

# Manistee County Natural Hazard Mitigation Plan

March 17, 2022



**Networks  
Northwest**

Talent / Business / Community



# Welcome

- Thank you for joining us!
- We will be discussing the following:
  - Community Survey Results
  - Historic Weather Events
  - Hazard Identification



# Purpose

## Hazard Mitigation Planning

**“The effort to reduce loss of life and property by lessening the impact of disasters”**

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## Billion-Dollar Disasters Shattered U.S. Record in 2020

The 22 events that each caused at least \$1 billion in damage show the increasing costs of climate change

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By Thomas Frank, E&E News on January 11, 2021



An aerial view of flood waters from Hurricane Delta surrounding structures destroyed by Hurricane Laura on October 10, 2020 in Creole, Louisiana. Credit: Mario Tama Getty Images





# Potential *Natural* Hazard Events

Drought

Excessive Precipitation (*may cause dam failure, high lake and river water levels, lakeshore and streambank erosion, flooding, contaminated water, etc.*)

Extreme temperatures (*heat/cold*)

Hail

High winds/Straight-line winds  
/Derecho

Invasive species (*can cause damage to forests, crops, native species, etc.*)

Public health emergency (i.e., *pandemic; contaminated water supply*)

Severe thunderstorms (*can produce hail, lightning, high winds, flooding, seiche, meteotsunami, etc.*)

Tornado

Wildfire

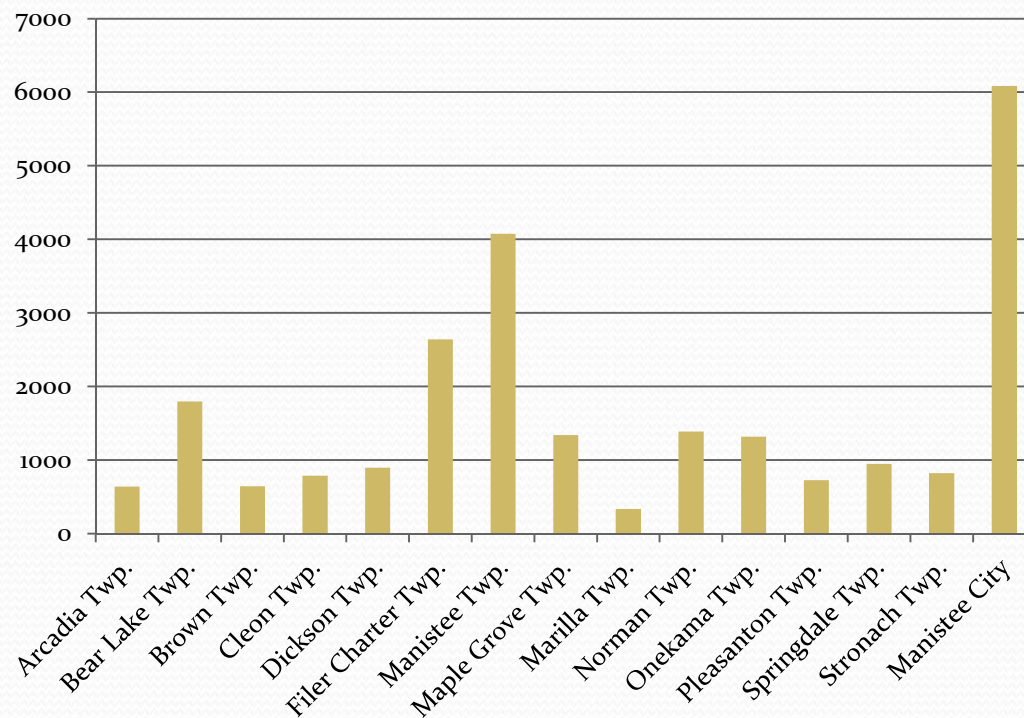
Winter Storm (*can produce ice, sleet, heavy snowfall, high winds...*)

Wildlife or zoonotic diseases (i.e., Bovine TB, Avian Influenza, Swine Flu)

# 2020 FEMA Grant Awards

## Building Resilient Infrastructure & Communities (BRIC) Funding Program

- \$700 million available for FY 2020
- Awards for small impoverished communities
  - 3,000 or fewer individuals







# 2020 FEMA Grant Awards

## Building Resilient Infrastructure & Communities (BRIC) Funding Program

- Income not to exceed 80% of the national per capita income
- In 2019, US per capita income was \$34,103. 80% = \$27,282
- Manistee County 2019 per capita income is \$26,668
- 77% of small impoverished applications were awarded



# 2020 FEMA Grant Awards

## Building Resilient Infrastructure and Communities (BRIC) Funding Program

- Awards for Wildfire Mitigation
  - To ensure states, local communities, tribes and territories have what they need to respond wildfires and have capacity to address mitigation, there is a renewed focus on building the capability to take advantage of mitigation funding offered by FEMA.
  - One project that FEMA selected represents an innovative systems methodology to reduce the risk of catastrophic wildfires. The methodology works simultaneously at large wildland and neighborhood scales to build more resilient communities.
  - The total project cost is \$49.3 million. FEMA estimates that 4,103 structures will opt into the defensible program that provides cost-share to property owners to implement defensible space and ignition resistant construction activities.
  - The project would also fund hazardous fuels reduction activities across 5,410 acres within three proposed project areas. The number of structures protected by hazardous fuels reduction activities is estimated to be 6,498.



# Community Survey Responses

Survey open Dec 2021 – 3/15/2022

40 responses/ 124 invites = 32% response rate

Received at least 1 response from all communities, EXCEPT:  
Dickson Twp., Pleasanton Twp., Stronach Twp., Village of Copemish, and Village of Onekama

Representation:

Local governments (elected & appointed officials; planning commission members, employees, public works)

Law enforcement

DHD #10

Blacker Airport

Munson Hospital

Manistee County Medical Care Facility

American Red Cross Disaster Program

Manistee Conservation District

TES Filer City Energy Plant

Local citizens

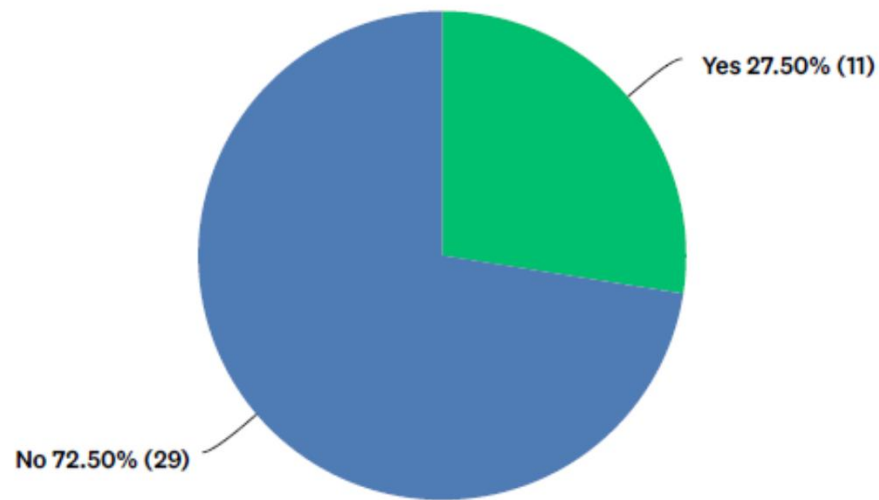
ANSWER CHOICES	RESPONSES	
Arcadia Twp.	2.50%	1
Bear Lake Twp.	5.00%	2
Brown Twp.	2.50%	1
City of Manistee	17.50%	7
Cleon Twp.	5.00%	2
Dickson Twp.	0.00%	0
Filer Twp.	5.00%	2
Manistee County	20.00%	8
Manistee Twp.	5.00%	2
Maple Grove Twp.	2.50%	1
Marilla Twp.	5.00%	2
Norman Twp.	2.50%	1
Onkama Twp.	5.00%	2
Pleasanton Twp.	0.00%	0
Springdale Twp.	2.50%	1
Stronach Twp.	0.00%	0
Village of Bear Lake	2.50%	1
Village of Copemish	0.00%	0
Village of East Lake	5.00%	2
Village of Kaleva	2.50%	1
Village of Onkama	0.00%	0
Other (please specify)	17.50%	7
Total Respondents: 40		



# Community Survey Responses

Q3 Are you familiar with the county's Natural Hazard Mitigation Plan?

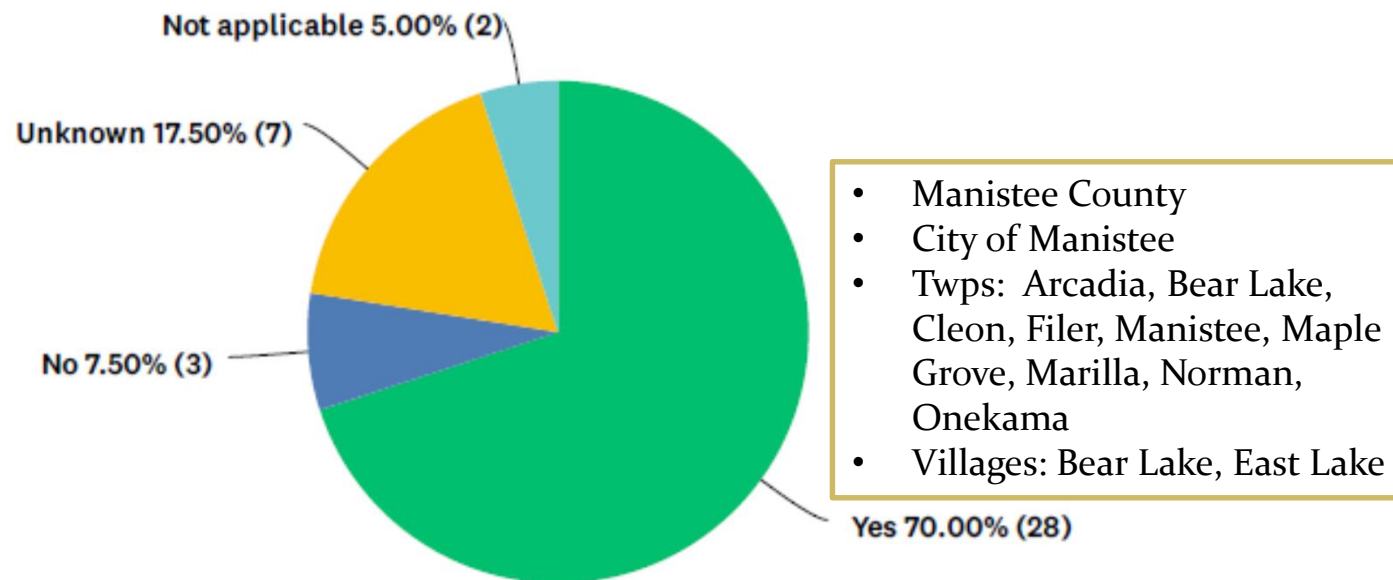
Answered: 40 Skipped: 0



# Community Survey Responses

Q4 Does the community you represent have an adopted Master Plan?

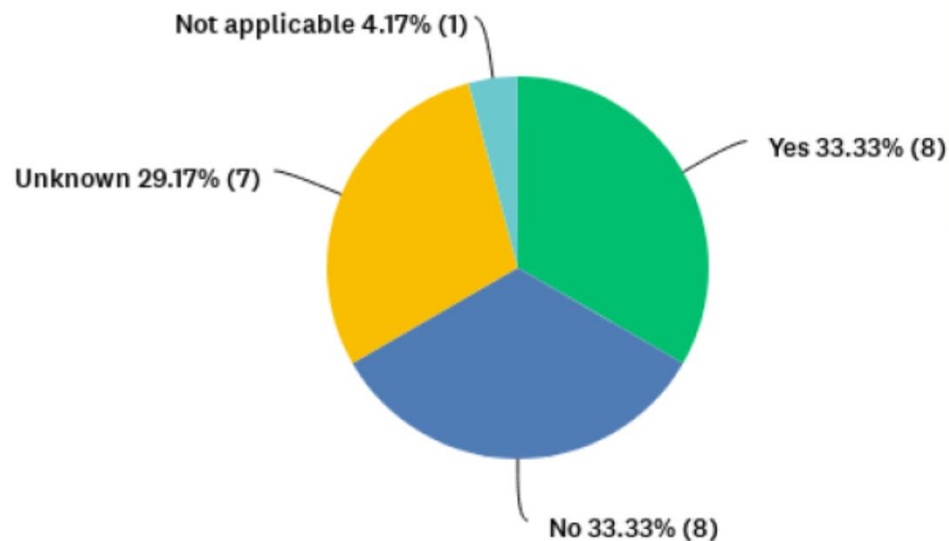
Answered: 40 Skipped: 0





# Community Survey Responses

Q5: Does the community you represent have an adopted Capital Improvements Plan?

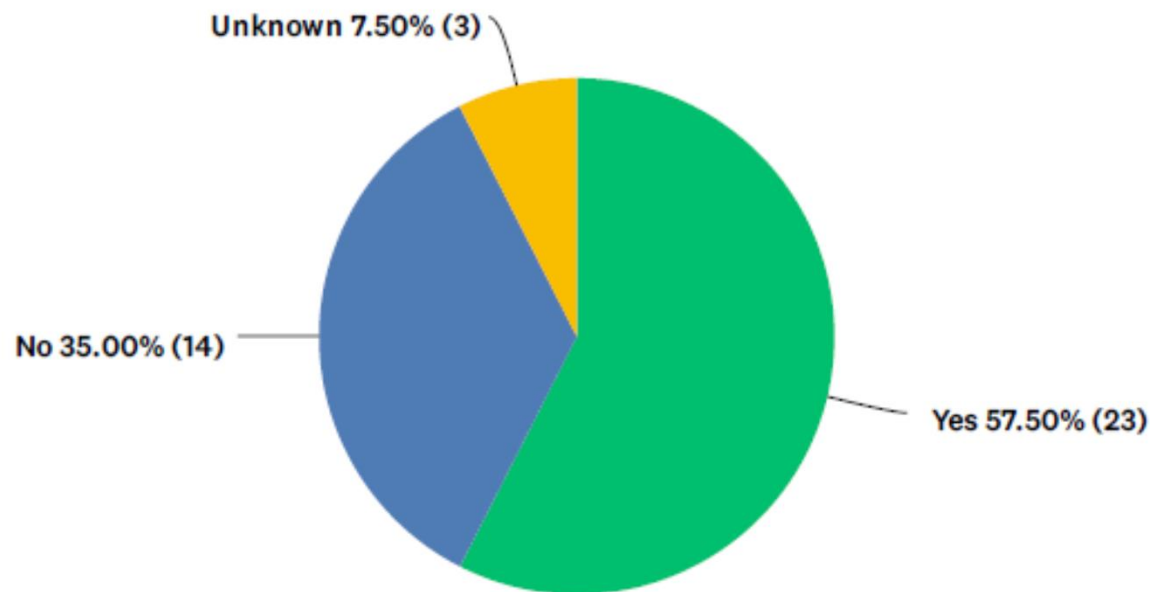


- City of Manistee
- Manistee County
- Filer Twp
- Onekama Twp
- Village of Onekama

# Community Survey Responses

Q6 Has the community you represent experienced a significant natural hazard event within the last 10 years?

Answered: 40 Skipped: 0





# Community Survey Responses

Q7 If so, what was the nature of the event?

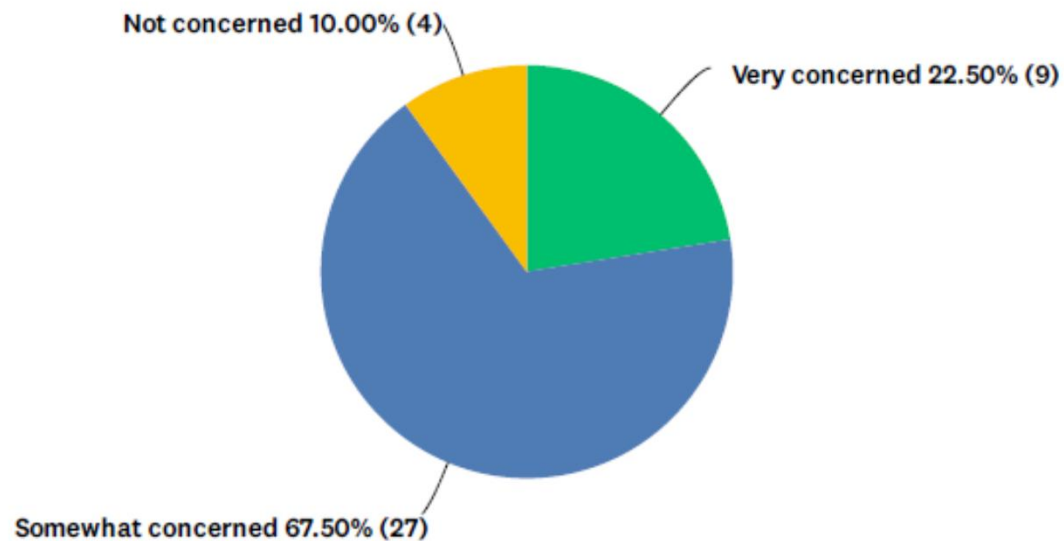
Answered: 24 Skipped: 16

- Arcadia Twp.
  - We lost a valued park and beach access because of the increased water levels of Lake MI.
- Cleon Twp.
  - Power outage due to snow.
- Filer Twp.
  - 7/21/2016 – 12” of rain cause localized flooding
- Manistee Twp.
  - Damage and loss of property due to high water levels
- Norman Twp.
  - Wildland fire
  - Greater than 100-year flood (Pine Creek)
- Onekama Twp.
  - Flooding, High Water
- City of Manistee
  - Meteotsunami, straightline winds, flooding, winter storms, lakeshore and Riverwalk erosion, sewer overflow from heavy rains
- County of Manistee
  - Wildfire, high/straight-line winds, flood, lakeshore flooding, seiche, high water levels on lake MI and connecting waterways, erosion of dunes along shoreline, proximity of structures to coastal recession, COVID-19

# Community Survey Responses

Q8 How concerned are you about future natural hazard events impacting your community?

Answered: 40 Skipped: 0





# Community Survey Responses

Q9 What type of natural hazard events are likely to have the largest impact on your community, for example fire, high winds, flood, drought, illness outbreak, etc.?

High Winds (27)  
Flooding/Heavy Rain (20)  
Illness Outbreak/Future Pandemic (14)  
Wildfire (14)  
High Lake Water Levels (7)  
Heavy Snowfall/Winter Storm/Ice/Blizzard (6)  
Drought/Loss of Water to Wells (4)  
Power Outage (3)  
Storms/High-Intensity Storms (3)  
Dam Failure (2)  
Tornado (1)  
Pollution of Waterways (1)  
Storm Drain Collapse (1)  
Extreme Heat/Cold Events (1)  
Lightning (1)

# Community Survey Responses

**Q10 Does your community have concerns about infrastructure (dams, bridges, utilities, etc.) withstanding a natural hazard event in the future? Please describe.**

RESPONSES	COMMUNITY
We are always concerned of a possible dam failure as we have 2 in the county.	Manistee County
If the Dams failed or the bridges over the river failed	
Tippy Dam and the several bridges across the rivers	
Shore line erosion	
Yes. Flooding events in combination with erratic weather patterns tied to storms can impact dams and bridges, culverts (particularly those that are improperly sized based on current specifications), and homes. Also dune erosion that exceeds normal historic dune erosion can impact homes and other structures that are close to Lake Michigan.	
Without electric service, the Blacker Airport can't operate	City of Manistee
Yes	
Utilities, road washouts, downstream from dam, shoreline erosion, aging bridges	
High Wind events can impact trees, utilities and communication, shoreline flooding and erosion.	
Heavy rainfalls can exceed capacity of storm water systems and our sanitary sewers can be impacted by illicit connections.	
Tippy and Hodenpyle Dams.	Arcadia Twp.
From my experience with MI bridge data, bridges in MI are generally out of date and due for improvement. I would imagine the bridges in the City of Manistee are due for improvement.	
Aging infrastructure, such as sewers, bridges etc.	
yes	
Yes	
Yes, roads and boat ramp areas	Brown Twp.
Utilities	Cleon Twp.
The biggest issues would be related to power outages due primarily high winds, which would affect the operation of our water and sewer infrastructure.	Filer Twp.
utilities	Marilla Twp.
Would like broadband services. We are greatly underserved.	
Our township has the Hodenpyle Dam.	Norman Twp.
Tippy Dam	
Electric and telephone utilities.	Onkama Twp.
Flood impacting septic systems surrounding the lake	
The only dam was Thompsonville dam which was privately owned and blew out many years ago.	Springdale Twp.
utilities	Village of Bear Lake

# Community Survey Responses

Q14 If so, please identify potential strategies you would like to explore in the near future.

Answered: 16 Skipped: 24

- There are meetings with the staff from the dam about safety & response to crisis
- Explore federal funding options for improving infrastructure. Adjust building codes for flood zones, adjust building codes for higher wind rating. Consider public purchase of damaged structures in flood zones and return them to their natural state
- Evacuations in case of large scale wildland fire
- We have plans for flood disasters, and evacuation plans
- Some landowners along Lake Michigan are hiring contractors to modify the slope of their dune, placing riprap, constructing sea walls, or taking other measures to address shoreline erosion on their specific parcel - In the future we would like to increase the frequency of educational events where the topic is the ecology and dynamics of the Great Lakes and shoreline ecosystems, as well as the importance of native plant communities, placement of structures, etc. We would also like to explore financial opportunities for landowners wanting to address shoreline erosion that is causing issues with their structures (such as homes collapsing into Lake Michigan). We would also like to explore and better understand options for landowners whose forests are leveled by abnormal windstorms - this might include options such as disaster relief provided by Farm Service Agency.
- We do recognize and have discussed our lack of tech accessibility.
- Flood mitigation projects
- Eliminating illicit connections and implementing a wet weather corrective action program
- Annual tree removal and trimming
- More space to spread out people in a congregate setting



# Historic Federal and Governor Declared Emergencies/Disasters

## Disaster Declarations for States and Counties

This page contains an interactive tool to allow you to explore historic federal disaster declarations by state, county, hazard, and year.

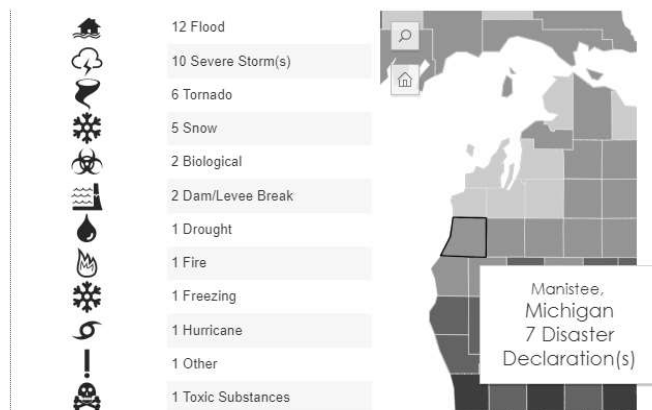
For accessibility, [view the raw data](#).

**First**, select a state or territory.

Michigan

**Then**, learn about the **43** disasters that have occurred in **Michigan** since 1953.

Click on an incident or county to filter the visualization. Click again to reset.



**Next**, see which months **disasters** have historically occurred in **Michigan**.

FEMA's Records of Disaster Declarations for States and Counties:  
<https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>

# Presidential and Governor Declared Emergencies/Disasters

Date	Type of Incident	Affected Area	Type of Declaration/Federal ID #	Notes
March 2020	COVID-19; COVID-19 Pandemic	Statewide & National	State of Emergency, National Emergency (3455), and Governor and Presidential Declared Major Disaster (4494)	
1/29/2019	Extreme Cold	Statewide	Governor Declared Emergency	
7/7/2008, 7/14/2008	Severe Thunderstorms, Winds, Flooding	Allegan, Barry, Eaton, Ingham, Lake, <b>Manistee</b> , Mason, Missaukee, Osceola, Ottawa, and Wexford Counties.	Governor Declared Major Disaster and Presidential Declared Major Disaster (1777)	Damages to roads; per capita impact for Manistee County: \$221.71
6/19/2008	Thunderstorms	Lake, <b>Manistee</b> , Osceola, Ottawa, and Wexford Counties	Governor Declared Emergency	
9/4/2005 and 9/7/2005	Hurricane (Katrina) Evacuation	Statewide	Governor Declared Disaster and Presidential Declared Emergency (3225)	Declared due to the emergency conditions in the State of Michigan, resulting from the influx of evacuees from states impacted by Hurricane Katrina beginning on August 29, 2005.
9/10-19/1986, 10/28/1986	Flooding, heavy rain	<b>Manistee</b> was one of many counties affected	Governor Declared Disaster and Presidential Declared Major Disaster (774)	
1/26-27/1978	Blizzard, Snowstorm	Statewide	Presidential Declared Emergency (3057); Governor Declared Disaster	
3/2/1977	Drought	44 Counties, including Antrim, Benzie, Charlevoix, Emmet, Grand Traverse, Kalkaska, Leelanau, <b>Manistee</b> , Missaukee, Otsego, Roscommon and Wexford.	Presidential Declared Emergency (3035)	
4/5/1956	Tornado	Benzie, Leelanau, <b>Manistee</b> and Ottawa Co.	Presidential Declared Major Disaster (53)	

# Historic Weather Events

- Extreme Winter Weather Events (15) 2012-2021

(events with ice covering, property damage, and/or up to/over 12 in. of snow)

Date	Event Type	Damages
3/2/2012	Heavy Snow	\$350,000 Property Damage
4/27/2012	Frost/Freeze	\$10 Million Fruit Crop Damage
12/20/2012	Winter Storm	
3/19/2013	Lake Effect Snow	
1/6/2014	Extreme Cold/Wind Chill	
1/24/2014	Winter Storm	
2/26/2014	Winter Storm	
1/8/2015	Winter Storm	
2/13/2015	Winter Storm	
11/19/2016	Winter Storm	
4/13/2018	Winter Storm	
1/28-29/2019	Winter Storm	
2/24/2019	Blizzard	
11/11/2019	Lake Effect Snow	
2/19/2021	Winter Storm	



# Historic Weather Events (cont'd)

- Severe Thunderstorms/High Winds, 2012-2021

Date	Location	Est.Wind Gust (knots)	Effect	Property Damage
5/28/2012	MANISTEE	52	Trees and power lines were downed.	10000
7/19/2013	WELLSTON	52	Several trees and power lines were downed in Wellston.	5000
8/7/2013	MANISTEE	61	Measured at the entrance to Manistee Harbor.	0
8/7/2013	WILDWOOD	54	Numerous trees were downed between Milarch and Erdman Roads in Onekama Township.	7000
8/7/2013	WELLSTON	52	Scattered downed trees occurred in Wellston, including one tree downed onto a vehicle.	12000
8/2/2015	MANISTEE	52	Trees were knocked down in the city of Manistee.	7000
12/24/2015	COUNTY-WIDE	53		0
4/20/2017	MANISTEE	59	A number of trees and utility poles were downed in and near the city of Manistee. A gust of 68 mph was measured at Manistee Blacker Airport.	16000
8/3/2017	MANISTEE	50	A large tree was downed onto power lines.	2000
8/28/2018	POMONA	58	Dozens of healthy maple trees were downed.	12000
7/20/2019	(MBL)BLACKR APT MANI	50	Several trees were downed.	4000
8/28/2021	ONEKAMA	50	Social media pictures of multiple trees/large limbs downed.	5000

# Historic Weather Events (cont'd)

- Hailstorms, 2012-2021

Date	Diameter (in.)	Location
5/15/2012	0.88	MANISTEE
5/15/2012	1	MANISTEE
5/27/2012	0.75	WELLSTON
8/3/2017	0.75	STRONACH
5/31/2019	0.75	ARCADIA
5/31/2019	0.88	COPEMISH
4/7/2020	1	ARCADIA
4/7/2020	0.75	BEAR LAKE
4/7/2020	1	BEAR LAKE
9/7/2021	1	PARKDALE
9/7/2021	1.5	HIGH BRIDGE
9/7/2021	1.75	WELLSTON
9/7/2021	0.88	MANISTEE

# Historic Weather Events (cont'd)

- Tornado

Date	Rating	Description	Property Damage
4/3/1956	EF-4		\$250,000
6/12/2008	EF-0	Started in Stronach, ended at High Bridge. EF0 tornado with estimated wind speeds 75 to 85 mph. The tornado tracked through forested land near Skocelas Road, just south of M-55. Numerous trees and large limbs were downed.	\$15,000

- Lightning

Date	Description
9/1/2000	Thunderstorms formed along a warm front that stretched across northern Lower Michigan. Intense lightning also occurred with these storms. The lightning caused power outages to hundreds of homes and businesses in the Traverse City area.
	Lightning associated with these storms and many others that night was nearly continuous. One man was killed by the lightning when he and his 9 year old son climbed a small hill behind a shopping mall to view the approaching lightning. The 40 year old father was struck and killed by a lightning bolt. His son was thrown to the ground, but only sustained minor injuries. Emergency crews performed CPR on the father immediately and a police officer arrived quickly with a defibrillator. However, attempts to revive the man failed.
	Lightning that Friday night also disrupted numerous high school football games. Many games were cancelled or postponed until the following Saturday morning. Many of the schools which began play had lengthy delays and many waited an hour or more before fans and players could return to the field. This was widely covered by area newspapers and television stations. The cost of postponed games is not known.
9/6/2016	A Texas man was struck and killed by lightning while on the North Country Trail in Dickson Township.



# Historic Weather Events (cont'd)

- Flood/Flash Flood

Date	Description	Start Location	End Location	Flood Cause	Damage
5/12/2000	Flash Flood	MANISTEE	MANISTEE		0
4/12/2001	Flash Flood	COUNTYWIDE	COUNTYWIDE		0
5/19/2001	Flash Flood	SOUTH PORTION	SOUTH PORTION		0
7/24/2005	Flash Flood	MANISTEE	MANISTEE		500000
6/12/2008	Flash Flood	OAK HILL	DUBLIN	Heavy Rain	970000
6/13/2008	Flash Flood	MANISTEE	MANISTEE	Heavy Rain	40000
5/11/2011	Flash Flood	WELLSTON	WELLSTON	Heavy Rain	10000
5/11/2011	Flash Flood	OAK HILL	DUBLIN	Heavy Rain	3500000
7/20/2019	Flood	HARLAN	CHIEF LAKE	Heavy Rain	0
7/20/2019	Flood	OAK HILL	DUBLIN	Heavy Rain	0

# Historic Weather Events (cont'd)

- Lakeshore Flood

Date	Description	Damage
10/16/2019	Flooding covered a portion of Lakeshore Drive at 5th Avenue Beach in Manistee. In Parkdale Township, the beach eroded up to the foundation of several homes, and a number of trees were washed into the lake.	350000
10/22/2019	A dock, boardwalk, and beach signage were destroyed in Parkdale Township.	142000
4/13/2020		0
11/1/2020	North Lakeshore Drive was flooded near the US Coast Guard Station in Manistee. Streets were covered in water, and the water extended to near the base of some homes.	7000





# Historic Weather Events (cont'd)

- Dense Fog

- 5/22/2010

- A charter fishing boat struck a pier at the entrance to Manistee Harbor, took on water, and sank. The seven people on board were pulled from the water by the Coast Guard and a local good Samaritan. The first mate of the boat, a 55 year old male, was given CPR and later pronounced dead (an indirect fatality). Two others were treated at a Manistee hospital, while the other four were treated at the scene. Visibility at the accident site was described as being very poor by local media.

- Rip Current

- 7/11/2007

- A 15 year old boy from a downstate Michigan community drowned as a result of rip currents at 5th Avenue Beach in the city of Manistee. Gusty onshore winds contributed to rip current development on Lake Michigan beaches of Northwest Lower Michigan.





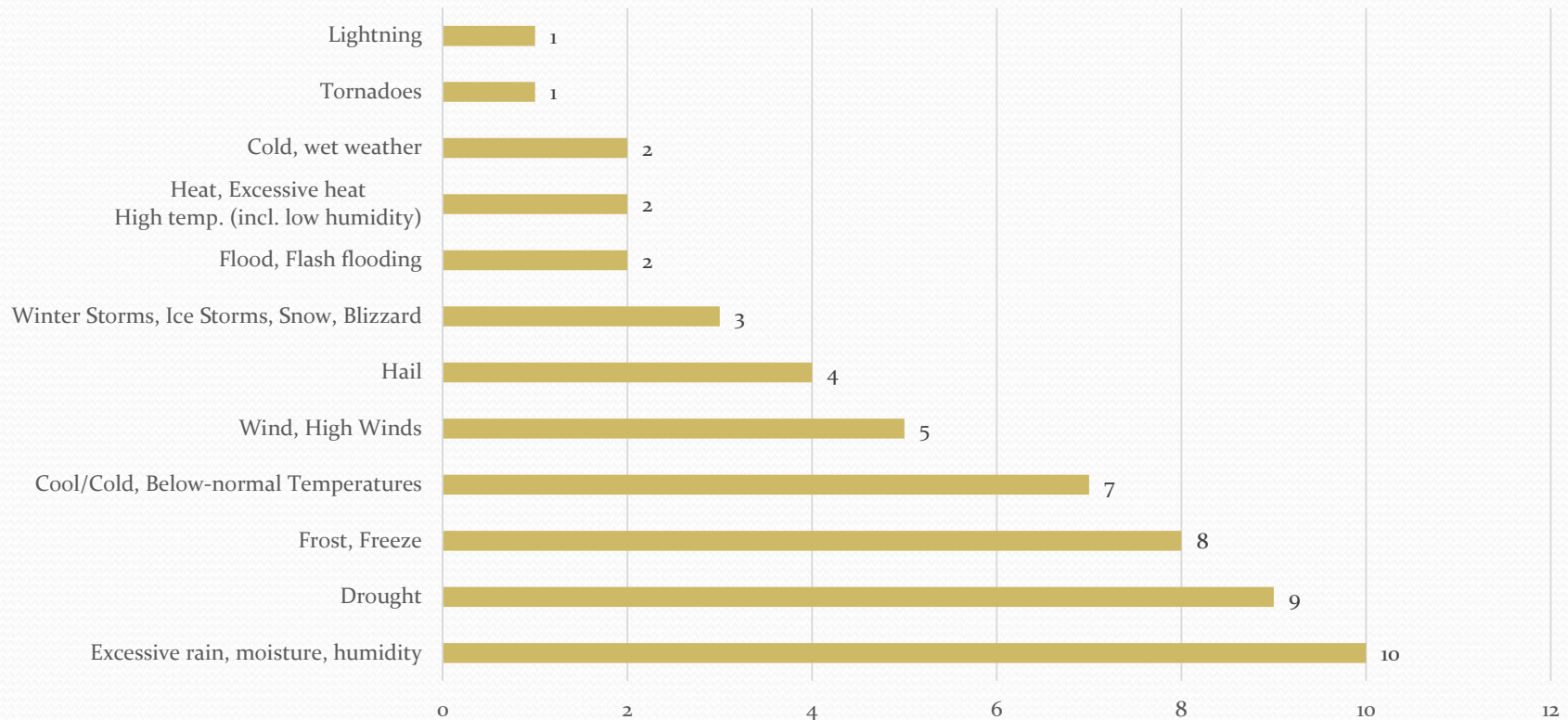
# Historic Weather Events

- Extreme Heat (2)

- **6/30/2018** The month of June closed with one of the hottest days in recent memory. Highs were well into the 90s, including 99 at Alpena, and 98 at Traverse City and Gaylord. The National Weather Service office near Gaylord also hit 98; that was (by several degrees) the warmest reading recorded at that location since observations began there in the late 1990s. Heat indices exceeded 105 degrees across most of northern lower Michigan, and some locations exceed 110. The warmest reported heat index on the day was 114 near Indian River. There were estimated to be between 25 and 30 individuals who visited local hospitals due to heat-related illnesses.
- **08/01/2001** Excessive Heat was also a problem the first two weeks in August across all of northern Michigan. Temperatures reach the mid to upper 90s, on average, a few days each year; however, for a 5 day (8/5 - 8/9) stretch overnight low temperatures failed to fall below the lower 70s in most areas. This very humid air mass was unusual for northern Michigan, an area which typically sees cool nighttime temperatures and for this reason has very few homes with air conditioners. No heat related deaths or injuries were reported; however, most outdoor events were modified due to the forecasts of hot and humid conditions. County fairs sent animals home, yet still there were livestock losses at fairs in Otsego and Alcona counties. Attendance at county fairs was well below normal and this was attributed to the heat.

# Disaster Impacts on Agriculture

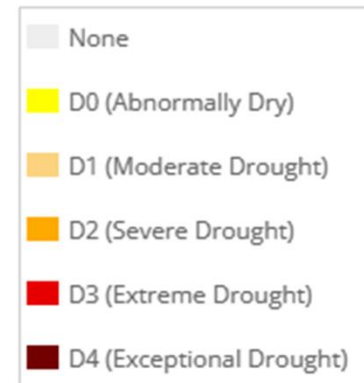
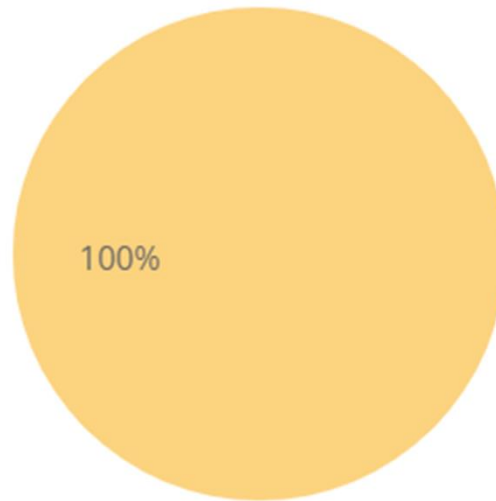
USDA Disaster Designations - Event Types  
Manistee County, 2012-2021





# Drought Risk

## Manistee County (MI) Percent Area in U.S. Drought Monitor Categories



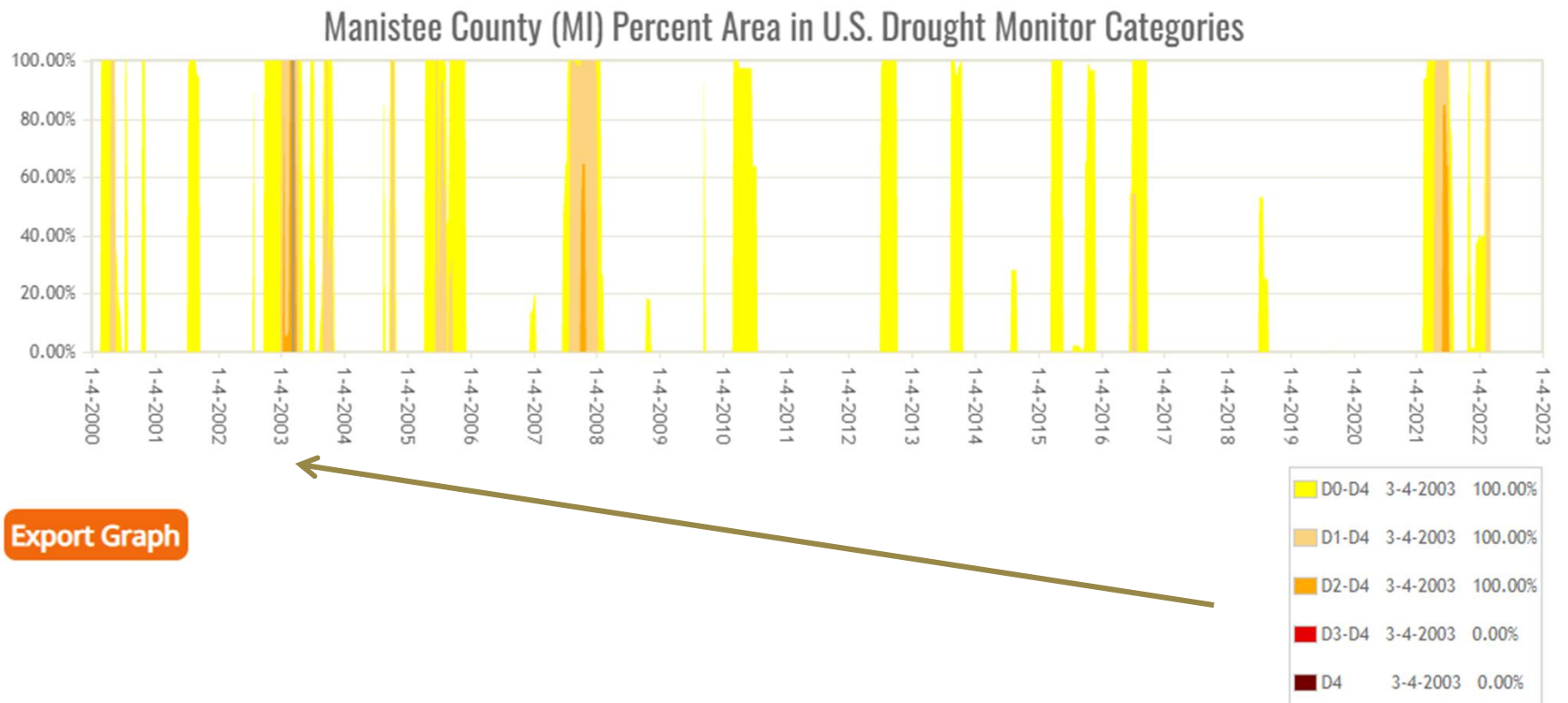
Michigan ▼

Category	Historically observed impacts
D0	Grass fires increase
	Lawns are brown; landscape and gardens are watered more frequently
D1	Most crops and vegetation are stressed; farmed Christmas trees are stressed
	Well levels decline
D2	Corn and soybean yields are low
	Mature trees are stressed
	Streamflow is extremely low, potentially too low to irrigate



# Historic Drought Monitor

April 2020-March 2021



Source: U.S. Drought Monitor <https://droughtmonitor.unl.edu/DmData/TimeSeries.aspx>

# Wildfire Risk



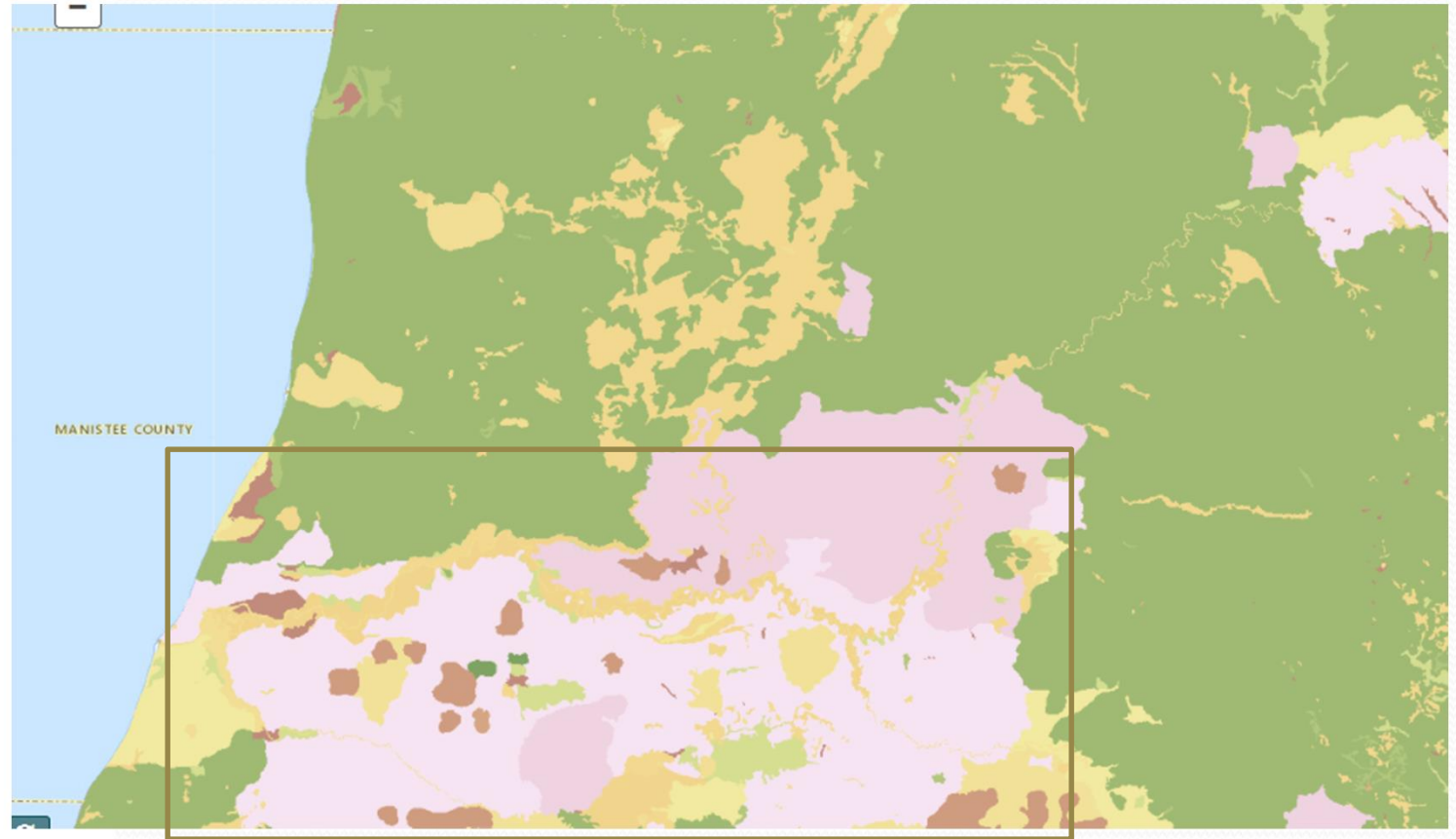
Source: Wildfire Risk Map - MDNR Forest Resources Division



# County Historic Forest Cover

MNFI Landcover Circa 1800

- ASPEN-BIRCH FOREST
- BEECH-SUGAR MAPLE FOREST
- BEECH-SUGAR MAPLE-HEMLOCK FOREST
- BLACK ASH SWAMP
- BLACK OAK BARREN
- CEDAR SWAMP
- EXPOSED BEDROCK
- GRASSLAND
- HEMLOCK-WHITE PINE FOREST
- HEMLOCK-YELLOW BIRCH FOREST
- JACK PINE-RED PINE FOREST
- LAKE/RIVER
- MIXED CONIFER SWAMP
- MIXED HARDWOOD SWAMP
- MIXED OAK FOREST
- MIXED OAK SAVANNA
- MIXED PINE-OAK FOREST
- MUSKEG/BOG
- OAK-HICKORY FOREST
- OAK/PINE BARRENS
- PINE BARRENS
- SAND DUNE
- SHRUB SWAMP/EMERGENT MARSH
- SPRUCE-FIR-CEDAR FOREST
- SUGAR MAPLE-BASSWOOD FOREST
- SUGAR MAPLE-HEMLOCK FOREST
- SUGAR MAPLE-YELLOW BIRCH FOREST
- WET PRAIRIE
- WHITE PINE-MIXED HARDWOOD FOREST
- WHITE PINE-RED PINE FOREST
- WHITE PINE-WHITE OAK FOREST
- Undetermined





# Wildland Fire - 2012

## Map Views

Display Fire Incidents by Year

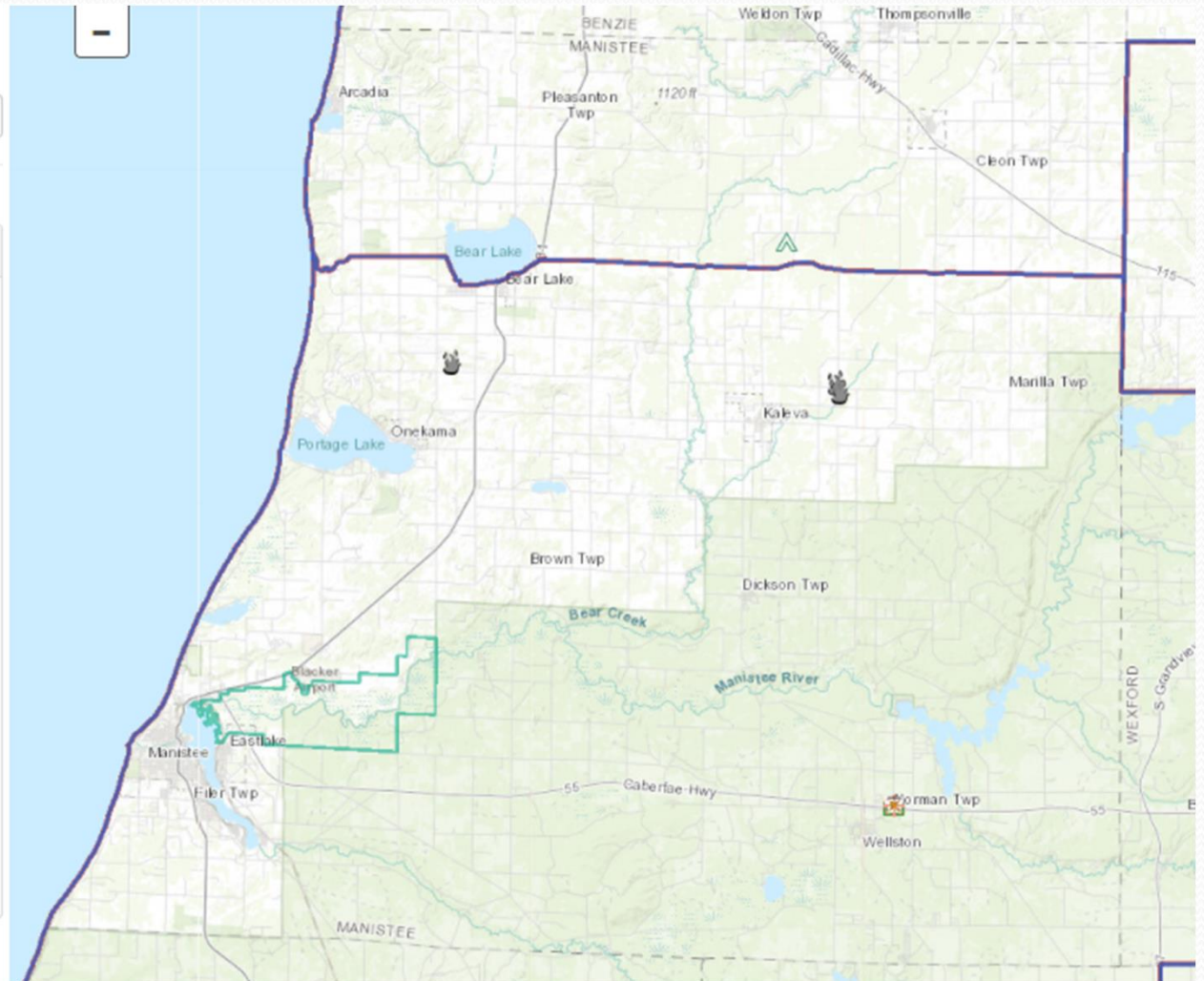
2012

Change the map items using the checkboxes

### Wildland Fire Incidents

- ☒ Fire Incident - Active
- ☒ Fire Incident - Closed
- ☒ Prescribed Burn - State
- ☒ Prescribed Burn - Federal
- ☒ Prescribed Burn - Contractor
- ☒ Prescribed Burn - Closed
- ☒ Weather Stations
- ☒ MDNR Fire Offices
- ☒ DNR Campgrounds
- ☒ MDNR Fire Protection
- ☒ MDNR Fire Management Boundaries
- ☐ USFS National Forest
- ☒ MDNR Wildlife Boundary
- ☐ DNR Ownership Parcels
- ☐ Has Concern

Basemaps



Source: Wildland Fire Map - <https://www.mcgi.state.mi.us/wildfire/mcgi.html#>



# County Wetlands

map Legend base maps About

## Map Legend

Change what items you see on the map by using the checkboxes

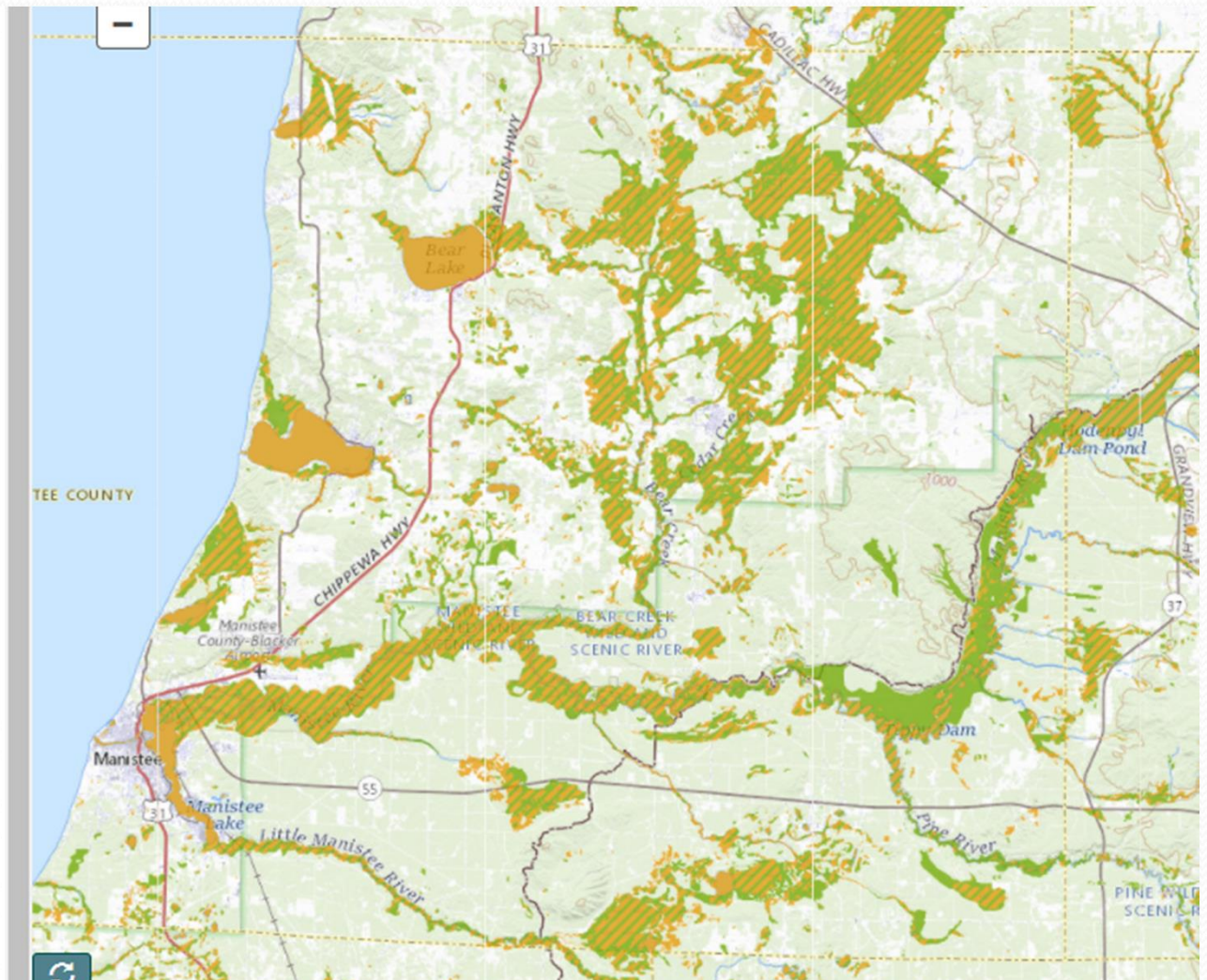
▼ Wetland Data

- ☐ Wetland (Hydric) Soils
- ☐ National Wetlands Inventory 2005
- ☐ Potential Wetland Restoration
  - ☐ Highest Potential - Hydric and Presettlement Wetland Overlay
  - ☐ High Potential - Hydric Soils Only
  - ☐ Moderate Potential - Presettlement Wetlands Only
- ☒ Part 303 Final Wetlands Inventory
  - ☐ Wetlands as identified on NWI and MIRIS maps
  - ☐ Soil areas which include wetland soils
  - ☒ Wetlands as identified on NWI and MIRIS maps and soil areas which include wetland soils

► Stream Data

► Coastal Data

► Historic Landcover



# Manistee County Dams

	Name	Height (ft)	Storage (acre-feet)	Location	City/Town ship	Owner	Regulatory Agency	Dam Type	Year Completed	Dam Purpose	Hazard Potential
1	Copemish Dam	10	180	First Creek	Copemish	Village of Copemish	-	Earth	1950	Recreation	Low
2	Peters Bayou Dam	12	595	Manistee River	Manistee	MDNR Wildlife	State	Earth	1969	Other	Low
3	Stronach Dam	20	850	Pine River	Manistee	Consumers Energy Company	-	Gravity, Earth	1912	Recreation	Low
4	Sunny Brook Dam	8	60	Pine Creek	Wellston	Patrick F. Kelley	State	Earth	1890	Other	Low
5	Tippy	82	27620	Manistee River	Manistee	Consumers Energy Company	-	Gravity, Earth	1918	Recreation	High





# Manistee County Dams

5 Dam(s) Found

Hazard Potential Classification: High  
Emergency Action Plan: Yes  
Owner Name: Consumers Energy Company  
Primary Purpose: Recreation

Owner Name: Consumers Energy Company  
Primary Purpose: Recreation

### Stronach Dam

Hazard Potential Classification: Low  
Emergency Action Plan: Not Required  
Owner Name: Consumers Energy  
Primary Purpose: Recreation

Owner Name: Consumers Energy  
Primary Purpose: Recreation

Peters Bayou Dam

Hazard Potential Classification: Low  
Emergency Action Plan: Not Required  
Owner Name: MDNR Wildlife  
Primary Purpose: Other

Owner Name: MDNR Wildlife  
Primary Purpose: Other

**Copemish Dam**  
Hazard Potential Classification: Low

Hazard Potential Classification: Low  
Emergency Action Plan: Not Required  
Owner Name: Village of Copemish  
Primary Purpose: Recreation

Owner Name: Village of Copemish  
Primary Purpose: Recreation

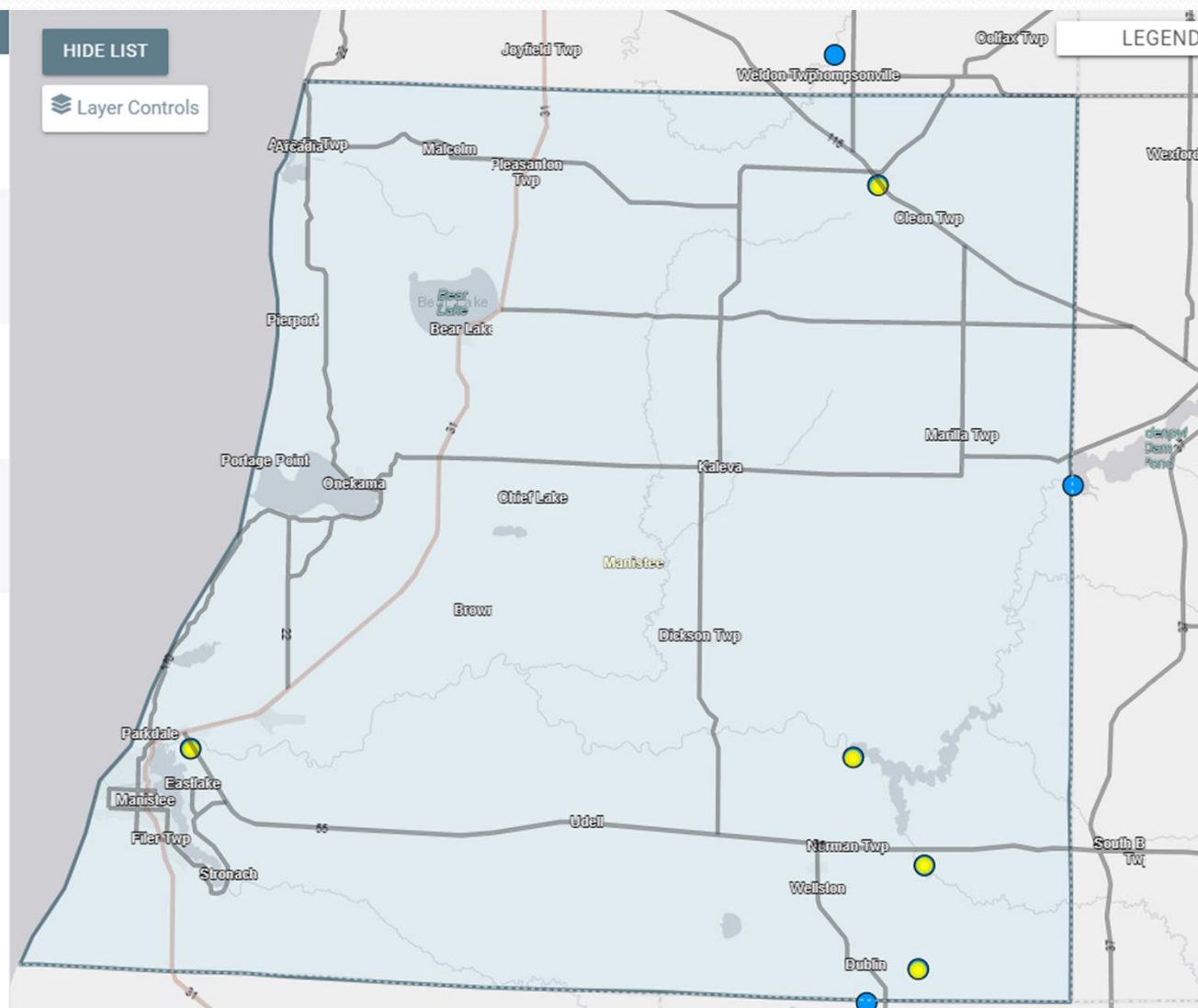
Sunny Brook Dam

Hazard Potential Classification: Low  
Emergency Action Plan: Not Required  
Owner Name: Patrick F. Kelley  
Primary Purpose: Other

Owner Name: Patrick F. Kelley  
Primary Purpose: Other

HIDE LIST

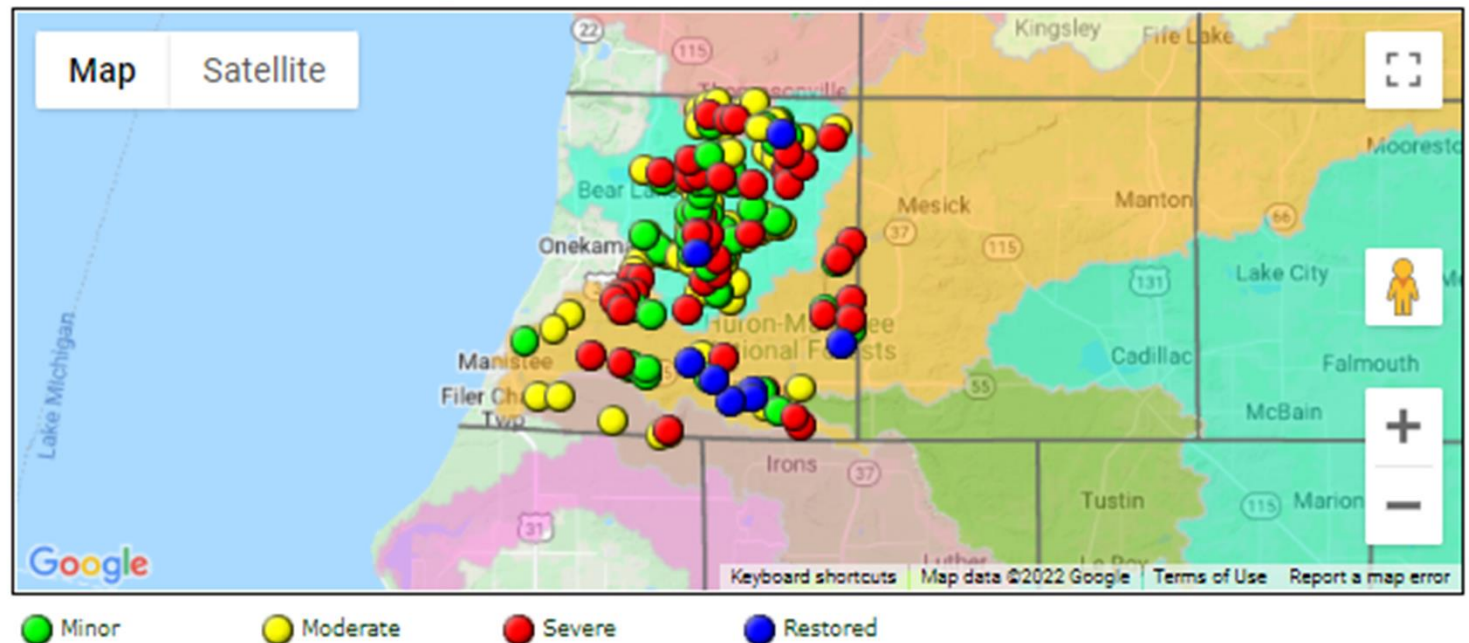
Layer Controls



# RIVER RESTORATION in Northern Michigan

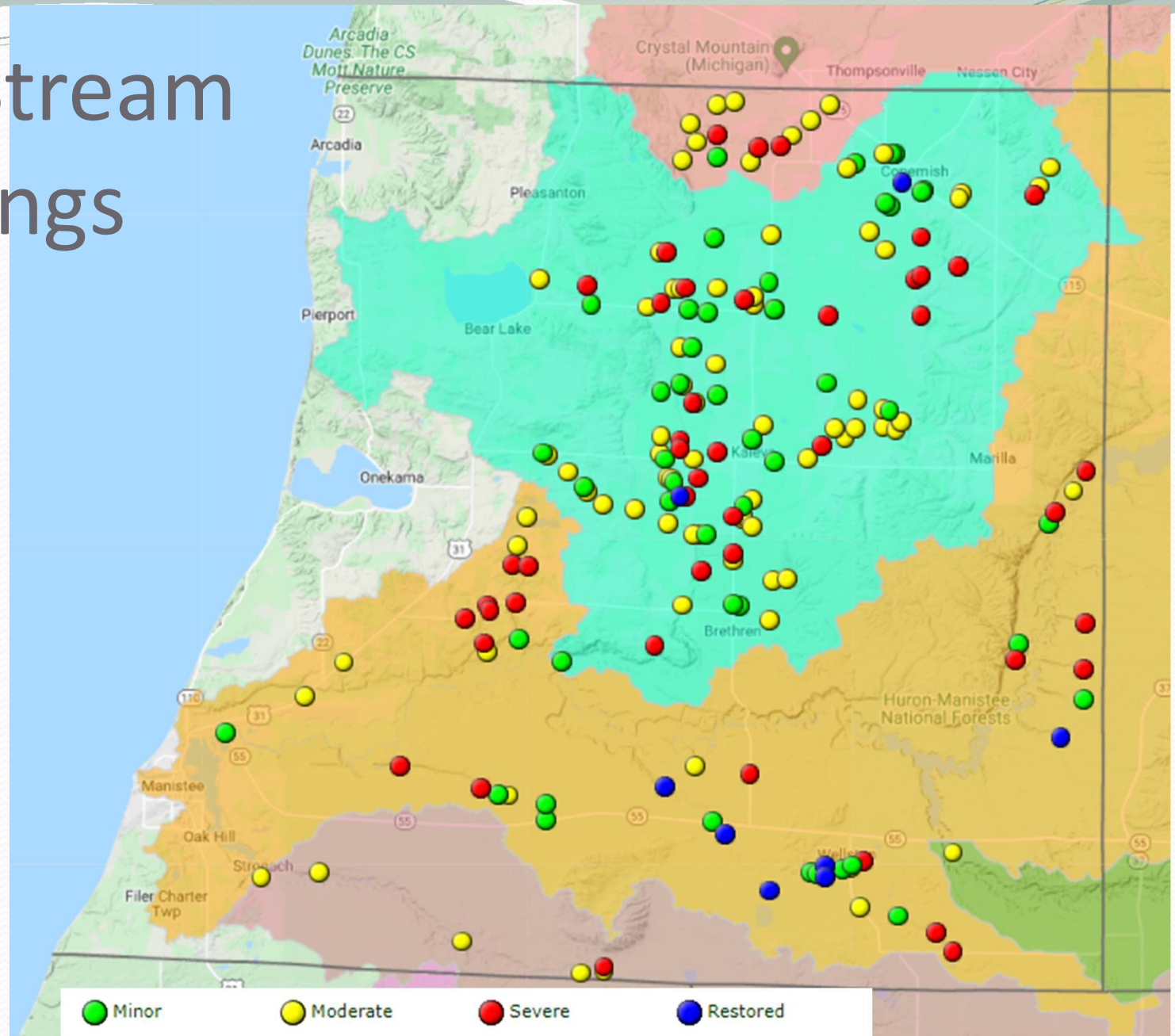
[About River Restoration](#)[Watersheds](#)[Counties](#)[Partners](#)[Home](#) | [Log In](#) | Search:  [Go](#)[Home](#) > [Counties](#) > [Manistee](#) > Road Stream Crossings

## Road Stream Crossings in Manistee County

[Manistee County](#)[Road Stream Crossings](#)[Streambank Erosion](#)



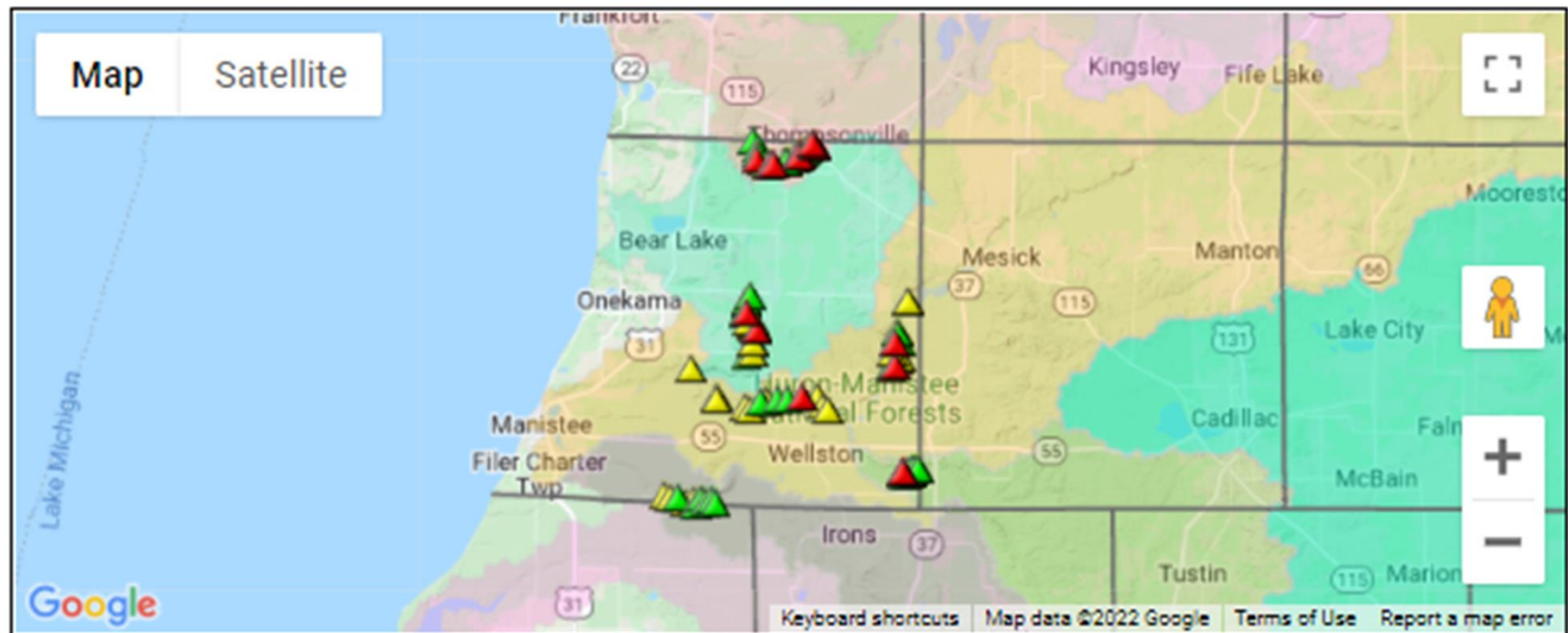
# Road Stream Crossings





Home &gt; Counties &gt; Manistee &gt; Streambank Erosion

## Streambank Erosion in Manistee County

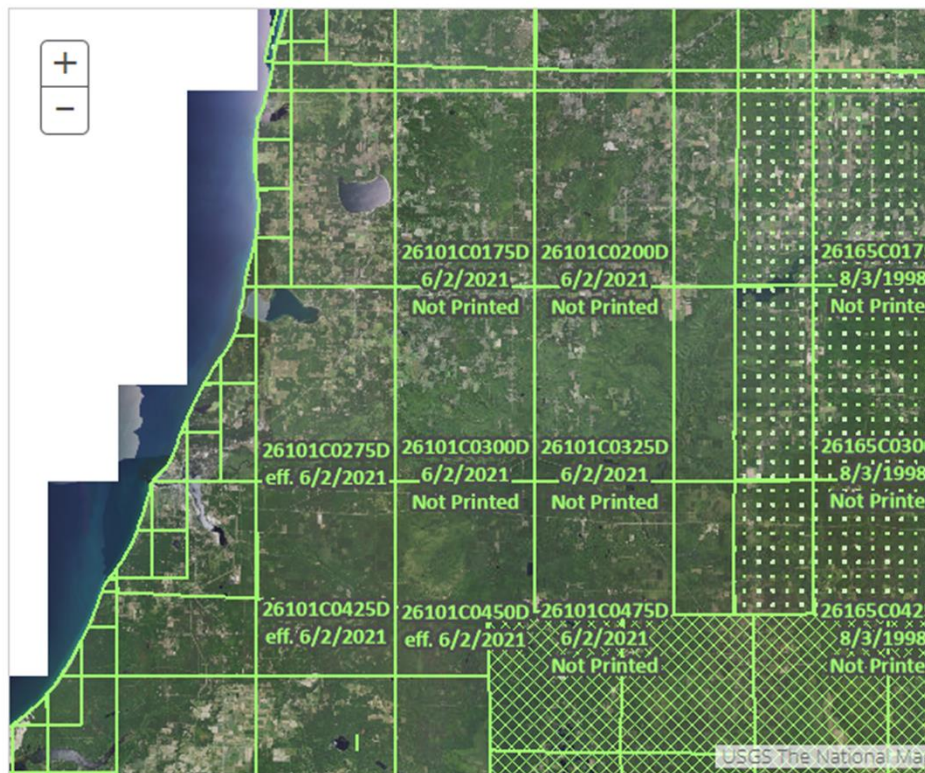


▲ Minor      ▲ Moderate      ▲ Severe

Site No.	Township	County	Stream	Length	Texture	Treatment
▲ <a href="#">BC-01</a>	Maple Grove Twp	Manistee	Bear Creek	50 ft.	Gravel	-Bank revegetation -Tree revetments
▲ <a href="#">BC-02</a>	Maple Grove Twp	Manistee	Bear Creek	20 ft.	Sand	-Bank revegetation -Tree revetments
▲ <a href="#">BC-03</a>	Maple Grove Twp	Manistee	Bear Creek	80 ft.	Sand	-Obstruction removal
▲ <a href="#">BC-04</a>	Maple Grove Twp	Manistee	Bear Creek	50 ft.	Sand	-Bank revegetation -Tree revetments
▲ <a href="#">BC-05</a>	Maple Grove Twp	Manistee	Bear Creek	20 ft.	Gravel	-Bank revegetation -Cover structure -Tree revetments
▲ <a href="#">BC-06</a>	Maple Grove Twp	Manistee	Bear Creek	40 ft.	Sand	-Bank revegetation -Tree revetments
▲ <a href="#">BC-07</a>	Maple Grove Twp	Manistee	Bear Creek	100 ft.	Sand	-Bank revegetation

# NFIP Participating Communities

- National Flood Insurance Program



Community Name	NFIP Participant?	Effective Date
ARCADIA TOWNSHIP	Y	06/02/21
BEAR LAKE TOWNSHIP	N	
BROWN TOWNSHIP	N	
CLEON TOWNSHIP	N	
DICKSON TOWNSHIP	N	
FILER TOWNSHIP	Y	06/02/21
MANISTEE TOWNSHIP	Y	06/02/21
MAPLE GROVE TOWNSHIP	N	
MARILLA TOWNSHIP	N	
NORMAN TOWNSHIP	N	
ONEKAMA TOWNSHIP	Y	06/02/21
PLEASANTON TOWNSHIP	N	
SPRINGDALE TOWNSHIP	N	
STRONACH TOWNSHIP	Y	06/02/21
CITY OF MANISTEE	Y	06/02/21
VILLAGE OF BEAR LAKE	N	
VILLAGE OF COPEMISH	N	
VILLAGE OF EASTLAKE	Y	06/02/21
VILLAGE OF KALEVA	N	
VILLAGE OF ONEKAMA	Y	06/02/21





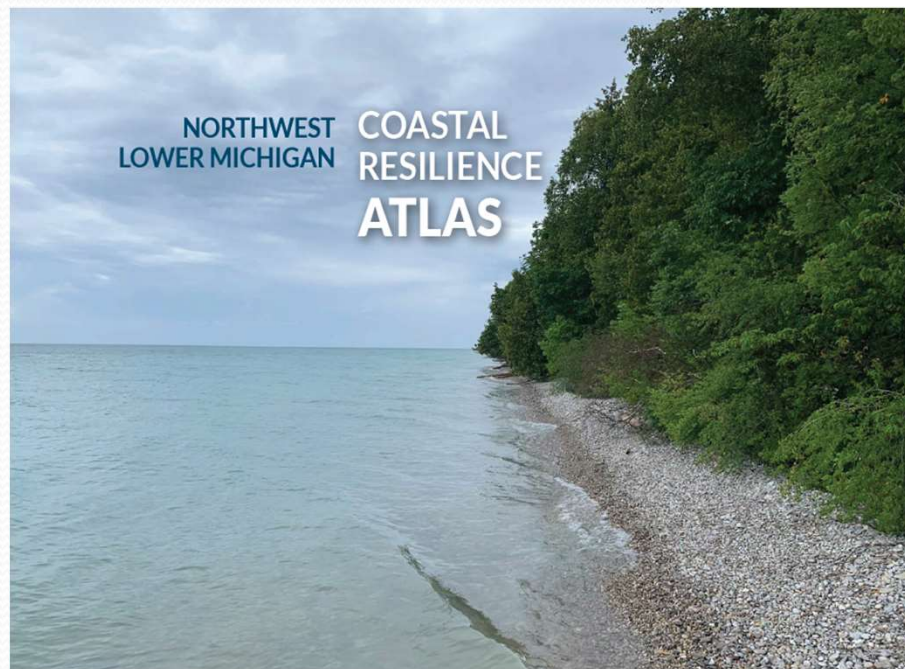
# NFIP & CRS Participating Communities

- The Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the NFIP
- In CRS communities, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community's efforts that address the three goals of the program:
  - Reduce and avoid flood damage to insurable property
  - Strengthen and support the insurance aspects of the National Flood Insurance Program
  - Foster comprehensive floodplain management



# Coastal Flooding / Coastal Recession

- [http://www.resilientmichigan.org/nw\\_atlas.asp](http://www.resilientmichigan.org/nw_atlas.asp)



## ACKNOWLEDGMENTS

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This Atlas was prepared by the Land Information Access Association (LIAA) in cooperation with the Great Lakes Research Center at Michigan Technological University and the Taubman College of Architecture and Urban Planning at the University of Michigan, July 2019.



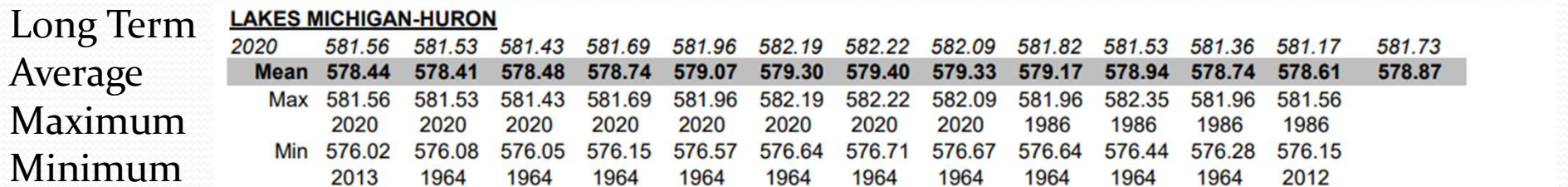


# Coastal Dynamics

- Decadal variability of lake water levels – Record highs in 2020 and 1986
- Wave Energy and Height
  - Erosion
  - Changing conditions
- Climate change on the Great Lakes
  - Increased precipitation events and storminess
  - Water temperature increasing



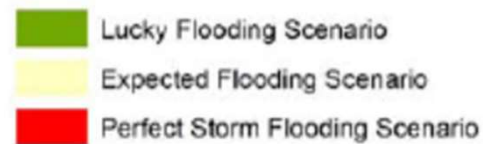
# US Army Corp of Engineers





# Coastal Flooding

[http://www.resilientmichigan.org/nw\\_atlas.asp](http://www.resilientmichigan.org/nw_atlas.asp)



- **“Lucky” Future: Great Lakes water levels will continue to stay relatively low. Although there will be wave and wind action, major storm events and wave impacts will not encroach on properties landward of current beaches.** A Lucky Future projection, indicating the land areas that would be affected by high-energy waves along the shorefront and/or adjacent riverine flooding under these conditions, is shown in green on the maps.
- **“Expected” Future: Great Lakes water levels will continue to fluctuate** according to long-term decadal patterns, including recent extreme storm events incorporated into the ongoing Great Lakes Coast Flood Study being conducted by the Federal Emergency Management Agency (FEMA). Given those ongoing fluctuations, this Climate Future accounts for periods when Great Lakes still-water elevations are closer to the long-term average. **In addition, this Climate Future anticipates the so-called “100-year storm event” (or 1% storm) becoming more like a 20- or 50-year storm event (i.e., an expected storm within the normal community planning time horizon) because of increased storminess.** The Expected Future projection is shown in yellow on the maps.
- **“Perfect Storm” Future: Great Lakes water levels will continue to fluctuate** according to decadal patterns, consistent with assumptions made for the Expected Future. However, for this Perfect Storm Climate Future, **the estimated still-water elevation is set higher than the long-term average and closer to the long-term high (583 feet). In addition, this Climate Future anticipates the occurrence of a so-called “500-year storm event” (or 0.2% storm) occurring within the planning time horizon while lake levels are high.** The Perfect Storm Future projection is shown in red on the maps.
- Taken together on the maps, the three climate futures are progressively cumulative; that is, the Expected Future is cumulative of all the green (Lucky) and yellow areas put together, and the Perfect Storm Future encompasses all green, yellow and red areas.

# Coastal Flooding

[http://www.resilientmichigan.org/nw\\_atlas.asp](http://www.resilientmichigan.org/nw_atlas.asp)

Northwest Lower Michigan Coastal Resilience Atlas

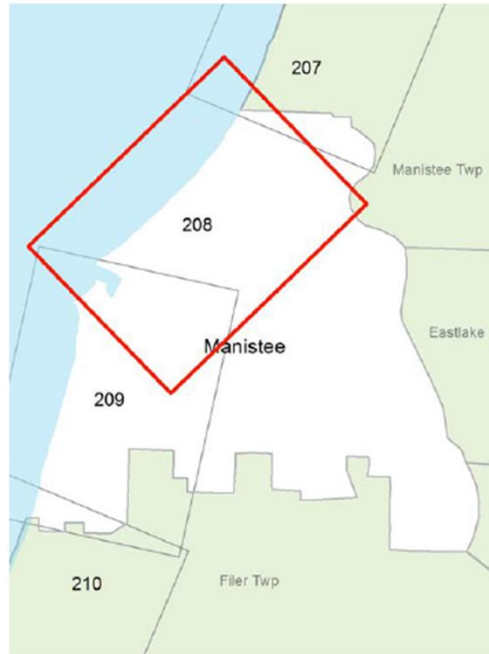
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## Manistee County





# Coastal Flooding



- Lucky Flooding Scenario
- Expected Flooding Scenario
- Perfect Storm Flooding Scenario





# Coastal Recession

[http://www.resilientmichigan.org/nw\\_atlas.asp](http://www.resilientmichigan.org/nw_atlas.asp)

## CHAPTER 4 Coastal Recession

As previously discussed, Great Lakes water level fluctuations do not result from the moon's gravitational pull like oceans, but from cyclical changes in rainfall, evaporation, and riverine and groundwater inflows. These factors work together to raise and lower the water levels of the Great Lakes in small increments daily, and larger increments seasonally and over the course of years and decades.

Unlike our nation's ocean coasts (which change in shoreline level over a 24-hour tidal period), the significantly longer time spans of mean water level change on the Great Lakes give the beach and nearshore region significant time to readjust to new water levels and wave characteristics. During multiple years of high-water levels, wave base moves landward, coastal erosion (bluff and beach) is accelerated, and the nearshore profile steepens. Conversely, during prolonged years of low water levels the reverse happens, although not completely. As the wave base moves offshore, coastal erosion decreases but it does not always stop completely, and the beach area grows larger. Because the beach readjustment from high water episodes to low water episodes is not complete (due to losses of beach sediment to offshore and into longshore sediment traps), there exists a net shoreline retreat over several cycles. For most Great Lakes shoreline, this is on the order of one foot per year of coastal retreat.





# Coastal Recession

[http://www.resilientmichigan.org/nw\\_atlas.asp](http://www.resilientmichigan.org/nw_atlas.asp)

Northwest Lower Michigan Coastal Resilience Atlas

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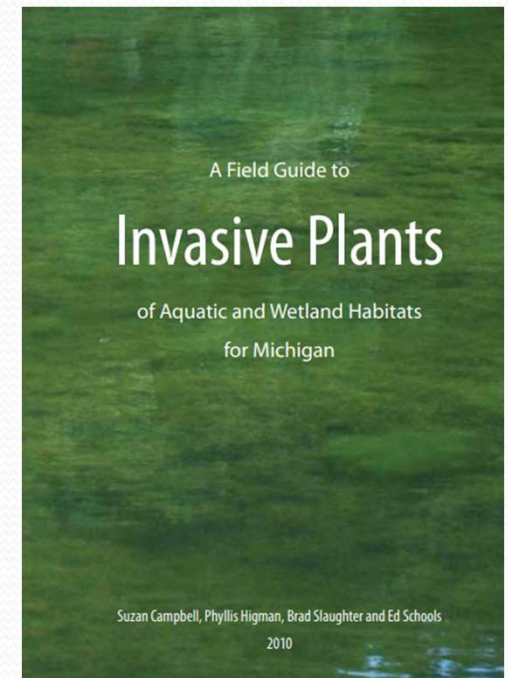
Bluff Detail, Panel 207, Manistee Twp.



Shoreline 1938  
Bluffline 1938  
Bluffline 2016  
Predicted 30  
yr bluff

# Invasive Species

- Only a small fraction of non-native plants are invasive
- Invasives is a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm
- Lake-moderated climates along Lake Michigan, Lake Erie, Saginaw Bay, Thumb, and Lake St. Clair are milder and have high potential to harbor species typically found to the south.





# Invasive Species



Baby's breath



Japanese and common barberry



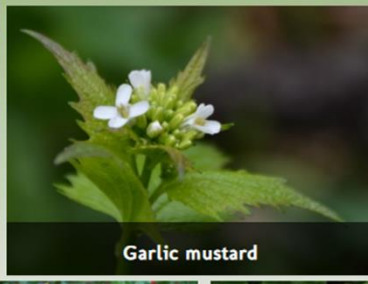
Blue lyme grass



Glossy and common buckthorn



Callery/Bradford/Cleveland Pear



Garlic mustard



Invasive honeysuckles



\*Knotweeds



Invasive bittersweet



\*Invasive Phragmites



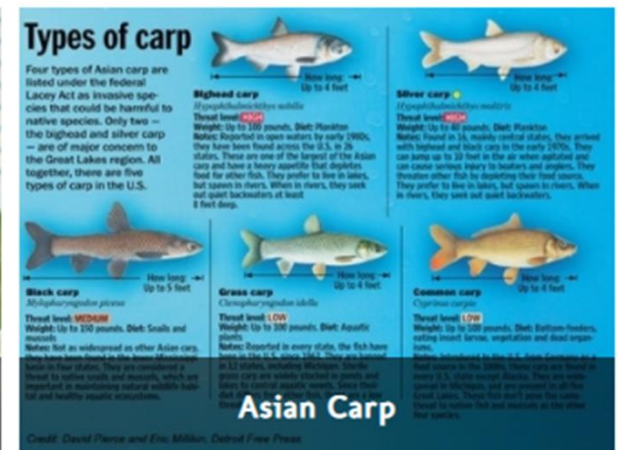
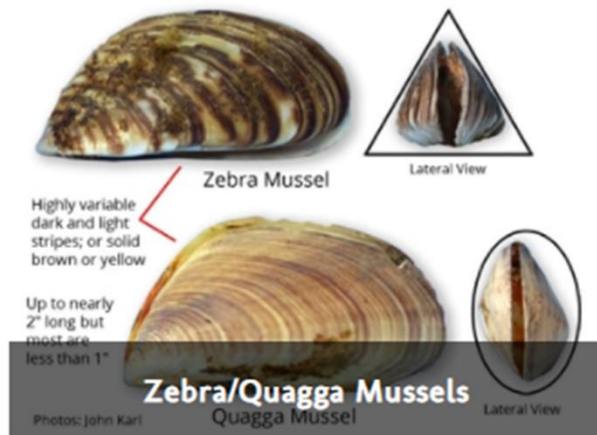
\*Purple loosestrife



Tree-of-Heaven



# Invasive Species







# Next Steps

- Hazard mapping
- Prepare hazard analysis
- Next group meeting / field trip