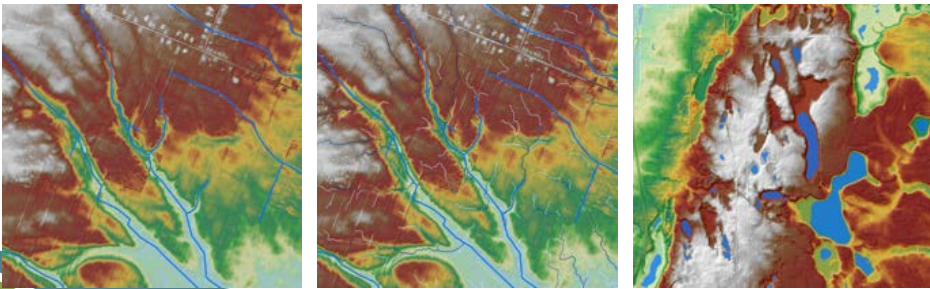


# GIS UPDATES IN EGLE'S WETLAND PROGRAM

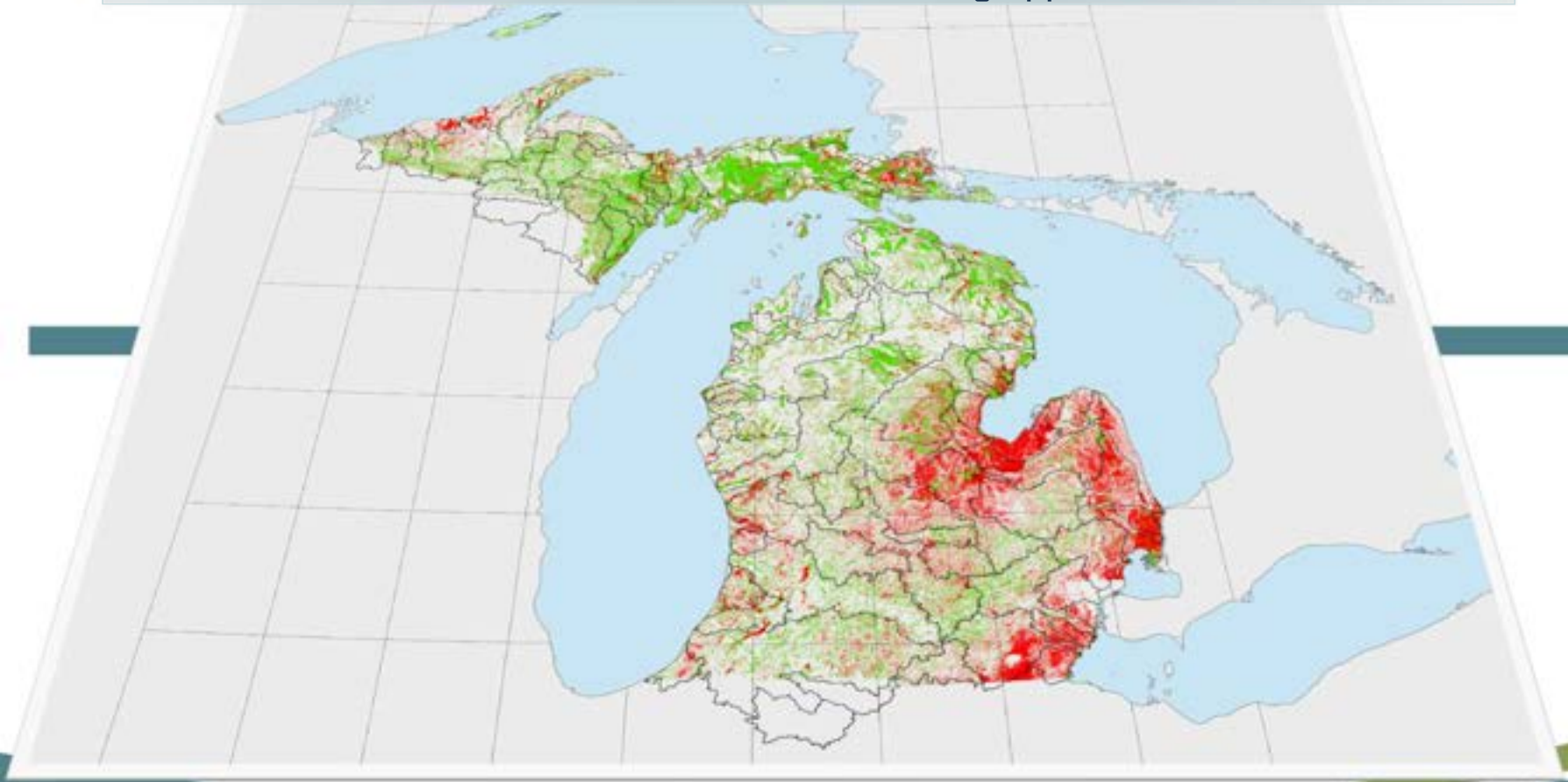


## A BRIEF OUTLINE

- NATIONAL WETLAND INVENTORY 2015 UPDATE
- NATIONAL HYDROGRAPHY DATASET UPDATE AND NWI INTEGRATION
- INLAND LAKE SHORELINE STATUS AND TRENDS

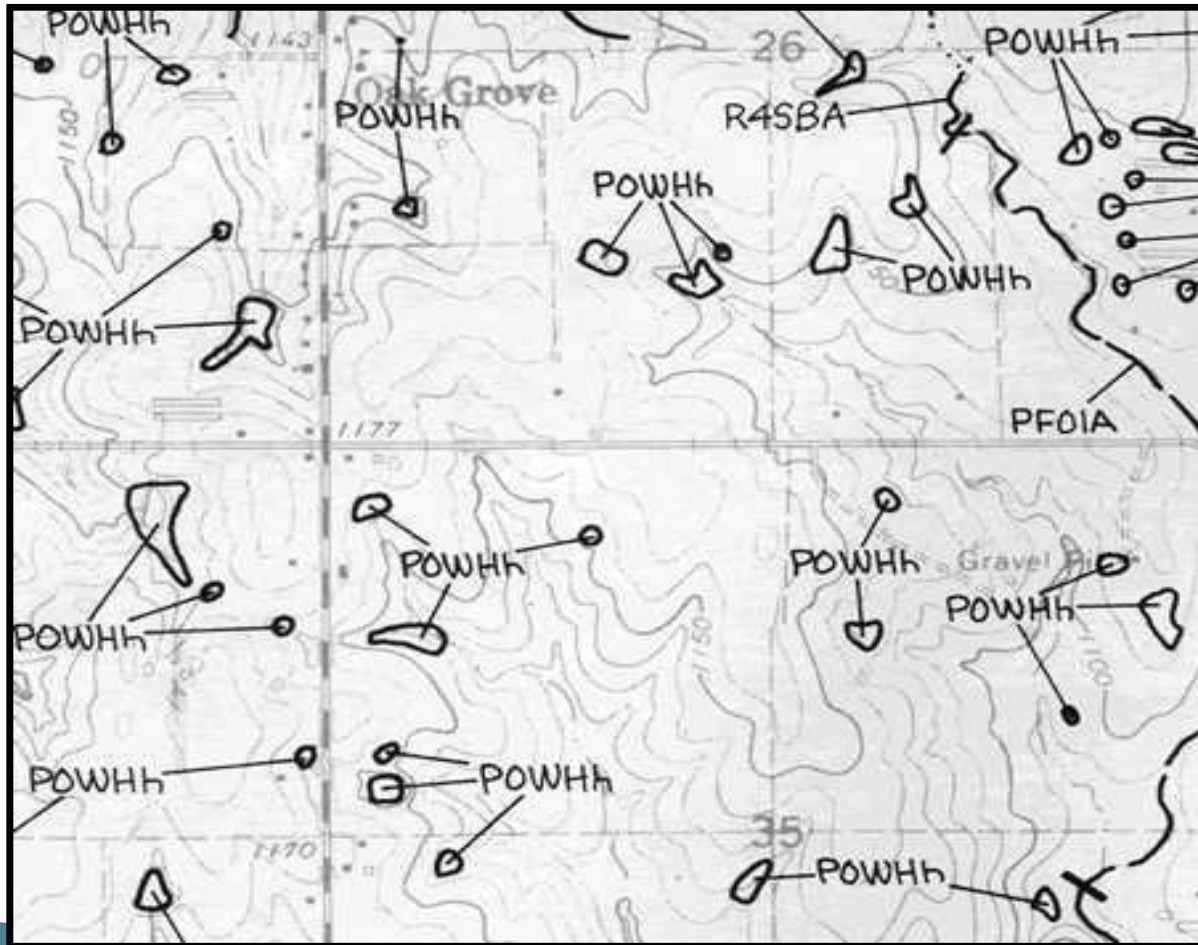
# NWI UPDATE 2015

The Best of Current Remote Sensing Applied to NWI





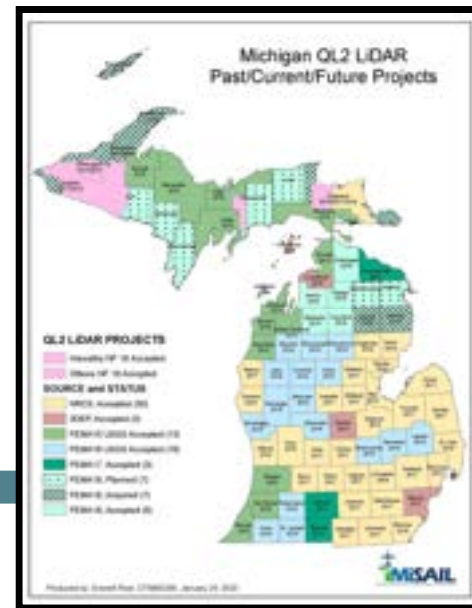
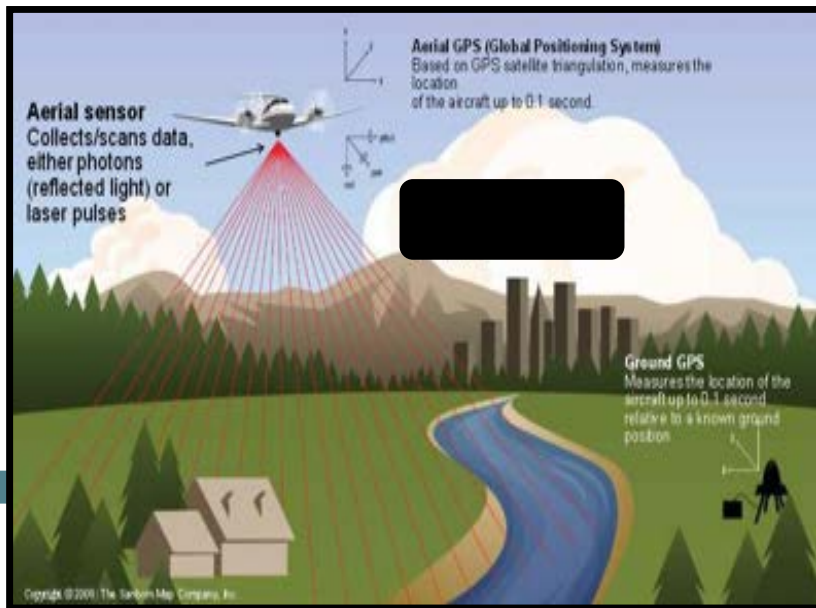
# National Wetland Inventory: History in Michigan



## NWI Update 2005: Tracking One Wetland Thru Time

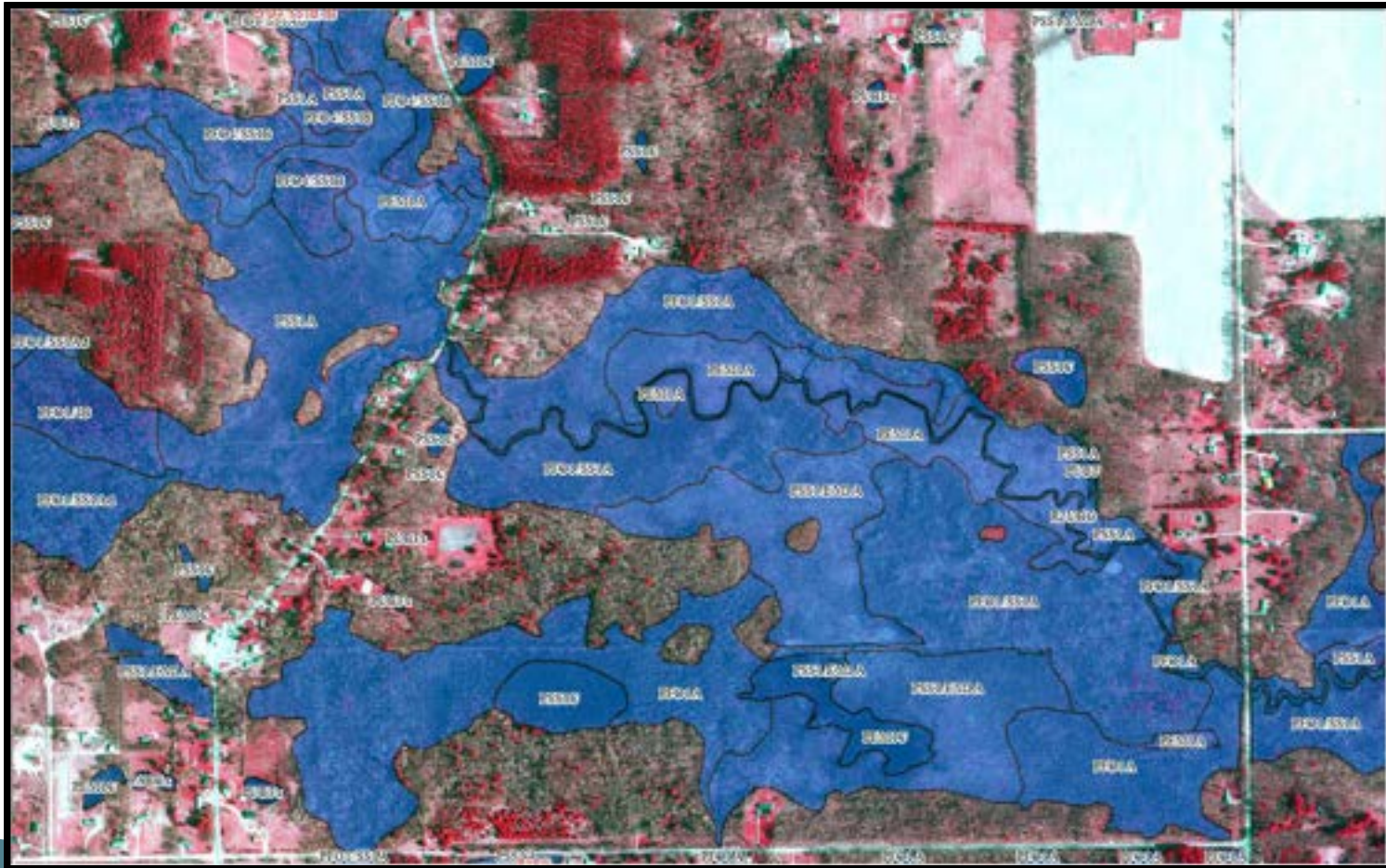


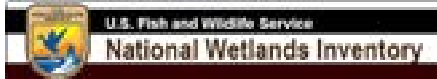
## New High Resolution Imagery & Topographic LiDAR



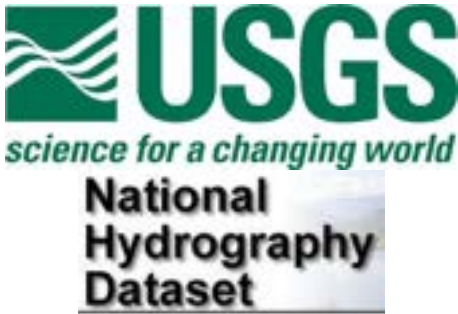


# NWI Update 2015: The Best of Current Remote Sensing Applied to NWI





# National Wetlands Inventory/ National Hydrography Dataset Joint Update

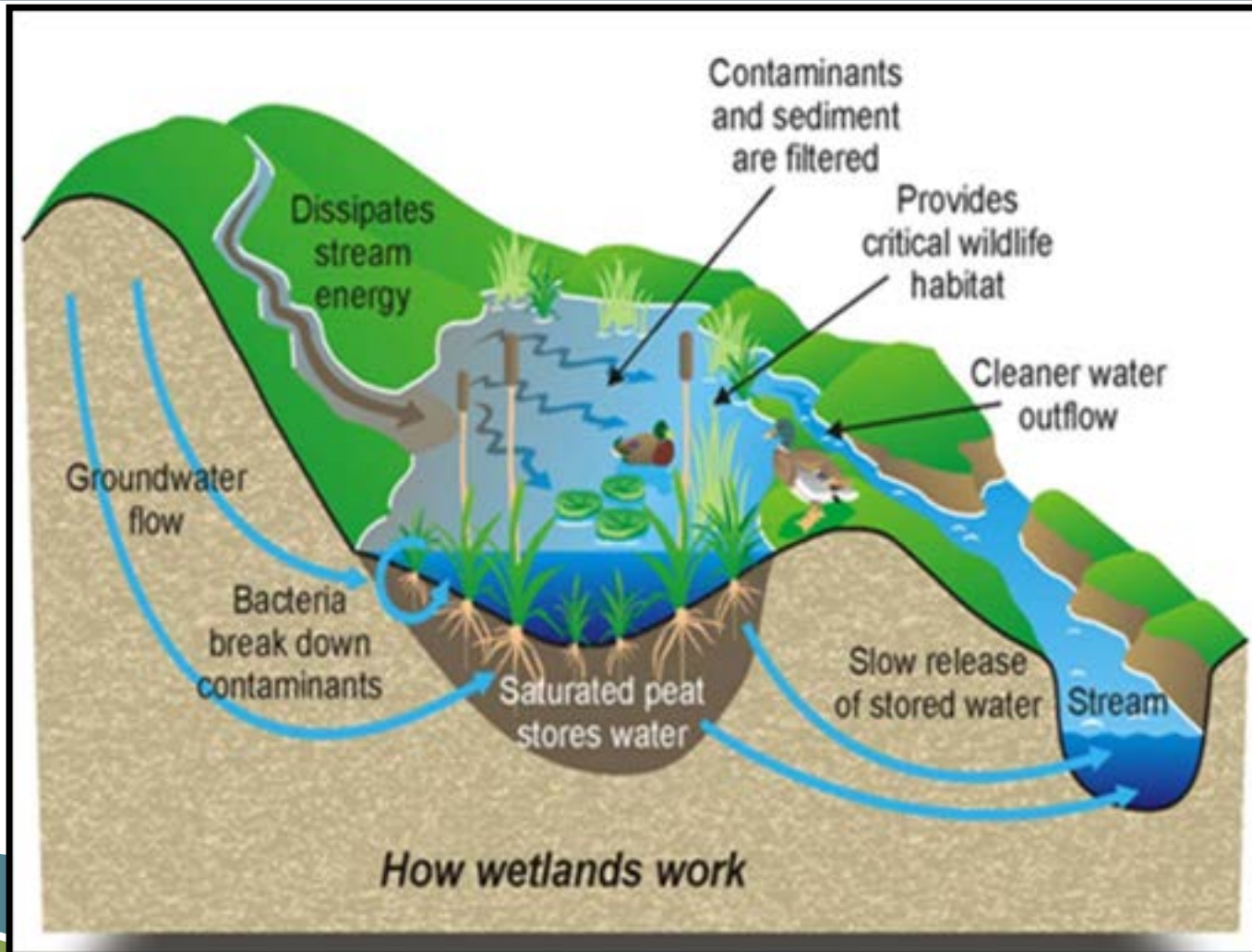


Data Integration and Interoperability:  
National Hydrography Dataset (USGS)  
National Wetland Inventory (USFWS)  
National Flood Hazard Layer (FEMA)



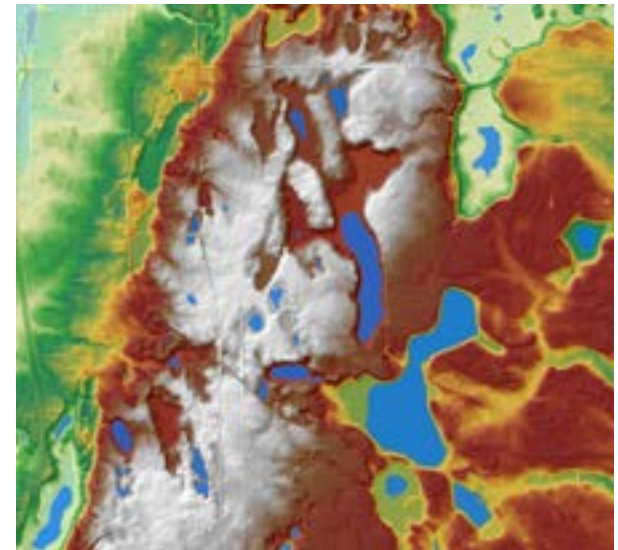
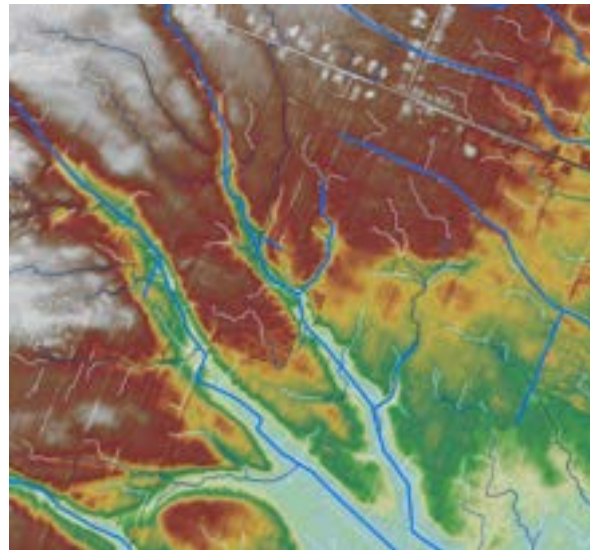
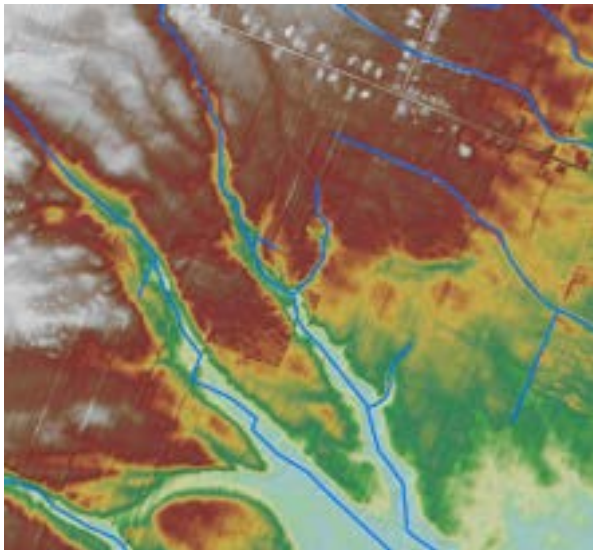


## Wetlands and Streams: Working Together for the Great Lakes



## Michigan Statewide NHD Project

- Generate high-quality hydrography data for the entire State of Michigan that meets USGS Elevation-Derived Hydrography (EDH) Specifications
- Generate “low-accumulation” vector data (drainageways) in addition to required EDH-level data



## NWI vs. EDH

- NWI polygons are generated primarily from orthoimagery
- Elevation-Derived Hydrography (EDH) polygons must conform to the LiDaR-derived bare-earth digital elevation model (DEM)
- Editing may be required if considerable differences exist between NWI and DEM





## NWI/NHD Integration = Consistent Hydrology Inventory



## Where we are Headed....



- SEMCOG – Completed Winter 2021
- Tri-Counties – Completed Winter 2021
- Kent County Pilot complete
- Renew Mi (1/21) Orange
- Renew Mi (2022) Yellow
- FWS - UP Watersheds TBD
- What's Needed?
  - Partners
  - Funding



- Statewide Funding Obtained 2021
- Contracts and Vendors in place
- Expected Completion within 5 years
- Partners include MI DNR, EGLE, DTMB, MDOT, USGS, Drain Commissioners, USFWS, FEMA





# ASSESSING LAKE SHORELINE DEVELOPMENT THROUGH TIME

LANDSCAPE LEVEL RESOURCE ASSESSMENT,  
CUMULATIVE IMPACTS, AND STATUS AND TRENDS





ENVIRONMENTAL

CSI:



# GUN LAKE SHORELINE INVENTORY LANDSCAPE LEVEL RESOURCE ASSESSMENT

- Historic Aerial Imagery  
+
- Contemporary Aerial Imagery  
+
- Wetland/Natural Shoreline Status and Trends Analysis

## DISCLAIMER:

Landscape Level Assessment of resource condition is dependent on quality and availability of imagery and reference data for the waterbody in question. ACCURACY and PRECISION of this type of dataset is less than an 'on-the-water' inventory, **BUT** the SCALE of this effort is larger given the landscape level approach reducing the COST and TIME of completing such an inventory



**HISTORIC IMAGERY**  
**1938**



**NATURAL SHORELINE (1938)  
TO  
DEVELOPED SHORELINE (2014)**



**NATURAL SHORELINE (1938)  
TO  
DEVELOPED SHORELINE (2014)**







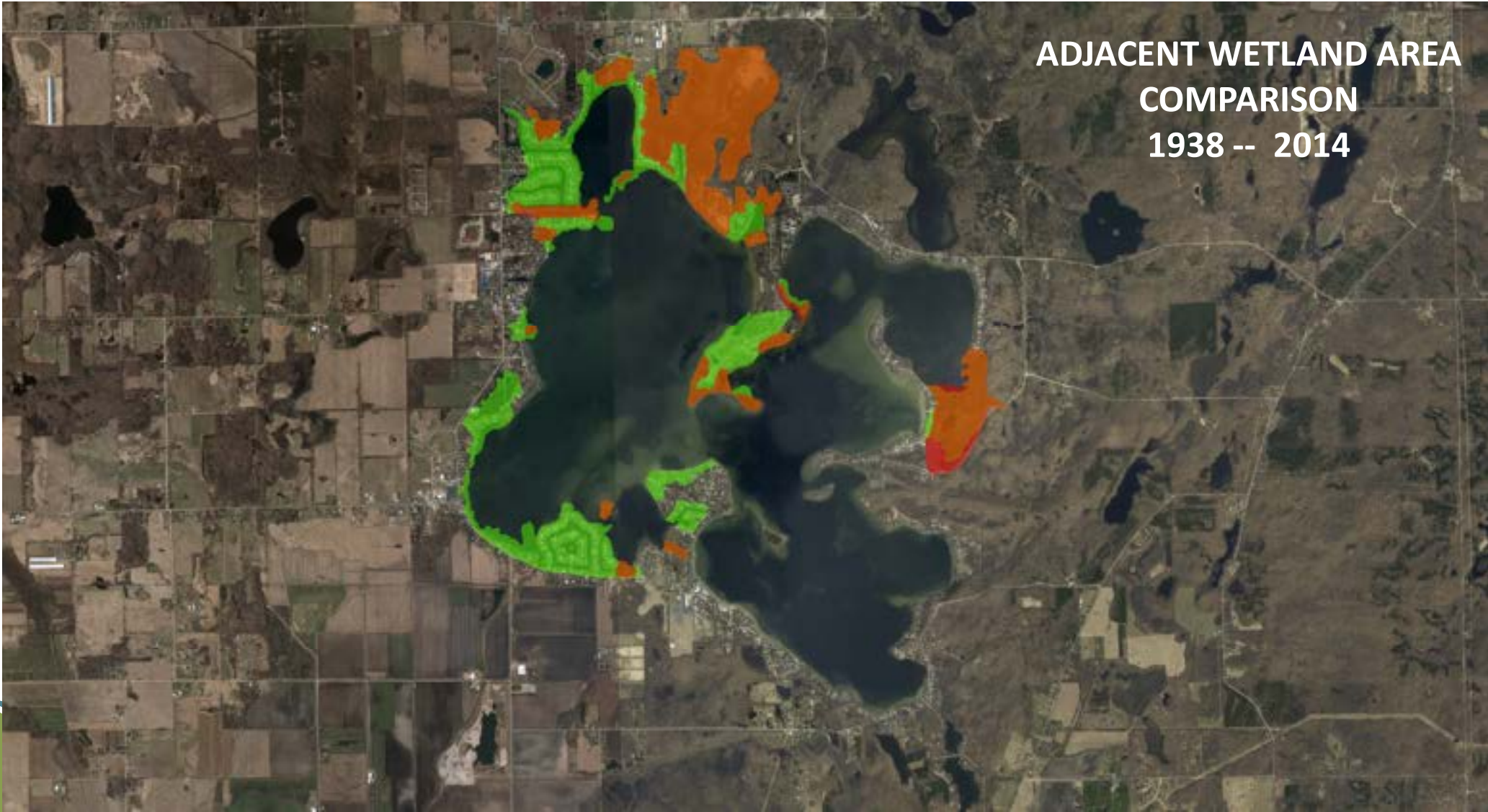
**NATURAL SHORELINE (1938)  
TO  
DEVELOPED SHORELINE (2014)**





**HISTORIC SHORELINE DEVELOPMENT (1938)**

**ADJACENT WETLAND AREA  
COMPARISON  
1938 -- 2014**





## FINAL CALCUATIONS

STEP 1: Total Shoreline (1938 and 2014)

STEP 2: Upland Shoreline (1938 and 2014)

STEP 3: Natural Shoreline (1938 and 2014)

STEP 4: Complete Steps 1-3 in Area of Interest

## WETLAND CALCUATIONS

1938 Wetland Area = 717 acres

2014 Wetland Area = 371 acres

48% loss of adjacent wetland area

### ENTIRE GUNN LAKE AREA

#### 1938

8.543 miles or 45,107.04 linear feet of upland frontage (including islands)

9.352 miles or 49,378.56 linear feet of wetland frontage (including islands)

17.895 total miles or 94,485.6 linear feet of shoreline (including islands)

52% of wetland shoreline

#### 2005

24.737 miles or 130,611.36 linear feet of upland frontage (including islands and canals)

3.566 miles or 18,828.48 linear feet of wetland frontage (including islands and canals)

28.303 total miles or 149,439.84 linear feet of shoreline (including islands and canals)

12% of wetland shoreline

### NORTH COVE AREA

#### 1938

0.51 miles or 269.28 linear feet of upland frontage (including islands)

3.649 miles or 19,266.72 linear feet of wetland frontage (including islands)

3.7 total miles or 19,536 linear feet of shoreline (including islands)

99% of wetland shoreline

#### 2005

6.813 miles or 35,972.64 linear feet of upland frontage (including islands and canals)

1.024 miles or 5,406.72 linear feet of wetland frontage (including islands and canals)

7.837 total miles or 41,379.36 linear feet of shoreline (including islands and canals)

13% of wetland shoreline



# LAKE CHARLEVOIX SHORELINE INVENTORY LANDSCAPE LEVEL RESOURCE ASSESSMENT

- Aerial Imagery
  - +
  - Remote Sensing Data (LiDAR, Radar, Drone)
    - +
    - Reference GIS Data Layers (MiWaters, Soils, etc)

## DISCLAIMER:

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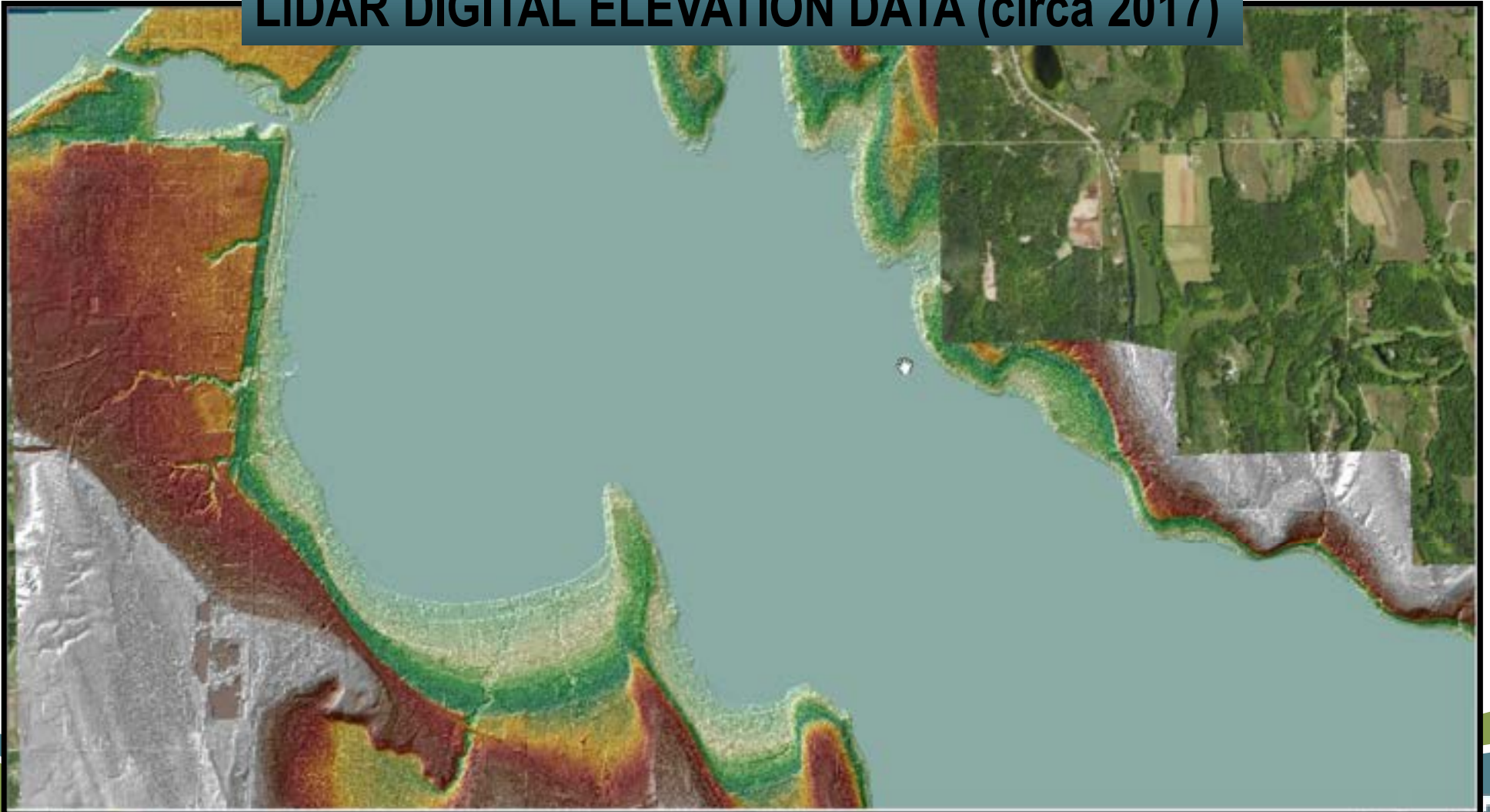
# AERIAL IMAGERY FOR CHARLEVOIX COUNTY



2017

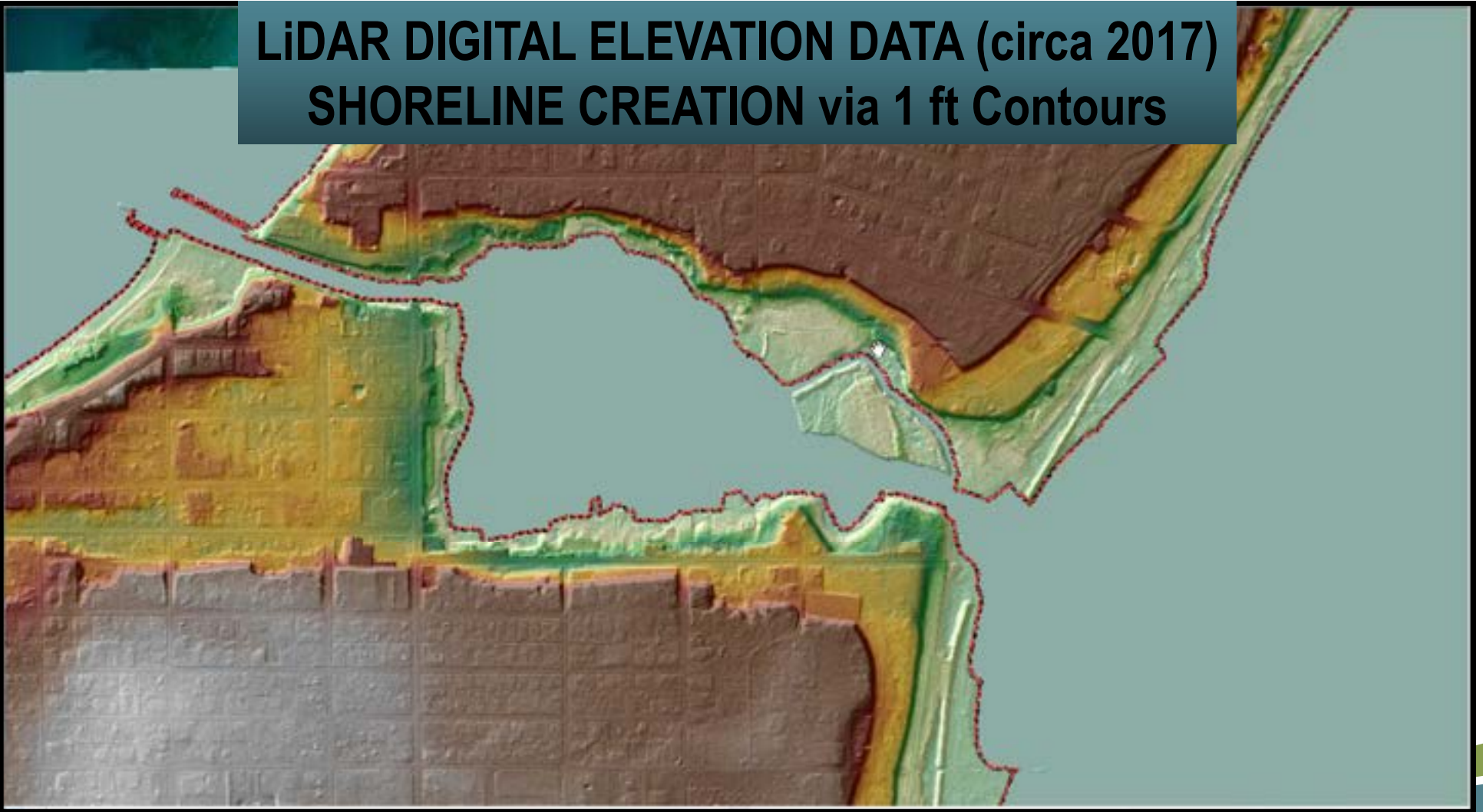
EGLE

## LiDAR DIGITAL ELEVATION DATA (circa 2017)





**LiDAR DIGITAL ELEVATION DATA (circa 2017)  
SHORELINE CREATION via 1 ft Contours**



# LAKE CHARLEVOIX SHORELINE INVENTORY PRESETTLEMENT

- General Land Office (GLO) Plat Map and Field Notes  
+
- Michigan Natural Features Inventory Land Cover 1800  
+
- Hydric Soils

## DISCLAIMER:

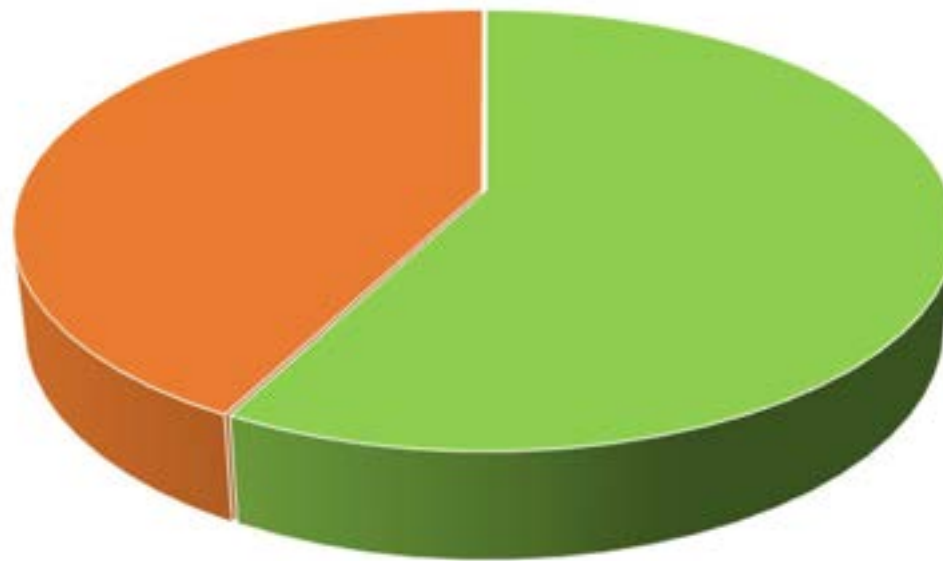
Landscape Level Assessment of resource condition is dependent on quality and availability of imagery and reference data for the waterbody in question. ACCURACY and PRECISION of this type of dataset is less than an 'on-the-water' inventory, **BUT** the SCALE of this effort is larger given the landscape level approach reducing the COST and TIME of completing such an inventory





# LAKE CHARLEVOIX PRESETTLEMENT WETLAND/UPLAND

SHORE TYPE	TOTAL LENGTH (feet)	TOTAL LENGTH (miles)
Wetland	192,986	36.6
Upland	141,446.50	26.7
<b>TOTAL</b>	<b>334,432.50</b>	<b>63.3</b>



■ Wetland ■ Upland

# LAKE CHARLEVOIX SHORELINE INVENTORY CURRENT circa 2020

- AERIAL IMAGERY AND REMOTE SENSING INTERPRETATION
  - +
    - MIWATERS PERMITTING LOCATIONS (circa 2020)

## DISCLAIMER:

Landscape Level Assessment of resource condition is dependent on quality and availability of imagery and reference data for the waterbody in question. ACCURACY and PRECISION of this type of dataset is less than an 'on-the-water' inventory, **BUT** the SCALE of this effort is larger given the landscape level approach reducing the COST and TIME of completing such an inventory



## LAKE CHARLEVOIX SHORELINE INVENTORY CURRENT circa 2020 IMAGERY CONSIDERATIONS

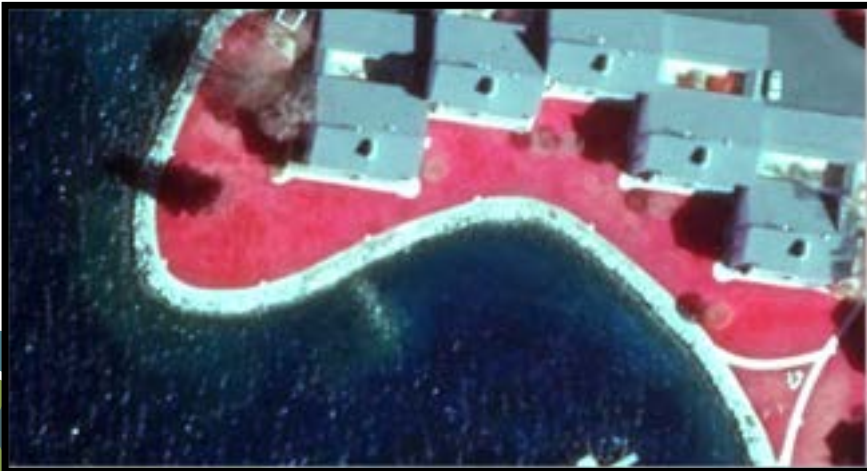


2017 Spring Leaf-off CIR Imagery



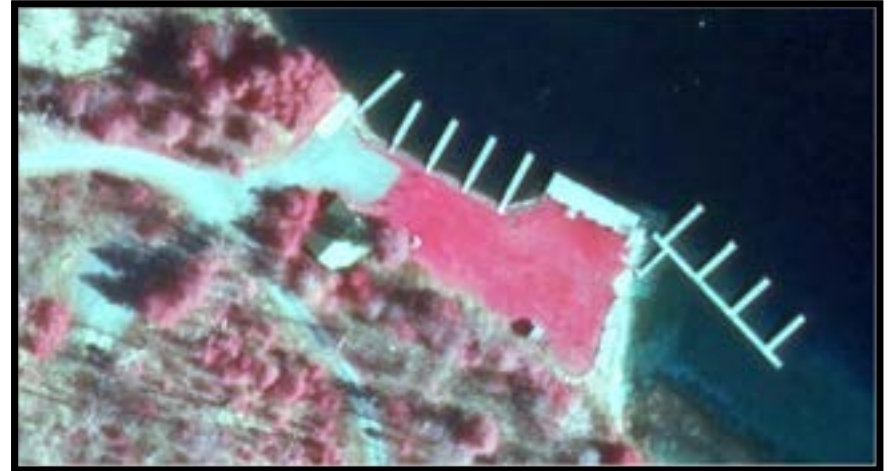
2020 Summer Leaf-on TC Imagery

LAKE CHARLEVOIX SHORELINE INVENTORY CURRENT circa 2020  
**ARMORING EXAMPLES -- RIPRAP**





LAKE CHARLEVOIX SHORELINE INVENTORY CURRENT circa 2020  
**ARMORING EXAMPLES -- SEAWALL**

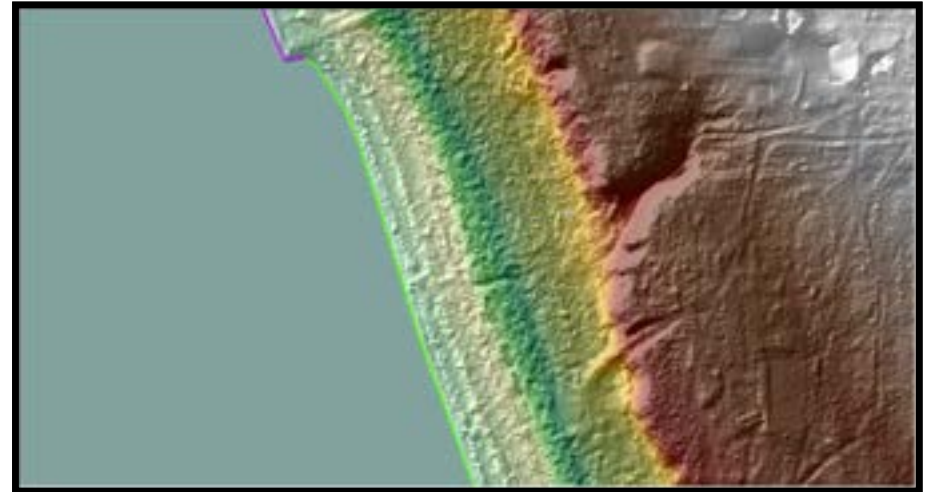




LAKE CHARLEVOIX SHORELINE INVENTORY CURRENT circa 2020  
**NON-ARMORING EXAMPLES -- DEVELOPED**

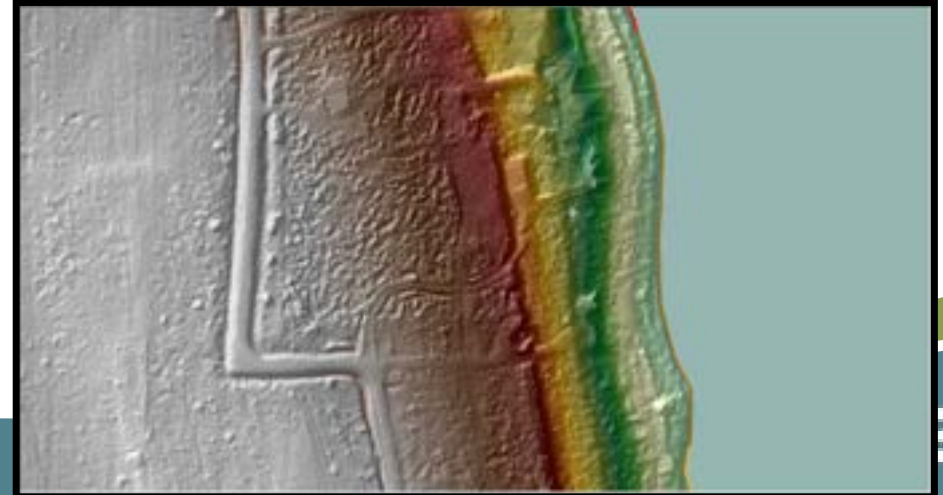


LAKE CHARLEVOIX SHORELINE INVENTORY CURRENT circa 2020  
**NON-ARMORING EXAMPLES -- WETLAND**



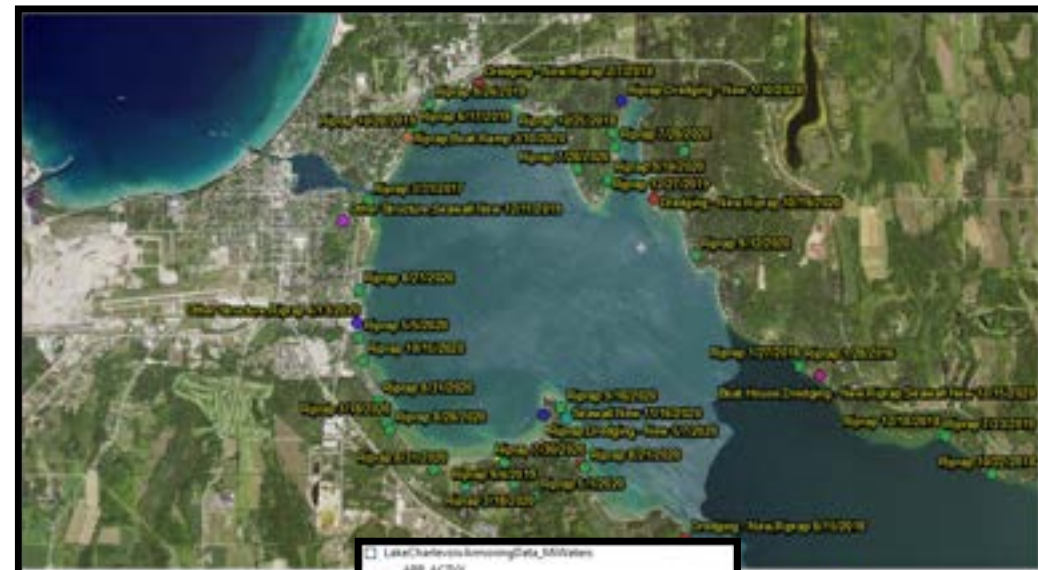
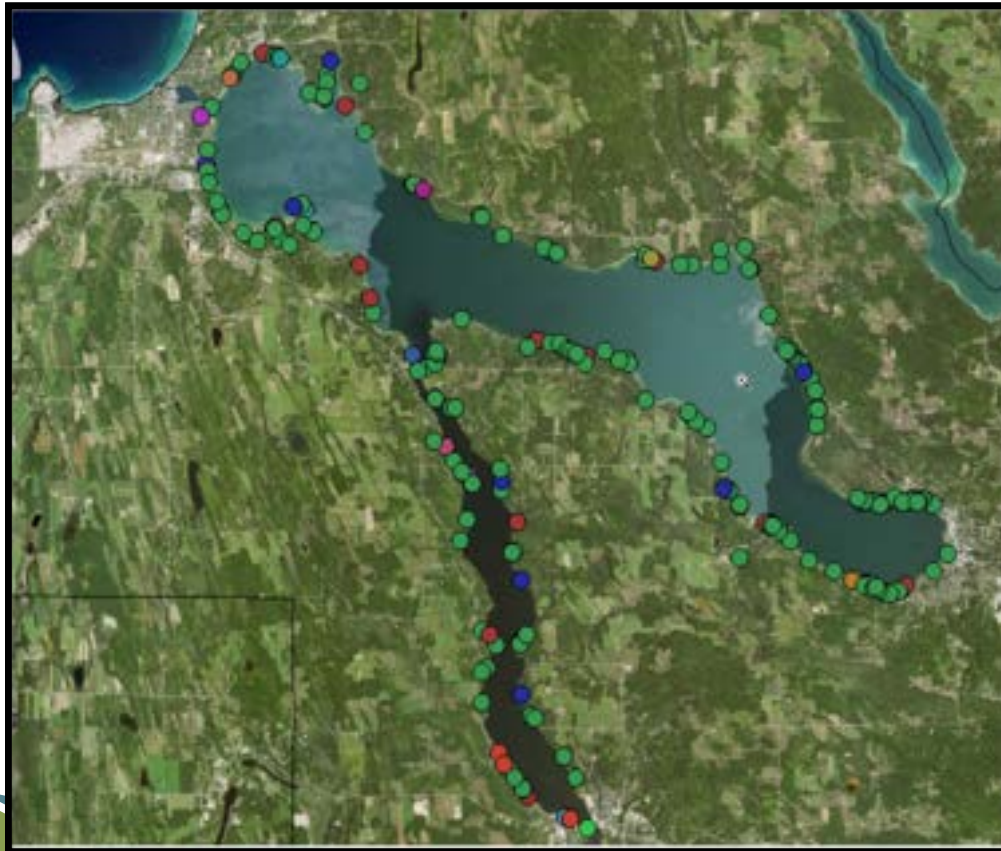


LAKE CHARLEVOIX SHORELINE INVENTORY CURRENT circa 2020  
**NON-ARMORING EXAMPLES -- NATURAL/UPLAND**

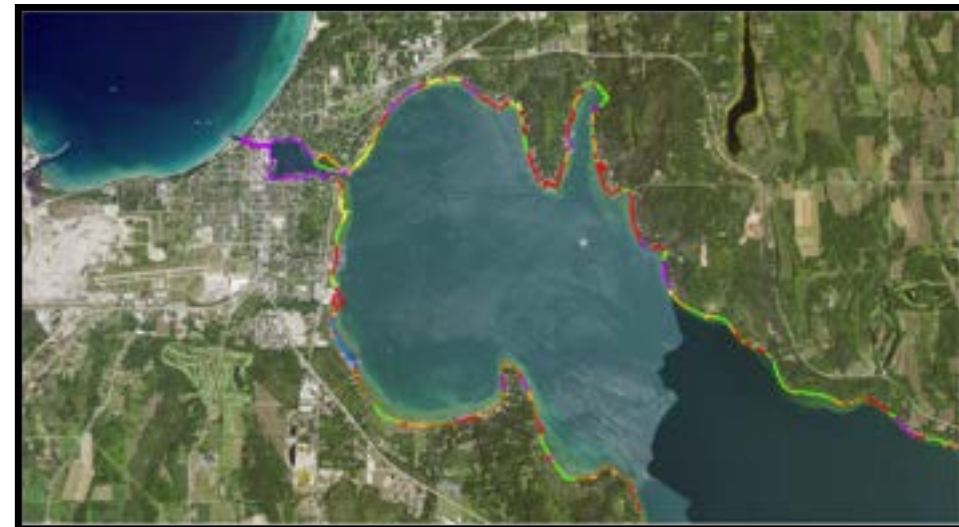




# LAKE CHARLEVOIX SHORELINE INVENTORY CURRENT circa 2020 MIWATERS PERMIT LOCATIONS



- LakeCharlevoixInventoryData\_MIWaters
- APP\_ACTIVITY
- Seawall, Riprap
  - Boat House, Dredging - New, Riprap, Seawall New
  - Boat Ramp, Buoy, Dredging - New, Riprap
  - Dock (except Cab Docks), Riprap
  - Dredging - Maintenance, Riprap
  - Dredging - New, Riprap
  - Fill (except spoil disposal or swim areas), Riprap, Dredging - New
  - Fill for Swim Areas, Riprap
  - Other Structure, Riprap
  - Other Structure, Seawall New
  - Piling, Riprap
  - Piling, Riprap, Dock (except Cab Docks)
  - Restoration, Seawall Replacement
  - Riprap
  - Riprap, Boat Ramp
  - Riprap, Dredging - New
  - Riprap, Fill (except spoil disposal or swim areas)
  - Riprap, Seawall Replacement
  - Seawall New
  - Seawall New, Riprap
  - Seawall Replacement



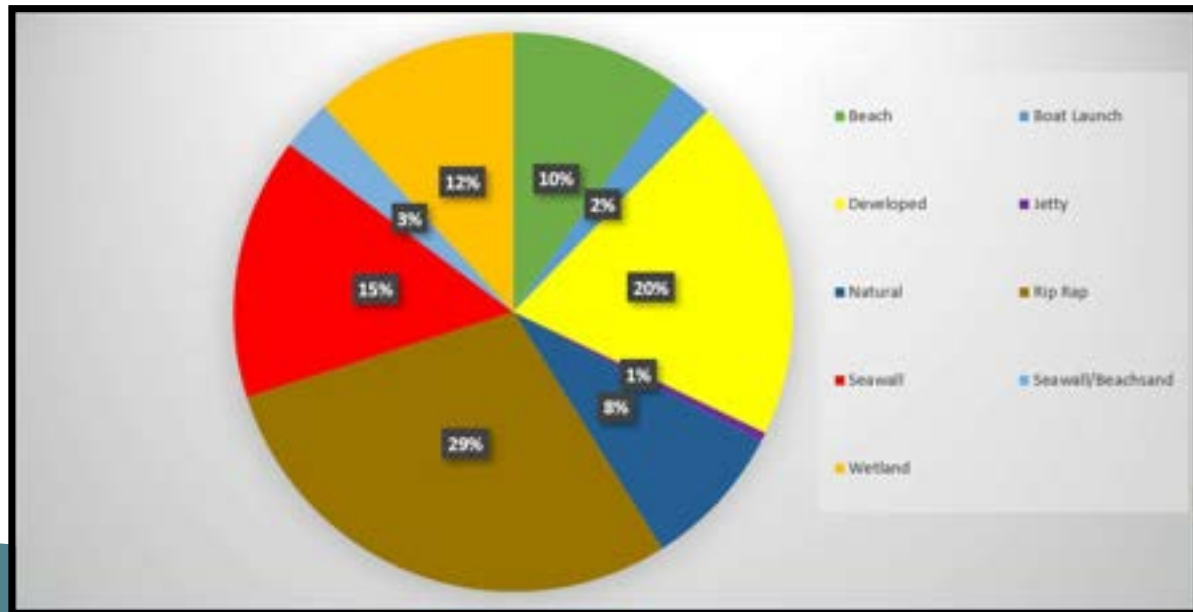
## LAKE CHARLEVOIX SHORELINE INVENTORY 2020

- GIS Data
- Periodic Updates
- Cumulative Impacts



# LAKE CHARLEVOIX SHORE TYPE STATS

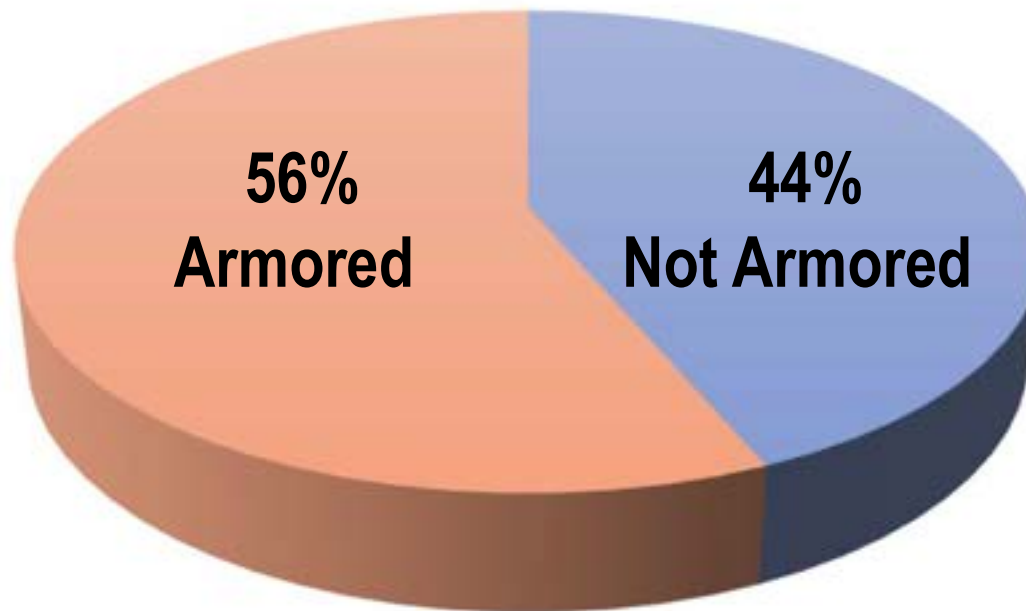
Shore Type	Shore Type Count	Total Length (ft)	Total Length (mi)
Beach	54	22048.5	4.2
Boat Launch	13	2178	0.4
Developed	109	49685.8	9.4
Jetty	3	1272.1	0.2
Natural	46	24184.3	4.6
Rip Rap	159	118888.8	22.5
Seawall	83	55266.4	10.5
Seawall/Beachsand	16	7055.4	1.3
Wetland	65	53853.2	10.2
<b>TOTAL</b>	<b>548</b>	<b>334,432.50</b>	<b>63.34</b>





## TOTAL SHORELINE ARMORED vs NOT ARMORED (circa 2020)

Armor	Feature Count	Total Length (ft)	Total Length (mi)
No	271	145,842.80	27.6
Yes	277	188,589.70	35.7
<b>TOTAL</b>	<b>548</b>	<b>334,432.50</b>	<b>63.3</b>



## WETLAND SHORELINE STATUS AND TRENDS

### PRESETTLEMENT

- Wetland Shoreline =  
**36.6 miles**
- Percent of Total  
Shoreline =  
**58%**

### CURRENT (2020)

- Wetland Shoreline =  
**10.2 miles**
- Percent of Total  
Shoreline =  
**16%**

- TOTAL LOSS OF 26.4 MILES OF WETLAND FRONTAGE
- 28% OF ORIGINAL WETLAND SHORELINE REMAINS
- **WETLAND LOSS = LOSS OF ECOLOGICAL SERVICES**

## LAKE CHARLEVOIX SHORELINE INVENTORY NEXT STEPS

- 2022 MIS Spring leaf-off imagery delivery (expected Fall 2022)
- Rectifying GIS Inventory with 'On the Water Surveys'
- Future LiDAR Data Collection
- MiWaters Permitting Data



Michigan Department of  
**Environment, Great Lakes, and Energy**

800-662-9278  
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**Chad Fizzell**

Environmental Quality Specialist  
Wetlands, Lakes, and Streams Unit  
EGLE Water Resources Division  
517-582-1811  
Fizzellc@michigan.gov