



MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY

Using Landscape Level Assessment in Watershed Planning and Beyond

Landscape Level Wetland Functional Assessment

(Enhanced NWI)

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What is Landscape Level Assessment?

How can it be utilized in Watershed Planning and Beyond?

How and why was it created?

Cumulative Loss

Getting Results
(Wetlands Map Viewer)

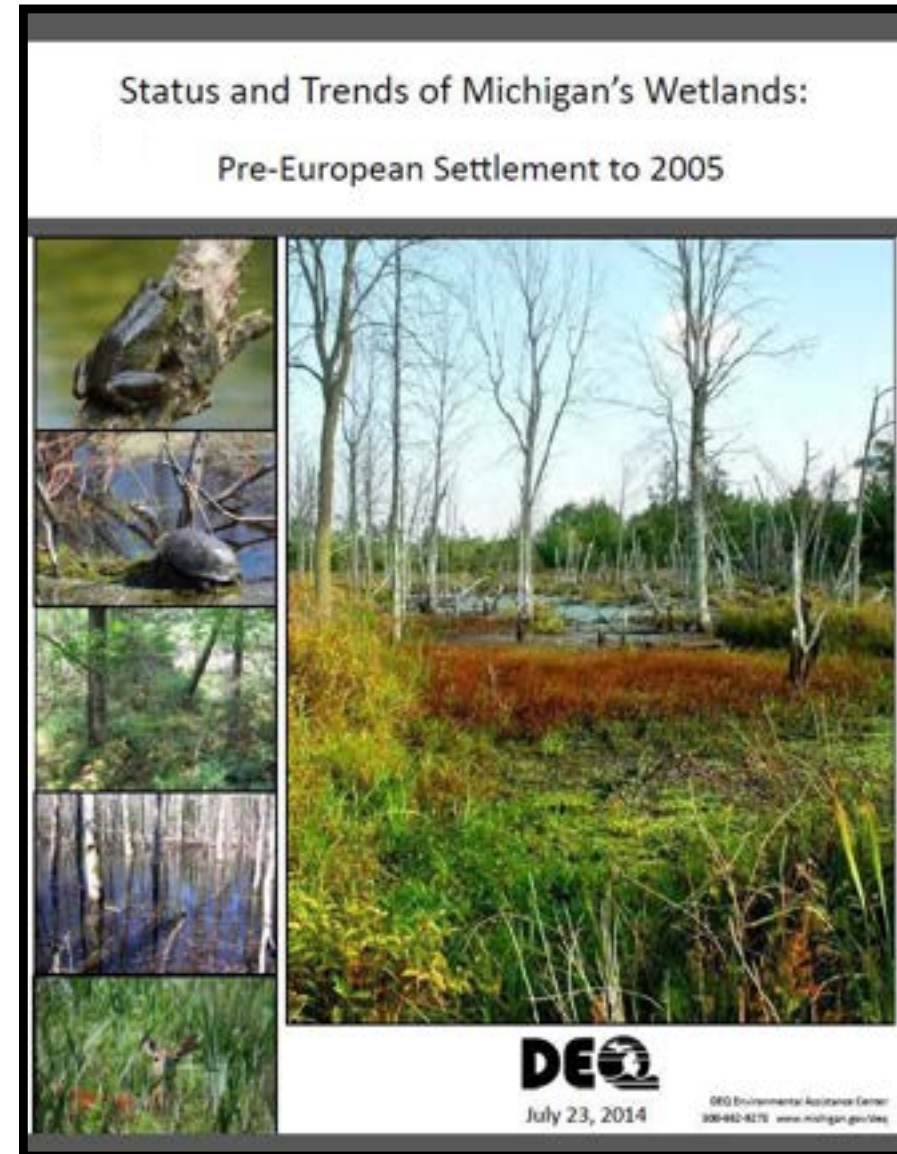
Uses of Landscape
Level Wetland
Assessment

Watershed
Planning

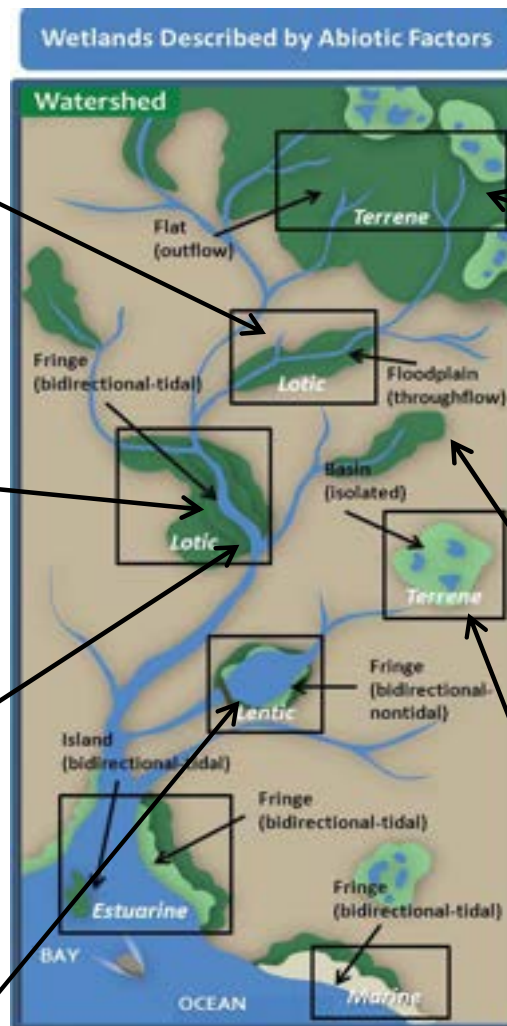
Why was LLWFA created?

Wetland Loss = Functional Loss

- Michigan currently has approximately 6,465,109 acres of wetlands. Michigan originally contained approximately 10.7 million acres of wetland prior to European settlement approximately 30% of the State's land mass.
- By 1978, that number had dropped to approximately 6,506,044 acres. Since the passage of Michigan's wetland protection law in 1979, the rate of wetland loss has declined dramatically.
- The total decline of wetland since 1978 is estimated at 41,000 acres, with the rate of decline slowing between the periods 1978 to 1998 (loss of approximately 1,642 acres per year) and 1998 to 2005 (loss of approximately 1,157 acres per year).
- Wetland loss has always been expressed as acreage loss
- What does the loss of 35,000 acres of wetland really mean in a Watershed?
- LLWFA allows wetland loss to be expressed in terms of functions lost!



Enhance Existing NWI



Key: Landscape position - white italicized, Landform - text from arrow, Water flow path - in parenthesis

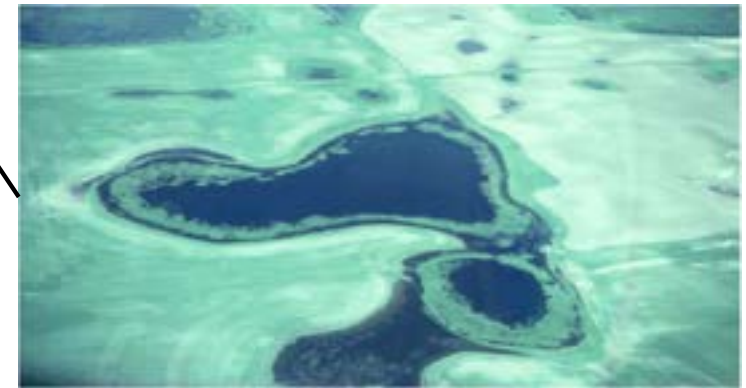
Terrene - isolated wetlands, headwater outflow wetlands, and wetlands along streams but not subject to overflow due to their elevation

Lentic - wetlands along rivers and streams and subject to periodic overflows (e.g., floodplains), including freshwater tidal wetlands

Lentic - wetlands within the basins of lakes and reservoirs where their hydrology is greatly affected by fluctuating lake or reservoir water levels

Estuarine - salt and brackish tidal wetlands associated with estuaries

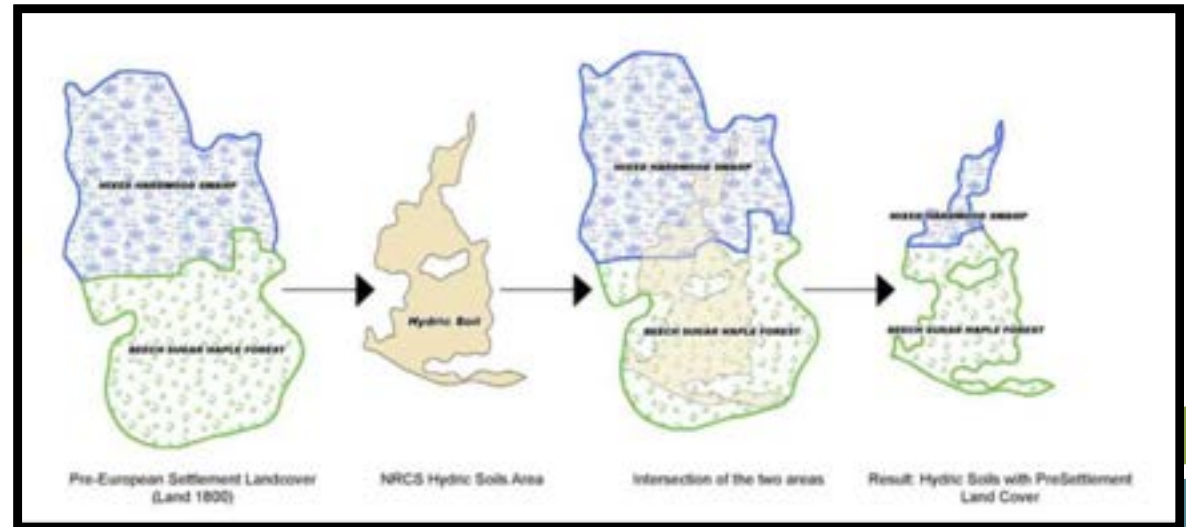
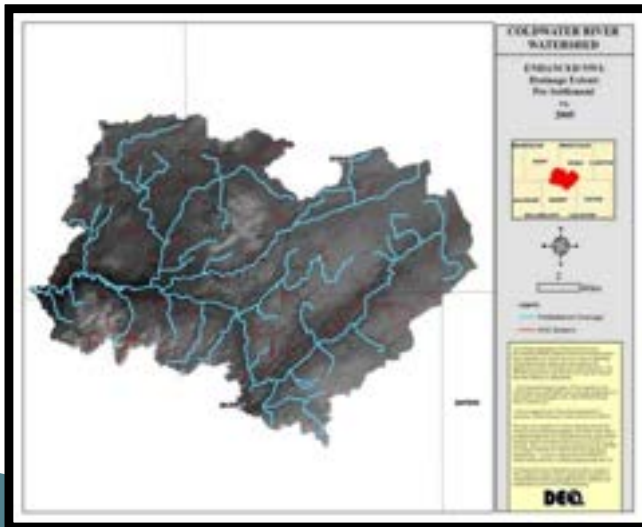
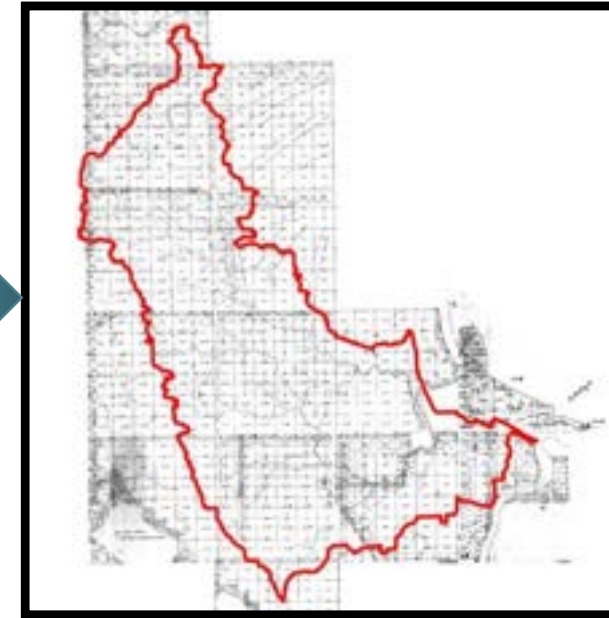
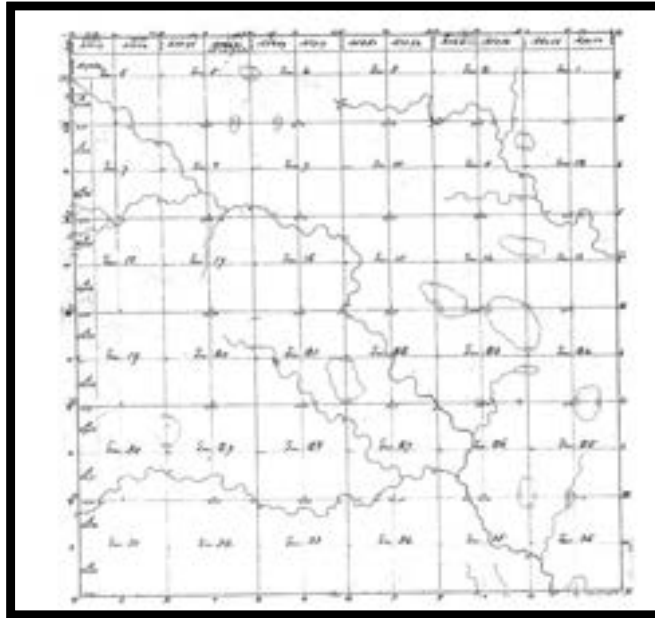
Marine - saltwater tidal wetlands along the shores of the ocean and its open embayments



Enhance/Create Historic Wetland NWI

Create Pre-Settlement wetland data

- Based on the presence of hydric soils
- Utilize historic land cover data
- Determine historic drainage extent
- Add LLWFA attributes



Evaluated Wetland Functions

- Water Quality Functions
 - Flood Water Storage
 - Streamflow Maintenance
 - Nutrient Transformation
 - Sediment and Other Particulate Retention
 - Shoreline Stabilization
 - Stream Shading
 - Ground Water Influence
 - Carbon Sequestration
 - Pathogen Retention
- Habitat Functions
 - Fish Habitat
 - Waterfowl/Waterbird Habitat
 - Shorebird Habitat
 - Interior Forest Bird Habitat
 - Amphibian Habitat
 - Conservation of Rare and Imperiled Wetlands & Species



Cumulative Loss at a Watershed Scale Wetland Resources Status and Trends

Pre-settlement Wetland conditions

- 79,967 Acres of Wetlands
- 5,360 Polygons
- Average Size – 15 Acres

2005 Wetland Condition

- 44,797 Acres of Wetlands
- 10,369 Polygons
- Average Size – 4.3 Acres

**56% OF ORIGINAL WETLAND ACREAGE REMAINS
44% LOSS OF TOTAL WETLAND RESOURCE**

**TOTAL ACREAGE LOSS OF:
35,170 ACRES**

Cumulative Loss

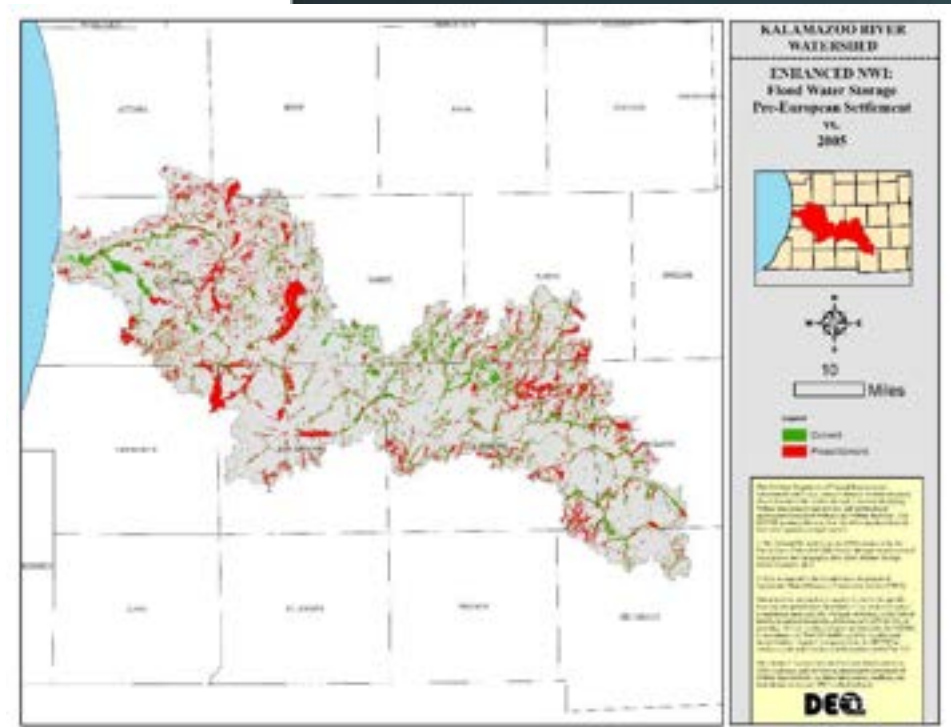
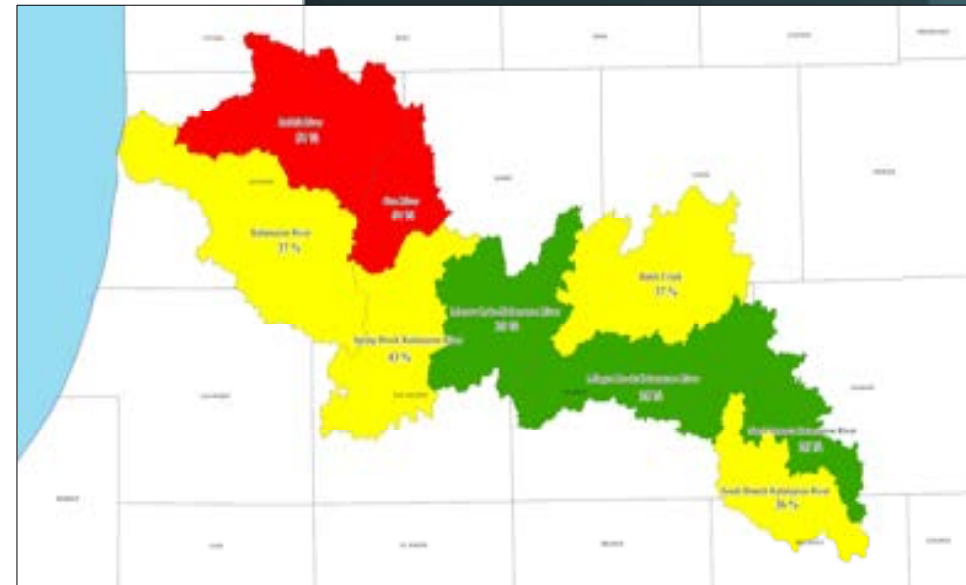
Quantity vs. Quality

Area	Acreage Loss	Floodwater Storage Loss	Sediment Retention Loss	Nutrient Transformation	Combined Water Quality Loss	Habitat Loss
Thornapple River	44%	40%	33%	44%	40%	32%
Chester Township	58%	61%	54%	65%	61%	66%
Coldwater River	49%	44%	32%	48%	45%	38%
Bear Creek Sub-basin	54%	52%	45%	54%	54%	46%
Fish Habitat		High		16,689.70	7,695.70	-54

- **Water Quality**- Floodwater Storage, Sediment Retention, Nutrient Transformation, Shoreline Stabilization, Streamflow Maintenance, Carbon Sequestration, and Pathogen Retention
- **Wildlife Habitat**- Fish, Waterfowl, Interior Forest Bird, Shorebird, and Amphibian Habitat.

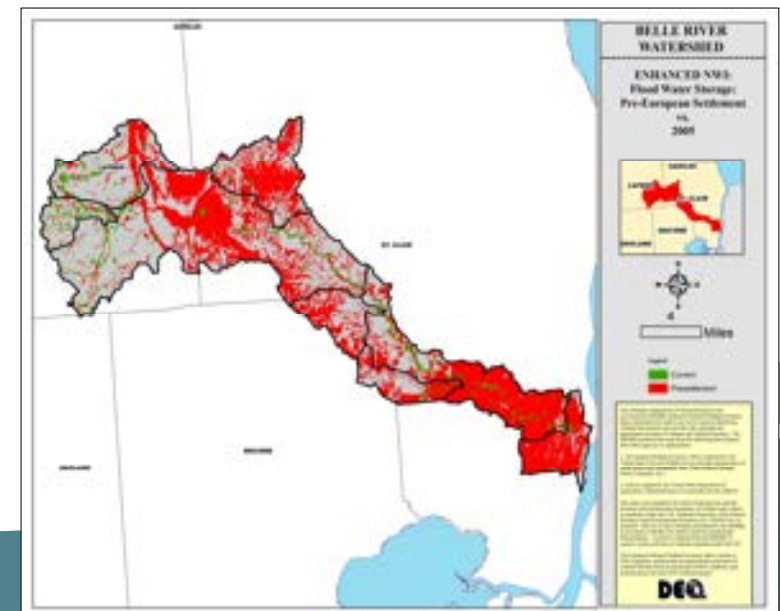
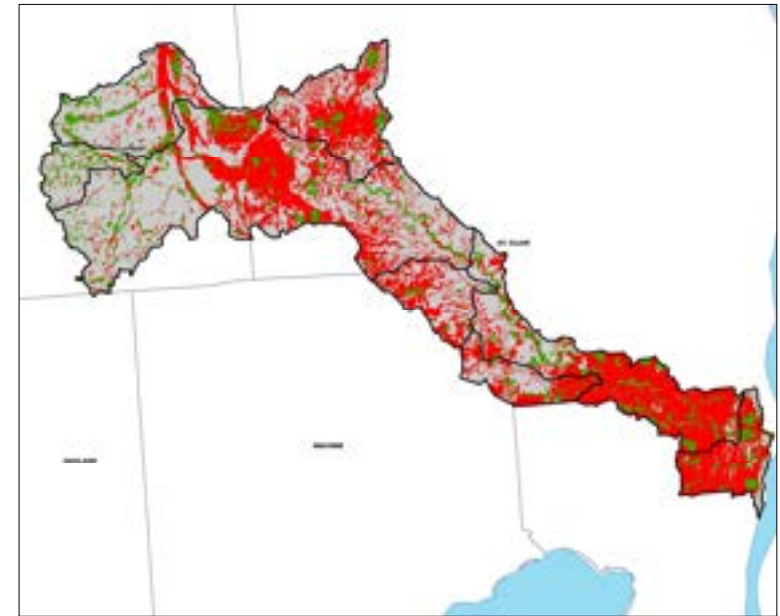
Cumulative Loss

- Loss of wetlands and in turn the benefits they provide can have negative impacts that include:
 - Flood water control
 - Wildlife Habitat
 - Sediment and Nutrients within lakes
 - Erosion control
 - Recharging of ground water supplies
- ❖ Kalamazoo River lost approximately 94,000 acres of wetland with the highest loss numbers being in the Rabbit River and Gun River sub-basins (Picture top right)
- ❖ However, the Kalamazoo River lost approximately 150,000 acres of flood water storage capacity (picture bottom right)



Cumulative Loss

- Belle River watershed has lost approximately 54,000 acres of wetland or 79% of its total resource (top right)
- This equates to the loss of approximately 89% of functioning flood water storage wetlands or 61,000 functioning acres. (bottom right)



Getting Results Wetlands Map Viewer

Functional Water Loss and or Gain

Type	Name	ID	Water Quality Comb.	Floodwater Store	Streamflow Maint.	Nutrient Transform	Sediment Retention	Shoreline Stabilization
HUC 8	Kalamazoo	04050003	-37%	-42%	-34%	-33%	-43%	-32%
HUC 10	North Branch Kalamazoo River	0405000301	-24%	-27%	-24%	-18%	-40%	-14%
HUC 10	South Branch Kalamazoo River	0405000302	-31%	-34%	-39%	-26%	-28%	-26%
HUC 10	Battle Creek	0405000303	-33%	-34%	-36%	-30%	-42%	-24%
HUC 10	Minges Brook-Kalamazoo River	0405000304	-32%	-43%	-26%	-22%	-51%	-22%

Show rows:

Results: 1 - 5 of 83

Habitat Loss and or Gain

Type	Name	ID	Habitat Comb.	Fish	Waterfowl	Shorebird	Forest Bird	Amphibian
HUC 8	Kalamazoo	04050003	-41%	-51%	+27%	-37%	-50%	-55%
HUC 10	North Branch Kalamazoo River	0405000301	-31%	-47%	-2%	-26%	-44%	-33%
HUC 10	South Branch Kalamazoo River	0405000302	-35%	-52%	+3%	-36%	-12%	-50%
HUC 10	Battle Creek	0405000303	-41%	-59%	+100%	-37%	-46%	-61%
HUC 10	Minges Brook-Kalamazoo River	0405000304	-42%	-60%	+18%	-26%	-51%	-63%

Getting Results Wetland Map Viewer Map View

The screenshot displays the EGLE Wetlands Map Viewer interface. On the left, there are several data panels:

- MIRIS 1978 Wetlands:** A table with columns 'Type', 'Acres', and 'Show on Map'. It lists 'Lowland Hardwood' with 172,762 Acres and a 'Highlight' button.
- NWI Data:** A table with columns 'Type', 'Acres', and 'Show on Map'. It lists 'FFOIC' with 263,375,415 Acres and a 'Highlight' button.
- NWI+ Data (Advanced Users):** A section header.
- NWI+ Data (Pre-Settlement):** A section header.
- NWI+ Data (Current):** A table with columns 'HGN', 'Details', and 'Show on Map'. It lists 'LSBATHw' with a 'View' button and a 'Highlight' button.

The main map area shows a satellite-style map with wetland areas highlighted in purple. A popup window titled 'EGLE Wetlands Map Viewer' is open, displaying 'NWI PLUS Wetlands Current' data for 'LSBATHw'. The popup includes a title bar with a close button, a subtitle 'Details for LSBATHw', and the following information:

- Total Wetland Acreage: 285.19
- Functional Water Acres: 570.37
- Habitat Acres: 285.19

Functional Water Acres		Habitat Acres	
Floodwater Storage	570.37	Fish	570.37
Streamflow Maint.	570.37	Waterfowl	285.19
Nutrient Transform	570.37	Shorebird	285.19
Sediment Retention	570.37	Forest Bird	285.19
Shoreline Stabilization	570.37		

At the bottom of the map, there is a navigation bar with links for 'Home', 'EGLE', 'Contacts', 'Policies', 'Online Services', 'Proposals', and 'Publics'. Below the navigation bar, it says 'Copyright © State of Michigan'.

Uses of LLWFA

Rank by Geography & Or Function



Sediment Retention Loss by Sub-Watershed

Rank	HU_12_NAME	Wetland Acreage	Sediment Retention Loss PCT
1	Duck Creek	923	57.8
2	Bear Creek	1,357	45.1
3	Messer Brook-Coldwater River	1,020	44.8
4	Jordan Lake-Little Thornapple River	1,025	42.2
5	Woodland Creek-Little Thornapple River	825	41.8
6	Pratt Lake Creek	1,401	8.4
7	Coldwater River	3,270	0.0



Wetland Loss By Township & Cities

Rank	NAME	Wetland Acres	Wetland Loss Percentage
1	Bowne Twp	251	0.0
2	Prairieville Twp	0	0.0
3	Johnstown Twp	1,611	2.6
4	Lowell Twp	368	5.7
5	Hope Twp	4,001	8.5
6	Castleton Twp	3,218	14.6
7	Leighton Twp	192	15.8
8	Orangeville Twp	334	17.0
9	Rutland Twp	2,998	19.7
10	Barry Twp	342	22.7
11	Thornapple Twp	1,590	23.8
12	Baltimore Twp	3,251	23.9
13	Yankee Springs Twp	1,060	24.6
14	Woodland Twp	1,080	25.6
15	Hastings	234	26.6
16	Irving Twp	1,430	27.1
17	Caledonia Twp	1,805	30.0
18	Hastings Twp	1,881	30.4
19	Carlton Twp	660	34.7
20	Bellevue Twp	672	36.2
21	Vermontville Twp	2,831	36.4
22	Ada Twp	163	42.6
23	Maple Grove Twp	1,977	45.8
24	Cascade Twp	947	47.1
25	Carmel Twp	1,149	47.8
26	Kalamo Twp	2,247	49.1
27	Gaines Twp	350	52.3
28	Chester Twp	2,084	58.6
29	Windsor Twp	750	63.0
30	Benton Twp	1,629	66.3
31	Sunfield Twp	1,159	67.8
32	Eaton Rapids Twp	457	71.2
33	Lansing	79	71.8
34	Eaton Twp	772	75.6
35	Assyria Twp	1	79.6
36	Delta Twp	169	81.8
37	Sebewa Twp	172	81.9
38	Roxand Twp	463	82.3
39	Pottersville	21	83.6
40	Oneida Twp	342	86.4
41	Charlotte	81	88.6

Uses Continued...

- Decision Making
 - Support zoning and land use planning
- Wetland Mitigation
 - Siting mitigation and restoration in a watershed context
- Project Review
 - How will the water quality and habitat functions be impacted
 - Does the project have negative impacts on an already stressed resource?
- Targeted Restoration
 - Does the watershed have flooding and nutrient problems?
- Targeted Protection
 - Protecting wetlands with high functional value
- Targeting Outreach
 - Informing landowners of the resources they may have on their properties
- Strategic Planning

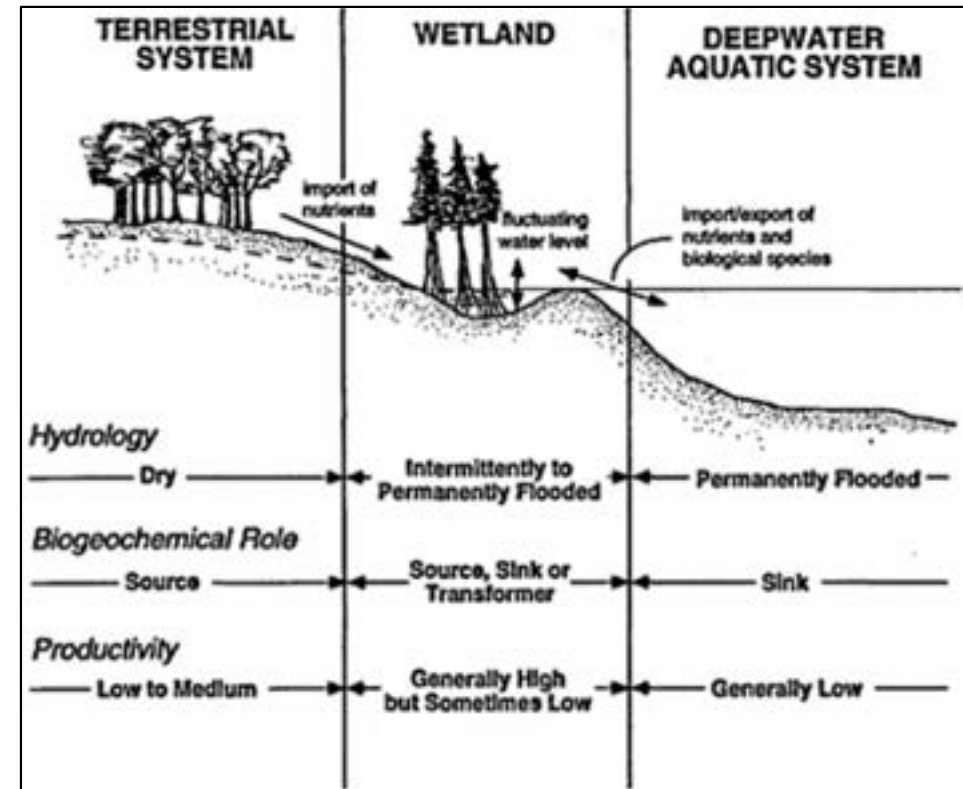
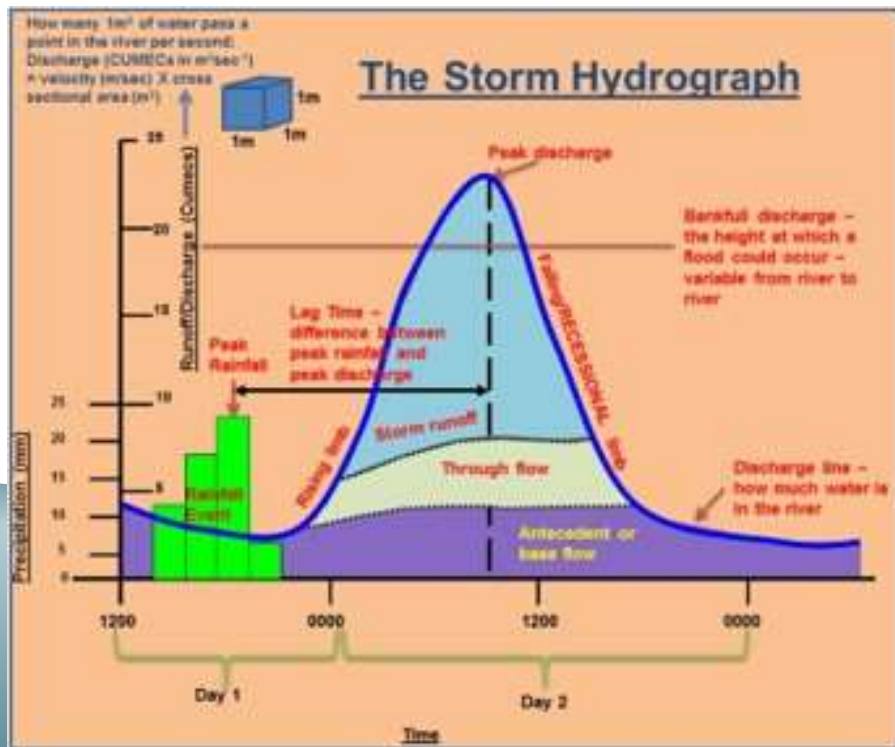


Watershed Planning

- **Primary Purpose of a Nine-element Watershed Management Plan**
 - Bring stakeholders together
 - Restore impaired designated uses
 - Protect designated users from becoming impaired
 - Identify and remediate the sources and causes of NPS pollutants through the implementation of Best Management Practices

How Information on Wetlands Help to inform Nine-Element Watershed Management Plans

- Watershed Characterization
- Watershed Assessment
- Information and Education
- Protection Efforts
- Restoration Efforts

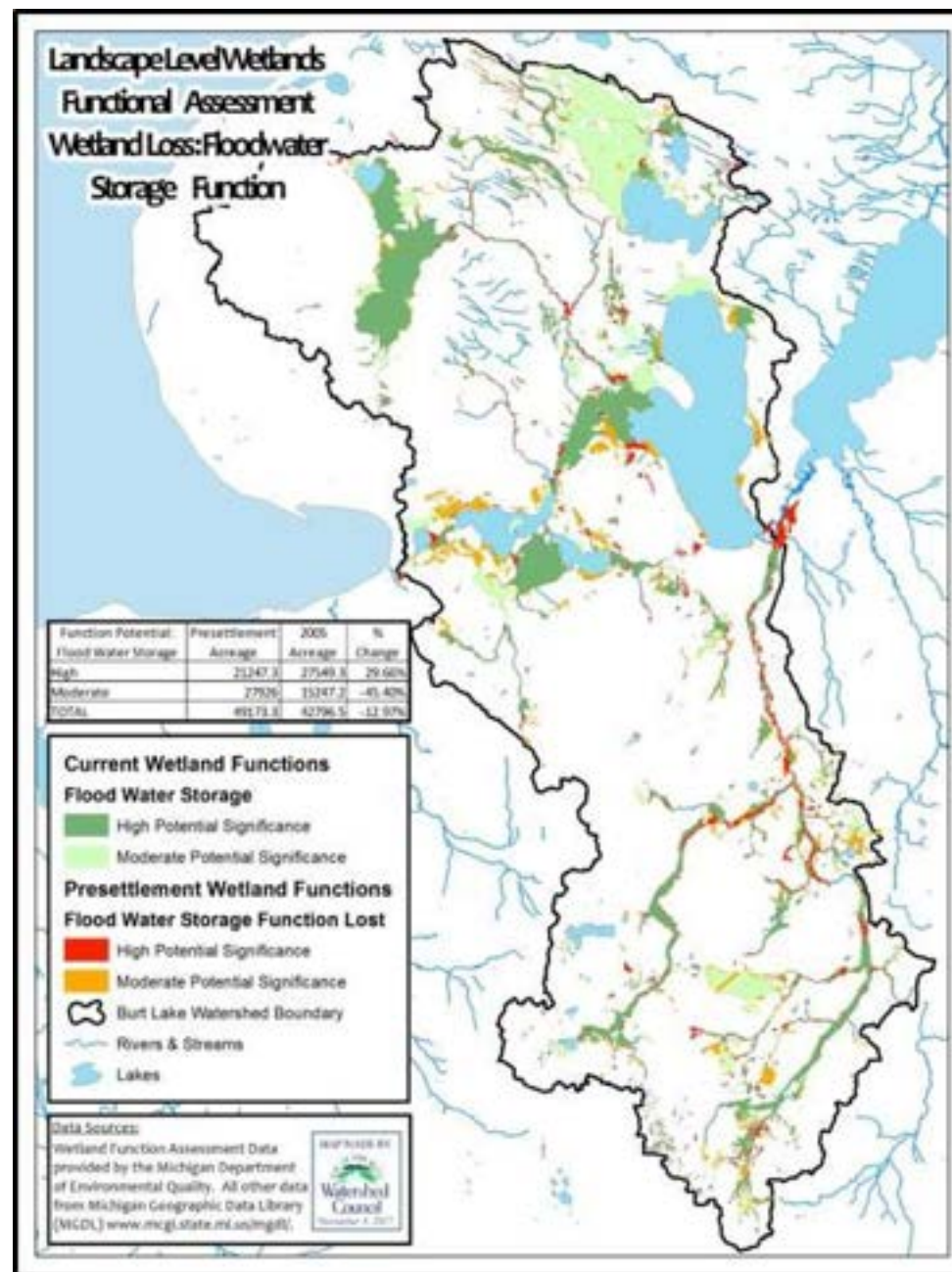


Incorporating the LLWFA Uses in a Nine-element Watershed Management Plan

Understanding the functions a wetland provides, can help direct and prioritize the protection and restoration action within a watershed management plan.

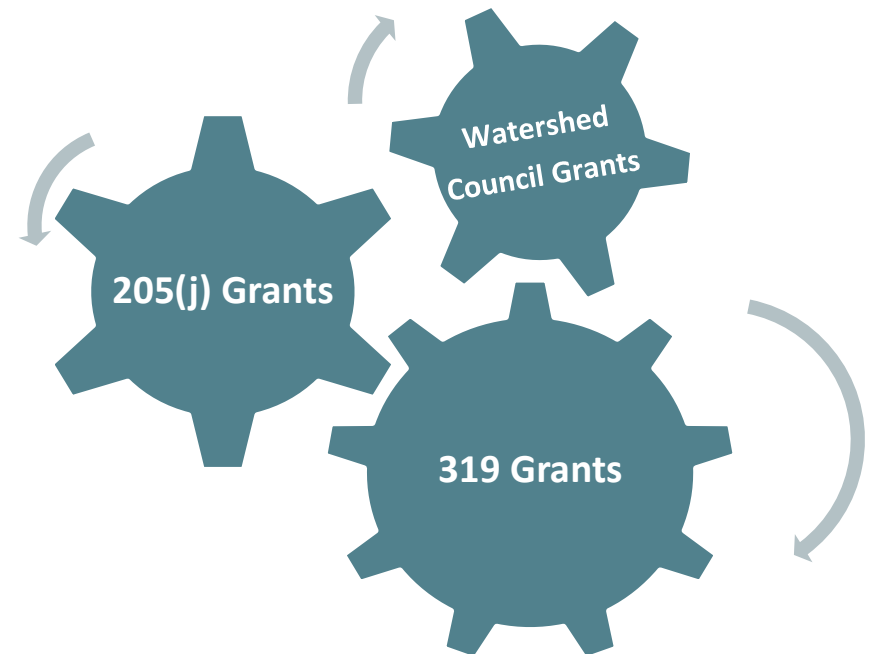
Important Functions

- Flood storage
- Stream flow maintenance
- Nutrient transformation
- Sediment and particulate retention
- Ground water influence



NPS Program Grant Funding Sources

- Implementation – Clean Water Act (CWA)
 - Section 319 - \$2.5 Million annually
 - Provides federal funding to groups implementing priority recommendations in critical areas outlined in watershed management plans
- Watershed Planning
 - CWA Section 205(J) \$125,000 annually
 - Provides federal funding to support watershed planning efforts
- Watershed Council Grants
 - \$600,000 annually 40,000 per grant
 - Provides to support watershed-based organizations to further watershed management goals



Each of these grants can stand alone or feed into one another.



Online Resources

- Landscape Level Assessment
<https://www.michigan.gov/egle/about/Organization/Water-Resources/Wetlands/landscape-level-assessment>
- Wetlands Map Viewer
<https://www.mcgi.state.mi.us/wetlands/>
- Wetlands and Watershed Planning
<https://www.michigan.gov/egle/about/organization/water-resources/wetlands/wetlands-watershed-planning>
- EGLE Non-Point Source Program
<https://www.michigan.gov/egle/about/organization/water-resources/nonpoint-source>
- EPA Resources for Watershed Planning
<https://www.epa.gov/nps/resources-watershed-planning>
- EGLE & DNR Voluntary Wetland Restoration Program
<https://www.michigan.gov/egle/about/organization/water-resources/wetlands/wetland-restoration>

LANDSCAPE LEVEL WETLAND FUNCTIONAL ASSESSEMENT
(LLWFA)
Version 1.0

Methodology Report



July 12, 2011

Michigan Department of Environmental Quality



Thank You

If you would like more information on using NWI for Wetland Functional Assessment, please contact EGLE for a copy of our Methodology Report.

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For Information on watershed planning
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