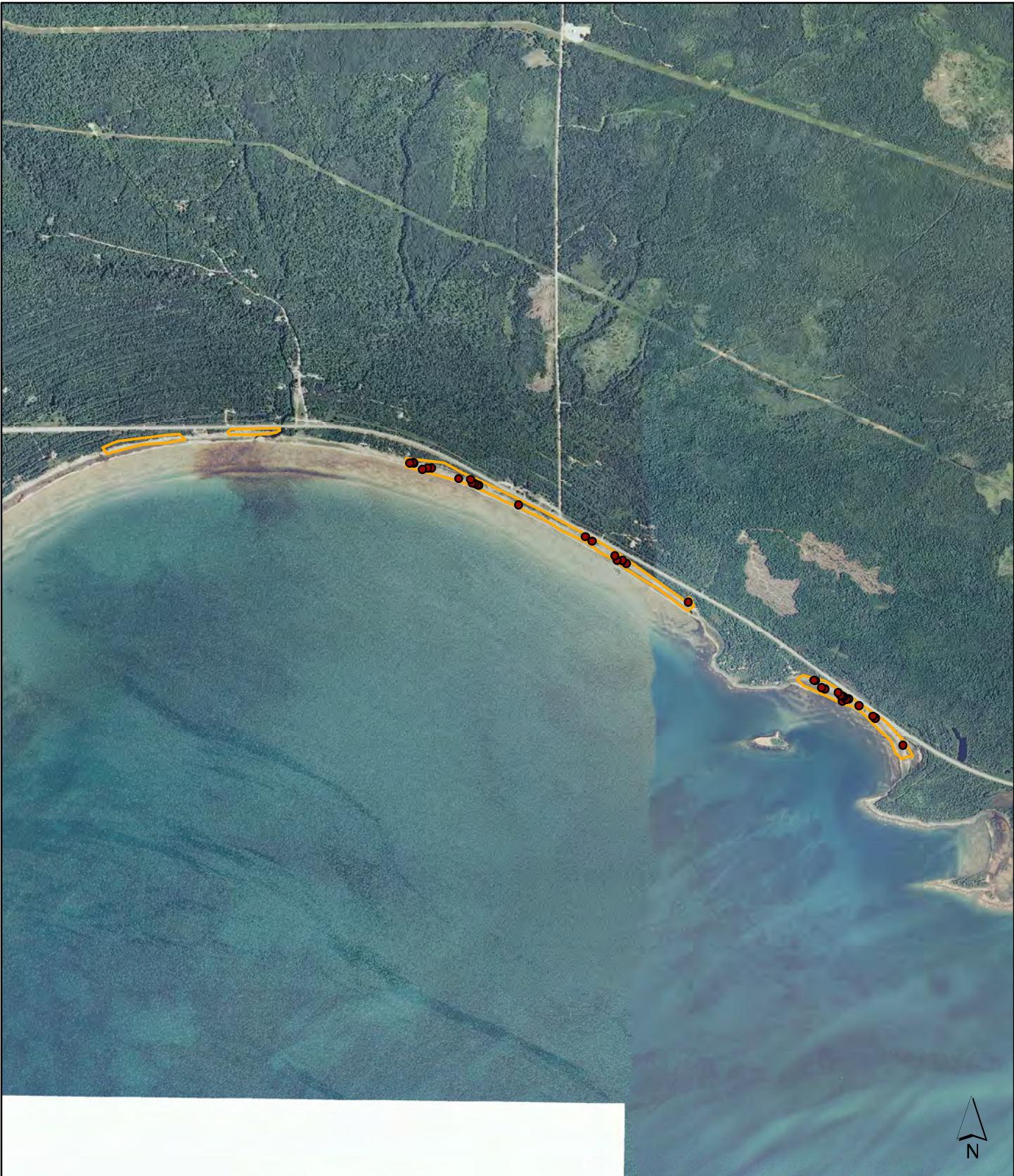
EO #: 153	Number of mature plants: 4329
EO Rank old: B	Number of immature plants: 5239
EO Rank new: AB	Occupied acreage: 90

● Field GPS points

 Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database

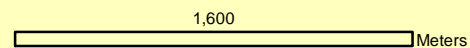


Site Name: Black River Road

EO #: 156	Number of mature plants: 62
EO Rank old: C	Number of immature plants: 110
EO Rank new: C	Occupied acreage: 39.3

● Field GPS points

○ Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 66

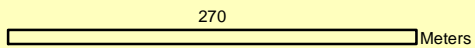


Site Name: Laketown Township Dunes

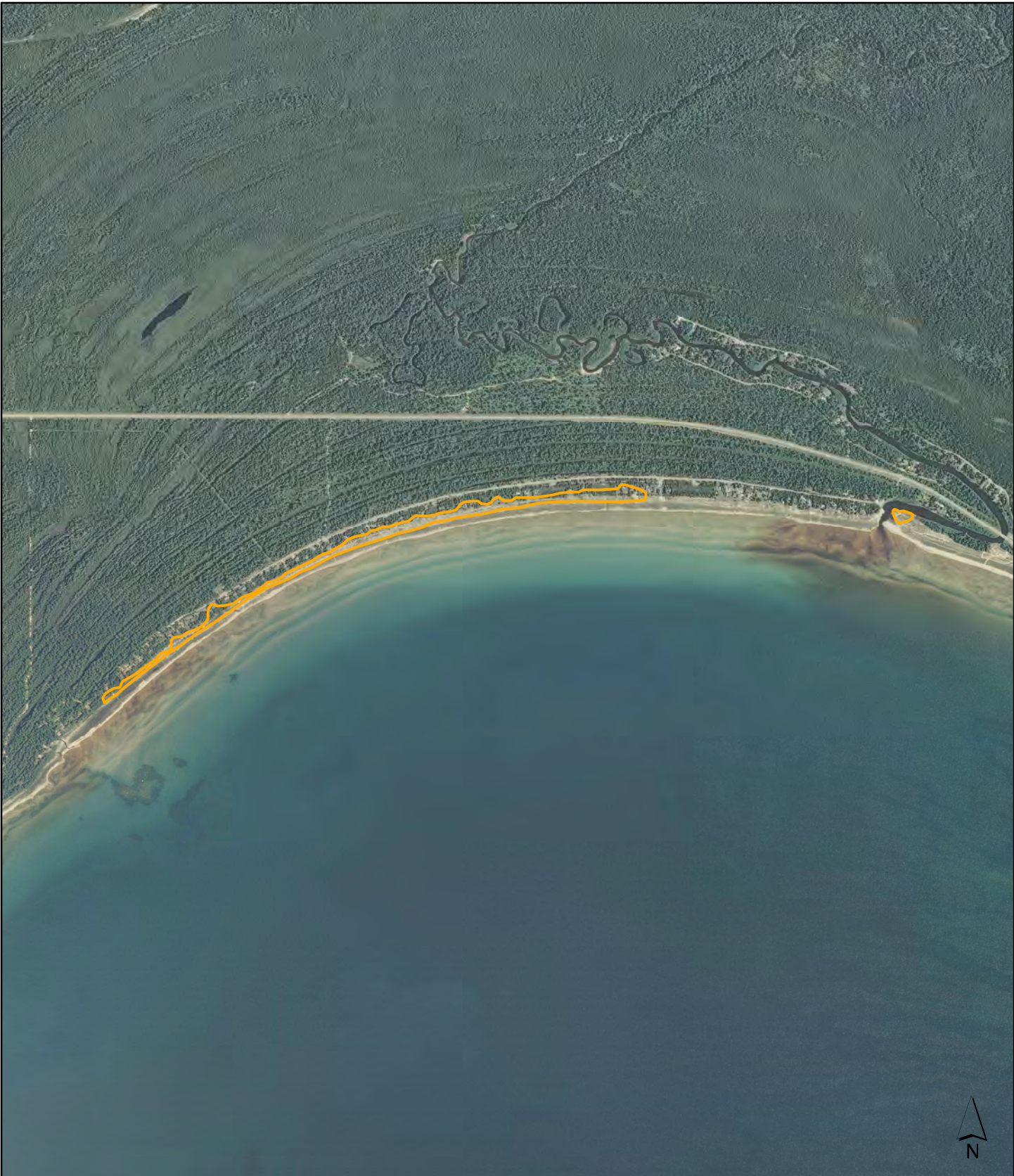
EO #: 157	Number of mature plants:	67
EO Rank old: C	Number of immature plants:	56
EO Rank new: CD	Occupied acreage:	2.7

● Field GPS points

○ Occupied acreage




Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 67

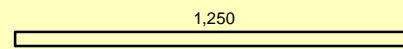


Site Name: West Beach Road

EO #: 160	Number of mature plants:	0
EO Rank old: BC	Number of immature plants:	0
EO Rank new:	Occupied acreage:	24.1

● Field GPS points

 Occupied acreage

 1,250 Meters


Data sources: 2010 NAIP imagery, MNFI Biotics database



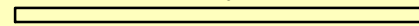
Site Name: El Cajon Bay/Misery Bay

EO #: 164	Number of mature plants:	0
EO Rank old: E	Number of immature plants:	0
EO Rank new: F	Occupied acreage:	2.3

● Field GPS points

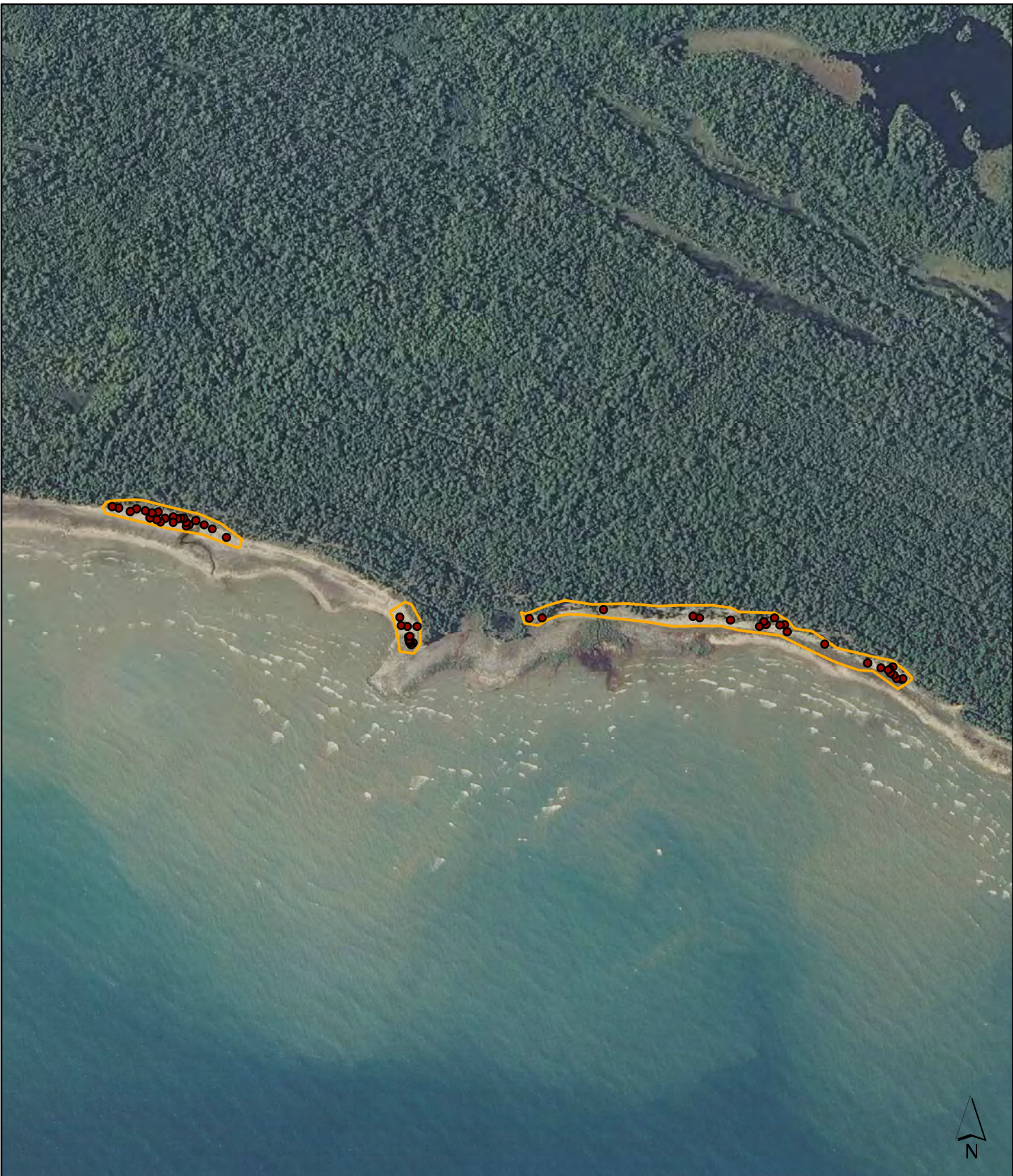
 Occupied acreage

270

 Meters

Data sources: 2010 NAIP imagery, MNFI Biotics database

Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 69

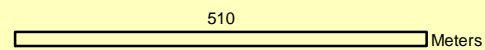


Site Name: Hudson Creek

EO #: 175	Number of mature plants:	125
EO Rank old:	Number of immature plants:	383
EO Rank new: C	Occupied acreage:	7.9

● Field GPS points

○ Occupied acreage



Data sources: 2010 NAIP imagery, MNFI Biotics database
 Status Assessment of Pitcher's Thistle (*Cirsium pitcheri*): Acquiring Contemporary Information for Recovery Planning 70