

WETLANDS IN THE ST. JOSEPH RIVER WATERSHED



Robert P. Zbiciak
March 15, 2010

Why Do We Care About Wetlands?

Why Protect and Restore Wetlands?

- Wetlands provide numerous valuable functions to society
- We have already lost many of our historic wetlands and the functions they provided

WETLAND FUNCTIONS AND THEIR BENEFITS

Flood Water Storage – Nature's Sponges

- ❑ Reduced Flooding and Associated Damage During High Water Events
- ❑ Reduces Flashiness of Streams
 - a) Reduces Bank Erosion
- ❑ Releases Water Slowly Over Time Which Provides Stable Stream Flows
 - a) streams don't dry up in summer
 - b) improves biological health of stream

WETLAND FUNCTIONS AND THEIR BENEFITS

Water Quality – Nature's Kidneys

- ❑ Sediment Removal

stored or slowed water allows suspended sediments to settle out resulting in clearer water and natural substrate

- ❑ Nutrient Removal

nutrients attached to suspended sediments are trapped and taken up by wetland plants resulting in fewer algal blooms and less nuisance aquatic vegetation

WETLAND FUNCTIONS AND THEIR BENEFITS

▣ Shoreline Stabilization

wetland plants growing along the shoreline reduce erosion and the need for shore protection (e.g. seawalls, rip rap etc.)

▣ Recharge Ground Water

- a) wells for drinking water (individual and municipal)
- b) irrigation for agriculture

WETLAND FUNCTIONS AND THEIR BENEFITS

□ Fish and Wildlife Habitat

a) Recreational Opportunities

Fishing

Hunting

Trapping

Bird Watching

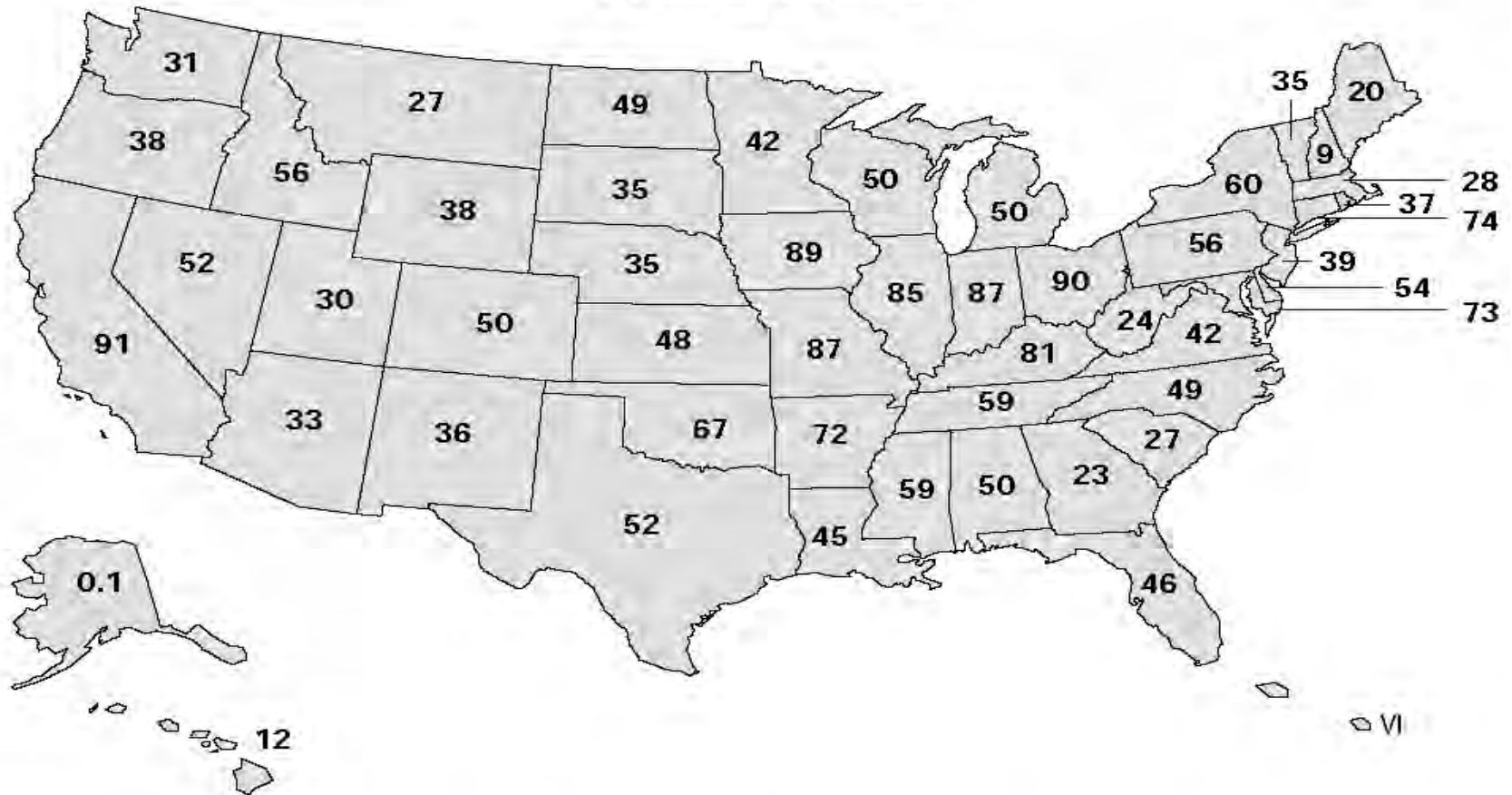
Open Space/Green Space

b) Threatened & Endangered or Rare Species

WETLAND FUNCTIONS AND THEIR BENEFITS

- ❑ Store Flood Waters – Reduce Flooding
- ❑ Remove Sediment – Clearer Water
- ❑ Remove Nutrients – Less Vegetation
- ❑ Stabilize Shorelines – Less Erosion
- ❑ Recharge Ground Water – Drinking Water
- ❑ Stream Flow Maintenance – Stable Flows
- ❑ Provide Fish and Wildlife Habitat – Fishing and Hunting Recreation

Percentage of Wetland Acreage Lost, 1780s-1980s



Twenty-two States have lost at least 50% of their original wetlands. Seven of these 22 (California, Indiana, Illinois, Iowa, Missouri, Kentucky, and Ohio) have lost more than 80% of their original wetlands.

Source: Dahl, T.E., 1990, *Wetlands Losses in the United States 1780's to 1980's*, U.S. Department of the Interior, Fish and Wildlife Service.

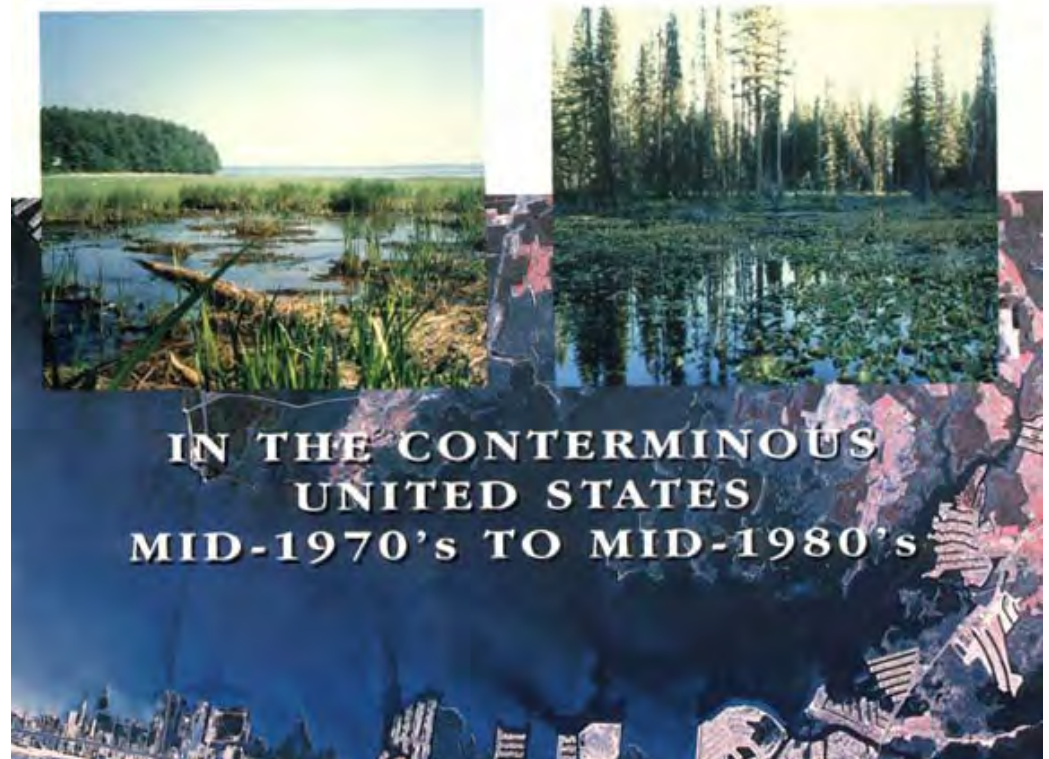
**Michigan
originally
contained
approximately
11 million
acres of
wetlands.**

**Indiana
originally
contained
approximately
5.6 million
acres of
wetlands.**

REPORT TO CONGRESS

Wetlands

STATUS AND TRENDS



Over 50% of Michigan's original wetlands have been drained or filled.

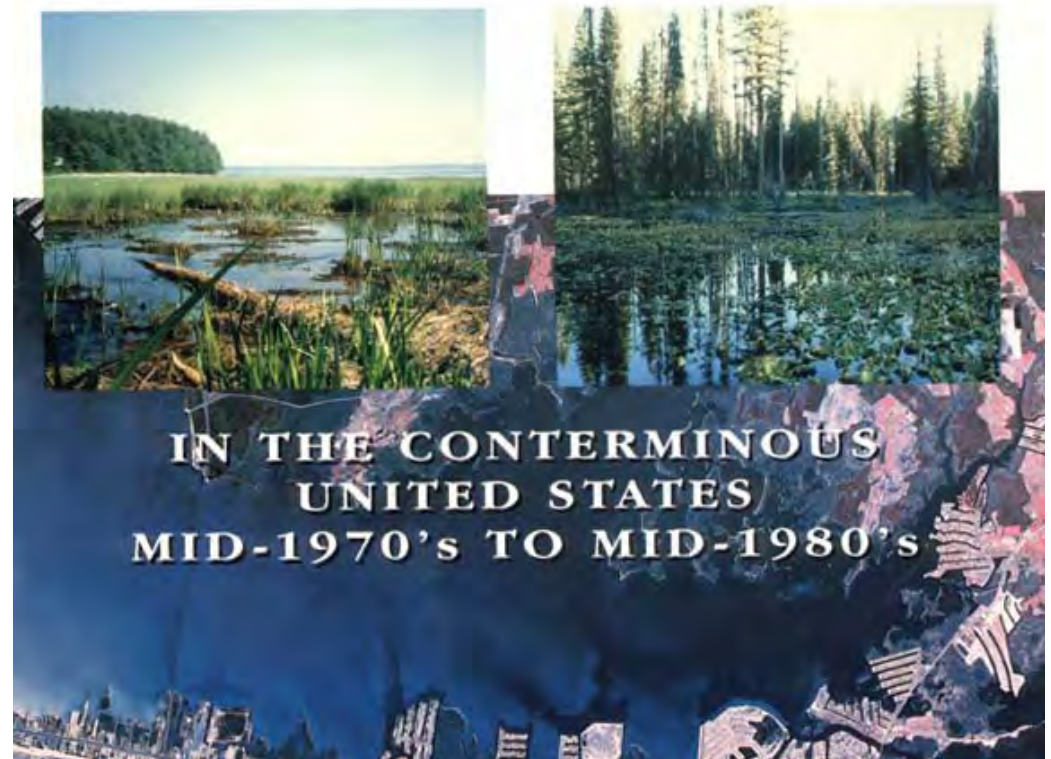
**Loss of 5.5 million acres.
5.5 million acres remain.**

USFWS. 1991.
Wetlands Status and Trends in the Conterminous United States
Mid 1970's to Mid-1980's.

REPORT TO CONGRESS

Wetlands

STATUS AND TRENDS



**87% of
Indiana's
original
wetlands have
been lost.**

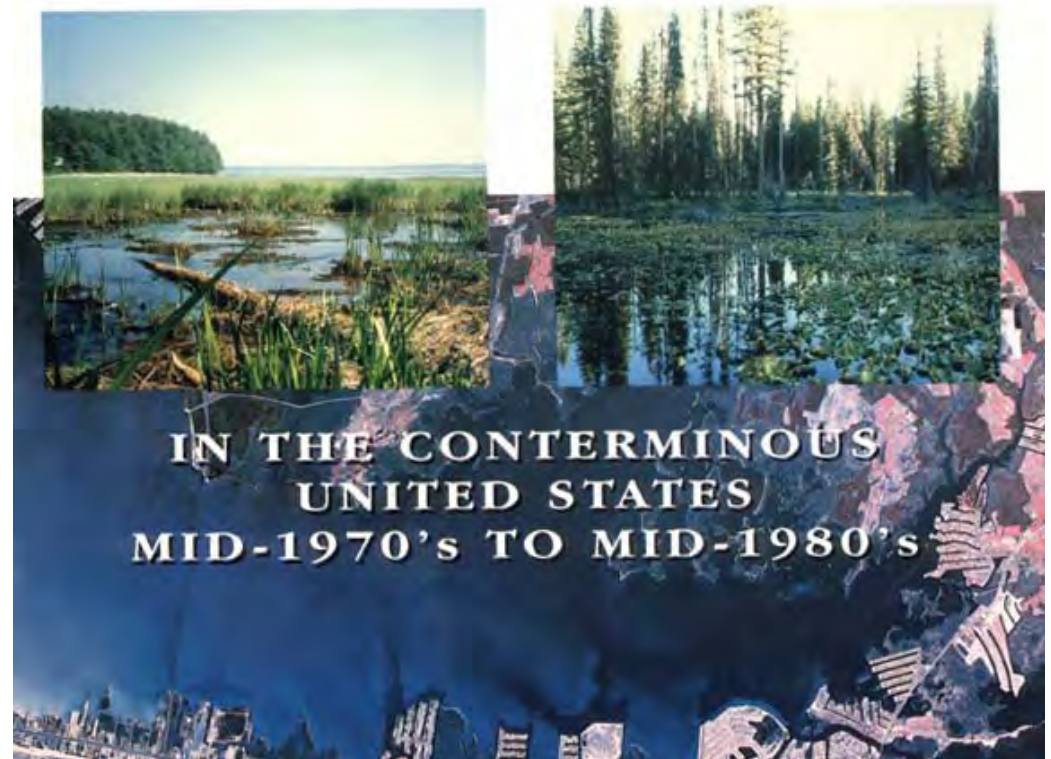
**Loss of 4.8
million acres.
813,000 acres
remain.**

USFWS. 1991.
Wetlands Status
and Trends in the
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Mid 1970's to Mid-
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REPORT TO CONGRESS

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STATUS AND TRENDS



WHY WERE WETLANDS DESTROYED ?

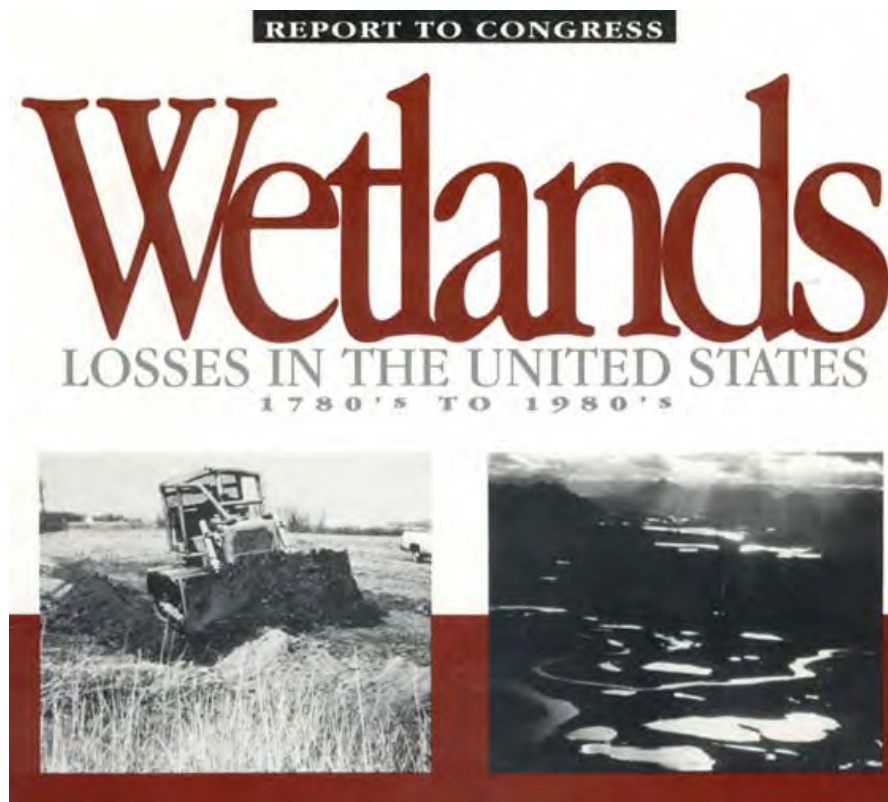
- ❑ Wetlands were considered mosquito-breeding swamps and “unusable wastelands”
- ❑ Wetlands needed to be “reclaimed” (e.g. drained and/or filled) to create “useable land”

A majority of the historic wetland loss in Michigan and Indiana was caused by drainage for agricultural purposes before 1930.

Additional acreage was drained by the Works Progress Administration to control mosquitoes between 1934 and 1940.

USFWS. 1990.

Wetlands Losses in the United States 1780's to 1980's.



OTHER MAJOR CAUSES OF WETLAND LOSSES

- ❑ RESIDENTIAL, COMMERCIAL AND INDUSTRIAL DEVELOPMENT AFTER THE GREAT DEPRESSION AND WORLD WAR II
- ❑ USED AS DISPOSAL AREAS "ISLANDS OF GARBAGE" IN LAKE ST CLAIR WETLAND
- ❑ MODERN DAY SUBURBAN SPRAWL (e.g. MALLS, SUBDIVISIONS, ROADS ETC.)

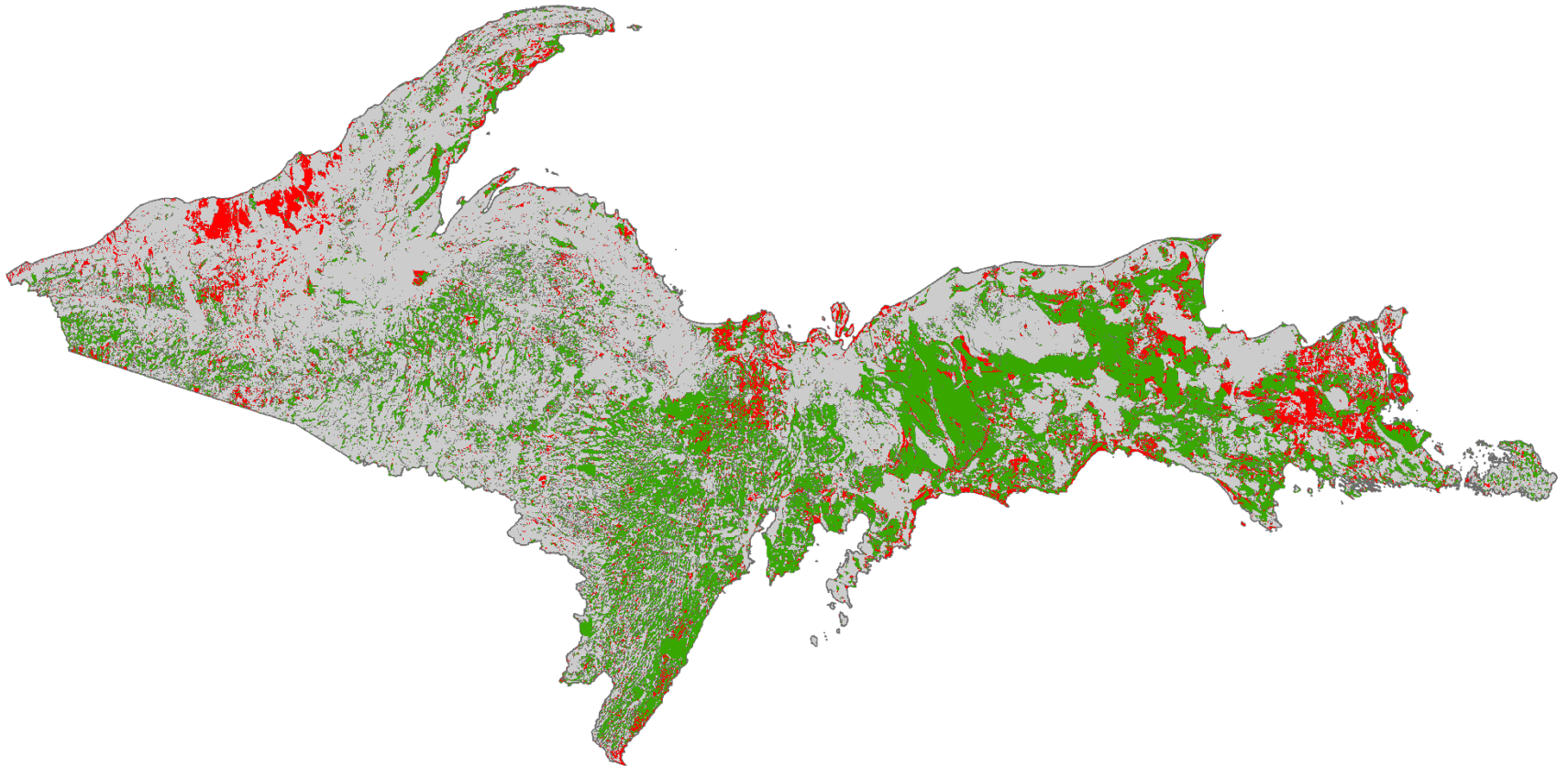
WETLAND LOSES NOT UNIFORM

- ❑ UPPER PENINSULA – 17% LOSS (638,000 ACRES)
- ❑ NORTHERN LOWER PENINSULA – 20% LOSS (387,000 ACRES)
- ❑ SOUTHERN LOWER PENINSULA – 66% LOSS (3,320,000 ACRES)
- ❑ GREAT LAKES COASTAL WETLANDS – 71% LOSS

UPPER PENINSULA: PRE-SETTLEMENT WETLANDS



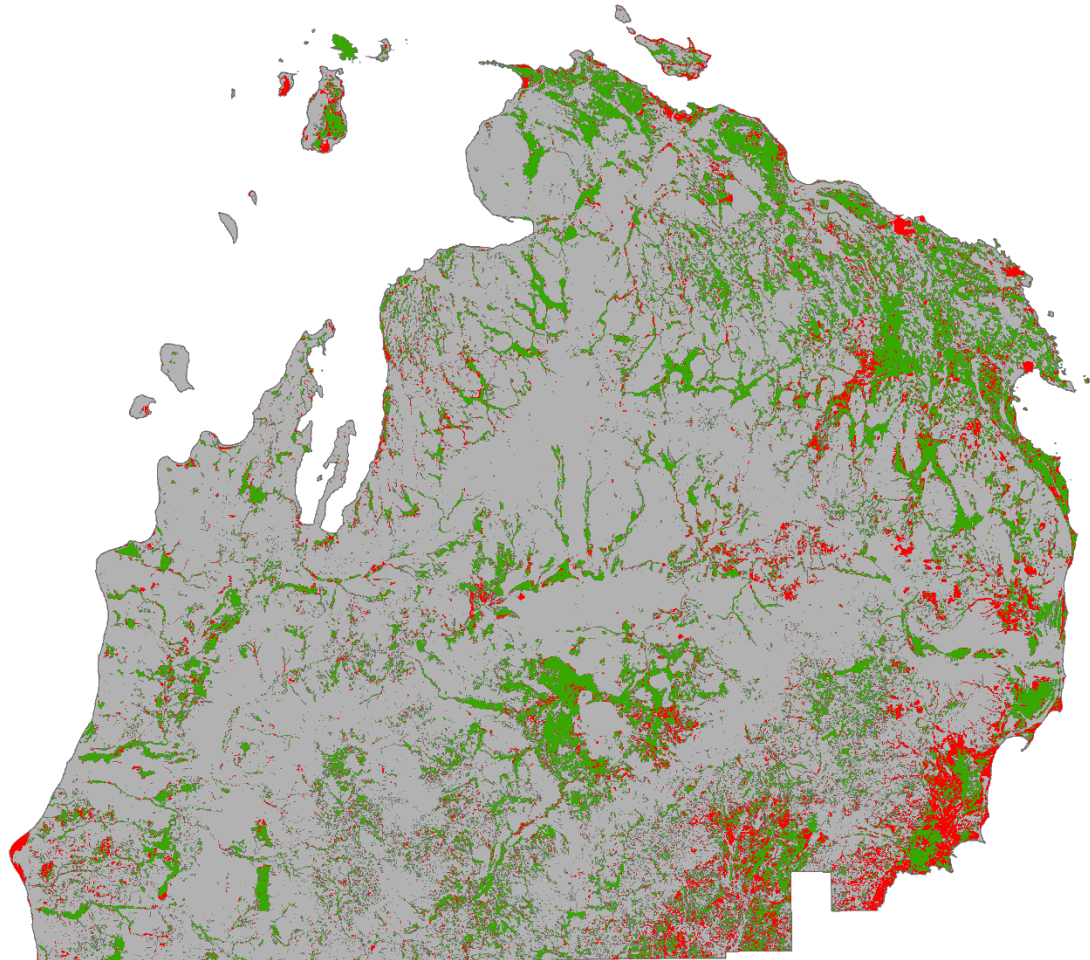
UPPER PENINSULA: APPROXIMATE AREAS OF WETLAND LOSS



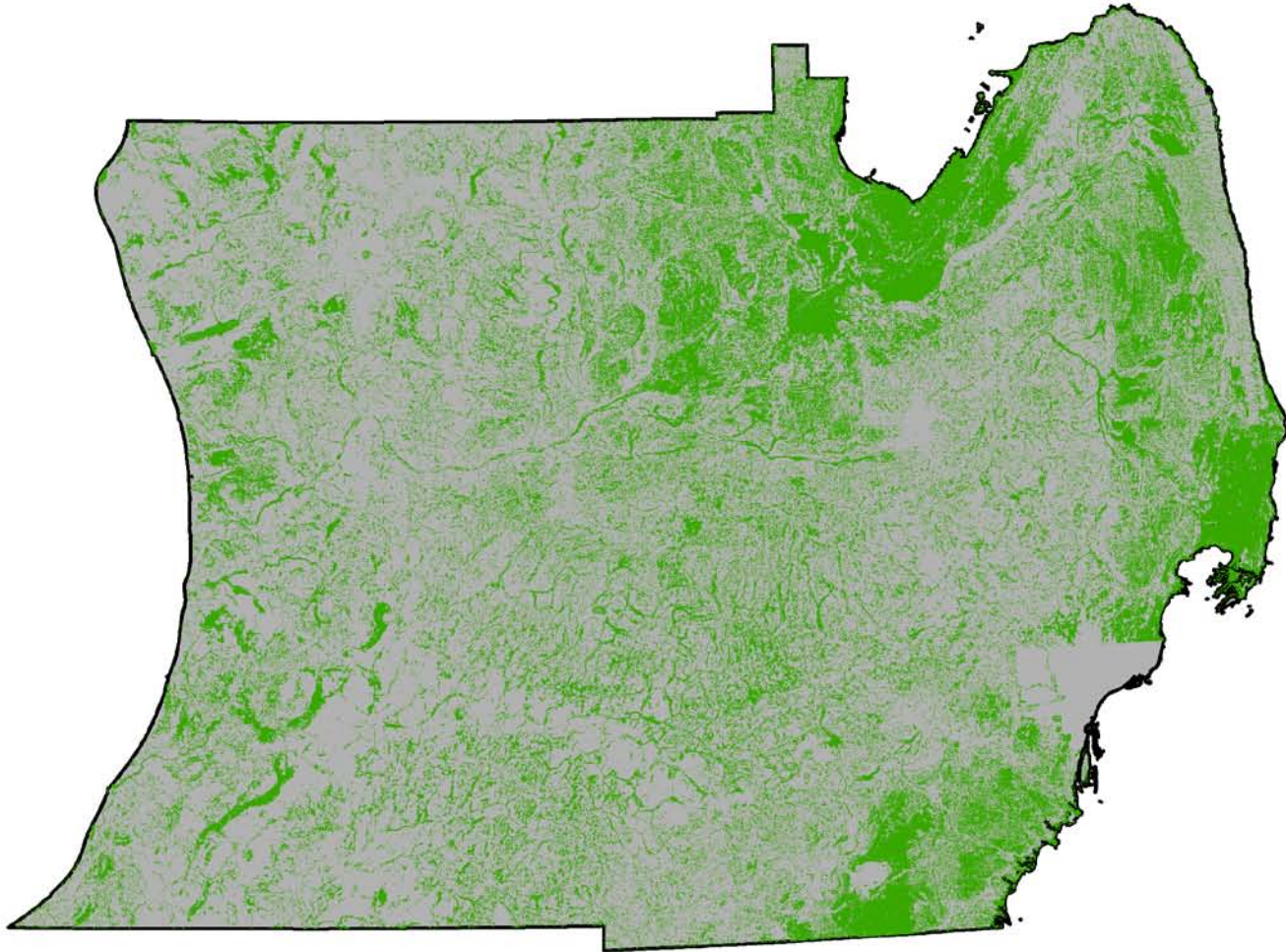
Northern Lower Peninsula: PRE-SETTLEMENT WETLANDS



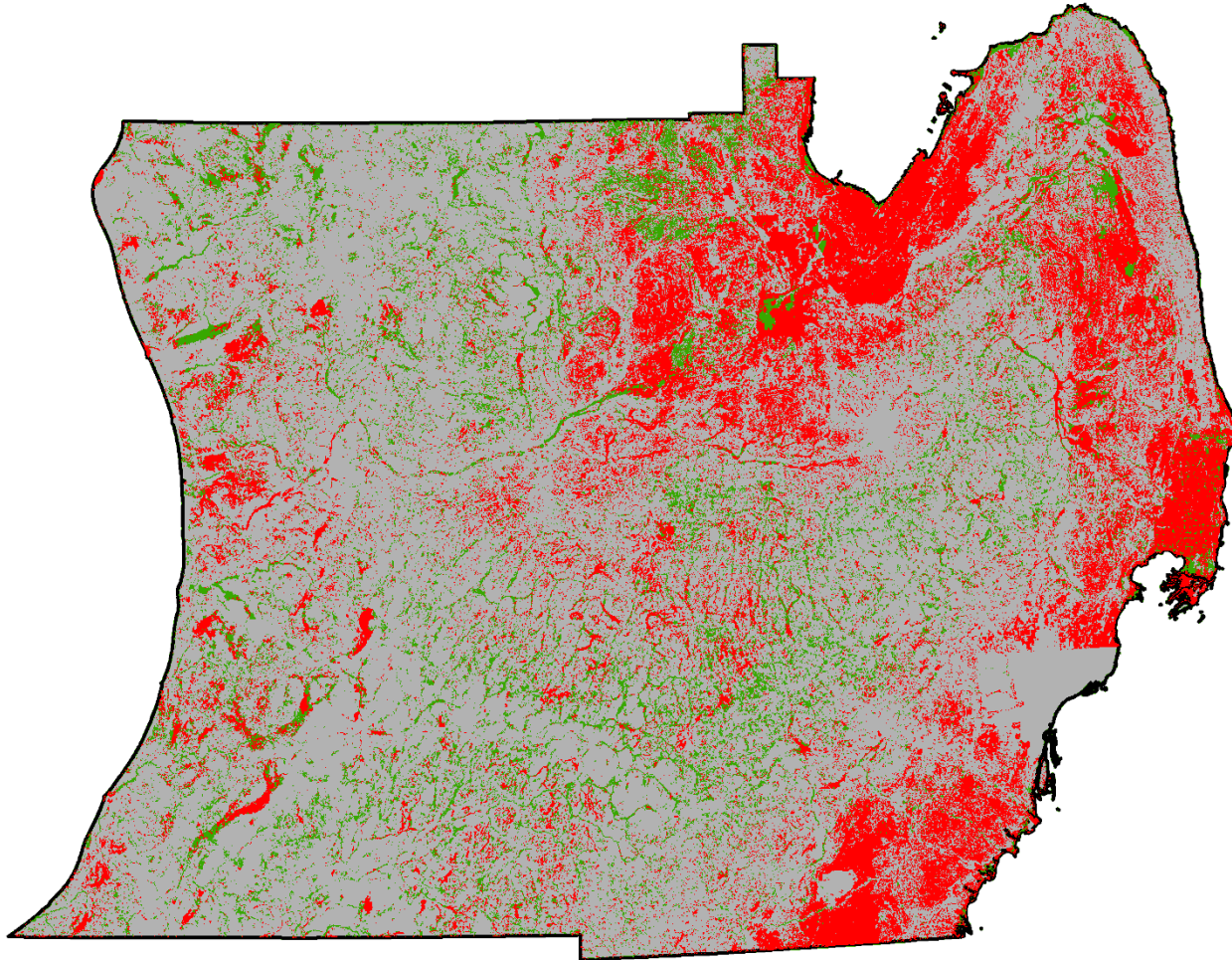
Northern Lower Peninsula: APPROXIMATE AREAS OF WETLAND LOSS



Southern Lower Peninsula: PRE-SETTLEMENT WETLANDS



Southern Lower Peninsula:
APPROXIMATE AREAS OF WETLAND LOSS



St. Joseph River Watershed Wetlands



Status and
Trends Pre-
Settlement
Current
Conditions

Data Layers Used in Michigan

- Pre-European Settlement Wetland Inventory (Michigan Natural Features Inventory)
- Hydric "Wet" Soils USDA-NRCS
- National Wetland Inventory (NWI)
United States Fish and Wildlife Service
Updated to 1998 (being updated to 2005)

Data Layers Used in Indiana

- Hydric “Wet” Soils USDA-NRCS
- National Wetland Inventory (NWI)
United States Fish and Wildlife Service
Updated to 2005
- **No Pre-European Settlement Wetland Inventory Exits for Indiana**

Data Limitations and Disclaimer

National Wetlands Inventory (NWI)

- Wetland boundaries determined from Aerial Imagery
- Last updated in 2005
- Obvious limitations to Aerial Photo Interpretation:
 - Errors of Omission (forested and drier-end wetlands)
 - Errors of Commission (misinterpretation of aerials)

The 2005 NWI data was used in this analysis to report status and trends, as this is currently the best data source available. However, this data may not accurately reflect current conditions on the ground.

THE MDEQ-Land and Water Mgmt Division has begun a joint project with Ducks Unlimited, Inc. to update the 1978 NWI using 1998 aerial imagery and 2005 aerial imagery. The project is on going, and this data will be used for all future Wetland Status and Trends analysis.

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

St. Joseph River Watershed (Indiana)



Status and
Trends Pre-
Settlement to
2005

ST. JOSEPH RIVER WATERSHED (IN): WETLAND RESOURCES STATUS AND TRENDS

PRESETTLEMENT WETLAND CONDITION

- ❑ 281,797 total acres of wetland
- ❑ 18,379 Polygons
- ❑ Average Size – 15 Acres

2005 WETLAND CONDITION

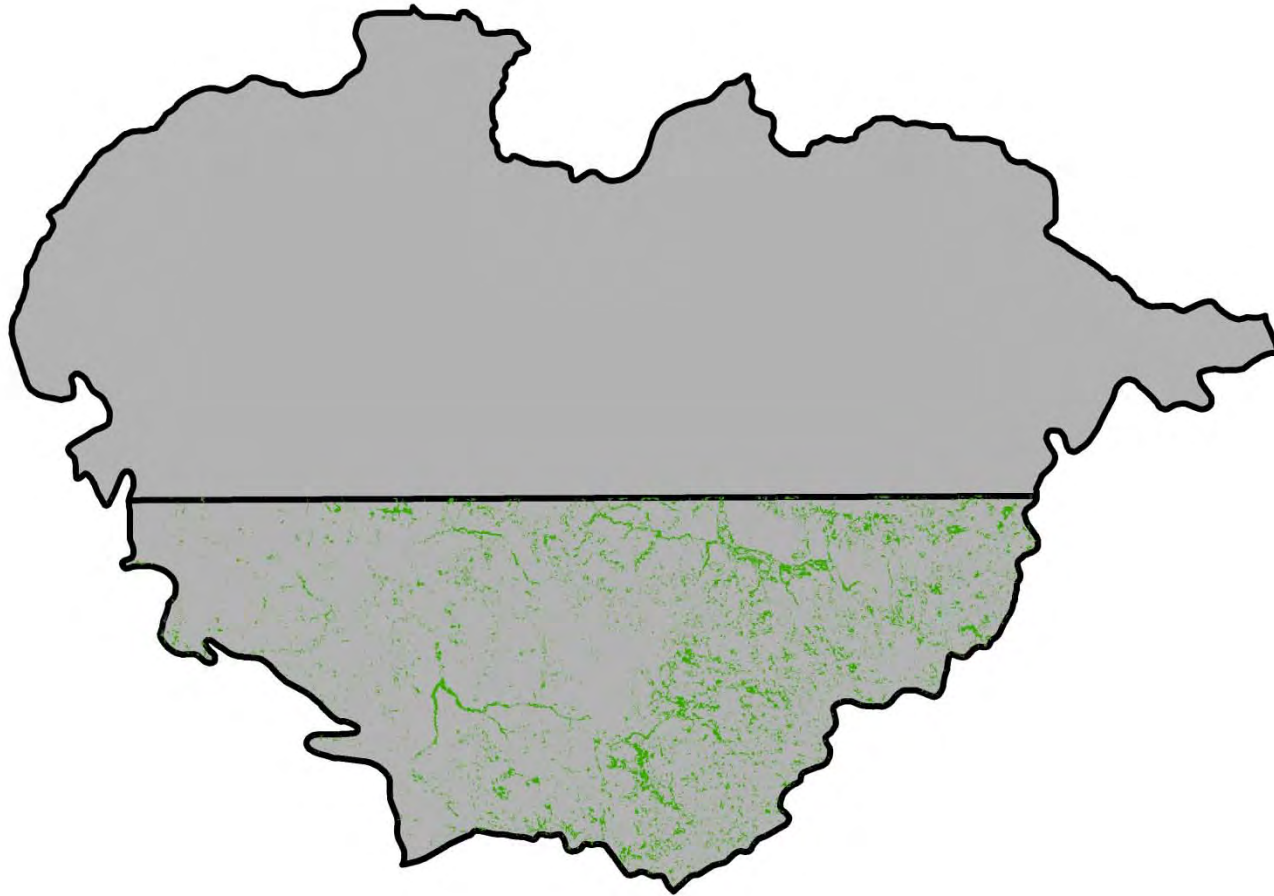
- ❑ 79,155 total acres of wetland
- ❑ 18,331 Polygons
- ❑ Average Size – 4.3 Acres

**28 % OF ORIGINAL WETLAND ACREAGE REMAINS
72% LOSS OF TOTAL WETLAND RESOURCE
LOSS OF 202,642 ACRES**

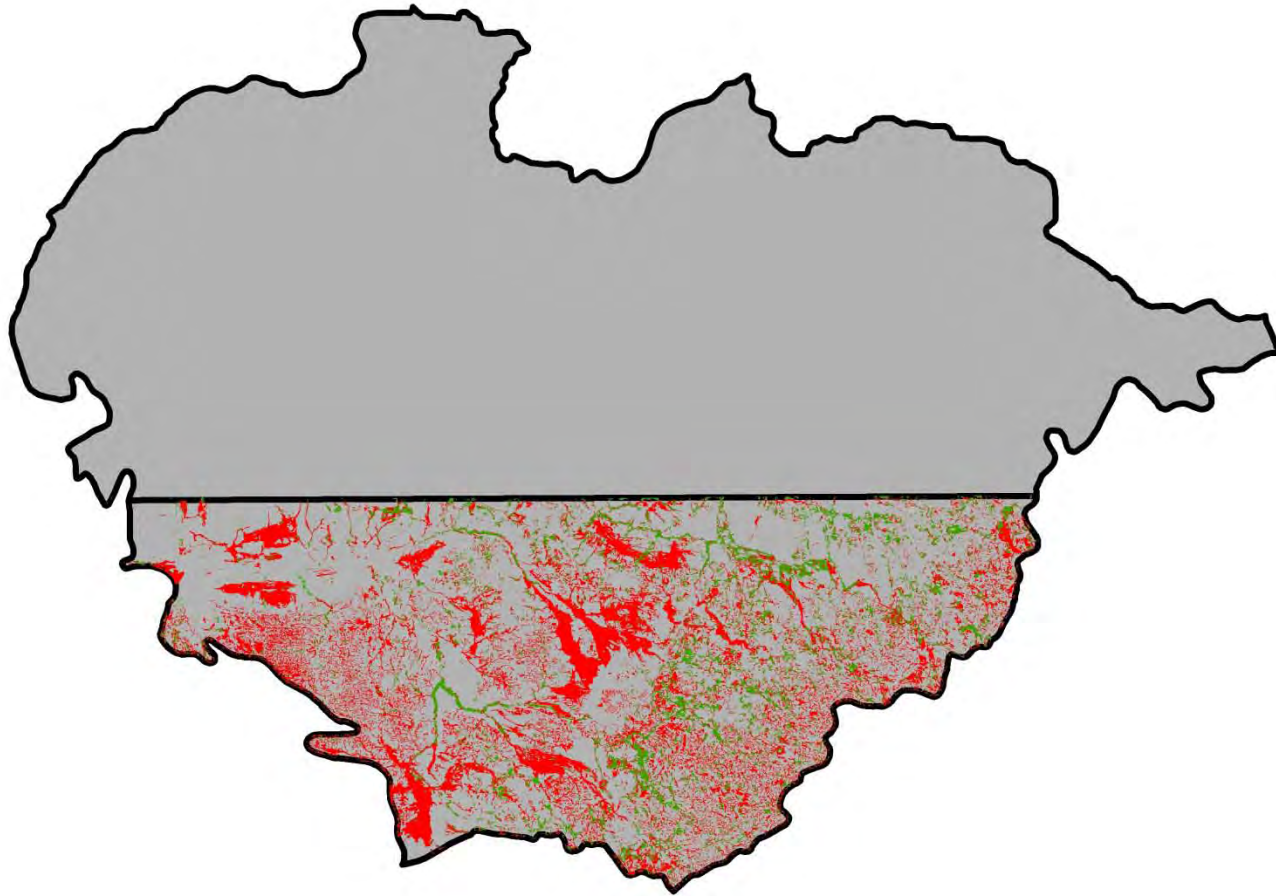
ST. JOSEPH RIVER (IN): PRE-SETTLEMENT WETLANDS



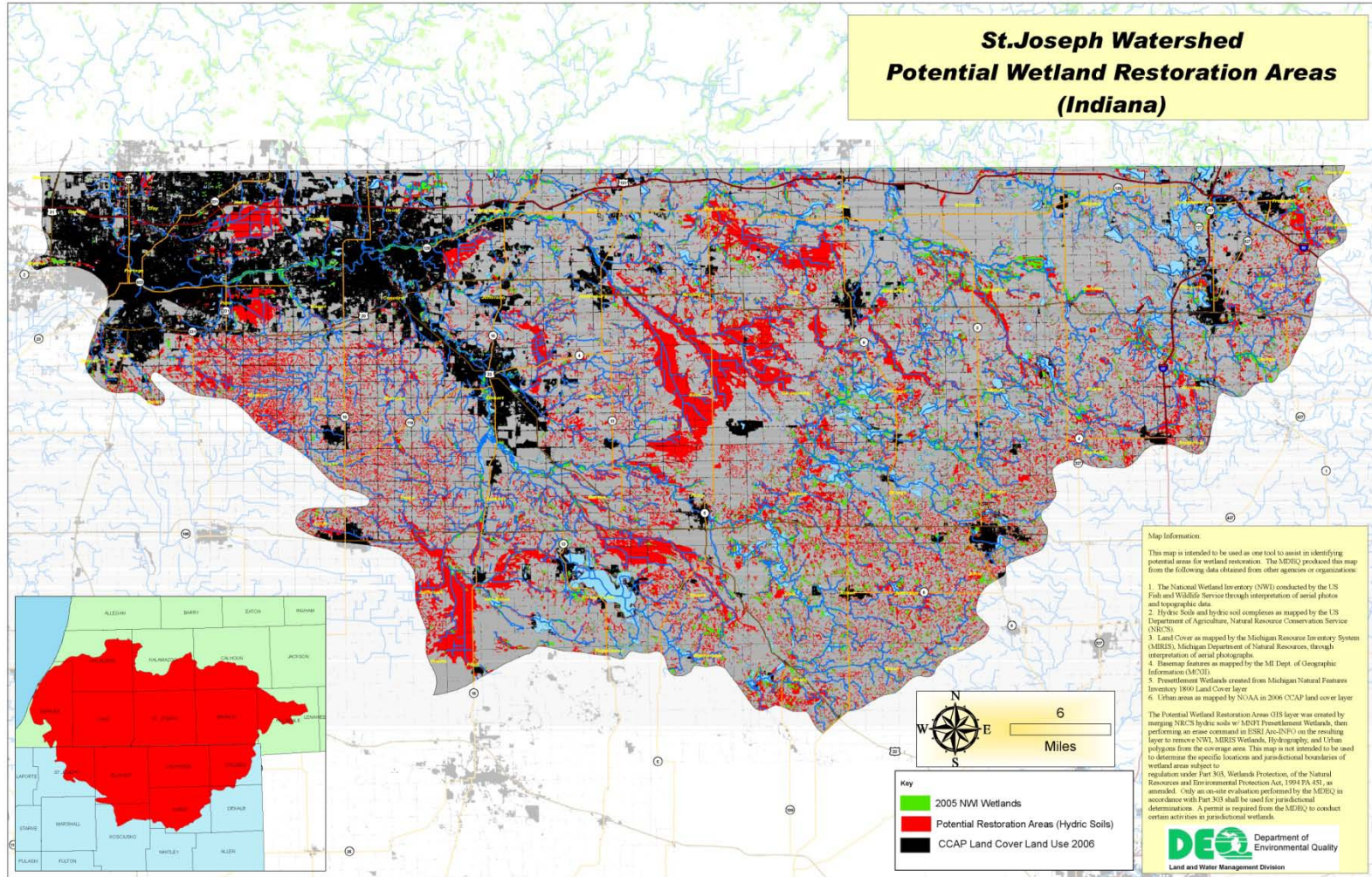
ST. JOSEPH RIVER (IN): 2005 NWI WETLANDS



ST. JOSEPH RIVER (IN): APPROXIMATE AREAS OF WETLAND LOSS



ST. JOSEPH RIVER (IN): Wetland Restoration Areas Map



St. Joseph River Watershed (Michigan)



Status and
Trends Pre-
Settlement to
1998

ST. JOSEPH RIVER WATERSHED (MI): WETLAND RESOURCES STATUS AND TRENDS

PRESETTLEMENT WETLAND CONDITION

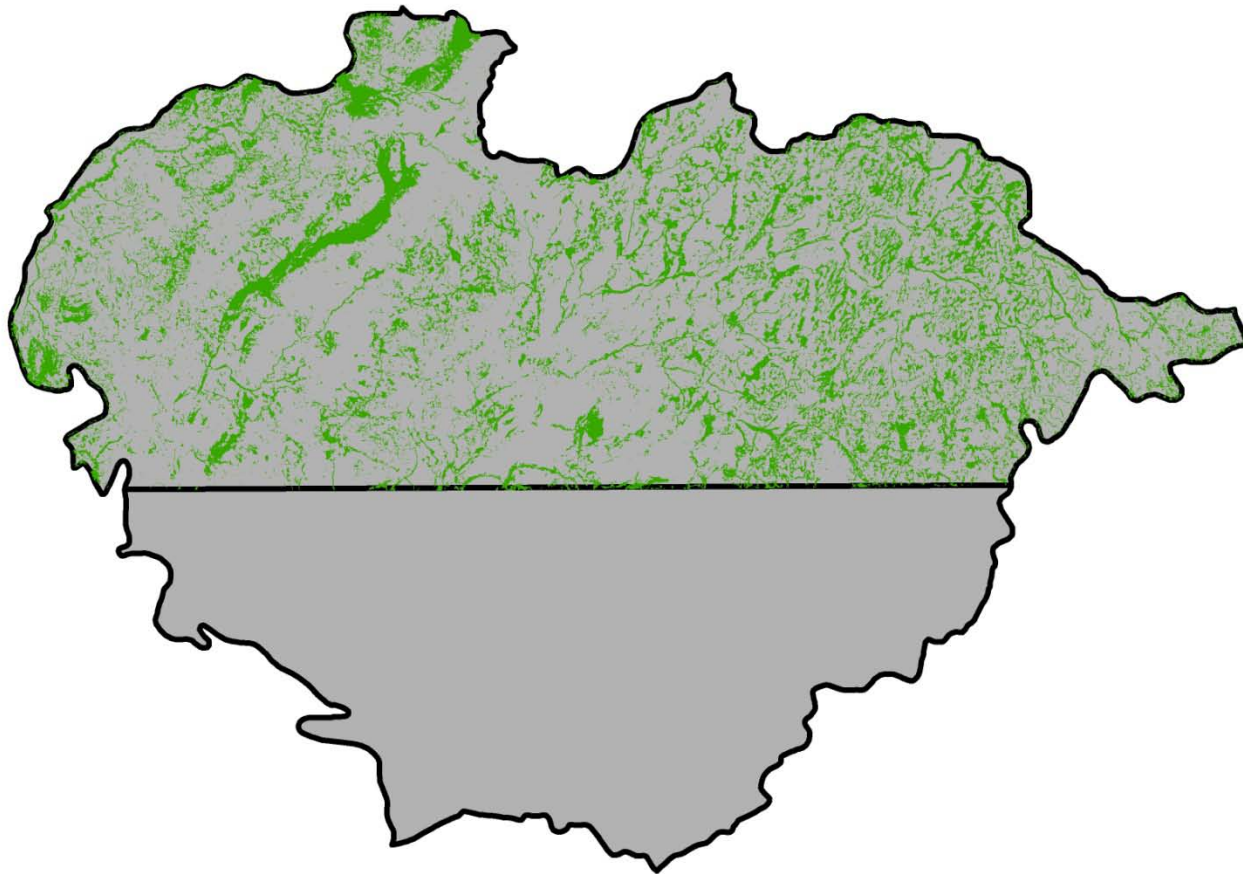
- 390,981 total acres of wetland
- 16,255 Polygons
- Average Size – 24 Acres

1998 WETLAND CONDITION

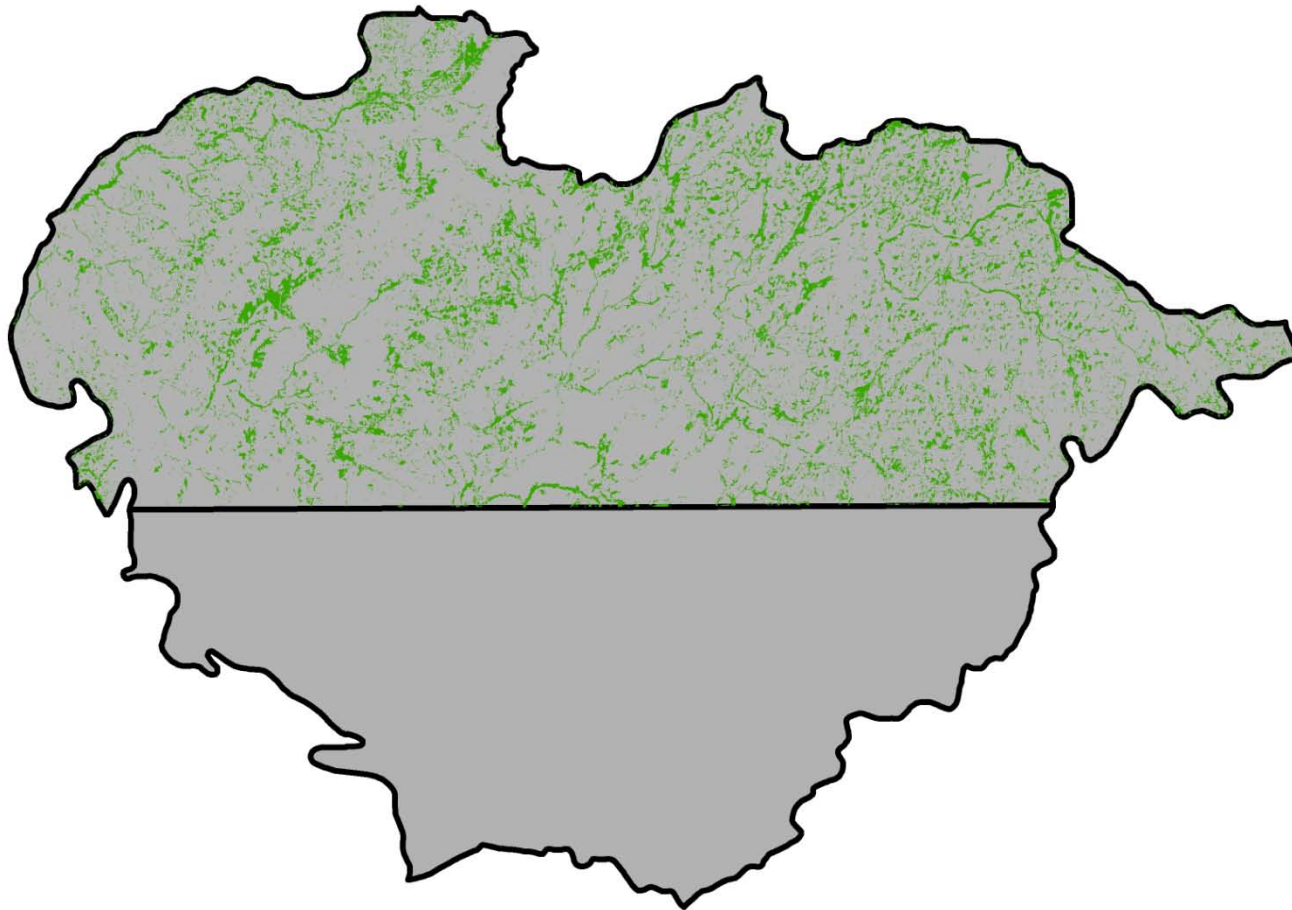
- 236,934 total acres of wetland
- 36,498 Polygons
- Average Size – 6.5 Acres

**60 % OF ORIGINAL WETLAND ACREAGE REMAINS
40% LOSS OF TOTAL WETLAND RESOURCE
LOSS OF 154,047 ACRES**

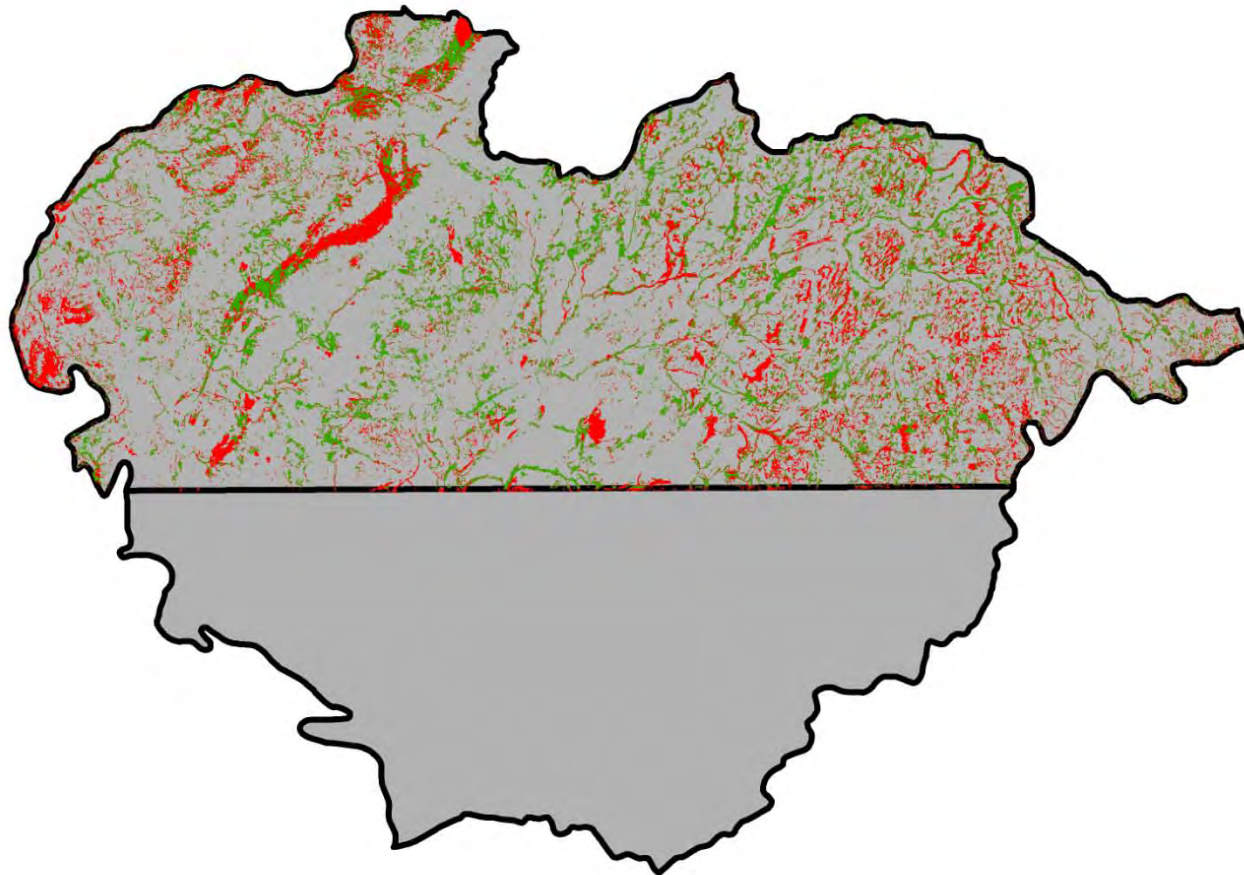
ST. JOSEPH RIVER (MI): PRE-SETTLEMENT WETLANDS



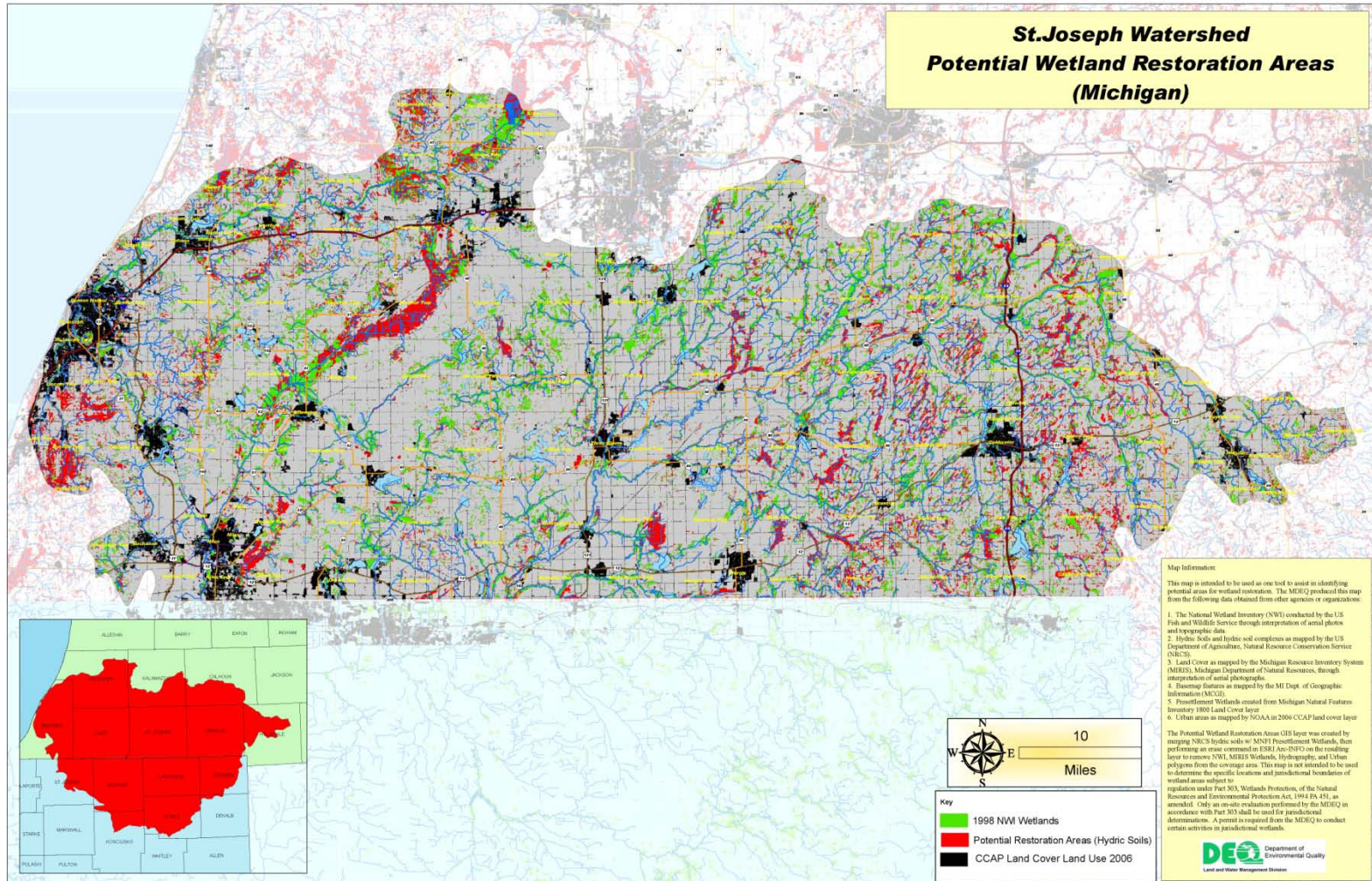
ST. JOSEPH RIVER (MI): 1998 NWI WETLANDS



ST. JOSEPH RIVER (MI): APPROXIMATE AREAS OF WETLAND LOSS



ST. JOSEPH RIVER (MI): Wetland Restoration Areas Map



St. Joseph River Watershed



Status and
Trends Pre-
Settlement
Current
Conditions

ST. JOSEPH RIVER WATERSHED: WETLAND RESOURCES STATUS AND TRENDS

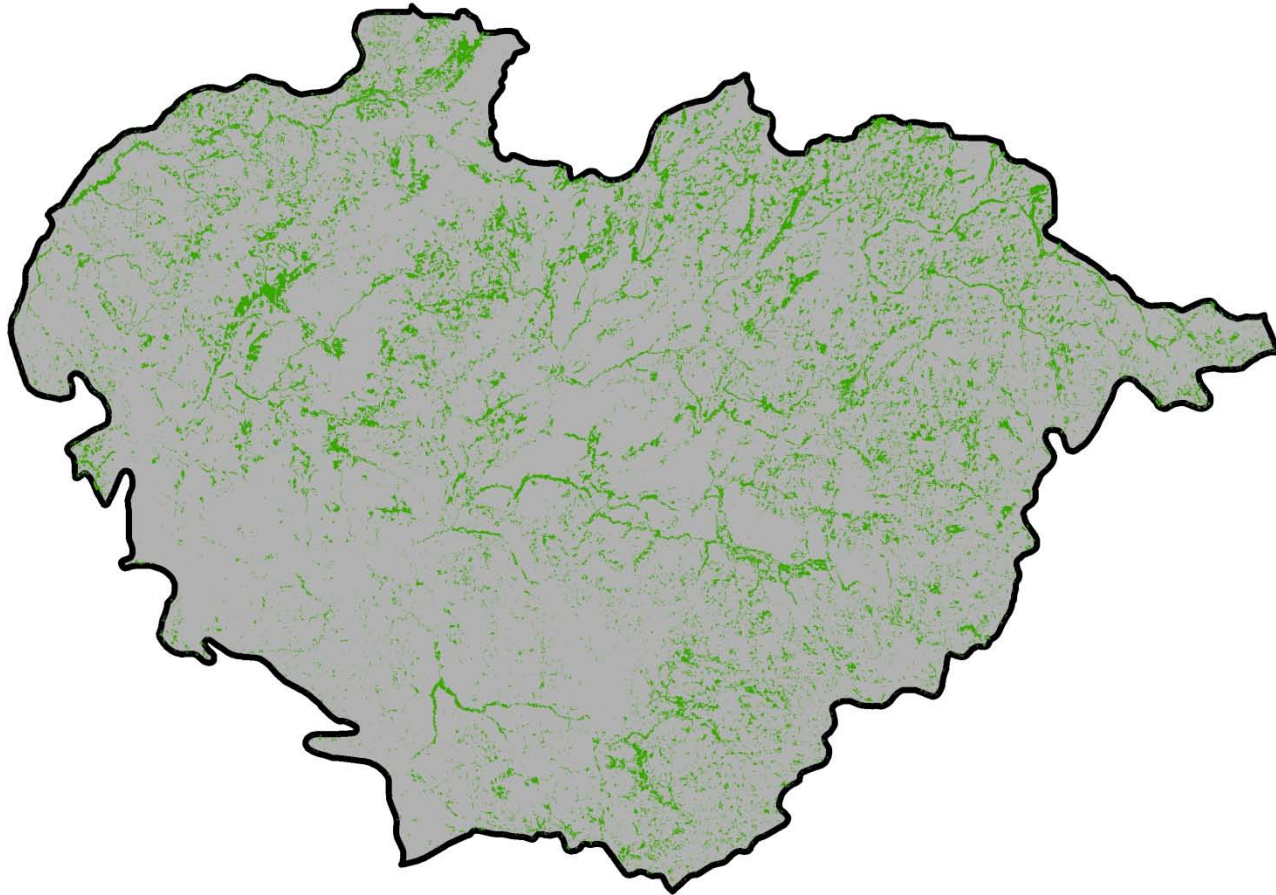
- | | |
|--|--------------------------------------|
| □ <u>PRESETTLEMENT WETLAND CONDITION</u> | □ <u>2005/1998 WETLAND CONDITION</u> |
| □ 672,778 total acres of wetland | □ 316,089 total acres of wetland |
| □ 34,634 Polygons | □ 54,829 Polygons |
| □ Average Size – 19 Acres | □ Average Size – 5.7 Acres |

**47 % OF ORIGINAL WETLAND ACREAGE REMAINS
53% LOSS OF TOTAL WETLAND RESOURCE
LOSS OF 356,689 ACRES**

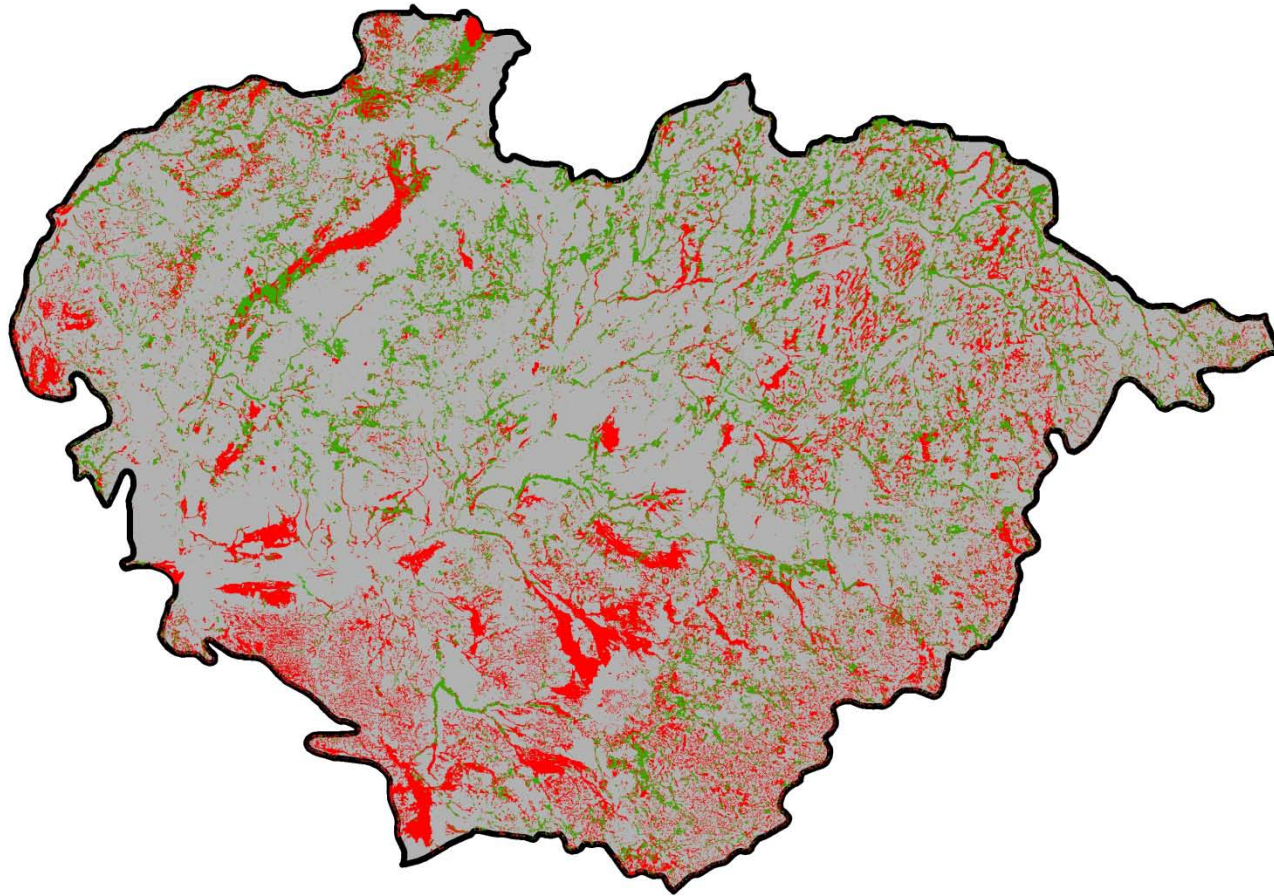
ST. JOSEPH RIVER: PRE-SETTLEMENT WETLANDS



ST. JOSEPH RIVER: PRESENT DAY WETLANDS



ST. JOSEPH RIVER: APPROXIMATE AREAS OF WETLAND LOSS



STATE OF MICHIGAN WETLAND RESTORATION GOALS

- MICHIGAN'S WETLAND CONSERVATION STRATEGY (DEQ 1997)
- SHORT TERM : (BY 2010) RESTORE 1% OF LOST WETLANDS (50,000 ACRES)
- LONG TERM : RESTORE 10% OF LOST WETLANDS (500,000 ACRES) NO TIME FRAME ESTABLISHED

STATE OF MICHIGAN WETLAND RESTORATION GOALS

- ❑ SHORT TERM GOAL WILL BE REACHED BY 2010 (APPROX 4,000 ACRES BEING RESTORED ANNUALLY)
- ❑ 2079 ESTABLISHED TIMEFRAME FOR MEETING OUR LONG TERM GOAL. 100 YEAR ANNIVERSARY OF MICHIGAN'S WETLAND PROTECTION STATUTE
- ❑ 112 YEARS AT CURRENT RATE (4,000 ACRES PER YEAR)
- ❑ MUST INCREASE RATE OF RESTORATION BY 63% TO 6,500 ACRES PER YEAR AND MAINTAIN IT FOR the next 69 YEARS TO REACH OUR LONG TERM GOAL

ST JOSEPH WETLAND RESTORATION GOALS

- Is there a goal?
- 1% restoration goal equals 3,567 acres
- 10% restoration goal equals 35,667 acres

ST JOE RIVER WATERSHED

- ❑ 54,800 individual wetlands to protect (316,089 acres)
- ❑ Hundreds of thousands of restorable wetland acres and sites
- ❑ Where to start????
- ❑ What should be the priorities?????

Voluntary Wetland Restoration Programs

- ❑ USDA - Wetland Reserve Program (WRP),
- ❑ USDA –Conservation Reserve Program (CRP)
Continuous sign up
- ❑ USDA - Conservation Reserve Enhancement Program (CREP)
- ❑ USFWS- Partners for Fish and Wildlife Program
- ❑ DNRE- Landowner Incentive Program (LIP)
- ❑ Ducks Unlimited Inc, Land Conservancies and Other Conservation Organizations

PASSIVE STRATEGY

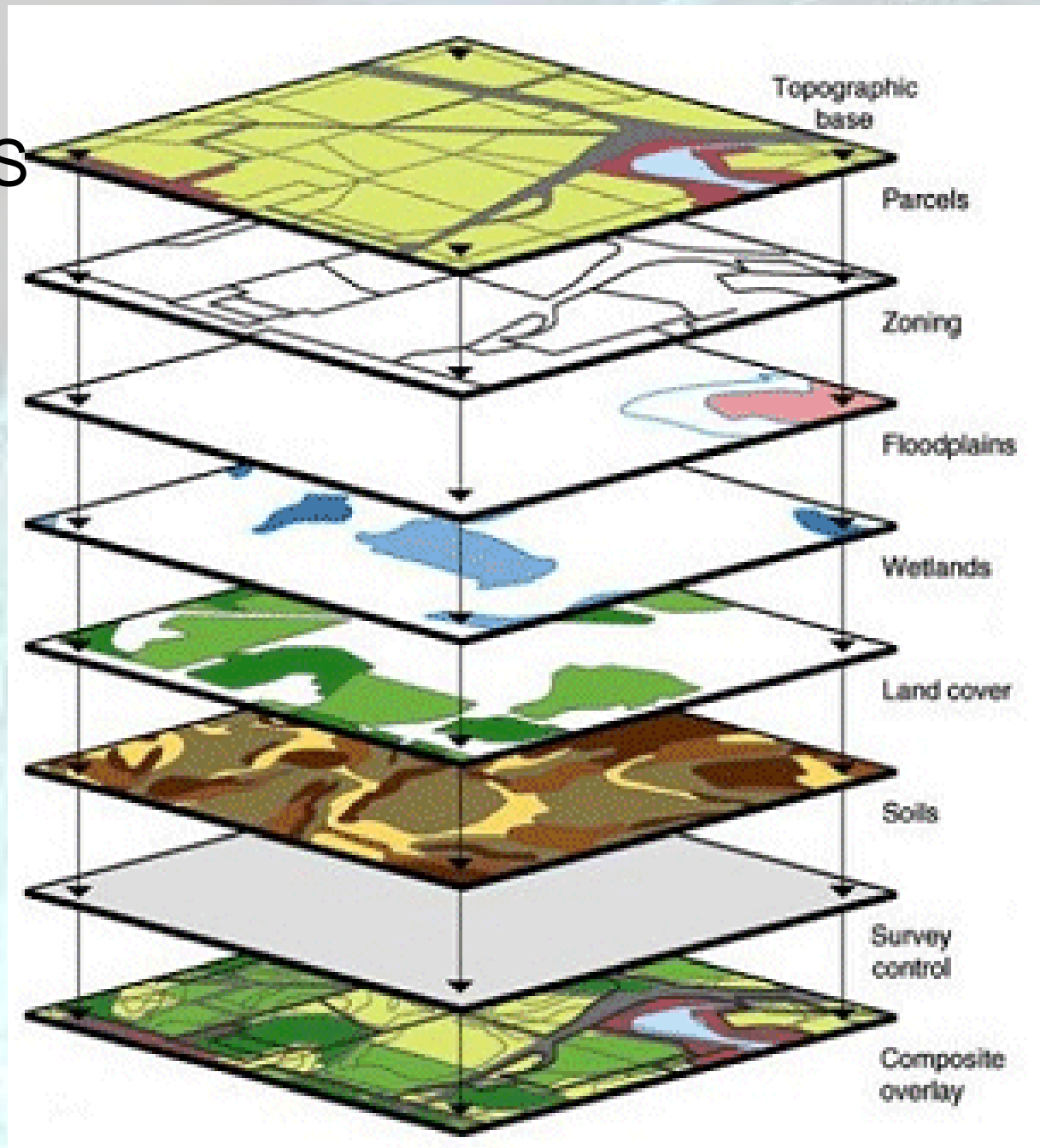
- ❑ TAKE WHATEVER OPPORTUNITIES COME ALONG
- ❑ WAIT FOR INTERESTED LANDOWNERS TO MAKE CONTACT
- ❑ CURRENTLY USED BY FEDERAL AGENCIES (NRCS, FSA & USFWS)

PROACTIVE STRATEGY

- ❑ USE AVAILABLE INFORMATION AND TECHNOLOGY TO SET PRIORITIES AND SELECT SITES
- ❑ MAKE CONTACT WITH LANDOWNERS OF PRIORITY SITES
- ❑ SELL THE CONCEPT AND PROGRAMS
- ❑ STARTING TO BE USED BY WATERSHED GROUPS AND CONSERVATION DISTRICTS

USE GIS TO PRIORITIZE SITES

- Allows inclusion of multiple metrics
- Hones in on landscape level information to identify specific sites
- Allows flexibility for the user to define needs



DESKTOP REVIEW OF PRIORITY SITES



DNRE Wetland Protection and Restoration Tools

- ❑ Wetland Protection Prioritization Model (Protection Tool)
- ❑ Wetland Restoration Prioritization Model (Restoration Tool)
- ❑ Landscape Level Wetland Functional Assessment (Protection and Restoration)

DNRE Wetland Protection Tool

Saginaw Bay Coastal Initiative

Wetland Protection Scoring Criteria

- ❑ Size of the Wetland
- ❑ Proximity to a Stream
- ❑ Landscape Context (adjacent land use and buffers)
- ❑ Migratory Bird Use (Ducks Unlimited Study)

Protection Tool Scoring Criteria

- Rare Species and Natural Communities
- Coastal Wetlands
- Isolated Wetlands

DNRE Wetland Restoration Tool

Clinton River Area of Concern (AOC)

Wetland Restoration Scoring Criteria

- ❑ Historic Wetlands (one or two layers)
- ❑ Proximity to an Existing Wetland
- ❑ Proximity to a Waterway
- ❑ Road Fragmentation

Restoration Tool Scoring Criteria

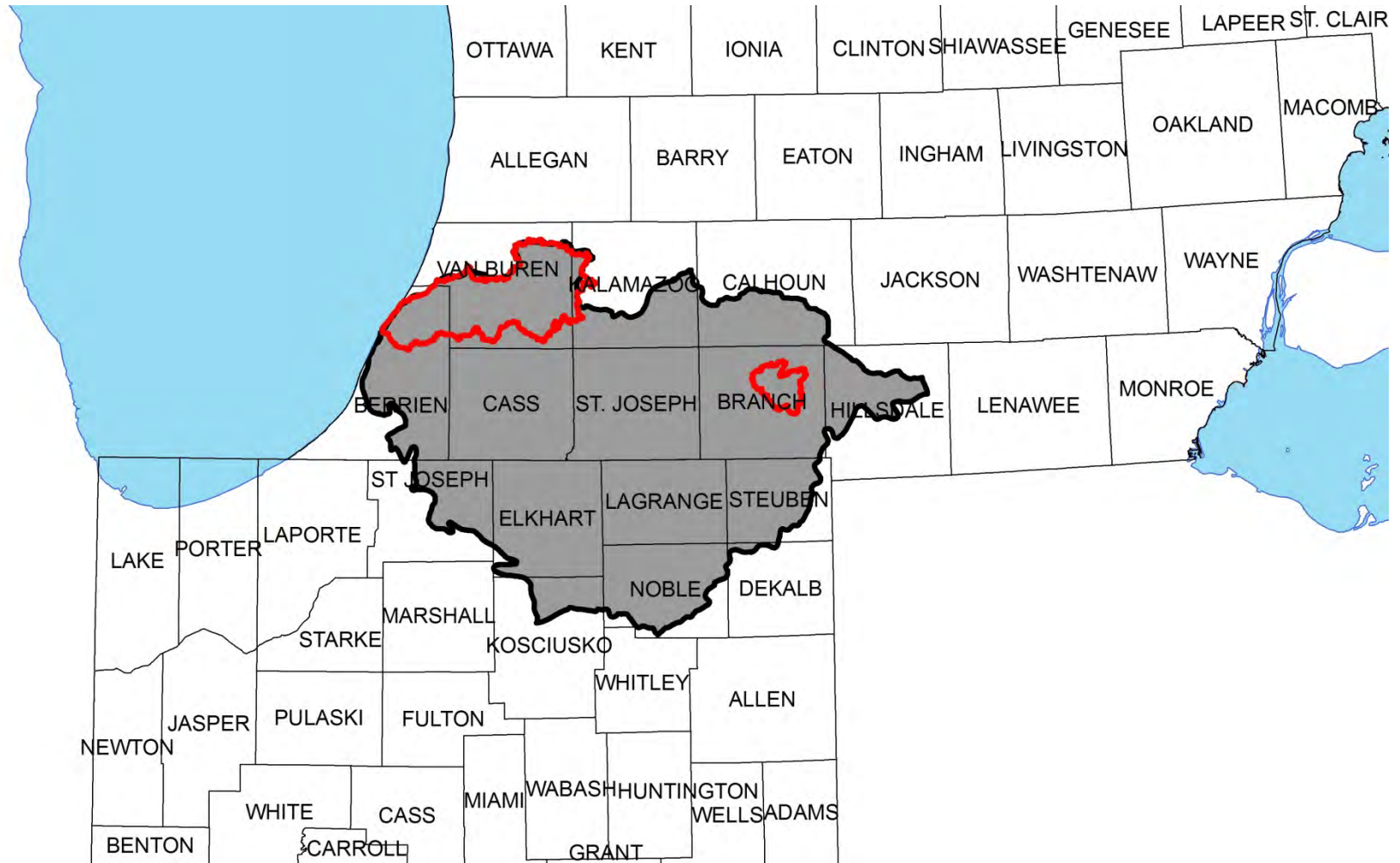
- Proximity to Protected Areas
- Headwater Areas
- Development Threat
- Significant Biological Features in the vicinity
- **Parcelization (How many owners)**

DNRE Wetland Protection and Restoration Tool

Landscape Level Wetland Functional Assessment

- ❑ Every existing wetland will be evaluated for the functions they are currently performing (all 54,829 wetlands)
- ❑ Every historically lost wetland will be evaluated for the functions they would likely perform if restored (all 34,634 wetlands)

PAW PAW, & HODUNK WATERSHEDS



“LLWW” descriptors –

HGM based coding for NWI maps

- L** Landscape Position
- L** Landform
- W** Water flow path
- W** Waterbody Type

Wetland Functions Evaluated

- Flood water storage
- Streamflow maintenance
- Nutrient transformation
- Sediment and particulate retention
- Shoreline stabilization
- Conservation of Rare & Imperiled Wetland Communities

- Habitat Functions
 - Herps & Amphibians
 - Fish
 - Shorebirds, Waterfowl, and Waterbirds

FUNCTIONAL UNIT COMPARISON

Table 5: Functional Unit comparison

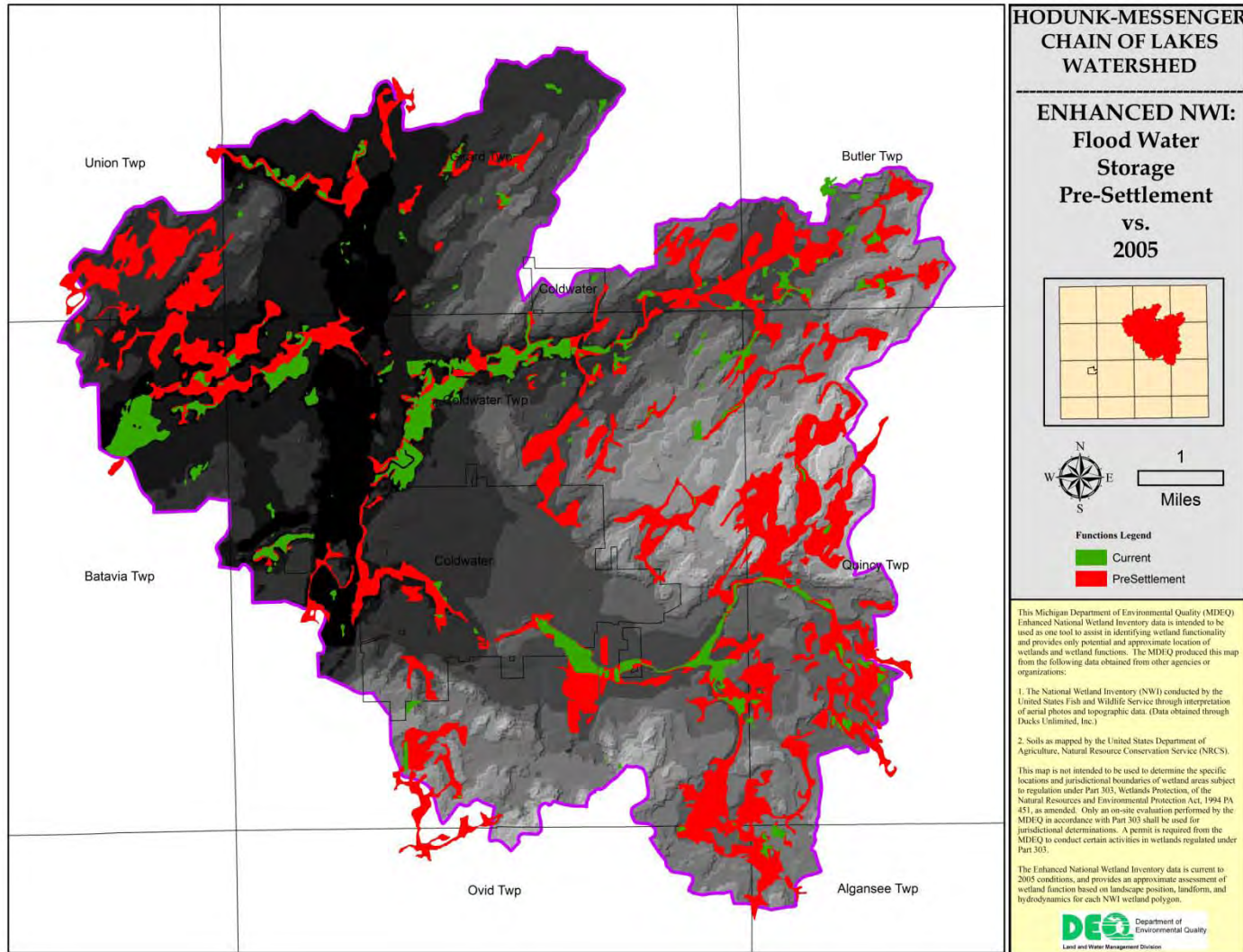
Function	Pre-European settlement Functional Units	2005 Functional Units	Predicted % of Original Capacity Left	Predicted % Change in Functional Capacity
Flood Water Storage	10,699.44	2,399.26	22	-78
Streamflow Maintenance	18,232.46	11,273.52	61	-39
Nutrient Transformation	13,585.03	7,058.17	52	-48
Sediment and Other Particulate Retention	8,035.00	6,240.73	77	-23
Shoreline Stabilization	11,278.65	6,120.43	54	-46
Conservation of Rare and Imperiled Wetlands	<Null>	385.26	<Null>	<Null>*

*Due to differences in mapping technique between pre-settlement and current wetland coverage, status and trends information for this function is not applicable.

FLOOD WATER STORAGE

- ❑ This function is important for reducing the downstream flooding and lowering flood heights, both of which aid in minimizing property damage and personal injury from such events.
- ❑ The following map illustrates wetlands that perform the above ecological service at a level of significance above that of wetlands not designated. Wetlands deemed to be performing this function are mapped in two distinct time periods; Pre-European settlement (red), and wetlands circa 2005 (green).

FLOOD WATER STORAGE



CONTACT INFORMATION:

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zbiciakr@michigan.gov

Chad Fizzell
GIS Specialist
517-335-6928
fizzellc@michigan.gov

A topographic map of a region, likely a mountain range, with a semi-transparent blue circle overlaid on the right side. The map shows contour lines and various geographical features. The text "LANDSCAPE POSITION" is centered over the map.

LANDSCAPE POSITION

Landscape Position – Lentic (Lake)



Landscape Position – Lotic (Stream)



RIVER



STREAM

Landscape Position – Terrene (Uplands)



A topographic map of a mountainous region, likely a mountain range, with the word "LANDFORM" overlaid in large, bold, black capital letters. The map uses contour lines to represent elevation, with higher elevations shown in brown and lower elevations in green. The word "LANDFORM" is centered horizontally and vertically on the map.

LANDFORM

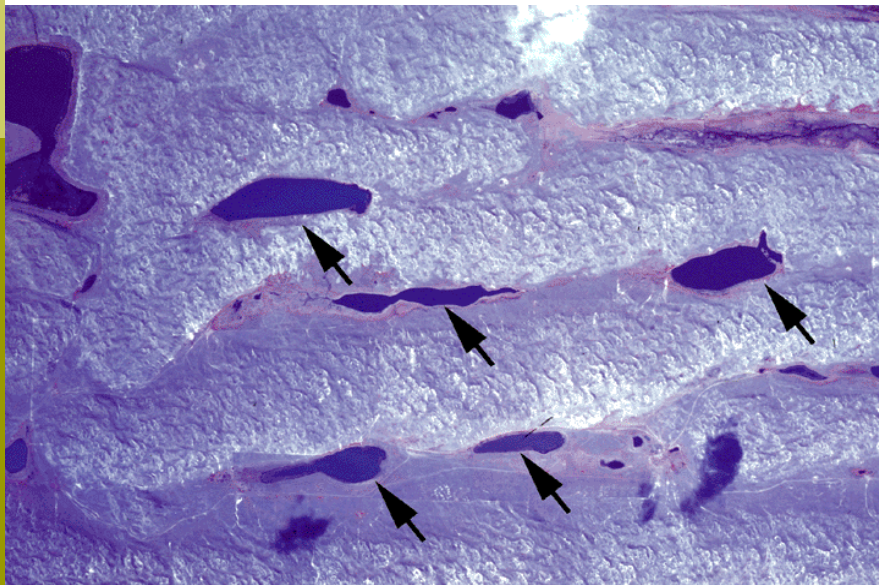
Fringe



Floodplain



Basin



Flat



Slope



A topographic map showing a watershed area. A specific path is highlighted in a light blue color, starting from a high elevation area (indicated by brown and red contour lines) and flowing down to a lower elevation area (indicated by green and yellow contour lines). The path follows the natural drainage of the terrain.

WATER FLOW PATH

WATER FLOW PATH

- ❑ Inflow (Water flows in but not out)
- ❑ Outflow (Water flows out but not in)
- ❑ Through flow (Water flows in and out)
- ❑ Bidirectional (Water flows back and forth)
- ❑ Isolated (surrounded by upland)

Wetland Functions Evaluated

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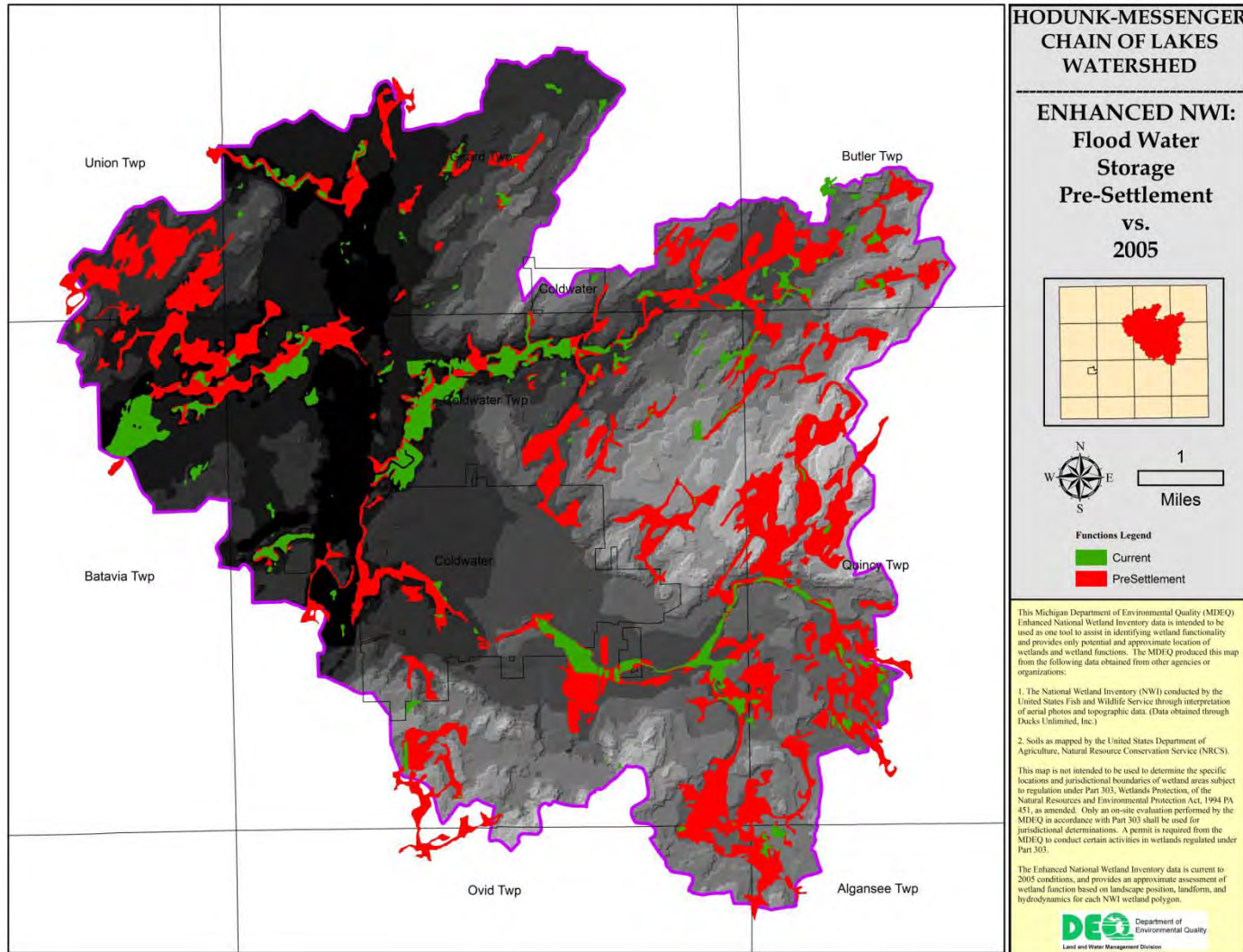
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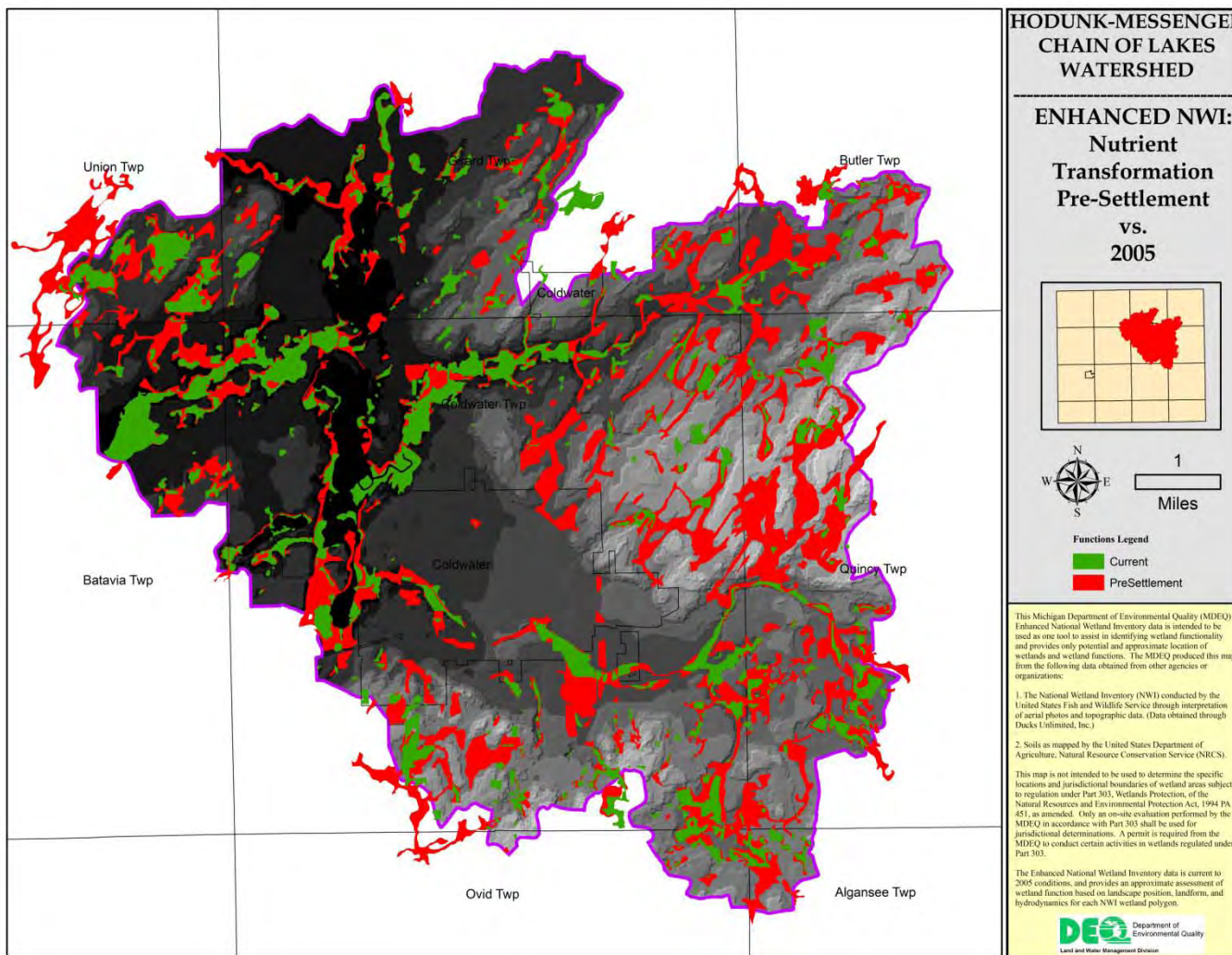
FLOOD WATER STORAGE



NUTRIENT TRANSFORMATION

- ❑ Wetlands that have a fluctuating water table are best able to recycle nutrients. Natural wetlands performing this function help improve local water quality of streams and other watercourses.
- ❑ The following map illustrates wetlands that perform the above ecological service at a level of significance above that of wetlands not designated. Wetlands deemed to be performing this function are mapped in two distinct time periods; Pre-European settlement (red), and wetlands circa 2005 (green).

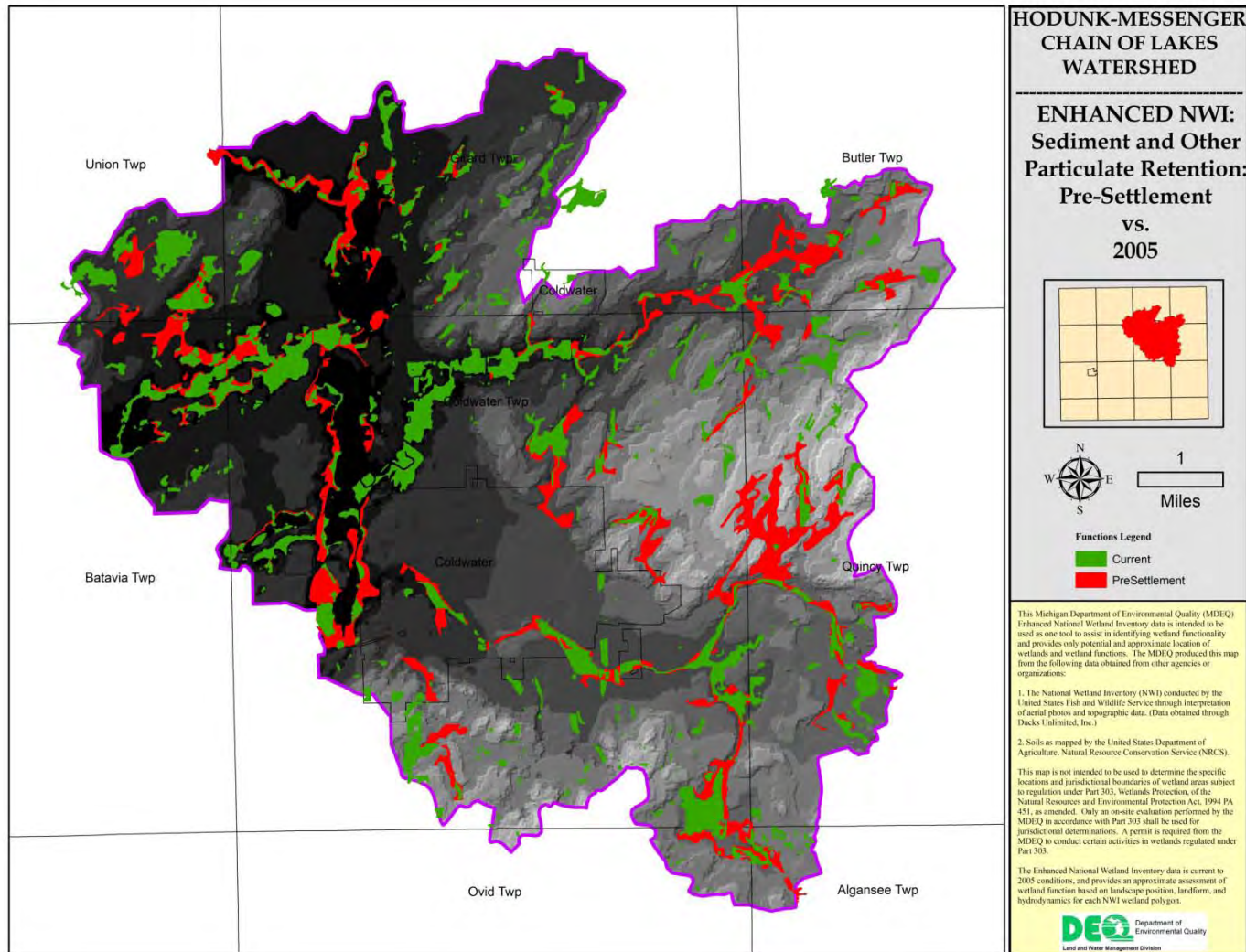
NUTRIENT TRANSFORMATION



SEDIMENT AND OTHER PARTICULATE RETENTION

- ❑ This function supports water quality maintenance by capturing sediments with bonded nutrients or heavy metals. Vegetated wetlands will perform this function at higher levels than those of non-vegetated wetlands.
- ❑ The following map illustrates wetlands that perform the above ecological service at a level of significance above that of wetlands not designated. Wetlands deemed to be performing this function are mapped in two distinct time periods; Pre-European settlement (red), and wetlands circa 2005 (green).

SEDIMENT AND OTHER PARTICULATE RETENTION



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