Upper Maple River
Watershed Management Plan

June 2010
MDNRE Tracking Code #2007-0118

Appendix 1

List of Committees

APPENDIX 1 – PROCESS OF COMMITTEE FORMATION

Establishment of Steering Committee and Subcommittees

The formation of the Upper Maple River Watershed Project Steering Committee was an integral part of initiating the project. The members have been actively and effectively involved in the planning process of the watershed project. Through their various areas of expertise, the members have discussed and evaluated problems and remedies of the Watershed to assure that the implementation of the Best Management Practices fit the objectives of the project.

Steering Committee Members

The Upper Maple River Watershed Project Steering Committee is dedicated to assisting the Upper Maple River Watershed Project in its efforts to provide encouragement, incentive, assistance, and education to the community in order to protect and improve water quality, and therefore the quality of life, in the Upper Maple River Watershed. The following is a list of the organizations represented in the Upper Maple River Watershed Project Steering Committee members:

Representing
State and Federal Agencies
Michigan Department of Natural Resources (MDNRE)
Michigan Department of Agriculture
Natural Resources Conservation Service
Conservation Districts
Clinton Conservation District (CCD)
Gratiot Conservation District (GCD)
Shiawassee Conservation District (SCD)
County Agencies
Clinton County Drain Commissioner (CCDC)
Clinton County Green Space
Gratiot County Drain Commissioner (GCDC)
Shiawassee County Drain Commissioner (SCDC)
Universities
Michigan State University Extension (MSUE)
Local Organizations
Friends of the Maple River (FOMR)
Consultants
Fishbeck, Thompson, Carr & Huber, Inc. (FTC&H)

Subcommittee Members

I&E Subcommittee - An I&E Subcommittee was formed to allow additional participation in completing the details of the projects and specific tasks of the work plan. The goal of the I&E Subcommittee was to involve interested persons in the Watershed to assist in the creation of a successful and innovative I&E strategy. The I&E Subcommittee focused on the development of I&E tools and their dissemination throughout the Watershed. The following is a list of the organizations represented in the I&E Subcommittee:

- Clinton Conservation District
- Clinton County Regional Educational Service Agency (CCRESA)
- Fishbeck, Thompson, Carr & Huber, Inc.
- Friends of the Maple River
- Greenstone, Chamber of Commerce
- Michigan Department of Natural Resources and Environment
- Michigan State University Extension
- Shiawassee Conservation District

Monitoring Subcommittee - The goal of the Monitoring Subcommittee is to work on the monitoring portion of the WMP to assess what work has been done on the project and what work still needs to be completed. The monitoring committee will also be involved in guiding the biological and erosion field inventories. The following is a list of the organizations represented in the Monitoring Subcommittee:

- Clinton Conservation District
- Clinton County Drain Commissioner
- Fishbeck, Thompson, Carr & Huber, Inc.
- Friends of the Maple River
- Michigan Department of Natural Resources and Environment

Policy Subcommittee - The goal of the Policy Subcommittee is to review community ordinances, policies and regulations to identify policies and regulations needed to enhance Watershed protection and improve water quality. The following is a list of the organizations represented in the Policy Subcommittee:

- Clinton Conservation District
- Clinton County Community Development
- Clinton County Road Commission
- Fishbeck, Thompson, Carr & Huber, Inc.
- Mid-Michigan Health Department
- Shiawassee County Health Department

Watershed Management Plan (WMP) Review Subcommittee - The goal of the WMP Review Subcommittee is to review the WMP draft sections. The following is a list of the organizations represented in the WMP Review Subcommittee representatives include:

- Clinton Conservation District
- Clinton County Drain Commissioner
- Clinton County Regional Educational Service Agency
- Fishbeck, Thompson, Carr & Huber, Inc.
- Friends of the Maple River
- Gratiot Conservation District
- Michigan Department of Natural Resources and Environment

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Appendix 2

Soils

APPENDIX 2 – GENERAL SOILS INFORMATION

According to the United States Department of Agriculture Natural Resources Conservation Service, the soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A: Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B: Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C: Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D: Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

KEY TO FIGURE 4: GENERAL SOILS OF THE UPPER MAPLE RIVER WATERSHED

Soils Series	**Hydrologic Code**	**Hydric Area**	**Slope Range (Percent)**	**Description**
Adrian	A/D	Yes	0-2%	Nearly level, slightly depressional, muck, very poorly drained
Arkona	B	No	0-2%	Nearly level, loamy sand, somewhat poorly drained
Arkport	B	No	1-12%	Sloping, loamy fine sand, well drained
Barry	B/D	Yes	0-2%	Nearly level, loamy, poorly drained
Belding	B	No	0-2%	Nearly level, sandy loam, somewhat poorly drained
Belleville	B/D	Yes	0-1%	Nearly level, loamy sand, poorly drained
Berville	B/D	Yes	0-2%	Nearly level, loamy, very poorly drained
Blount	C	No	0-6%	Gently sloping, loamy, somewhat poorly drained
Boyer	B	No	0-25%	Level to steep, sandy loam, well drained
Breckenridge	B/D	Yes	0-2%	Nearly level, sandy loam, poorly drained
Brevort	B/D	Yes	0-2%	Nearly level, loamy sand, poorly drained
Brookston	B/D	Yes	0-2%	Nearly level, loamy, very poorly drained

Soils Series	Hydrologic Code	Hydric Area	Slope Range (Percent)	Description
Capac	C	No	0-6%	Gently sloping, loamy, somewhat poorly drained
Carlisle	A/D	Yes	0-2%	Nearly level, muck, very poorly drained
Celina	B	No	2-6%	Gently sloping, loamy, well drained
Ceresco	B	Yes	0-2%	Nearly level, fine sandy loam, somewhat poorly drained
Cohoctah	B/D	Yes	0-2%	Nearly level, loamy, very poorly drained
Colwood	B/D	Yes	0-2%	Nearly level, loamy, very poorly drained
Conover	C	No	0-6%	Gently sloping, loamy, somewhat poorly drained
Corunna	B/D	Yes	0-2%	Nearly level, sandy loam, poorly drained
Dixboro	B	No	0-3%	Nearly level, fine sandy loam, somewhat poorly drained
Edwards	B/D	Yes	0-2%	Nearly level, slightly depressional, muck, very poorly drained
Fox	B	No	2-18%	Sloping, sandy loam, well drained
Gilford	B/D	Yes	0-2%	Nearly level, sandy loam, very poorly drained
Gladwin	B	No	0-2%	Nearly level, loamy sand, somewhat poorly drained
Glendora	A/D	Yes	0-2%	Nearly level, sandy loam, poorly drained
Granby	A/D	Yes	0-2%	Nearly level, loamy sand, very poorly drained
Houghton	A/D	Yes	0-2%	Nearly level, slightly depressional, muck, very poorly drained
Huntington	B	No	1-5%	Gently sloping, silty loam, well drained
Iosco	B	No	0-2%	Nearly level, loamy sand, somewhat poorly drained
Kendallville	B	No	2-12%	Sloping, sandy loam, well drained
Kibbie	B	No	0-6%	Gently sloping, loamy, somewhat poorly drained
Kingsville	A/D	Yes	0-1%	Nearly level, loamy sand, poorly drained
Lamson	B/D	Yes	0-1%	Nearly level, loamy very fine sand, poorly drained
Lapeer	B	No	2-12%	Gently sloping, sandy loam, well drained
Lenawee	B/D	Yes	0-2%	Nearly level, clay loam, poorly drained
Linwood	A/D	Yes	0-2%	Nearly level, muck, very poorly drained

Soils Series	Hydrologic Code	Hydric Area	Slope Range (Percent)	Description
Locke	B	No	0-6%	Gently sloping, sandy loam, somewhat poorly drained
Macomb	B	No	0-6%	Gently sloping, loamy, somewhat poorly drained
Mancelona	B	No	0-6%	Gently sloping, loamy sand, well drained
Marlette	B	No	2-25%	Gently sloping to steep, loamy, well drained
Matherton	B	No	0-6%	Gently sloping, loamy, somewhat poorly drained
Menominee	C	No	2-12%	Sloping, loamy sand, well drained
Metamora	B	No	0-6%	Gently sloping, sandy loam, somewhat poorly drained
Metea	B	No	0-6%	Gently sloping, loamy sand, well drained
Miami	B	No	2-25%	Sloping to steep, loamy, well drained
Newaygo	B	No	2-6%	Gently sloping, sandy loam, well drained
Oakville	A	No	0-6%	Gently sloping, fine sand, well drained
Oshtemo	B	No	2-6%	Gently sloping, sandy loam, well drained
Ottokee	A	No	0-2%	Nearly level, loamy sand, moderately well drained
Owosso	B	No	0-18%	Nearly level to sloping, sandy loam, well drained
Palms	A/D	Yes	0-2%	Nearly level, muck, very poorly drained
Parkhill	B/D	Yes	0-2%	Nearly level, loamy, very poorly drained
Perrinton	C	No	2-12%	Sloping, loamy, well drained
Pert	D	Yes	0-2%	Nearly level, clay loam, somewhat poorly drained
Pipestone	B	No	0-2%	Nearly level, loamy sand, somewhat poorly drained
Plainfield	A	No	0-18	Nearly level to sloping, loamy sand, excessively drained
Riverdale	A	No	0-2%	Nearly level, loamy sand, somewhat poorly drained
Saranac	C/D	Yes	0-1%	Nearly level, silty clay loam, poorly drained
Sebewa	B/D	Yes	0-2%	Nearly level, loamy, very poorly drained
Selfridge	B	No	0-4%	Gently sloping, loamy sand, somewhat poorly drained
Shoals	C	Yes	0-2%	Nearly level, loamy, somewhat poorly drained
Sickles	B/D	Yes	0-1%	Nearly level, loamy sand, poorly drained
Sims	D	Yes	0-2%	Nearly level, silty clay loam, very poorly drained

Soils Series	Hydrologic Code	Hydric Area	Slope Range (Percent)	Description
Sisson	B	No	2-6%	Gently sloping, fine sandy loam, well drained
Sloan	B/D	Yes	0-2%	Nearly level, loam, very poorly drained
Spinks	A	No	0-18%	Sloping, loamy sand, well drained
Tawas	A/D	Yes	0-2%	Nearly level, muck, very poorly drained
Tedrow	B	No	0-2%	Nearly level, loamy sand, somewhat poorly drained
Thetford	A	No	0-3%	Nearly level, loamy sand, somewhat poorly drained
Thomas	B/D	Yes	0-1%	Nearly level, muck, very poorly drained
Tobico	A/D	Yes	0-1%	Nearly level, muck, poorly drained
Toledo	D	Yes	0-1%	Nearly level, clay loam, very poorly drained
Tuscola	B	No	2-6%	Gently sloping, loamy, moderately well drained
Vestaburg	A/D	Yes	0-1%	Nearly level, loamy sand, poorly drained
Wallkill	C/D	Yes	0-2%	Nearly level, loamy, very poorly drained
Wasepi	B	No	0-6%	Gently sloping, sandy loam, somewhat poorly drained
Washtenaw	C/D	Yes	0-2%	Nearly level, loamy, very poorly drained
Wauseon	B/D	Yes	0-1%	Nearly level, sandy loam, very poorly drained

Source: Soil Survey of Clinton County 1973, Shiawassee County, 1974, Gratiot County 1979

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Appendix 3

MDEQ - Status & Trends Report

Upper Maple River Watershed

Status and Trends
Pre-settlement
to
2005

Department of Environmental Quality
Land and Water Management Division
September 2009

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 Comission (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.

Upper Maple River Wetland Resources Status and Trends

PRESETTLEMENT WETLAND CONDITION

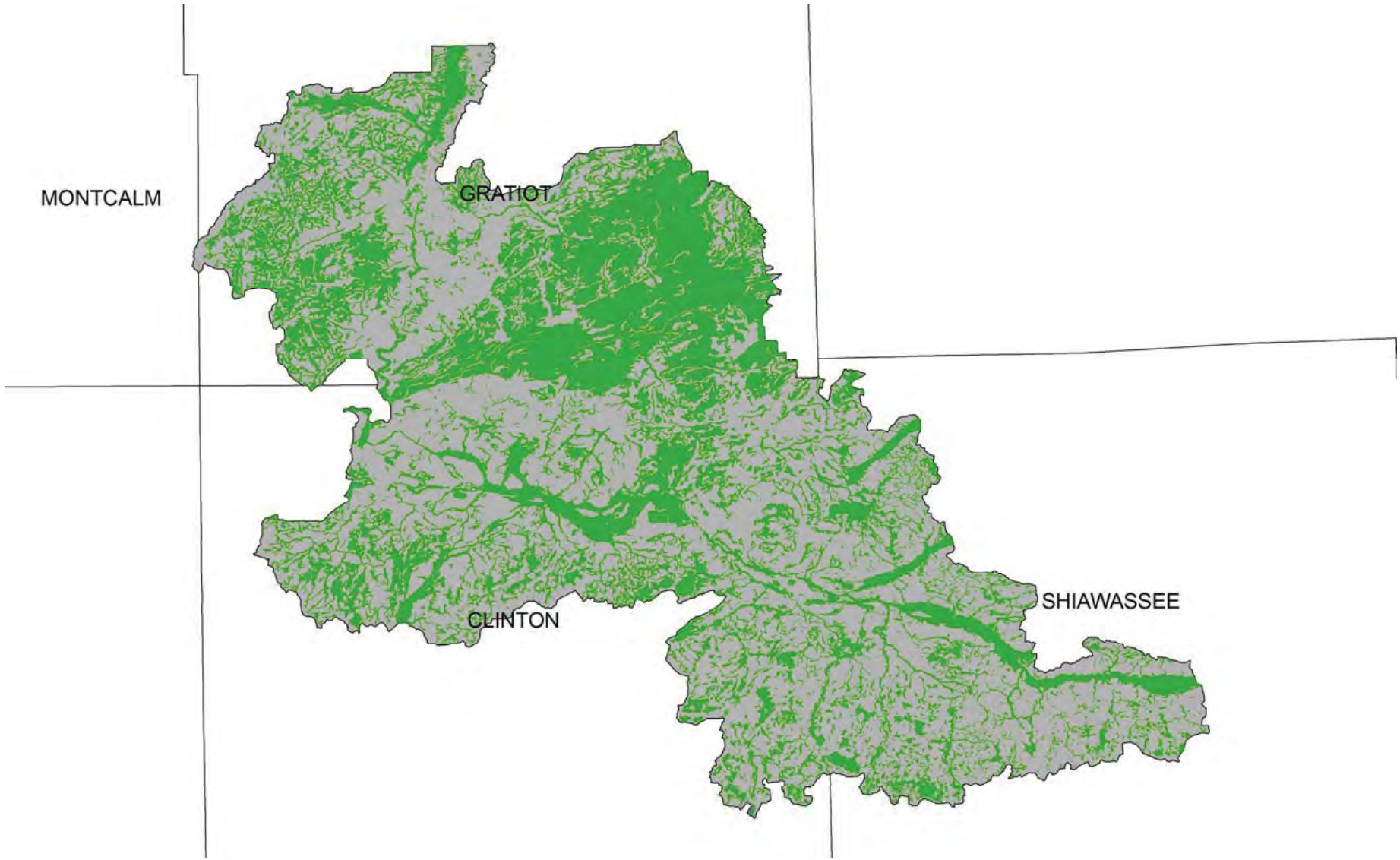
- 129,979 Acres of Wetlands
- 2,878 Polygons
- Average Size – 45 Acres

2005 WETLAND CONDITION

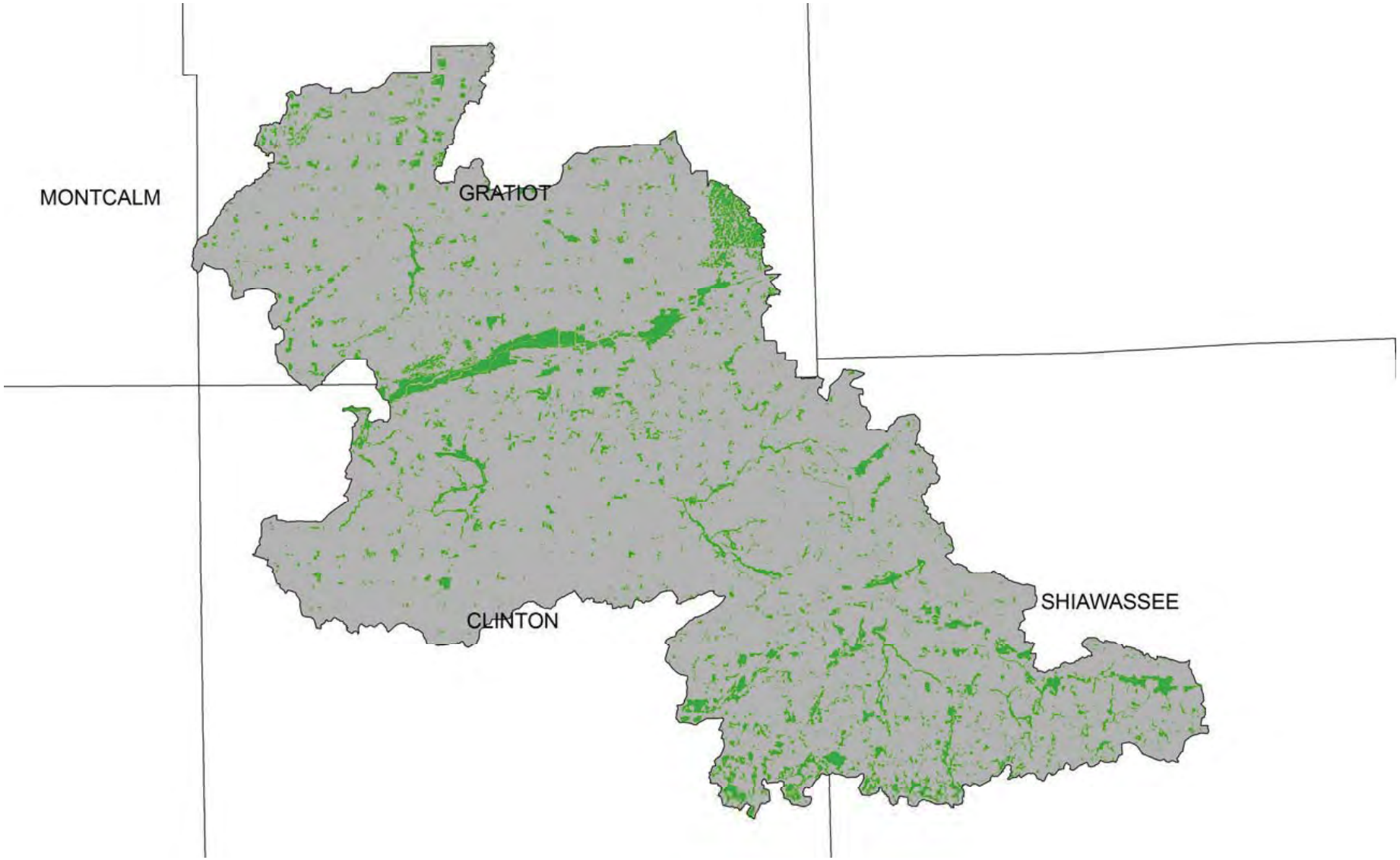
- 27,284 Acres of Wetlands
- 5,048 Polygons
- Average Size – 5.4 Acres

21 % OF ORIGINAL WETLAND ACREAGE REMAINS
79 % LOSS OF TOTAL WETLAND RESOURCE

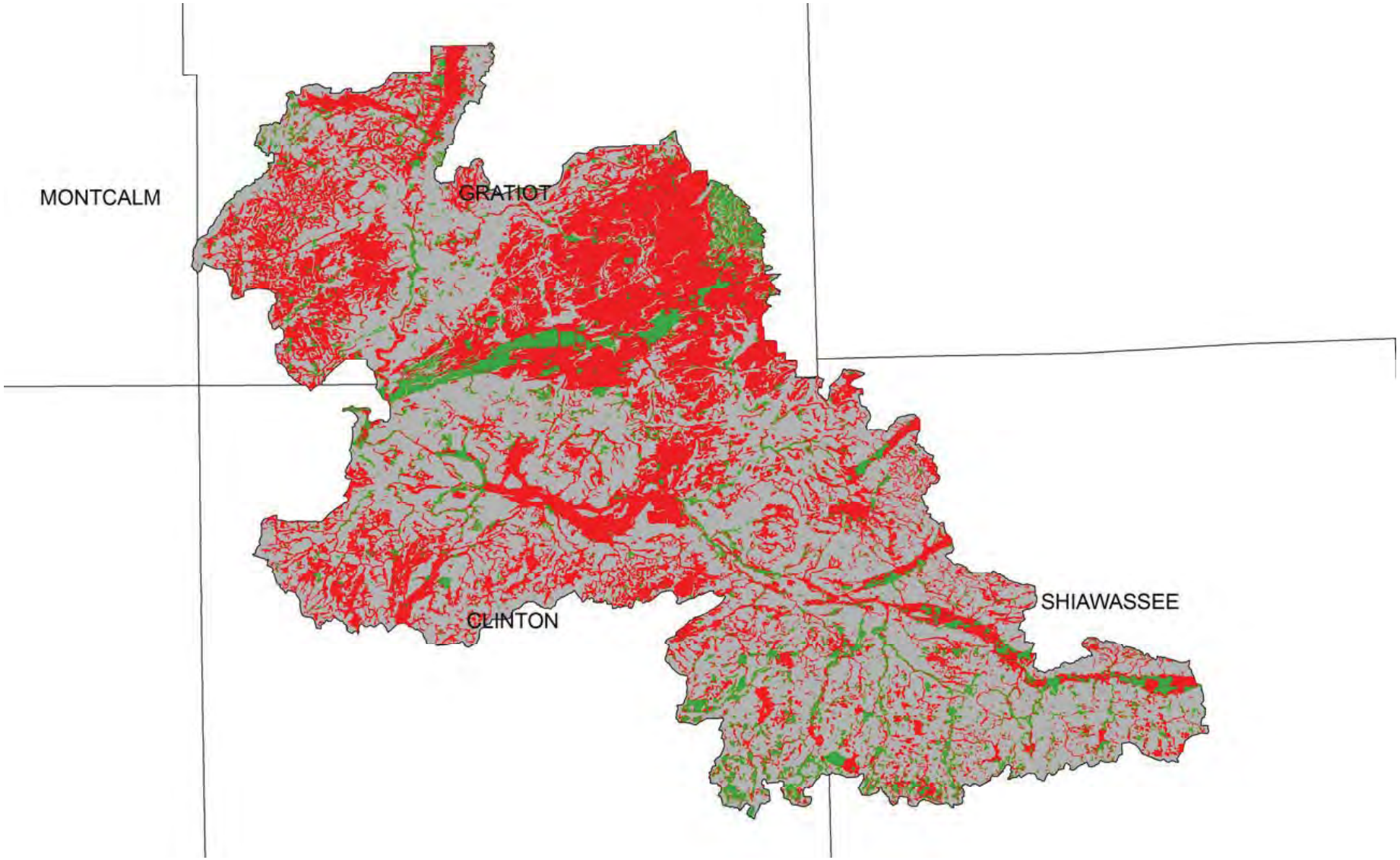
UPPER MAPLE RIVER: PRE-SETTLEMENT WETLANDS



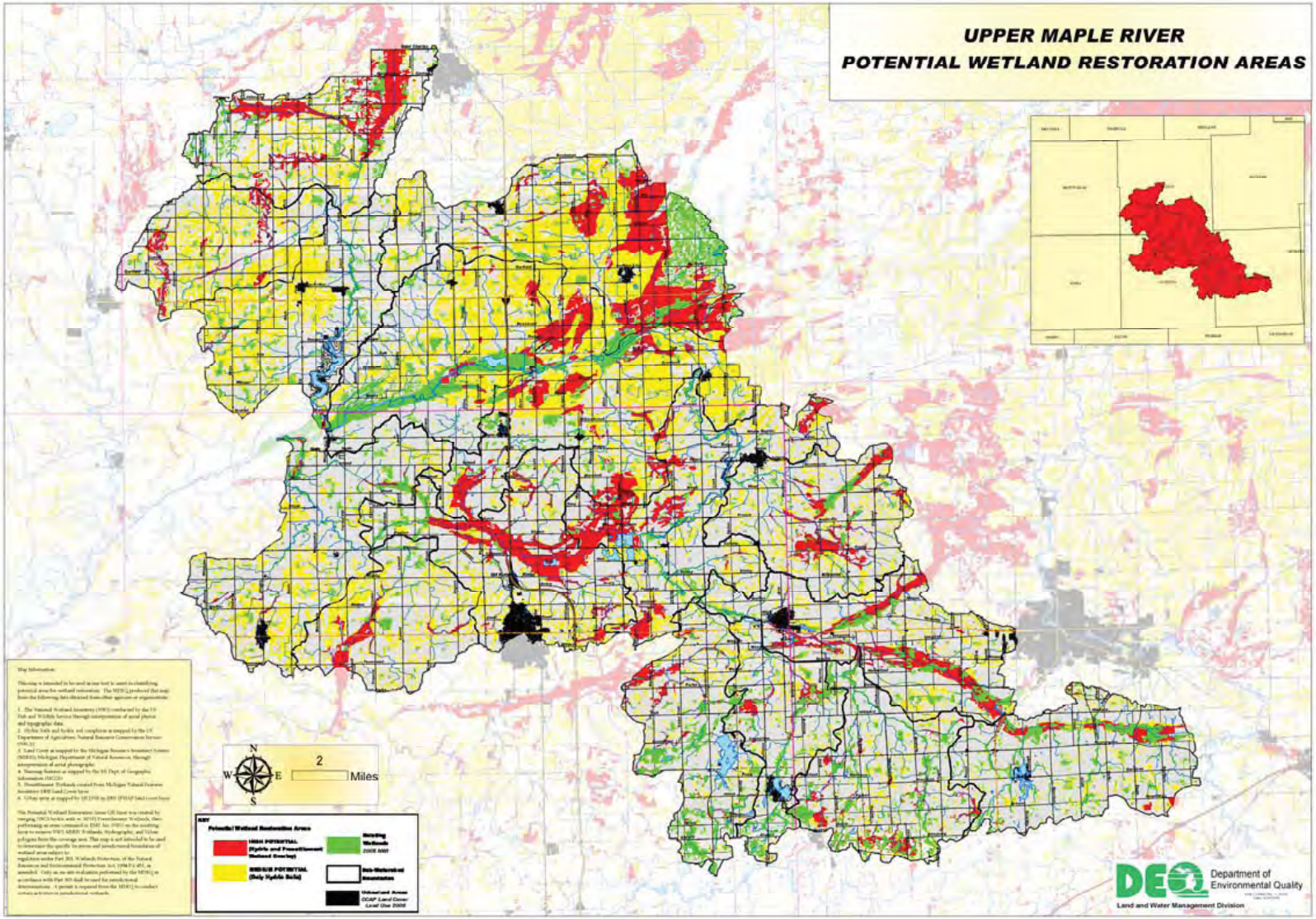
UPPER MAPLE RIVER: 2005 NWI WETLANDS



UPPER MAPLE RIVER: APPROXIMATE AREAS OF WETLANDS LOSS



Upper Maple River Watershed



River Styx-Pine Creek Resources Status and Trends

PRESETTLEMENT WETLAND CONDITION

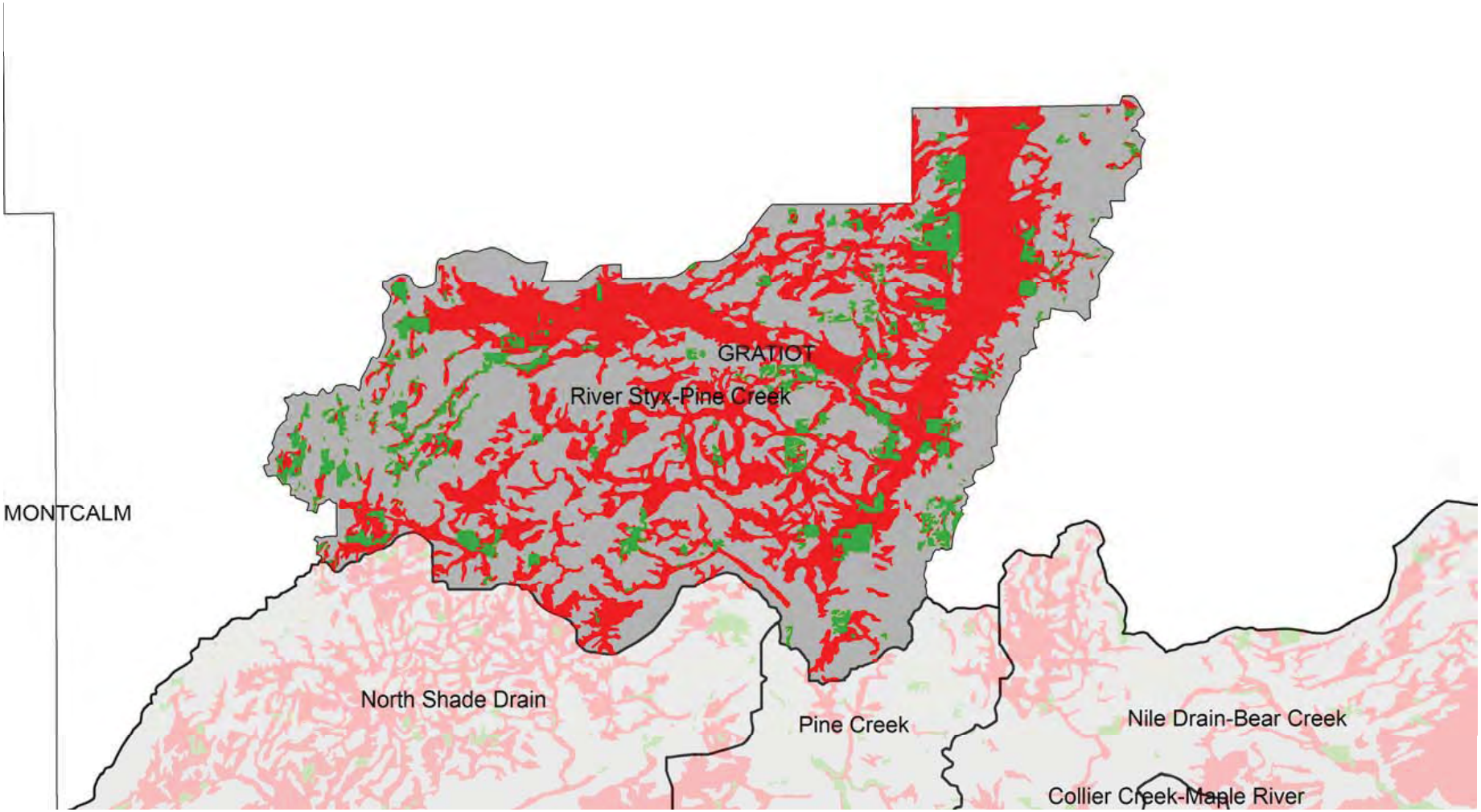
- 7,769 total acres of wetland
- 164 Polygons
- Average Size – 47 Acres

2005 WETLAND CONDITION

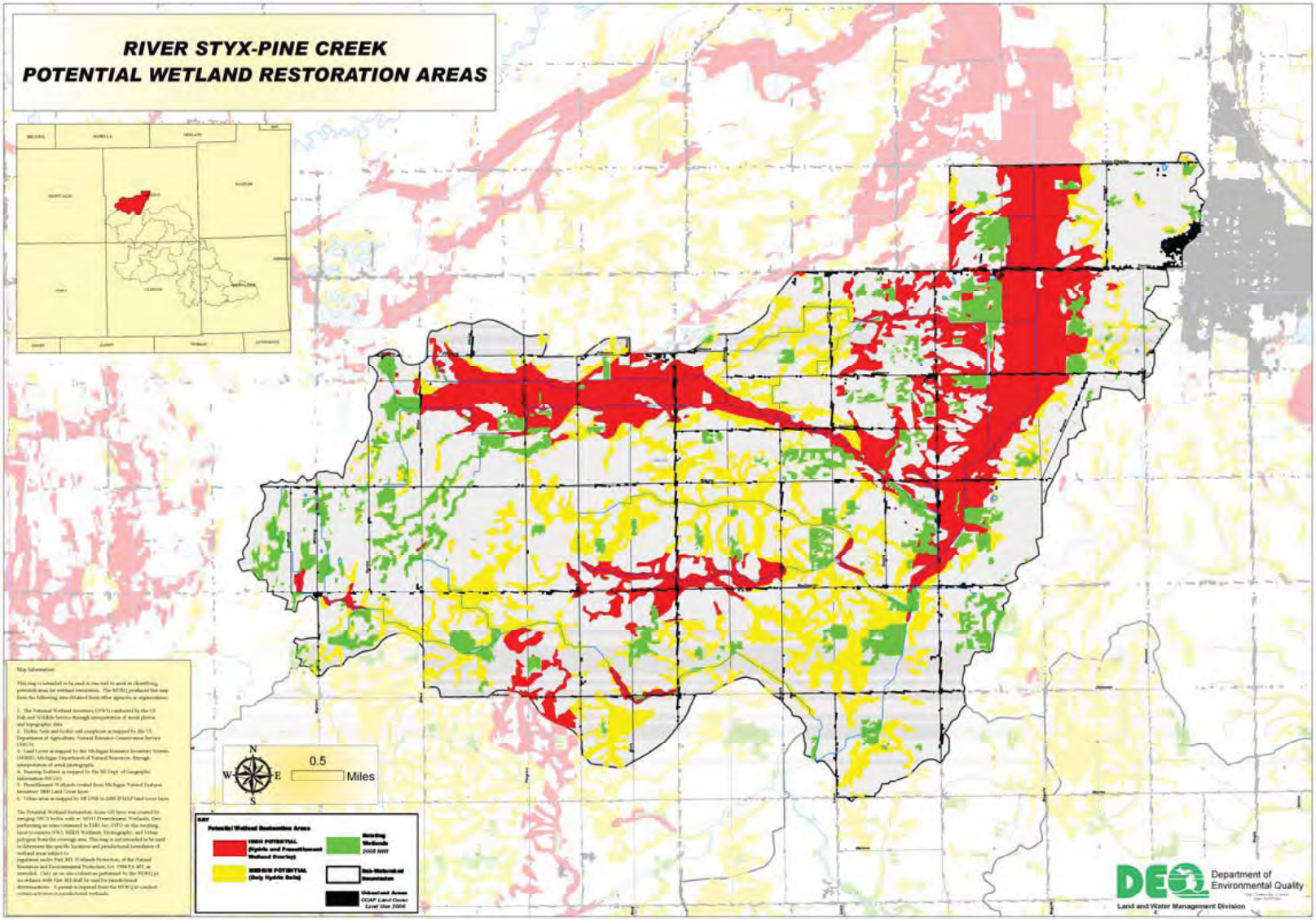
- 1,476 total acres of wetland
- 320 Polygons
- Average Size – 4.6 Acres

18 % OF ORIGINAL WETLAND ACREAGE REMAINS
82 % LOSS OF TOTAL WETLAND RESOURCE

RIVER STYX-PINE CREEK: APPROXIMATE AREAS OF WETLANDS LOSS



RIVER STYX-PINE CREEK SUB-WATERSHED



North Shade Drain Resources Status and Trends

PRESETTLEMENT WETLAND CONDITION

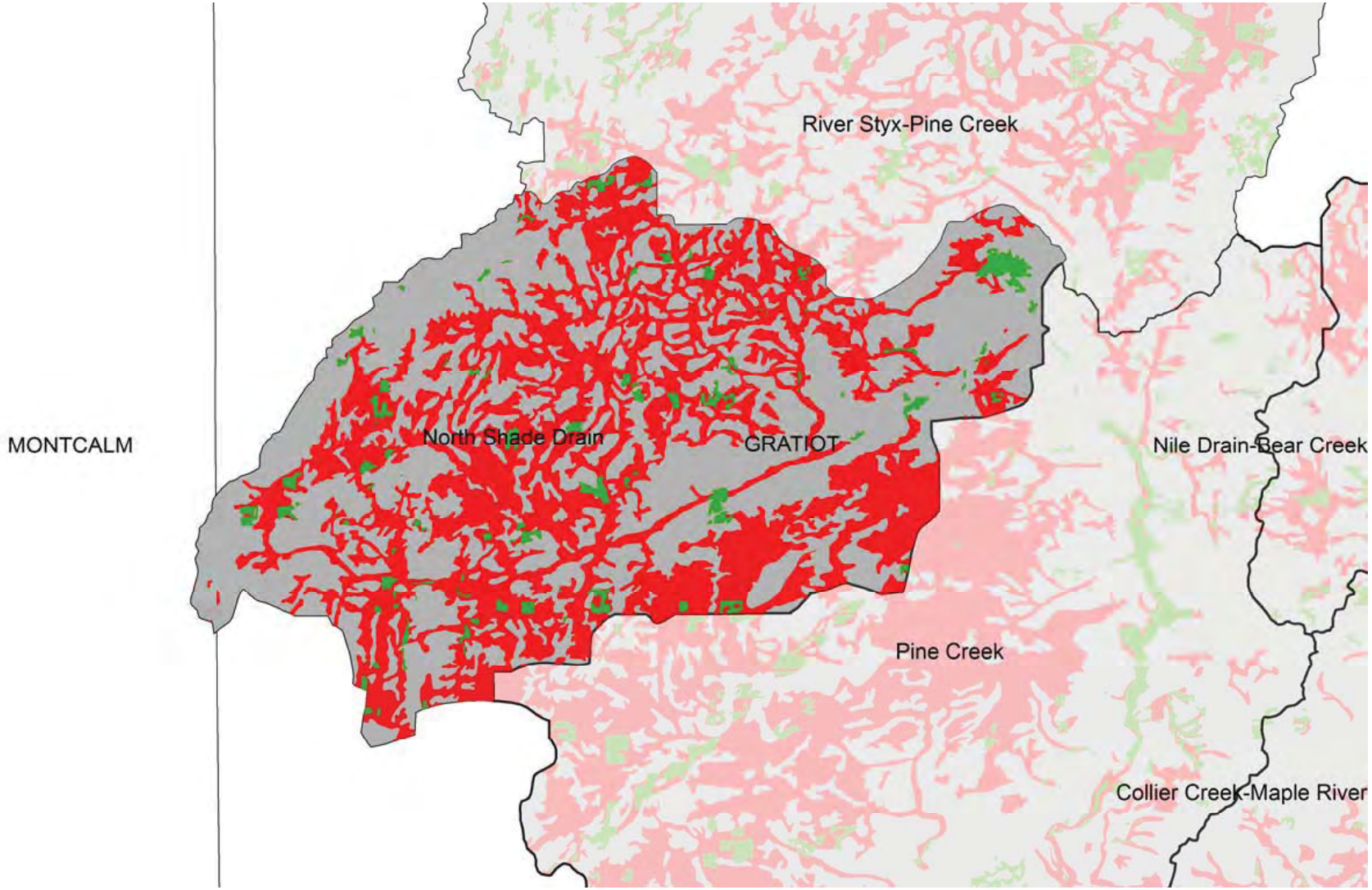
- 6,259 total acres of wetland
- 66 Polygons
- Average Size – 95 Acres

2005 WETLAND CONDITION

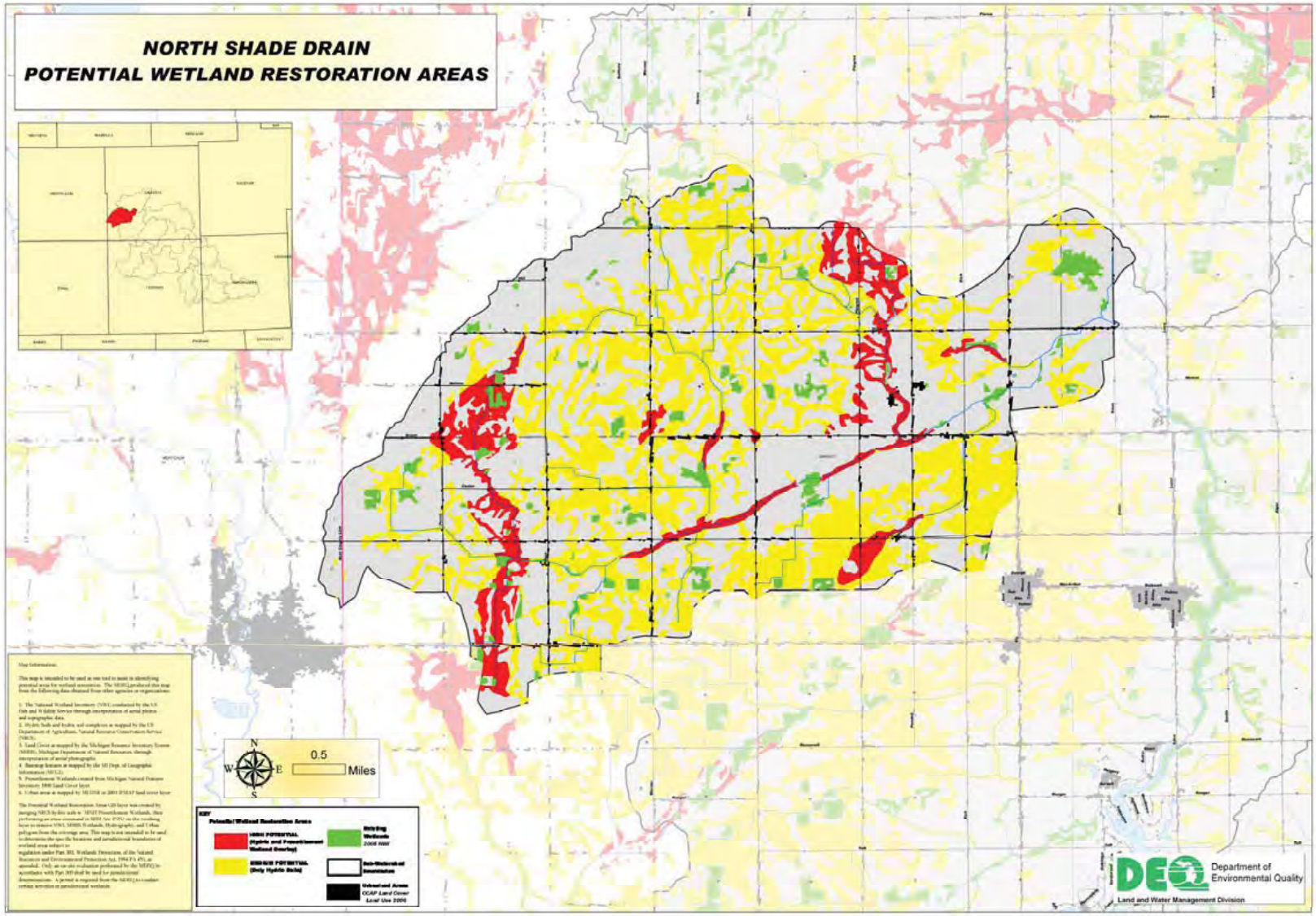
- 453 total acres of wetland
- 120 Polygons
- Average Size – 3.77 Acres

7 % OF ORIGINAL WETLAND ACREAGE REMAINS
93 % LOSS OF TOTAL WETLAND RESOURCE

NORTH SHADE DRAIN: APPROXIMATE AREAS OF WETLANDS LOSS



NORTH SHADE DRAIN SUB-WATERSHED



Pine Creek Resources
Status and Trends

PRESETTLEMENT WETLAND CONDITION

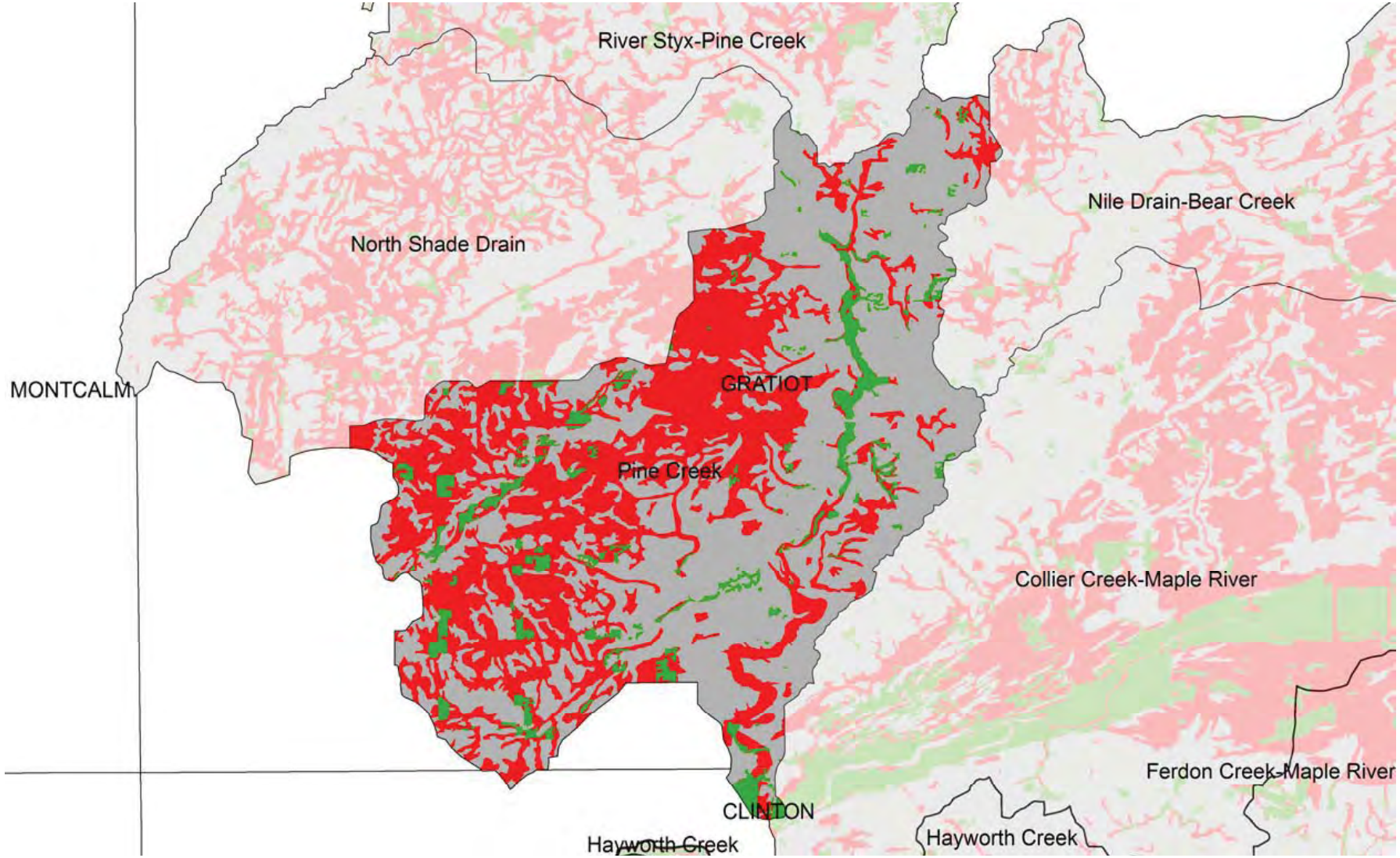
- 8,090 total acres of wetland
- 86 Polygons
- Average Size – 94 Acres

2005 WETLAND CONDITION

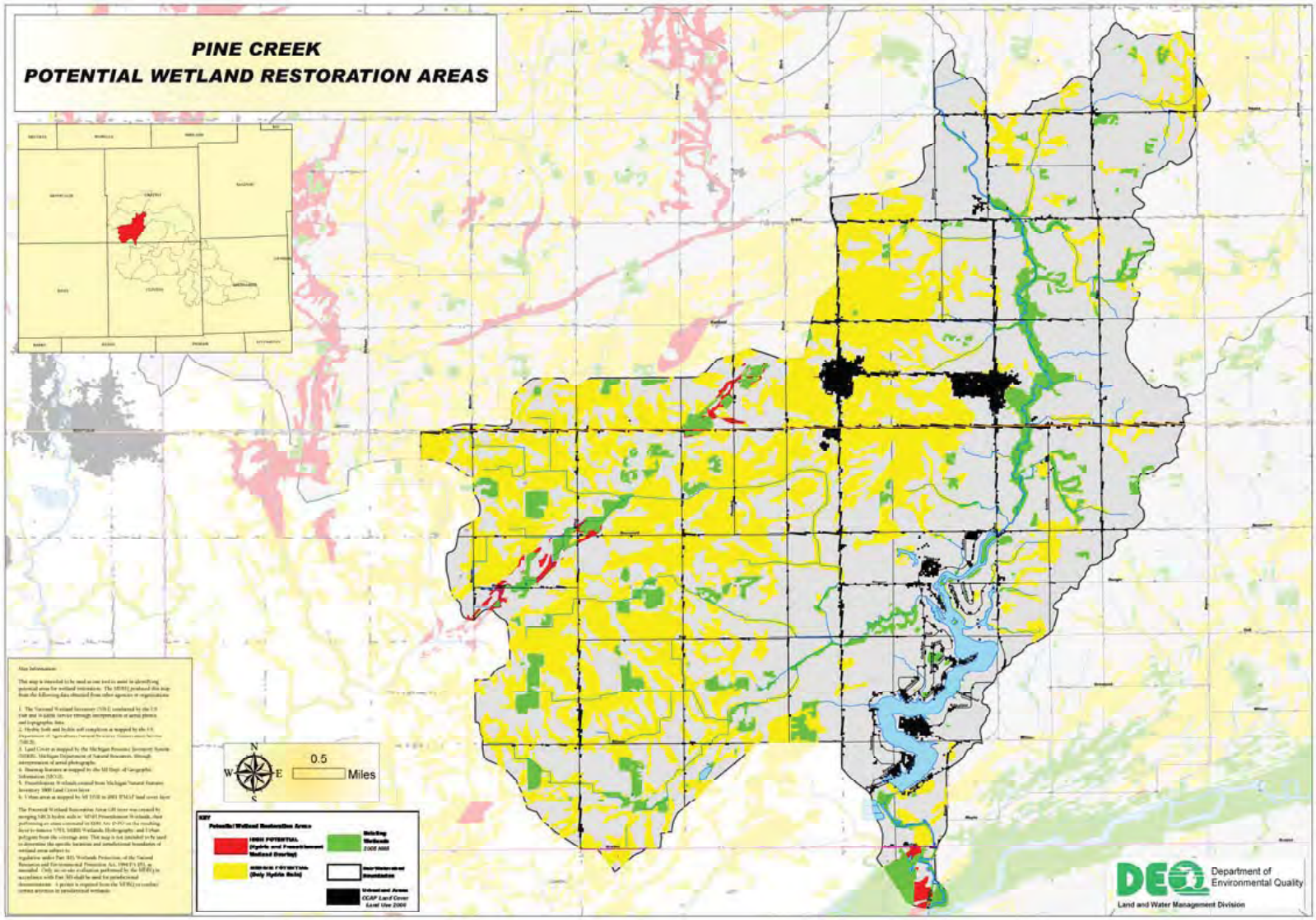
- 1,271 total acres of wetland
- 212 Polygons
- Average Size – 6 Acres

15 % OF ORIGINAL WETLAND ACREAGE REMAINS
85 % LOSS OF TOTAL WETLAND RESOURCE

PINE CREEK : APPROXIMATE AREAS OF WETLANDS LOSS



PINE CREEK SUB-WATERSHED



Nile Drain-Bear Creek Resources Status and Trends

PRESETTLEMENT WETLAND CONDITION

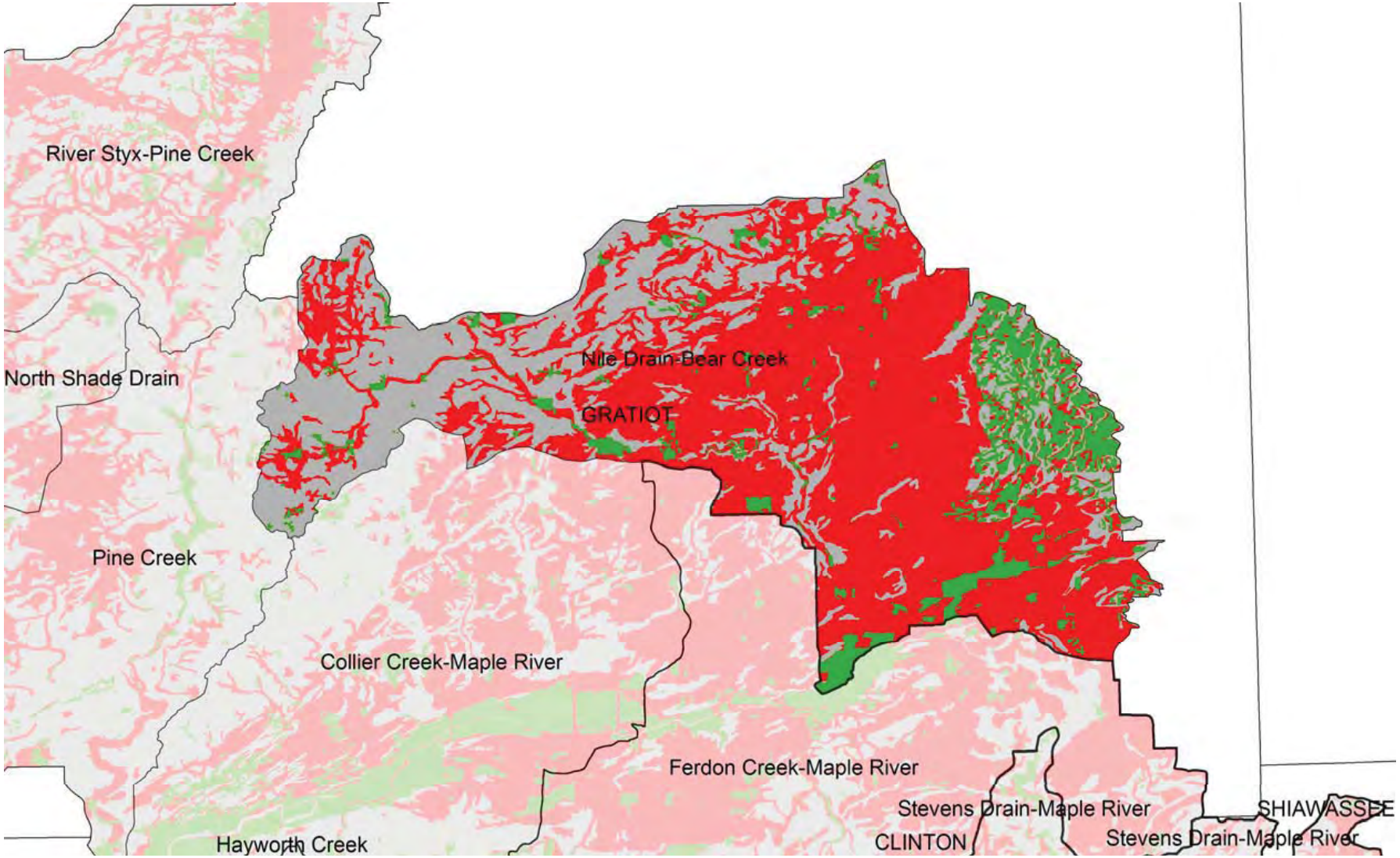
- 19,813 total acres of wetland
- 214 Polygons
- Average Size – 93 Acres

2005 WETLAND CONDITION

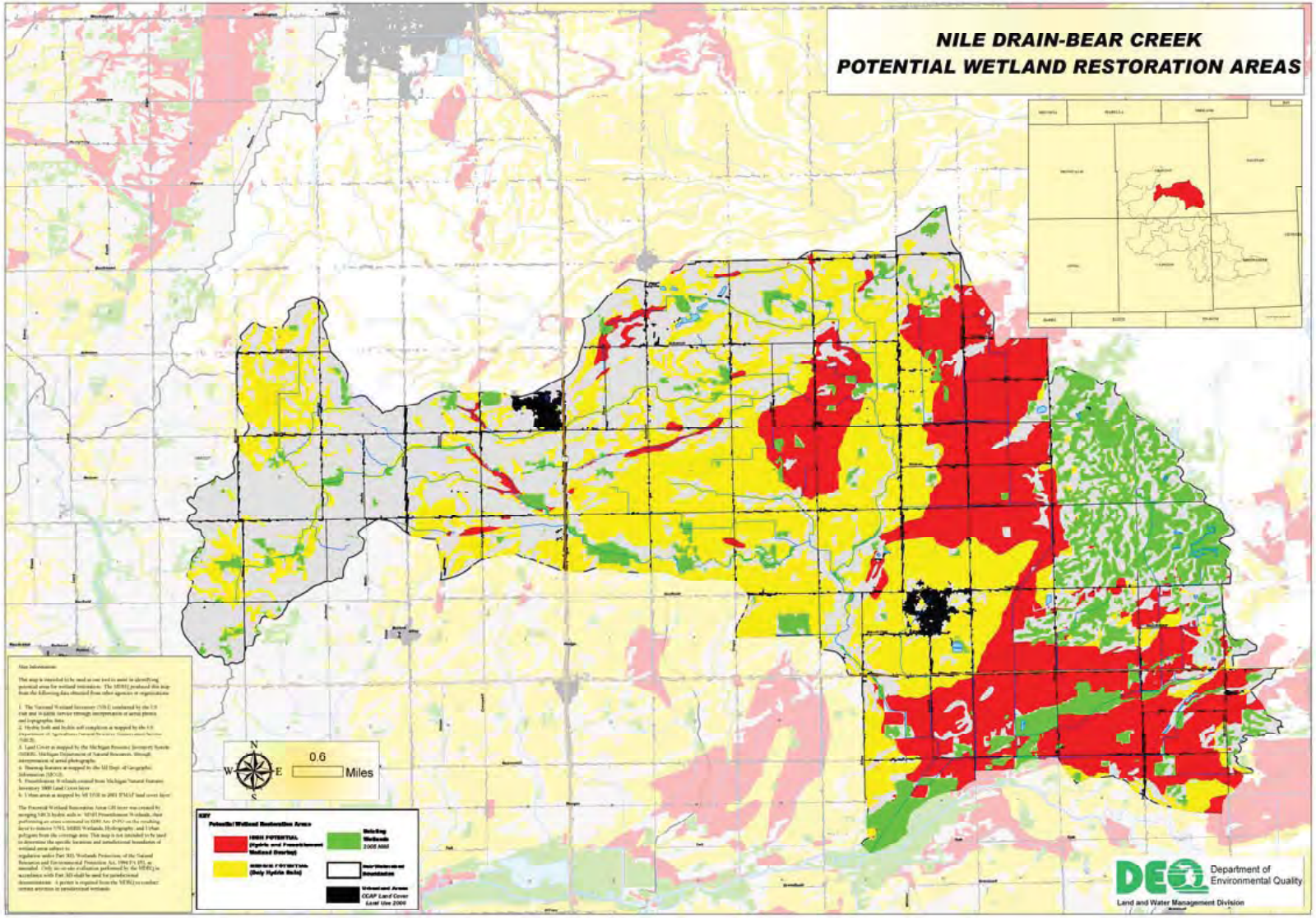
- 3,300 total acres of wetland
- 408 Polygons
- Average Size – 8 Acres

16 % OF ORIGINAL WETLAND ACREAGE REMAINS
84 % LOSS OF TOTAL WETLAND RESOURCE

NILE DRAIN-BEAR CREEK: APPROXIMATE AREAS OF WETLANDS LOSS



NILE DRAIN-BEAR CREEK SUB-WATERSHED



Collier Creek-Maple River Resources Status and Trends

PRESETTLEMENT WETLAND CONDITION

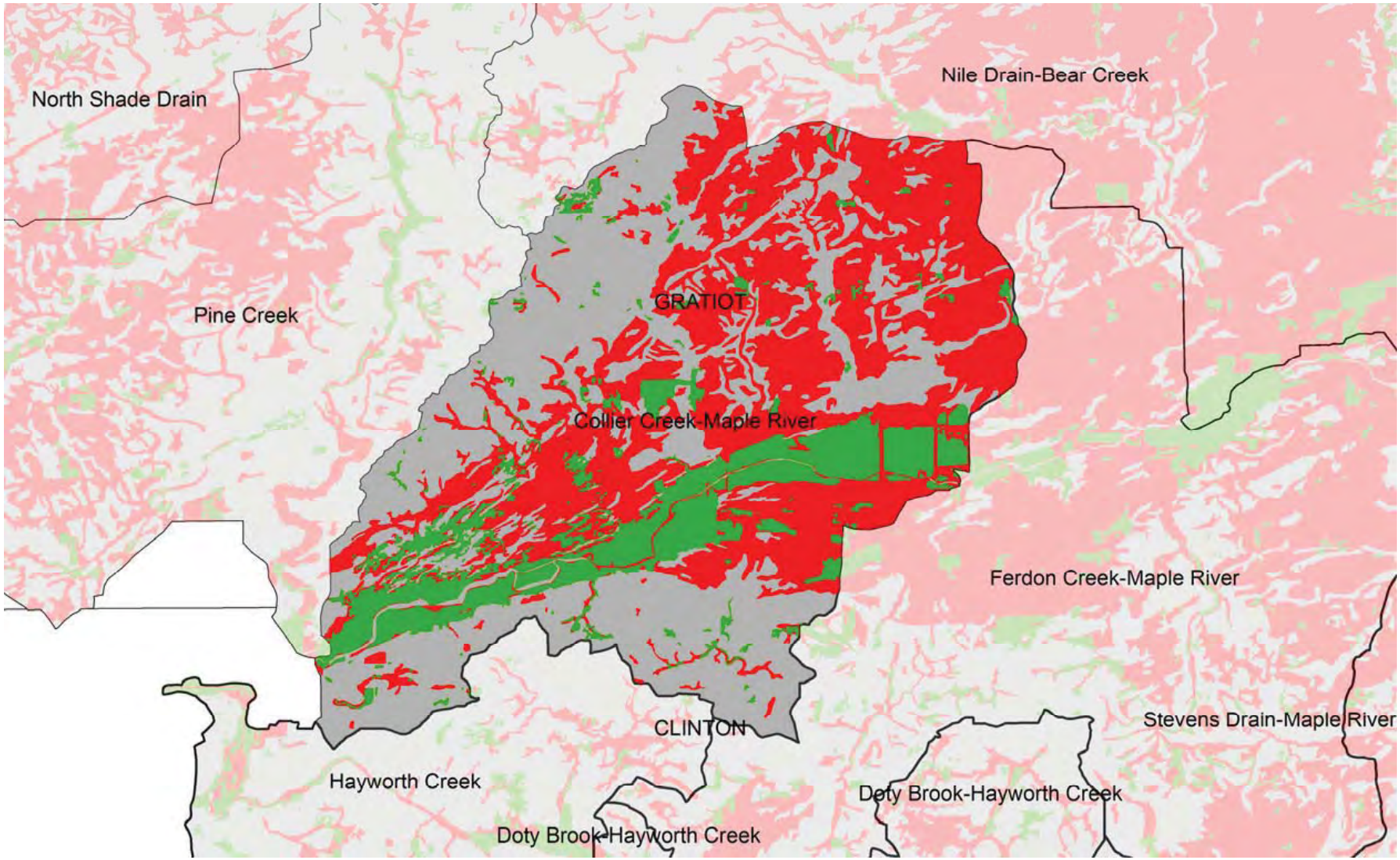
- 12,405 total acres of wetland
- 160 Polygons
- Average Size – 78 Acres

2005 WETLAND CONDITION

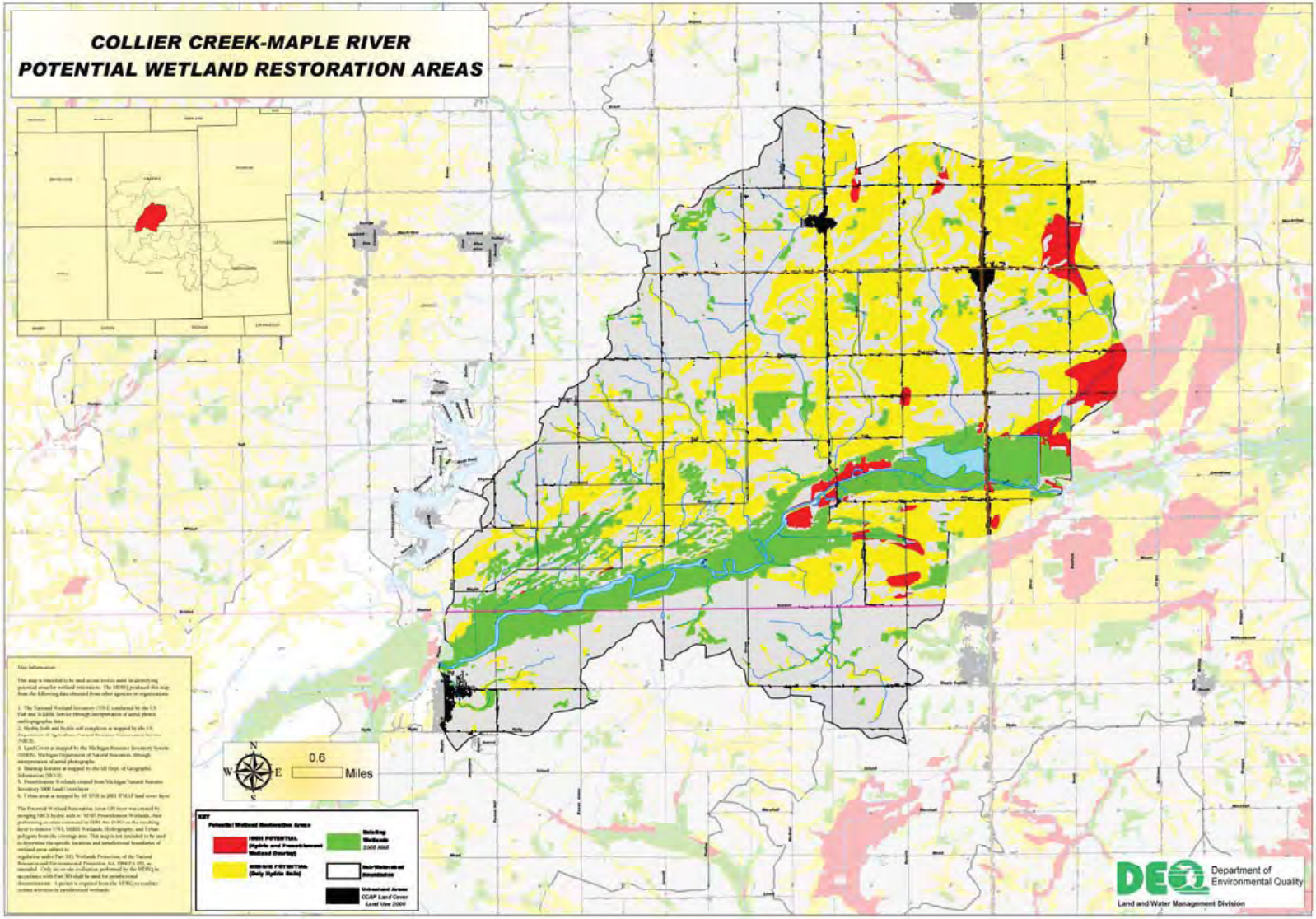
- 3,637 total acres of wetland
- 332 Polygons
- Average Size – 10 Acres

29 % OF ORIGINAL WETLAND ACREAGE REMAINS
71 % LOSS OF TOTAL WETLAND RESOURCE

COLLIER CREEK-MAPLE RIVER: APPROXIMATE AREAS OF WETLANDS LOSS



COLLIER CREEK-MAPLE RIVER SUB-WATERSHED



Ferdon Creek-Maple River Resources Status and Trends

PRESETTLEMENT WETLAND CONDITION

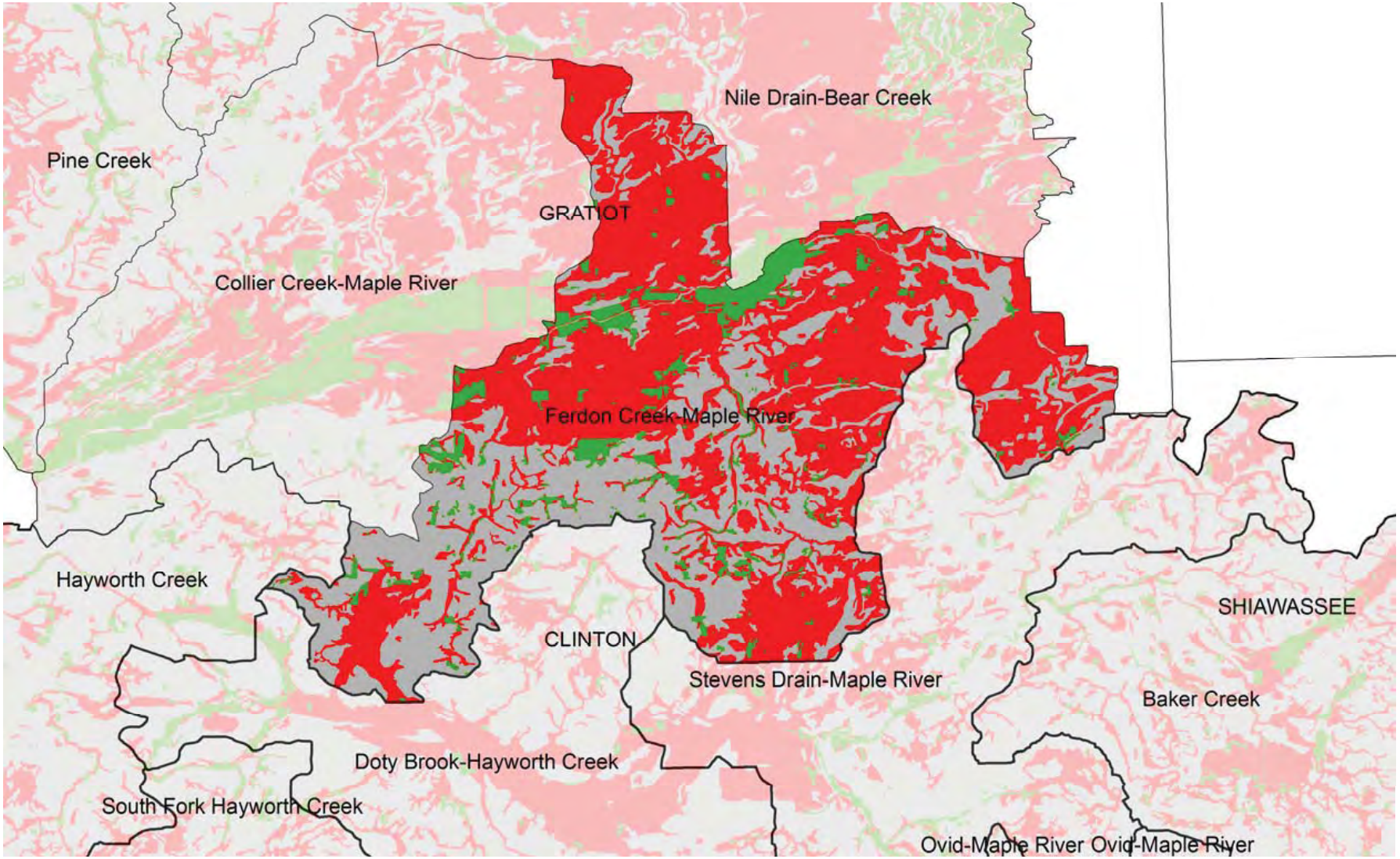
- 17,517 total acres of wetland
- 279 Polygons
- Average Size – 62 Acres

2005 WETLAND CONDITION

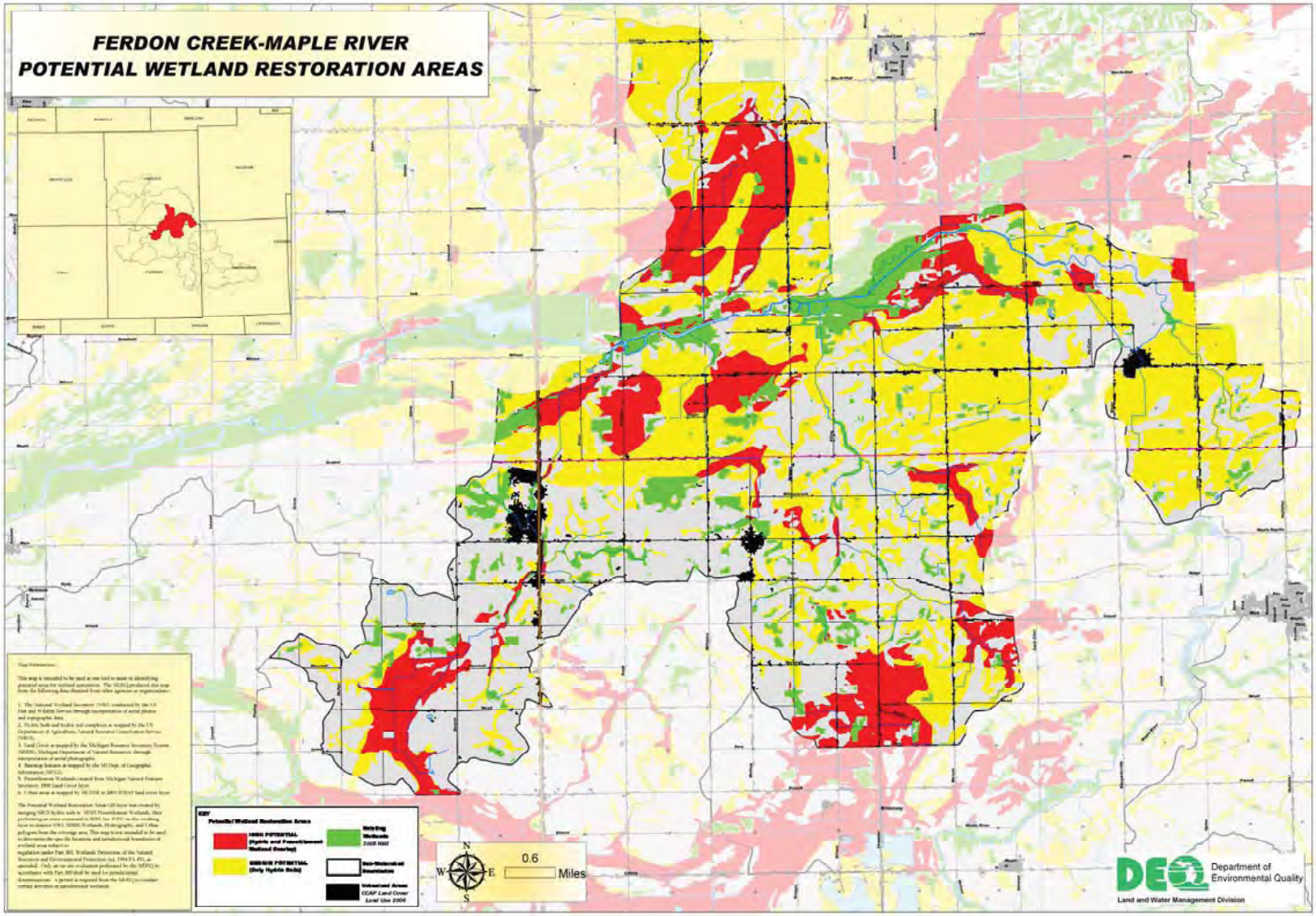
- 2,195 total acres of wetland
- 374 Polygons
- Average Size – 6 Acres

12 % OF ORIGINAL WETLAND ACREAGE REMAINS
88 % LOSS OF TOTAL WETLAND RESOURCE

FERDON CREEK-MAPLE RIVER: APPROXIMATE AREAS OF WETLANDS LOSS



FERDON CREEK-MAPLE RIVER SUB-WATERSHED



Hayworth Creek Resources
Status and Trends

PRESETTLEMENT WETLAND CONDITION

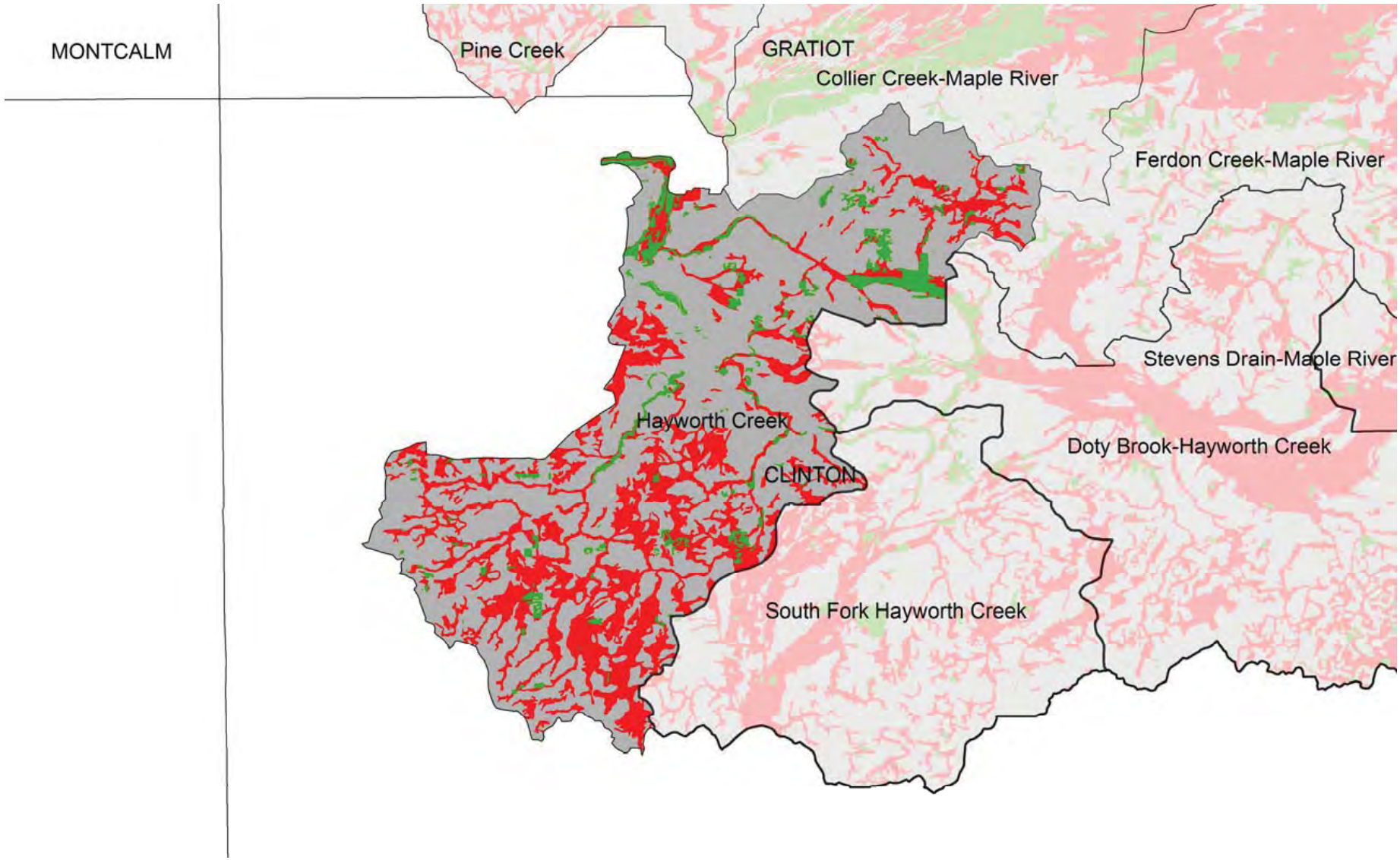
- 6,561 total acres of wetland
- 122 Polygons
- Average Size – 54 Acres

2005 WETLAND CONDITION

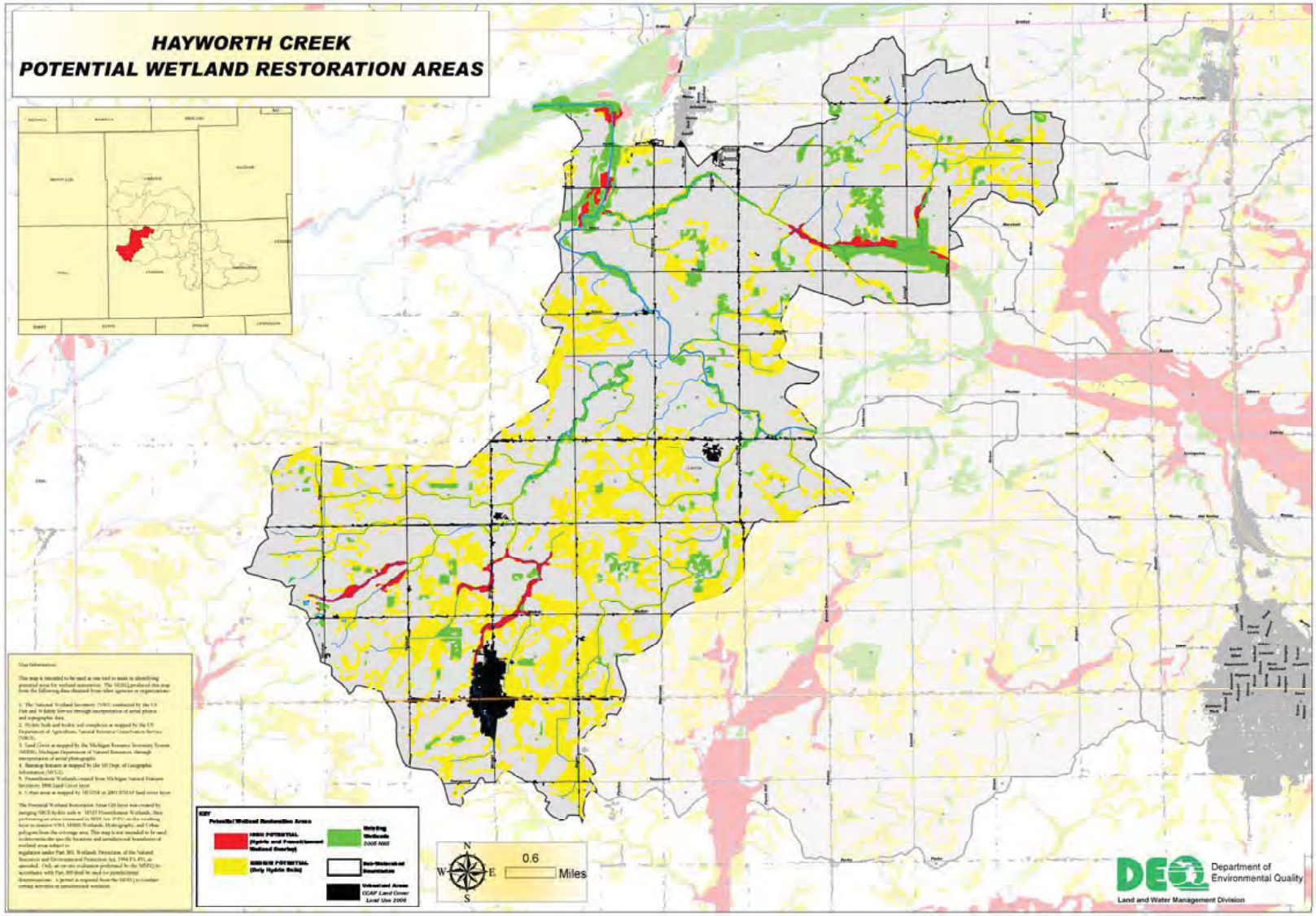
- 1,276 total acres of wetland
- 229 Polygons
- Average Size – 5.5 Acres

19 % OF ORIGINAL WETLAND ACREAGE REMAINS
81 % LOSS OF TOTAL WETLAND RESOURCE

HAYWORTH CREEK: APPROXIMATE AREAS OF WETLANDS LOSS



HAYWORTH CREEK SUB-WATERSHED



South Fork Hayworth Creek Resources Status and Trends

PRESETTLEMENT WETLAND CONDITION

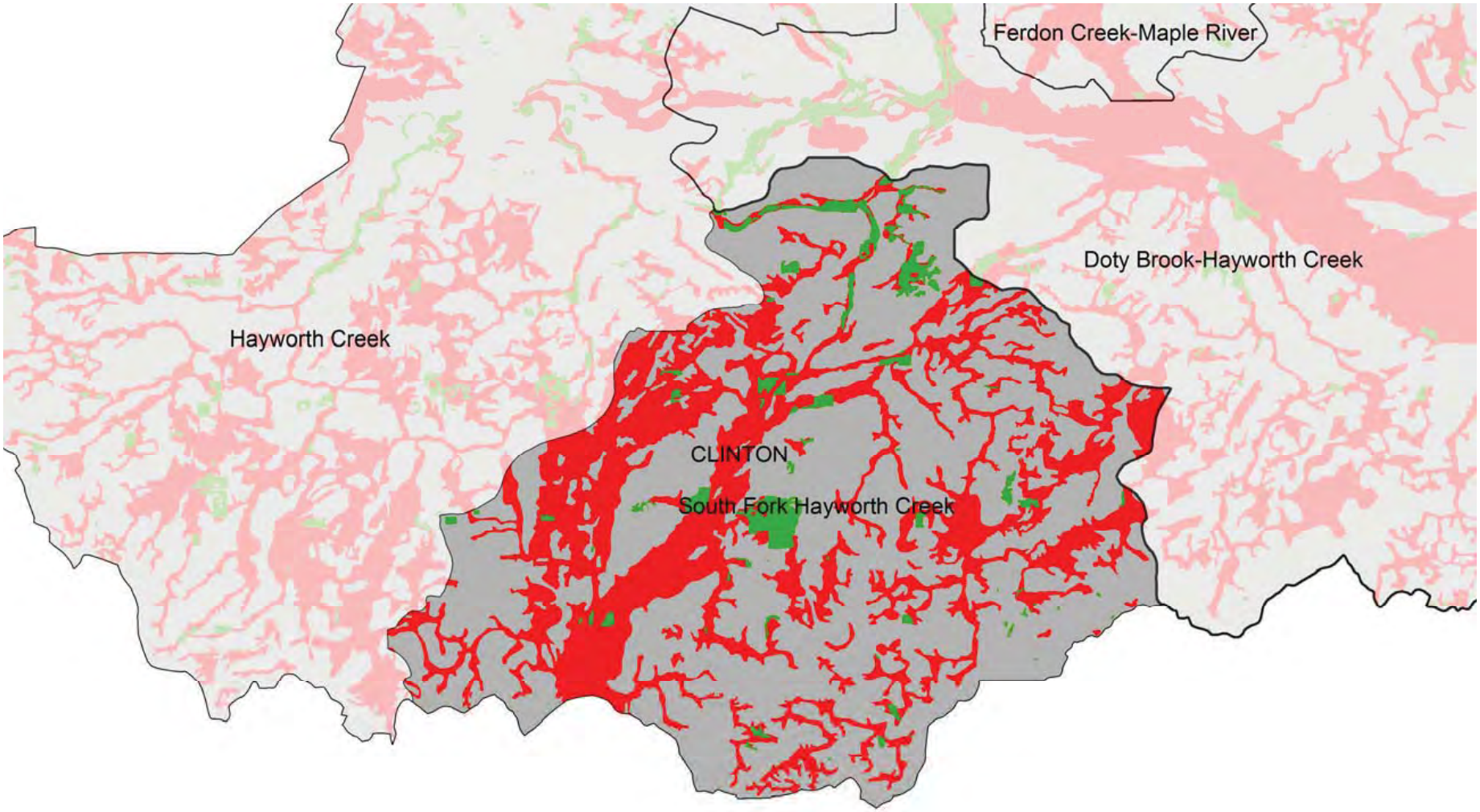
- 4,714 total acres of wetland
- 88 Polygons
- Average Size – 54 Acres

2005 WETLAND CONDITION

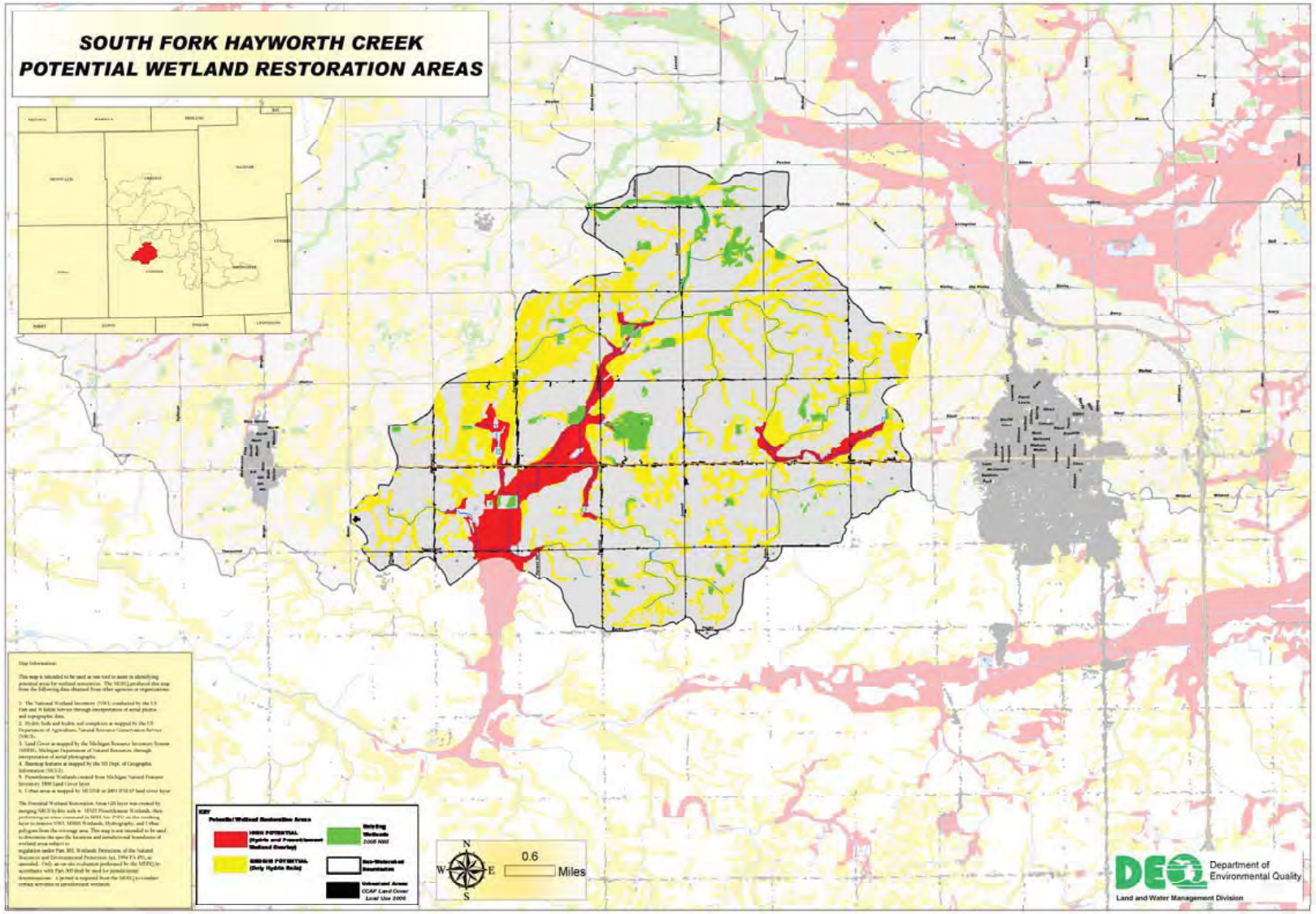
- 470 total acres of wetland
- 94 Polygons
- Average Size – 5 Acres

9 % OF ORIGINAL WETLAND ACREAGE REMAINS
91 % LOSS OF TOTAL WETLAND RESOURCE

SOUTH FORK HAYWORTH CREEK: APPROXIMATE AREAS OF WETLANDS LOSS



SOUTH FORK HAYWORTH CREEK SUB-WATERSHED



Doty Brook-Hayworth Creek Resources Status and Trends

PRESETTLEMENT WETLAND CONDITION

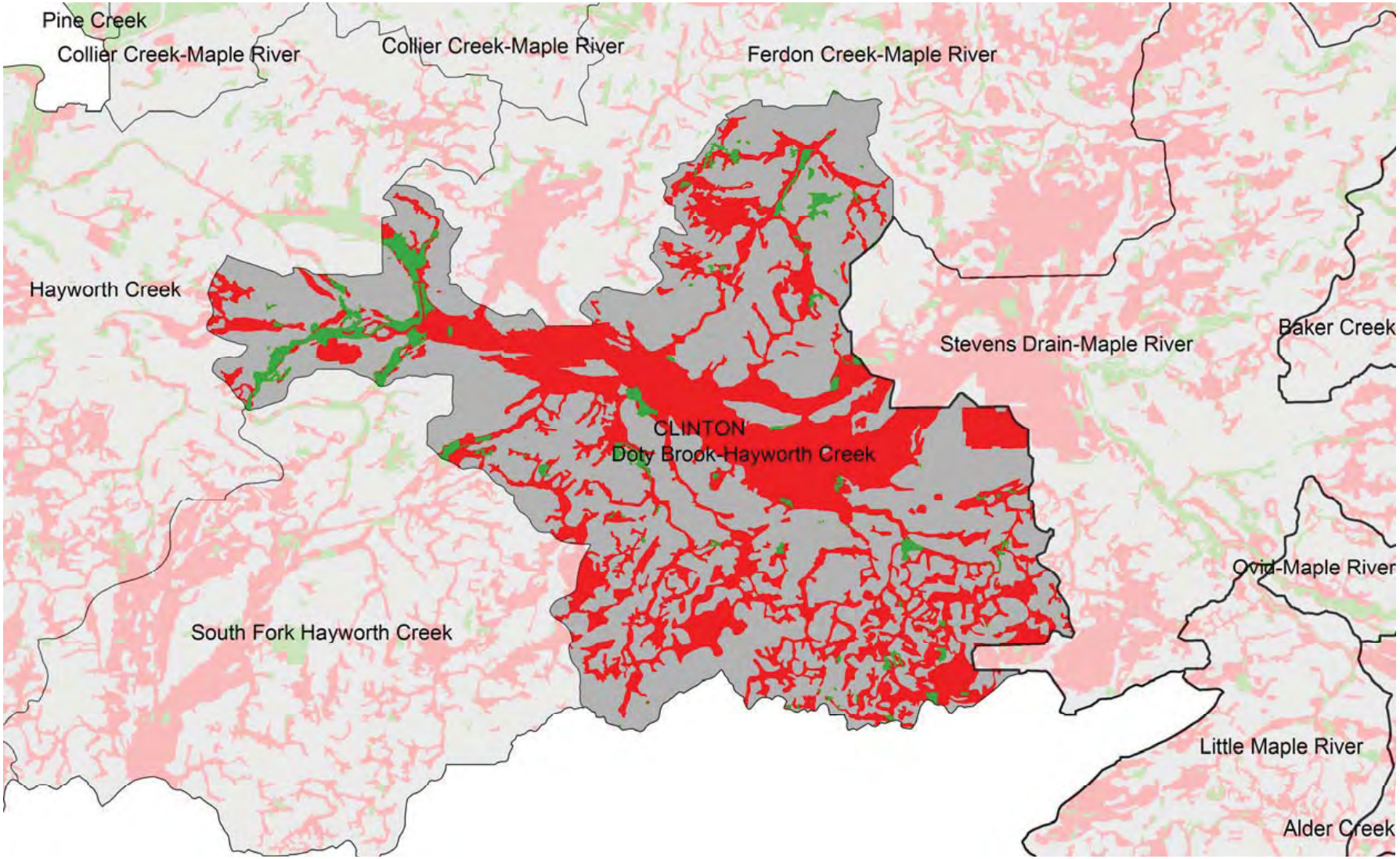
- 8,161 total acres of wetland
- 156 Polygons
- Average Size – 52 Acres

2005 WETLAND CONDITION

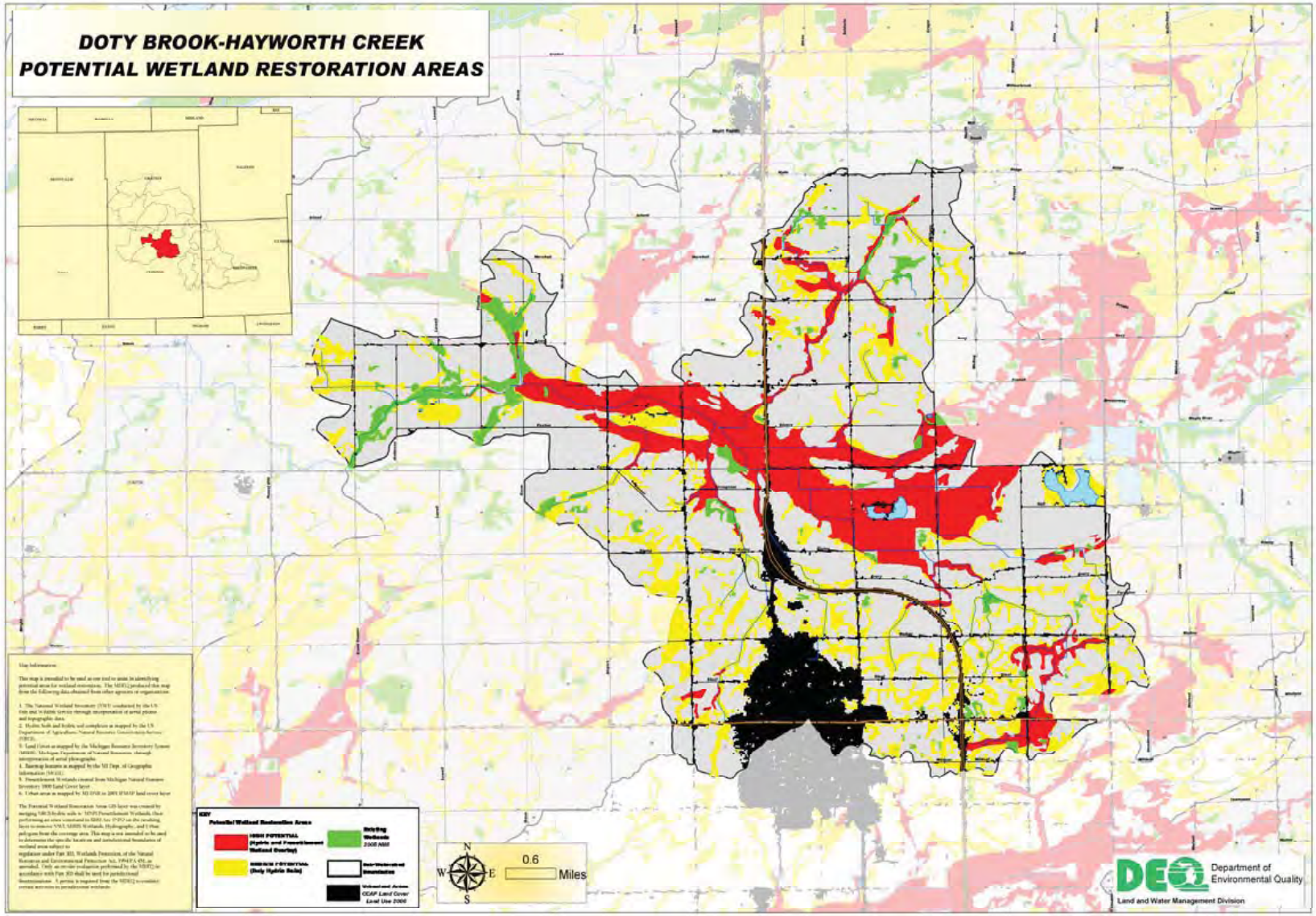
- 776 total acres of wetland
- 152 Polygons
- Average Size – 5.1 Acres

9 % OF ORIGINAL WETLAND ACREAGE REMAINS
91 % LOSS OF TOTAL WETLAND RESOURCE

DOTY BROOK-HAYWORTH CREEK: APPROXIMATE AREAS OF WETLANDS LOSS



DOTY BROOK-HAYWORTH CREEK SUB-WATERSHED



Stevens Drain-Maple River Resources Status and Trends

PRESETTLEMENT WETLAND CONDITION

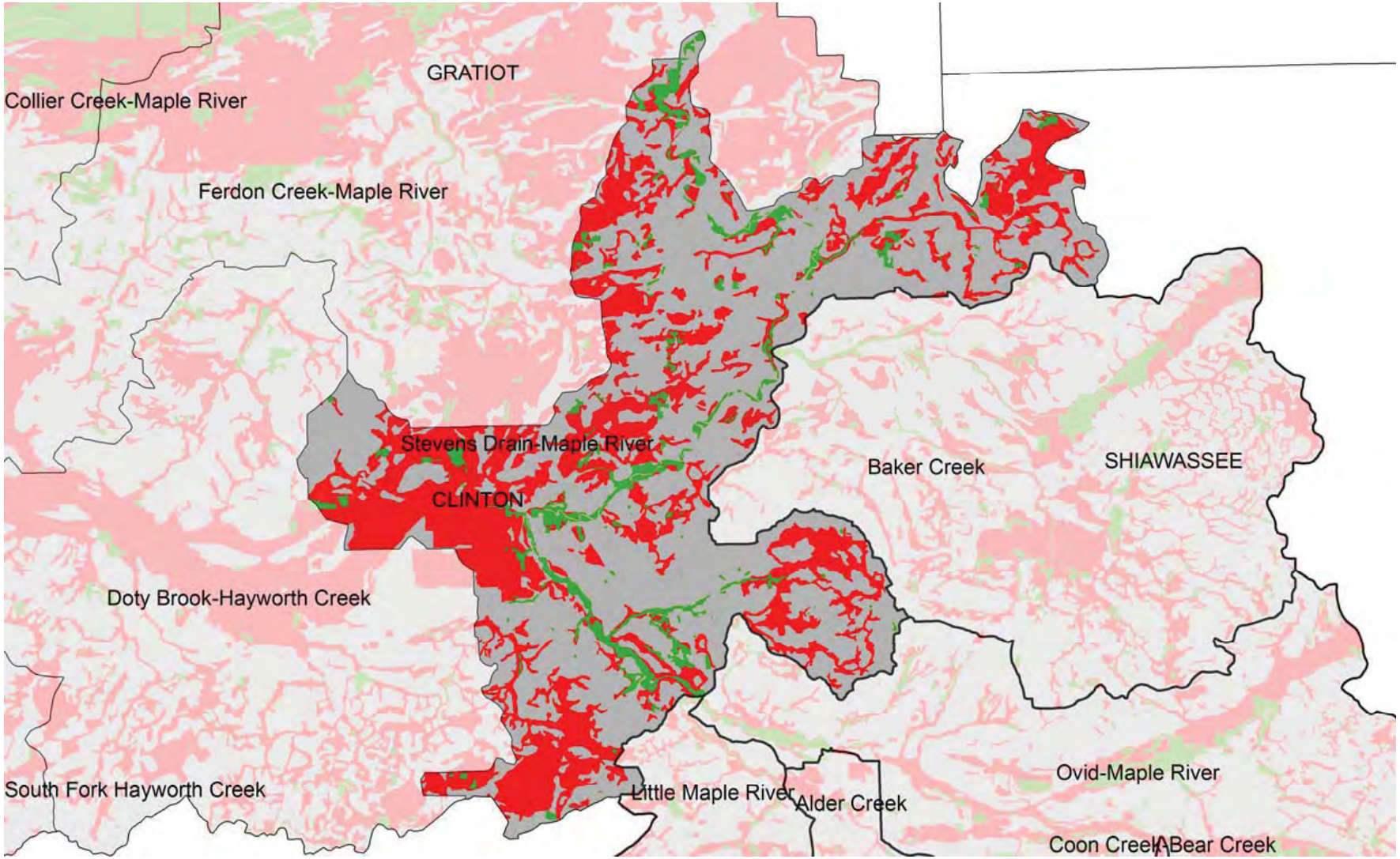
- 7,915 total acres of wetland
- 245 Polygons
- Average Size – 32 Acres

2005 WETLAND CONDITION

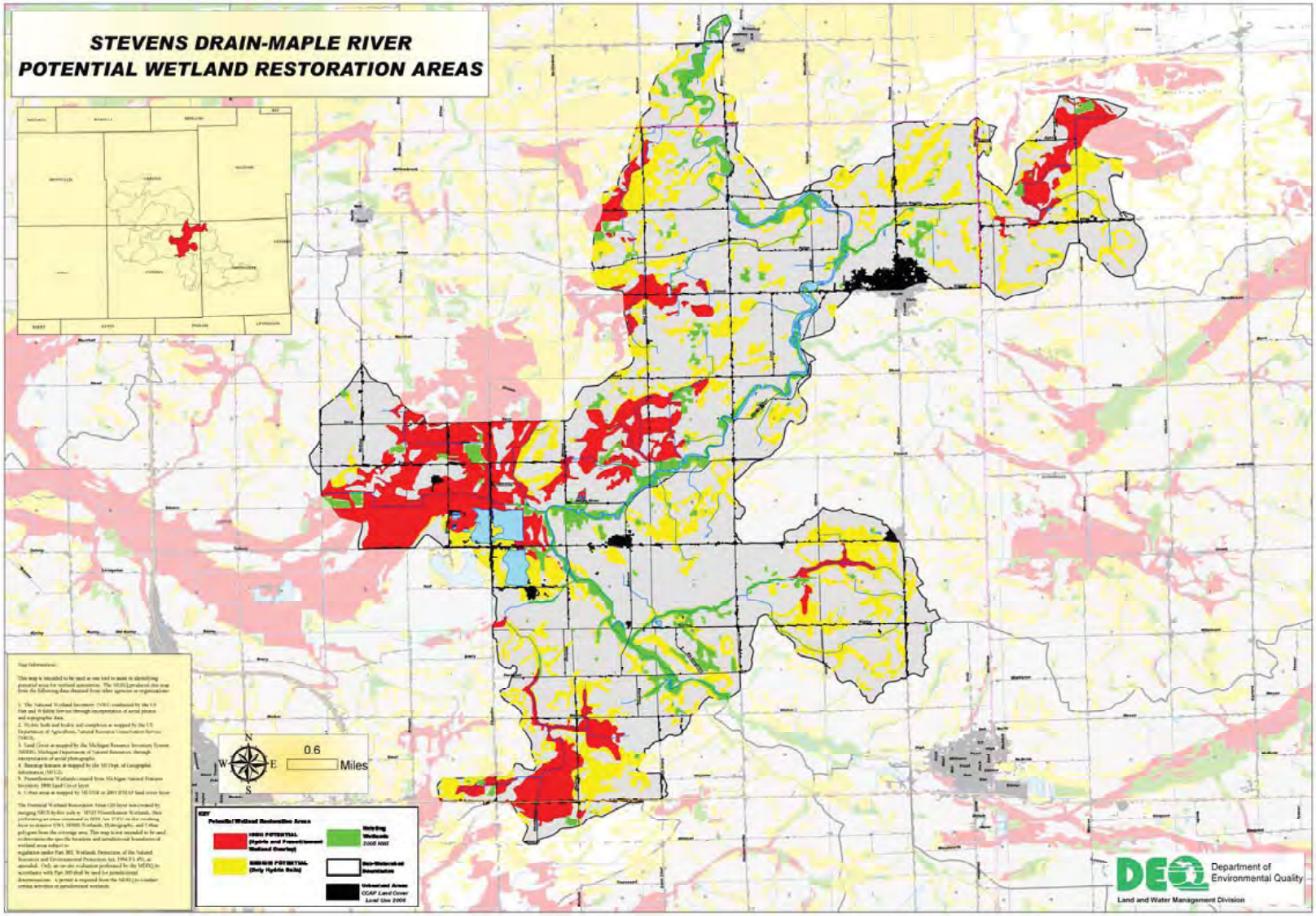
- 1,233 total acres of wetland
- 294 Polygons
- Average Size – 4.2 Acres

15 % OF ORIGINAL WETLAND ACREAGE REMAINS
85 % LOSS OF TOTAL WETLAND RESOURCE

STEVENS DRAIN-MAPLE RIVER: APPROXIMATE AREAS OF WETLANDS LOSS



STEVENS DRAIN-MAPLE RIVER SUB-WATERSHED



Baker Creek Resources
Status and Trends

PRESETTLEMENT WETLAND CONDITION

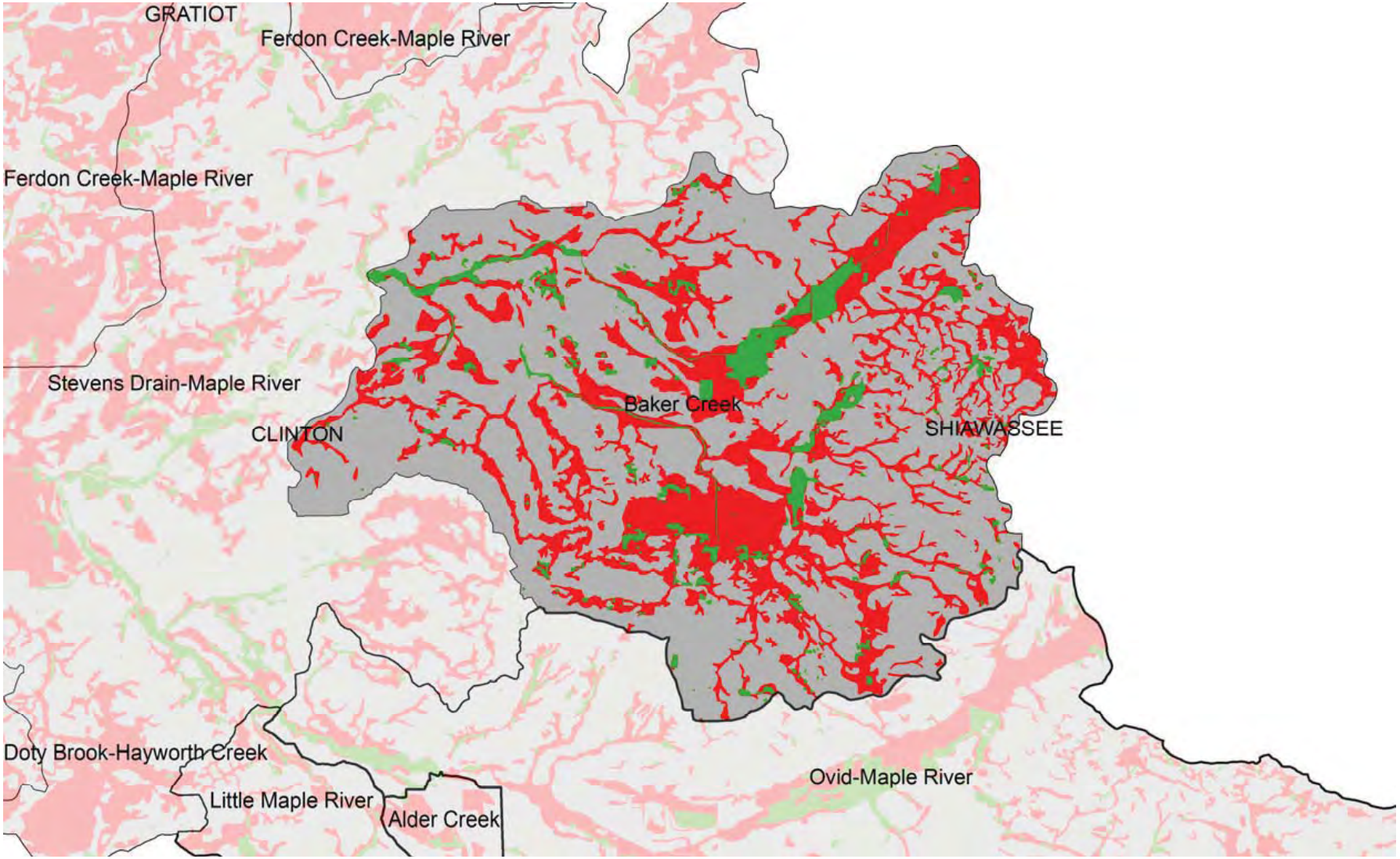
- 5,342 total acres of wetland
- 181 Polygons
- Average Size – 30 Acres

2005 WETLAND CONDITION

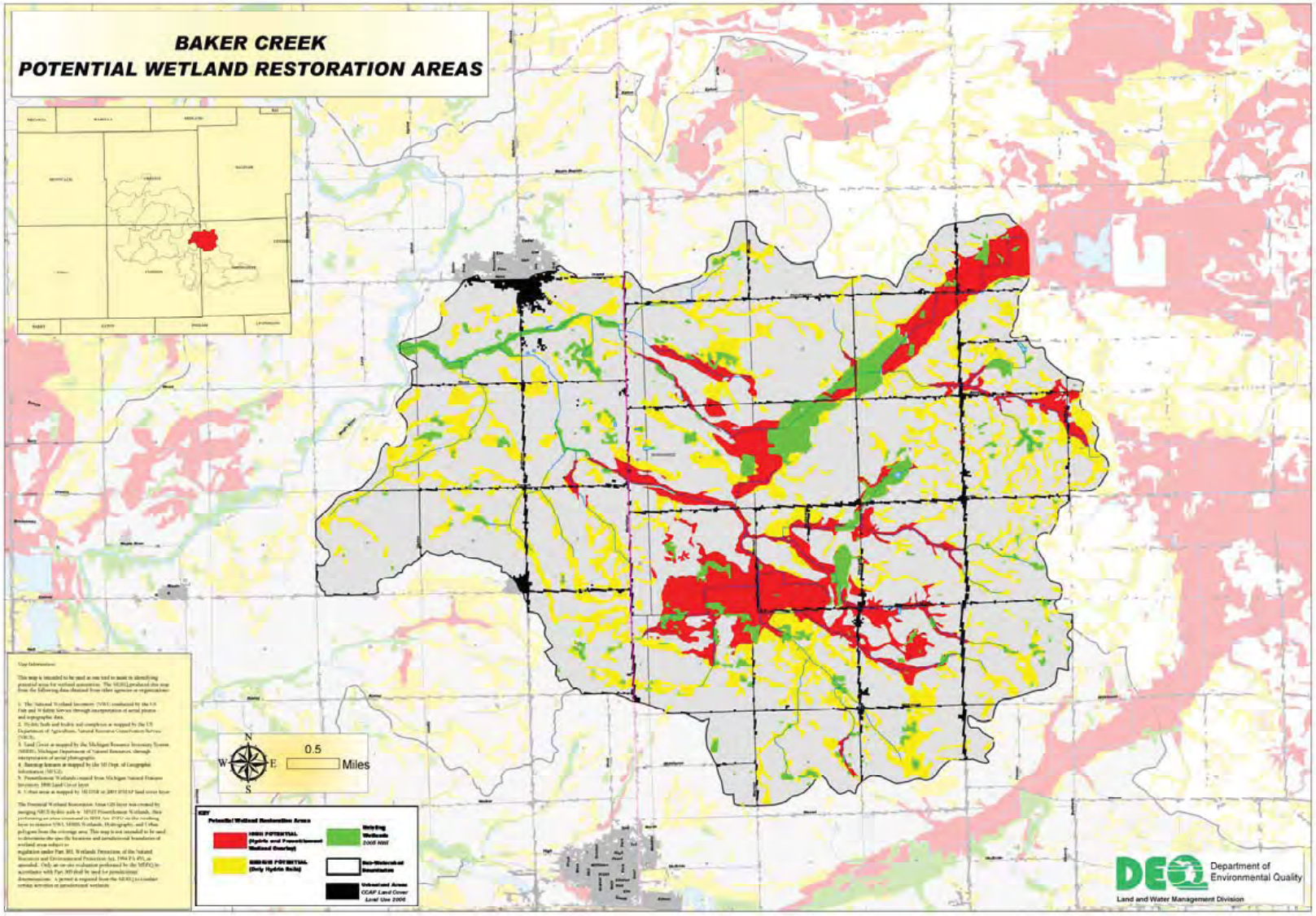
- 947 total acres of wetland
- 284 Polygons
- Average Size – 3 Acres

17 % OF ORIGINAL WETLAND ACREAGE REMAINS
83 % LOSS OF TOTAL WETLAND RESOURCE

BAKER CREEK:
APPROXIMATE AREAS OF WETLANDS LOSS



BAKER CREEK SUB-WATERSHED



Ovid-Maple River Resources Status and Trends

PRESETTLEMENT WETLAND CONDITION

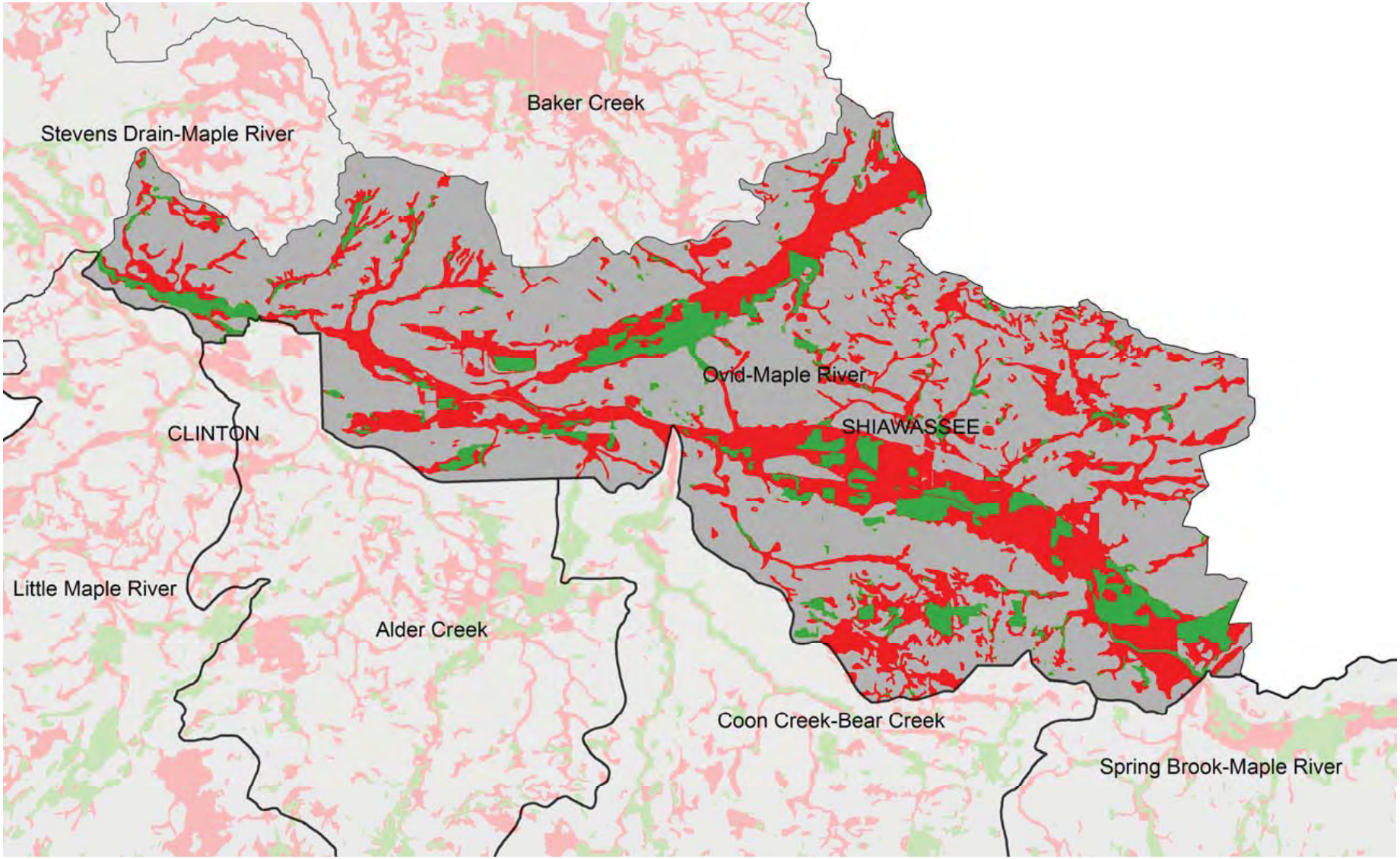
- 6,823 total acres of wetland
- 267 Polygons
- Average Size – 25.5 Acres

2005 WETLAND CONDITION

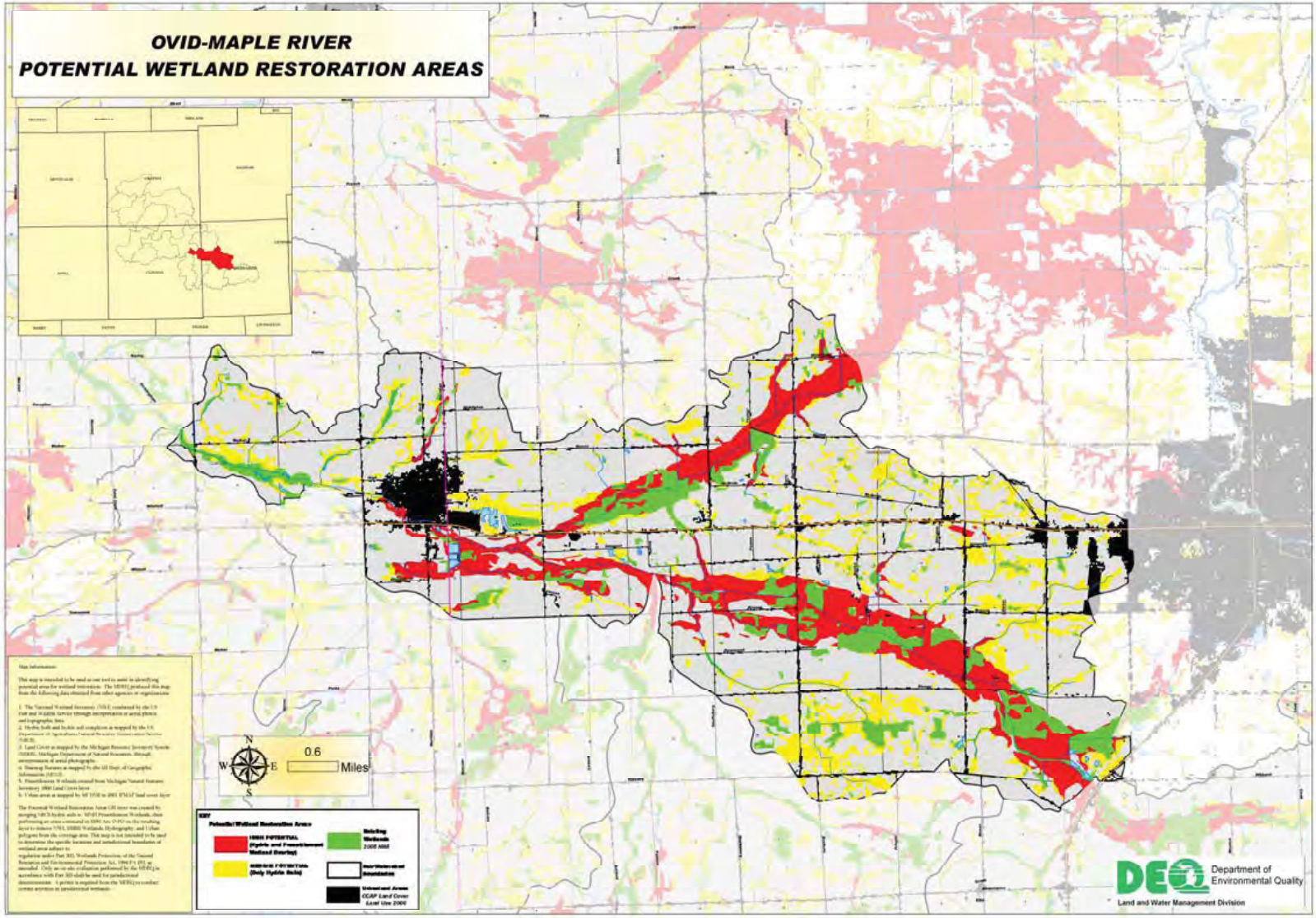
- 1,765 total acres of wetland
- 390 Polygons
- Average Size – 4.5 Acres

25 % OF ORIGINAL WETLAND ACREAGE REMAINS
75 % LOSS OF TOTAL WETLAND RESOURCE

OVID-MAPLE RIVER: APPROXIMATE AREAS OF WETLANDS LOSS



OVID-MAPLE RIVER SUB-WATERSHED



Little Maple River Resources Status and Trends

PRESETTLEMENT WETLAND CONDITION

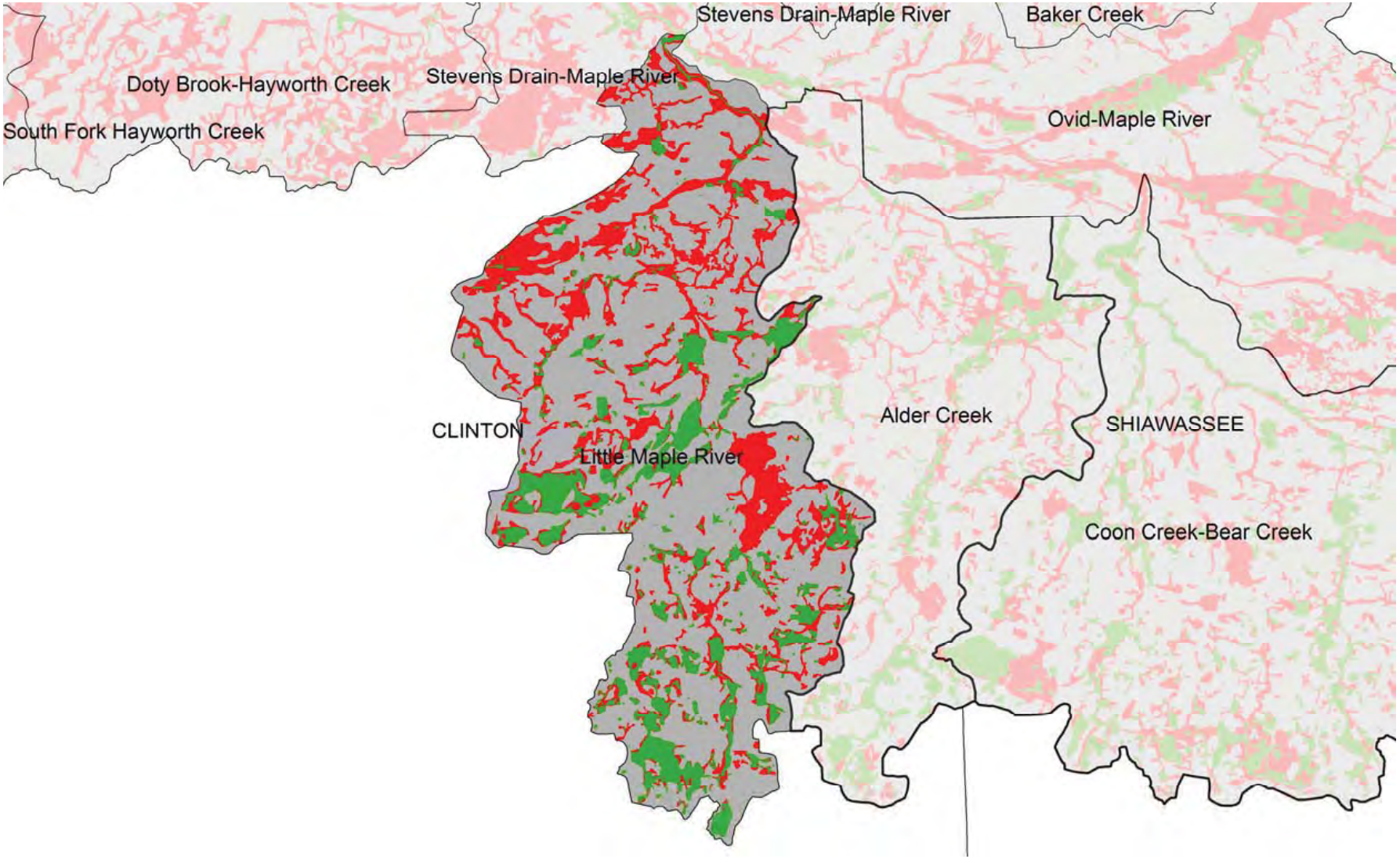
- 5,058 total acres of wetland
- 232 Polygons
- Average Size – 22 Acres

2005 WETLAND CONDITION

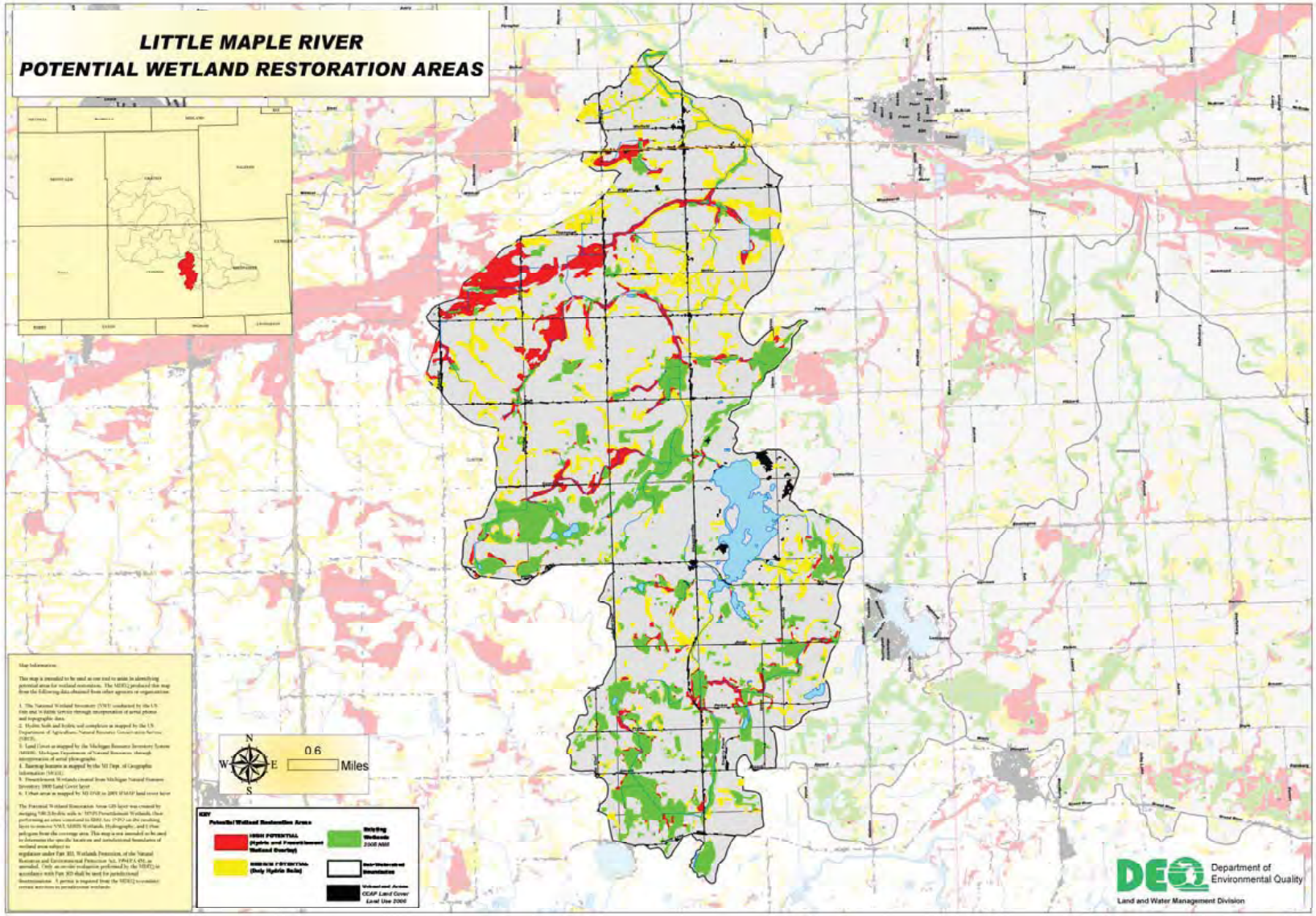
- 2,251 total acres of wetland
- 476 Polygons
- Average Size – 4.7 Acres

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

LITTLE MAPLE RIVER: APPROXIMATE AREAS OF WETLANDS LOSS



LITTLE MAPLE RIVER SUB-WATERSHED



Alder Creek Resources
Status and Trends

PRESETTLEMENT WETLAND CONDITION

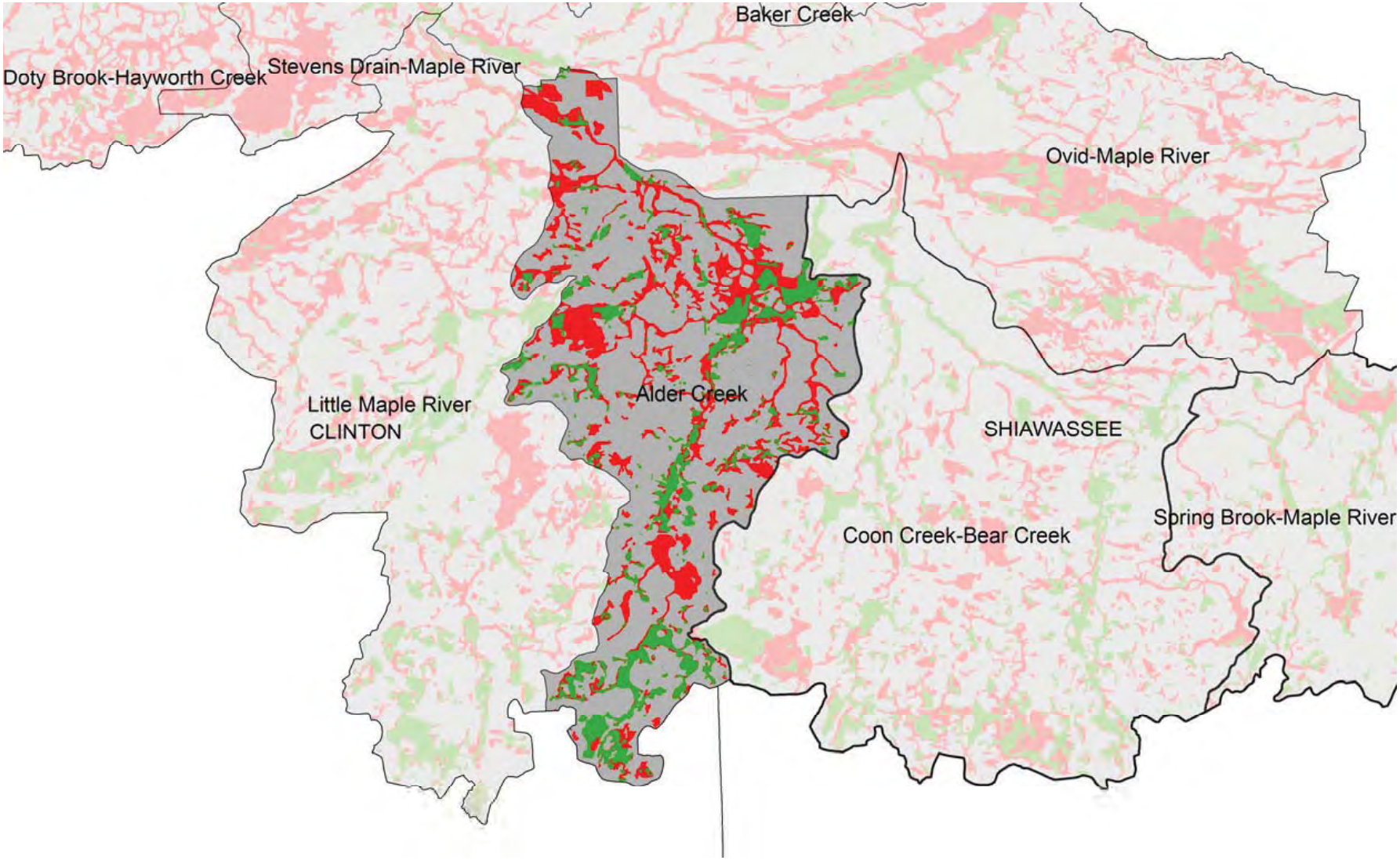
- 3,283 total acres of wetland
- 170 Polygons
- Average Size – 19 Acres

2005 WETLAND CONDITION

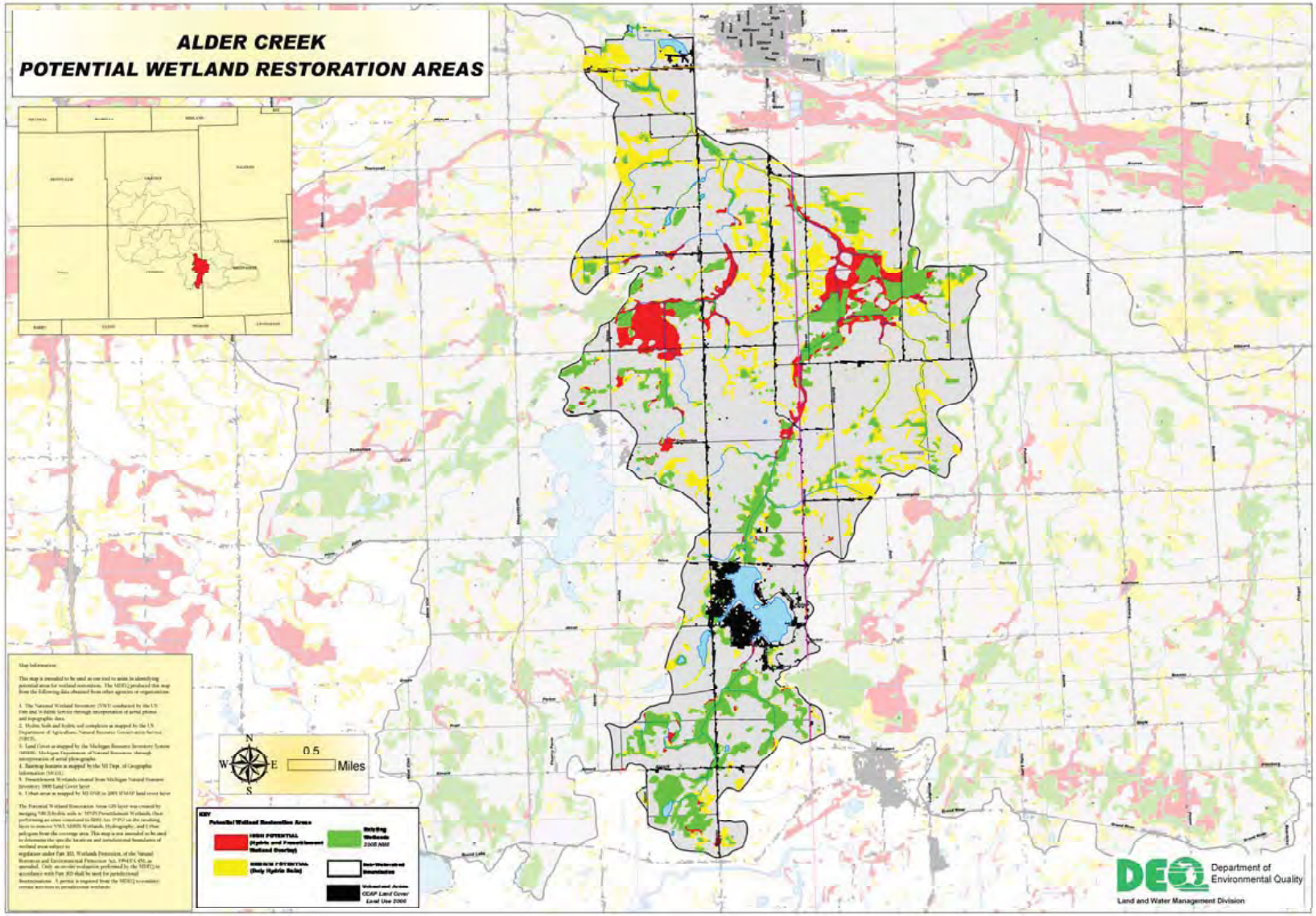
- 1,462 total acres of wetland
- 346 Polygons
- Average Size – 4 Acres

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

ALDER CREEK:
APPROXIMATE AREAS OF WETLANDS LOSS



ALDER CREEK SUB-WATERSHED



Coon Creek-Bear Creek Resources Status and Trends

PRESETTLEMENT WETLAND CONDITION

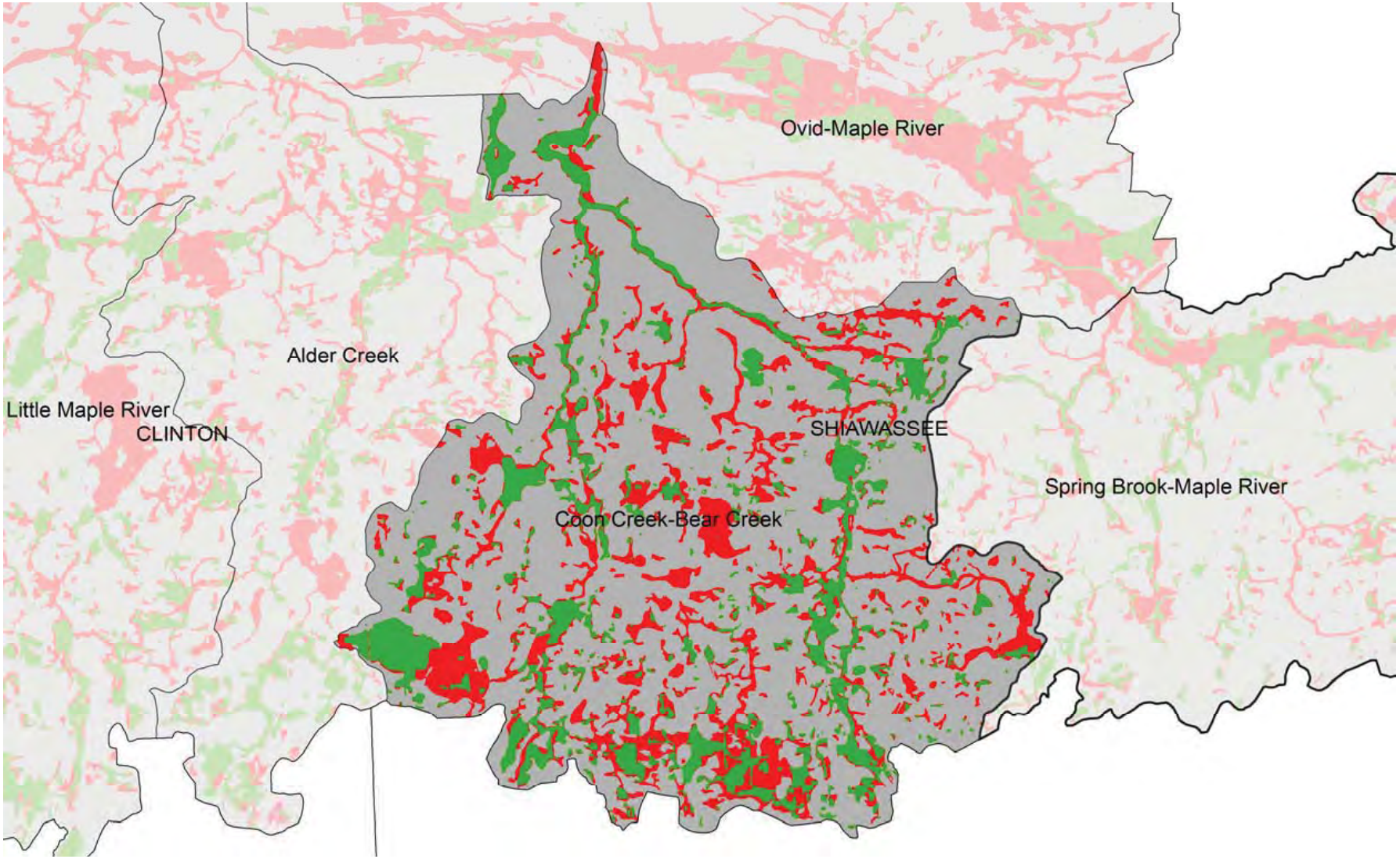
- 4,932 total acres of wetland
- 335 Polygons
- Average Size – 14.7 Acres

2005 WETLAND CONDITION

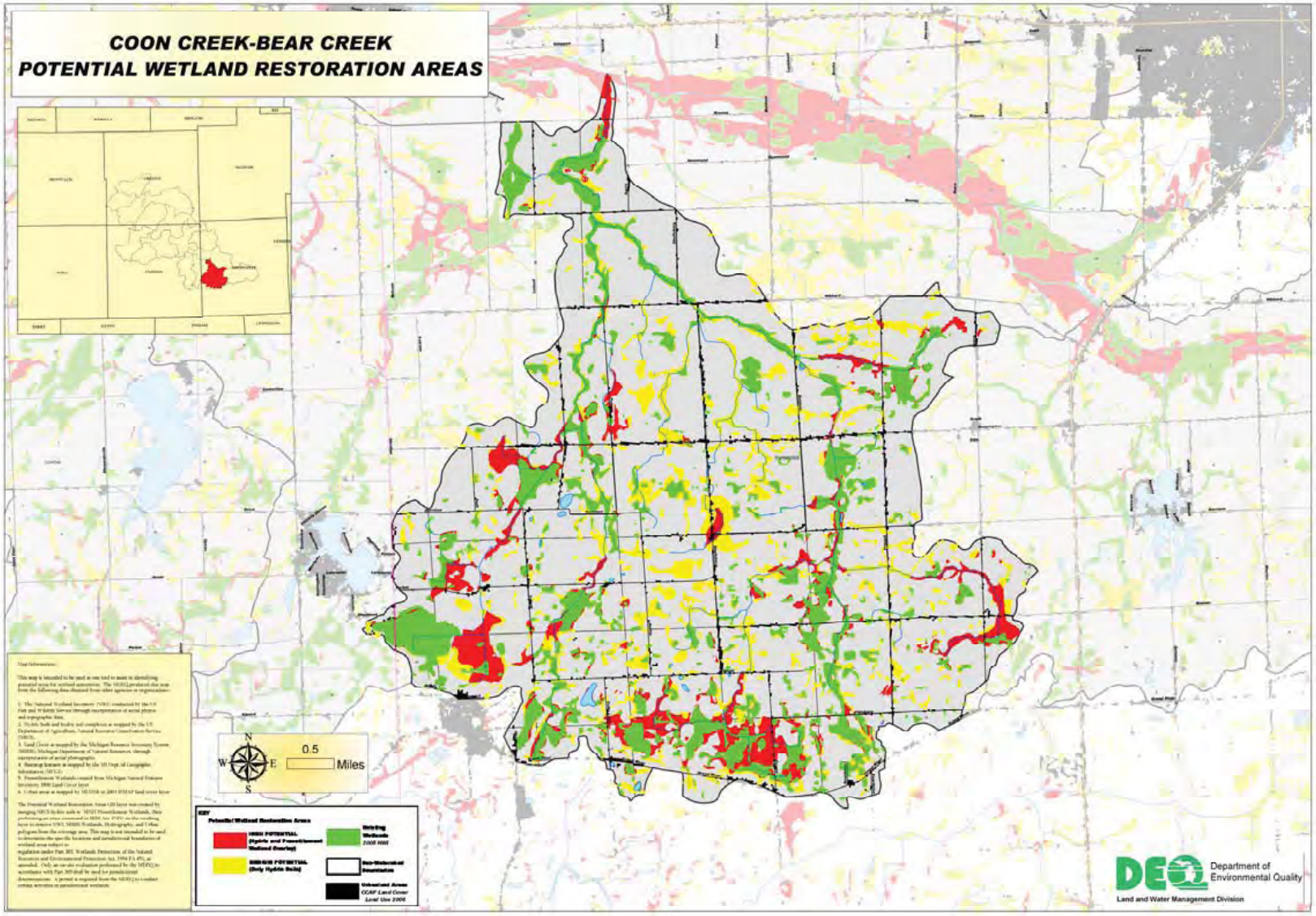
- 2,594 total acres of wetland
- 547 Polygons
- Average Size – 4.7 Acres

52 % OF ORIGINAL WETLAND ACREAGE REMAINS
48 % LOSS OF TOTAL WETLAND RESOURCE

COON CREEK-BEAR CREEK: APPROXIMATE AREAS OF WETLANDS LOSS



COON CREEK-BEAR CREEK SUB-WATERSHED



Spring Brook-Maple River Resources Status and Trends

PRESETTLEMENT WETLAND CONDITION

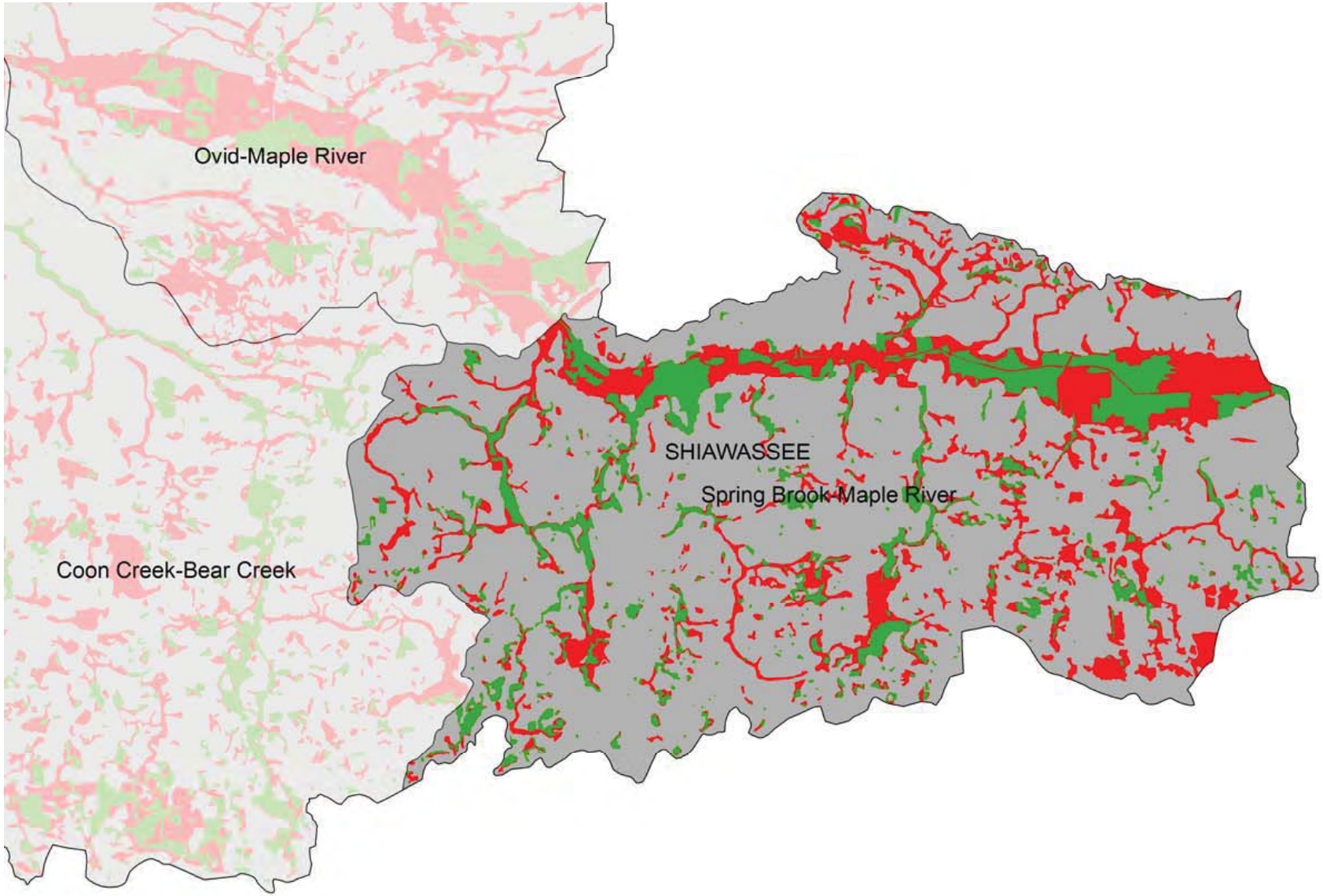
- 4,718 total acres of wetland
- 315 Polygons
- Average Size – 15 Acres

2005 WETLAND CONDITION

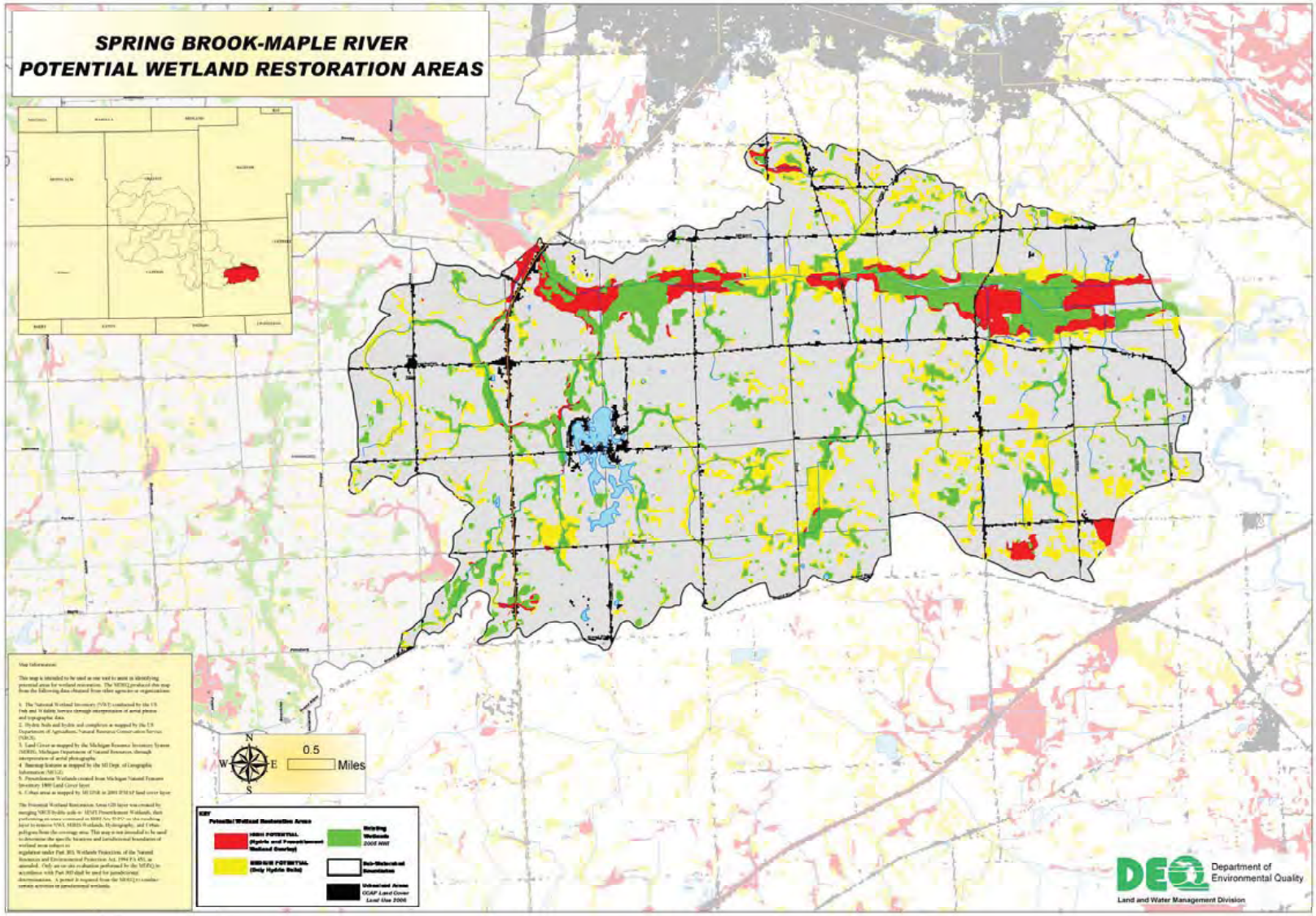
- 2,172 total acres of wetland
- 540 Polygons
- Average Size – 4 Acres

46 % OF ORIGINAL WETLAND ACREAGE REMAINS
54 % LOSS OF TOTAL WETLAND RESOURCE

SPRING BROOK-MAPLE RIVER: APPROXIMATE AREAS OF WETLANDS LOSS



SPRING BROOK-MAPLE RIVER SUB-WATERSHED



Upper Maple River Watershed Management Plan

June 2010
MDNRE Tracking Code #2007-0118

Appendix 4

MDEQ - LLFWA Report

UPPER MAPLE 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)

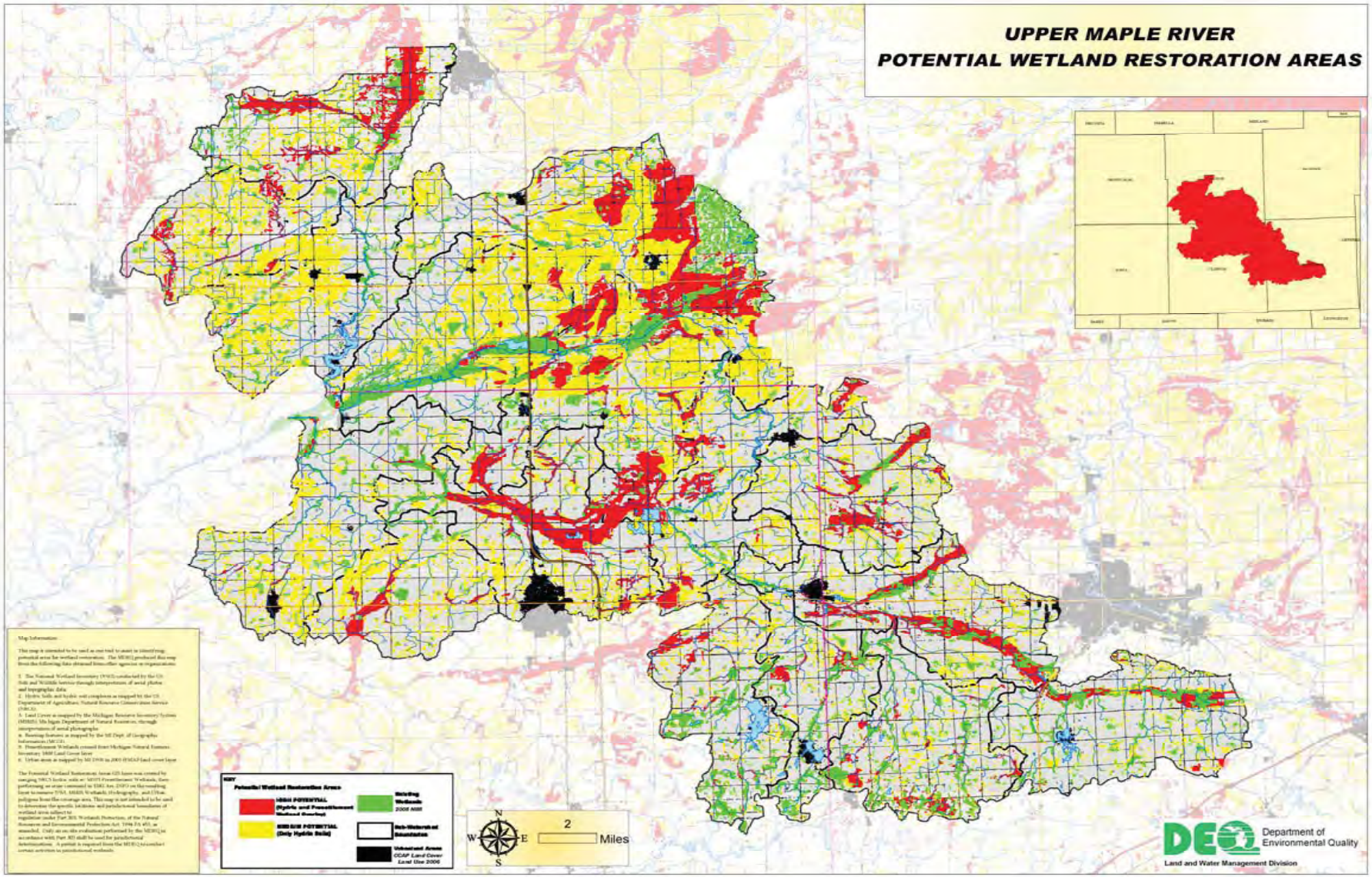
- Wetland boundaries determined from Aerial Imagery
- Last updated in 2005
- Obvious limitations to Aerial Photo Interpretation:
  - Errors of Omission (forested and drier-end wetlands)
  - Errors of Comission (misinterpretation of aerials)

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.

UPPER MAPLE RIVER WATERSHED



Upper Maple River Watershed
Wetland Resources Status and Trends

Pre-settlement Wetland conditions

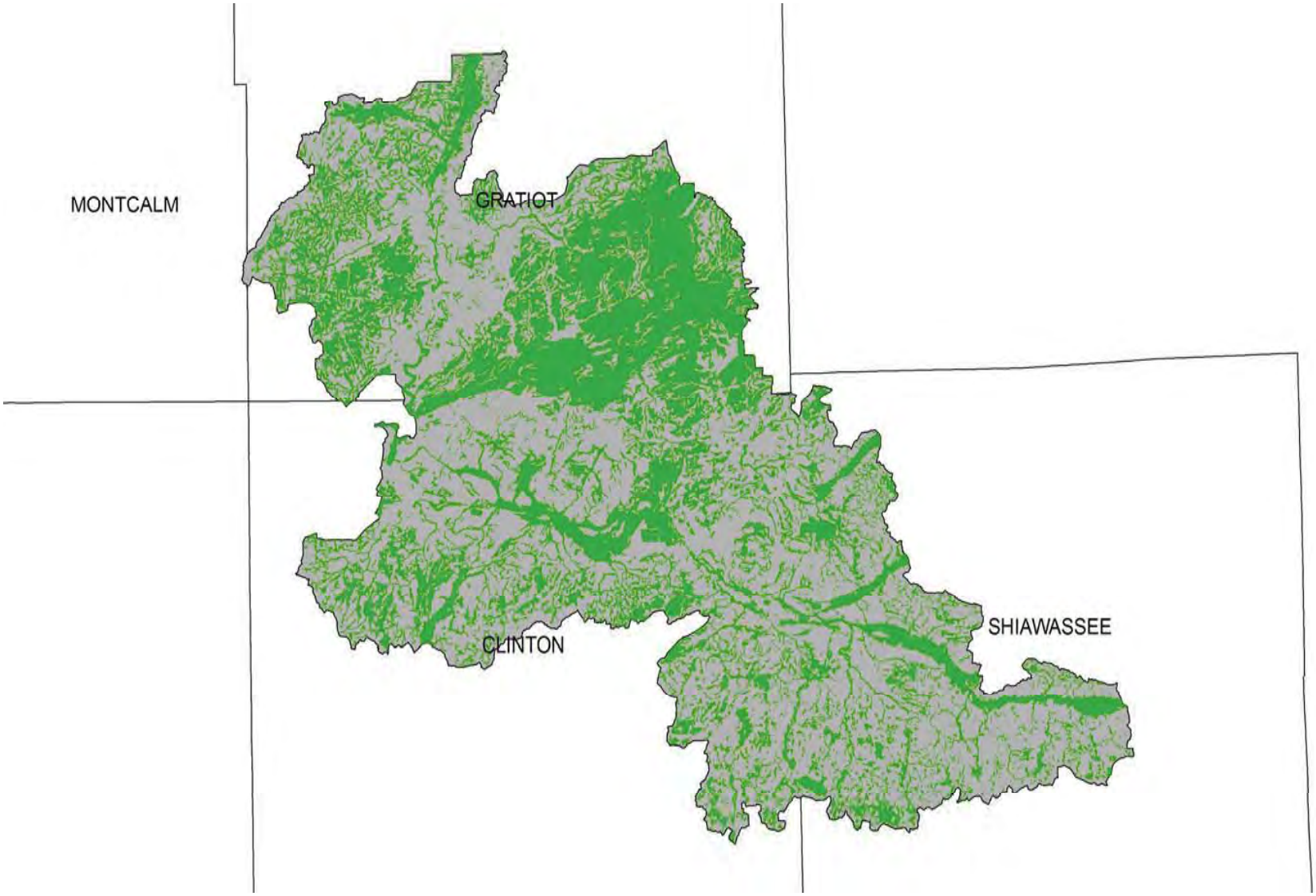
- 129,368 Acres of Wetlands
- 2,858 Polygons
- Average Size – 45 Acres

2005 Wetland Condition

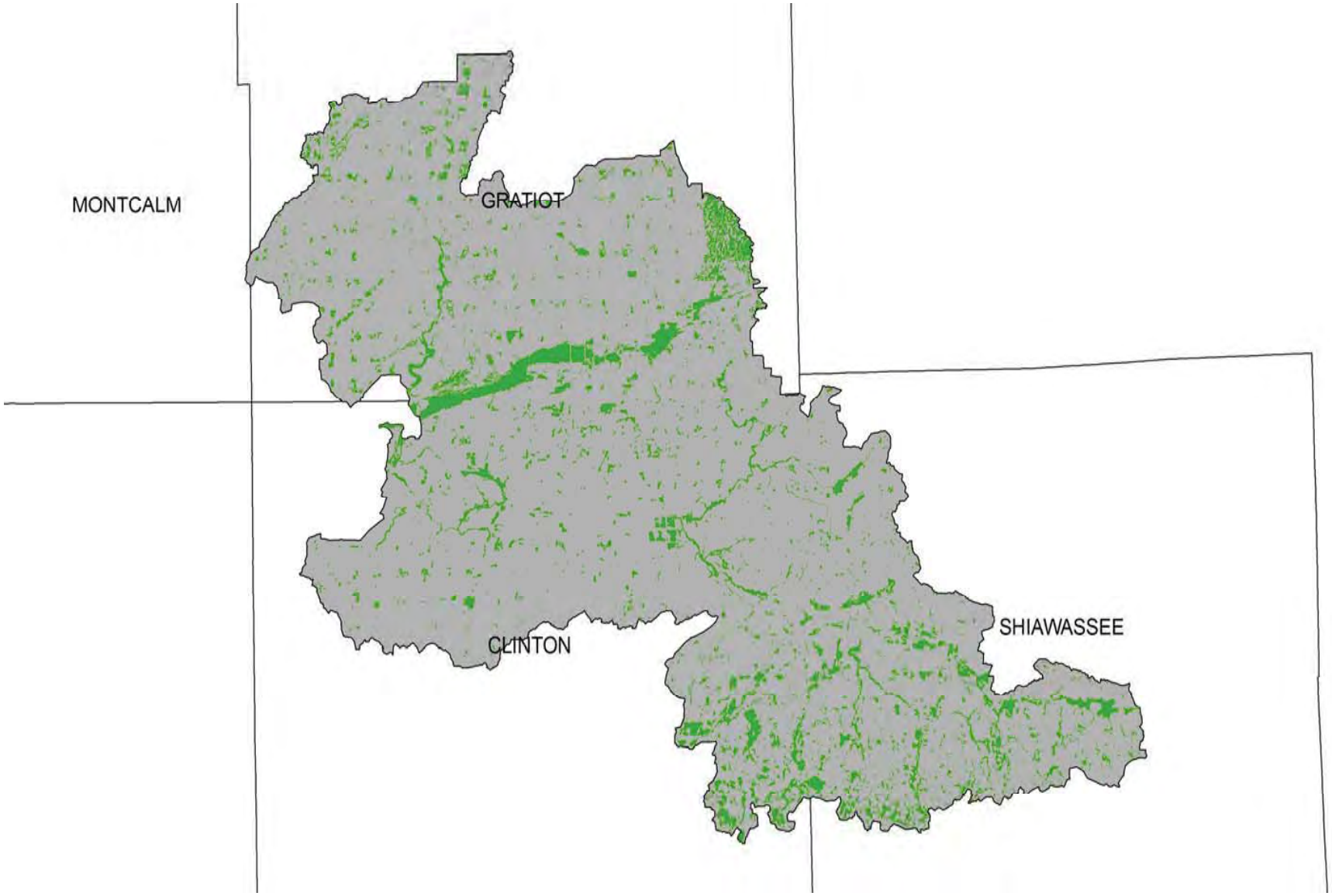
- 27,284 Acres of Wetlands
- 5,048 Polygons
- Average Size – 5.4 Acres

21% OF ORIGINAL WETLAND ACREAGE REMAINS
79% LOSS OF TOTAL WETLAND RESOURCE

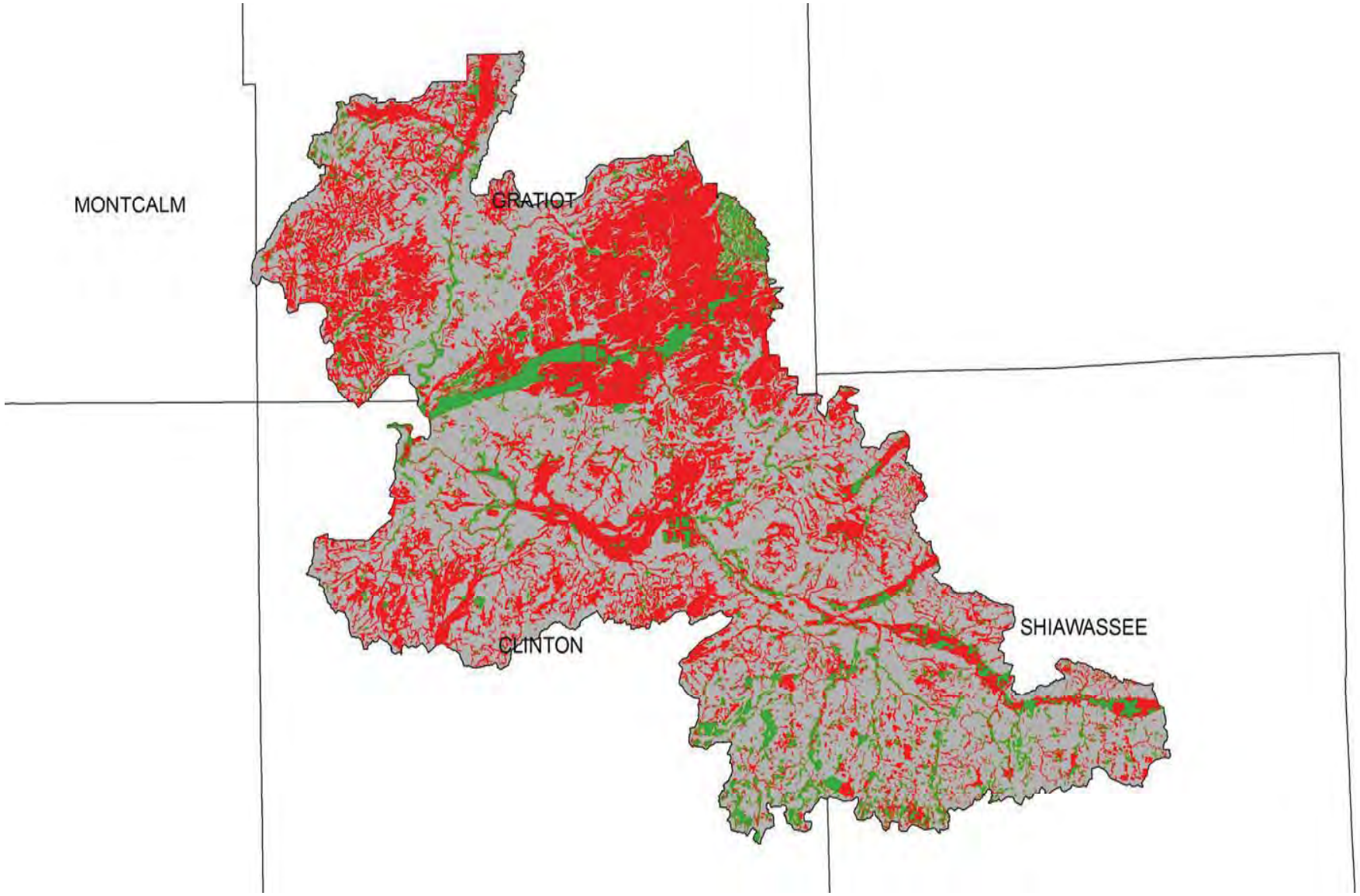
PRE-EUROPEAN SETTLEMET WETLAND COVERAGE



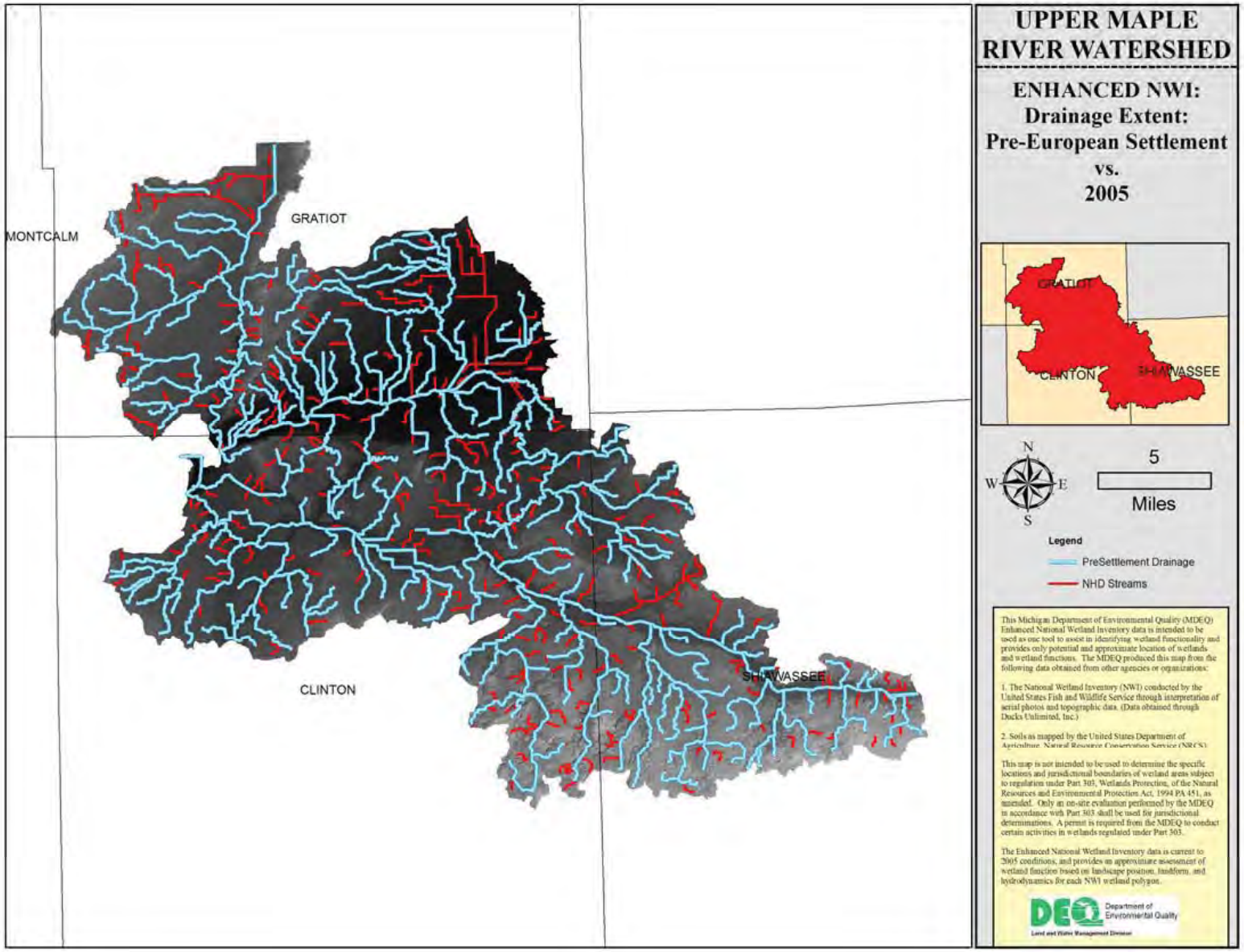
2005 WETLAND COVERAGE



APPROXIMATE WETLAND LOSS PRE-EUROPEAN SETTLEMENT TO 2005



DRAINAGE EXTENT



NWI TYPE COMPARISON

Table 1: Generalized NWI type comparison

Wetland Type	Pre-European Settlement Acres	2005 Acres of Wetlands	Net Acres Remaining
Palustrine Emergent	2,631.80	6,224.91*	236%
Palustrine Forested	123,956.10	17,646.44**	14%
Palustrine Shrub-Scrub	2,780.40***	3,146.47****	113%
Other Palustrine			
Ponds	0*****	1,234.93	100%
Total	129,368.30	28,252.75	21%

*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
***** No acreage in ponds due to mapping differences between Pre-Settlement and Current wetland coverage's.

NWI CLASSES

Table 2: 2005 NWI Classes

NWI Wetland Type	Acreage
Unconsolidated Shore	9.07
Aquatic Bed	26.88
Emergent	6,356.44
Mixed Emergent/Forested (Deciduous)	19.20
Mixed Emergent/Unconsolidated Bottom	28.05
Mixed Emergent/Scrub-Shrub (Deciduous)	61.13
Broad-Leaved Deciduous Forested	16,874.21
Needle-Leaved Deciduous Forested	154.47
Needle-Leaved Evergreen Forested	35.37
Forested Dead	18.13
Mixed Forested/Emergent (Deciduous)	363.32
Mixed Forested/Scrub Shrub (Deciduous)	200.94
Scrub-Shrub (Deciduous)	2,557.14
Mixed Scrub-Shrub/Emergent	589.33
Palustrine Unconsolidated Shore	4.00
Unconsolidated Bottom	1,234.93
Total	28,532.61
Riverine-Unconsolidated Bottom	424.16
Lacustrine-Unconsolidated Bottom	1,526.32

DETAILED FUNCTIONAL COMPARISONS

Table 3: Detailed Functional Comparisons

Function	Potential Significance	Pre-European Settlement Acreage	2005 Acreage	% Change in Acreage
Flood Water Storage	High	35,853.10	11,502.63	-68
	Moderate	89,278.03	6,952.04	-92
	Total	125,131.13	18,454.67	-85
Streamflow Maintenance	High	107,831.42	16,582.70	-85
	Moderate	14,771.56	7,107.00	-52
	Total	122,602.98	23,689.70	-81
Nutrient Transformation	High	24,976.80	19,395.85	-22
	Moderate	104,391.50	7,813.33	-93
	Total	129,368.30	27,209.18	-79
Sediment and Retention of Other Particulates	High	42,183.60	10,452.40	-75
	Moderate	170.85	10,130.48	5829 *
	Total	42,354.45	20,582.88	-51
Shoreline Stabilization	High	35,853.10	11,495.82	-68
	Moderate	83,639.77	9,338.36	-89
	Total	119,492.87	20,834.18	-83
Fish Habitat	High	119,492.84	12,835.95	-89
	Moderate	3,520.03	7,441.20	111 *
	Total	123,012.87	20,277.15	-84
Stream Shading	High	22,821.30	4,429.88	-81
	Moderate	6,650.15	1,362.10	-80
	Total	29,471.45	5,791.98	-80

* 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…

Function	Potential Significance	Pre-European Settlement Acreage	2005 Acreage	% Change in Acreage
Waterfowl/Waterbird Habitat	High	2,813.35	7,191.51	156 *
	Moderate	15,383.82	11,780.88	-23
	Total	18,197.17	18,972.39	4 *
Shorebird Habitat	High	0.00	20.62	Null *
	Moderate	127,887.30	27,245.40	-79
	Total	127,887.30	27,266.02	-79
Interior Forest Bird Habitat	High	7,720.12	5,431.90	-30
	Moderate	119,016.34	15,361.00	-87
	Total	126,736.46	20,792.90	-84
Amphibian Habitat	High	76,155.20	5,150.67	-93
	Moderate	1,697.81	4,566.50	169 *
	Total	77,853.01	9,717.17	-88
Ground Water Influence	High	0.00	0.00	Null
	Moderate	24,763.70	5,110.70	-79
	Total	24,763.70	5,110.70	-79
Conservation of Rare and Imperiled	High	Null	50.48	100
	Moderate	Null	Null	Null
	Total	Null	50.48	Null

* Increases in the moderate & high categories 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 4: 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	160,984.23	29,957.30	19	-81
Streamflow Maintenance	230,434.40	40,272.40	17	-83
Nutrient Transformation	154,345.10	46,605.03	30	-70
Sediment and Other Particulate Retention	84,538.05	31,035.28	37	-63
Shoreline Stabilization	155,345.97	32,330.00	21	-79
Fish Habitat	242,505.71	33,113.10	14	-86
Stream Shading	52,292.75	10,221.86	20	-80
Waterfowl and Waterbird Habitat	21,010.52	26,163.90	125	0 *
Shorebird Habitat	127,887.30	27,286.64	21	-79
Interior Forest Bird Habitat	134,456.58	26,224.80	20	-80
Amphibian Habitat	154,008.21	14,867.84	10	-90
Ground Water Influence	24,763.70	5,110.70	21	-79
Conservation of Rare and Imperiled	0	100.96	100	0

*An increase 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.

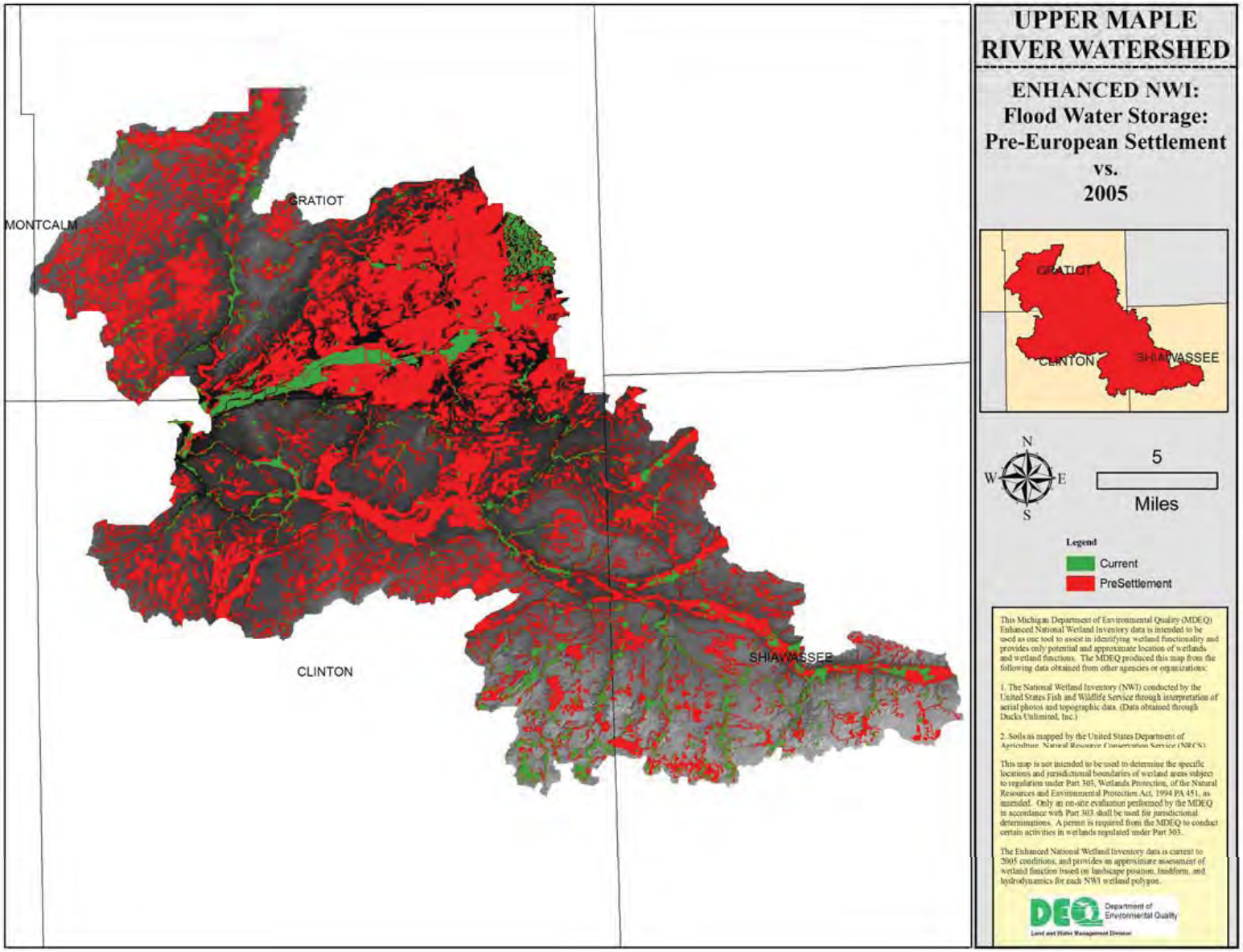
LIMITATIONS OF THE WETLAND FUNCTIONS FOR WATERSHED ASSESSMENT

- 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 2005 (green).

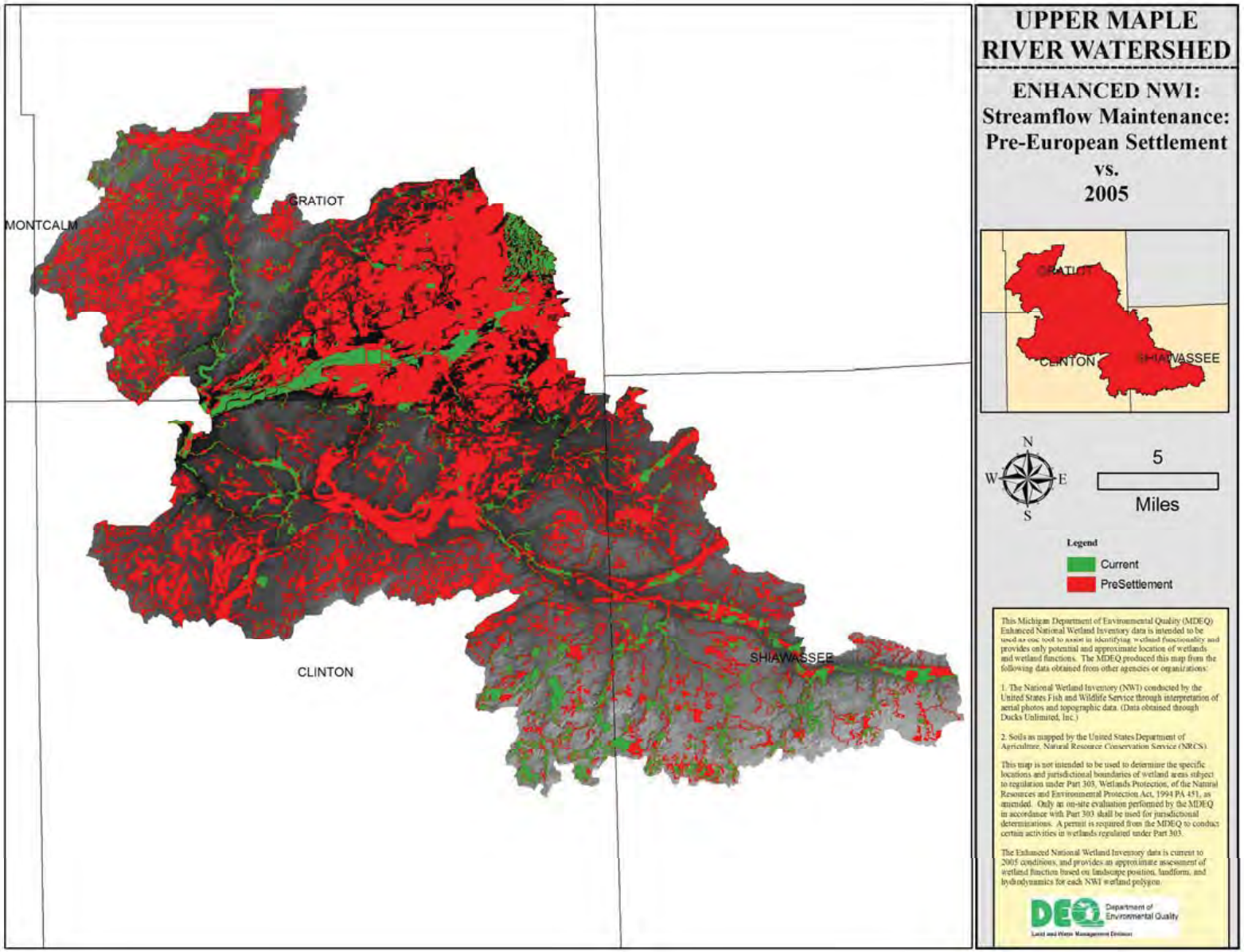
FLOOD WATER STORAGE



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 2005 (green).

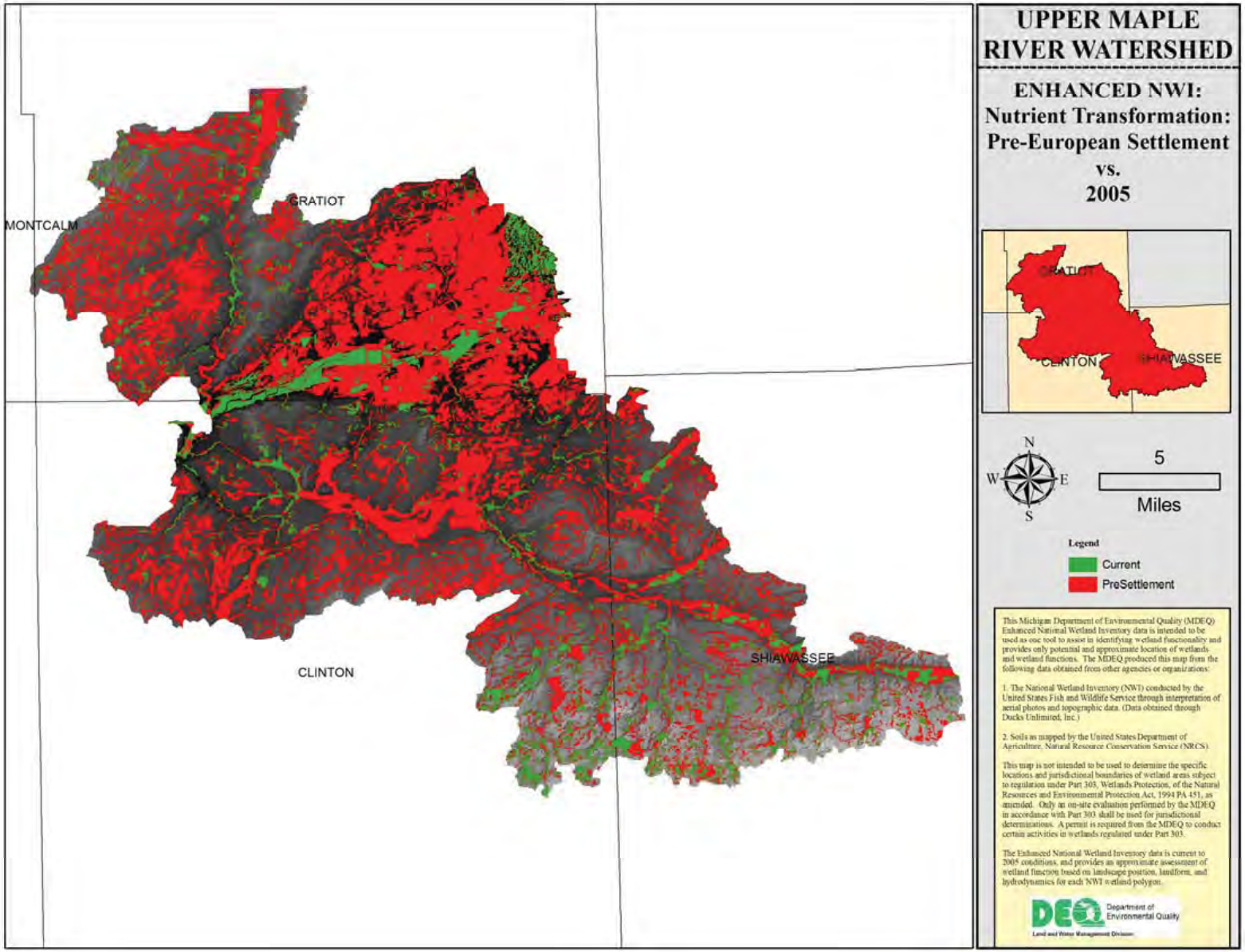
STREAMFLOW MAINTENANCE



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 2005 (green).

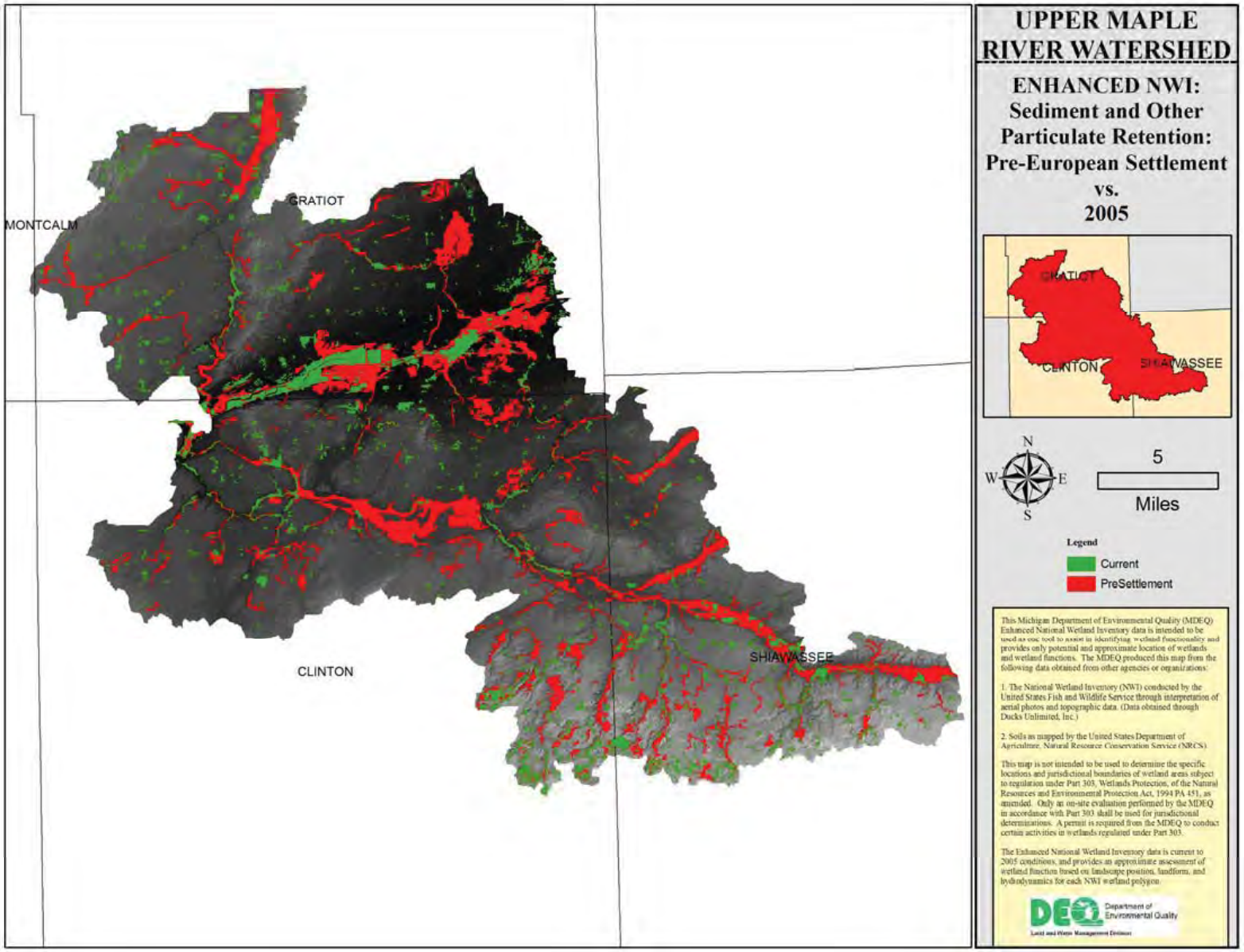
NUTRIENT TRANSFORMATION



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).

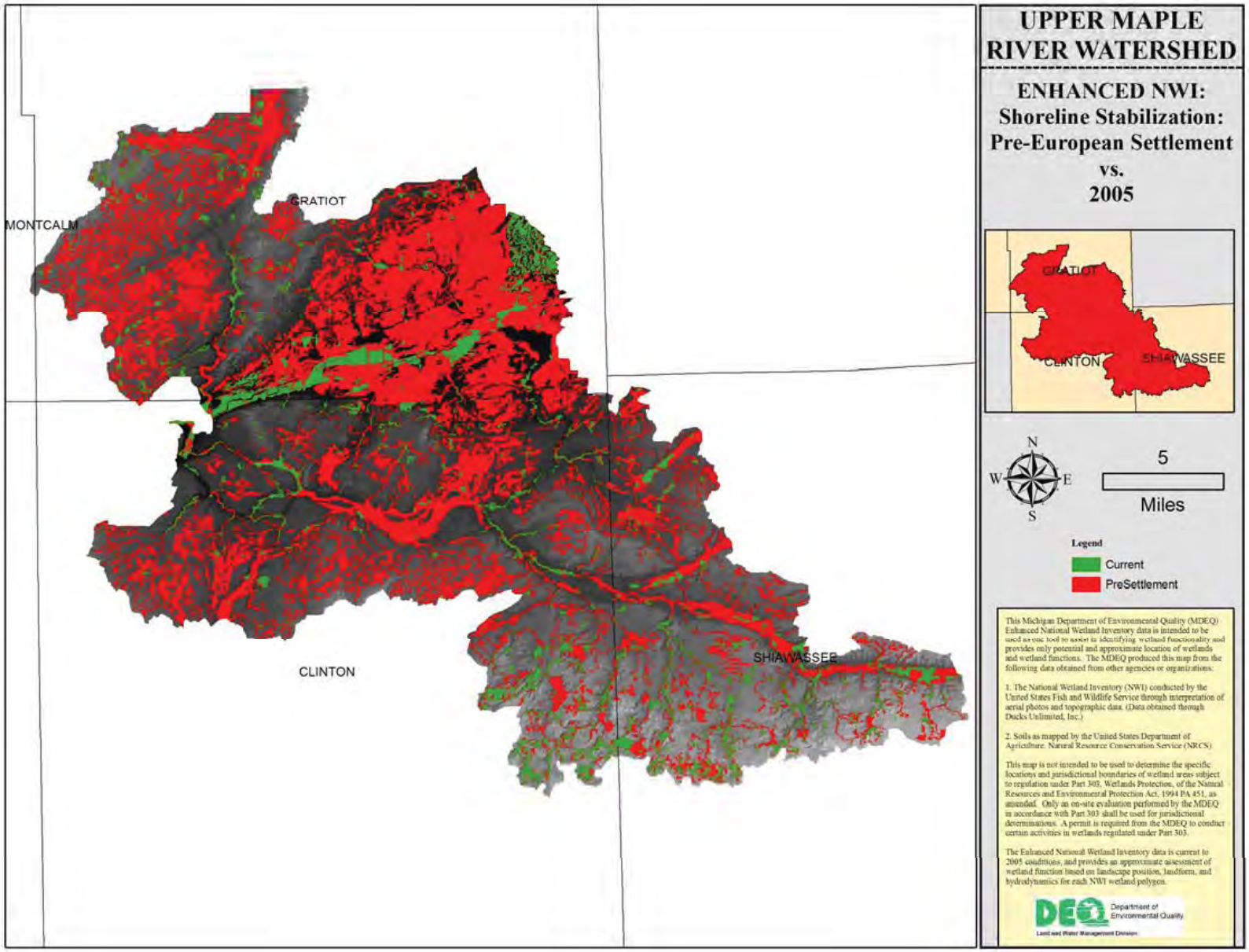
SEDIMENT AND OTHER PARTICULATE RETENTION



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 2005 (green).

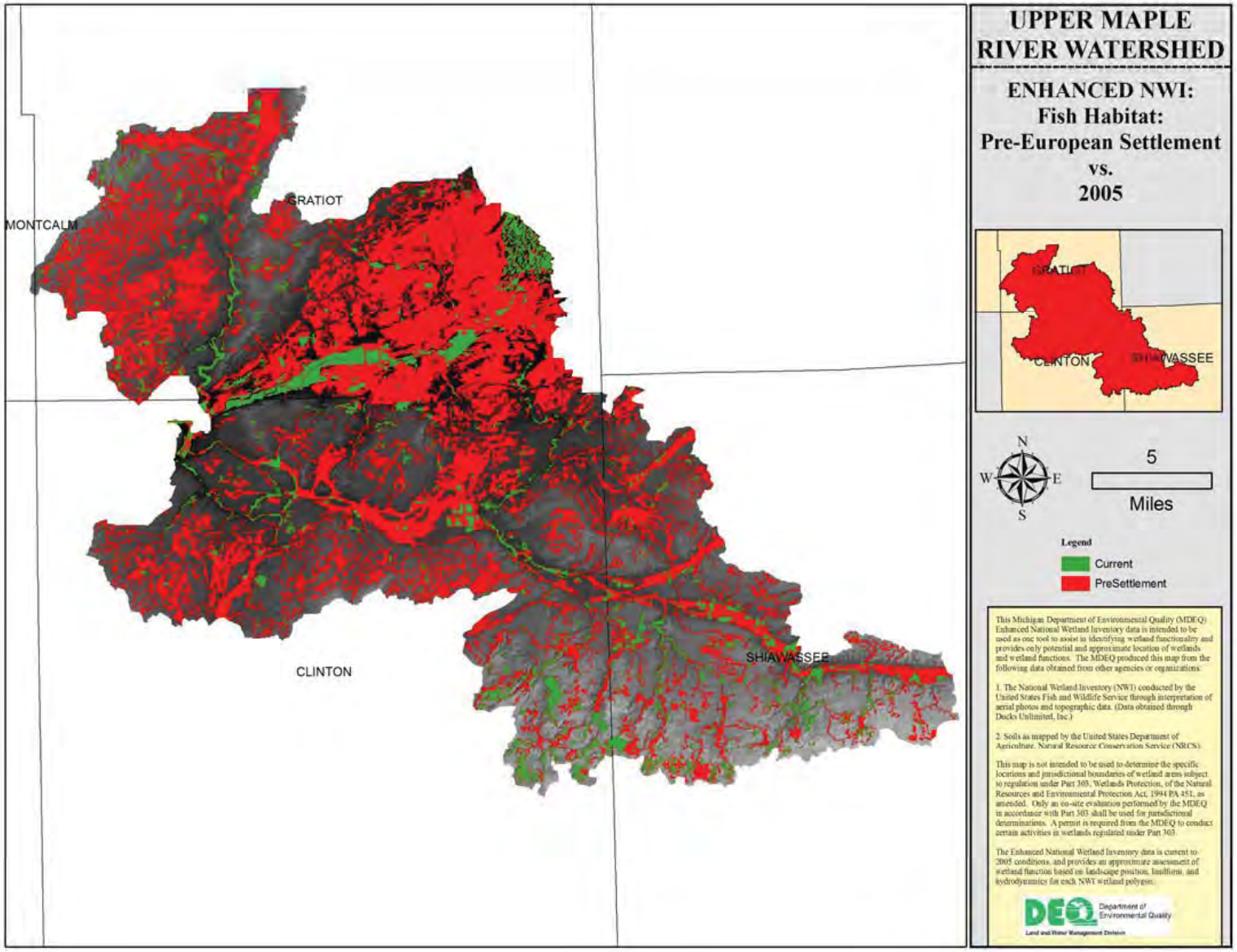
SHORELINE STABILIZATION



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.
- 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).

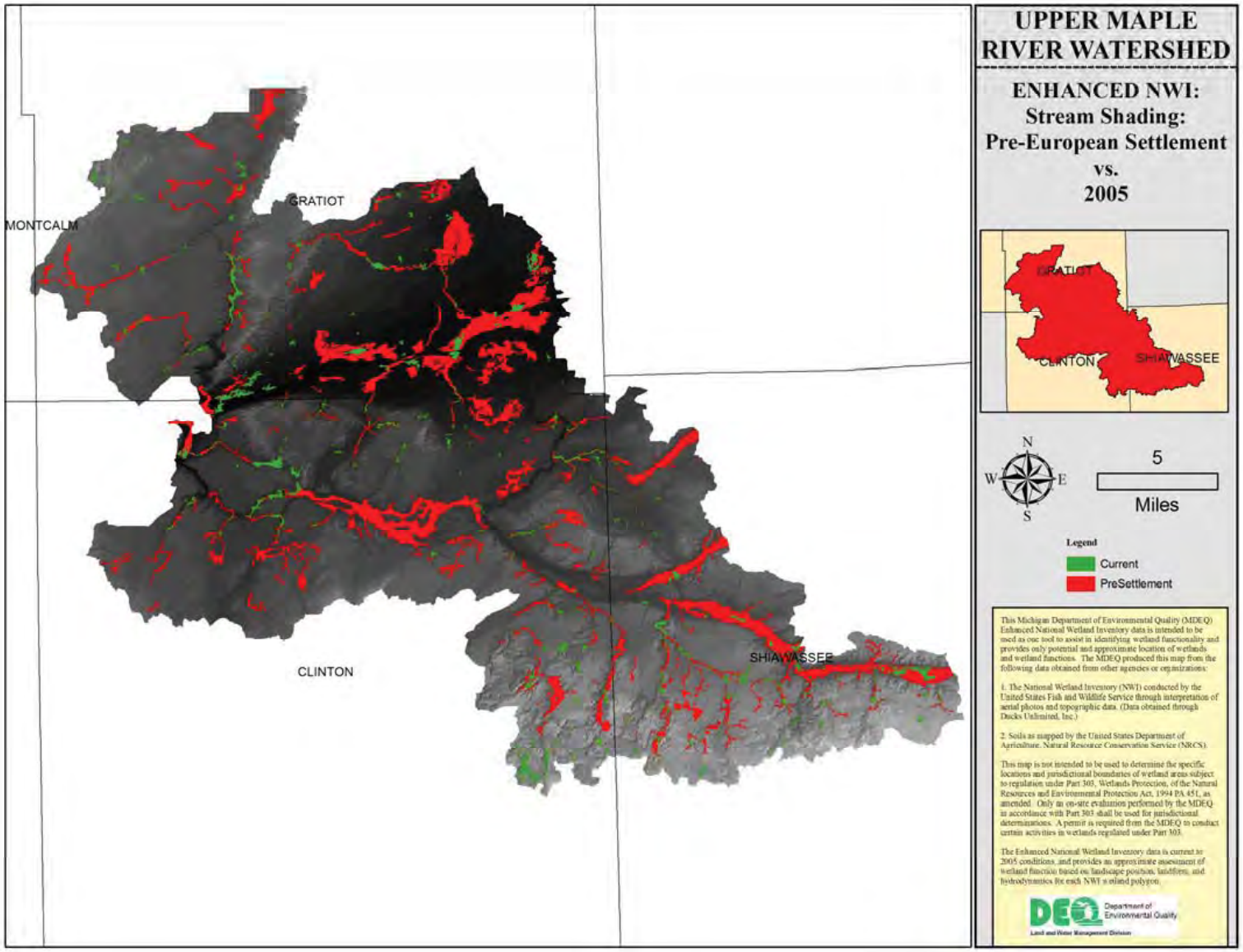
FISH HABITAT



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.
- 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).

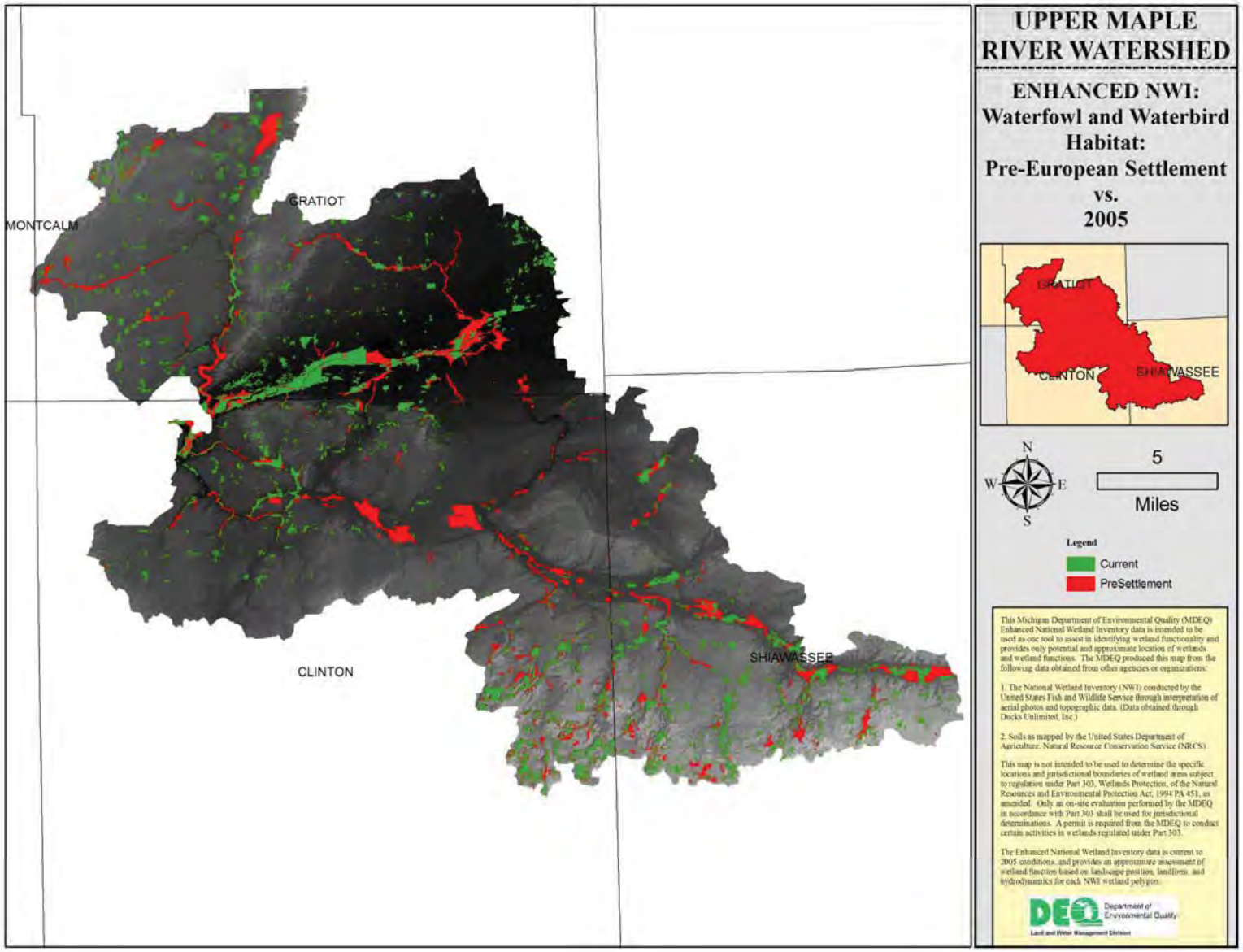
STREAM SHADING



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 2005 (green).

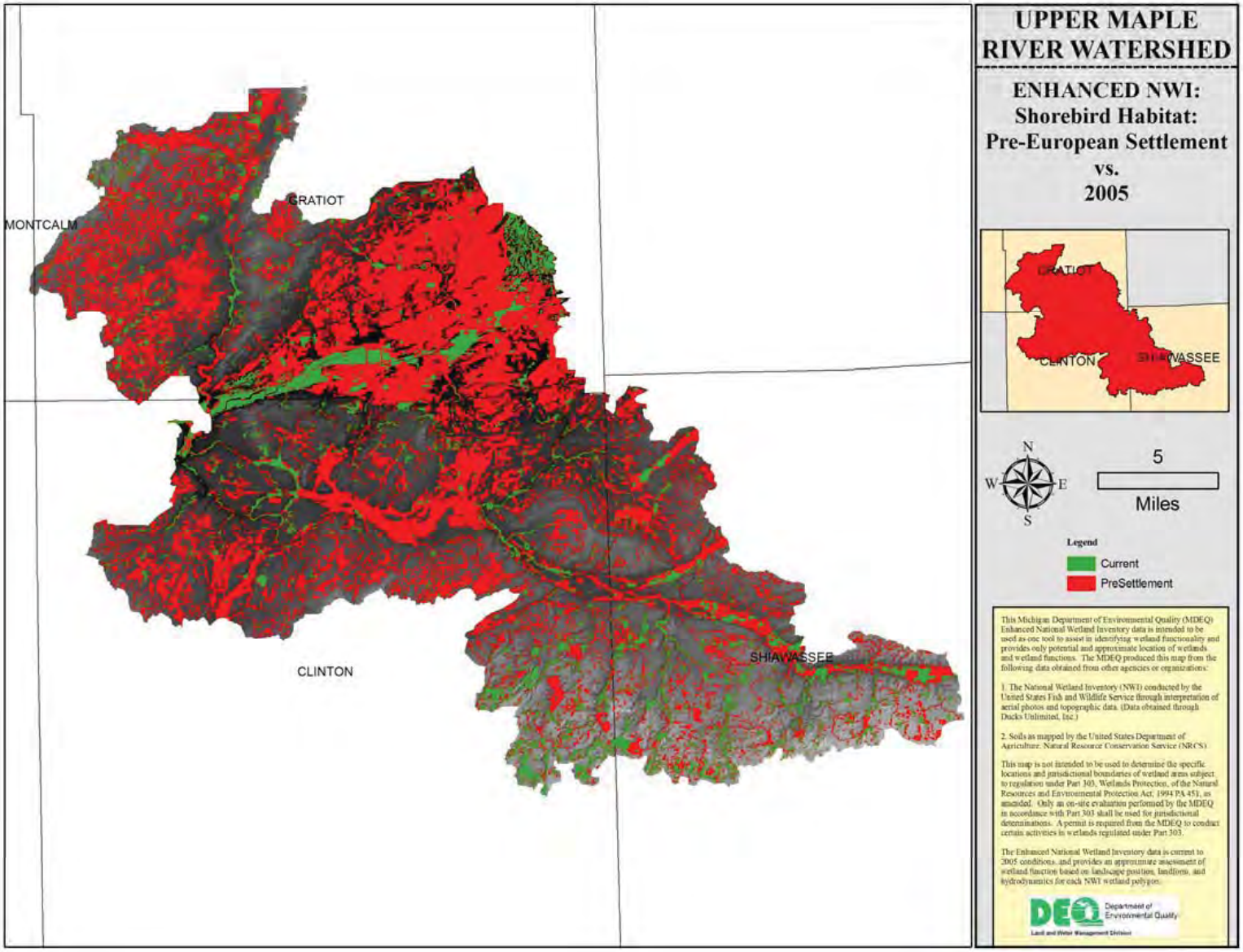
WATERFOWL & WATERBIRD HABITAT



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 2005 (green).

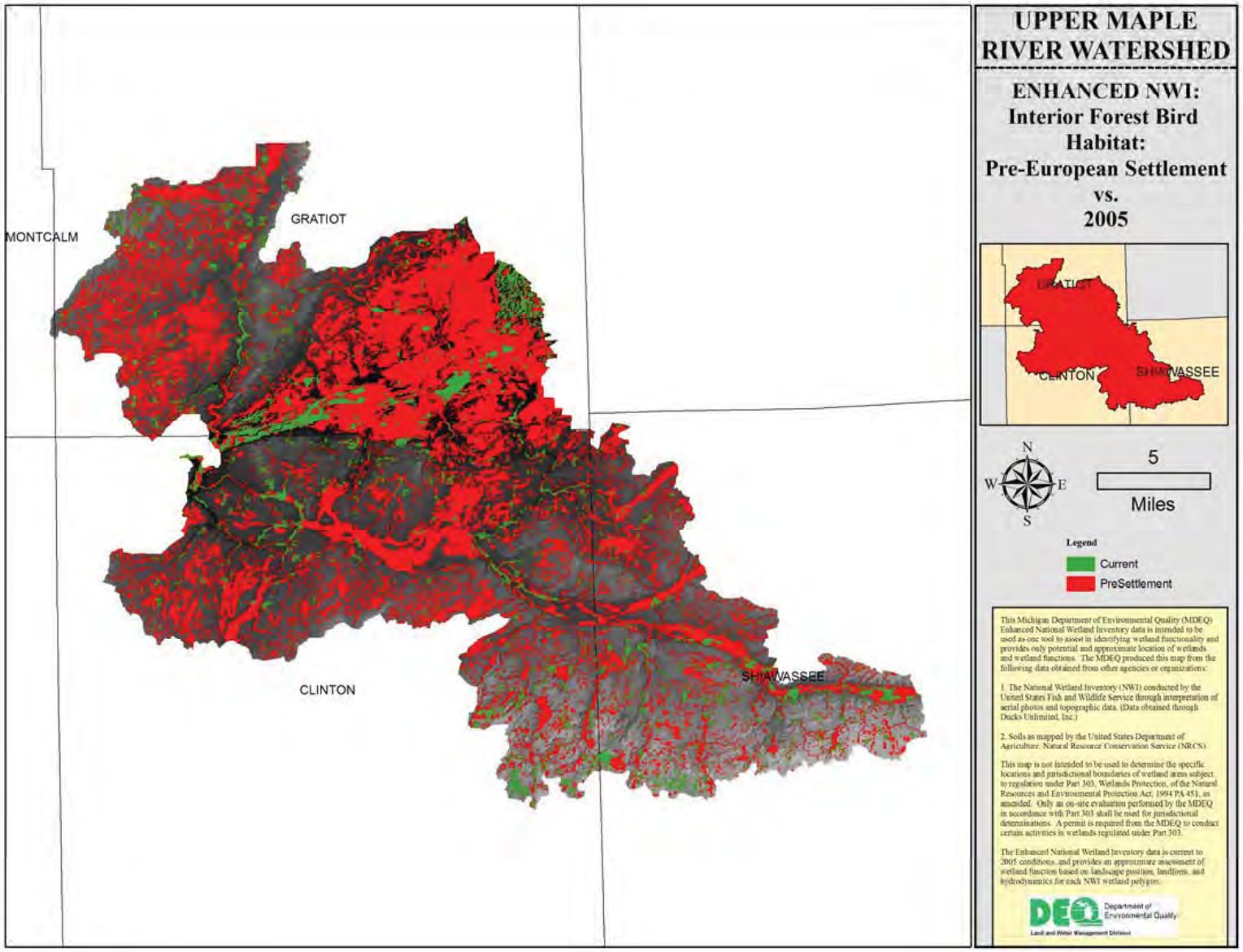
SHORE BIRD HABAITAT



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.
- 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).

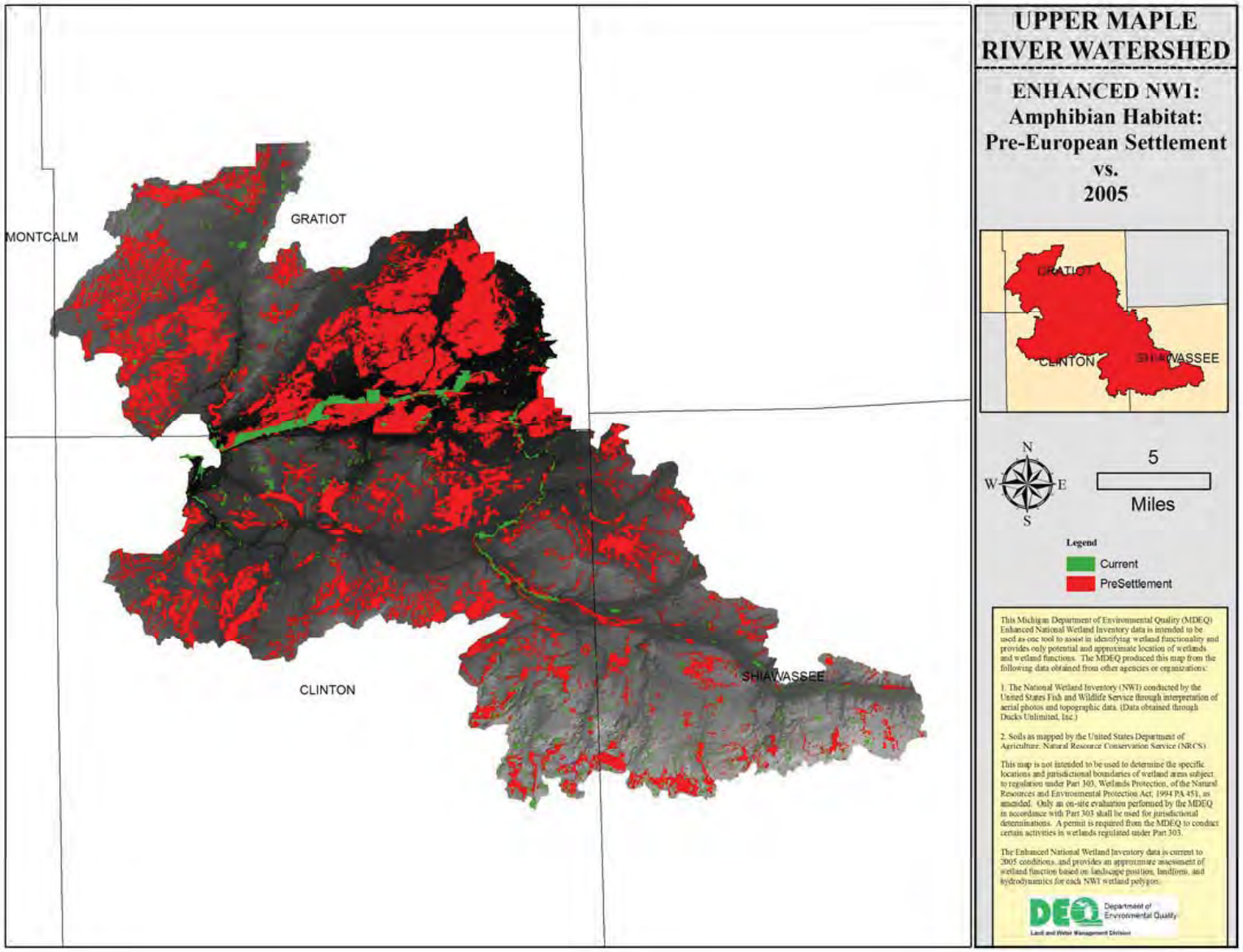
INTERIOR FOREST BIRD HABITAT



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.
- 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).

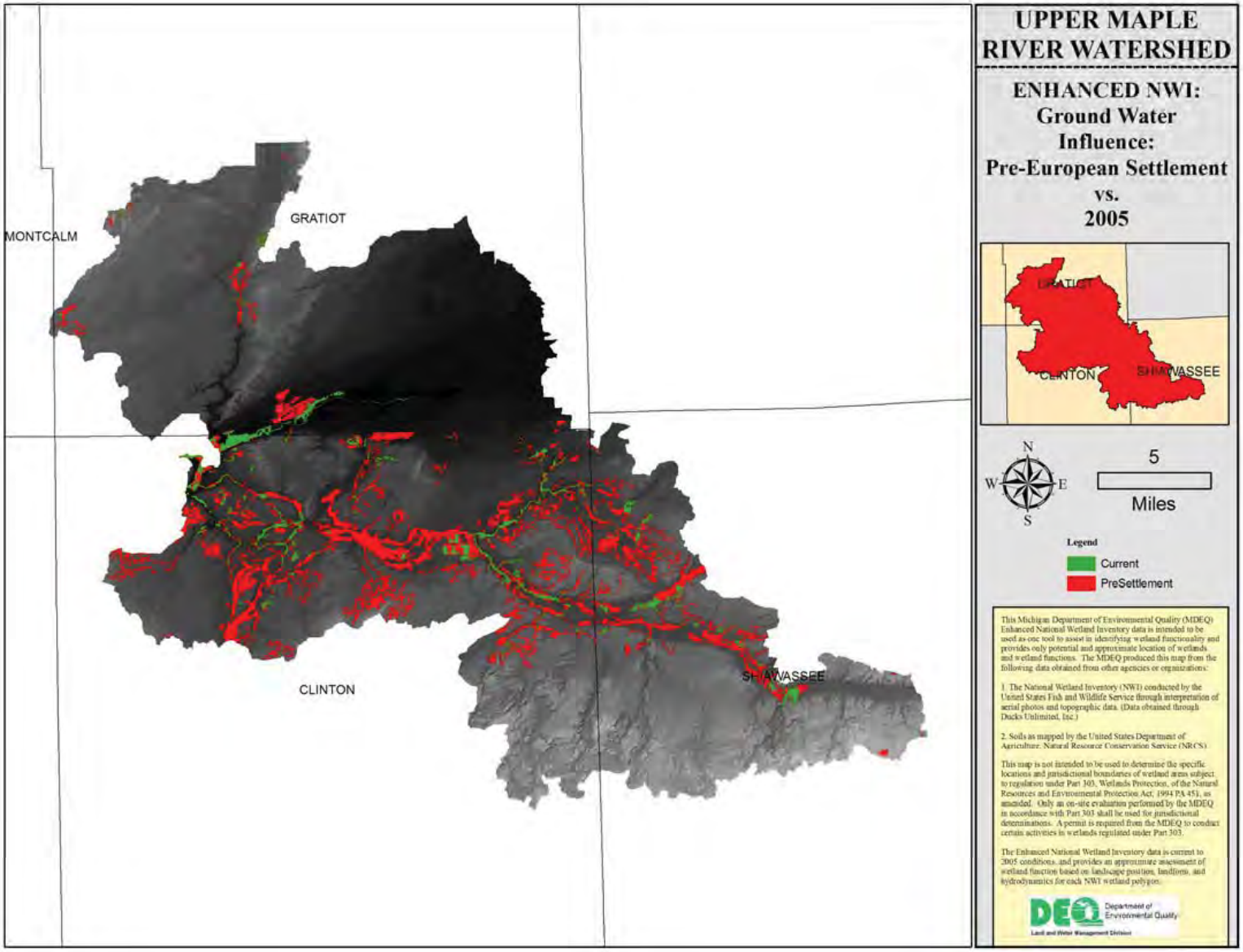
AMPHIBIAN HABITAT



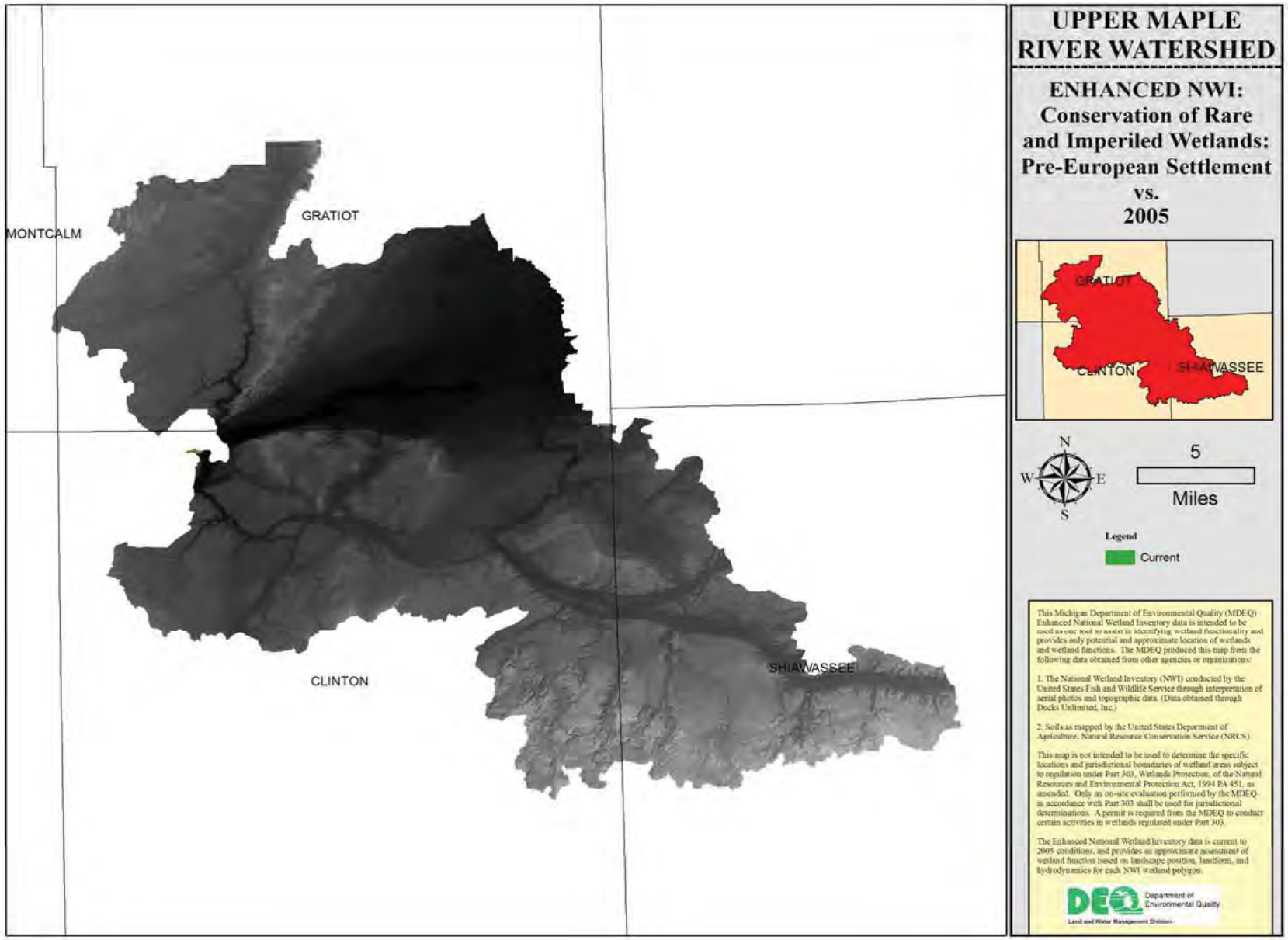
GROUND WATER INFLUENCE

- 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. Due 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 level of significance above that of wetlands not designated. Wetlands deemed to be performing this function are mapped in (green) circa 2005.

CONSERVATION OF RARE AND IMPERILED WETLANDS