

# Little River Band of Ottawa Indians Natural Hazard Mitigation Plan

February 18, 2022



**Networks  
Northwest**

Talent / Business / Community



# Welcome

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



# Introductions

- Networks Northwest Staff
  - Jennifer Neal, AICP
  - Stephanie Loria
- Community Partners

# LRBOI Project Meeting Attendance Table

| Participating Agency or Jurisdiction                    | Participant Name and/or Title                       | Meeting Attended                                      |                                 |                                   |                                   |
|---|---|---|---------------------------------|-----------------------------------|-----------------------------------|
|   |   | HM Kick-off Meeting 7/1/2021 (In person and via Zoom) | TERT Meeting (via Zoom) 10/6/21 | TERT Meeting (in person) 11/17/21 | TERT Meeting (in person) 02/18/22 |
| Networks Northwest                                      | Jennifer Neal, Community Planner                    | X   | X                               | X                                 | X                                 |
|   | Stephanie Loria, Community Planner                  |   | X                               | X                                 | X                                 |
|   | Frank Post, Hazard Mitigation Planner               | X   | X                               |                                   |                                   |
|   | Zach Vega, Community Planner                        | X   |                                 |                                   |                                   |
|   | Rob Carson, Director of Community Development       | X   |                                 |                                   |                                   |
| Michigan State Police - Em. Mgmt. and Homeland Security | Mike Sobocinski, Hazard Mitigation Planning Analyst | X   |                                 |                                   |                                   |
| LRBOI   | Brandy Martin, Incident Commander                   | X   | X                               | X                                 |                                   |
|   | Bill Willis, Budget Coordinator                     |   | X                               | X                                 |                                   |
|   | Robert Robles, Public Safety                        |   |                                 | X                                 |                                   |
|   | Gary Lewis, Utilities Director                      |   |                                 | X                                 |                                   |
|   | Jay Sam, Historic Preservation                      |   |                                 | X                                 |                                   |
|   | Steve Parsons, BIA Roads/Planning Coordinator       |   | X                               | X                                 |                                   |
|   | Allison Smart, Natural Resources                    |   |                                 | X                                 |                                   |
|   | Tara Bailey, Housing Director                       |   | X                               |                                   |                                   |
|   | Frank Beaver, Natural Resources Director            |   |                                 | X                                 |                                   |
|   | Tyler Leppanen, Little River Holdings               |   |                                 | X                                 |                                   |
|   | Lee Ivinson, LRCR Compliance                        |   |                                 |                                   |                                   |
|   | Robert Medacco, Public Safety Director              |   |                                 | X                                 |                                   |
|   | Lyle Dorr, Grants                                   |   | X                               |                                   |                                   |
|   | Andrew Hurford, Gaming                              |   | X                               |                                   |                                   |
|   | Dottie Batchelder, Family Services                  |   | X                               |                                   |                                   |
|   | Drew Jeurnik, IT                                    |   | X                               |                                   |                                   |

# Nearly \$300K in FEMA grants will help two tribes, seven counties

JEFF ZIDE

*jeffrey.zide@pioneergroup.com*

MANISTEE COUNTY — Nearly \$300,000 in federal grants will help two tribes and seven counties in northern Michigan prepare for natural disasters.

Networks Northwest received Pre-Disaster Mitigation Grants totaling \$296,937 from the Federal Emergency Management Agency, according to a news release from Networks Northwest.

“The first award is for the update of the tribal natural hazard mitigation plan for the Grand Traverse Band of Ottawa and Chippewa Indians, and to update county plans for Antrim, Benzie, Kalkaska, Leelanau, Manistee, Missaukee, and Wexford counties,” The release read. “The second award is for the creation of a new plan for the Little River Band of Ottawa Indians. During the planning project period (2021-2023), Networks Northwest’s Community Development team will work in partnership with each tribe and county to prepare a total of nine tribal or multi-jurisdictional natural hazard mitigation plans.”

Brandy Martin, Incident Commander for the Tribal Emergency Response Team for the Little River Band of Ottawa Indians said this grant is important because currently, the tribe does not have its own hazard mitigation plan. According to Martin, the tribe had adopted the Manistee County plan in 2007 but that expired in 2012 and they have not had one since.

She said once the tribe and Networks Northwest can have a plan on file with FEMA, they can apply specifically for Hazard

Manistee News Advocate  
Saturday, October 23, 2021

## GRANTS

CONTINUED FROM 1A

Mitigation funding. She said also having a plan, that has, for instance, mentions of cultural sights, will allow them to apply for special funding for FEMA that is set aside for Native American tribes. Martin said that instead of having to compete with the county, they will only have to compete with other tribes in terms of receiving hazard mitigation funding for specific cultural sites.

“Hazard mitigation planning reduces loss of life and property by minimizing the impact of natural disasters. Creating and updating hazard mitigation plans follow

a defined process of identifying hazards within the community, analyzing the risks posed by those hazards, establishing priorities for addressing those risks, and choosing specific actions that will mitigate those risks,” according to Networks Northwest. “Under the Disaster Mitigation Act (DMA), which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, state and local governments are required to adopt a state or local hazard mitigation plan (LHMP) approved by FEMA in order to qualify for federal hazard mitigation project grants. Hazard mitigation plans are valid for five years from the date of FEMA approval.”

Networks Northwest said it

began coordinating with all nine communities in July and will stop coordination in December 2023 after final plans are submitted to FEMA for approval and each local jurisdiction has had an opportunity to review and adopt the plan.

Resident and stakeholder feedback will be gathered throughout the process.

“The public is encouraged to attend public engagement events that will be held to collect feedback and provide direction for the plan. Project events and updates for each plan will be posted periodically throughout the process on the Networks Northwest website at [nwm.org/HazardPlan](http://nwm.org/HazardPlan),” reads the news release.



# Community Survey Responses

## from 10/6/21 to 2/14/22

### 45 Responses

Tribal Government Employee (30)

Tribal Member/Citizen (8)

Physician

Victim Advocate

Utility Operator WWTP

Pharmacy Technician

Police Chief

Legislative Assistant

Surveillance Operator

Tribal Probation Officer

Utility Director

Tribal Councilor

Program Specialist

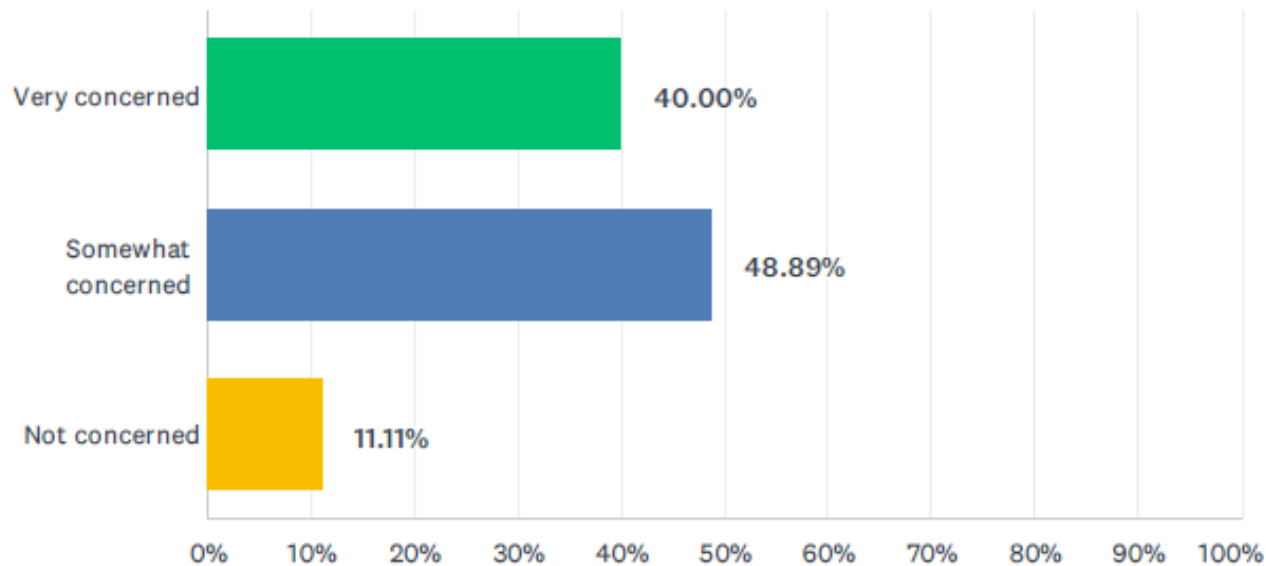
Police Detective

Neighboring County EM Coordinator (Mason County)

# Community Survey Results

Q2 How concerned are you about future natural hazard events impacting your community?

Answered: 45 Skipped: 0



# Community Survey Results

Q3 What type of natural hazard events are likely to have the largest impact on your community (for example fire, flood, drought, illness outbreak, etc.)?

1. Pandemic/Illness Outbreak; Lack of Outbreak Resources; Disease (31)
2. Flood and Wildfire (18 each)
3. Snowstorms/Winter Storms/Blizzard (8)
4. Large/Major Storm/Severe Weather Storms (6)
5. High Winds and Tornado (5 each)
6. Dam Failure Drought and Power Outages (3 each)
7. Extreme Seiche Event, Thunderstorms, Unintentional destruction of natural medicines and/or endangered plants/trees, Water contamination, Air pollution (1 each)



# Community Survey Results

Q4 Does your community have concerns about infrastructure (dams, bridges, utilities, etc.) and the potential for a hazardous event in the future? Please describe.

water Tippy dams sewage failure old cause concern county  
infrastructure unsure bridges flooding dam areas  
Yes aware Utilities need repair systems needs

County doesn't work with the Tribe to address sewage dumpage in the lake, deforestation, and erosion; road dam and bridge repairs

City sewer system is inadequate.

Storms causing loss of power at sewage lift stations – drinking water contamination/disease risk. Back-up generators are a good idea.

LRBOI is downstream of the Hodenpyl and Tippy dams. They are aging. Failure of these dams would cause widespread flooding.

Infrastructure in some areas is getting old, is not designed for climate change, and is not as strong as it should be, or updated. Maintenance is occurring in some areas now, but it is an ongoing process.

Concern about roadways flooding.

Undersized bridges and culverts. Many of the County's drainage systems have been impacted in recent years with flash flooding.

Manistee's two draw bridges may be damaged during a severe storm. Traffic needs to flow through those two areas.

Repair of roads and bridges used by vehicles and railcars.

No annual infrastructure assessments or inspections done on our roofs, windows, etc.

❖ The Tribe works with Cons. Energy on [planning/prevention of a] dam failure or flood as most of the community would be flooded should this happen

❖ The Tribe has processes in place for utility disasters, vulnerability assessment, water and sewer issues.

# Community Survey Results

Q5 Does your community have concerns that a natural hazard event in the future would require investment in new and/or upgraded infrastructure and technology? (I.e., renewable energy, improved stormwater management, internet/cellular, etc.)

sure access need water internet improved yes  
internet cellular renewable energy concerns  
know

- Solar panels to generate electricity; electrical generators
- Internet and cellular booster – poor cellular service at this time
- Backup generators should be installed at all waste water lift stations
- Concern with elders losing power in storms
- Access to emergency support and relief in a natural hazard event
- Improved sewer/storm water system
- Storm water management to handle high precipitation events; fluctuations in Lake MI levels have prompted the need for upgraded infrastructure for water treatment and shoreline erosion prevention
- Waste water treatment and road infrastructure are vulnerable

# Community Survey Results

Q6 Have there been any negative impacts on the public health and/or natural environment of your community that you attribute to climate change?

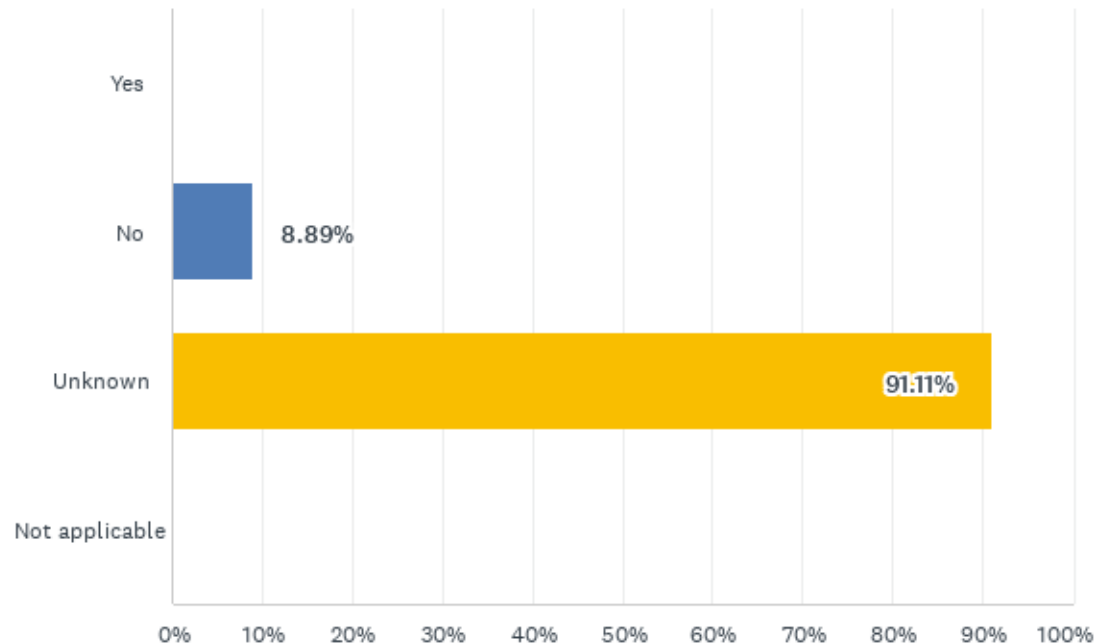
causing area aware increased impacted people yes community  
climate change weather

**41% of respondents indicated yes; 59% indicated no or unsure.**

- Weather related impacts cause more than just physical or structural damage
- Decline in wetlands
- Hotter summers
- Increased fire damage/wildfire frequency and severity
- Wildfire smoke particulates from fires out west impacted our air quality
- Negative impacts to many animal species including some culturally significant species
- Milder and drier winters increases the spread of invasive pests and diseases in the environment (Hemlock wooly adelgid spread)
- Erratic precipitation patterns; periods of drought which impact native plant and animal species (i.e., drought in Spring 2021 was followed by an unusually wet summer, which negatively impacted wild rice populations).
- Water tables rising and falling
- Shoreline erosion
- Seiche events/excess precipitation events cause sewage backups and overflows, resulting in pollution of water bodies and the plants and animals in the environment
- Mason County has responded to several severe storms that have impacted the community, placing a strain on the community's emergency response network.

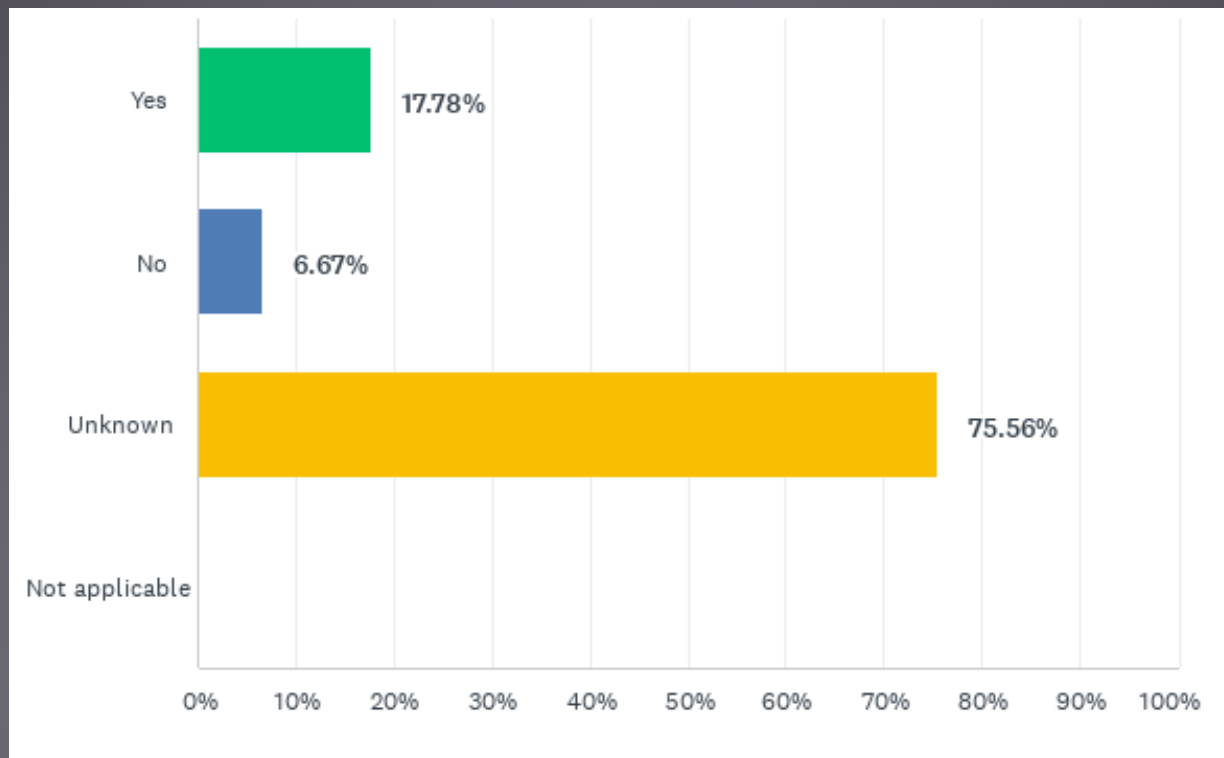
# Community Survey Results

Q7 Has your community requested assistance for mitigation projects in the past?



# Community Survey Results

Q9 Has your community considered mitigation strategies for potential or current hazards?





# Community Survey Results

## Potential Mitigation Strategies to Explore:

- Infrastructure
- Solar energy
- In the process of completing renewable energy studies and strategic planning to investing in renewable energy projects
- Emergency services for the elderly in a hazard event
- Have our duplicate electronic information and data stored at an alternative site at least 50 miles from our “home” site to reduce the risk of having a singular event destroy all E-info. and its back-up.
- Mason County is currently updating their HM Plan and strategies



# Community Survey Results

## What Else to Consider in the Plan?

- Include all of our Reservation lands and not just here locally. We need to ensure all of our land is protected.
- Have a plan that is realistic, do-able and easy to follow by the people who will implement the plan.
- Infrastructure
- LRBOI NRD's progress on their Wetland Program that is working to map and monitor wetlands on Tribal properties. Wetlands are key to mitigating floodwater surges and need to be protected and restored.
- Severe winter storms – ice/snow
- The impact on employees who must come to work during a severe weather event
- Considering Tribal values and the importance of game and non-game species to the community.
- Cultural properties and impacts
- Native plant and animal species
- Safety over profits, please

# Historic Federal and Governor Declared Emergencies/Disasters

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.



12 Flood

10 Severe Storm(s)

6 Tornado

5 Snow

2 Biological

2 Dam/Levee Break

1 Drought

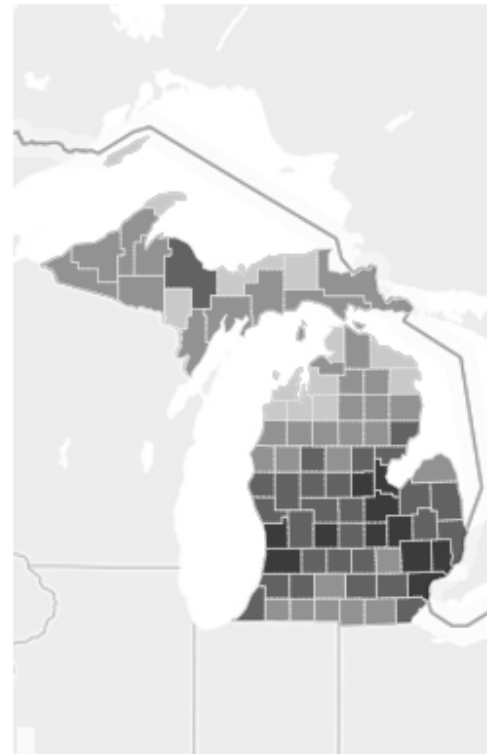
1 Fire

1 Freezing

1 Hurricane

1 Other

1 Toxic Substances



# Presidential and Governor Declared Emergencies/Disasters

- **March 10, 2020: Governor Whitmer declared a State of Emergency** in Michigan to address the COVID-19 pandemic.
- **March 13, 2020: the U.S. made a National Emergency Declaration** regarding the COVID-19 virus outbreak. The Federal government began developing a sweeping relief package.
- **March 23, 2020: Governor Whitmer announced an order for all Michigan businesses and operations to temporarily suspend in-person operations** that are not necessary to sustain or protect life, and to stay home unless they are part of the critical infrastructure workforce, engaging in outdoor activities, or performing necessary tasks (e.g. going to the grocery store).
- **March 26, 2020: Governor Whitmer requested a Major Disaster Declaration for the State of Michigan due to the Coronavirus Disease 2019 (COVID-19) pandemic beginning on January 20, 2020, and continuing.** The Governor requested a declaration for Individual Assistance (all programs) statewide; Public Assistance (Categories A-G), including direct Federal assistance, statewide; and Hazard Mitigation statewide. The Governor also requested that the cost-sharing requirement be waived for this disaster.
- **March 27, 2020: President Trump approved Governor Whitmer's request for a Major Disaster Declaration in Michigan,** which allows Michigan to participate in FEMA programming.

# Presidential and Governor Declared Emergencies/Disasters

## Disaster/Emergency Declarations by the Governor or President, 2019-1956

| Incident Type   | Number of Incidents |
|---|---------------------|
| Flooding (2019, 2018, 2014, 2013, 2008, 2004, 1997, 1986, 1975) | 10                  |
| T-Storms/Severe Storms (2008, 2004, 1998, 1980, 1965)           | 8                   |
| Severe Winter Weather (2019, 2000, 1999, 1978, 1977, 1976)      | 6                   |
| Severe Winds (1975, 1980, 1998)                                 | 4                   |
| Tornado (1956, 1965, 1975, 1976)                                | 4                   |
| Great Lakes Flooding, Wave Action (1986)                        | 1                   |
| Extreme Cold (2019)   | 1                   |
| Drought (1977)  | 1                   |

# Presidential and Governor Declared Emergencies/Disasters

| Date of Incident               | Type of Incident            | Affected Area   | (P)residential Declaration* /<br>Federal ID Number** or<br>(G)overnor's Declaration*** |
|--------------------------------|-----------------------------|---|--|
| 3/14/2019                      | Flooding                    | Newaygo County  | (G) Emergency  |
| 2/7/2019                       | Severe Winter Weather       | City of Grand Rapids  | (G) Emergency  |
| 1/29/2019                      | Extreme Cold                | All 83 counties   | (G) Emergency  |
| 2/19/2018                      | Flooding                    | City of Grand Rapids and City of Lansing; Allegan, Arenac, Barry, Berrien, Cass, Clare, Eaton, Ingham, Ionia, Kalamazoo, Kent, Newaygo, Mecosta, Ogemaw, Oscoda, Ottawa, and St. Joseph Co.   | (G) Disaster   |
| 4/12/2014                      | Flooding                    | Isabella, Mecosta, Missaukee, Muskegon, Newaygo, Osceola, Roscommon, and Wexford Co.  | (G) Disaster   |
| 5/7/13 - 6/18/13               | Flooding                    | Allegan, Baraga, Barry, Benzie, Genesee, Gogebic, Gratiot, Houghton, Ionia, Iron, Kent, Keweenaw, Marquette, Mecosta, Midland, Muskegon, Newaygo, Ontonagon, Osceola, Ottawa and Saginaw Co.; City of Grand Rapids (Kent Co.); City of Ionia (Ionia Co.)  | (G) Disaster   |
| 4/16/13-5/14/13                | Flooding                    | 16 counties: Allegan, Baraga, Barry, Gogebic, Houghton, Ionia, Kent, Keweenaw, Marquette, Midland, Muskegon, Newaygo, Ontonagon, Osceola, Ottawa, and Saginaw Co.   | (P) Major Disaster (4121)  |
| 7/14/2008                      | Thunderstorms, flooding     | 12 counties: Allegan, Barry, Eaton, Ingham, Lake, Manistee, Mason, Missaukee, Osceola, Ottawa, Saginaw, and Wexford Co.   | (P) Major Disaster (1777)  |
| 6/19/2008                      | Thunderstorms               | Lake, Manistee, Osceola, Ottawa, and Wexford Co.  | (G) Emergency  |
| 6/13/2008                      | Thunderstorms               | City of Saginaw and City of Lansing (Ingham Co.); Allegan, Eaton, and Mason Co.   | (G) Emergency  |
| 9/7/2005                       | Hurricane evacuation        | All 83 counties   | (P) Emergency (3225)   |
| 9/4/2005                       | Hurricane evacuation        | All 83 counties   | (G) Disaster   |
| 5/20/04-6/8/04                 | Thunderstorms, flooding     | 23 counties: Barry, Berrien, Cass, Eaton, Genesee, Gladwin, Ingham, Ionia, Jackson, Kent, Livingston, Macomb, Mecosta, Muskegon, Oakland, Ottawa, Saginaw, Sanilac, Shiawassee, St. Clair, St. Joseph, Washtenaw, and Wayne Co.   | (P) Major Disaster (1527)  |
| 6/3/2004                       | Thunderstorms, flooding     | Arenac, Barry, Berrien, Cass, Genesee, Gladwin, Ingham, Ionia, Jackson, Kent, Livingston, Macomb, Mecosta, Newaygo, Oakland, Ottawa, Saginaw, St. Clair, St. Joseph, Sanilac, Shiawassee, Van Buren and Wayne Co.   | (G) Disaster   |
| 12/11-31/00                    | Blizzard, snowstorm         | 39 counties: Allegan, Barry, Bay, Berrien, Branch, Calhoun, Cass, Clare, Clinton, Eaton, Genesee, Gladwin, Gratiot, Hillsdale, Huron, Ingham, Ionia, Isabella, Jackson, Kalamazoo, Kent, Lapeer, Livingston, Macomb, Mecosta, Midland, Montcalm, Muskegon, Oakland, Osceola, Ottawa, Saginaw, St. Clair, St. Joseph, Sanilac, Shiawassee, Tuscola, Van Buren, and Washtenaw Co. | (P) Emergency (3160)   |
| 1/2-15/99                      | Blizzard, snowstorm         | 31 counties: Alcona, Allegan, Arenac, Barry, Berrien, Branch, Cass, Crawford, Ionia, Iosco, Jackson, Kalamazoo, Kent, Lenawee, Macomb, Marquette, Mecosta, Monroe, Montmorency, Muskegon, Newaygo, Oakland, Oceana, Ogemaw, Osceola, Oscoda, Otsego, Ottawa, St. Joseph, Van Buren, Washtenaw, and Wayne Co.  | (P) Emergency (3137)   |
| 6/3-5/1998                     | Thunderstorms, severe winds | Bay, Clinton, Gratiot, Ionia, Kent, Mason, Mecosta, Montcalm, Muskegon, Newaygo, Oceana, Ottawa, Saginaw, and Shiawassee Co.; Village of Armada (Macomb Co.)  | (G) Disaster   |
| 5/31/1998                      | Thunderstorms, severe winds | 13 counties: Bay, Clinton, Gratiot, Ionia, Kent, Mason, Montcalm, Muskegon, Newaygo, Oceana, Ottawa, Saginaw, and Shiawassee Co.  | (P) Major Disaster (1226)  |
| 6/27/1997                      | Rainstorms, flooding        | Allegan and Ottawa Co.  | (G) Disaster   |
| 10/28/86<br>9/15/86<br>9/12/86 | Flooding, heavy rain        | Allegan, Arenac, Bay, Clare, Clinton, Genesee, Gladwin, Gratiot, Huron, Ionia, Isabella, Kent, Lake, Lapeer, Macomb, Manistee, Mason, Mecosta, Midland, Montcalm, Muskegon, Newaygo, Oceana, Osceola, Ottawa, Saginaw, Shiawassee, Tuscola, and Van Buren Co.   | (G) Disaster   |
| 9/10-19/86                     | Flooding                    | 30 counties: Allegan, Arenac, Bay, Clare, Clinton, Genesee, Gladwin, Gratiot, Huron, Ionia, Isabella, Kent, Lake, Lapeer, Macomb, Manistee, Mason, Mecosta, Midland, Montcalm, Muskegon, Newaygo, Oceana, Osceola, Ottawa, Saginaw, Sanilac, Shiawassee, Tuscola, and Van Buren Co.   | (P) Major Disaster (774)   |

# Presidential and Governor Declared Emergencies/Disasters

| Date of Incident  | Type of Incident                   | Affected Area  | (P)residential Declaration* / Federal ID Number** or (G)overnor's Declaration*** |
|-------------------|------------------------------------|--|--|
| 2/21/1986         | Great Lakes flooding, wave action  | Allegan, Arenac, Bay, Berrien, Grand Traverse, Iosco, Macomb, Marquette, Menominee, Monroe, <b>Muskegon</b> , <b>Ottawa</b> , Saginaw, St. Clair, Tuscola, Van Buren, and Wayne Co.  | (G) Disaster   |
| 7/21/1980         | Thunderstorms, severe winds        | Allegan, Berrien, Calhoun, Cass, Jackson, St. Joseph, Van Buren, Washtenaw, and Wayne Co.; <b>City of Grand Haven and Village of Spring Lake (Ottawa Co.)</b>  | (G) Disaster   |
| 7/15-20/80        | Severe winds                       | 10 counties: Allegan, Berrien, Calhoun, Cass, Jackson, <b>Ottawa</b> , St. Joseph, Van Buren, Washtenaw, and Wayne Co.   | (P) Major Disaster (631)   |
| 1/26-27/78        | Blizzard, snowstorm                | <b>Statewide</b>   | (P) Emergency (3057)   |
| 1/26/1978         | Blizzard, snowstorm                | <b>Statewide</b>   | (G) Disaster   |
| 3/2/1977          | Drought                            | 44 counties: Alcona, Alger, Alpena, Antrim, Arenac, Baraga, Benzie, Charlevoix, Cheboygan, Chippewa, Clare, Crawford, Delta, Dickinson, Emmet, Gladwin, Gogebic, Grand Traverse, Houghton, Iosco, Iron, Isabella, Kalkaska, <b>Lake</b> , Leelanau, Luce, Mackinac, <b>Manistee</b> , Marquette, <b>Mason</b> , Mecosta, Menominee, Missaukee, Montmorency, <b>Oceana</b> , Ogemaw, Ontonagon, Osceola, Oscoda, Otsego, Presque Isle, Roscommon, Schoolcraft, and <b>Wexford Co.</b> | (P) Emergency (3035)   |
| 1/26-31/77        | Blizzard, snowstorm                | 15 counties: Allegan, Barry, Berrien, Cass, Chippewa, Hillsdale, Kalamazoo, <b>Kent</b> , Monroe, <b>Muskegon</b> , <b>Newaygo</b> , <b>Oceana</b> , <b>Ottawa</b> , St. Joseph, and Van Buren Co.   | (P) Emergency (3030)   |
| 1/28/1977         | Blizzard                           | Allegan, Barry, Berrien, Cass, Chippewa, Eaton, Hillsdale, Ionia, <b>Muskegon</b> , <b>Newaygo</b> , <b>Oceana</b> , <b>Ottawa</b> , Sanilac, Shiawassee, and Van Buren Co.  | (G) Disaster   |
| 3/20/76, 3/2-7/76 | Ice storm, tornadoes               | 29 counties: Allegan, Bay, Clare, Clinton, Genesee, Gladwin, Gratiot, Ionia, Isabella, Jackson, <b>Kent</b> , Lapeer, Macomb, Mecosta, Midland, Montcalm, <b>Muskegon</b> , <b>Newaygo</b> , Oakland, <b>Oceana</b> , Osceola, <b>Ottawa</b> , Roscommon, Saginaw, St. Clair, Sanilac, Shiawassee, Tuscola, and Wayne Co.  | (P) Major Disaster (495)   |
| 8/20/75-9/6/75    | Rainstorms, severe winds, flooding | 16 counties: Allegan, Clare, Genesee, Gratiot, Ingham, Isabella, Mecosta, Midland, Montcalm, <b>Muskegon</b> , <b>Newaygo</b> , <b>Oceana</b> , Osceola, <b>Ottawa</b> , Saginaw, and Shiawassee Co.   | (P) Major Disaster (486)   |
| 4/18-30/75        | Flooding, rain, tornadoes          | 21 counties: Allegan, Barry, Berrien, Calhoun, Clinton, Crawford, Eaton, Genesee, Ingham, Ionia, Kalamazoo, <b>Kent</b> , Lapeer, Livingston, Macomb, Oakland, <b>Ottawa</b> , Saginaw, St. Clair, Shiawassee, and Van Buren Co.   | (P) Major Disaster (465)   |
| 4/11/1965         | Tornadoes, severe storms           | 16 counties: Allegan, Barry, Bay, Branch, Clinton, Eaton, Gratiot, Hillsdale, Kalamazoo, <b>Kent</b> , Lenawee, Monroe, Montcalm, <b>Ottawa</b> , Shiawassee, and Washtenaw Co.  | (P) Major Disaster (190)   |
| 4/5/1956          | Tornado                            | 4 counties: Benzie, Leelanau, <b>Manistee</b> , and <b>Ottawa Co.</b>  | (P) Major Disaster (53)  |

## Notes

\*Does not include separate Secretary of Agriculture or Small Business Administration (SBA) disaster declarations, which are issued under other authorities. Declarations after 1974 were issued under PL 93-288 (Disaster Relief Act), as amended by the Robert T. Stafford Disaster Relief and Emergency Assistance Act (1988) and the Disaster Mitigation Act (2000).

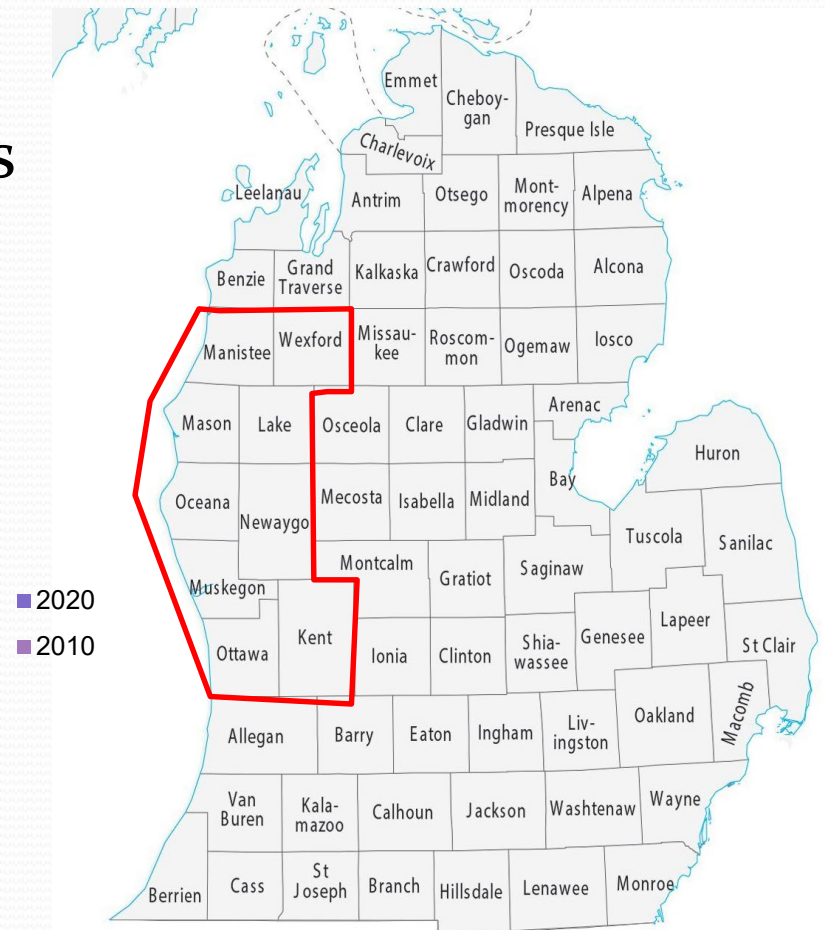
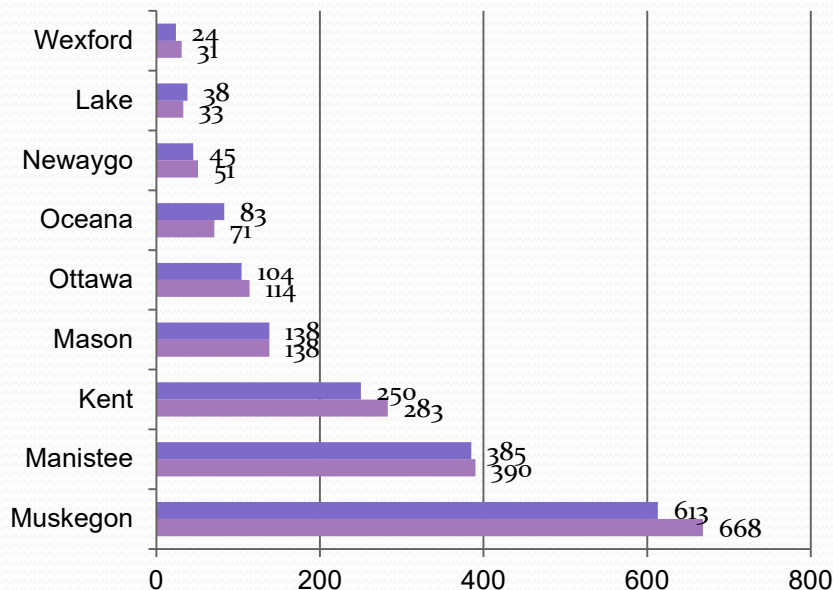
\*\*Indicates federal declaration number assigned by FEMA or its predecessor agencies

\*\*\*Declarations since 1977 were issued under 1976 PA 390, as amended (Michigan Emergency Management Act).



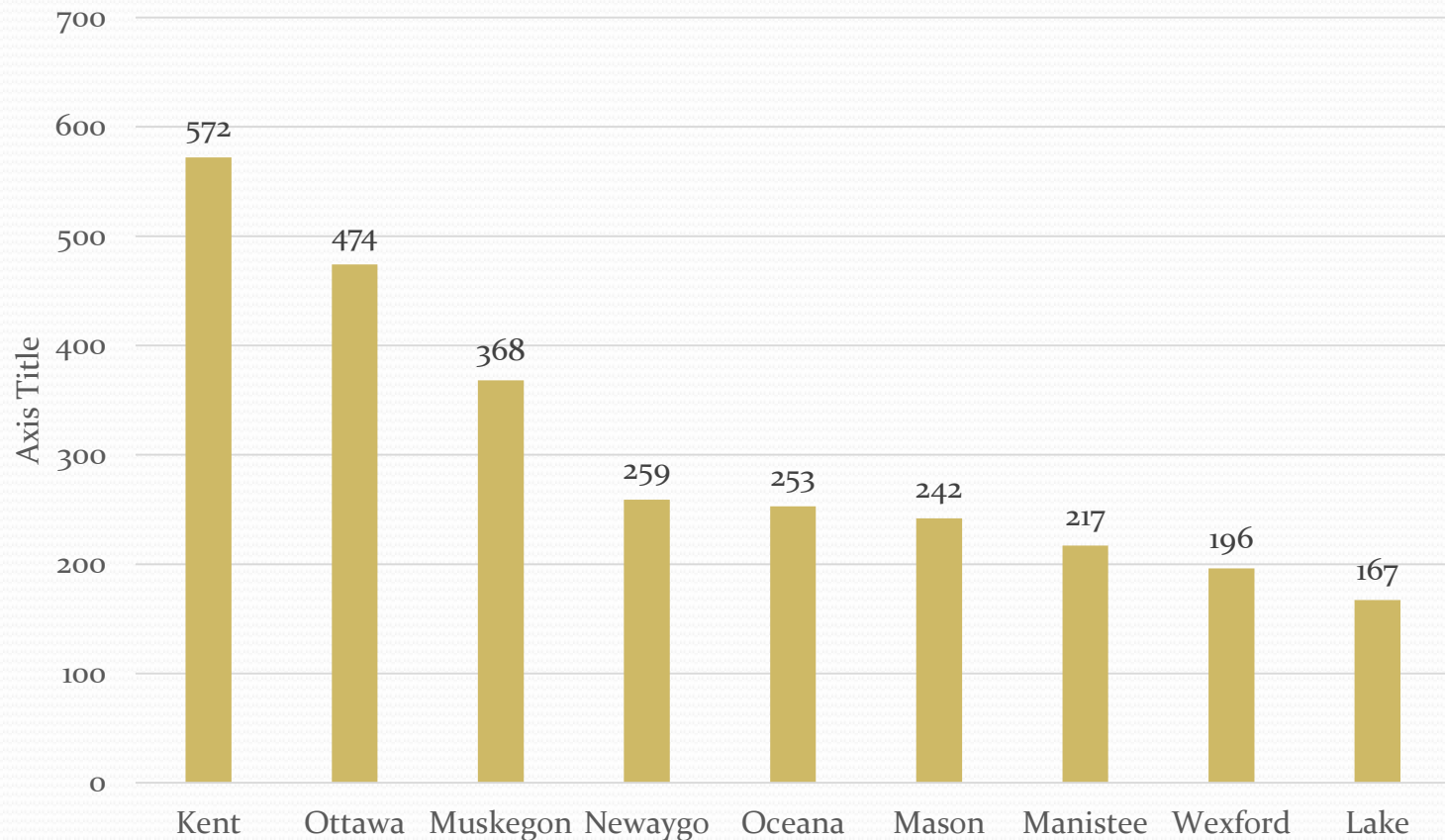
# Historic Weather Events

- LRBOI Membership Coverage Area – 9 Counties



# Historic Weather Events

Total Severe Storm Events per County, 1950-2021\*



\*Source: NOAA Storm Events Database. Data does not reflect contiguous years from 1950-2021.

# Historic Weather Events

|                                    | Total<br>Events<br>per<br>County | High Wind,<br>T-Storm w/<br>Wind | Winter<br>Weather<br>(Blizzard, Ice,<br>Sleet, Heavy<br>Snow, Extreme<br>Cold,<br>Frost/Freeze) | Hail | Flood/Flash<br>Flood,<br>Heavy Rain | Tornado,<br>Waterspout<br>, Funnel<br>Cloud | Lightni<br>ng | Excessive<br>Heat | Lakeshore<br>Flood | Dense<br>Fog | Drought | Seiche | Rip<br>Current |
|------------------------------------|----------------------------------|----------------------------------|---|------|-------------------------------------|---|---------------|-------------------|--------------------|--------------|---------|--------|----------------|
| Kent                               | 572                              | 264                              | 108   | 131  | 25                                  | 39  | 3             | 1                 | 0                  | 1            | 0       | 0      | 0              |
| Ottawa                             | 474                              | 185                              | 147   | 93   | 21                                  | 24  | 3             | 0                 | 0                  | 1            | 0       | 0      | 0              |
| Muskegon                           | 368                              | 156                              | 122   | 63   | 15                                  | 10  | 1             | 0                 | 0                  | 0            | 0       | 1      | 0              |
| Newaygo                            | 259                              | 97                               | 85  | 49   | 14                                  | 13  | 0             | 1                 | 0                  | 0            | 0       | 0      | 0              |
| Oceana                             | 253                              | 70                               | 131   | 38   | 9                                   | 5   | 0             | 0                 | 0                  | 0            | 0       | 0      | 0              |
| Mason                              | 242                              | 86                               | 115   | 22   | 14                                  | 5   | 0             | 0                 | 0                  | 0            | 0       | 0      | 0              |
| Manistee                           | 217                              | 64                               | 99  | 32   | 10                                  | 2   | 2             | 2                 | 4                  | 1            | 0       | 0      | 1              |
| Wexford                            | 196                              | 68                               | 73  | 32   | 11                                  | 8   | 1             | 2                 | 0                  | 0            | 1       | 0      | 0              |
| Lake                               | 167                              | 51                               | 85  | 18   | 9                                   | 4   | 0             | 0                 | 0                  | 0            | 0       | 0      | 0              |
| Total Event<br>Types for<br>Region |                                  | 1041                             | 965   | 478  | 128                                 | 110   | 10            | 6                 | 4                  | 3            | 1       | 1      | 1              |

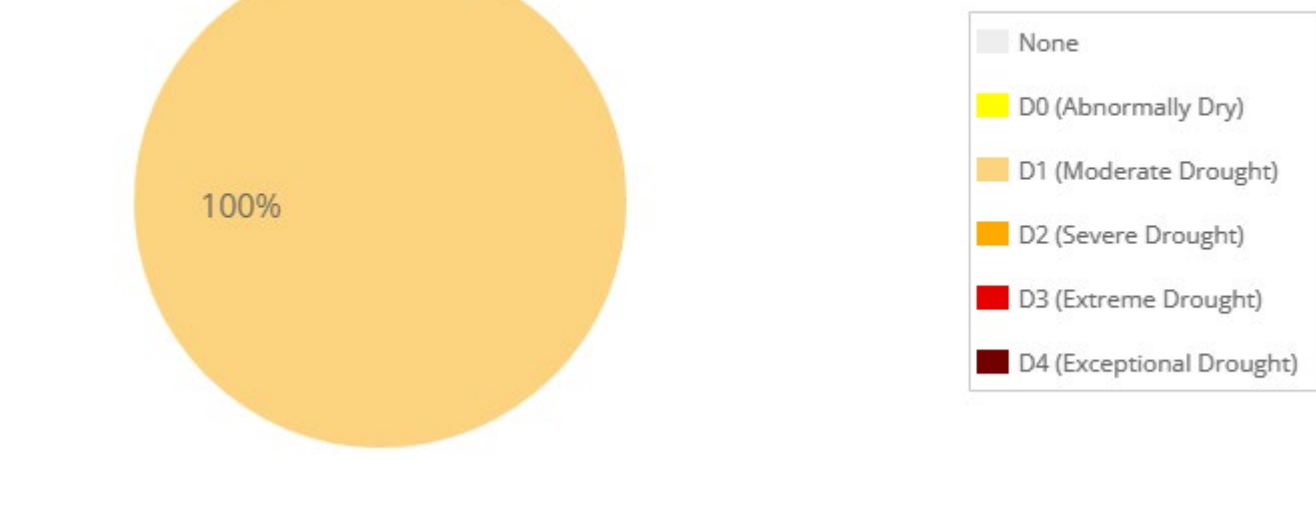
# Historic Weather Events

- 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.

# Drought Risk

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





Michigan

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

# Wildfire Risk

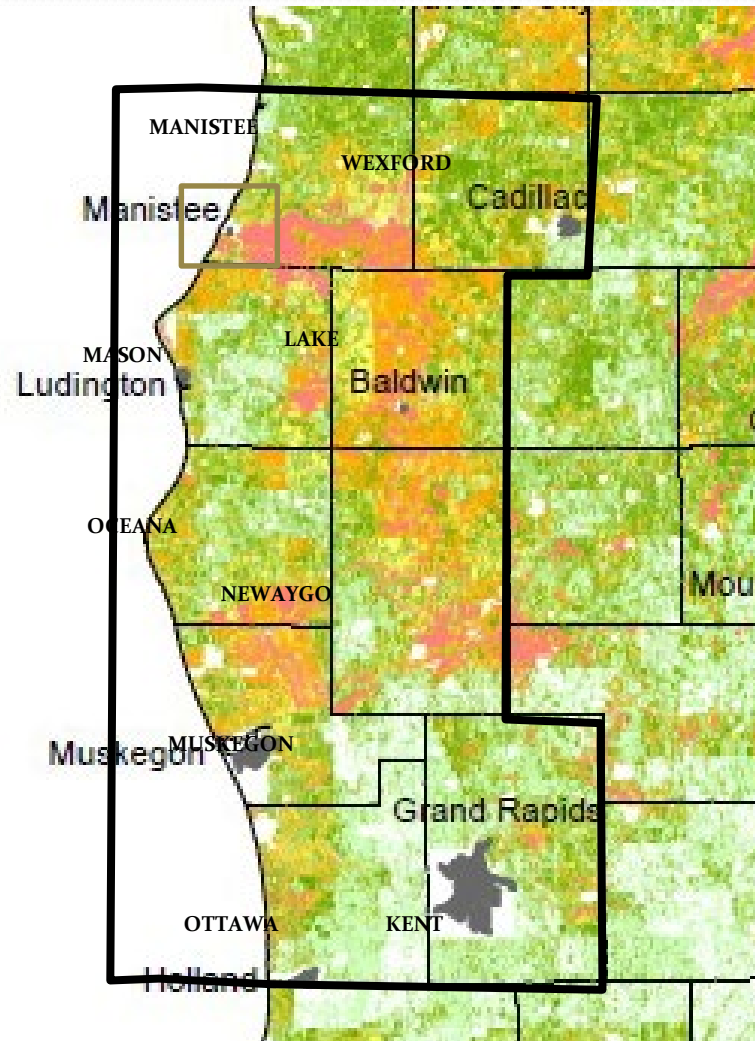
## Legend

-  Cities
-  County Boundaries

## Fire Risk w/ Dry Soils

-  No Risk
-  Low Risk
-  Moderate Risk
-  High Risk
-  Very High Risk
-  Extreme Risk

Data includes Land Cover Type, Canopy Cover, Township Scaled Fire Risk, and Dry Soil types from SSURGO Soils data.



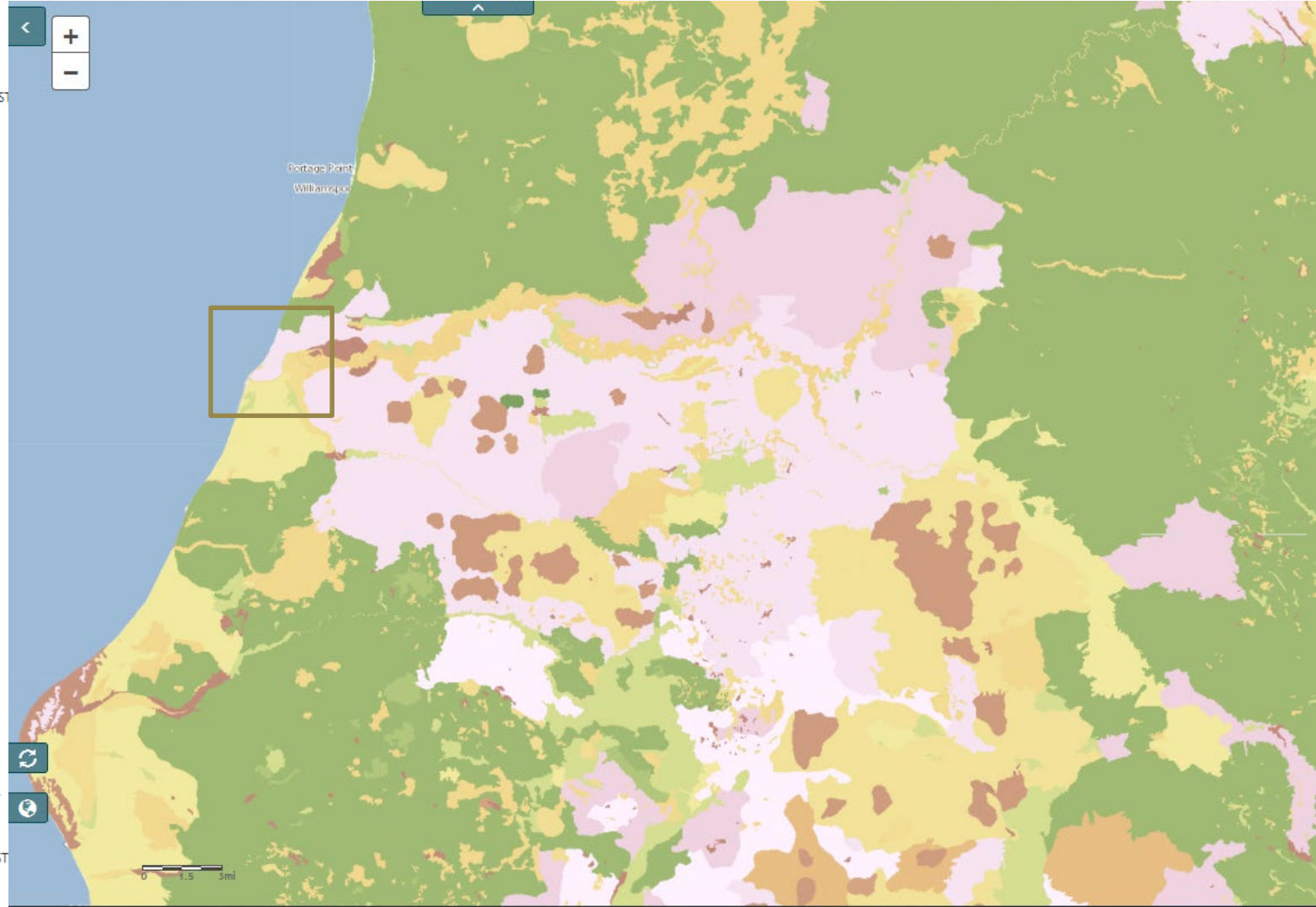
Source: Wildfire Risk Map - MDNR Forest Resources Division



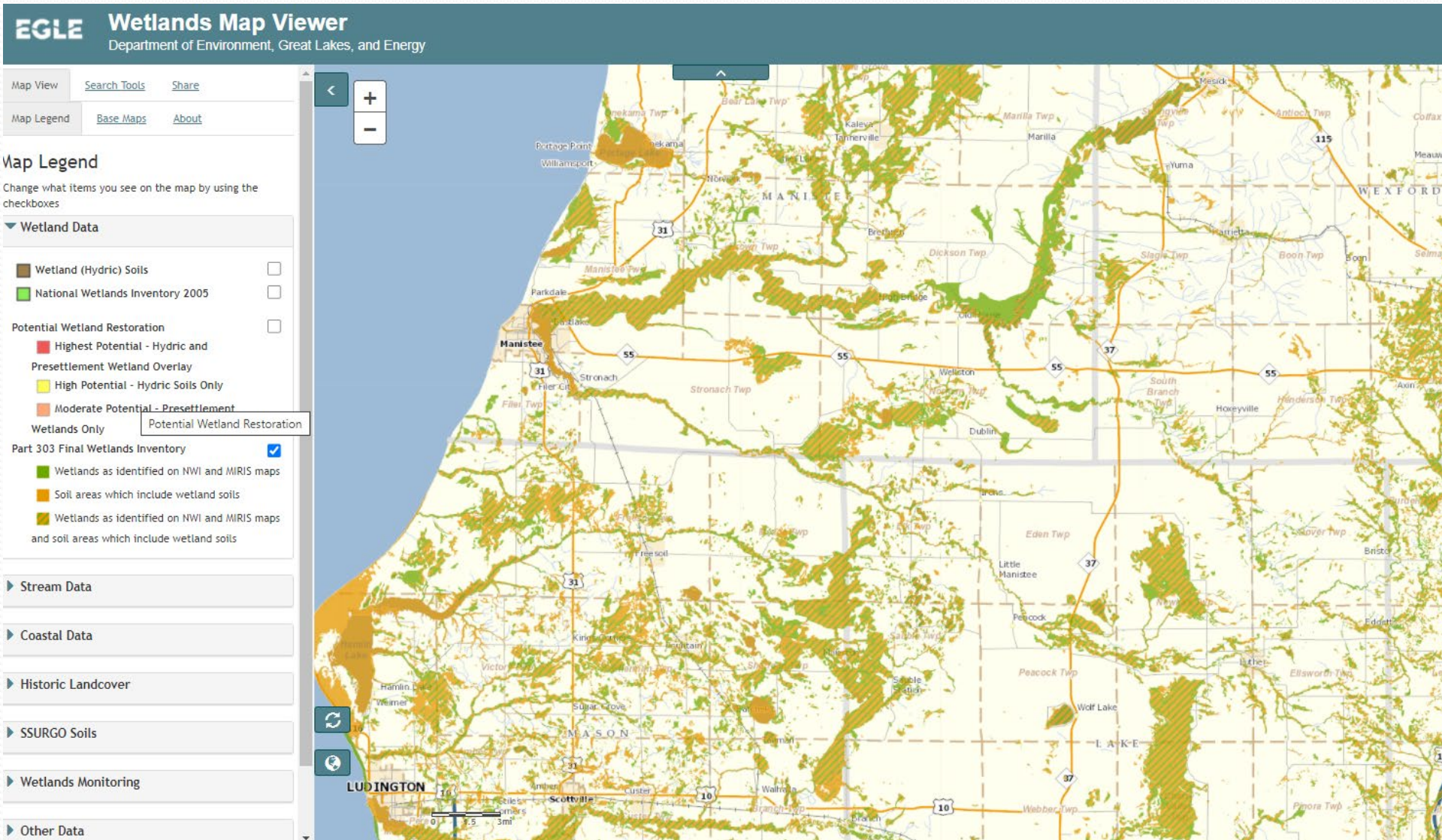
# Region Forests

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



# Region Wetlands





# Region Dams –

## Listed on the National Inventory of Dams

### Dams of Manistee County, Michigan ?

**93 years** Average Dam Age

**100%** High Hazard Potential Dams with an EAP

**20%** Federally Regulated Dams

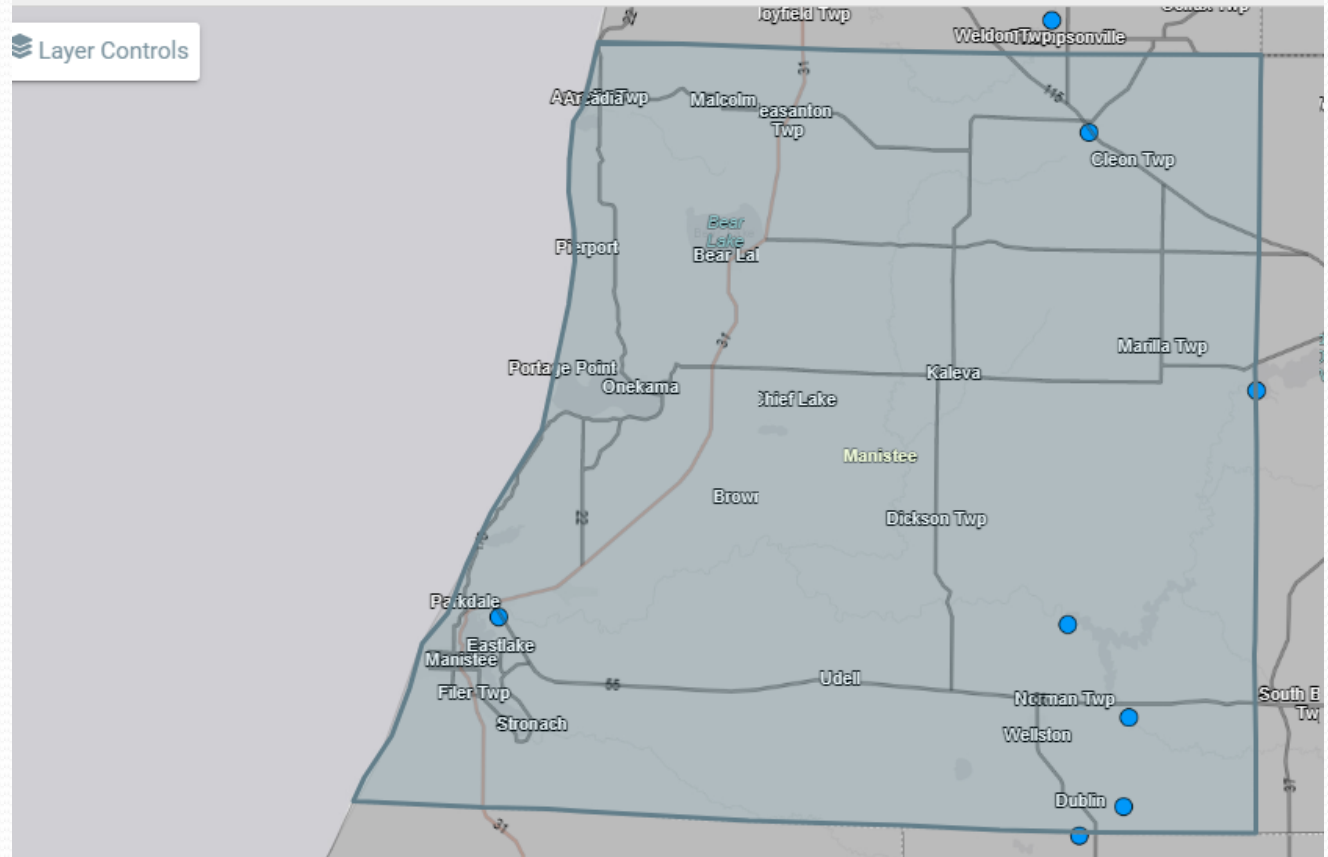
**0%** Dams with Hydropower

**40%** State-Regulated Dams

BROWSE THESE DAMS

Layer Controls

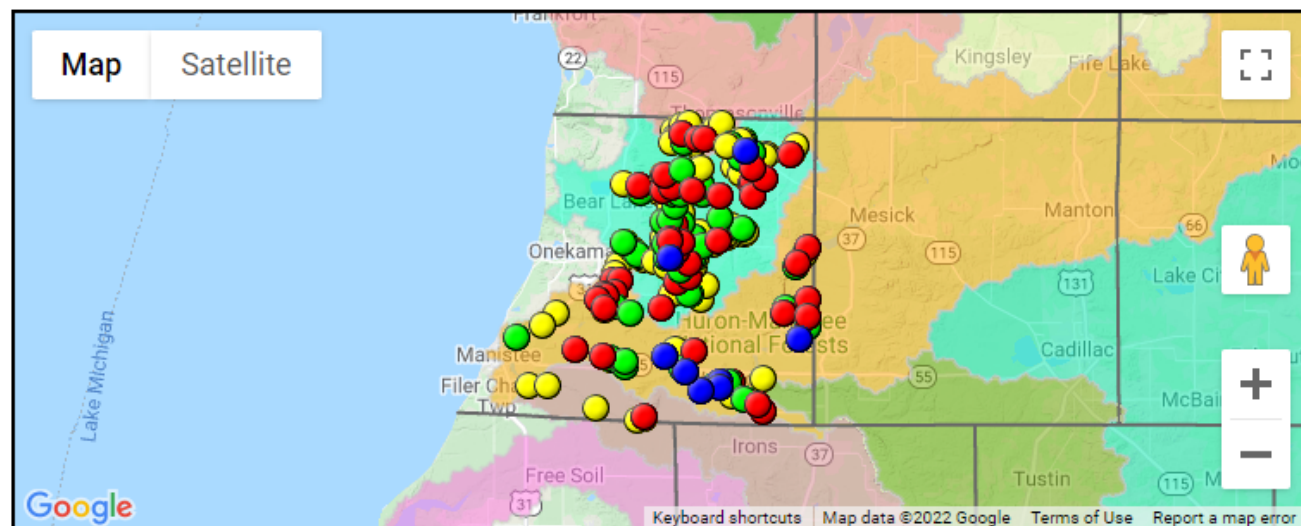
| County   | # of Dams | High Hazard Potential |
|----------|-----------|-----------------------|
| Kent     | 15        | 5                     |
| Lake     | 10        | 0                     |
| Manistee | 5         | 1                     |
| Mason    | 4         | 2                     |
| Muskegon | 6         | 1                     |
| Newaygo  | 10        | 3                     |
| Oceana   | 8         | 2                     |
| Ottawa   | 9         | 1                     |
| Wexford  | 9         | 1                     |



# RIVER RESTORATION in Northern Michigan


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[Home](#) > [Counties](#) > [Manistee](#) > Road Stream Crossings

## Road Stream Crossings in Manistee County

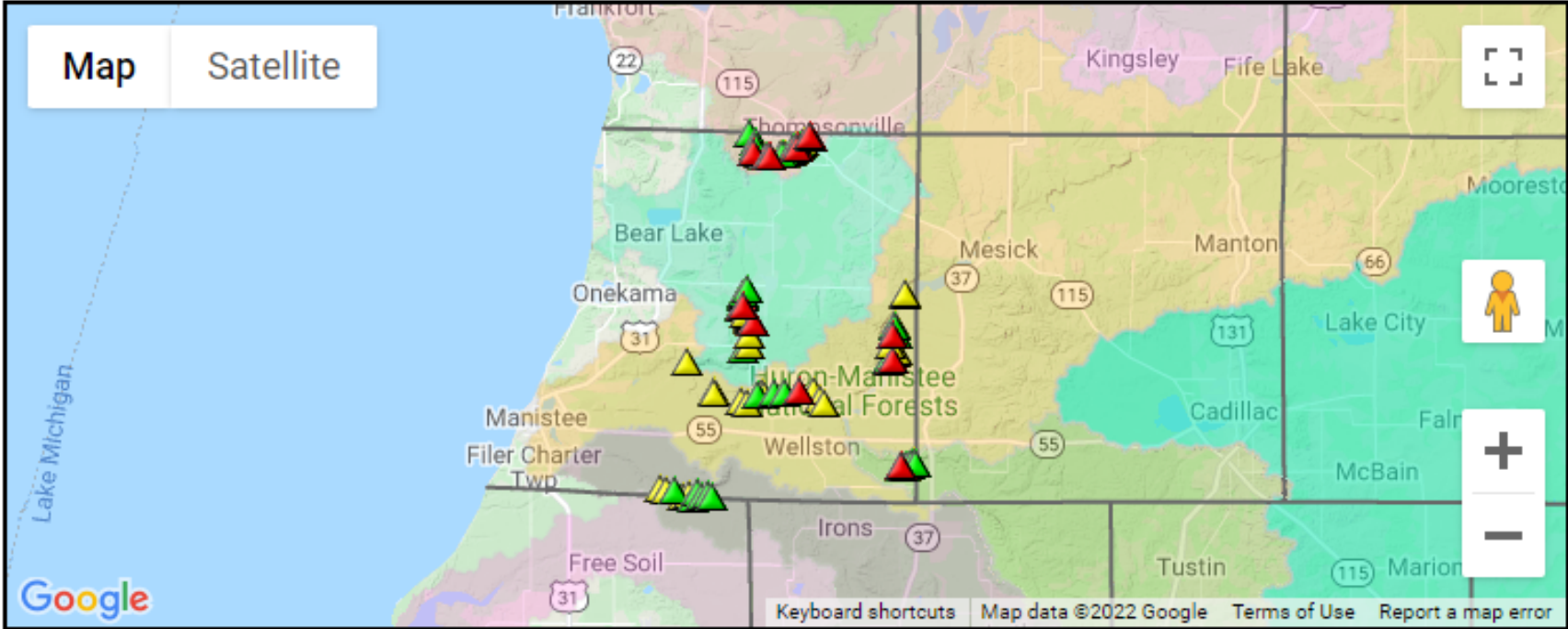
**Manistee County**
**Road Stream Crossings**
**Streambank Erosion**


| Site No.   | Township       | County   | Road                          | Stream                   |
|------------|----------------|----------|-------------------------------|--------------------------|
| BEAR_BC001 | Springdale Twp | Manistee | Tomasek Rd                    | Dutchman Creek           |
| BEAR_BC002 | Springdale Twp | Manistee | Springdale Rd (County Rd 669) | Dutchman Creek           |
| BEAR_BC003 | Springdale Twp | Manistee | County Rd 669                 | Dutchman Creek           |
| BEAR_BC004 | Cleon Twp      | Manistee | M-115                         | Dutchman Creek           |
| BEAR_BC005 | Cleon Twp      | Manistee | Old Railroad NE of M115       | Dutchman Creek           |
| BEAR_BC006 | Cleon Twp      | Manistee | Faylor Rd/ County Rd 604      | Tributary of First Creek |
| BEAR_BC007 | Cleon Twp      | Manistee | Conrad Rd                     | First Creek              |
| BEAR_BC008 | Cleon Twp      | Manistee | Litzen Rd                     | First Creek              |
| BEAR_BC009 | Cleon Twp      | Manistee | Erwin Rd                      | First Creek              |
| BEAR_BC010 | Cleon Twp      | Manistee | Conrail Railroad              | First Creek              |
| BEAR_BC011 | Cleon Twp      | Manistee | Yates Rd (County Rd 597)      | First Creek              |
| BEAR_BC012 | Cleon Twp      | Manistee | M-115                         | First Creek              |
| BEAR_BC013 | Cleon Twp      | Manistee | Lake Rd                       | First Creek              |





# 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<br>-Tree revetments                     |
| ▲ <a href="#">BC-02</a> | Maple Grove Twp | Manistee | Bear Creek | 20 ft.  | Sand    | -Bank revegetation<br>-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<br>-Tree revetments                     |
| ▲ <a href="#">BC-05</a> | Maple Grove Twp | Manistee | Bear Creek | 20 ft.  | Gravel  | -Bank revegetation<br>-Cover structure<br>-Tree revetments |
| ▲ <a href="#">BC-06</a> | Maple Grove Twp | Manistee | Bear Creek | 40 ft.  | Sand    | -Bank revegetation<br>-Tree revetments                     |
| ▲ <a href="#">BC-07</a> | Maple Grove Twp | Manistee | Bear Creek | 100 ft. | Sand    | -Bank revegetation<br>-Rock riprap<br>-Tree revetments     |
| ▲ <a href="#">BC-08</a> | Maple Grove Twp | Manistee | Bear Creek | 100 ft. | Sand    | -Bank revegetation   |

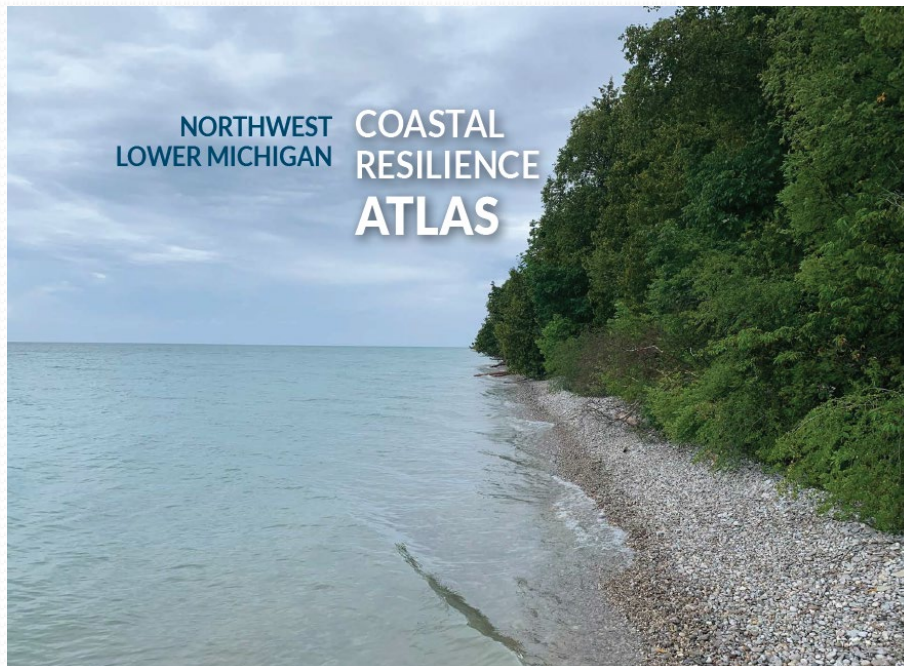


# NFIP & CRS Participating Communities

- National Flood Insurance Program
- 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

Financial assistance for this project was provided, in part, by the Michigan Coastal Zone Management Program, Department of Environment, Great Lakes, and Energy, and is supported through a grant under the National Coastal Zone Management Act of 1972, as amended, administered by the Office for Coastal Management, National Oceanic and Atmospheric Administration. The statements, findings, conclusions and recommendations in this report are those of the researchers and do not necessarily reflect the views of the Michigan Department of Environment, Great Lakes, and Energy and the National Oceanic and Atmospheric Administration.



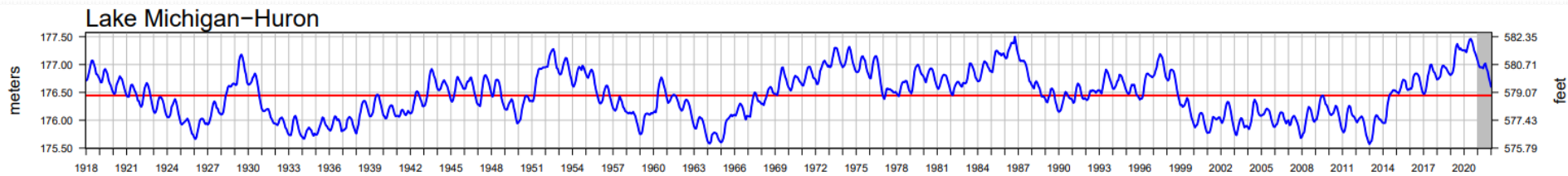
This Atlas was prepared by the Land Information Access Association (LIAA) in cooperation with the Great Lakes Research Center at Michigan Technological University and the Taubman College of Architecture and Urban Planning at the University of Michigan, July 2019.



# Coastal Dynamics

- Changing water levels
- Water Energy and Height
  - Erosion
  - Changing conditions
- Climate change on the Great Lakes
  - Increased precipitation and storminess
  - Variability of lake water levels
  - Water temperature

# US Army Corp of Engineers



Long Term  
Average  
Maximum  
Minimum

## LAKES MICHIGAN-HURON

[illegible]

# 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

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

To develop the scenario planning framework, the research team had to establish assumptions regarding future climate conditions that could affect northwest Lower Michigan. These varying “climate futures” — all of which are reasonably anticipated possibilities — are arranged from a least impactful (“Lucky”) to a most impactful (“Perfect Storm”) condition in terms of the potential for wave damage and flooding hazards they would bring.

The following descriptions outline the key assumptions made in defining each of the climate futures as compared to the others. The maps in this chapter show the estimated land areas that would be affected by waves and flooding under these three climate futures.

**“Lucky” Future:** Under the Lucky Climate 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 shoreline and/or adjacent riverine flooding under these conditions, is shown in green on the maps.

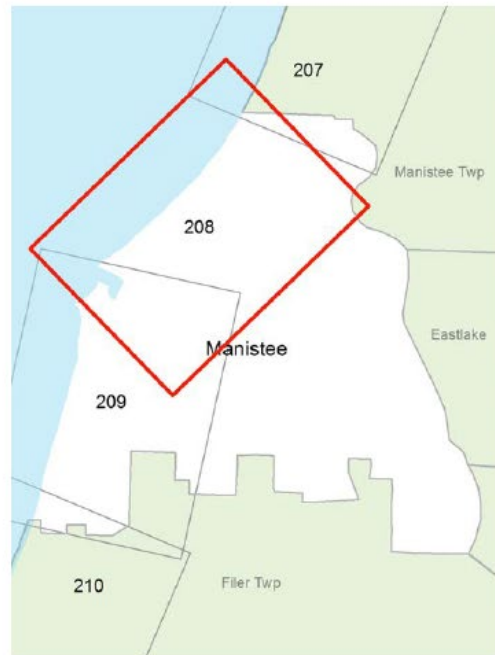
**“Expected” Future:** Under the Expected Climate Future, Great Lakes water levels will continue to fluctuate according to long-term decadal patterns, including recent extreme storm events incorporated into the ongoing Great Lakes Coast Flood Study being conducted by the Federal Emergency Management 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:** Under the Perfect Storm Climate 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. It is important to note that this flooding analysis is only complete for Lake Michigan coastal areas; inland rivers, streams and other waterbodies may show little or no data.



# 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)

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Northwest Lower Michigan Coastal Resilience Atlas

## 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

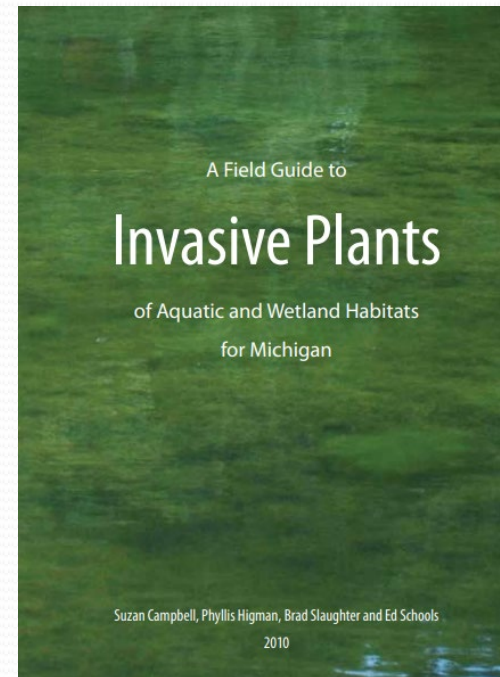
Chapter 4 | Coastal Recession | Manistee County 615

Bluff Detail, Panel 207, Manistee Twp.



# 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



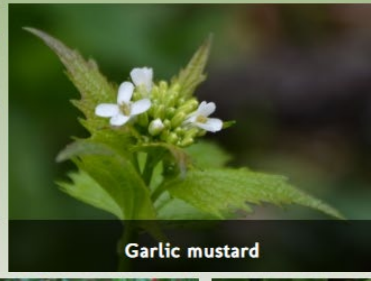
Blue lyme grass



Glossy and common buckthorn



Callery/Bradford/Cleveland Pear



Garlic mustard



Invasive honeysuckles



\*Knotweeds



Invasive bittersweet



\*Invasive Phragmites



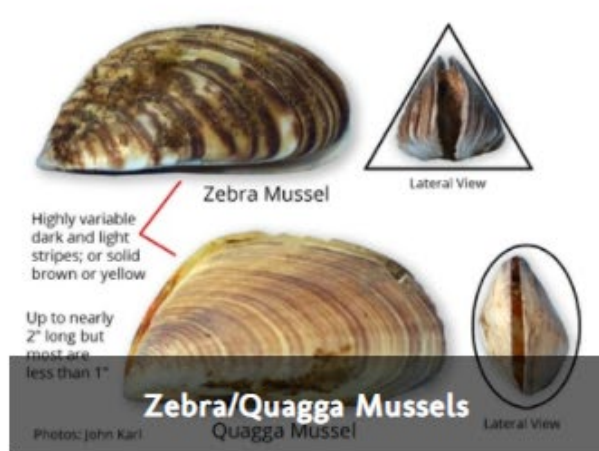
\*Purple loosestrife



Tree-of-Heaven



# Invasive Species



## Types of carp

Four types of Asian carp are listed under the federal Lacey Act as invasive species that could be harmful to native species. Only two — the bighead and silver carp — are of major concern to the Great Lakes region. All together, there are five types of carp in the U.S.

| Bighead carp  | Silver carp  | Black carp   | Grass carp   | Common carp  |
|---|--|--|--|--|
| <i>Crucianella asotus</i>   | <i>Cyprinus carpio</i>   | <i>Miklopharyngodon piceus</i>   | <i>Ctenopharyngodon idella</i>   | <i>Cyprinus carpio</i>   |
| Threat level: <b>HIGH</b>   | Threat level: <b>HIGH</b>  | Threat level: <b>MEDIUM</b>  | Threat level: <b>LOW</b>   | Threat level: <b>LOW</b>   |
| Weight: Up to 40 pounds. Diet: Plankton. Notes: Imported as open water by early 1900s, they have been found across the U.S. in 26 states. These are one of the largest of the Asian carp and have a bony scapula that doubles as a shield for other fish. They prefer to live in lakes, not rivers or streams. When in rivers, they seek out quiet backwaters at least 8 feet deep. | Weight: Up to 100 pounds. Diet: Plankton. Notes: Imported in U.S. mostly as a bait species, they arrived with bighead and grass carp in the early 1970s. They can jump up to 30 feet in the air when startled and can cause serious injury to boaters and anglers. They threaten other fish by depleting their food sources. They prefer to live in lakes, but can live in rivers. When in rivers, they seek out quiet backwaters. | Weight: Up to 200 pounds. Diet: Scuds and aquatic plants. Notes: Reported in some states, the fish have been found in the lower Mississippi River in 12 states, including Mississippi. Some grass carp are easily trained to eat and are used for control aquatic weeds. Grass carp are not as aggressive as the other Asian carp. | Weight: Up to 100 pounds. Diet: Bottom feeders, eating insect larvae, vegetation and dead organisms. Notes: Introduced to the U.S. in 1929, grass carp have been found in the Gulf of Mexico. They are very common in the Gulf, and are present in all five Great Lakes. Grass carp are not as aggressive as the other Asian carp. | Weight: Up to 100 pounds. Diet: Bottom feeders, eating insect larvae, vegetation and dead organisms. Notes: Introduced to the U.S. in 1929, grass carp have been found in the Gulf of Mexico. They are very common in the Gulf, and are present in all five Great Lakes. Grass carp are not as aggressive as the other Asian carp. |

Credit: David Rouse and Eric Millard, Detroit Free Press





# Next Steps

- Hazard mapping
- Prepare hazard analysis
- Next group meeting



# Thank you!

- Any questions??