Coastal Scoping Report

Great Lakes Coastal Flood Study

Lake Huron and Lake Superior

Chippewa County and Mackinac County, Michigan

Individual Coastal Scoping Report

Report Number 01

Draft - April 2014

FEMA

U.S. Department of Homeland Security
Federal Emergency Management Agency Region V
536 South Clark Street, 6th Floor
Chicago, Illinois 60605

SUBMITTED BY:

125 S. Wacker Drive, Suite 600
Chicago, IL 60606

Date Submitted: Draft April 2014

Project Area Community List

This list includes all communities within the Project Area covered by this report for the Great Lakes Coastal Study under consideration for new Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) products and datasets, which may include Flood Insurance Studies (FISs) and Flood Insurance Rate Maps (FIRMs). Not all communities will receive new/updated FEMA Risk MAP products and datasets or FISs and FIRMs.

Chippewa County	Mackinac County*
Bay Mills, Township of	Bois Blanc, Township of
Bruce, Township of	Clark, Township of
Chippewa, Township of	Mackinac Island, City of
Dafter, Township of	Marquette, Township of
Detour, Township of	St. Ignace, City of
Detour, Village of	St. Ignace, Township of
Drummond Island, Township of	
Pickford, Township of	
Raber, Township of	
Sault Sainte Marie, City of	
Soo, Township of	
Sugar Island, Township of	
Superior, Township of	
Whitefish, Township of	
Bay Mills Indian Community	
Sault Sainte Marie Tribe of Chippewa	

*In Michigan, only those jurisdictions known to be responsible for administering floodplain ordinances and potentially affected by the upcoming Lake Huron and Lake Superior coastal flood study were included in this Coastal Scoping process. However, all coastal communities are encouraged to participate in the future Lake Huron and Lake Superior coastal flood study process and may request to be included in future correspondence regarding the Lake Huron and Lake Superior coastal flood study.

Table of Contents

Acronyms and Abbreviations v

I. Coastal Scoping Overview 1

i. Great Lakes Coastal Flood Study 1

ii. Purpose of Great Lakes Coastal Scoping 2

iii. Coastal Flood Risk Products 3

II. Stakeholder Communication and Coordination 5

i. Lake Huron and Lake Superior Coastal Scoping Stakeholder Coordination 5

III. Coastal Scoping Meeting 7

IV. Summary of Data Analysis 9

i. Data that can be used for future Coastal Flood Risk Products 12

I.IV.i.1 Average Annualized Loss (AAL) Data 12

I.IV.i.2 Coastal Recession 13

I.IV.i.3 Federal Land 13

I.IV.i.4 Jurisdictional Boundaries 13

I.IV.i.5 Local Data 13

I.IV.i.6 Publicly Owned Land 14

I.IV.i.7 Shoreline Information 14

I.IV.i.8 Stream Lines/Hydrograph 15

I.IV.i.9 Topography, Bathymetry, and Oblique Imagery 16

I.IV.i.10 Transportation 17

I.IV.i.11 Watershed Boundaries 18

ii. Other Data and Information 18

I.IV.ii.1 Coastal Barrier Resources Systems 18

I.IV.ii.2 Coastal Flood Protection Measures 18

I.IV.ii.3 Community Assisted Visits 20

I.IV.ii.4 Community Rating System 21

I.IV.ii.5 Coordinated Needs Management Strategy (CNMS) and NFIP Mapping Needs 21

I.IV.ii.6 Critically Eroded Beaches and Beach Nourishment/Dune Replacement Projects 22

I.IV.ii.7 Dams 22

I.IV.ii.8 Declared Disasters 23
I.IV.ii.9 Flood Insurance Policies 23
I.IV.ii.10 Gage Data 24
I.IV.ii.11 Historical Flooding and High Water Marks 27
I.IV.ii.12 Letters of Map Change 27
I.IV.ii.13 Ordinance Level 28
I.IV.ii.14 Proposed Draft Transects 29
I.IV.ii.15 Regulatory Mapping 30
I.IV.ii.16 Repetitive Loss 31
I.IV.ii.17 State-level Data Sets, Programs, and Information 32
V. Risk MAP Projects and Needs 32
i. Future Coastal Study 32
ii. Potential for Mitigation Assistance 33
iii. Compliance 33
iv. Communication 34
v. Unmet Needs 35
VI. Close 35
VII. References 35
VIII. Attachments 36

Table of Contents - continued

List of Tables

Table 1. Data Collected for Chippewa and Mackinac Counties 10
Table 2. Hazus AAL Data for Chippewa and Mackinac Counties 13
Table 3. Summary of Shoreline Types.....14
Table 4. Summary of Shoreline by Land Use 15
Table 5. Summary of Shoreline Coverage 15
Table 6. Summary of Shoreline Vegetation Types 15
Table 7. USACE Coastal Structure Inventory 20
Table 8. Summary of Community Assisted Visits in Chippewa and Mackinac Counties..21
Table 9. CNMS Status for Chippewa and Mackinac Counties.....22
Table 10. Declared Disasters in Chippewa and Mackinac Counties 23
Table 11. Summary of Flood Insurance Policies and Claims for Chippewa and Mackinac Counties 24
Table 12. NOAA Meteorological Stations on Chippewa and Mackinac Counties.....25
Table 13. Summary of LOMC cases in Chippewa and Mackinac Counties.....28
Table 14. Program Status and Ordinance Level 29
Table 15. Effective Mapping Status.....30
Table 16. Repetitive Loss.....311

List of Figures

Figure 1: Sample Proposed Draft Transect Figure.....9
Figure 2: USACE Historic Great Lakes Water Level Data (1918 to 2012).....26

Attachments

Attachment A. Coastal Data Request Form (sample)
Attachment B. Chippewa and Mackinac Counties Pre-Meeting Correspondence *[To be provided in Final Coastal Scoping Report]*
Attachment C. Draft Coastal Scoping Maps
Attachment D. Proposed Draft Transect Figures
Attachment E. Stakeholder Comments from Coastal Scoping meeting *[To be provided in Final Coastal Scoping Report]*
Attachment F. Chippewa and Mackinac County Coastal Scoping Meeting Documents *[To be developed following Coastal Scoping meetings]*
Attachment G. Coastal Data Request Form Compilation *[To be developed following Coastal Scoping meetings]*

Acronyms and Abbreviations

AAL	average annualized loss
ASFPM	Association of State Floodplain Managers
BFE	base flood elevations
CAC	Community Assisted Contact
CAV	Community Assistance Visit
CBRS	Coastal Barrier Resources System
CHARTS	Compact Hydrographic Airborne Rapid Total Survey
CHL	Coastal and Hydraulics Laboratory
CID	Community Identification Number
CIS	Community Information System
CMAG	Coastal Management Assistance Grant
C-MAN	Coastal Marine Automated Network
CNMS	Coordinated Needs Management Strategy
CO-OPS	Center for Operational Oceanographic Products and Services
CRS	Community Rating System
CSLF	changes since last FIRM
DEM	digital elevation model
DFO	Department of Fisheries and Oceans
DTM	digital terrain model
ECID	Enterprise Coastal Inventory Database
ERDC	Engineer Research and Development Center
ESRI	Environmental Systems Research Institute
FEMA	Federal Emergency Management Agency
FIPS	Federal Information Processing Standards
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
GIS	geographic information system
GLCFS	Great Lakes Coastal Flood Study
GLCRG	Great Lakes Coastal Restoration Grant
Hazus-MH	Multi-Hazard Risk Assessment and Loss Estimation Software Program
HMA	Hazard Mitigation Assistance
HUC8	Hydrologic Unit Code 8
HWM	High Water Mark
LiDAR	Light Detection and Ranging
LiMWA	Limit of Moderate Wave Action
LOMA	Letter of Map Amendment

LOMC	Letter of Map Change
LOMR	Letter of Map Revision
LOMR-F	Letter of Map Revision based on Fill
MIP	Mapping Information Platform
MLI	Midterm Levee Inventory
MNUSS	Mapping Needs Update Support System
MPTA	Mitigation Planning Technical Assistance
MSC	Map Service Center
NCMP	National Coastal Mapping Program
NDBC	National Data Buoy Center
NFIP	National Flood Insurance Program
NGDC	National Geophysical Data Center
NID	National Inventory of Dams
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NWS	National Weather Service
Risk MAP	Risk Mapping, Assessment, and Planning
RL	repetitive loss
RLTG	Repetitive Loss Target Group
SFHA	Special Flood Hazard Area
SHMO	state hazard mitigation officer
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

I. Coastal Scoping Overview

The Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning, or Risk MAP, program, helps communities identify, assess, and reduce their flood risk. Through Risk MAP, FEMA provides information to enhance local mitigation plans, improve community outreach, and increase local resilience to floods.

During the Coastal Scoping phase of Risk MAP project development, FEMA:

- Gathers information about local flood risk and flood hazards
- Reviews mitigation plans to understand local mitigation capabilities, hazard risk assessments, and current or future mitigation activities
- Supports communities within the coastal area to develop a vision for the future
- Collects information from communities about their flooding history, development plans, daily operations, and stormwater and floodplain management activities
- Uses all information gathered to determine which areas require mapping, risk assessment, or mitigation planning assistance through a Risk MAP project
- Develops Coastal Scoping Map and Report that summarize and display the Coastal Scoping findings

The Coastal Scoping process involves coordination with Great Lakes stakeholders, data collection and analysis, community interviews, a Coastal Scoping meeting with stakeholders affected by the study, and development of recommendations based on an analysis of data and information gathered throughout the process.

i. Great Lakes Coastal Flood Study

FEMA has initiated a coastal analysis and mapping study that may result in updated Flood Insurance Rate Maps (FIRMs) for coastal counties along the Great Lakes. The new coastal flood hazard analyses will utilize updated 1-percent-annual-chance (100-year) flood elevations obtained from a comprehensive storm surge study being developed by the U.S. Army Corps of Engineers (USACE).

The Great Lakes Coastal Flood Study (GLCFS) will incorporate modern analysis of historic storm and high water events and provide for updated flood risk information serving United States communities having shoreline along the Great Lakes. The storm surge study is one of the most extensive coastal storm surge analyses to date, encompassing coastal floodplains in the eight states with coastlines on the Great Lakes.

An updated coastal flood study is needed to obtain a better estimate of coastal flood hazards on the Great Lakes. The current, effective FIRMs are outdated primarily due to the age of data and the coastal methodologies used in producing them. Major changes in National Flood Insurance Program (NFIP) policies and methodologies have been implemented since the effective date of many flood insurance studies in the area, creating the need for an update that will reflect a more detailed and complete hazard determination.

The GLCFS includes a system-wide solution that provides a comprehensive analysis of storm and high water events within the Great Lakes Basin. This program is funded through the FEMA Risk MAP program. FEMA, USACE, Association of State Floodplain Managers (ASFPM), state partners, and FEMA contractors will collaborate in updating the coastal methodology and flood maps and create new flood risk products. FEMA manages the NFIP, which is the cornerstone of the national strategy for preparing communities for flood-related disasters.

ii. Purpose of Great Lakes Coastal Scoping

The Great Lakes Coastal Scoping process included data collection, information exchange between all governmental levels of stakeholders, spatial data presentation, cooperative discussion with stakeholders to better understand the Great Lakes area, and a collaborative approach on the project planning. The process allowed FEMA to continue to vet the Great Lakes coastal study methodologies with a large stakeholder group, discuss local priorities and data, discuss coastal issues, and move towards a project that will successfully identify the risks associated with Great Lakes flooding.

This Coastal Scoping Report discusses the communities potentially affected by coastal flooding in Chippewa and Mackinac Counties, Michigan. This Coastal Scoping process helped FEMA to better identify the types of datasets or products that will be useful at the local level, especially as it relates to identifying new mitigation strategies and actions, and for use in local planning efforts. Products that may be available to communities as a result of the Great Lakes flood study include updated FIRMs and Flood Insurance Studies (FISs), coastal flood risk products, calibrated models for storm surge and wave analysis on each of

the lakes, and accurate depictions of water level and wave response on each lake occurring during hundreds of actual events. The type of product a community receives is dependent not only on the coastal flood study analysis results and future congressional funding, but also on the type of datasets, local and national, that are available.

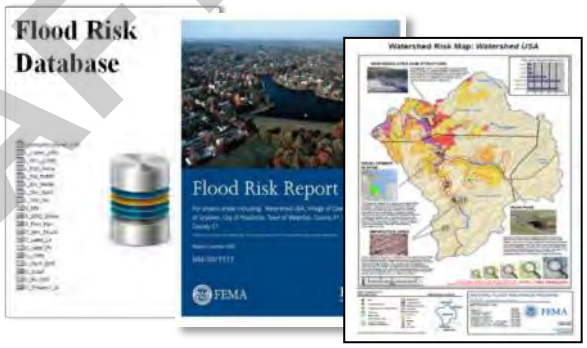
The following section describes the coastal flood risk products that a community may receive, as well as some products that are under development for the Great Lakes study areas.

iii. Coastal Flood Risk Products

As part of a Risk MAP project, FEMA will seek to provide state and community officials with three flood risk products to help them gain a better understanding of flood risk and its potential impact on communities and individuals. These products will also enable communities to move forward with informed mitigation actions to reduce identified risk. Delivery of the products discussed below will depend on available data, results of coastal analysis, local partnerships, and fiscal year funding.

The three products are:

- Flood Risk Database
- Flood Risk Report
- Flood Risk Map



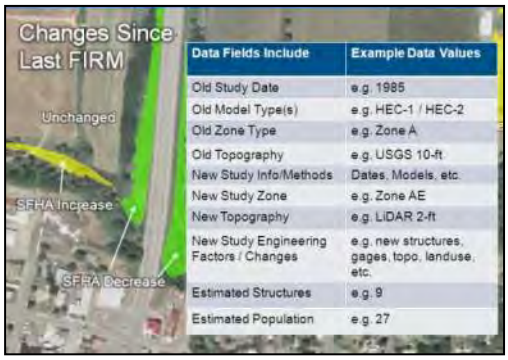
These products will summarize information captured in flood risk datasets that may be generated during a Risk MAP, or flood risk, study. The flood risk datasets could include regular and enhanced products. Standard flood risk datasets, also termed products, are listed below.

- **Changes Since Last FIRM (CSLF)**

  The CSLFs serve the following purposes:

  Identify Areas and Types of Flood Zone Change:
  - Compares current effective (previous) with proposed (new) flood hazard mapping.
  - Flood zone changes are categorized and quantified.

  Provide study/reach level rationale for changes, including:
  - Methodology and assumptions.



- Changes of model inputs or parameters (also known as Contributing Engineering Factors).

- **Flood Depth and Analysis Grids (1-percent-annual-chance event only)**

  Reflect total depth (i.e., stillwater and waves). Will be created for the 1-percent frequency event of the engineering studies performed and as appropriate for the data. Wave runup areas may not be applicable.
  Created using the regulatory mapping and associated zone breaks as input

- **Flood Risk Assessment (Hazus-MH)**

  Hazus-MH combines science, engineering and mathematical modeling with geographic information systems (GIS) technology to estimate losses of life and property, and shows those losses on a map.
  HAZUS-MH estimates impacts to the physical, social, and economic vitality of a community from earthquakes, hurricane, winds, and floods.
  Coastal flood risk assessments will be similar to riverine, but will use coastal depth grids as input for refined analysis.
  Hazus-MH analysis and data can support adoption of high regulatory standards for structures in high loss areas.
  Hazus-MH results can help to provide justification to find mitigation projects to protect citizens and properties from losses during future coastal flood events.

HAZUS MH
EARTHQUAKE • WIND • FLOOD

For more information about Hazus and data inputs, visit http://www.fema.gov/hazus or enter keywords "fema hazus" into an internet search engine.

In addition, FEMA is looking into the possibility of developing some unique Great Lakes coastal flood risk products that utilize datasets that have recently been collected or will be collected as part of the GLCFS:

- Storm Response Erosion Data: Dataset is expected to contain the results from erosion analysis in response to the 1-percent-annual chance flood event
- Shoreline Feature Data: Dataset was developed by USACE in 2012 and contains primary and secondary land use tables as well as coastline type, materials, and

vegetation. The current dataset contains data at 1-mile spacing. The dataset does not include field-based reconnaissance or sediment/subsurface soil collection.

The delivery of these standard flood risk products and the Great Lakes coastal flood risk datasets will be dependent on the location of the Risk MAP study and coastal analysis, data availability, fiscal year funding, and partnerships with local communities. Therefore, all communities may not receive flood risk products.

II. Stakeholder Communication and Coordination

Communication and coordination with federal, state and local stakeholders is key to the success of the GLCFS. A large emphasis has been placed on identifying stakeholders early and often and working with those stakeholders continually throughout the study process, from Coastal Scoping all the way through flood map and flood risk product development. Through outreach, the goal is to increase understanding of the new coastal study methodologies and the tools and processes that will be available for risk-based community planning, and to increase flood hazard awareness within the Great Lakes coastal region.

i. Lake Huron and Lake Superior Coastal Scoping Stakeholder Coordination

Meetings, emails, telephone calls, and letters are essential to communicate effectively throughout the life of this Lake Huron and Lake Superior Coastal Flood Study project, which has begun with this Coastal Scoping process.

To kick-off this Coastal Scoping process, FEMA formed a group of core stakeholders, which included representatives from FEMA Region V, STARR (mapping partner to FEMA), USACE, National Oceanic and Atmospheric Administration (NOAA), ASFPM, the state NFIP coordinators, the State Hazard Mitigation Officers (SHMOs), and state engineers. The core stakeholders reviewed the Coastal Scoping plan, objectives, and key outcomes for Lake Huron and Lake Superior Coastal Scoping with FEMA, provided suggestions for outreach and communication, and raised any concerns as it related to Lake Huron and Lake Superior and the coastal flood study process. Following this kick-off process, outreach, communication, and coordination with local stakeholders was initiated.

Coastal Scoping meeting letter invitations were sent to local community and county stakeholders within the Chippewa and Mackinac Counties portions of the Lake Huron and Lake Superior Coastal Flood Study project. In addition, an email invitation was sent to a larger list of stakeholders including, but not limited to, the core stakeholders, other federal agencies, universities, watershed groups, Great Lakes associations, technical stakeholders, and emergency management agencies. Representatives from the local governments, including cities, townships, and villages, were considered fundamental stakeholders in this process because they have been elected or appointed to represent the interests of the residents of this project area.

The Coastal Scoping meeting invitations also included a Coastal Data Request Form (Attachment A). Communities were asked to provide information on data that they had available at the local level that may be of use during the flood study update and during the development of the coastal flood risk products discussed earlier in this report. The Coastal Data Request Form includes data requests for:

- Base map data
- Coastal data
- Historic flood data
- Risk assessment
- Other comments/concerns based on local knowledge

No information was received prior to the Coastal Scoping meeting.

The core stakeholder documents, stakeholder contact list, and Coastal Scoping meeting invitations will be provided in Attachment B, Chippewa and Mackinac Counties Pre-Meeting Correspondence, in the Final Coastal Scoping Report.

III. Coastal Scoping Meeting

The Coastal Scoping meeting for Chippewa and Mackinac Counties will be held on Thursday, May 8, 2014 at the Bayliss Public Library Community Room in Sault Sainte Marie. Communities and stakeholders affected by coastal flooding in Chippewa and Mackinac Counties were invited to the Coastal Scoping meeting. The purpose of this meeting is to facilitate discussion about study needs, desired compliance support, and local flood risk awareness efforts.

The objectives of the Coastal Scoping meeting include:

- Continuation and expansion upon stakeholder engagement
- Discussion of data inputs from federal, state and local stakeholders
- Identification of local coastal flood hazard needs and areas of concern
- Identification of flood risk products and datasets
- NFIP regulatory updates
- Coastal Scoping schedule and deliverables

The Coastal Scoping meeting presentations included the following information:

- An overview of the GLCFS and schedule
- Review of the Coastal Scoping process and outcomes
- Discussion of coastal mapping and flood risk topics to be aware of
- Discussion of how the study may affect the communities, including compliance requirements
- Encouragement and facilitated discussion regarding coastal study needs, desired compliance support, and local flood risk awareness efforts

Draft Coastal Scoping maps for Chippewa and Mackinac Counties (Attachment C) will be displayed and utilized during the meeting to encourage the discussion regarding areas of coastal flood risk concern and areas of hazard mitigation interest. The draft Coastal Scoping maps shown at the meeting will include geospatial and tabular data that had been collected prior to the meeting.

Geospatial Data:

- Average Annualized Loss (AAL) data
- Coastal Barrier Resources System (CBRS)[1]
- Coordinated Needs Management Strategy (CNMS)[2] Data- riverine only
- Proposed transects
- Effective Special Flood Hazard Areas (SFHAs)
- Jurisdictional boundaries
- Letters of Map Change (LOMCs)
- Levees - *None for this study area*
- Shoreline
- Streams
- U.S. Geologic Survey (USGS) gages

Participants at the Coastal Scoping meeting will be asked to cooperatively identify areas of flooding concern using the draft Coastal Scoping Maps and through general discussion during the meeting.

In addition to the draft Coastal Scoping maps, figures showing the location of initially proposed draft transects around Chippewa and Mackinac Counties will be available for review and comment immediately following the meetings. Stakeholders will be encouraged to review the proposed draft transects and provide comments related to the location of the transects. The proposed draft transect maps that will be available at the Coastal Scoping meeting for Chippewa and Mackinac Counties can be found in Attachment D. A sample map is shown as Figure 1:

[1] CBRS consists of the undeveloped coastal barriers and other areas located on the coasts of the United States that are identified and generally depicted on a series of maps. CBRS areas are ineligible for most new Federal expenditures and financial assistance.

[2] CNMS is FEMA's strategy for coordinating the management of mapping needs using modern geospatial technologies and current policies, requirements, and procedures. CNMS makes information related to mapping needs readily accessible and more usable. CNMS is only for riverine studies at this time. It is expected coastal needs will be captured in this system in the future.

Figure 1: Sample Proposed Draft Transect Figure

- Additional information will be added to this section following the Coastal Scoping meeting.

IV. Summary of Data Analysis

During this Coastal Scoping portion of the Lake Huron and Lake Superior Coastal Flood Study project, a massive collection of tabular and spatial data will be conducted for all the coastal communities from federal and state sources, as well as information collected through telephone conversation, the Coastal Scoping meeting, and the Coastal Scoping Coastal Data Request Forms sent to each coastal community. This section lists the types of data and their sources that will be collected for the Chippewa and Mackinac Counties study area, including information collected during and after the Coastal Scoping meeting. The data analysis that follows Table 1 is divided into two sections: one section listing the data that can be used for Risk MAP product development and the other section listing the information that helped the study team to form a better understanding of the Chippewa and Mackinac Counties Lake Huron and Lake Superior Project Areas prior to moving forward with the coastal flood study.

Table 1. Data Collected for Chippewa and Mackinac Counties

Data Types	Deliverable/ Product	Source	Date of Data Collection	Level
AAL	Coastal Scoping Map	FEMA	1/20/2014	Nationwide
Bathymetry and Topography	Coastal Scoping Report	USACE	2012	Lakewide
Census Blocks	Coastal Scoping Map	U.S. Census Bureau	1/14/2014	Countywide
Contacts	Coastal Scoping Report	Local Community Websites, State/FEMA updates	2/19/2014	Countywide
CAVs	Coastal Scoping Report	FEMA Community Information System (CIS)	2/6/2014	Countywide
Community Rating System (CRS)	Coastal Scoping Report	FEMA's "Community Rating System Communities and Their Classes"	2/6/2014	Nationwide
CBRS	Coastal Scoping Map	U.S. Fish and Wildlife Service	1/16/2014	Nationwide
Coastal Structures	Coastal Scoping Map/Tabular Data	USACE	To be collected	Nationwide
CNMS	Coastal Scoping Map	FEMA	12/31/2013	Countywide
Critically Eroded Beach Areas	Coastal Scoping Report	Local Stakeholders	To be collected	Statewide
Dams	Coastal Scoping Report	USACE, National Inventory of Dams, FIRM Database	2/19/2014	Countywide
Declared Disasters	Coastal Scoping Report	FEMA's "Disaster Declarations Summary"	1/27/2014	Nationwide
Effective Floodplains	Coastal Scoping Map	FEMA Map Service Center and Mapping Information Platform	2/19/2014	Countywide
Flood Insurance Policies	Coastal Scoping Report	FEMA CIS	2/5/2014	Nationwide
High Water Marks	Coastal Scoping Report	Effective FIS	To be collected	Countywide
Historical Flooding	Coastal Scoping Report	Effective FIS, Local Mitigation Plans	2/20/2014	Countywide

Table 1. Data Collected for Chippewa and Mackinac Counties

Data Types	Deliverable/ Product	Source	Date of Data Collection	Level
Historical Storm Events	Coastal Scoping Report	Effective FIS, Local Mitigation Plans	2/20/2014	Countywide
Local Data	Coastal Scoping Report	Coastal Data Request Form completed by communities	To be collected	Countywide
LOMCs	Coastal Scoping Map	FEMA's Mapping Information Platform	2/4/2014	Countywide
Meteorological Gages	Coastal Scoping Map	NOAA Great Lakes Environmental Research Laboratory	1/16/2014	Regionwide
Oblique Imagery	Coastal Scoping Report	USACE	2012	Lakewide
Ordinance Level	Coastal Scoping Report	FEMA CIS	2/6/2014	Countywide
Proposed Draft Transects	Coastal Scoping Map	FEMA	4/2/2014	Lakewide
Repetitive Loss	Coastal Scoping Report	FEMA CIS	1/24/2014	Countywide
Shoreline Classification	Coastal Scoping Map	USACE	1/29/2014	Regionwide
Stream Gages	Coastal Scoping Map	USGS	1/21/2014	Countywide
Water Level Gages	Coastal Scoping Map	NOAA Department of Fisheries and Oceans	2/5/2014	Regionwide
Wave Gages	Coastal Scoping Map	NOAA	2/5/2014	Regionwide

i. Data that can be used for future Coastal Flood Risk Products

During the Coastal Scoping process, the project team created a database of available flood hazard and flood risk assessment data. This database not only provides an inventory of available data, but helps identify gaps in the flood hazard data. State, county, and government GIS websites can provide some of the pertinent data, but local knowledge of flooding is critical to help accurately determine flood risks and mapping needs. Therefore, local and regional data were also used where available. The subsections below provide details on the data determined to be available within the project area.

I.IV.i.1 Average Annualized Loss (AAL) Data

AAL data provide a general understanding of the dollar losses associated with a certain frequency of flood events within a county and are used to get a relative comparison of flood risk. They are determined by FEMA's Multi-Hazard Risk Assessment and Loss Estimation Program, otherwise known as Hazus-MH.

Hazus, a free risk assessment software application from FEMA, is the most widely used flood risk assessment tool available. Hazus can run different scenario floods (riverine and coastal) to determine how much damage might occur as a result. Hazus can also be used by community officials to evaluate flood damage that can occur based on new or proposed mitigation projects or future development patterns and practices, and it can run specialized risk assessments, such as what happens when a dam or levee fails.

Hazus-MH includes national datasets that can be supplemented with local data. If local detailed data are available, users may consider using these data to perform more refined Hazus analyses. Hazus-MH is flexible and allows users to update Hazus-MH with local data or use a combination of both local and national. Augmenting the Hazus-MH provided data with local data can improve the accuracy and resolution of analysis results. Additional information about the Hazus-MH process and tool can be found at http://www.fema.gov/protecting-our-communities/hazus.

The Hazus-MH analysis used in this report is based on approximate flood boundaries and national datasets. The calculation is based on flood elevation estimates using the 10-meter Digital Elevation Model (DEM) on streams with drainage areas of at least 10 square miles.

The results shown in Table 2 include data for the entire county, as opposed to only the coastal project area. Information can also be obtained from the report titled FEMA *Hazus AAL Usability Analysis*, dated April 13, 2011 (Federal Emergency Managment Agency, 2011). AAL data summarized at the census block level are shown on the draft Coastal Scoping maps (Attachment C).

Table 2. Hazus AAL Data for Chippewa and Mackinac Counties

FIPS Code	County	Total Losses for Building and Content (in thousands of $)
26033	Chippewa	$3,267
26097	Mackinac	$2,962

Source: FEMA
FIPS = Federal Information Processing Standards

I.IV.i.2 Coastal Recession

Coastal erosion is the recession of land and the removal of beach or dune sediments. It affects all of the beaches and coasts in the world, including those of Lake Huron and Lake Superior. Important factors in coastal erosion are the types of rock or soil being eroded, the presence or absence of beaches or human-made structures, and how the shore is oriented with respect to prevailing winds and waves, water levels, climatology, and groundwater and surface drainage.

- Additional Information will be added to this section following the Coastal Scoping meeting.

I.IV.i.3 Federal Land

Federal lands data were obtained from the National Atlas at http://nationalatlas.gov/mld/fedlanp.html. These data are also available from the National Coastal Scoping Data Repository located on FEMA's Mapping Information Platform (MIP) at https://hazards.fema.gov. The map layer shows those lands owned or administered by the Federal Government, including the Bureau of Land Management, the Bureau of Reclamation, the U.S. Department of Agriculture Forest Service, the Department of Defense, the U.S. Fish and Wildlife Service, the National Park Service, and other agencies. Only areas of 640 acres or more are included.

No federal lands were found in the Chippewa and Mackinac Counties project area.

I.IV.i.4 Jurisdictional Boundaries

Chippewa and Mackinac Counties' jurisdictional boundaries can also be obtained from a derived set of TIGER line files available through the U.S. Census Bureau geography division. To find out more about TIGER line files and other Census TIGER database derived data sets visit http://www.census.gov/geo/www/tiger.

I.IV.i.5 Local Data

As part of this Coastal Scoping process, communities were asked to fill out a Coastal Data Request Form and provide information on data that they have available at the local level that may be of use during the coastal flood study update and during the development of the coastal flood risk products discussed earlier in this report. The Coastal Data Request Form

(Attachment A) includes data requests for base map data, coastal data, historic flood data, and risk assessment information.

- This section will be completed following Coastal Scoping meetings. A compilation of the completed Coastal Data Request Forms will be provided in Attachment G in the Final Coastal Scoping Report.

I.IV.i.6 Publicly Owned Land

No statewide geospatial coverage dataset for publicly owned lands was identified during this Coastal Scoping process.

I.IV.i.7 Shoreline Information

A shoreline feature dataset was generated by USACE Detroit District (U.S. Army Corps of Engineers, 2012) using 2012 oblique photographs (see "Topography, Bathymetry, and Oblique Imagery" subsection in this report). The dataset captures shoreline types, land uses, coverage, and vegetation types along the entire Great Lakes shoreline, including Lake Huron and Lake Superior. The dataset includes identification of "artificial" shoreline, which may be indicative of local coastal flood protection structures. This dataset does not identify the level of protection of any coastal structures, and it does not validate whether or not a coastal structure exists. The current dataset contains data at 1-mile spacing. The dataset does not include field-based reconnaissance or sediment/subsurface soil collection. The dataset can be downloaded from http://www.greatlakescoast.org/ under the "Technical Resources" section.

From the USACE shoreline feature dataset, the approximate shoreline along Chippewa and Mackinac Counties that is covered by this study totals 795 miles. The shoreline classification information for Chippewa and Mackinac Counties is summarized in Tables 3 through 6, including shoreline types, land uses, coverage, and vegetation types, respectively. The Chippewa shoreline includes shoreline on Lake Superior and Lake Huron.

Table 3. Summary of Shoreline Types

County	Lake	Total Shoreline (mile)	Artificial Shoreline (mile)	Boulders, Bedrock (mile)	Cohesive Clays and Silts (mile)	Sand (mile)	Shingles, Pebbles, Cobbles (Mile)
Chippewa	Superior/Huron	532.01	65.05	38.61	--	160.26	268.09
Mackinac	Huron	262.99	17.42	39.49	--	51.87	154.22

Source: USACE 2012, Great Lakes Shoreline Classification

Table 4. Summary of Shoreline by Land Use

County	Lake	Total Shoreline (mile)	Commercial/ Industrial (mile)	Farm Land (mile)	Forested (mile)	High Density Residential (mile)	Low Density Residential (mile)	Moderate Density Residential (mile)	Park Land (mile)
Chippewa	Superior/Huron	532.01	29.60	3.75	191.99	5.62	181.97	69.34	49.74
Mackinac	Huron	262.99	13.68	--	82.85	6.22	114.78	29.85	16.61

Source: USACE 2012, Great Lakes Shoreline Classification

Table 5. Summary of Shoreline Coverage

County	Lake	Total Shoreline (mile)	Bluff 2'-10' (mile)	Coastal Wetland (mile)	Dune 2'-10' (mile)	Flat Coast (mile)	High Bluff 10'+ (mile)	High Dune 10'+ (mile)	Other (mile)
Chippewa	Superior/ Huron	532.01	15.47	132.06	5.59	372.05	4.35	1.24	1.24
Mackinac	Huron	262.99	2.49	47.99	15.54	192.62	3.73	0.62	-

Source: USACE 2012, Great Lakes Shoreline Classification

Table 6. Summary of Shoreline Vegetation Types

County	Lake	Total Shoreline (mile)	High Density Shrubs/ Trees (mile)	Low Density Shrubs/ Trees (mile)	Manicured Lawn (mile)	Moderate Density Shrubs/Trees (mile)	None (mile)	Unmaintained Non-Woody Vegetation (mile)	Other (mile)
Chippewa	Superior/ Huron	532.01	212.73	28.67	71.74	51.59	9.71	153.85	3.7
Mackinac	Huron	262.99	134.36	5.6	18.04	24.88	6.22	73.90	-

Source: USACE 2012, Great Lakes Shoreline Classification

I.IV.i.8 Stream Lines/Hydrograph

Stream lines and water areas for Chippewa and Huron Counties were obtained from a derived set of TIGER line files available through the U.S. Census Bureau geography division. To find out more about TIGER line files and other Census TIGER database derived datasets visit
, http://www.census.gov/geo/maps-data/data/tiger-line.html.

I.IV.i.9 Topography, Bathymetry, and Oblique Imagery

New Data Collected for Great Lakes Coastal Flood Study
As part of the GLCFS, Light Detection and Ranging (LiDAR) was collected by USACE to develop topographic and bathymetric data along the Lake Huron shoreline and the Whitefish Bay area in Chippewa County along Lake Superior. Topography is the configuration of natural and man-made features of a surface area and their relative position and elevations. Bathymetry is the underwater equivalent to topography.

LiDAR is an optical remote sensing technology that can measure the distance to, or other properties of, a target by illuminating the target with light, often using pulses from a laser. A narrow laser beam can be used to map physical features with very high resolution. Downward-looking LiDAR instruments fitted to aircraft and satellites are used for surveying and mapping. LiDAR can be used to create Digital Terrain Models (DTM) and Digital Elevation Models (DEM), which is a digital model or 3-dimensional representation of the terrain's surface.

The LiDAR data collected by USACE for this study was within a 1500 meter buffer (500 meters inland and 1000 meters seaward of the land/water interface). Where water clarity permitted, data was collected to cover all federal navigation projects. Flight lines were flown along the channel alignment to ensure the best possible coverage of inlets and structures.

For quality control purposes, one cross line was used every 25 miles along shore or more frequently to ensure 90 percent of all planned lines within the area were crossed by a cross line. In areas of the coast where natural or artificial barriers prevent aircraft operations, the cross line(s) were collected at the nearest possible location to the required interval, but no closer than five miles to an adjacent planned cross line. Overlapping lines and datasets were compared to each other and to cross lines and the differences calculated.

At the time this report was generated, the quality control process was not yet completed on the LiDAR dataset. However, as part of that process, the vertical difference between the LiDAR and ground truth data will be calculated. Ground truth refers to a process in which a pixel on a satellite image is compared to what is there in reality. This is especially important in order to relate LiDAR data to real features and materials on the ground. The collection of ground truth data enables calibration of the LiDAR data, and aids in the interpretation and analysis of what is being sensed. Using this process, all systematic errors will be identified and eliminated and remaining errors should have a normal distribution. Differences between a DEM created from the LiDAR data representing bare ground and the ground truth data will be unbiased and within +/-15 cm (RMSE[1]) in flat terrain and within +/-30 cm (RMSE[3]) in hilly terrain. Horizontal positions will be accurate to +/- 1.5m (RMSE[3]). Data will be processed to 2-feet contours.

[1] Root-mean-square-error is a measure of the differences between values predicted by a model or an estimator and the values actually observed.

The processing of the bathymetric data for this study will be performed based on the strongest return of each LiDAR pulse, assuming this depth represents the bottom. Data will be processed to produce bottom reflectance data from the LiDAR data.

The GLCFS will utilize the best available topographic and bathymetric data for rest of the Lake Superior shoreline along Chippewa County and identification of available datasets is currently in progress as part of the coastal scoping efforts.

As part of the GLCFS, USACE collected oblique imagery for the entire Great Lakes coastline in 2012. Oblique imagery is captured at an angle, as compared to an overhead view provided by orthophotos, and allows users a 3-dimensional view of landscape, buildings, and other features. This dataset may be useful to communities during emergency response, planning, and identification of shoreline types and obstructions; and management of assets, critical facilities, and public properties along the Lake Huron and Lake Superior shoreline. The oblique imagery is current available via a web-based browser at http://www.greatlakes.usace.army.mil/.

Other Data Available:
The NOAA Coastal Services Center, Digital Coast, hosts a variety of digital coastal data, including bathymetric and topographic data, and is located at http://www.csc.noaa.gov/digitalcoast.

- ❖ This section will be completed following Coastal Scoping meetings.

I.IV.i.10 Transportation

The World Topo Map service has been used as a basemap layer on the Coastal Scoping Map, and includes a transportation layer. For more information on Environmental Systems Research Institute (ESRI) Map services and how they can be used in GIS, please visit **http://goto.arcgisonline.com/maps/World_Topo_Map.**

In addition, transportation data for Chippewa and Mackinac Counties were obtained from a derived set of TIGER line files available through the U.S. Census Bureau geography division. To find out more about TIGER line files and other Census TIGER database derived datasets visit (http://www.census.gov/geo/maps-data/data/tiger-line.html).

I.IV.i.11 Watershed Boundaries

USGS Hydrologic Unit Code 8 (HUC8) watershed boundaries were obtained from the National Atlas 2011 "Raw Data Download" (http://nationalatlas.gov/atlasftp.html).

Chippewa County contains portions of five HUC-8 watersheds: Carp-Pine (04070002), Lake Huron (04080300), Waiska (04020203), Tahquamenon (04020202) and St Marys (04070001).

Mackinac County contains portions of three HUC-8 watersheds: Carp-Pine (04070002), Brevort-Millecoquins (04060107), and Lake Huron (04080300).

ii. Other Data and Information

Chippewa County is located in the easternmost portion of Michigan's Upper Peninsula. It is bordered by Lake Superior on the north, Canada to the northeast, Luce County on the west, Mackinac County on the southwest, and Lake Huron on the south. Chippewa County had a 2010 population of 38,520 (U.S. Census Bureau, 2010). Sault Sainte Marie is the only city in Chippewa County. Chippewa County also contains

Mackinac County is located in the south portion of Michigan's Upper Peninsula. It is bordered by Lake Michigan and Lake Huron to the south, Schoolcraft County to the west, Luce County to the north, and Chippewa County to the northeast. Mackinac County had a 2010 population of 11,113 (U.S. Census Bureau, 2010). Mackinac County contains the cities of St. Ignace and Mackinac Island.

I.IV.ii.1 Coastal Barrier Resources Systems

Coastal barriers are unique land forms that protect distinct aquatic habitats and serve as the mainland's first line of defense against damage from coastal storms and erosion. CBRS defines a coastal barrier as a landform composed of unconsolidated shifting sand or other sedimentary material that is generally long and narrow and entirely or almost entirely surrounded by water. They are sufficiently above normal tides so that they usually have dunes and terrestrial vegetation. The CBRS boundaries were downloaded from U.S. Fish and Wildlife Service (http://www.fws.gov/CBRA/Maps/Data_Disclaimer_Shapefiles.html) and are dated June 15, 2010.

Chippewa and Mackinac Counties have twenty designated units of coastal barriers along the Lake Superior and Lake Huron shoreline and/or within this study area.

I.IV.ii.2 Coastal Flood Protection Measures

Coastal structures along Lake Huron and Lake Superior will be reviewed in more detail during the engineering analysis portion of the Lake Huron and Lake Superior study and were not analyzed as part of this Coastal Scoping process. A summary of information collected regarding existing coastal structures and flood protection measures is described below.

FEMA's Midterm Levee Inventory (MLI) project compiled a database of structures that were designed to provide at least the minimum level of protection from the base flood level (1- percent-annual-chance flood). For this Coastal Scoping process, the November 2011 MLI Status Report published by FEMA was reviewed. The MLI Levee database shows no levee segments in Chippewa and Mackinac Counties study areas that provide protection from the 1-percent-annual-chance flood; however, as discussed below, other flood protection measures do exist.

The USACE Coastal and Hydraulics Laboratory (CHL), a member of the Engineer Research and Development Center (ERDC), has compiled an inventory of coastal structures called the Enterprise Coastal Inventory Database (ECID). The ECID application and database houses information on more than 900 coastal structures in the U.S. and uses a Google Earth interface for users to access information on the structures including project reports, aerial photographs, wave and water level and bathymetric data. The database and application are available at http://chl.erdc.usace.army.mil/chl.aspx?p=s&a=Projects;246 . These maintained coastal structures protect harbors and shore-based infrastructure, provide beach and shoreline stability control, provide flood protection to varying degrees, and protect coastal communities, roadways, bridges, and other structures orinfrastructures. These structures include seawalls, bulkheads, revetments, dikes and levees, breakwaters, groins, sills/perched beaches, and jetties and piers.

The USACE coastal structures along Lake Huron and Lake Superior found within Chippewa and Mackinac Counties are compiled in Table 7. It is important to note that these coastal structures do not necessarily protect areas from the 1-percent-annual-chance flood event. Many of these USACE coastal structures were built between 1860 and 1940. Low lake levels since the 1990's have accelerated deterioration of these navigation structures and USACE Detroit District launched an investigation to assess the effects of changes in Great Lakes water levels on the performance and stability of these structures. An inventory of critical infrastructure protected by federally maintained navigation structures was conducted along with a condition assessment of the structures, including an estimation of the risk associated with structure failure. Structures were rated on the following scale:

A – Failure Unlikely
B – Low Risk of Failure
C – Medium Risk of Failure
D – High Risk of Failure
F – Failed

Table 7 also provides the condition assessment for each of the structures listed.

Table 7. USACE Coastal Structure Inventory

State	Lake	County	Coastal Structure	USACE Condition Assessment	Structure Length (feet)
Minnesota	Huron	Chippewa County	Detour Harbor Breakwater	NA	399
Michigan	Superior	Chippewa County	Whitefish Point Harbor Interior Breakwater	NA	98
Michigan	Superior	Chippewa County	Whitefish Point Harbor North Breakwater	NA	179
Michigan	Superior	Chippewa County	Whitefish Point Harbor South Breakwater	NA	154
Michigan	Huron	Mackinac County	Mackinac Island Harbor East Breakwater	NA	277
Michigan	Huron	Mackinac County	Mackinac Island Harbor West Breakwater	NA	290

NA = Not Available

I.IV.ii.3 Community Assisted Visits

Statewide Community Assistance Visits (CAVs) are part of the evaluation and review process used by FEMA and local officials to ensure that each community adequately enforces local floodplain management regulations to remain in compliance with NFIP requirements. Generally, a CAV consists of a tour of the floodplain, an inspection of community permit files, and meetings with local appointed and elected officials. During a CAV, observations and investigations focus on identifying issues in various areas, such as the community's floodplain management regulations (ordinance), community administration and enforcement procedures, engineering or other issues within the FIRMs, other problems in the community's floodplain management, and problems with the biennial report data. Any administrative problems or potential violations identified during a CAV are documented in the CAV findings report. The community is notified and given the opportunity to correct those administrative procedures and remedy the violations to the maximum extent possible within established deadlines. The summary of CAV visits were extracted from FEMA's Community Information System (CIS) at https://portal.fema.gov in January 2014. Table 8 shows the most recent CAV date by community or jurisdiction. Not all communities within the project area were identified as having a CAV, therefore, those communities are not included in the table.

Table 8. Summary of Community Assisted Visits in Chippewa and Mackinac Counties

County	Lake	Community	CAV Date	FIRM Date
Chippewa	Superior	Bruce, Township of	08/19/05	9/29/2006
Chippewa	Superior	Sault Sainte Marie, City of	04/17/91	5/4/1988
Mackinac	Huron	Clark, Township of	01/09/95	11/4/1992
Mackinac	Huron	St. Ignace, City of	09/06/00	-
Mackinac	Huron	St. Ignace, Township of	09/06/00	11/20/2000

CAV = Community Assisted Visit

I.IV.ii.4 Community Rating System

CRS is a voluntary incentive program to provide flood insurance premium discounts to NFIP-participating communities that take extra measures to manage floodplains above the minimum requirements. A point system is used to determine a CRS rating. The more measures a community takes to minimize or eliminate exposure to floods, the more CRS points are awarded and the higher the discount on flood insurance premiums. The list of CRS communities is available on FEMA's Website site at http://www.fema.gov/library/viewRecord.do?id=3629, which was accessed in January 2014.

No coastal communities in Chippewa or Mackinac Counties participate in the CRS program.

I.IV.ii.5 Coordinated Needs Management Strategy (CNMS) and NFIP Mapping Needs

During FEMA's Flood Map Modernization program from 2003 to 2008, FEMA adhered to Procedure Memorandum No. 56 which states that, "Section 575 of the National Flood Insurance Program Reform Act of 1994 mandates that at least once every five years FEMA assess the need to review and update all floodplain areas and flood risk zones identified, delineated, or established under Section 1360 of the National Flood Insurance Act, as amended." This requirement was fulfilled through the Mapping Needs Assessment process. Other mechanisms such as the Mapping Needs Update Support System (MNUSS) and scoping reports were used to capture information describing conditions on the FIRMs and the potential for a map update.

FEMA's CNMS was initiated through FEMA's Risk MAP program in 2009 to update the way FEMA organizes, stores, and analyzes flood hazard mapping needs information for communities. CNMS defines an approach and structure for the identification and management of flood hazard mapping needs that provides support to data-driven planning and the flood map update investment process in a geospatial environment. The goal is to identify areas where existing flood maps are not up to FEMA's mapping standards. More

information about the CNMS can be found at http://www.fema.gov/library/viewRecord.do?id=4628 .

There are three classifications within the CNMS: "Valid," "Unverified," and "Unknown." New and updated studies (those with new hydrologic and hydraulic models) performed during FEMA's Map Modernization program were automatically determined to be "Valid" and the remaining studies went through a 17-element validation process with 7 critical and 10 secondary elements. Validation elements apply physical, climatological, and environmental factors to stream studies to determine validity. A stream study has to pass all of the critical elements and at least seven secondary elements to be classified as "Valid." The remaining streams are classified as "Unverified" or "Unknown". Studies for which flood hazard data are identified as having critical or significant secondary change characteristics are classified as "Unverified." Streams with a status of "Unknown" are those that have a study underway, will be evaluated in the future, or do not have sufficient information to determine whether they are "Valid" or "Unverified" (Federal Emergency Managment Agency, 2013).

Table 9 summarizes the draft results of the county-wide validation analysis obtained from CNMS in December, 2013. CNMS only captures riverine studies at this time.

Table 9. CNMS Status for Chippewa and Mackinac Counties

County	FIPS	Unknown (stream miles)	Unverified (stream miles)	Valid (stream miles)	Total (stream miles)
Chippewa	26033	-	-	33.57	33.57
Mackinac	26097	189.73	-	-	189.73

FIPS = Federal Information Processing Standard

I.IV.ii.6 Critically Eroded Beaches and Beach Nourishment/Dune Replacement Projects

Critically eroded beaches and beach nourishment/dune replacement projects were not identified in Chippewa or Mackinac County at the time this report was issued, although it should be noted that all counties experience shore erosion.

I.IV.ii.7 Dams

The National Inventory of Dams (NID) is a congressionally authorized database that documents dams in the United States and its territories. The current NID, published in 2010, includes information on 84,000 dams that are more than 25 feet high, hold more than 50 acre-feet of water, or are considered a significant hazard if they fail. The NID is maintained and published by USACE, in cooperation with the Association of State Dam Safety Officials, the states and territories, and federal dam-regulating agencies. The database contains information about the dams' locations, sizes, purposes, types, last inspections, regulatory facts, and other technical data. The information contained in the NID is updated approximately every 2 years. The NID is available at the USACE Website https://nid.usace.army.mil/.

At the time this report was compiled, the NID identified 4 dams in Chippewa County and 2 dams in Mackinac County within the project areas.

I.IV.ii.8 Declared Disasters

The FEMA Disaster Declarations Summary is a summarized dataset describing all federally declared disasters. This information begins with the first disaster declaration in 1953 and features all three disaster declaration types: major disaster, emergency, and fire management assistance. The dataset includes declared recovery programs and geographic areas (County data not available before 1964; fire management records are considered partial because of the historical nature of the dataset).

The list of FEMA's disaster declarations is available on the FEMA Website at http://www.fema.gov/data-feeds . Table 10 lists the major disaster declarations that have been declared in Chippewa and Mackinac Counties.

Table 10. Declared Disasters in Chippewa and Mackinac Counties

Declared County/Area	Disaster Number	Declaration Date	Incident Type	Description
Chippewa (County)	1028	5/10/1994	Freezing	Severe Deep Freeze
Chippewa (County)	3030	2/5/1977	Snow	Snowstorms
Chippewa (County)	3035	3/2/1977	Drought	Drought
Chippewa (County)	3057	1/27/1978	Snow	Blizzards and Snowstorms
Chippewa (County)	3225	9/7/2005	Hurricane	Hurricane Katrina Evacuation*
Mackinac (County)	1028	5/10/1994	Freezing	Severe Deep Freeze
Mackinac (County)	3035	3/2/1977	Drought	Drought
Mackinac (County)	3057	1/27/1978	Snow	Blizzards and Snowstorms
Mackinac (County)	3225	9/7/2005	Hurricane	Hurricane Katrina Evacuation*

*Refers to the federal disaster aid that was made available to Michigan to supplement its efforts to assist evacuees from areas struck by Hurricane Katrina.

I.IV.ii.9 Flood Insurance Policies

A community's agreement to adopt and enforce floodplain management ordinances, particularly with respect to new construction, is an important element in making flood insurance available to home and business owners. For this Coastal Scoping project, data on flood insurance policies were also gathered.

Table 11 summarizes the numbers and premiums of insurance policies, the total coverage, and the numbers and dollar amounts of paid losses in communities of Chippewa and

Mackinac Counties. The data are based on Community Summary Reports that were extracted from FEMA's CIS website (https://portal.fema.gov/famsVuWeb/home) in January 2014. For communities not listed, data was not available at this source.

Table 11. Summary of Flood Insurance Policies and Claims for Chippewa and Mackinac Counties

County	Community	CID	No. Policies	Total Premium	Total Coverage	Number of claims since 1978	Dollar ($) paid for claims since 1978
Chippewa	Bay Mills, Township of	260374	14	$9,684	$1,555,200	0	$ 0
Chippewa	Bruce, Township of	260375	5	$3,680	$704,000	1	$ 0
Chippewa	Detour, Township of	260775	4	$4,222	$673,000	0	$ 0
Chippewa	Drummond Island, Township of	260803	10	$7,591	$1,628,900	0	$ 0
Chippewa	Raber, Township of	260786	4	$1,891	$240,500	0	$ 0
Chippewa	Sault Sainte Marie, City of	260059	2	$ 795	$206,000	1	$ 0
Chippewa	Soo, Township of	260378	1	$ 412	$350,000	0	$ 0
Chippewa	Superior, Township of	260380	4	$4,579	$405,700	0	$ 0
Chippewa	Whitefish, Township of	260321	5	$2,525	$938,000	0	$ 0
Mackinac	Clark, Township of	260759	24	$22,668	$4,101,000	0	$ 0
Mackinac	St. Ignace, Township of	260444	10	$5,271	$1,530,400	1	$ 0

Source: FEMA's CIS Summary Report "Insurance Reports"

Additional information on disaster history can be found in the State of Michigan Hazard Mitigation Plan, at the Michigan State Police website under their Emergency Management and Homeland Security Publications page (http://www.michigan.gov/msp/0,4643,7-123-1593_3507-14743--,00.html).

I.IV.ii.10 Gage Data

The NOAA Coastal Services Center, Digital Coast, hosts a variety of digital coastal data, including gage data, and is located at http://www.csc.noaa.gov/digitalcoast.

Meteorological Stations

The National Data Buoy Center (NDBC) is a part of the NOAA National Weather Service (NWS). NDBC designs, develops, operates, and maintains a network of data collecting buoys and coastal stations. NDBC provides hourly observations from a network of about

90 buoys and 60 Coastal Marine Automated Network (C-MAN) stations to help meet these needs. All stations measure wind speed, direction, and gust; atmospheric pressure; and air temperature. Water level is measured at selected stations. The historical and current data are available at the NDBC website http://www.ndbc.noaa.gov/ .

Table 12 shows the meteorological station identification number and location for the gages in the Lake Huron and Lake Superior's Chippewa and Mackinac Counties project areas, which are owned by the National Ocean Service (NOS), one of six offices within NOAA.

Table 12. NOAA Meteorological Stations on Lake Huron and Lake Superior near Chippewa and Mackinac Counties

Lake	County	Station ID	Location	Owner	Data	Years of Historical Data
Huron	Chippewa	WNEM4	West Neebish Island, MI	NOS	Meteorological Observation	2008-Present
Huron	Chippewa	RCKM4	Rock Cut, MI	NOS	Meteorological Observation	2004-Present
Superior	Chippewa	LTRM4	Little Rapids, MI	NOS	Meteorological Observation	2006-Present
Superior	Chippewa	SWPM4	S.W. Pier, MI	NOS	Meteorological Observation	2004-Present
Superior	Chippewa	PTIM4	Point Iriquois, MI	NOS	Meteorological Observation	2004-Present
Superior	Chippewa	WFPM4	Whitefish Point, MI	NWS	Meteorological Observation	2010-Present
Huron	Mackinac	DTLM4	De Tour Village, MI	NOS	Meteorological Observation	2004-Present

In addition, the Great Lakes Environmental Research Laboratory is a part of NOAA focused on the Great Lakes. It maintains multiple datasets, including a collection of meteorological data for both the United States and Canada. The datasets can be found online at http://www.glerl.noaa.gov .

Stream Gages

The USGS National Water Information System Web Interface http://waterdata.usgs.gov/nwis (accessed February 2014) provides no data for any stream gage location in Chippewa and Mackinac Counties.

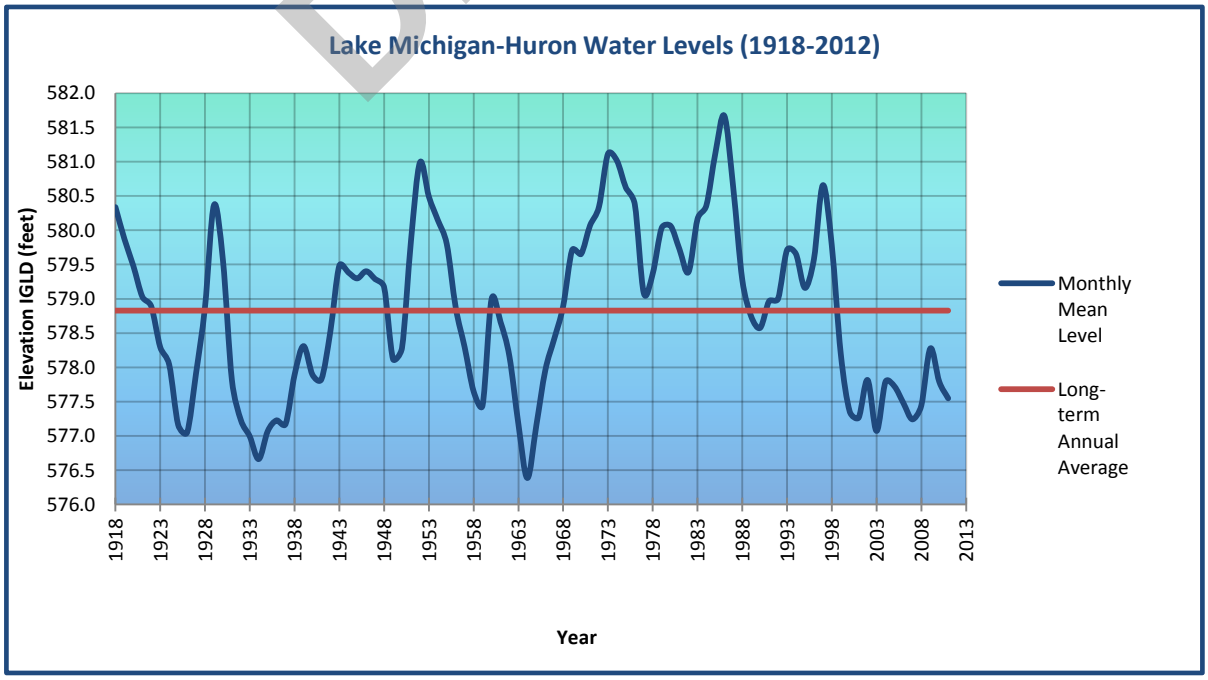
Water Level Station:

NOAA's Center for Operational Oceanographic Products and Services (CO-OPS) maintains several water level stations along Lake Huron. CO-OPS' primary motivation is the collection and dissemination of high quality and accurate measurements of lake level for scientific studies.

Great Lakes water levels constitute one of the longest high quality hydrometeorological data sets in North America with reference gage records beginning about 1860 with sporadic records back to the early 1800's. The station information and water level data are available at NOAA CO-OPS Website: http://tidesandcurrents.noaa.gov/stations.html#LakeHuron and http://tidesandcurrents.noaa.gov/stations.html#LakeSuperior.

The monthly high and low water level data from the year 1918 to 2012 at Lake Huron are available at the USACE Website: http://www.lre.usace.army.mil/Missions/GreatLakesInformation/GreatLakesWaterLevels/HistoricalData.aspx.

Figure 2 depicts Historic Great Lakes Water Levels from 1918 to 2012 (U.S. Army Corps of Engineers, 2012).



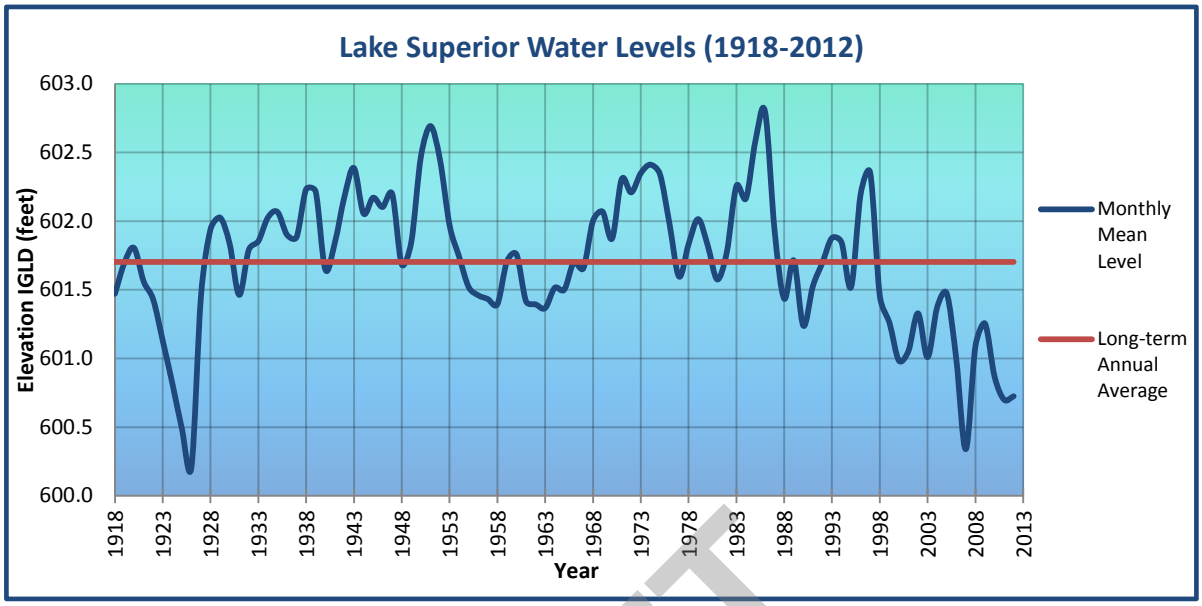


Figure 2: USACE Historic Great Lakes Water Level Data (1918 to 2012)

The Great Lakes Water Levels Report provides daily mean water levels of Lake Huron and Lake Superior for the past three months. The data are available at the USACE website: http://www.lre.usace.army.mil/Missions/GreatLakesInformation/GreatLakesWaterLevels/CurrentConditions.aspxq.

Wave Gage/Buoy Stations

The NDBC is a part of the NOAA NWS. NDBC designs, develops, operates, and maintains a network of data collecting buoys and coastal stations. NDBC provides hourly observations from a network of about 90 buoys and 60 C-MAN stations to help meet these needs. In addition to standard meteorological observation, all buoy stations, and some C-MAN stations, measure sea surface temperature and wave height and period. Conductivity and water current are measured at selected stations. The historical and current data are available at NDBC website http://www.ndbc.noaa.gov/ .

I.IV.ii.11 Historical Flooding and High Water Marks

As part of this Coastal Scoping process, effective FISs were reviewed for information on historical flooding and high water mark data. No information specific to Lake Huron and Lake Superior flooding or high water marks (HWMs) was identified for these counties.

If local stakeholders have additional available high water mark data, historical flooding information or historic flooding photographs, they are encouraged to submit them to FEMA Region V Mitigation Division.

I.IV.ii.12 Letters of Map Change

An LOMC is a letter that reflects an official revision to an effective NFIP map. LOMCs are issued in place of the physical revision and republication of the effective FIRM. LOMCs include completed cases of Letters of Map Amendment (LOMAs) and Letters of

Map Revision (LOMRs), including LOMRs based on fill (LOMR-Fs), and conditional LOMRs. The lists of LOMC cases were obtained from the FEMA Mapping Information Platform Website (https://hazards.fema.gov/femaportal/wps/portal) in February 2014.

Table 13 lists the number of LOMCs in the project area per county. No Conditional LOMAs or Conditional LOMR-Fs were included. The LOMCs are shown on the Coastal Scoping Maps. Clusters of LOMCs indicate a need for updated maps.

Table 13. Summary of LOMC cases in Chippewa and Mackinac Counties

County	Number of Letters of Map Amendments	Number of Letters of Map Revisions – Based on Fill	Number of Letters of Map Revisions – Floodway Removal	Number of Letters of Map Revisions
Chippewa	307	2	0	1
Mackinac	103	2	0	0

I.IV.ii.13 Ordinance Level

Local regulations regarding development within known flood hazard areas can range from ordinances with minimum NFIP requirements to strong, pro-active ordinances that not only regulate and protect new and improved development in existing SFHAs but also seek to mitigate the growth of SFHAs caused by increased runoff from developed areas and the degradation of natural flood control areas, such as wetlands and forests.

Title 44 of the Code of Federal Regulations Sections 60.3(a)–(e) describes the NFIP floodplain ordinance levels and provides the minimum requirements for community participation in the NFIP. The proper ordinance level for each community is determined by the type of flooding that is present within the community.

Ordinance levels are shown in the table below:

Ordinance Level	Description
A	Floodplains have not been identified
B	Floodplains with no base flood elevations (BFEs)
C	Floodplains with BFEs or coastal flooding with no high-hazard areas (Zone V)
D	Floodplains with BFEs and floodways
E	Coastal high-hazard areas identified, but no floodways
D & E	Both floodways and coastal high-hazard areas

Table 14. Program Status and Ordinance Level

Lake	County	Community	CID	Program Status	Ordinance Level
Superior	Chippewa	Sault Sainte Marie, City of	260059	PARTICIPATING	NA*
Superior	Chippewa	Whitefish, Township of	260321	PARTICIPATING	NA*
Superior	Chippewa	Bay Mills, Township of	260374	PARTICIPATING	NA*
Huron	Chippewa	Bruce, Township of	260375	PARTICIPATING	NA*
Superior	Chippewa	Chippewa, Township of	261397	NA*	NA*
Superior	Chippewa	Dafter, Township of	261359	NA*	NA*
Huron	Chippewa	Pickford, Township of	260376	NOT PARTICIPATING	NA*
Superior	Chippewa	Soo, Township of	260378	PARTICIPATING	NA*
Superior	Chippewa	Sugar Island, Township of	260379	NOT PARTICIPATING	NA*
Superior	Chippewa	Superior, Township of	260380	PARTICIPATING	NA*
Huron	Chippewa	Detour, Township of	260775	PARTICIPATING	NA*
Huron	Chippewa	Detour, Village of	261358	NA*	NA*
Huron	Chippewa	Raber, Township of	260786	PARTICIPATING	NA*
Huron	Chippewa	Drummond Island, Township of	260803	PARTICIPATING	NA*
Superior	Chippewa	Bay Mills Indian Community	261524	NA*	NA*
Superior	Chippewa	Sault Sainte Marie Tribe of Chippewa	261531	NA*	NA*
Huron	Mackinac	St. Ignace, Township of	260444	PARTICIPATING	NA*
Huron	Mackinac	Marquette, Township of	260750	PARTICIPATING	NA*
Huron	Mackinac	Clark, Township of	260759	PARTICIPATING	NA*
Huron	Mackinac	Mackinac Island, City of	260764	PARTICIPATING	NA*
Huron	Mackinac	St. Ignace, City of	260767	PARTICIPATING	NA*
Huron	Mackinac	Bois Blanc, Township of	260795	PARTICIPATING	NA*

*Not provided within FEMA's Community Information System

I.IV.ii.14 Proposed Draft Transects

Transects are profiles along which coastal flooding analysis is performed. Transects are used to transform offshore conditions to the shoreline and are used to define coastal flood risks inland of the shoreline. They are placed to define representative profiles for a shoreline reach. The transect layout for coastal hazards analysis and subsequent floodplain delineation is determined by physical factors such as changes in topography, bathymetry, shoreline orientation, and land cover data, in addition to societal factors such as variations in development and density. The base maps listed earlier in this section (i.e., LiDAR, bathymetry) were reviewed, or will be reviewed once available, to determine revisions to the draft placement for hazard modeling transects along the Lake Huron and Lake Superior shoreline.

The originally proposed draft transect layout is shown on the draft Coastal Scoping Map for Chippewa and Mackinac Counties (Attachment C). During the Coastal Scoping

meeting, input will be solicited regarding transect locations. The current transect layout includes an identification number per transect. Note that these identification numbers will change as the draft transects are revised in the future.

- ❖ This section and the transect map shown in Attachment C will be updated following the Coastal Scoping meeting.

I.IV.ii.15 Regulatory Mapping

The effective mapping status for communities in the Chippewa and Mackinac Counties project area is listed in Table 15.

Table 15. Effective Mapping Status

County	Community	CID	FIRM Date	Program Status
Chippewa	Bay Mills, Township of	260374	7/3/1986	Participating
Chippewa	Bruce, Township of	260375	9/30/1988	Participating
Chippewa	Chippewa, Township of	261397	NA	NA
Chippewa	Dafter, Township of	261359	NA	NA
Chippewa	Detour, Township of	260775	11/20/2000	Participating
Chippewa	Detour, Village of	261358	NA	NA
Chippewa	Drummond Island, Township of	260803	11/20/2000	Participating
Chippewa	Pickford, Township of	260376	-	Not participating
Chippewa	Raber, Township of	260786	9/30/1988	Participating
Chippewa	Sault Sainte Marie, City of	260059	5/4/1988	Participating
Chippewa	Soo, Township of	260378	NSFHA	Participating
Chippewa	Sugar Island, Township of	260379	-	Not participating
Chippewa	Superior, Township of	260380	9/1/1988	Participating
Chippewa	Whitefish, Township of	260321	11/4/1992	Participating
Chippewa	Bay Mills Indian Community	261524	NA	NA
Chippewa	Sault Sainte Marie Tribe of Chippewa	261531	NA	NA
Mackinac	Bois Blanc, township of	260795	NSFHA	Participating
Mackinac	Clark, Township of	260759	11/4/1992	Participating
Mackinac	Mackinac Island, City of	260764	NSFHA	Participating
Mackinac	Marquette, Township of	260750	NSFHA	Participating
Mackinac	St. Ignace, City of	260767	NSFHA	Participating
Mackinac	St. Ignace, Township of	260444	11/20/2000	Participating

NSFHA = No Special Flood Hazard Areas

Effective FIRMs and FISs can be downloaded from FEMA's Map Service Center (MSC) at https://msc.fema.gov.

I.IV.ii.16 Repetitive Loss

A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. A RL property may or may not be currently insured by the NFIP. There are currently over 122,000 repetitive loss properties nationwide.

Structures that flood frequently strain the National Flood Insurance Fund. In fact, the RL properties are the biggest draw on the Fund. FEMA has paid almost $3.5 billion dollars in claims for RL properties. RL properties not only increase the NFIPs annual losses and the need for borrowing funds from Congress, they drain funds needed to prepare for catastrophic events. Community leaders and residents are also concerned with the RL problem because residents' lives are disrupted and may be threatened by the continual flooding.

Over the years, there have been a number of efforts aimed at addressing repetitive losses. Depending on individual circumstances, appropriate mitigation measures commonly include elevating buildings above the level of the base flood, demolishing buildings, and removing buildings from the SFHA as part of a flood control project. Sometimes, mitigation takes the form of a local drainage-improvement project that meets NFIP standards and removes a property or properties from RL or Repetitive Loss Target Group (RLTG) status.

Repetitive losses were reviewed in FEMA's CIS "Community Disaster Detail – Flood Insurance" report. Table 16 details the total number of repetitive loss structures and total amount of repetitive loss payments in Chippewa and Mackinac Counties project area communities.

Table 16. Repetitive Loss

County	Community	CID	Total Repetitive Loss Structures	Total Repetitive Loss Payment
Chippewa	Bay Mills, Township of	260374	0	-
Chippewa	Bruce, Township of	260375	0	-
Chippewa	Chippewa, Township of	261397	NA	NA
Chippewa	Dafter, Township of	261359	0	-
Chippewa	Detour, Township of	260775	0	-
Chippewa	Detour, Village of	261358	0	-
Chippewa	Drummond Island, Township of	260803	0	-
Chippewa	Pickford, Township of	260376	0	-

County	Community	CID	Total Repetitive Loss Structures	Total Repetitive Loss Payment
Chippewa	Raber, Township of	260786	0	-
Chippewa	Sault Sainte Marie, City of	260059	0	-
Chippewa	Soo, Township of	260378	0	-
Chippewa	Sugar Island, Township of	260379	0	-
Chippewa	Superior, Township of	260380	0	-
Chippewa	Whitefish, Township of	260321	0	-
Chippewa	Bay Mills Indian Community	261524	NA	NA
Chippewa	Sault Sainte Marie Tribe of Chippewa	261531	NA	NA
Mackinac	Bois Blanc, Township of	260795	0	-
Mackinac	Clark, Township of	260759	0	-
Mackinac	Mackinac Island, City of	260764	0	-
Mackinac	Marquette, Township of	260750	0	-
Mackinac	St. Ignace, City of	260767	0	-
Mackinac	St. Ignace, Township of	260444	0	-

I.IV.ii.17 State-level Data Sets, Programs, and Information

The information in this section will be compiled by the project team throughout this Coastal Scoping process based on research of the project area and discussions with local and regional stakeholders.

- This section will be completed following the Coastal Scoping meeting.

V. Risk MAP Projects and Needs

This section provides information about the planned next steps for the Lake Huron and Lake Superior GLCFS, including information about the upcoming coastal analysis, potential for mitigation technical assistance within the project area, potential for changes in compliance as a result of the coastal flood study, future communications, and how unmet needs will be addressed.

i. Future Coastal Study

Information and data collected as part of this Coastal Scoping effort and provided in this report will be utilized in the upcoming coastal flood study for Lake Huron and Lake Superior.

A summary of the GLCFS project, as well as project updates, can be found at http://www.greatlakescoast.org/ under the "Great Lakes Coastal Analysis & Mapping" section.

❖ This section will be completed following the Coastal Scoping meeting.

ii. Potential for Mitigation Assistance

As part of a Risk MAP project, Mitigation Planning Technical Assistance (MPTA) may be available to help communities plan for and reduce risks by providing communities with specialized assistance. MPTA includes risk assessment, mitigation planning, and traditional hazard identification (flood mapping) activities. Technical assistance through MTPA can be performed at any time during the hazard mitigation planning process.

Determining which communities receive MPTA is dependent on identification of a need, the willingness of a community to partner with FEMA, local resources and data availability, and federal funding availability. Unfortunately, not every community will be able to receive MPTA as part of a Risk MAP project. Forming a partnership between FEMA and a local community is an essential part of initiating a MPTA project. Assistance will be prioritized after all data and information are collected and assessed by FEMA in coordination with the local communities to determine where MPTA resources would be beneficial. Communities should alert FEMA of any resources that are available at the local level, and of actions they are interested in implementing in partnership with FEMA. Technical assistance activities should be based on the needs of the community and assist with already established capabilities.

Some technical assistance activities could include (but are not limited to):

- Advising in the creation of initial Hazard Mitigation Plans
- Advising in the update of existing Hazard Mitigation Plans
- Training to improve a community's capabilities for reducing risk
- Assistance in incorporating flood risk datasets and products into potential and effective community legislation, guidance, regulations, and procedures
- Assistance with the creation, acquisition and incorporation of GIS data into potential and effective maps, planning mechanisms, and emergency management procedures
- Facilitating the identification of data gaps and interpret technical data to identify risk reduction deficiencies that should be corrected

Additional discussions will occur between FEMA and local stakeholders as this coastal flood study moves forward to see if MPTA would be an appropriate and beneficial option.

iii. Compliance

FEMA uses a number of tools to determine a community's compliance with the minimum regulations of the NFIP. Among them are Community Assisted Contacts (CACs), CAVs,

LOMC process, and Submit-for-Rates. These tools help assess a community's implementation of their flood damage reduction regulations and identify any floodplain management deficiencies and violations.

If administrative problems or potential violations are identified, the community will be notified and given the opportunity to correct those administrative procedures and remedy the violations to the maximum extent possible within established deadlines. FEMA or the state will work with the community to help them bring their program into compliance with NFIP requirements. In extreme cases where the community does not take action to bring itself into compliance, FEMA may initiate an enforcement action against the community.

After coastal analysis is completed for this study, communities may be faced with adopting new regulations related to coastal high hazard areas. An understanding of regulations associated with coastal areas will be important so that communities remain compliant. During this Coastal Scoping process, stakeholders were provided with information regarding NFIP requirements that are associated with coastal hazard zones, as well as information about new FEMA guidance related to moderate wave action.

These compliance topics, including coastal SFHAs, building requirements in VE Zones, and Limit of Moderate Wave Action (LiMWA), are discussed in detail at http://www.greatlakescoast.org.

iv. Communication

Throughout this Coastal Scoping process, community representatives and local stakeholders indicated the need to be kept informed about the results of Coastal Scoping, the upcoming coastal flood study, and opportunities for public input throughout the study process.

Throughout this study process, Federal, State, and local stakeholders will be kept informed via email, telephone calls, letters, newsletters, and meetings as appropriate. A dedicated email account was created (GreatLakesFloodStudy@STARR-Team.com) to distribute project information, meeting reminders, and summaries.

Stakeholder involvement will continue to be important through the remainder of the project. The GLCFS website http://www.greatlakescoast.org is an excellent resource where stakeholders can obtain the most up-to-date information about the status of the Great Lakes flood study projects, data collection, upcoming meetings, new technical reports, the latest methodologies, factsheets, and additional information.

FEMA encourages stakeholders to remain involved throughout the study process and will seek to identify partnership opportunities during the study process.

v. Unmet Needs

- This section will be completed following the Coastal Scoping meeting.

VI. Close

- This section will be completed following the Coastal Scoping meeting.

VII. References

Federal Emergency Management Agency. (2011). *Public Owned Land*. Retrieved July 2012, from Mapping Information Platform: https://hazards.fema.gov/femaportal/wps/portal

Federal Emergency Management Agency. (2012, May). *FEMA Great Lakes Coastal Guidelines, Appendix D.3 Update DRAFT.* Retrieved September 2012, from FEMA: http://www.fema.gov/library/viewRecord.do?id=5912

Federal Emergency Management Agency. (2012a). *Coordinated Needs Management System*. Retrieved June 2012, from http://cnms.riskmapcds.com/HelpCNMS.html

Federal Emergency Management Agency. (May 2012). *Mitigation Planning Report with Transmittal Memo.*

Federal Emergency Managment Agency. (2003). *Guildelines and Specifications for Flood Hazard Mapping Partners.*

Federal Emergency Managment Agency. (2010). *Coordinated Needs Managment Strategy*. Retrieved July 2012, from Coordinated Needs Managment Strategy: http://cnms.riskmapcds.com/HelpCNMS.html

Federal Emergency Managment Agency. (2011). *HAZUS Flood Average Annualized Loss Usability Analysis.*

Michigan Department of State Police, Emergency Management and Homeland Security Division. (2011). *Michigan Hazard Mitigation Plan.*

National Oceanic & Atmospheric Administration. (2009). *Ocean and Great Lakes Jobs Snapshot*. Retrieved August 2012, from Coastal County Snapshots: www.csc.noaa.gov/snapshots/

U.S Army Corps of Engineers. (2004). *Management Plan.*

U.S. Army Corps of Engineers. (2012, March 23). *Historic Data.* Retrieved August 2012, from U.S. Army Corps of Engineers - Detroit District: http://www.lre.usace.army.mil/greatlakes/hh/greatlakeswaterlevels/historicdata/

U.S. Army Corps of Engineers. (2012). Shoreline Feature Dataset. Detroit District, MI.

U.S. Census Bureau. (2010). *State and County Quick Facts*. Retrieved February, 2014, from http://quickfacts.census.gov

U.S. Environmental Protection Agency. (2012, June 25). *Great Lakes*. Retrieved September 2012, from U.S. Environmental Protection Agency: http://www.epa.gov/glnpo/atlas/gl-fact1.html

U.S. Environmental Protection Agency. (2012). *Great Lakes Factsheet No. 1 Physical Features and Population*. Retrieved October 12, 2012, from The Great Lakes: An Environmental Atlas and Resource Book: http://www.epa.gov/glnpo/atlas/gl-fact1.html

VIII. Attachments

Coastal Scoping data and information, as well as this report and appendices, have been stored digitally on FEMA's MIP Coastal Scoping Data Repository at J:\FEMA\COASTAL SCOPING_DATA_REPOSITORY\R05_DATA\ and can be accessed by FEMA authorized users. The MIP can be accessed from https://hazards.fema.gov/. A username and password is required to access certain data within the MIP.

The final Coastal Scoping report and attachments will also be available for download from http://www.greatlakescoast.org/.

Attachments in this report include:
Attachment A. Coastal Data Request Form (sample)
Attachment C. Draft Coastal Scoping Maps
Attachment D. Proposed Draft Transect Figures

The following attachments will be developed after the Coastal Scoping meeting and provided in the Final Coastal Scoping Report:
Attachment B. Chippewa and Mackinac Counties Pre-Meeting Correspondence
Attachment E. Stakeholder Comments from Coastal Scoping Meeting
Attachment F. Chippewa and Mackinac Counties Coastal Scoping Meeting Documents
Attachment G. Coastal Data Request Form Compilation

Attachment A

Coastal Data Request Form (sample)

Community Coastal Data Request Form

Thank you for taking the time to complete this questionnaire. We are interested in obtaining coastal-specific data for your community. It will provide important information to help FEMA understand coastal flood risk issues in your community and to work with you in increasing your community's resilience to coastal flooding through implementation of the Risk MAP program. In addition, this form can be used as a way to prepare for the upcoming Community Meeting, as the topics on this form will be discussed throughout the meeting.

Once you have completed the questionnaire, please return the form:

Via e-mail: GreatLakesFloodStudy@starr-team.com
By mail: Amol Daxikar, CDM, 50 Hampshire Street, Cambridge, MA 02139
E-mail: Amol.Daxikar@starr-team.com
Phone: (617) 452-6386

Please provide as much information as possible. If you have any questions about the Scoping process or about completing this questionnaire, please contact:

Amol Daxikar

Contact Information	
Community/Organization	
Name:	
Title:	
Address:	
E-mail:	
Phone:	

Contact Preference	☐ Email ☐ Phone ☐ Mail

Please check off the types of data you will provide by June 15, 2014

	Base Map Data	*Please select available data type*	
	Topography (e.g., LiDAR or contour data)	☐ *Hard copy*	☐ *Digital*
	Property information (e.g., Building footprints, parcel data, tax assessor's data)	☐ *Hard copy*	☐ *Digital*
	Land Use	☐ *Hard copy*	☐ *Digital*
	Vegetation Type	☐ *Hard copy*	☐ *Digital*
Coastal Data			
	Coastal structures (e.g., seawalls, levees, jetties, groins, etc.)	☐ *Hard copy*	☐ *Digital*
	Coastal features (i.e., dunes and bluffs)	☐ *Hard copy*	☐ *Digital*
	Shoreline change data	☐ *Hard copy*	☐ *Digital*
	Locations of beach nourishment or dune restoration projects	☐ *Hard copy*	☐ *Digital*
	Areas of significant beach or dune erosion	☐ *Hard copy*	☐ *Digital*
	Mean high water	☐ *Hard copy*	☐ *Digital*
	Mean lake level	☐ *Hard copy*	☐ *Digital*
	Anecdotal or historical wave height information		
Other Data			
	Hydraulic structures (e.g., bridges, culverts, levees, dams) with inspection status, if available	☐ *Hard copy*	☐ *Digital*
	Elevated roads	☐ *Hard copy*	☐ *Digital*
	Critical facilities	☐ *Hard copy*	☐ *Digital*
	Other relevant data	☐ *Hard copy*	☐ *Digital*

Please provide the following information about the community:

Historical Flood Data		
Are you aware of any coastal flooding issues not represented on effective FIRMs:	☐ yes ☐ no	If yes, please explain and provide inundation areas of historic flooding events if available.
Risk Assessment		
Does your community have HAZUS-based loss estimates from average annualized loss?	☐ yes ☐ no	If yes, please describe:
Does your community have other risk assessment data?	☐ yes ☐ no	If yes, please describe:

Does your community have areas of recent or planned development/re-development and areas of high growth or other natural land changes (e.g., wildfires or landslides):	☐ yes ☐ no	If yes, please describe:
Are there any locations of other ongoing studies or projects and studied areas that have been modified since the effective map and require an updated study (e.g., highway improvement, seawall improvement, etc.)	☐ yes ☐ no	If yes, please describe:
Any other comments/concerns based on local knowledge:		

Attachment C

Draft Coastal Scoping Maps

MAP SYMBOLOGY

LEGEND

- Transects
- Shoreline
- Dams
- USGS Gages
- Letters of Map Change
- Coastal Barrier Resource System

Effective Flood Hazard Areas

- ZONE A
- ZONE AE
- 0.2% ANNUAL CHANCE FLOOD

AAL Data

- Less than $10,000
- $10,001 - $100,000
- $100,001 - $1,000,000
- $1,000,001 - $5,000,000
- Greater than $5,000,000

Coordinated Needs Management Strategy

- Unverified
- Unknown
- Valid

N
W E
S

0 50 100 200 Miles

COASTAL STUDY LOCATOR

NATIONAL FLOOD INSURANCE PROGRAM

Draft Coastal Scoping Map

LAKE SUPERIOR/HURON COASTAL STUDY

CHIPPEWA COUNTY, MICHIGAN COASTAL STUDY COMMUNITIES

Bay Mills, Township of
Bay Mills Indian Community
Bruce, Township of
Chippewa, Township of
Dafter, Township of
Detour, Township of
Detour, Village of
Drummond Island, Township of
Pickford, Township of
Raber, Township of
Sault Sainte Marie, City of
Sault Sainte Marie Tribe of Chippewa
Soo, Township of
Sugar Island, Township of
Superior, Township of
Whitefish, Township of

STARR

FEMA

CHIPPEWA COUNTY

MACKINAC COUNTY

EMMET COUNTY

CHEBOYGAN COUNTY

PRESQUE ISLE COUNTY

Lake Huron

Sources: Esri, DeLorme, HERE, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

MAP SYMBOLOGY

LEGEND

- Transects
- Shoreline
- Dams
- USGS Gages
- Letters of Map Change
- Coastal Barrier Resource System

AAL Data

- Less than $10,000
- $10,001 - $100,000
- $100,001 - $1,000,000
- $1,000,001 - $5,000,000
- Greater than $5,000,000

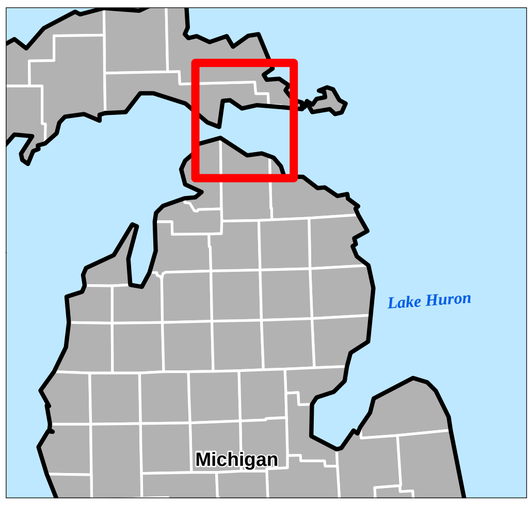
Coordinated Needs Management Strategy

- Unverified
- Unknown
- Valid

W E S

0 3 6 Miles

COASTAL STUDY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

Draft Coastal Scoping Map

LAKE HURON COASTAL STUDY

MACKINAC COUNTY, MICHIGAN COASTAL STUDY COMMUNITIES

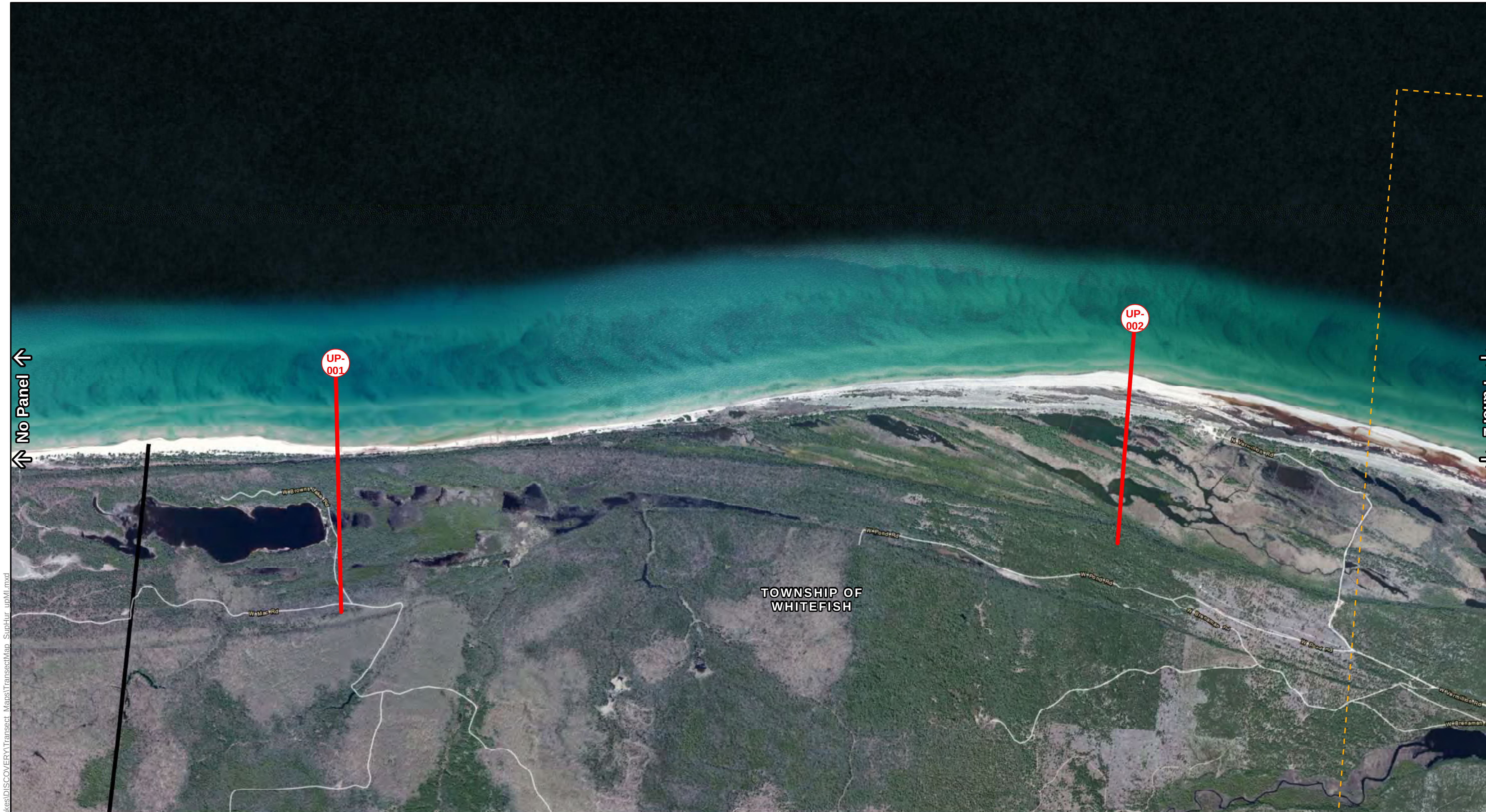
Bois Blanc, Township of
Clark, Township of
Mackinac Island, City of
Marquette, Township of
St. Ignace, City of
St. Ignace, Township of

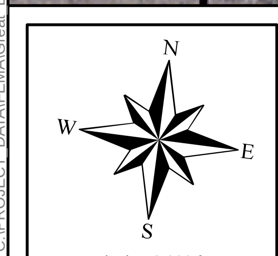
STARR

FEMA

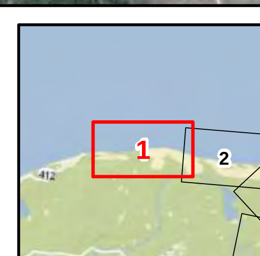
Attachment D

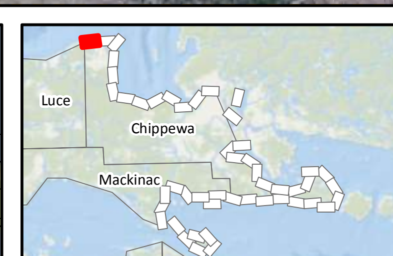
Proposed Draft Transect Figures





Project Transect
Adjoining Panel Edge
Political Boundary



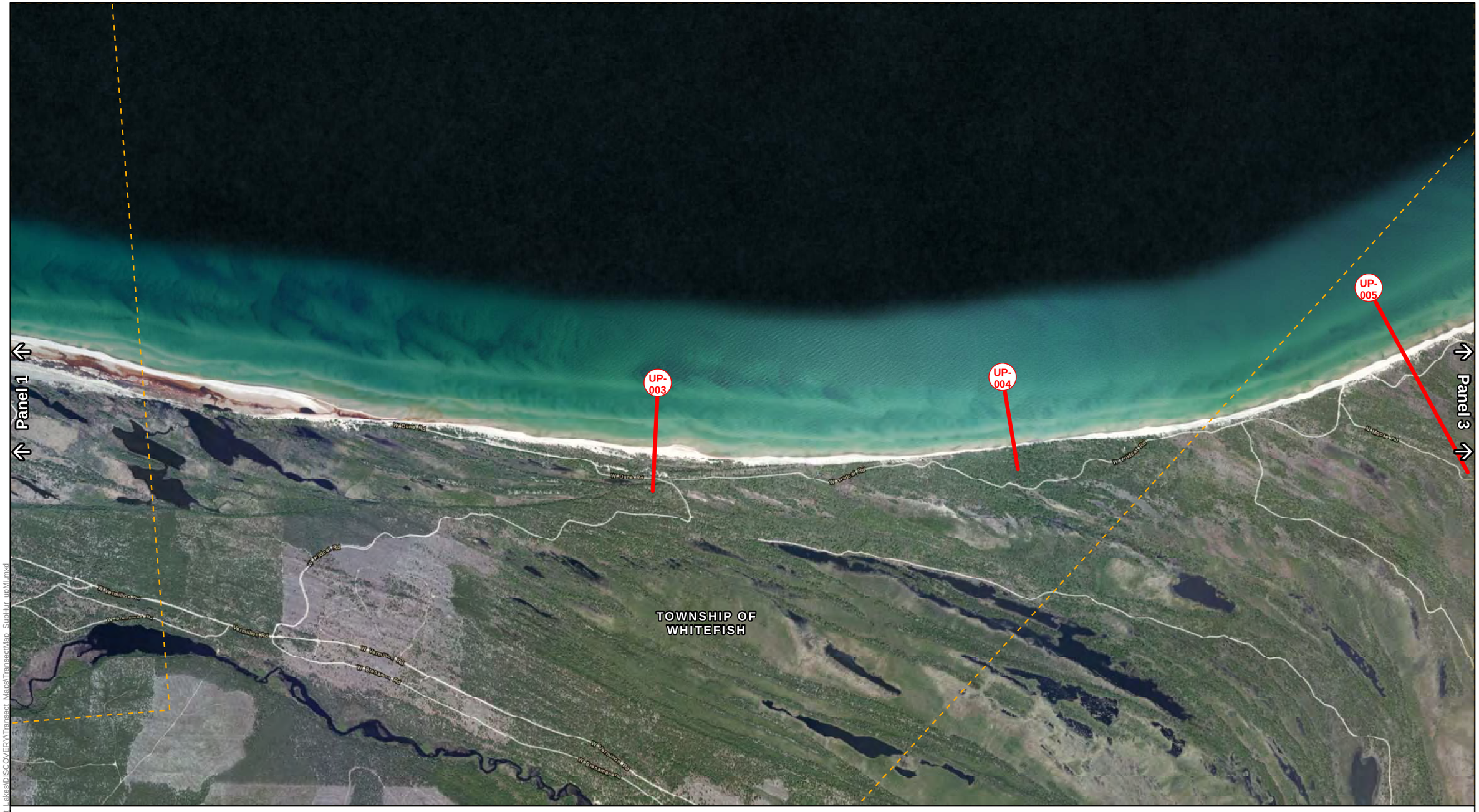


COUNTIES
CHIPPEWA COUNTY
LUCE COUNTY

COMMUNITIES
TOWNSHIP OF WHITEFISH

FEMA STARR

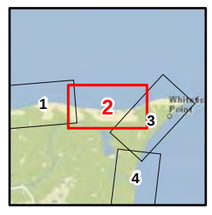
Lakes Superior and Huron
DRAFT TRANSECTS
Panel 1 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

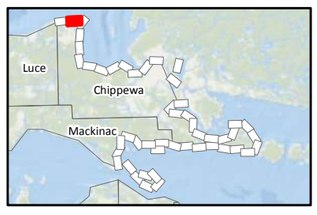


Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

N
W E
S
1 inch = 2,000 feet

Project Transect
Adjoining Panel Edge
Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF WHITEFISH

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 2 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

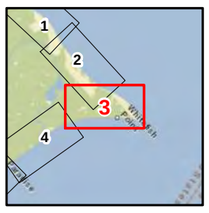
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

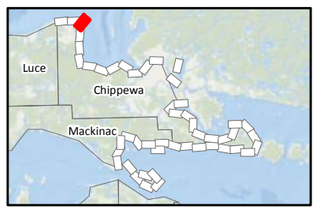
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary



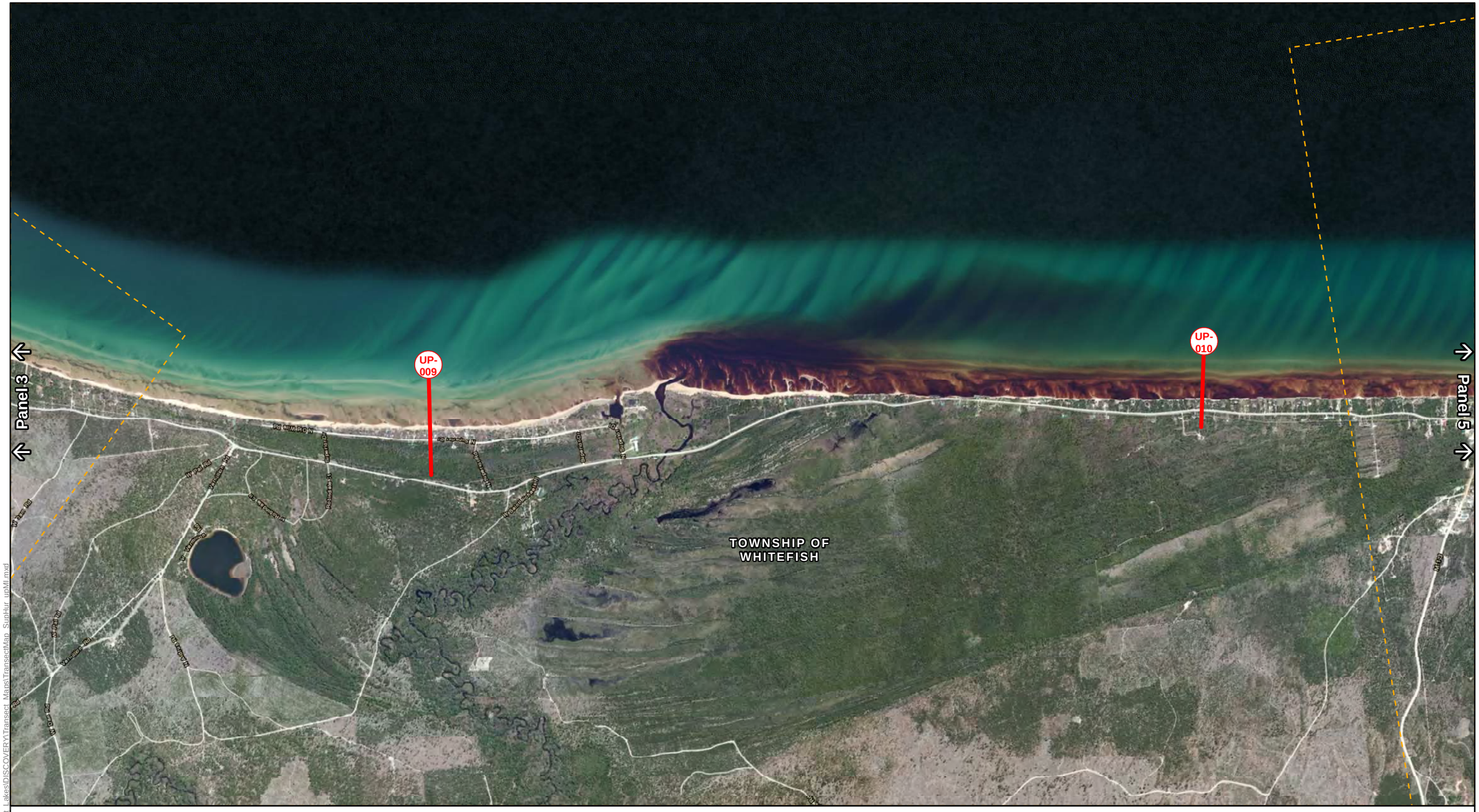


COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF WHITEFISH

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 3 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

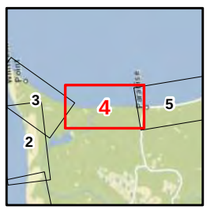


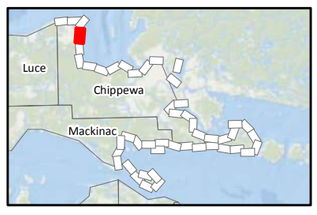
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF WHITEFISH

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 4 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

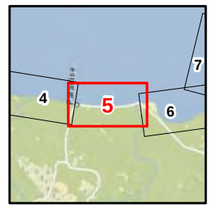
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

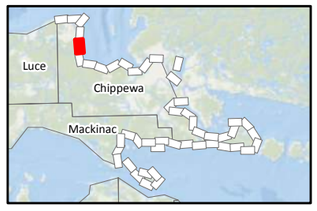
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF WHITEFISH

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 5 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

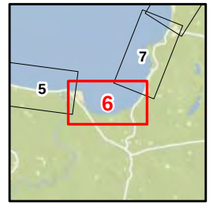
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

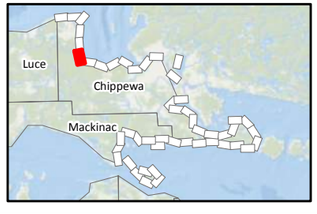
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary



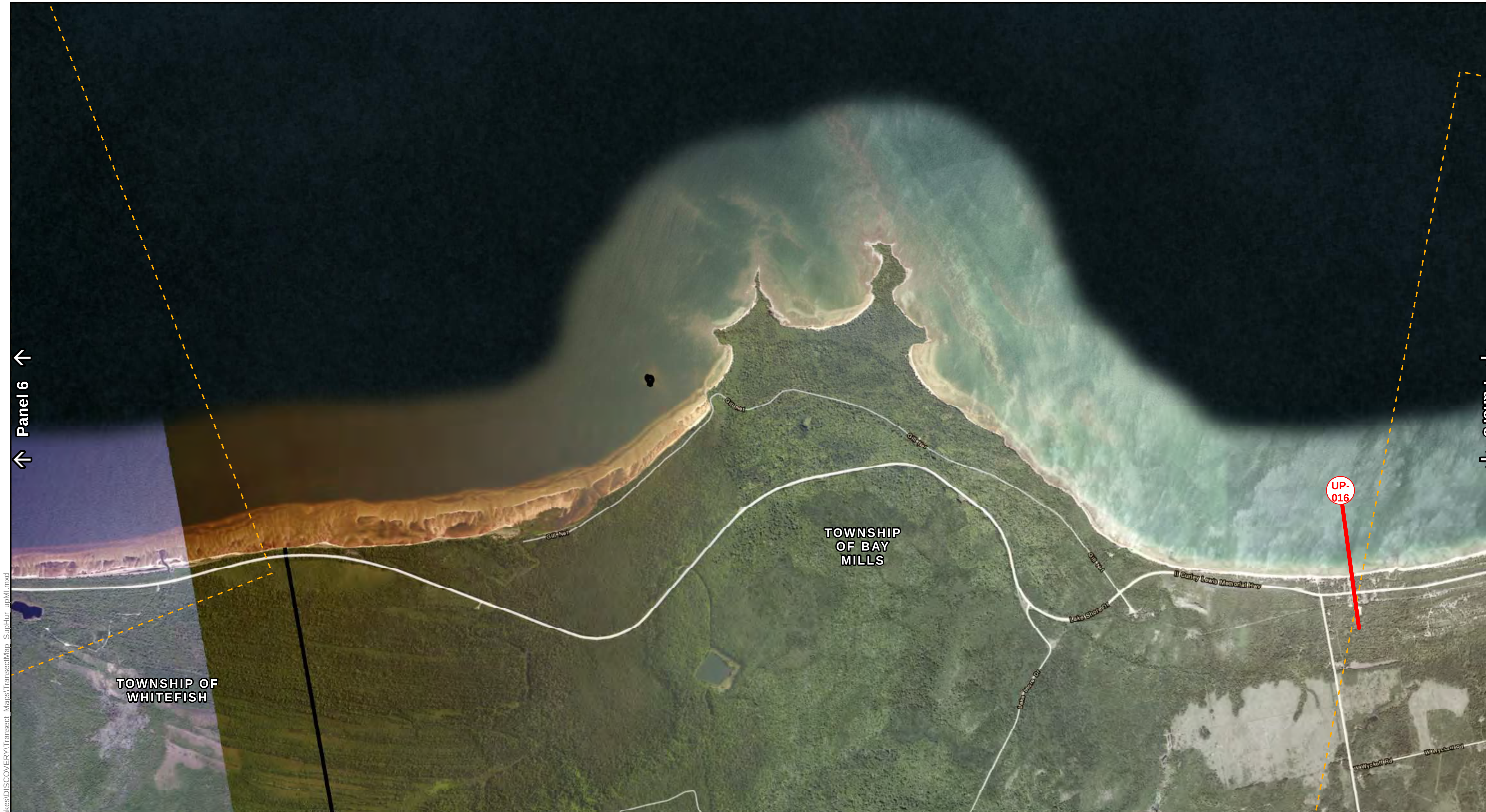


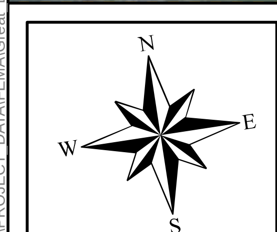
COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF WHITEFISH

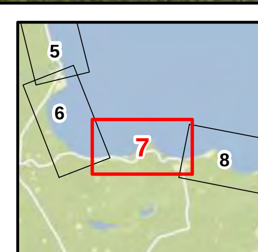
FEMA STARR

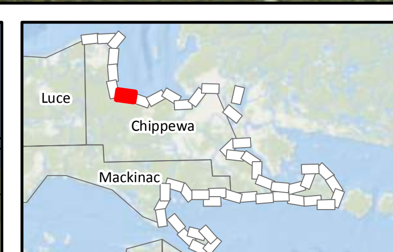
Lakes Superior and Huron
DRAFT TRANSECTS
Panel 6 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)





Project Transect
Adjoining Panel Edge
Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF WHITEFISH
TOWNSHIP OF BAY MILLS

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 7 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT DATA\FEMA\Great Lakes\DISCOVERY\Transect Maps\TransectMap SupHur upMI.mxd

UP-017

Panel 7

Panel 9

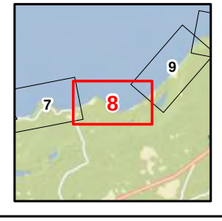
TOWNSHIP OF BAY MILLS

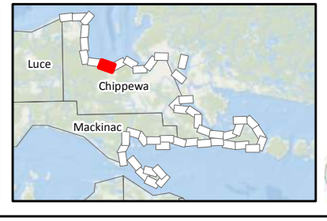
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF BAY MILLS

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 8 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

UP-017

UP-018

UP-019

Panel 8

Panel 10

TOWNSHIP OF BAY MILLS

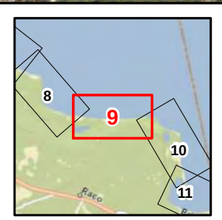
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

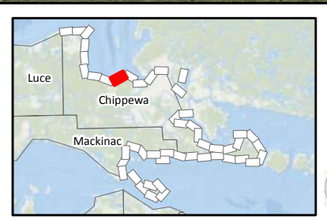
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary



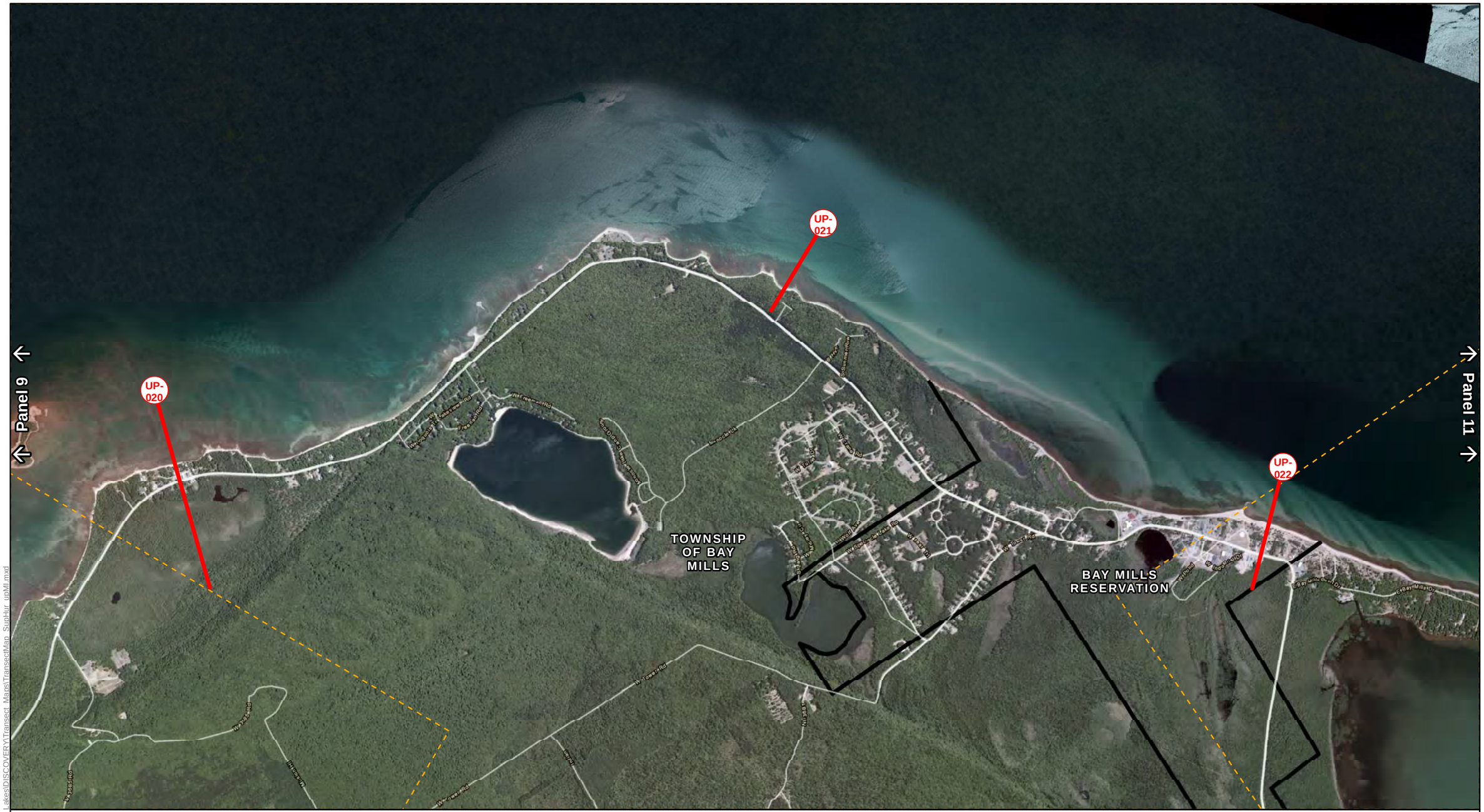


COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF BAY MILLS

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 9 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

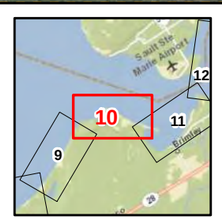


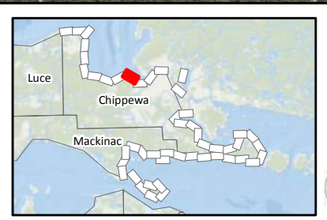
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF BAY MILLS
BAY MILLS RESERVATION

FEMA STARR

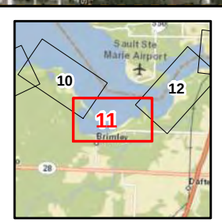
Lakes Superior and Huron
DRAFT TRANSECTS
Panel 10 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

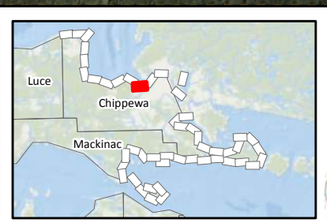
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

N
W E
S
1 inch = 2,000 feet

- Project Transect
- Adjoining Panel Edge
- Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
BAY MILLS RESERVATION
TOWNSHIP OF BAY MILLS
TOWNSHIP OF DAFTER
TOWNSHIP OF SOO
TOWNSHIP OF SUPERIOR

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 11 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

TOWNSHIP OF BAY MILLS

TOWNSHIP OF SOO

CITY OF SAULT STE MARIE

UP-026

UP-027

Panel 11

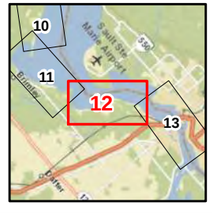
Panel 13

1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary



COUNTIES

CHIPPEWA COUNTY

COMMUNITIES

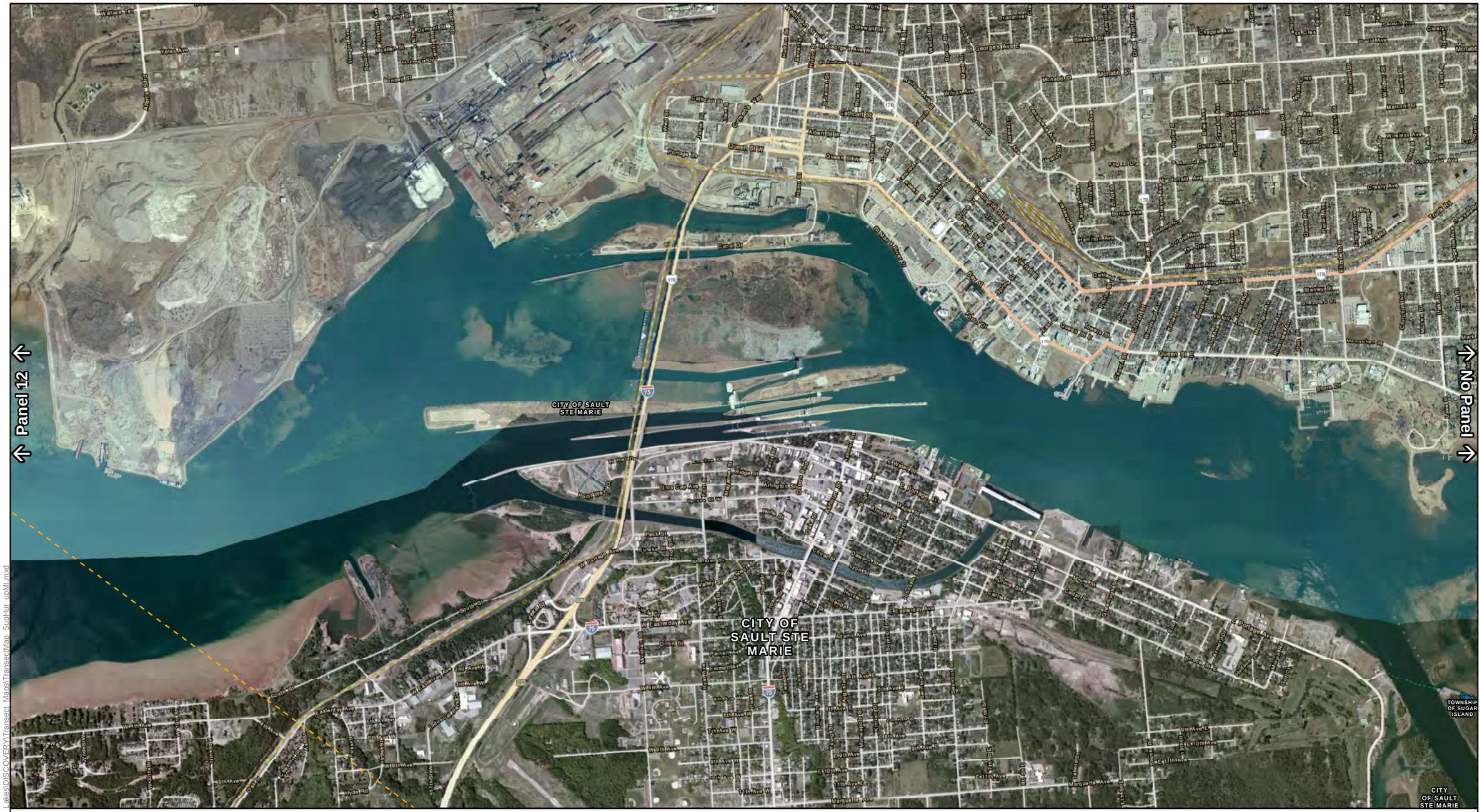
CITY OF SAULT STE MARIE
TOWNSHIP OF BAY MILLS
TOWNSHIP OF DAFTER
TOWNSHIP OF SOO

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 12 of 49

(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Mains\TransectMap_SupHur_upMI.mxd



1 inch = 2,000 feet

— Project Transect

┅ Adjoining Panel Edge

— Political Boundary

COUNTIES

CHIPPEWA COUNTY

COMMUNITIES

CITY OF SAULT STE MARIE
TOWNSHIP OF SUGAR ISLAND

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 13 of 49
(Map Set: MI Upper Peninsula -
Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

TOWNSHIP OF SUGAR ISLAND

UP-028

No Panel

No Panel

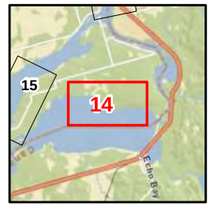
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

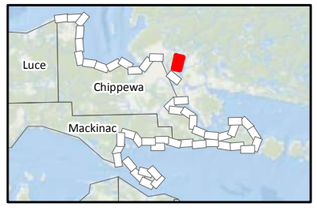
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF SUGAR ISLAND

FEMA STARR

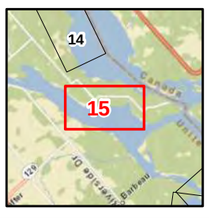
Lakes Superior and Huron
DRAFT TRANSECTS
Panel 14 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

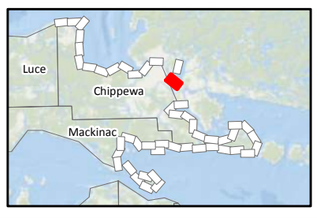
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
BAY MILLS RESERVATION
TOWNSHIP OF BRUCE
TOWNSHIP OF SUGAR ISLAND

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 15 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

TOWNSHIP OF BRUCE

TOWNSHIP OF SOO

Panel 17

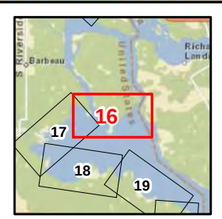
No Panel

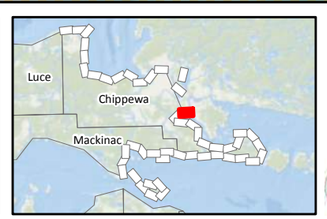
N
W E
S
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF SOO
TOWNSHIP OF BRUCE

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 16 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upM.mxd

TOWNSHIP OF BRUCE

TOWNSHIP OF PICKFORD

UP-030

Panel 18

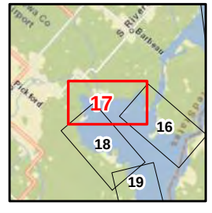
Panel 16

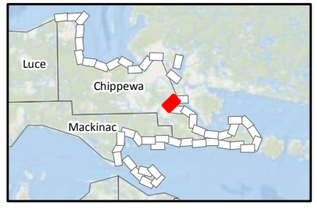
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF PICKFORD
TOWNSHIP OF BRUCE

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 17 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

Panel 17

Panel 19

UP-031

TOWNSHIP OF PICKFORD

TOWNSHIP OF RABER

E Gogomain Rd

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

N

W E

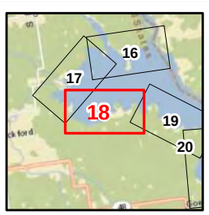
S

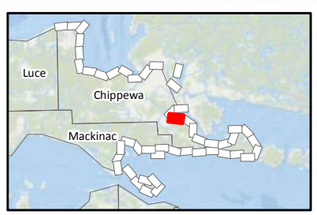
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary



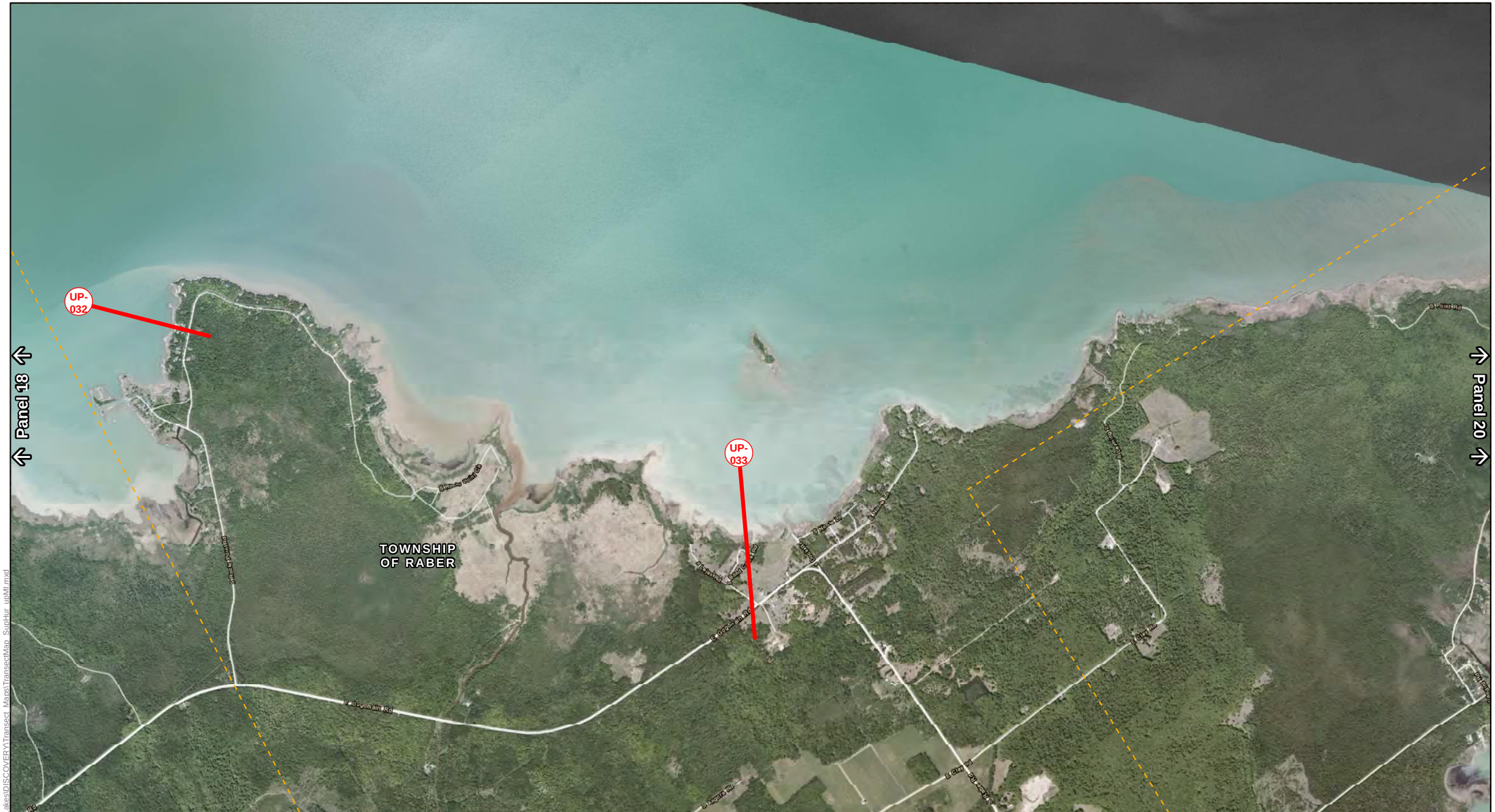


COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF RABER
TOWNSHIP OF PICKFORD

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 18 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)



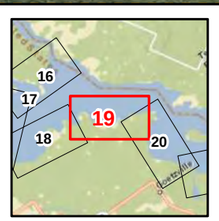
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Mans\TransectMap_SupHur_upMI.mxd

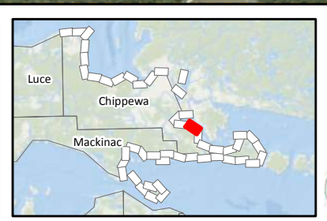
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF RABER

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 19 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

UP-034

UP-035

Panel 19

Panel 21

TOWNSHIP OF RABER

TOWNSHIP OF DETOUR

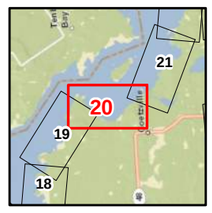
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

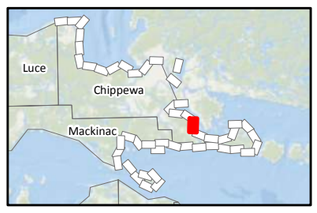
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

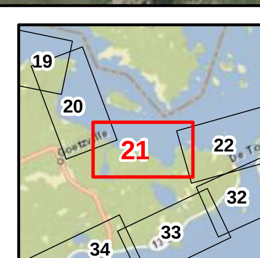
COMMUNITIES
TOWNSHIP OF RABER
TOWNSHIP OF DETOUR

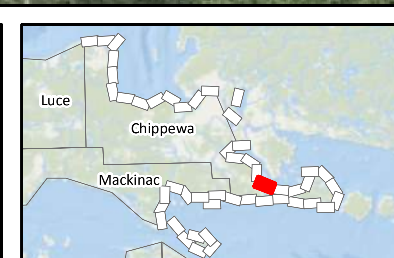
FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 20 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

1 inch = 2,000 feet

Project Transect
Adjoining Panel Edge
Political Boundary



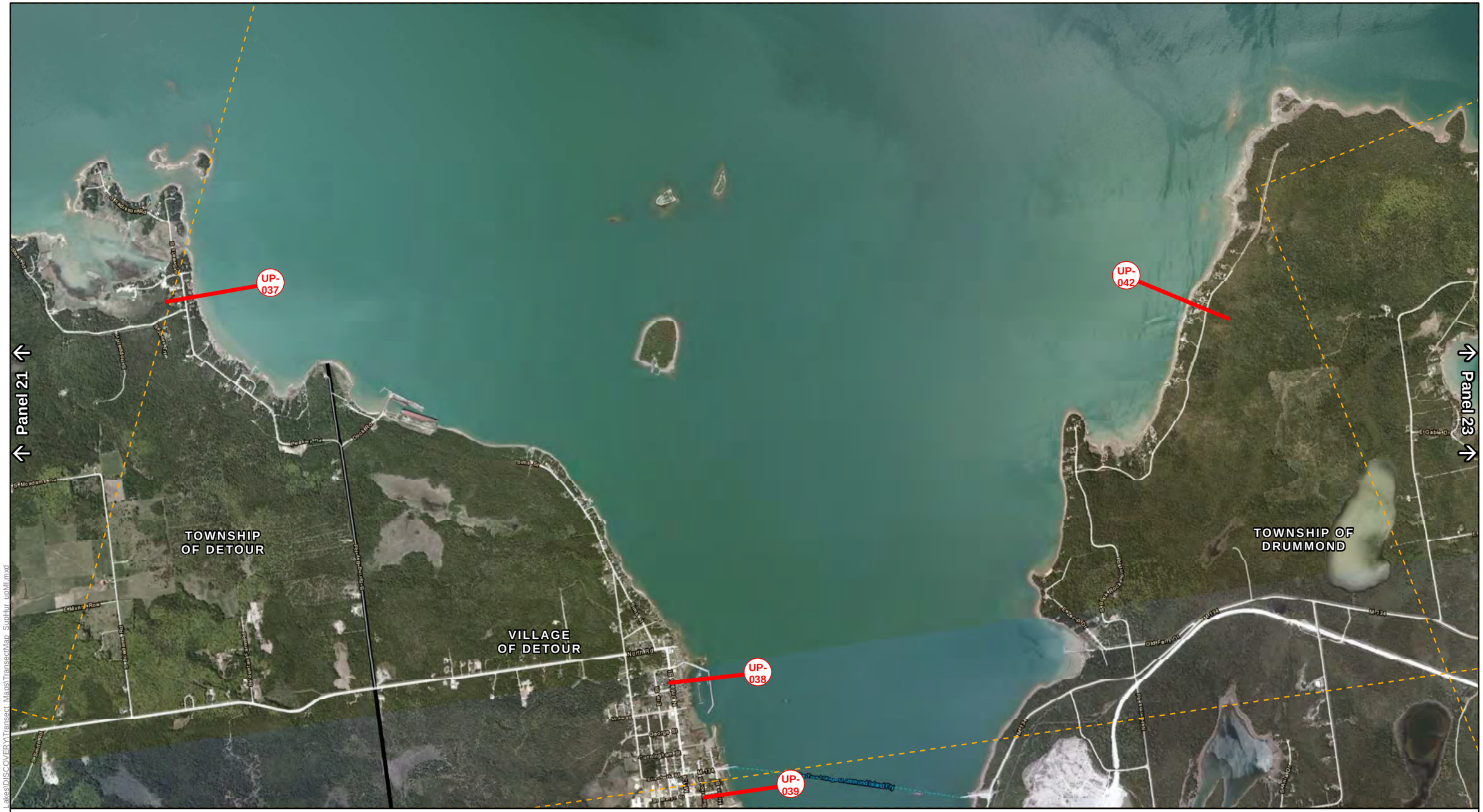


COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF DETOUR

FEMA STARR

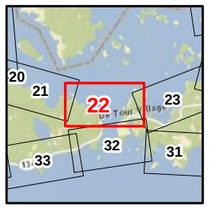
Lakes Superior and Huron
DRAFT TRANSECTS
Panel 21 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

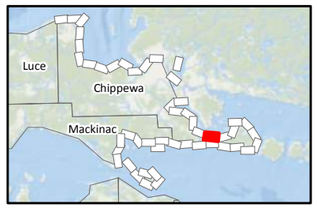


Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

N
W E
S
1 inch = 2,000 feet

Project Transect
Adjoining Panel Edge
Political Boundary



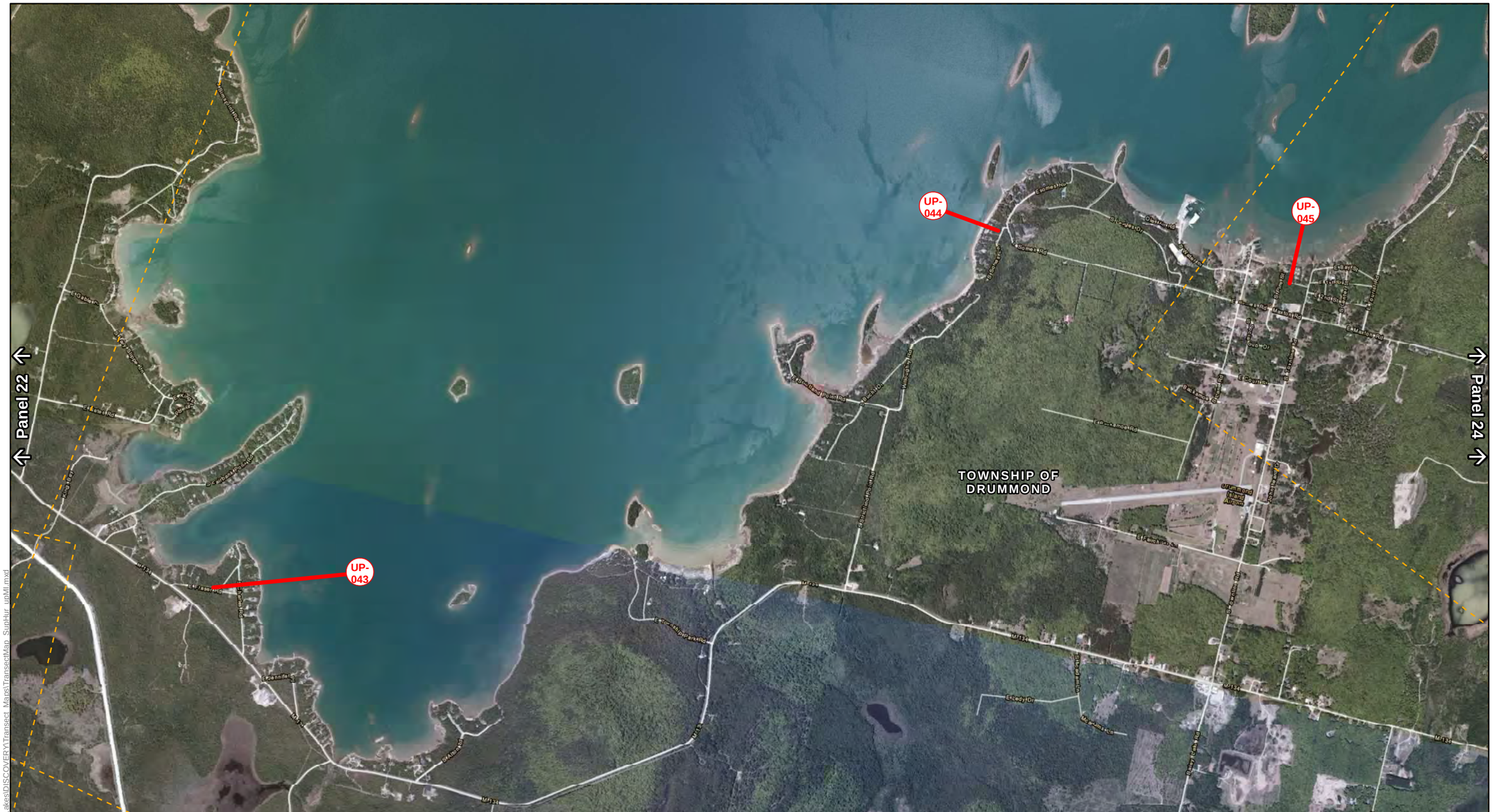


COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
VILLAGE OF DETOUR
TOWNSHIP OF DRUMMOND
TOWNSHIP OF DETOUR

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 22 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)



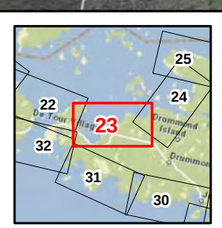
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

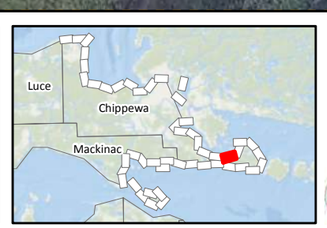
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary



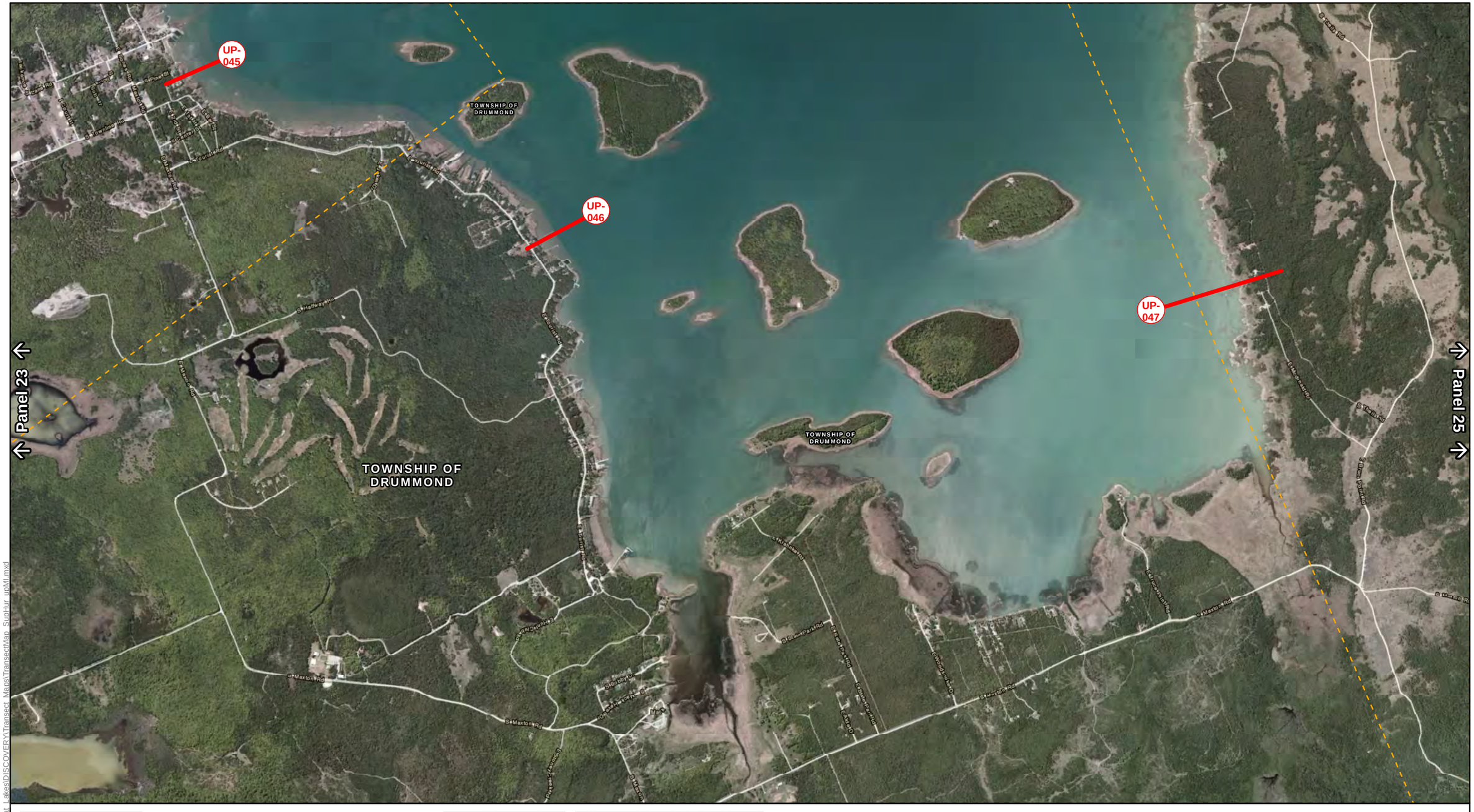


COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF DRUMMOND

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 23 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)



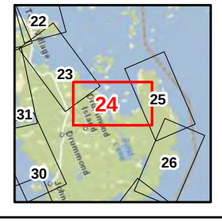
Path: C:\PROJECT_DATA\FEMA\GreatLakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

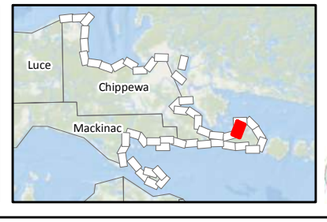
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF DRUMMOND

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 24 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

UP-048

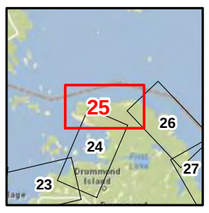
TOWNSHIP OF DRUMMOND

Panel 24

Panel 26

N
W
E
S
1 inch = 2,000 feet

Project Transect
Adjoining Panel Edge
Political Boundary



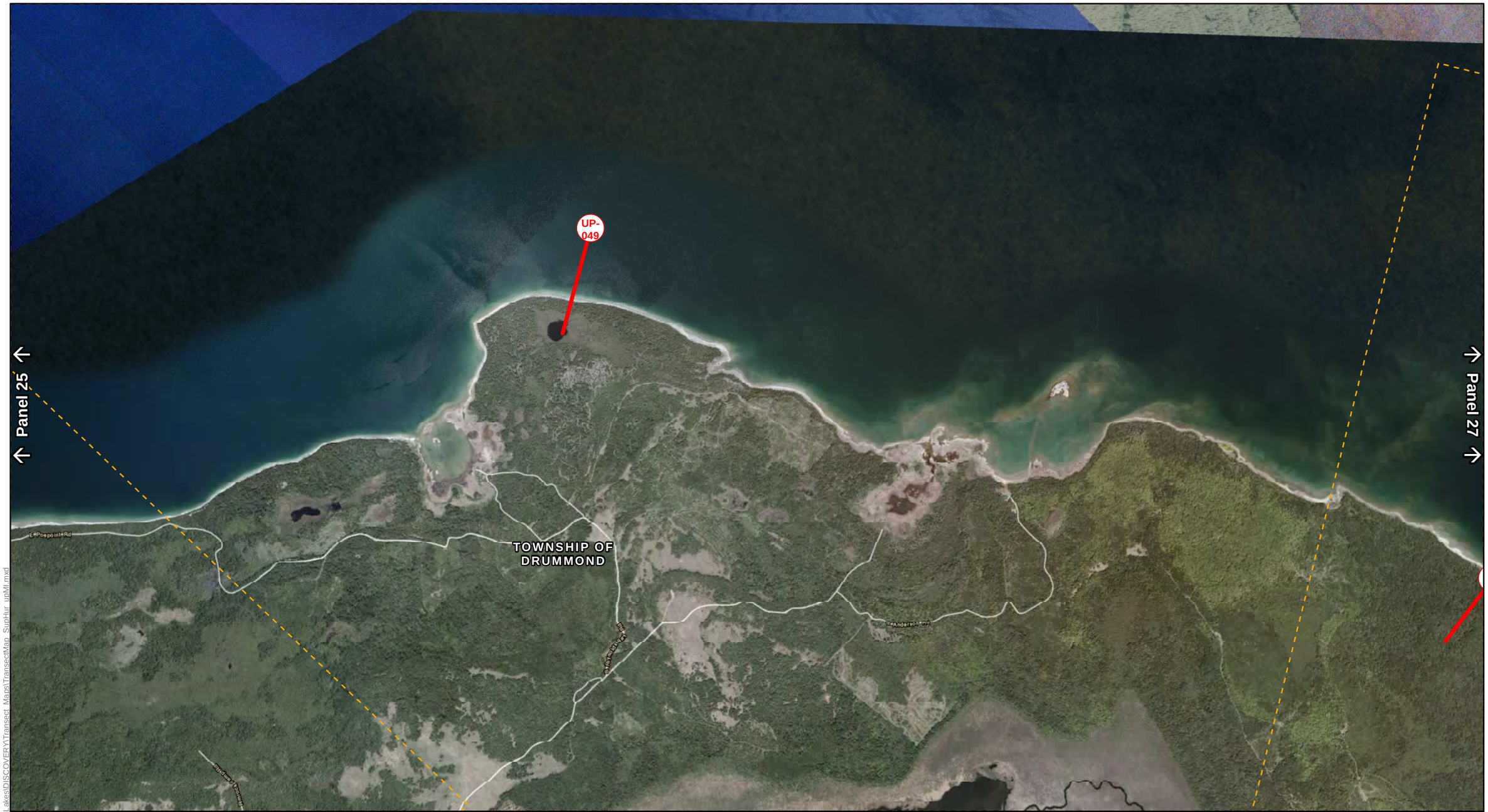
COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF DRUMMOND

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 25 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_unMI.mxd



1 inch = 2,000 feet

🟥 Project Transect
▭ Adjoining Panel Edge
╱╲ Political Boundary

COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF DRUMMOND

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 26 of 49
(Map Set: MI Upper Peninsula -
Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

Panel 26

Panel 28

UP-050

TOWNSHIP OF DRUMMOND

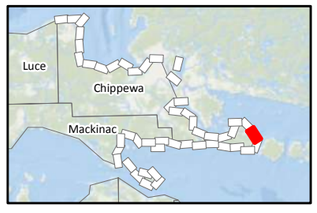
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary



COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF DRUMMOND

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 27 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

TOWNSHIP OF DRUMMOND

Panel 29

Panel 27

UP-053

UP-052

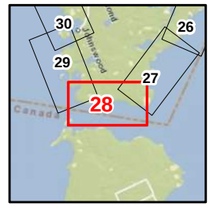
UP-051

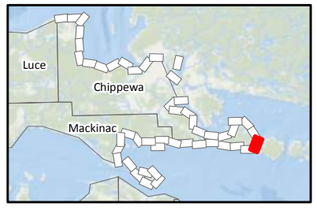
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF DRUMMOND

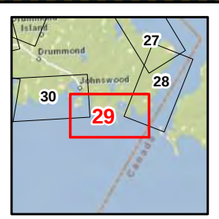
FEMA STARR

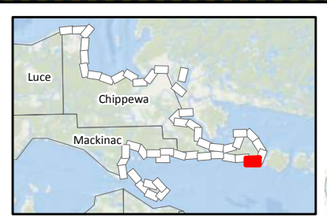
Lakes Superior and Huron
DRAFT TRANSECTS
Panel 28 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

N
W E
S
1 inch = 2,000 feet

Project Transect
Adjoining Panel Edge
Political Boundary





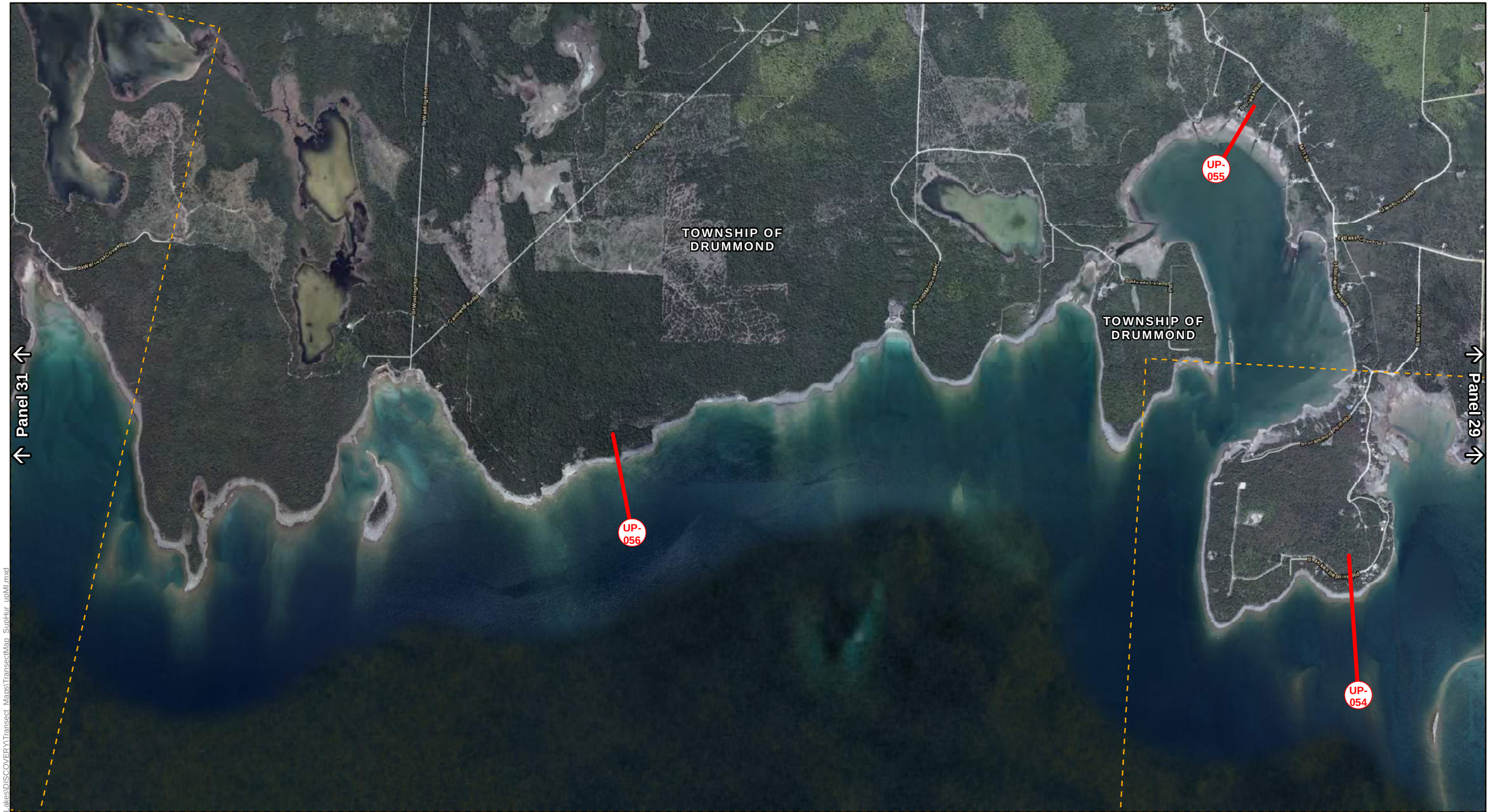
COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF DRUMMOND

FEMA STARR

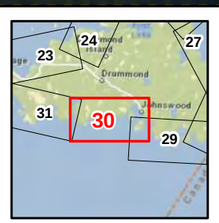
Lakes Superior and Huron
DRAFT TRANSECTS
Panel 29 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

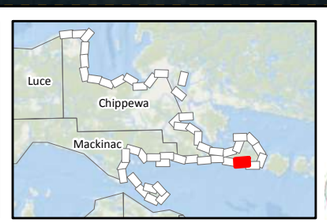
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Mains\TransectMap_SupHur_upMI.mxd



N
W E
S
1 inch = 2,000 feet

Project Transect
Adjoining Panel Edge
Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF DRUMMOND

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 30 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

TOWNSHIP OF DRUMMOND

Panel 32

Panel 30

UP-058

UP-057

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

N

W E

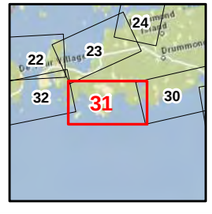
S

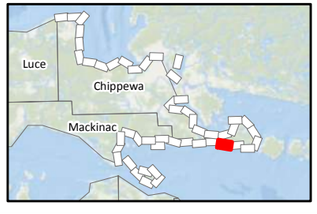
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF DRUMMOND

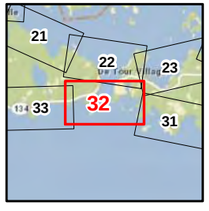
FEMA STARR

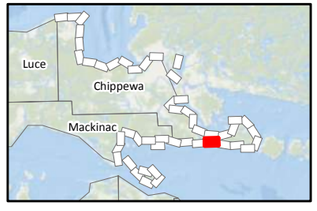
Lakes Superior and Huron
DRAFT TRANSECTS
Panel 31 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES

CHIPPEWA COUNTY

COMMUNITIES

VILLAGE OF DETOUR
TOWNSHIP OF DRUMMOND
TOWNSHIP OF DETOUR

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 32 of 49

(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Mans\TransectMap_SupHur_upMI.mxd

TOWNSHIP
OF DETOUR

Panel 34

Panel 32

UP-065

UP-064

UP-063

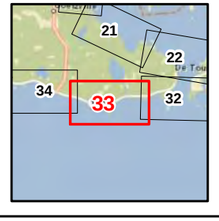
UP-062

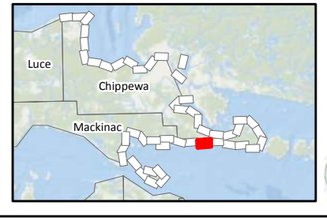
N
W
E
S
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF DETOUR

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 33 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Mans\TransectMap_SupHur_upMI.mxd

TOWNSHIP OF RABER

TOWNSHIP OF CLARK

TOWNSHIP OF DETOUR

UP-067

UP-066

UP-065

Panel 35

TOWNSHIP OF CLARK

Panel 33

N

W E

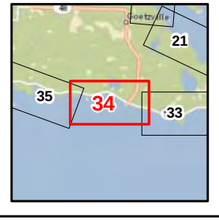
S

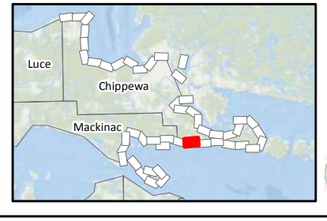
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES

CHIPPEWA COUNTY
MACKINAC COUNTY

COMMUNITIES

TOWNSHIP OF RABER
TOWNSHIP OF DETOUR
TOWNSHIP OF CLARK

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 34 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Mans\TransectMap_SupHur_upMI.mxd

TOWNSHIP OF RABER

TOWNSHIP OF CLARK

TOWNSHIP OF CLARK

TOWNSHIP OF CLARK

TOWNSHIP OF CLARK

TOWNSHIP OF CLARK

UP-069

UP-068

UP-070

Panel 36

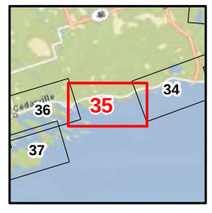
Panel 34

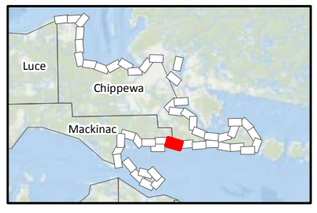
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
MACKINAC COUNTY
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF RABER
TOWNSHIP OF CLARK

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 35 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

TOWNSHIP OF RABER

TOWNSHIP OF CLARK

TOWNSHIP OF DETOUR

UP-067

UP-066

UP-065

Panel 35

TOWNSHIP OF CLARK

Panel 33

N

W E

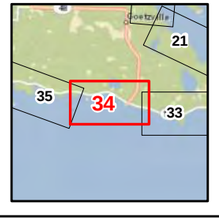
S

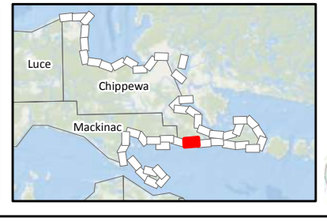
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES

CHIPPEWA COUNTY
MACKINAC COUNTY

COMMUNITIES

TOWNSHIP OF RABER
TOWNSHIP OF DETOUR
TOWNSHIP OF CLARK

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 34 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Mans\TransectMap_SupHur_upMI.mxd

TOWNSHIP OF RABER

TOWNSHIP OF CLARK

TOWNSHIP OF CLARK

TOWNSHIP OF CLARK

TOWNSHIP OF CLARK

TOWNSHIP OF CLARK

UP-069

UP-068

UP-070

Panel 36

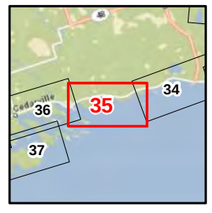
Panel 34

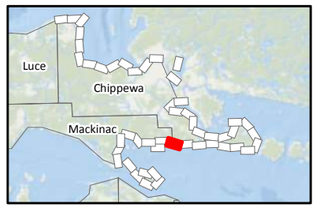
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





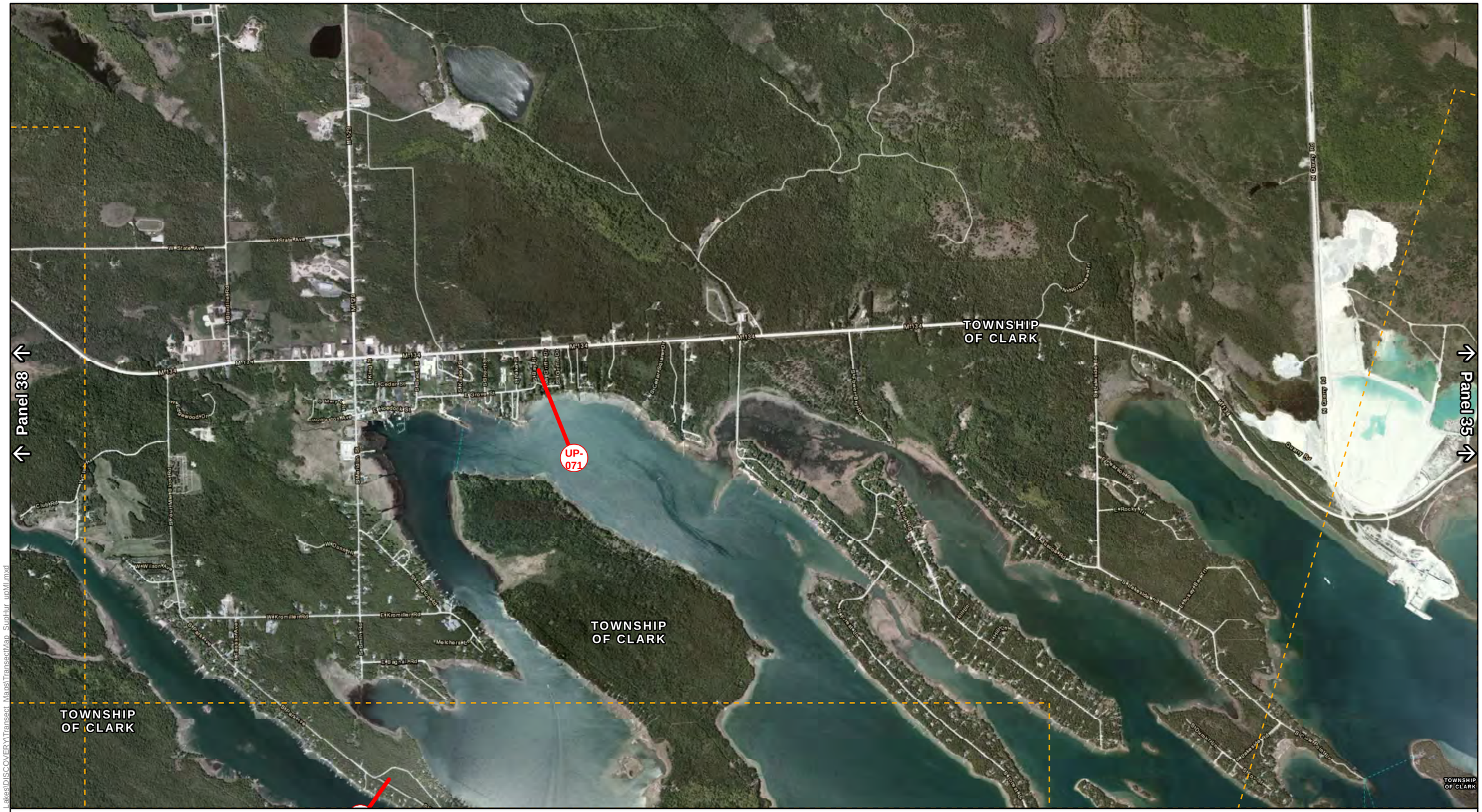
COUNTIES
MACKINAC COUNTY
CHIPPEWA COUNTY

COMMUNITIES
TOWNSHIP OF RABER
TOWNSHIP OF CLARK

FEMA STARR

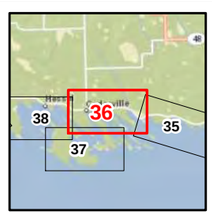
Lakes Superior and Huron
DRAFT TRANSECTS
Panel 35 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

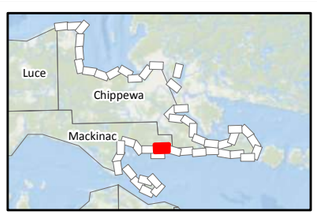
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd



N
W E
S
1 inch = 2,000 feet

Project Transect
Adjoining Panel Edge
Political Boundary





COUNTIES
MACKINAC COUNTY

COMMUNITIES
TOWNSHIP OF CLARK

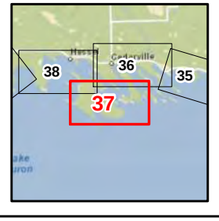
FEMA STARR

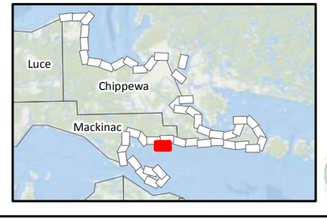
Lakes Superior and Huron
DRAFT TRANSECTS
Panel 36 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

N
W E
S
1 inch = 2,000 feet

Project Transect
Adjoining Panel Edge
Political Boundary





COUNTIES
MACKINAC COUNTY

COMMUNITIES
TOWNSHIP OF CLARK

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 37 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

TOWNSHIP OF MARQUETTE

TOWNSHIP OF CLARK

TOWNSHIP OF CLARK

TOWNSHIP OF CLARK

UP-076

UP-075

UP-077

Panel 39

Panel 36

N

W E

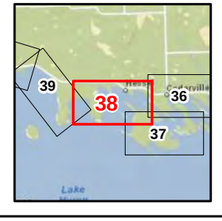
S

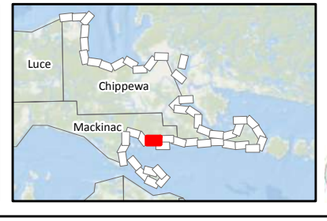
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES

MACKINAC COUNTY

COMMUNITIES

TOWNSHIP OF MARQUETTE

TOWNSHIP OF CLARK

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 38 of 49

(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\AGreat_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

TOWNSHIP OF MARQUETTE

TOWNSHIP OF CLARK

Panel 40

Panel 38

UP-079

UP-078

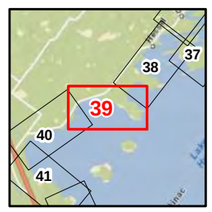
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

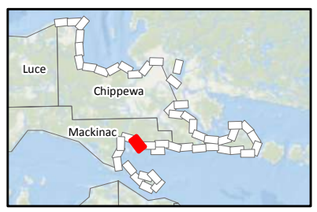
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
MACKINAC COUNTY

COMMUNITIES
TOWNSHIP OF MARQUETTE
TOWNSHIP OF CLARK

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 39 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

TOWNSHIP OF ST IGNACE

TOWNSHIP OF MARQUETTE

Panel 41

Panel 39

UP-081

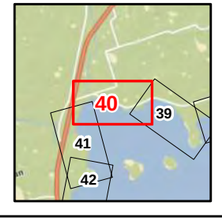
UP-080

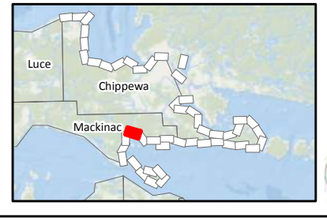
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
MACKINAC COUNTY

COMMUNITIES
TOWNSHIP OF ST IGNACE
TOWNSHIP OF MARQUETTE

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 40 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\AGreat_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

UP-081

UP-082

UP-083

Panel 40

Panel 42

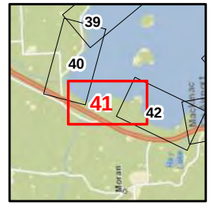
TOWNSHIP OF ST IGNACE

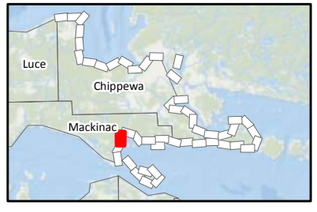
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
MACKINAC COUNTY

COMMUNITIES
TOWNSHIP OF ST IGNACE

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 41 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

UP-083

UP-084

UP-085

UP-086

Panel 41

Panel 43

SAULT STE. MARIE INDIAN RESERVATION

TOWNSHIP OF ST IGNACE

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

N

E

S

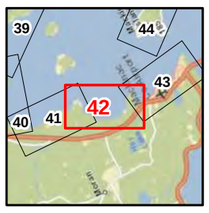
W

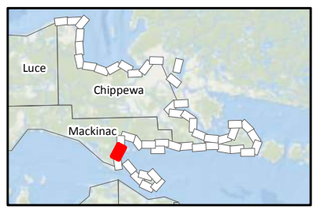
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES

MACKINAC COUNTY

COMMUNITIES

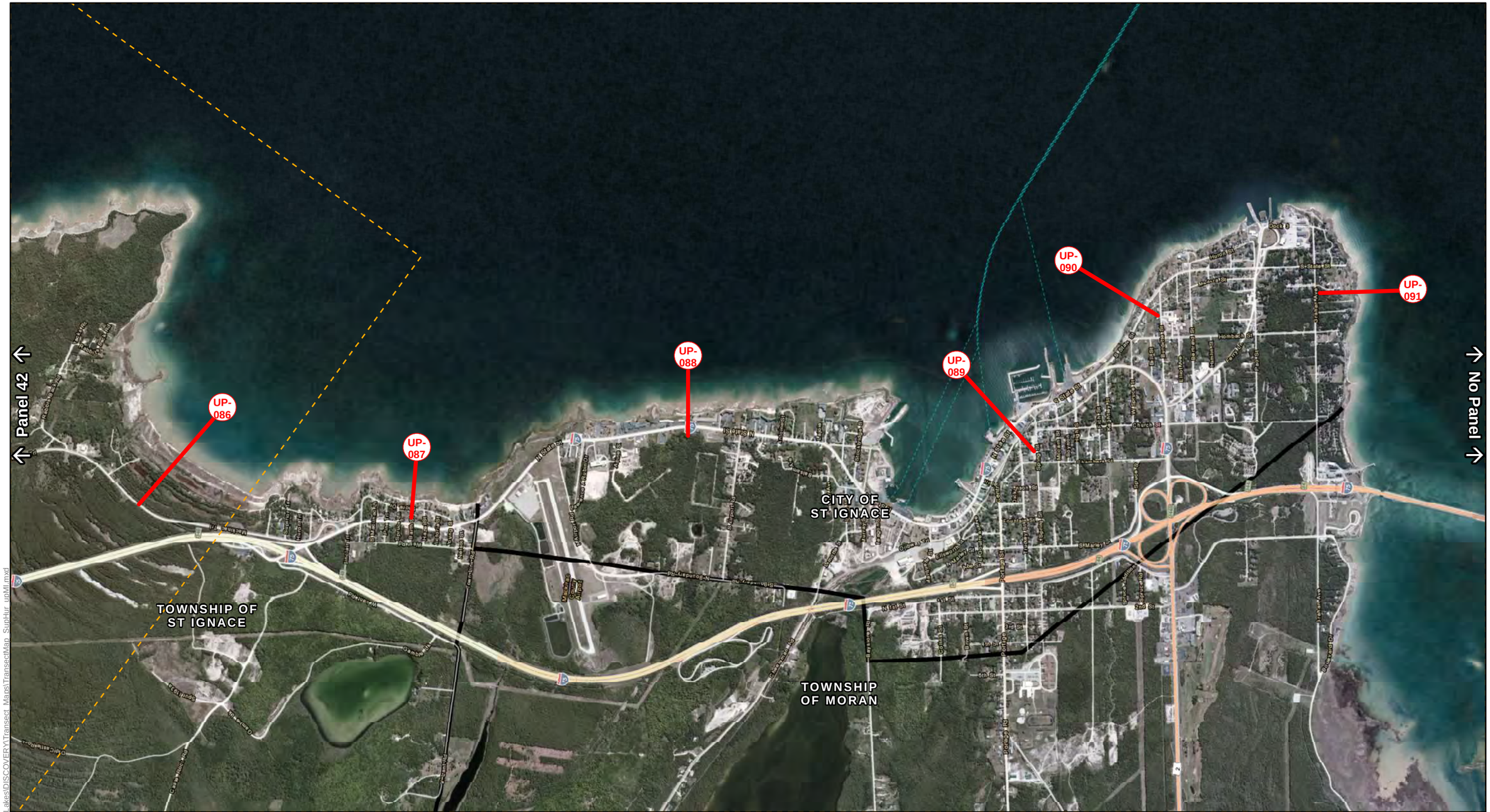
TOWNSHIP OF ST IGNACE

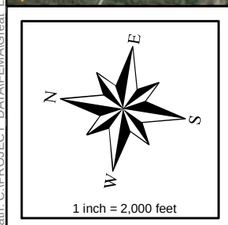
SAULT STE. MARIE INDIAN RESERVATION

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 42 of 49

(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

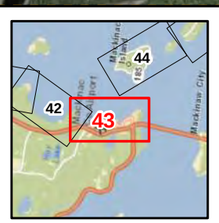


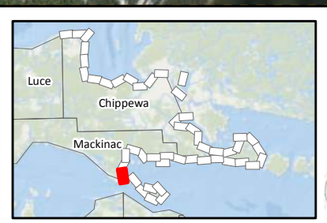


Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
MACKINAC COUNTY

COMMUNITIES
CITY OF ST IGNACE
TOWNSHIP OF MORAN
TOWNSHIP OF ST IGNACE

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 43 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

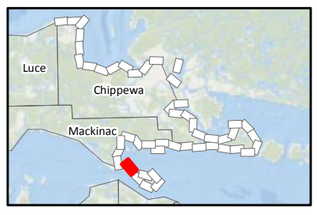
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary



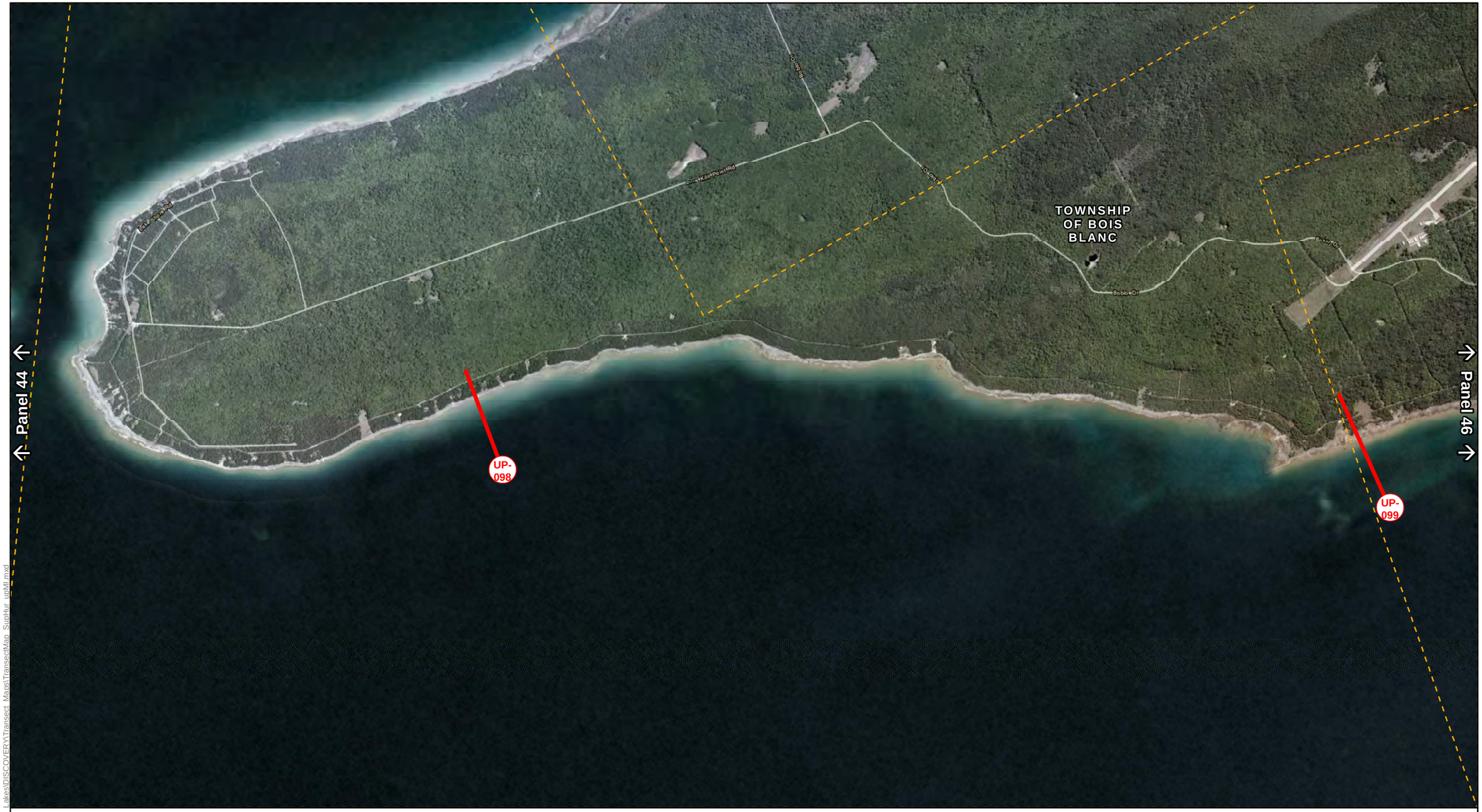
COUNTIES
MACKINAC COUNTY

COMMUNITIES
CITY OF MACKINAC ISLAND

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 44 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

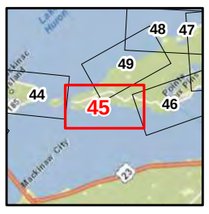


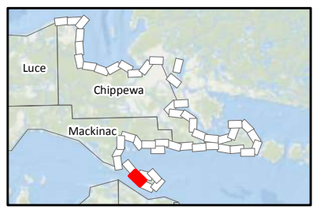
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





COUNTIES
MACKINAC COUNTY

COMMUNITIES
TOWNSHIP OF BOIS BLANC

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 45 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Mans\TransectMap_SupHur_upMI.mxd

TOWNSHIP OF
BOIS BLANC

UP-100

Panel 45

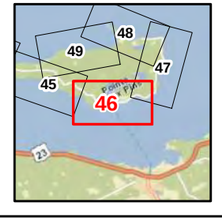
Panel 47

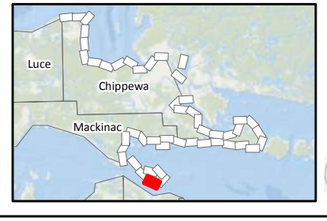
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





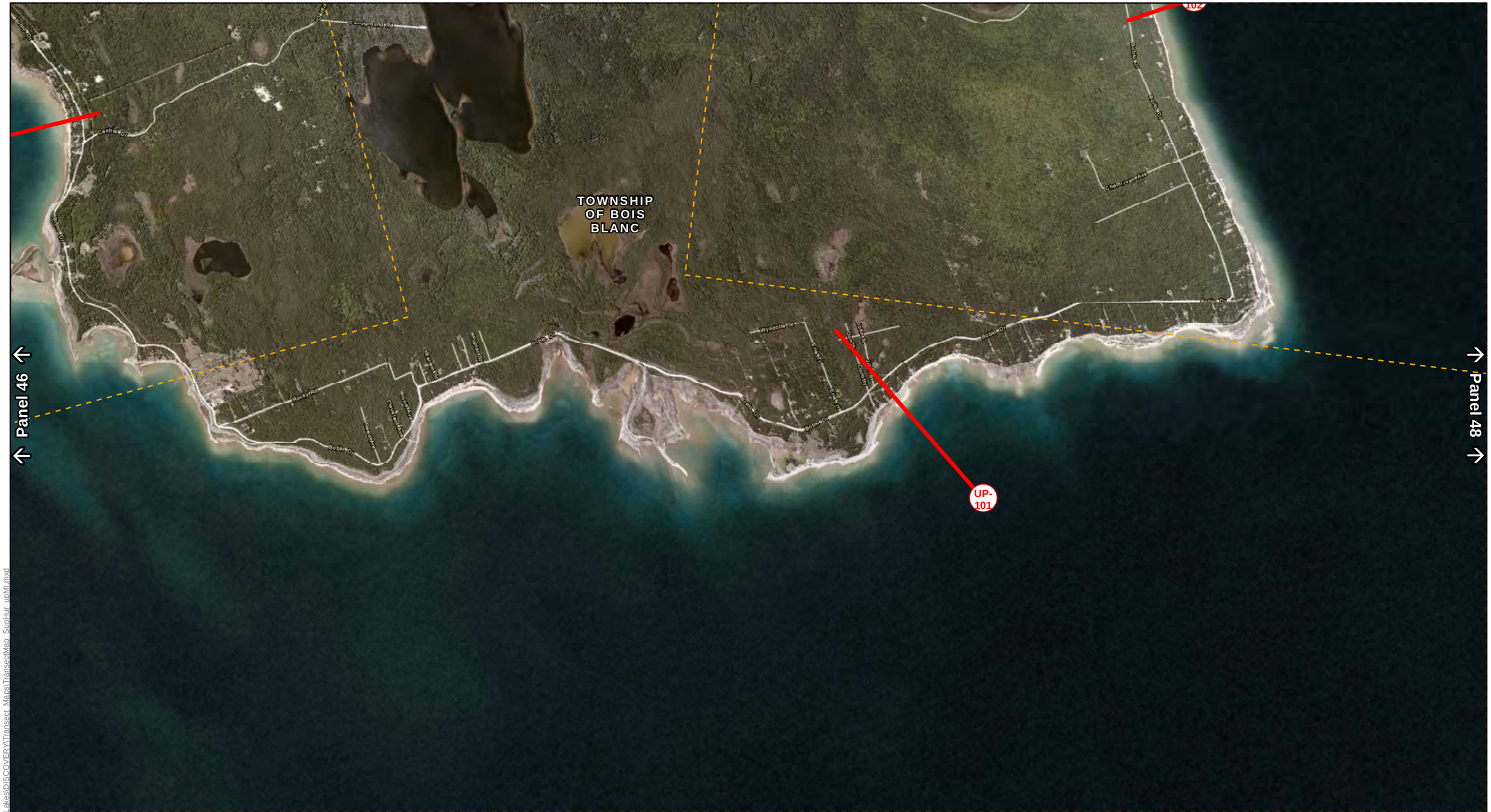
COUNTIES
MACKINAC COUNTY

COMMUNITIES
TOWNSHIP OF BOIS BLANC

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 46 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Mans\TransectMap_SupHur_upMI.mxd

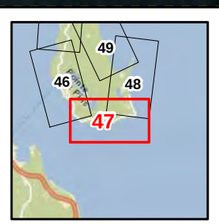


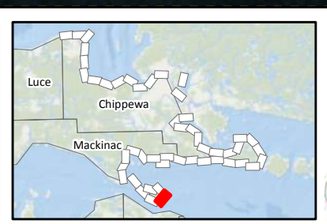
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary





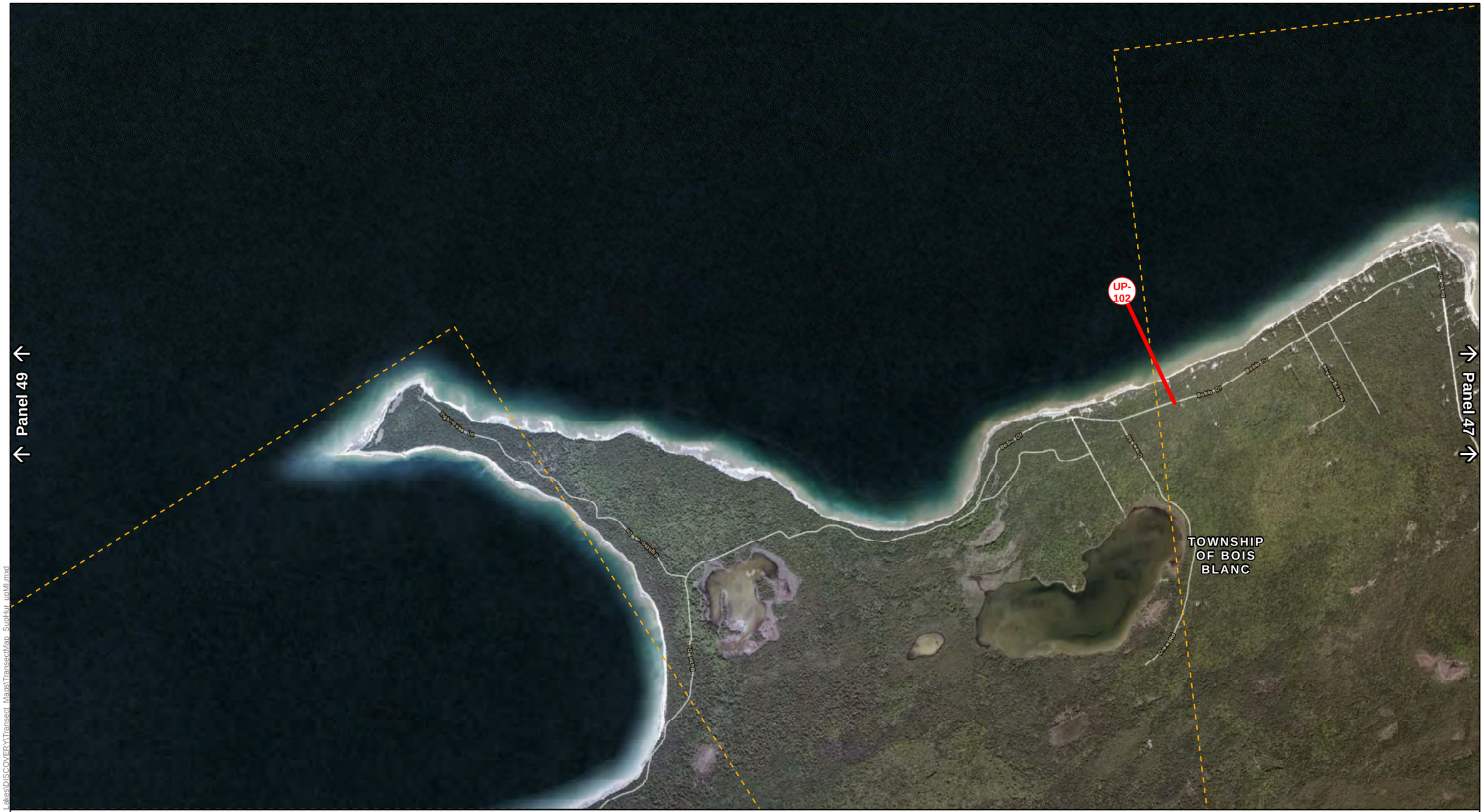
COUNTIES
MACKINAC COUNTY

COMMUNITIES
TOWNSHIP OF BOIS BLANC

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 47 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd



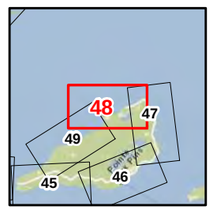
Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd

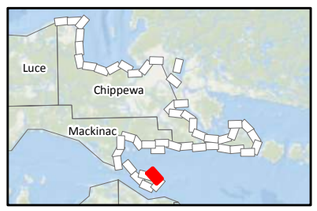
1 inch = 2,000 feet

Project Transect

Adjoining Panel Edge

Political Boundary



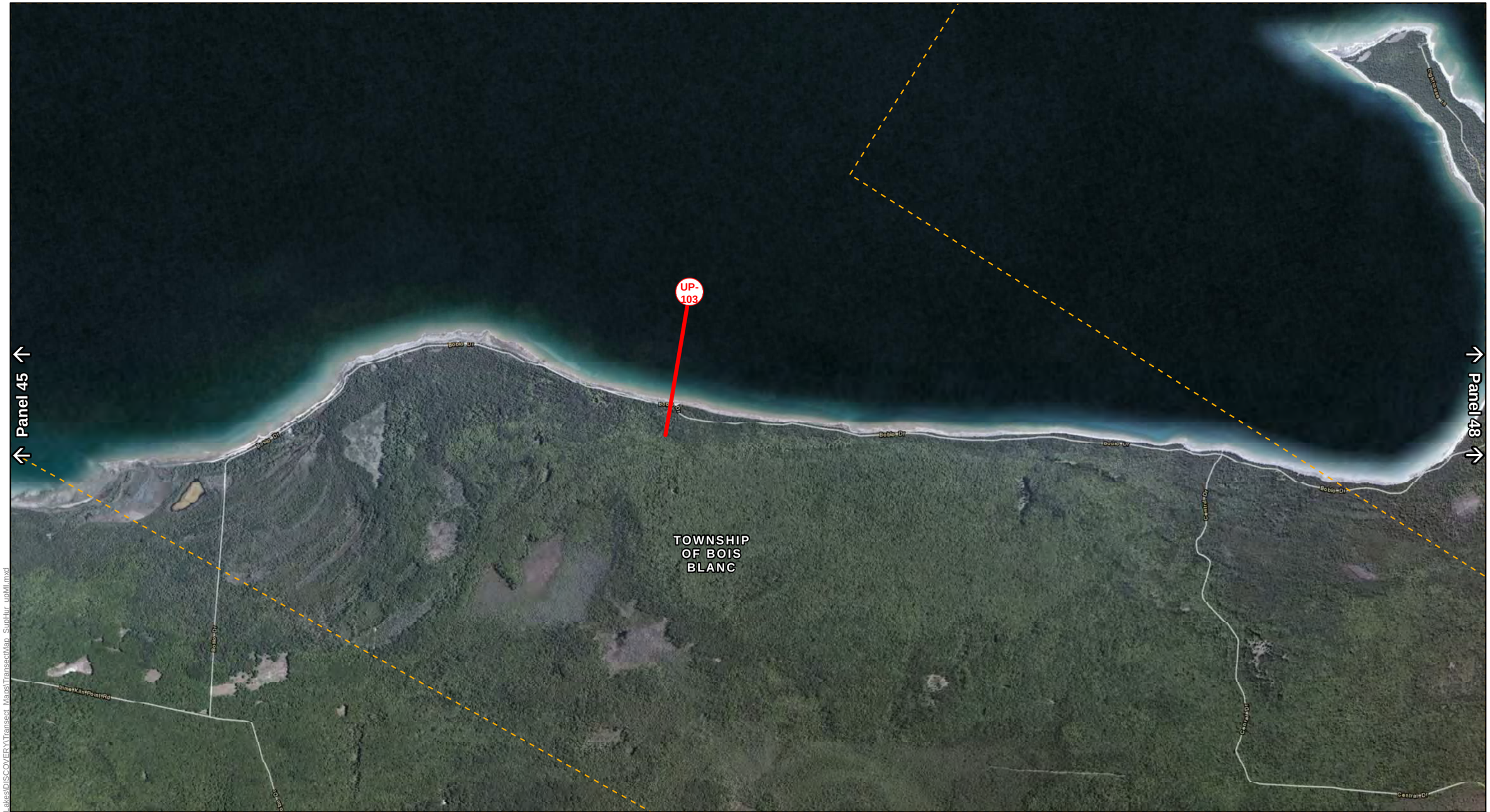


COUNTIES
MACKINAC COUNTY

COMMUNITIES
TOWNSHIP OF BOIS BLANC

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 48 of 49
(Map Set: MI Upper Peninsula - Chippewa and Mackinac Counties)



N
E
S
W

1 inch = 2,000 feet

- Project Transect
- Adjoining Panel Edge
- Political Boundary

COUNTIES
MACKINAC COUNTY

COMMUNITIES
TOWNSHIP OF BOIS BLANC

FEMA STARR

Lakes Superior and Huron
DRAFT TRANSECTS
Panel 49 of 49
(Map Set: MI Upper Peninsula -
Chippewa and Mackinac Counties)

Path: C:\PROJECT_DATA\FEMA\Great_Lakes\DISCOVERY\Transect_Maps\TransectMap_SupHur_upMI.mxd