LOWER GRAND RIVER WATERSHED

Landscape Level Wetland Functional Assessment

(Enhanced NWI)

Department of Environmental Quality

Land and Water Management Division

Data Limitations and Disclaimer

National Wetlands Inventory (NWI)

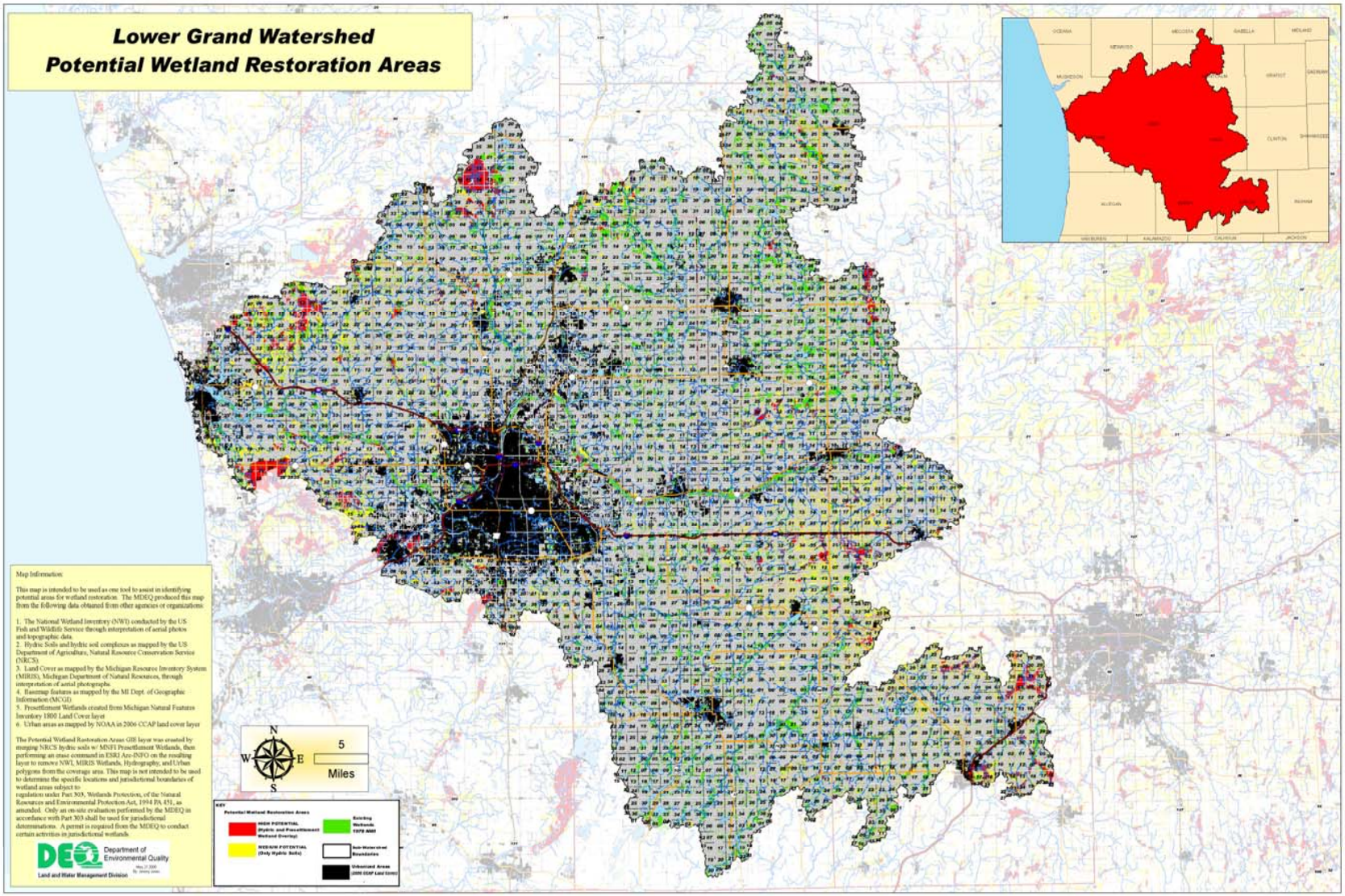
- Wetland boundaries determined from Aerial Imagery
- Last updated in 1978
- Obvious limitations to Aerial Photo Interpretation:
  - Errors of Omission (forested and drier-end wetlands)
  - Errors of Comission (misinterpretation of aerials)

The 1978 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.

LOWER GRAND RIVER WATERSHED

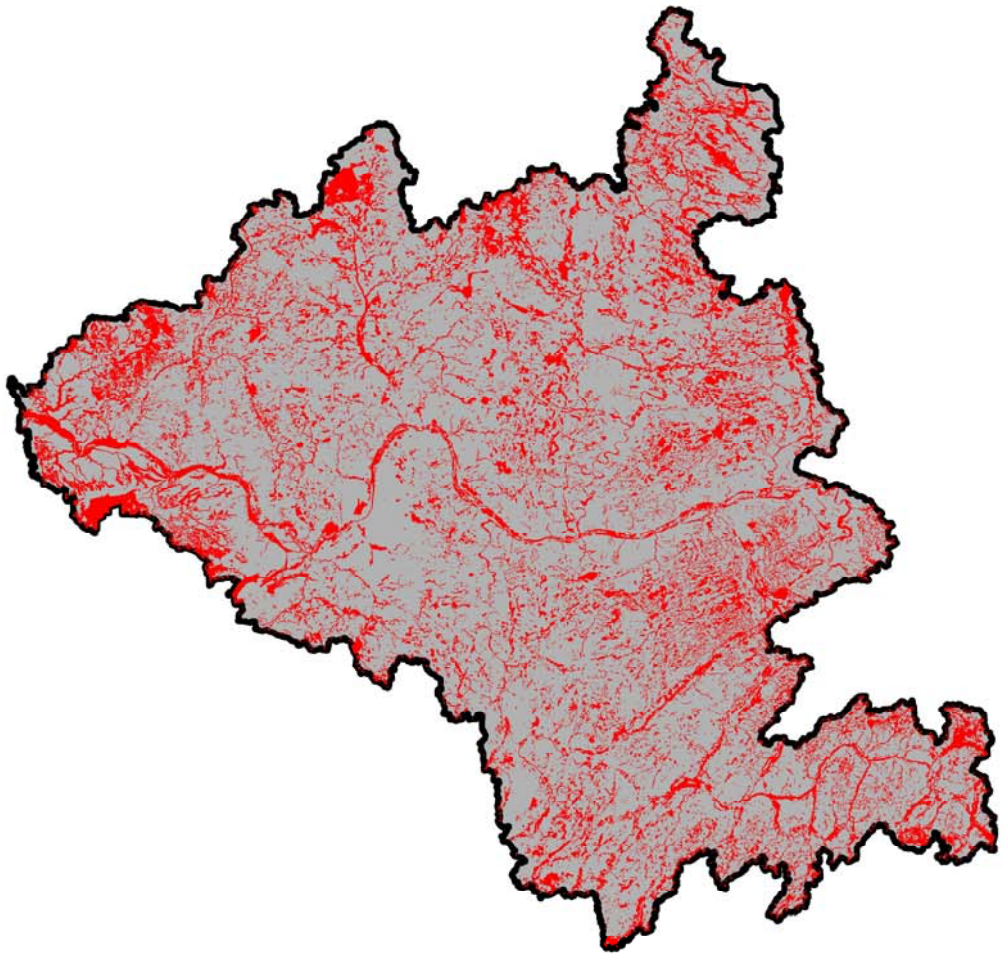


Lower Grand River Watershed
Wetland Resources Status and Trends

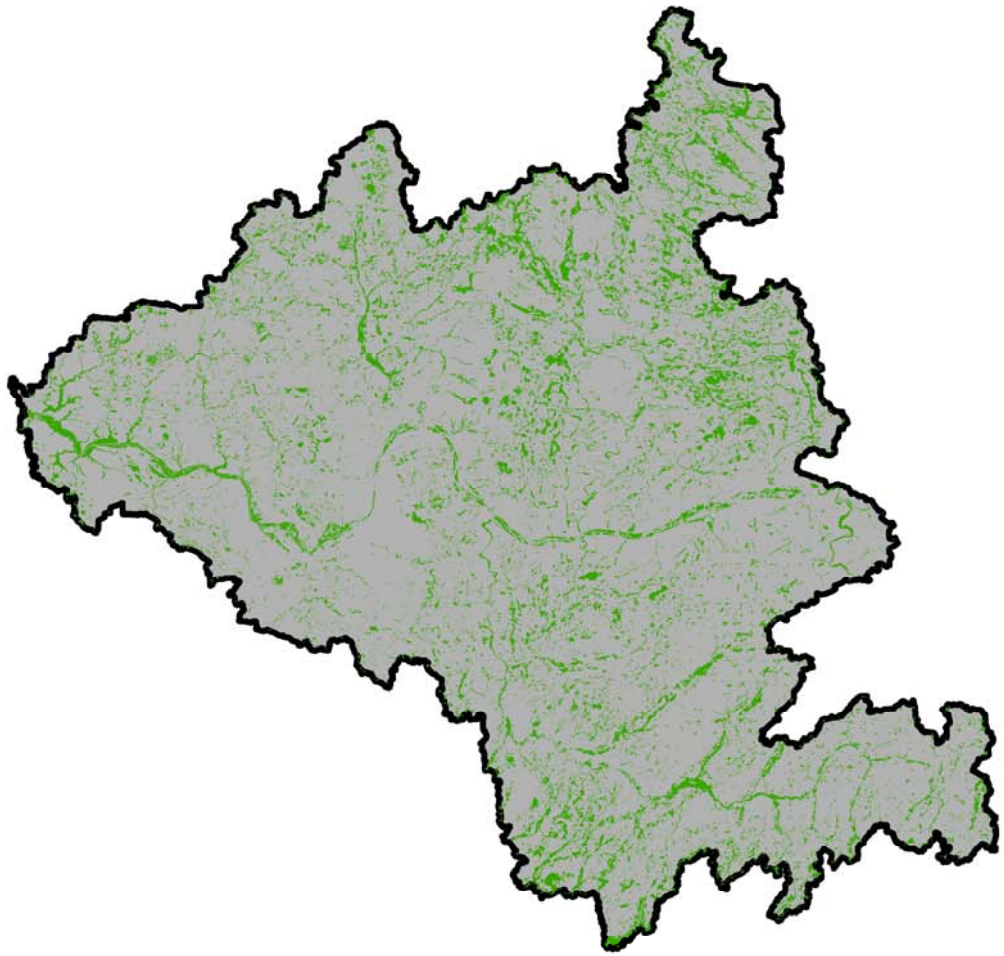
Pre-settlement Wetland conditions	1978 Wetland Condition
• 407,522 Acres of Wetlands	• 237,519 Acres of Wetlands
• 23,875 Polygons	• 52,764 Polygons
• Average Size – 17 Acres	• Average Size – 4.5 Acres

58% OF ORIGINAL WETLAND ACREAGE REMAINS
42% LOSS OF TOTAL WETLAND RESOURCE

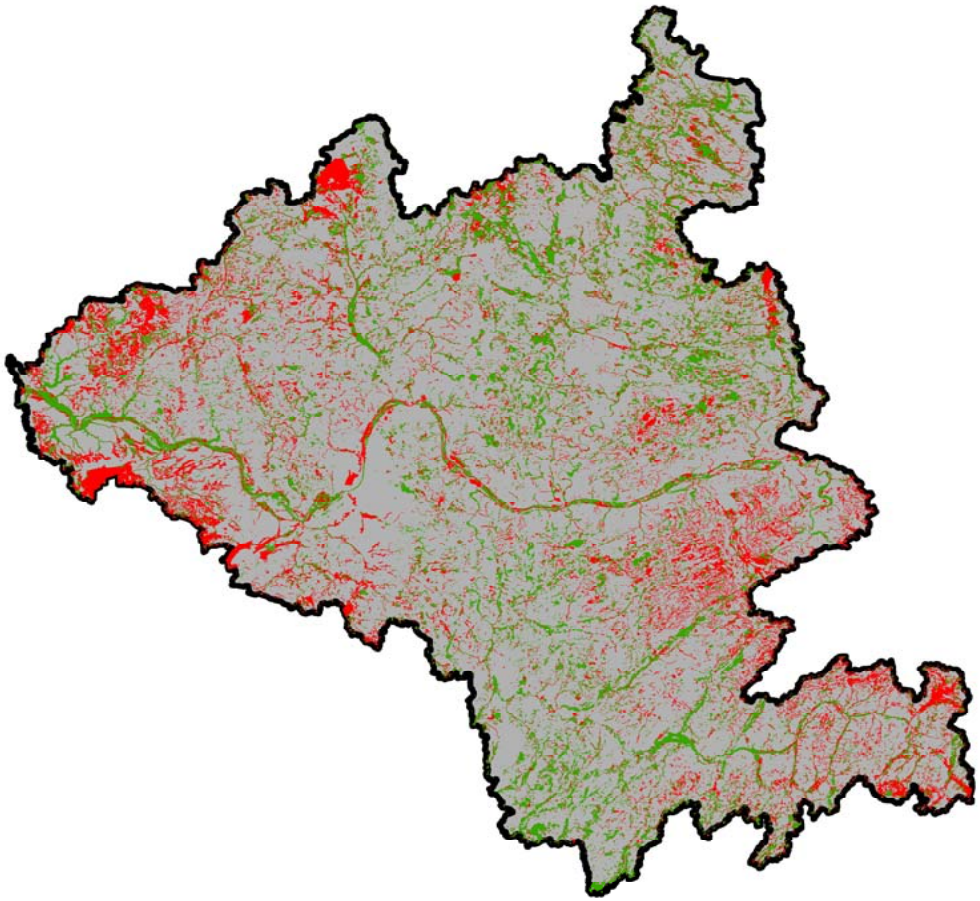
PRE-EUROPEAN SETTLEMET WETLAND COVERAGE



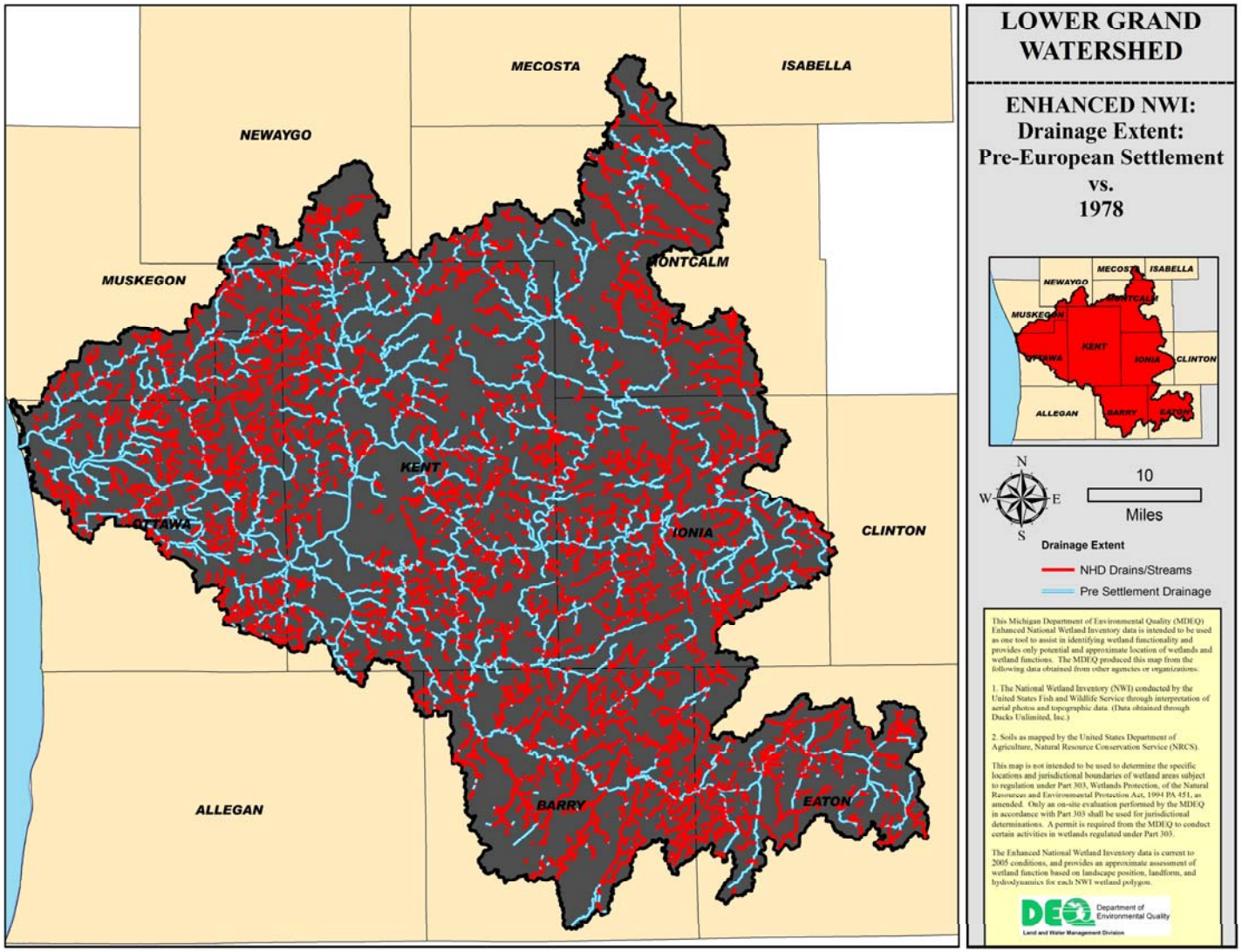
1978 WETLAND COVERAGE



APPROXIMATE WETLAND LOSS PRE-EUROPEAN SETTLEMENT TO 1978



DRAINAGE EXTENT



NWI TYPE COMPARISON

Table 1: Generalized NWI type comparison

Wetland Type	Pre-European Settlement Acres	1978 Acres of Wetlands	Net Acres Remaining
Palustrine Emergent	5,222	53,510*	102%
Palustrine Forested	364,857	110,056**	30%
Palustrine Shrub-Scrub	33,512***	30,601****	91%
Other Palustrine			
Palustrine Aquatic Bed	0*****	1,510	100%
Ponds	0*****	14,402	100%
Total	403,591	208,569	51%

*Includes mixed emergent wetland classes and mixed communities where subclasses include Forested and Shrub-Scrub Areas
**Includes mixed forested wetland classes and mixed communities where subclasses include Emergent and Shrub-Scrub Areas
*** Includes mixed Shrub-Scrub/Emergent communities
****Includes mixed shrub-scrub wetland classes and mixed communities where subclasses include Emergent, Forested and Shrub-Scrub
***** Low acreage in ponds and Aquatic bed due to mapping differences between Pre-Settlement and Current wetland coverage's.

NWI CLASSES

Table 2: 1978 NWI Classes	Acreage
NWI Wetland Type	
Lacustrine Aquatic Bed/Emergent	246.81
Aquatic Bed	1,510.54
Emergent (Persistent)	45,970.85
Emergent (Non-Persistent)	323.64
Mixed Emergent/Scrub-Shrub	5,044.11
Mixed Emergent/Forested	1,390.36
Mixed Emergent/Aquatic Bed	110.53
Forested	96,186.32
Mixed Forested Scrub Shrub	9,050.85
Mixed Forested / Emergent	3,038.01
Scrub-Shrub	22,294.42
Mixed Scrub-Shrub/Emergent	4,435.80
Mixed Scrub-Shrub/Aquatic Bed	159.39
Mixed Scrub-Shrub/Forested	3,649.77
Unconsolidated Bottom/Vegetated	207,093.00
Unconsolidated Bottom	13,620.30
Unconsolidated Shore	111.49
Palustrine Farmed	1,383.20
Total	415,619.41
Riverine-Unconsolidated Bottom	5,532.62
Lacustrine-Unconsolidated Bottom	22,435.09

DETAILED FUNCTIONAL COMPARISONS

Table 3: Detailed Functional Comparisons

Function	Potential Significance	Pre-European settlement Acreage	1978 Acreage	% Change in Acreage
Flood Water Storage	High	141,078.85	85,574.61	-40
	Moderate	145,366.26	43,167.66	-70
	Total	286,445.11	128,742.27	-56
Streamflow Maintenance	High	242,533.63	120,297.28	-50
	Moderate	51,698.77	38,134.91	-27
	Total	294,232.40	158,432.19	-46
Nutrient Transformation	High	220,197.63	122,951.85	-45
	Moderate	156,856.75	50,864.24	-68
	Total	377,054.38	173,816.09	-54
Sediment and Retention of Other Particulates	High	286,272.70	104,742.59	-64
	Moderate	44,800.88	47,689.10	106+ *
	Total	331,073.58	152,431.69	-54
Shoreline Stabilization	High	145,668.38	111,033.26	-24
	Moderate	115,579.28	34,144.10	-70
	Total	261,247.66	145,177.36	-45
Fish Habitat	High	281,087.58	150,521.40	-47
	Moderate	20,242.28	20,397.85	100+ *
	Total	301,329.86	170,919.25	-44
Stream Shading	High	114,194.59	49,696.66	-57
	Moderate	8,447.24	9,014.61	106+ *
	Total	122,641.83	77,277.61	-37

* Increases in the moderate category in the functions above can be attributed to the mapping differences in the two wetland layers and may not represent the current conditions on the ground.

DETAILED FUNCTIONAL COMPARISONS CONT…

Table 3: Detailed Functional Comparisons

Function	Potential Significance	Pre-European Settlement Acreage	1978 Acreage	% Change in Acreage
Waterfowl/Waterbird Habitat	High	26,788.84	66,000.12	246+ *
	Moderate	114,944.83	75,717.80	-35
	Total	141,733.67	141,717.92	-1
Shorebird Habitat	High	<Null>	1,493.34	100+ *
	Moderate	235,294.79	193,943.44	-18
	Total	235,294.79	195,436.78	-17
Interior Forest Bird Habitat	High	46,243.32	44,883.05	-3
	Moderate	326,955.10	95,774.93	-70
	Total	373,198.42	140,657.98	-63
Amphibian Habitat	High	71,602.93	47,915.99	-33
	Moderate	29,007.97	34,430.20	118+ *
	Total	100,610.90	82,346.19	-19
Ground Water Influence	High	14,545.77	3,761.74	-75
	Moderate	189,442.23	125,016.92	-35
	Total	203,998.00	128,778.67	-37
Conservation of Rare and Imperiled Wetlands	High	<Null>	8,963.67	<Null>
	Moderate	<Null>	<Null>	<Null>
	Total	<Null>	8,963.67	<Null>

* Increases in the moderate & high category in the functions above can be attributed to the mapping differences in the two wetland layers and may not represent the current conditions on the ground.

FUNCTIONAL UNIT COMPARISON

Table 5: Functional Unit comparison

Function	Pre-European Settlement Functional Units	1978 Functional Units	Predicted % of Original Capacity Left	Predicted % Change in Functional Capacity
Flood Water Storage	427,523.96	214,316.88	50	-50
Streamflow Maintenance	536,163.57	278,729.47	49	-51
Nutrient Transformation	597,252.01	296,767.94	50	-50
Sediment and Other Particulate Retention	617,346.28	257,174.28	41	-59
Shoreline Stabilization	406,916.04	256,210.62	38	-62
Fish Habitat	582,417.44	321,440.65	55	-45
Stream Shading	236,836.42	108,407.93	45	-55
Waterfowl and Waterbird Habitat	168,522.51	207,718.04	100	+23 *
Shorebird Habitat	235,294.79	196,423.46	83	-17
Interior Forest Bird Habitat	419,441.74	185,541.03	44	-56
Amphibian Habitat	172,213.83	130,262.18	75	-25
Ground Water Influence	218,533.77	132,540.40	60	-40
Conservation of Rare Imperiled	<Null>	17,927.34	<Null>	<Null>

* Increases in the functional unit comparison above can be attributed to the mapping differences in the two wetland layers and may not represent the current conditions on the ground.

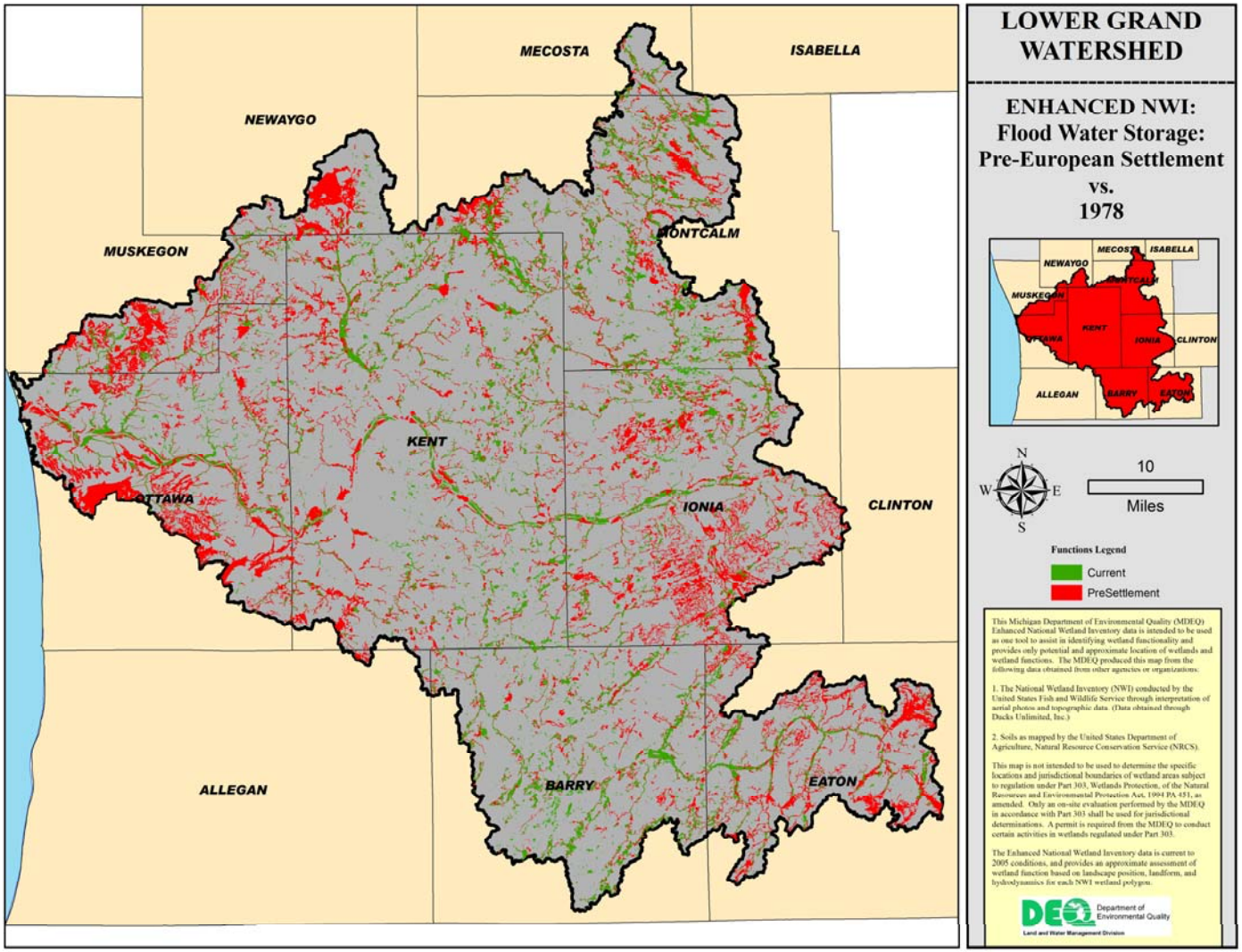
LIMITATIONS OF THE WETLAND FUNCTIONS FOR WATERSHED ASSESSMENT

- Source data are a primary limiting factor.
- Wetland mapping limitations due to scale, photo quality, and date and time of year of the photos.
- Difficulty of photo interpreting certain wetland types
  - Forested wetlands
  - Drier-end wetlands
- Functional assessment is a preliminary one based on:
  - Wetland Characteristics interpreted through remote sensing
  - Professional Judgment of various specialists to develop correlations between those wetlands and their functions.
- Watershed-based Preliminary Assessment of wetland functions:
  - Applies general knowledge about wetlands and their functions
  - Develops a watershed overview that highlights possible wetlands of significance
  - Does not consider the condition of the adjacent upland
  - Does not obviate the need for more detailed assessment of various functions
- This analysis is a “Landscape Level” assessment and used to identify wetlands that are likely to perform a given function at a level above that of other wetlands not designated.

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 1978 (green).

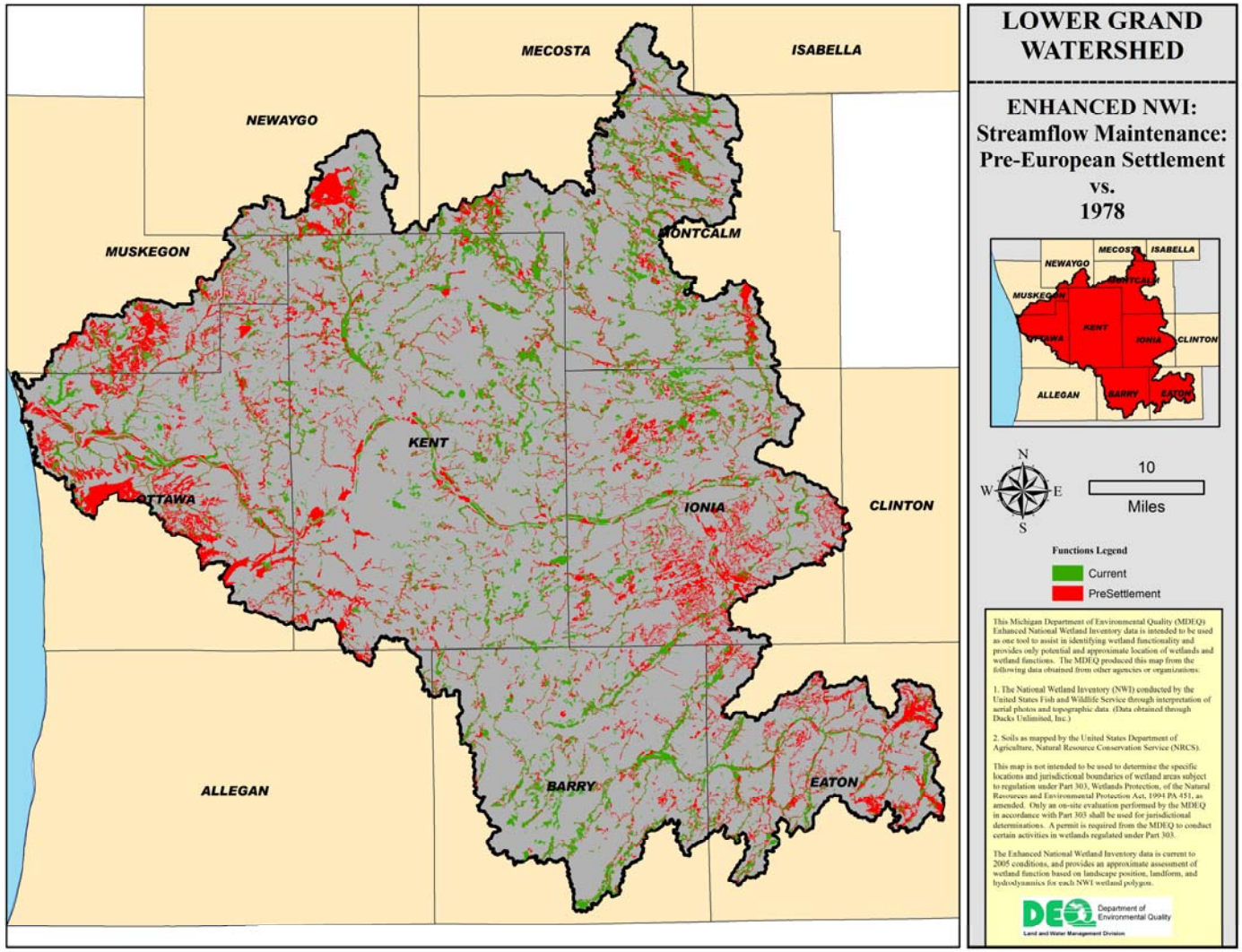
FLOOD WATER STORAGE



STREAMFLOW MAINTENANCE

- Wetlands that are sources of groundwater discharge that sustain streamflow in the watershed. Such wetlands are critically important for supporting aquatic life in streams. All wetlands classified as headwater wetlands are important for streamflow.
- 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 1978 (green).

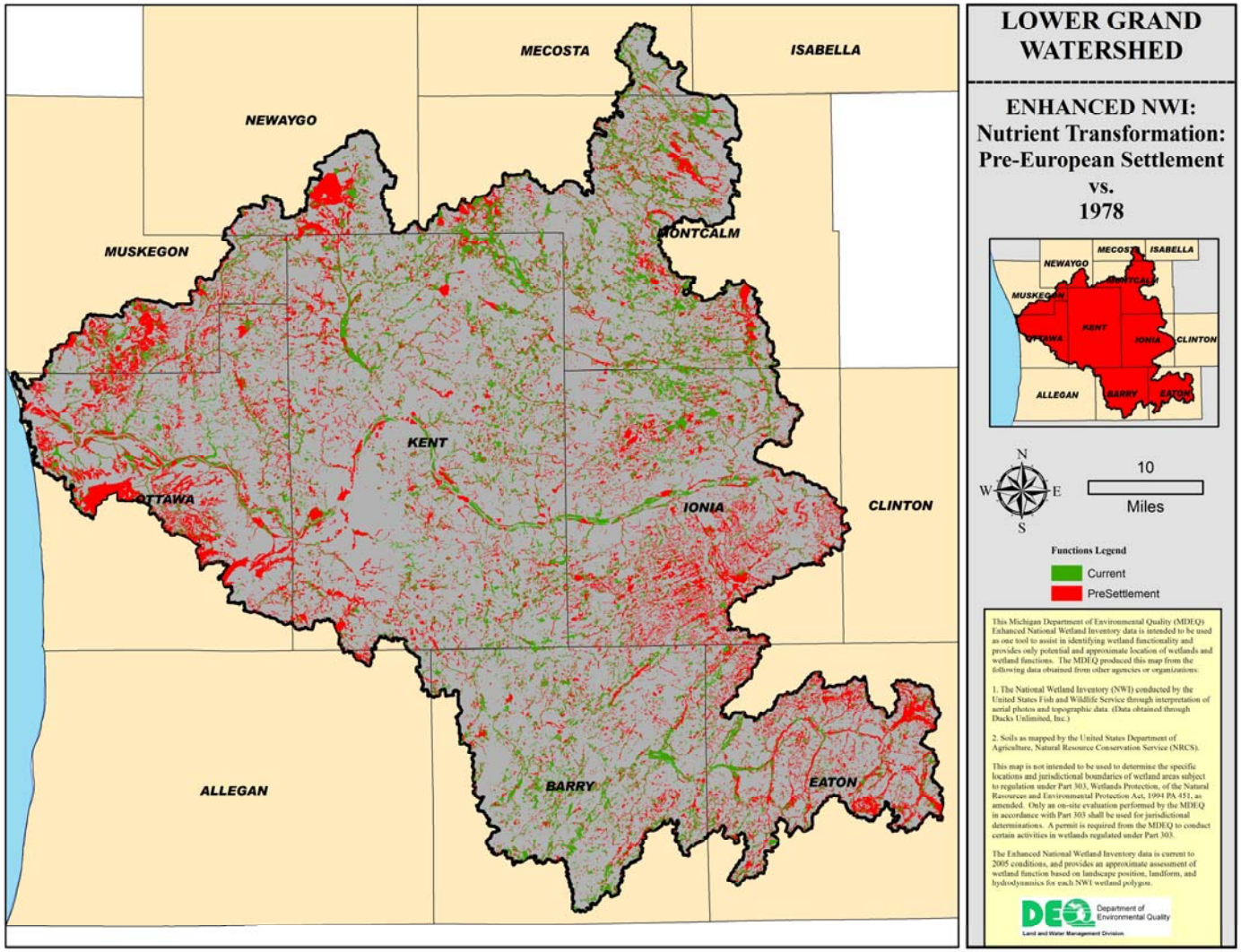
STREAMFLOW MAINTENANCE



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 1978 (green).

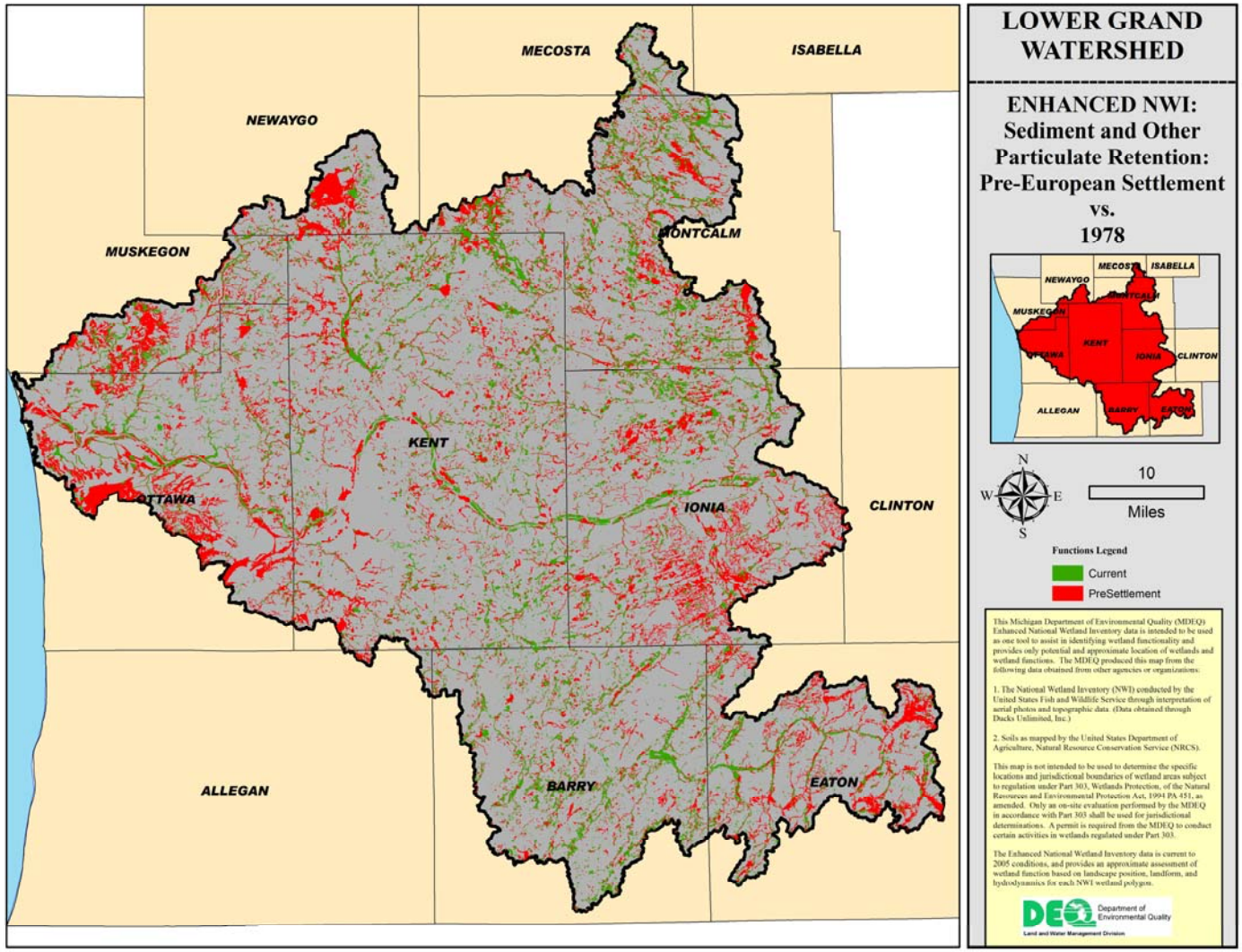
NUTRIENT TRANSFORMATION



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 1978 (green).

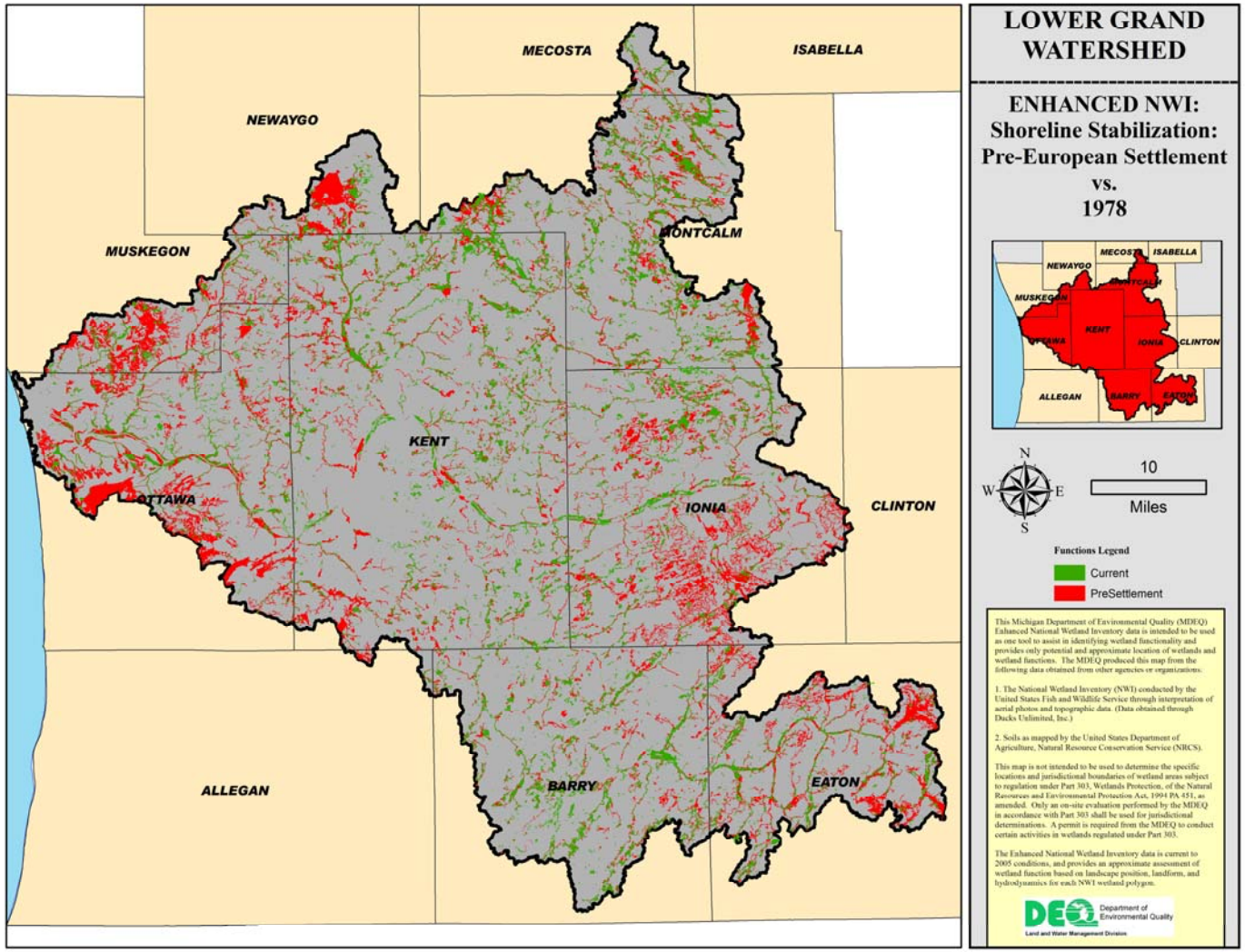
SEDIMENT AND OTHER PARTICULATE RETENTION



SHORELINE STABILIZATION

- Vegetated wetland along all waterbodies (e.g. estuaries, lakes, rivers, and streams) provide this function. Vegetation stabilizes the soil or substrate and diminished wave action, thereby reducing shoreline erosion potential.
- 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 1978 (green).

SHORELINE STABILIZATION



FISH HABITAT

- Wetlands that are considered essential to one or more parts of fish life cycles. Wetlands designated as important for fish are generally those used for reproduction, or feeding.
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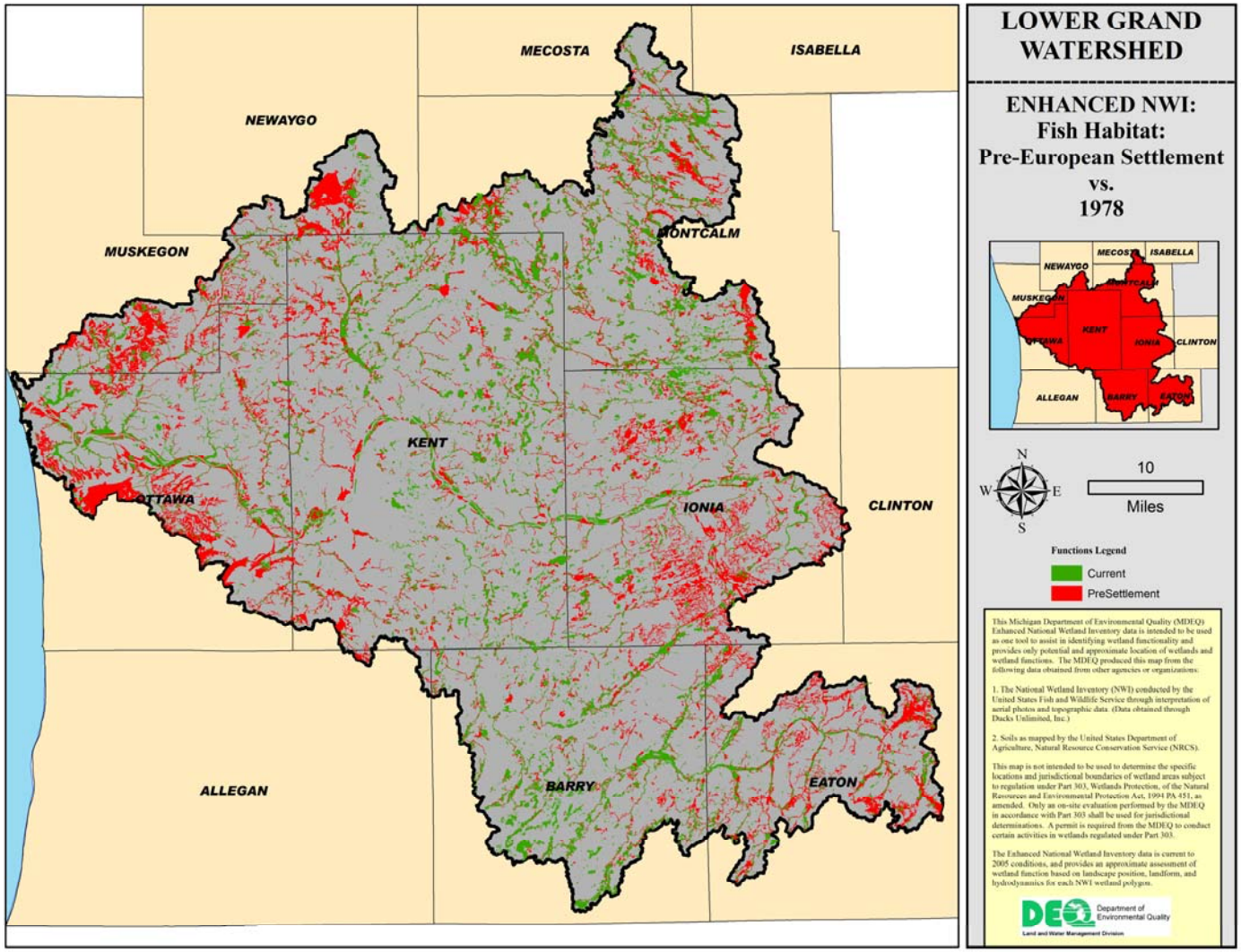

STREAM SHADING

- Wetlands that perform water temperature control due to the proximity to streams and waterways. These wetlands generally are Palustrine Forested or Scrub-Shrub.
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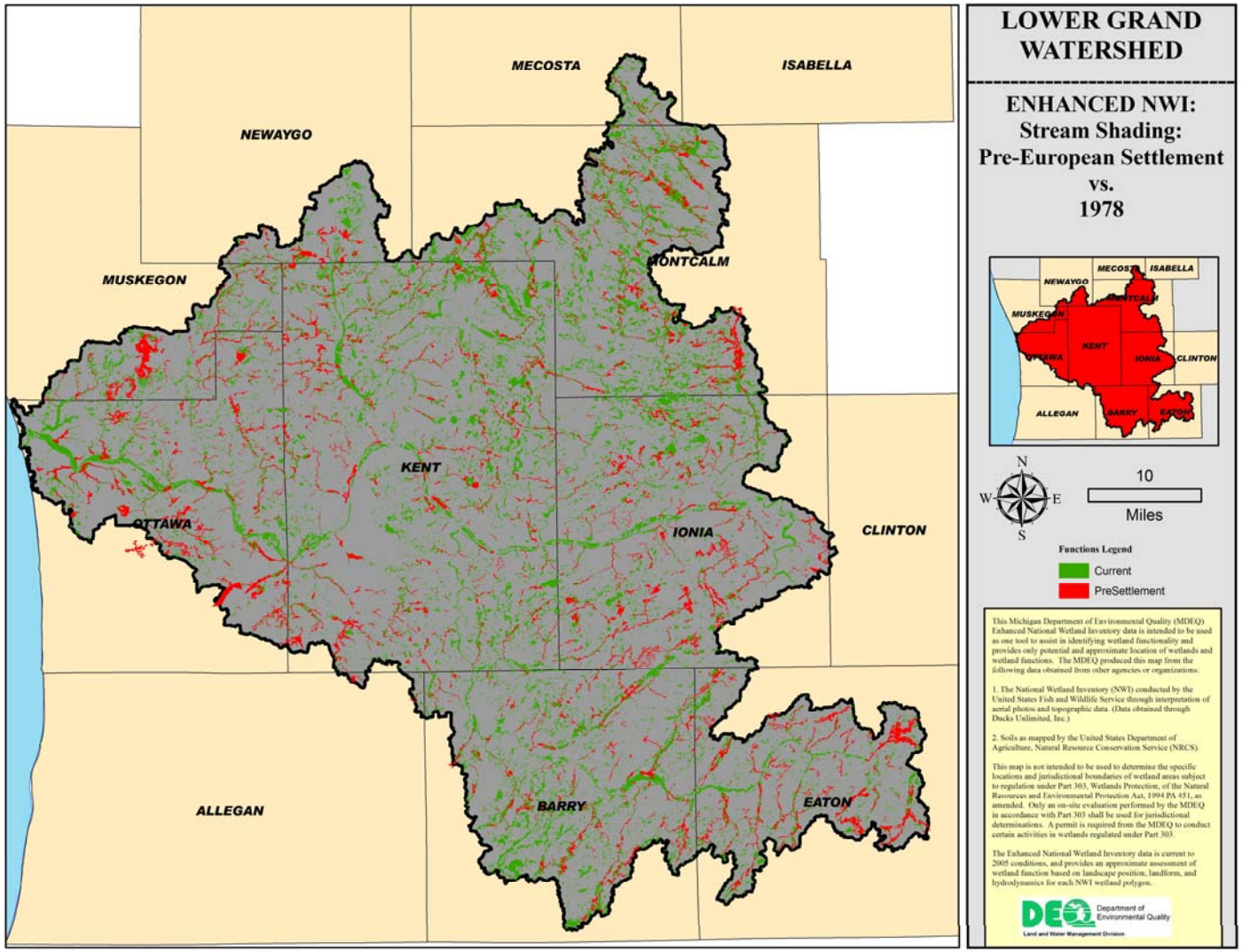
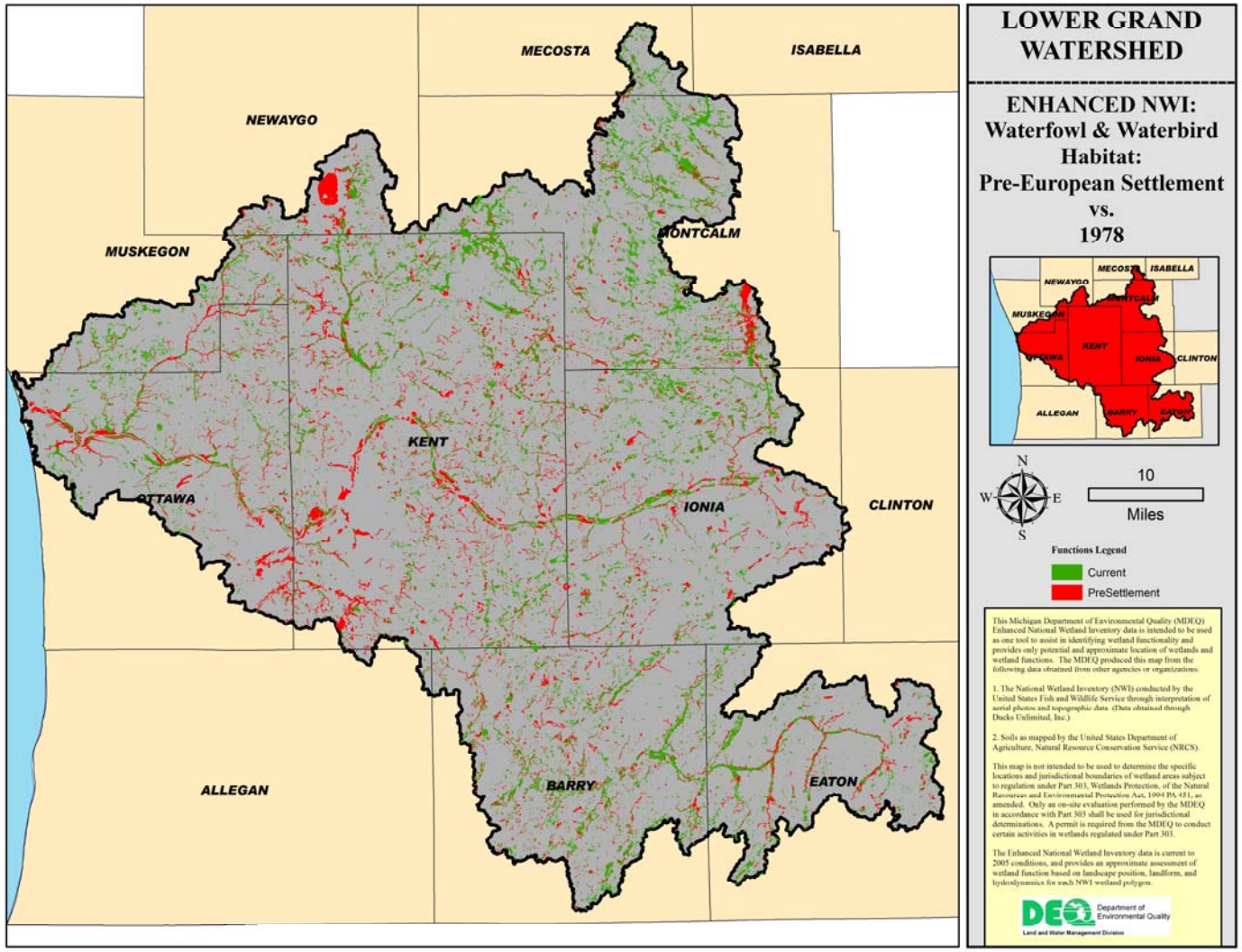


WATERFOWL AND WATERBIRD HABITAT

- Wetlands designated as important for waterfowl and waterbirds are generally those used for nesting, reproduction, or feeding. The emphasis is on the wetter wetlands and ones that are frequently flooded for long periods.
- 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 1978 (green).

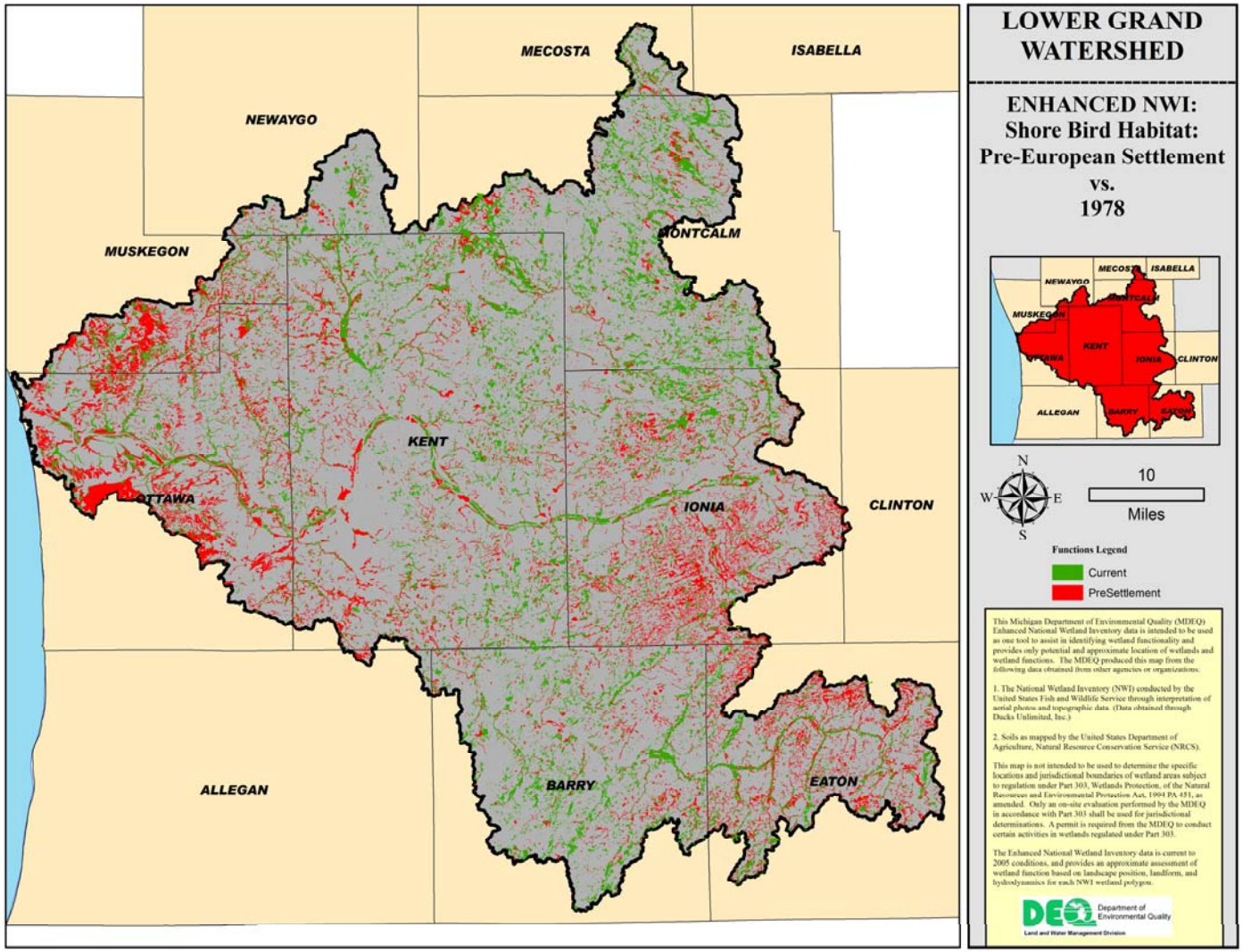
WATERFOWL & WATERBIRD HABITAT



SHOREBIRD HABITAT

- Shorebirds generally inhabit open areas of beaches, grasslands, wetlands, and tundra and undertake some of the longest migrations known. Along their migration pathway, many shorebirds feed in coastal and inland wetlands where they accumulate fat reserves needed to continue their flight. Common species include; plovers, oystercatchers, avocets, stilts, and sandpipers. This function attempts to capture wetland types most likely to provide habitat for these species.
- 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 1978 (green).

SHORE BIRD HABAITAT



INTERIOR FOREST BIRDS

- Interior Forest Birds require large forested areas to breed successfully and maintain viable populations. This diverse group includes colorful songbirds such as; tanagers, warblers, vireos that breed in North America and winter in the Caribbean, Central and South America, as well as residents and short-distance migrants such as; woodpeckers, hawks, and owls. They depend on large forested tracts, including streamside and floodplain forests. It is important to note that adjacent upland forest to these riparian areas are critical habitat for these species as well. This function attempts to capture wetland types most likely to provide habitat for these species.
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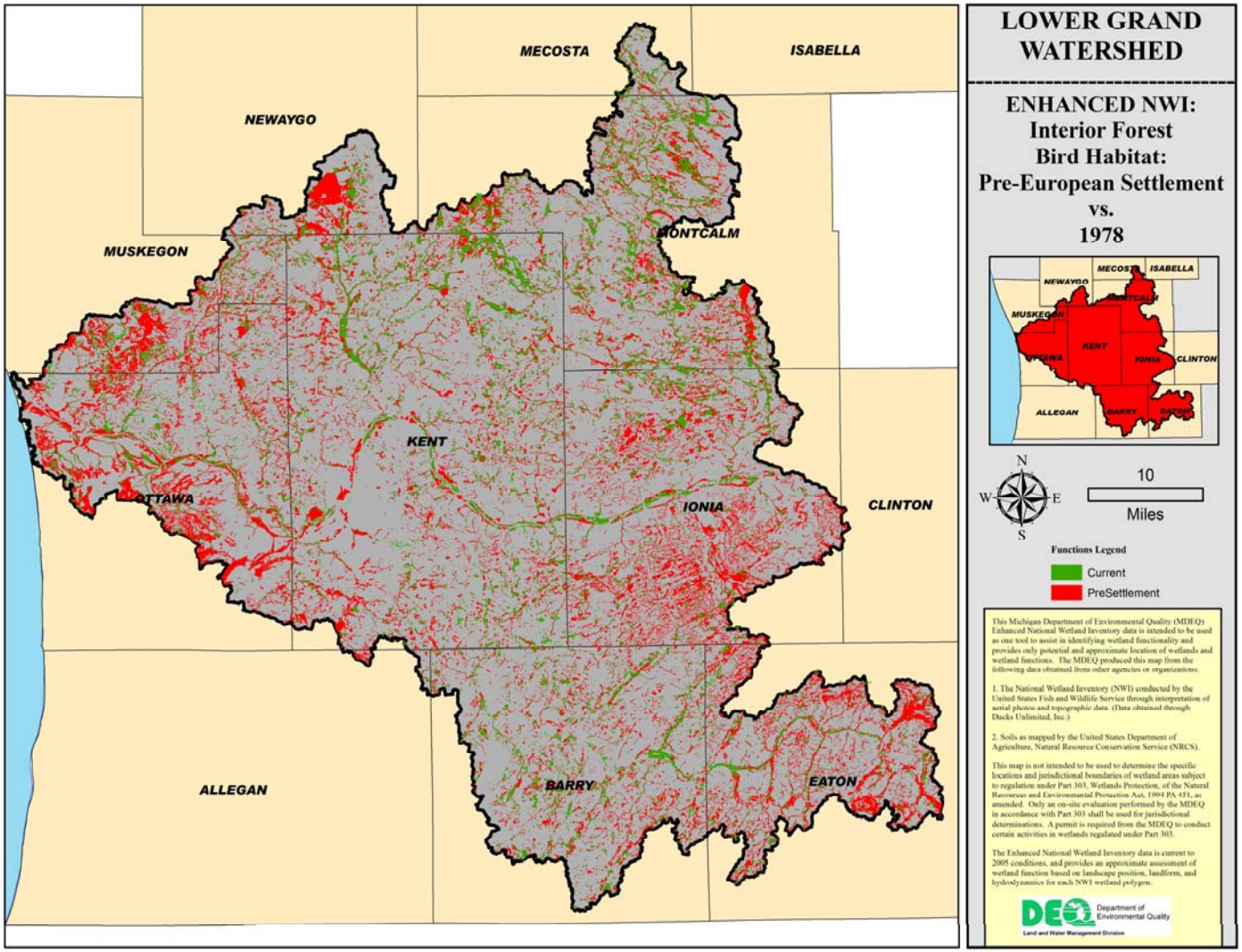

AMPHIBIAN HABITAT

- Amphibians share several characteristics in common including wet skin that functions in respiration and gelatinous eggs that require water or moist soil for development. Most amphibians have an aquatic stage and a terrestrial stage and thus live in both aquatic and terrestrial habitats. Aquatic stages of these organisms are often eaten by fish and so for certain species, successful reproduction may occur only in fish-free ponds. Common sub-groups of amphibians are salamanders, frogs, and toads. This function attempts to capture wetland types most likely to provide habitat for these species.
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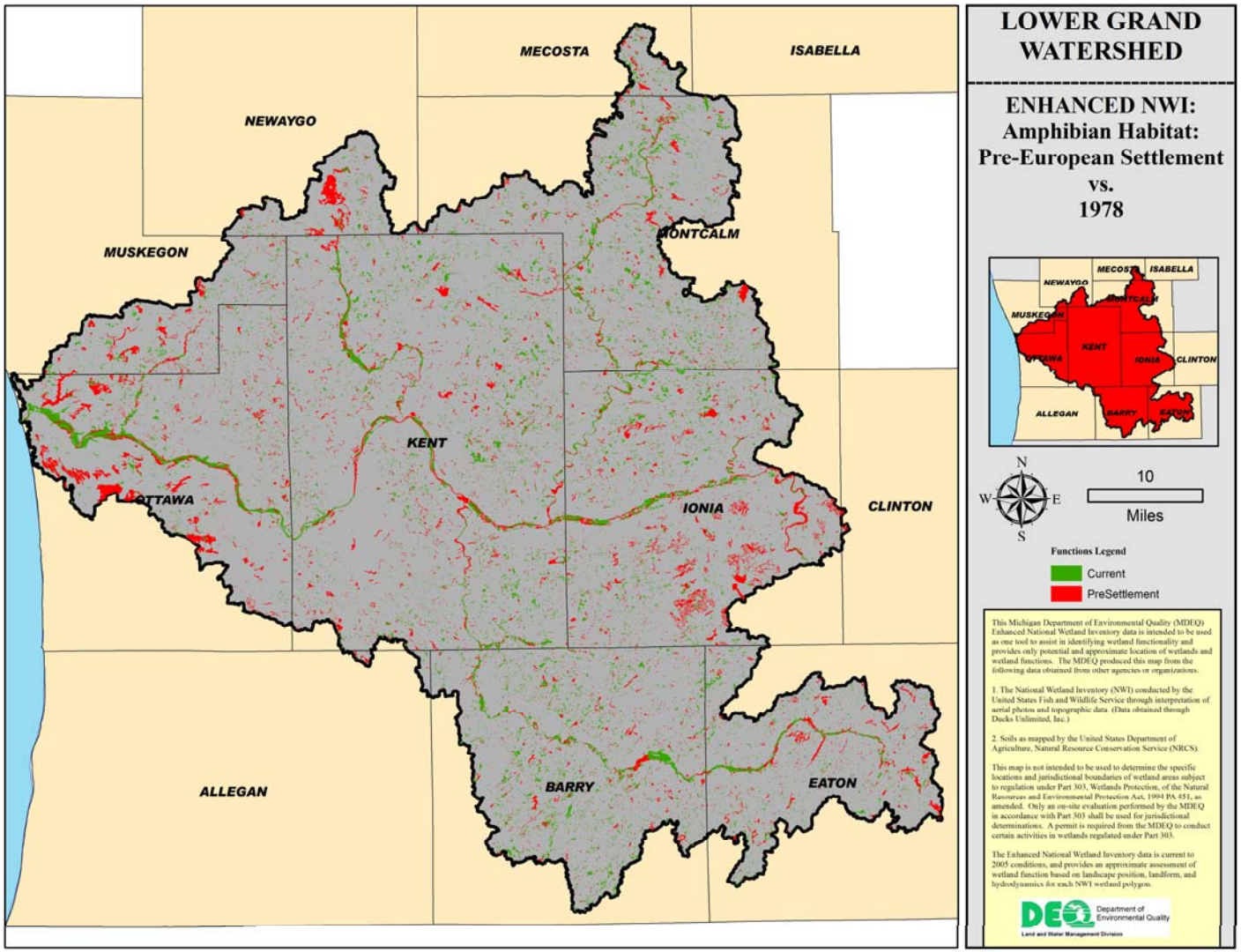
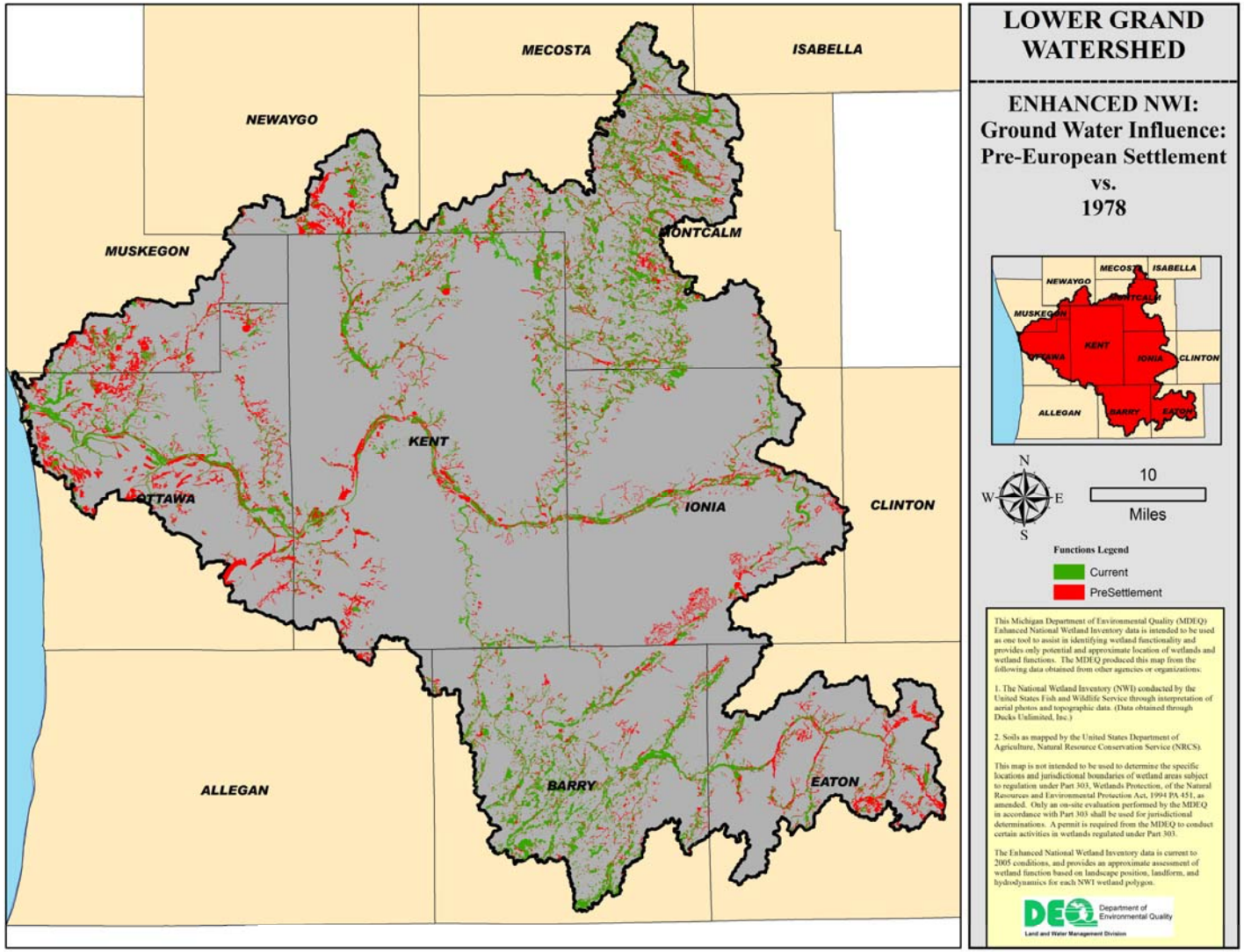


GROUND WATER INFLUENCE

- Wetlands categorized as High or Moderate for Groundwater Influence are areas that receive some or all of their hydrologic input from groundwater reflected at the surface. The DARCY (definition of acronym) model was the data source utilized to determine this wetland/groundwater connection, which is based upon soil transmissivity and topography. Wetlands rated for this function are important for maintaining streamflows and temperature control in waterbodies.
- 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).

GROUND WATER INFLUENCE



CONSERVATION OF RARE AND IMPERILED WETLANDS

- Wetlands that are considered rare either globally or at the state level. They are likely to contain a wide variety of flora and fauna, or contain threatened or endangered species.
- This function is derived from the Michigan Natural Features Dataset (MNFI) that only serves to inventory sites where staff biologists have performed surveys. Do to this the dataset should not be used as a comprehensive inventory of Rare and Imperiled wetlands.
- The following map illustrates wetlands that perform the above ecological service at a high level of significance. Wetlands deemed to be performing this function are mapped in (green).

CONSERVATION OF RARE AND IMPERILED WETLANDS