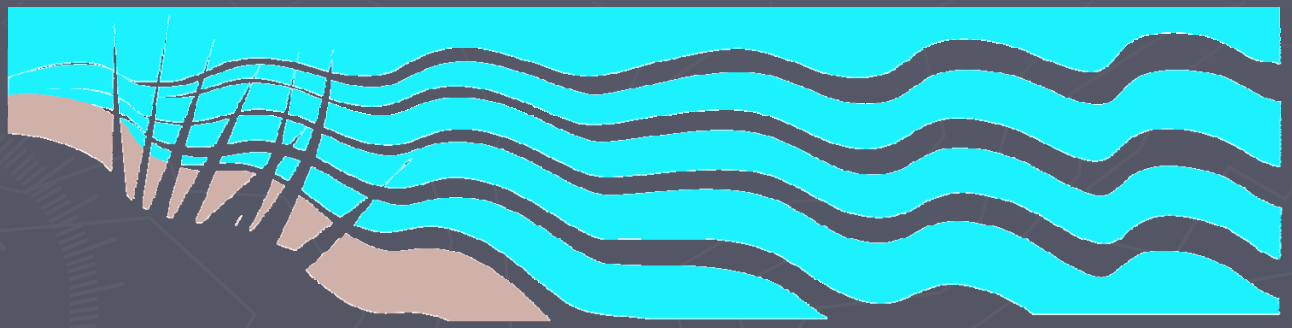
Lower Grand River Organization of Watersheds (LGROW)



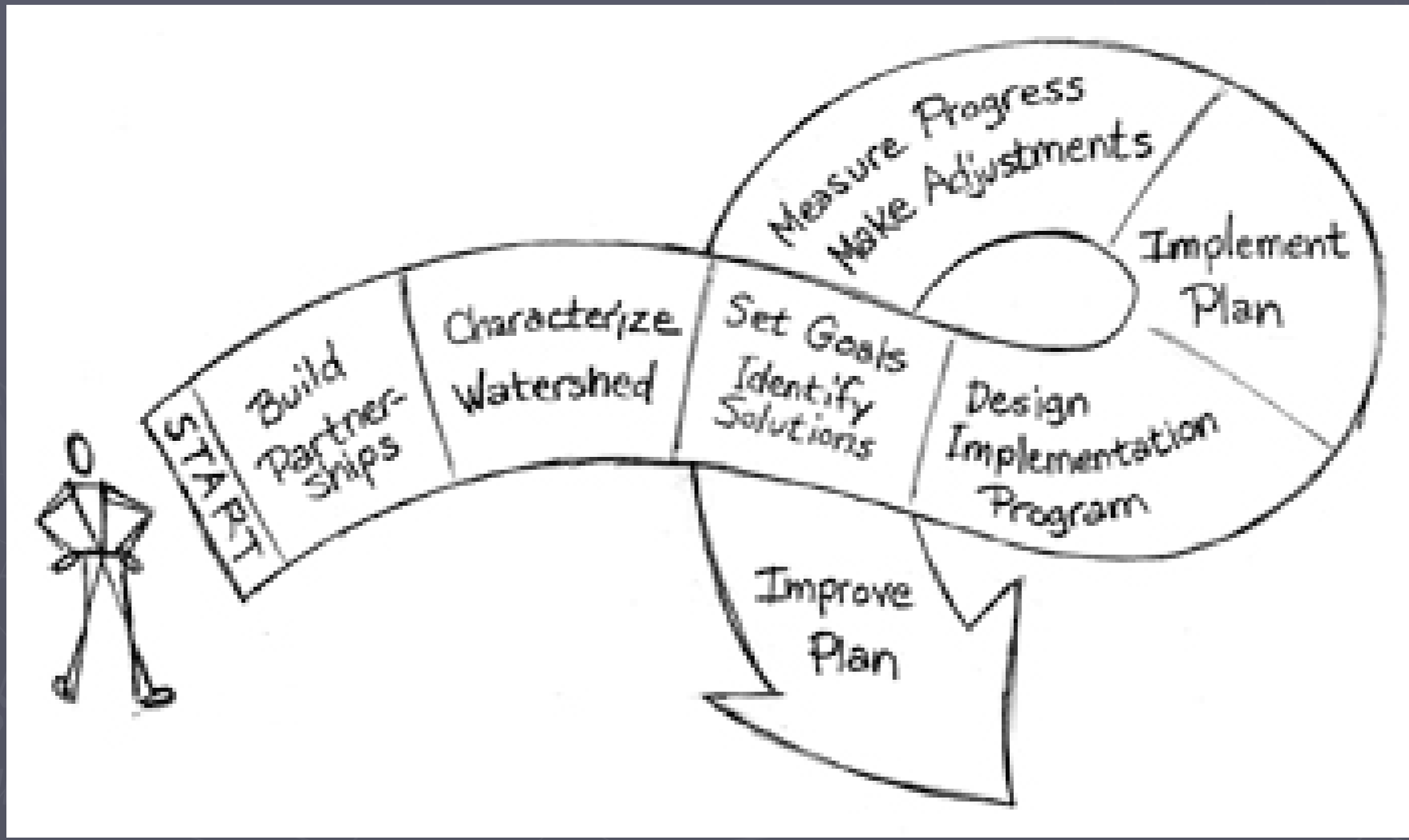
Summary of the Lower Grand River Watershed Management Plan (WMP)
November 1, 2010

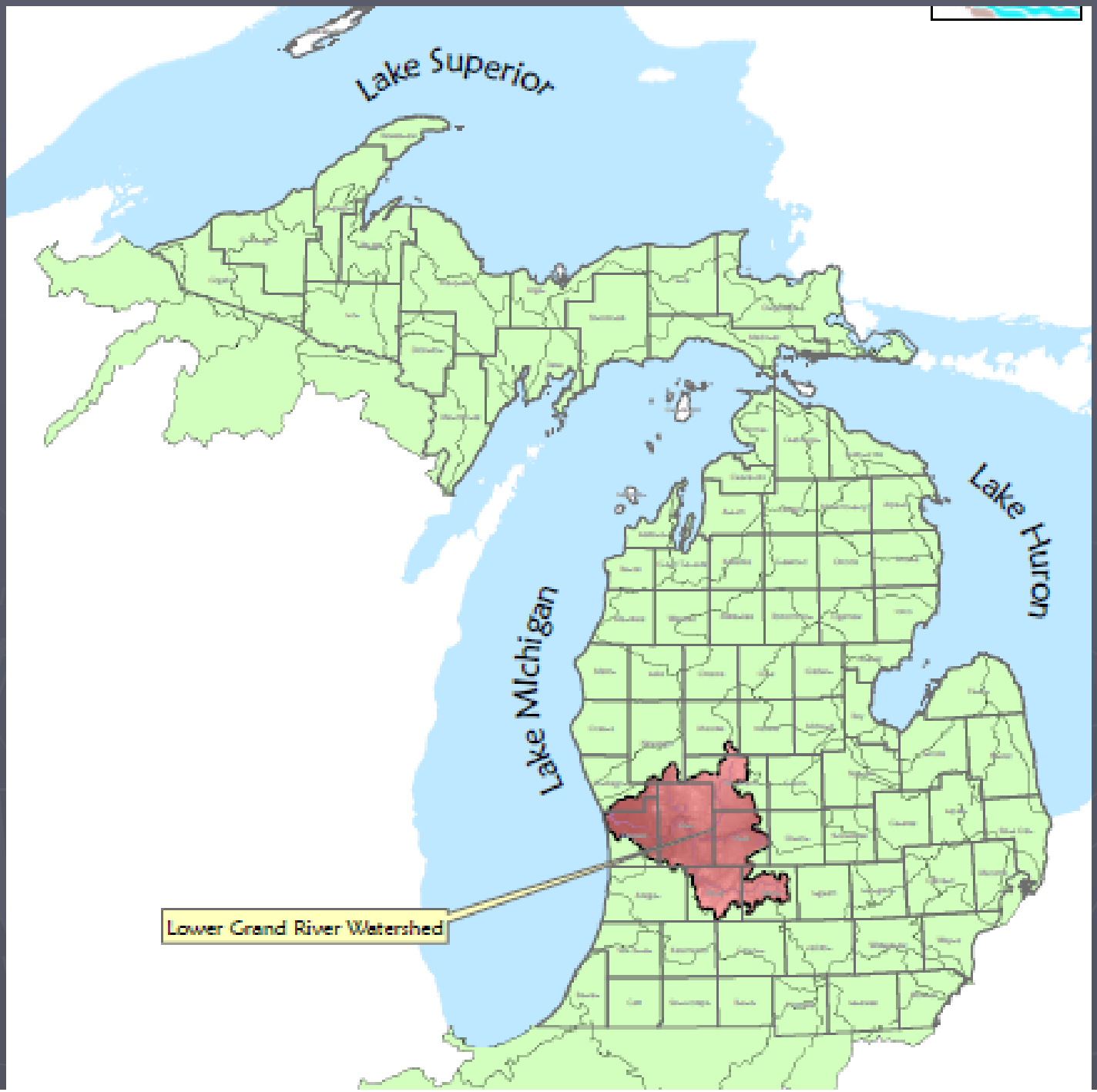
Mission and Vision

- **MISSION** of the Watershed: *Discover and restore all water resources and celebrate our shared water legacy throughout our entire Grand River Watershed community.*

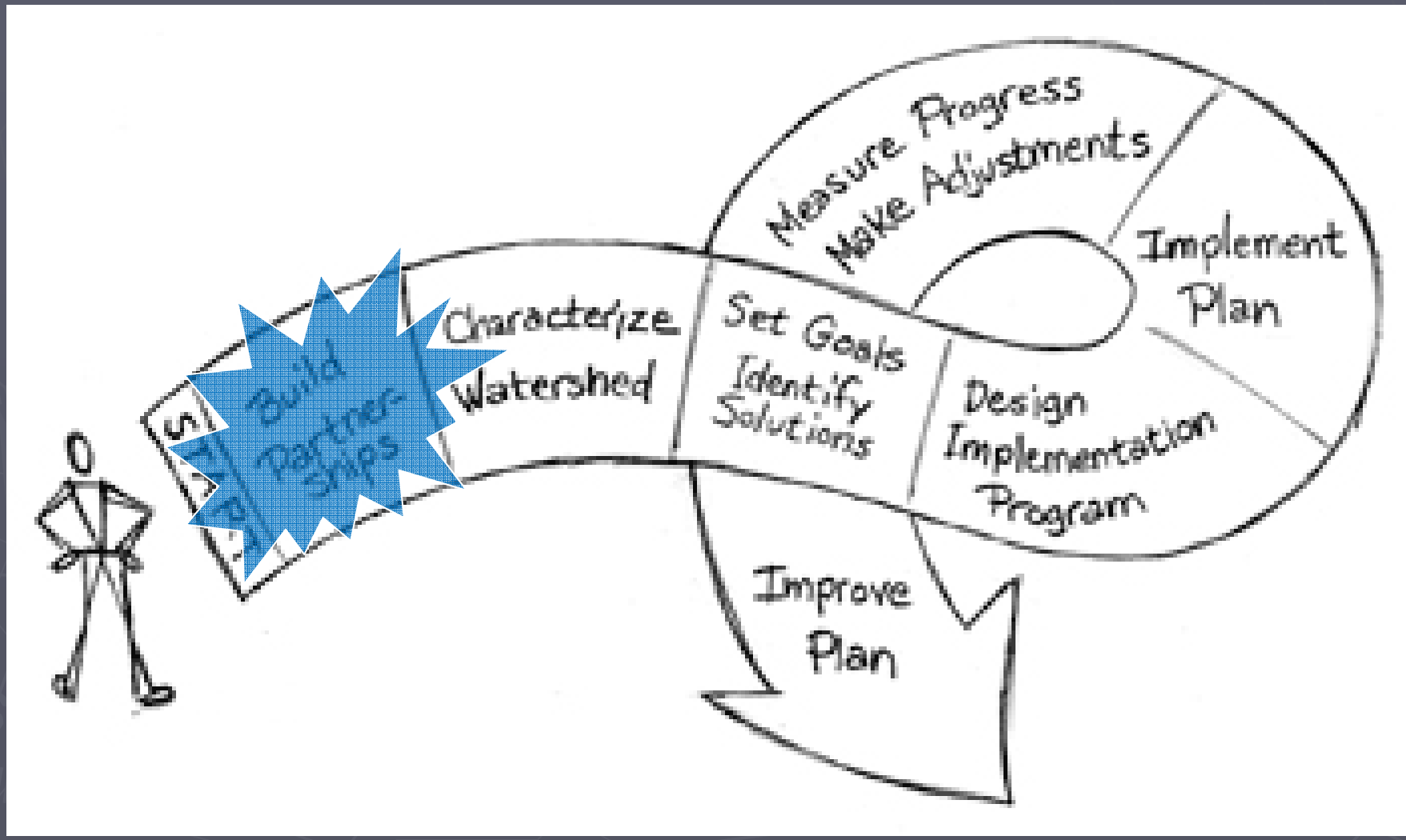
- Our **VISION** for the Watershed: *Swimming, drinking, fishing, and enjoying our Grand River Watershed: Connecting water with life.*

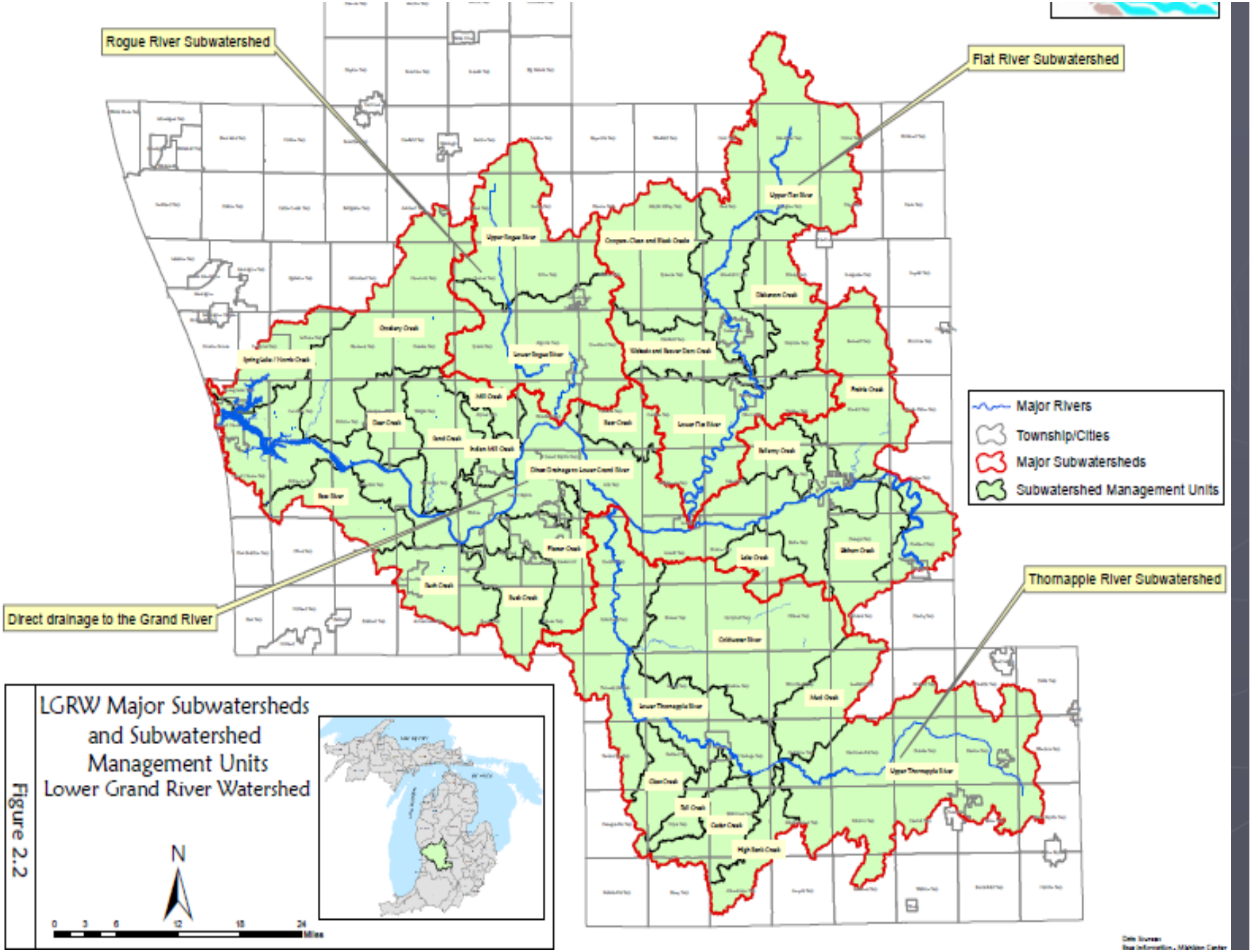
Watershed Management Process



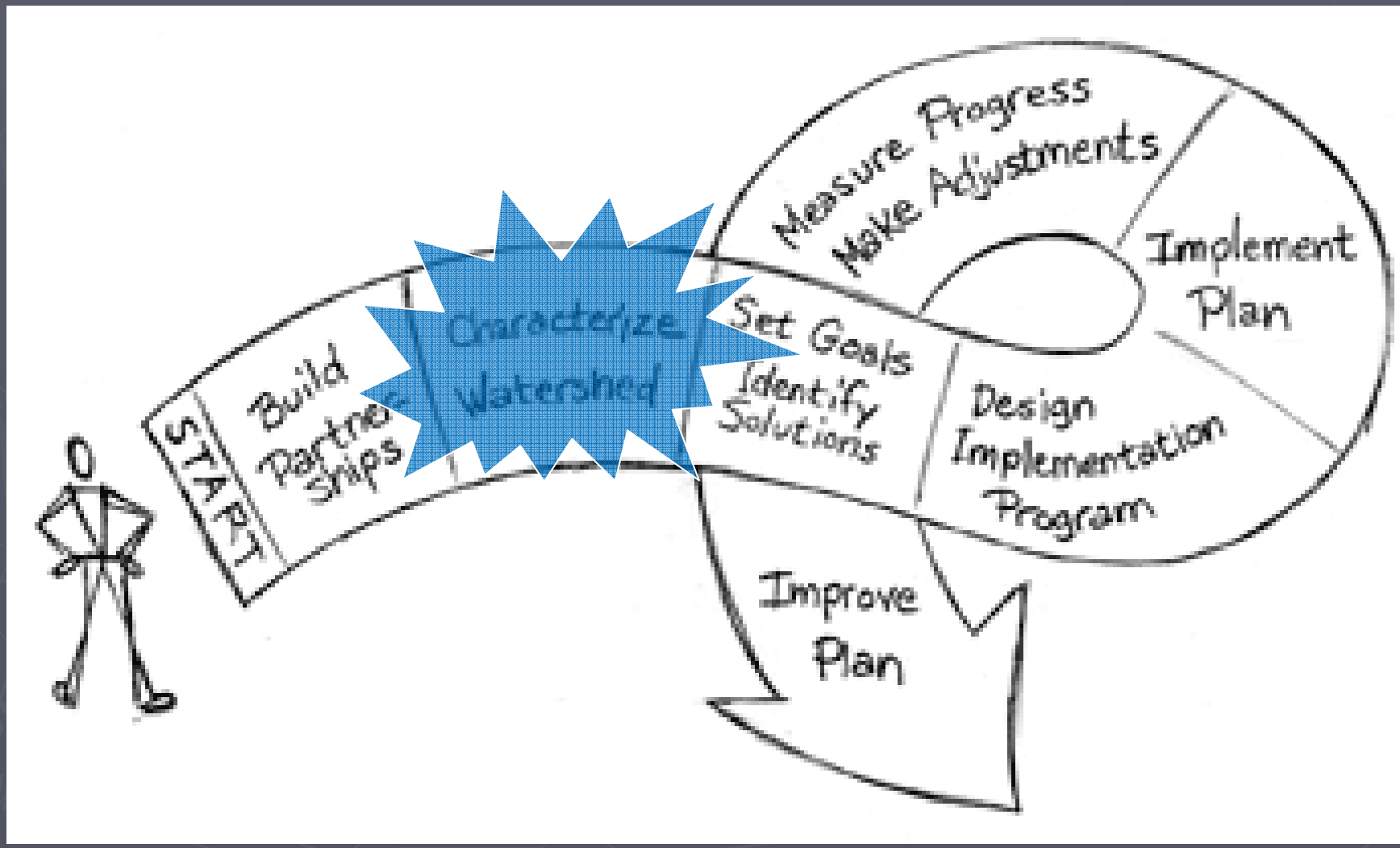

Lake Superior
Lake Michigan
Lake Huron
Lower Grand River Watershed

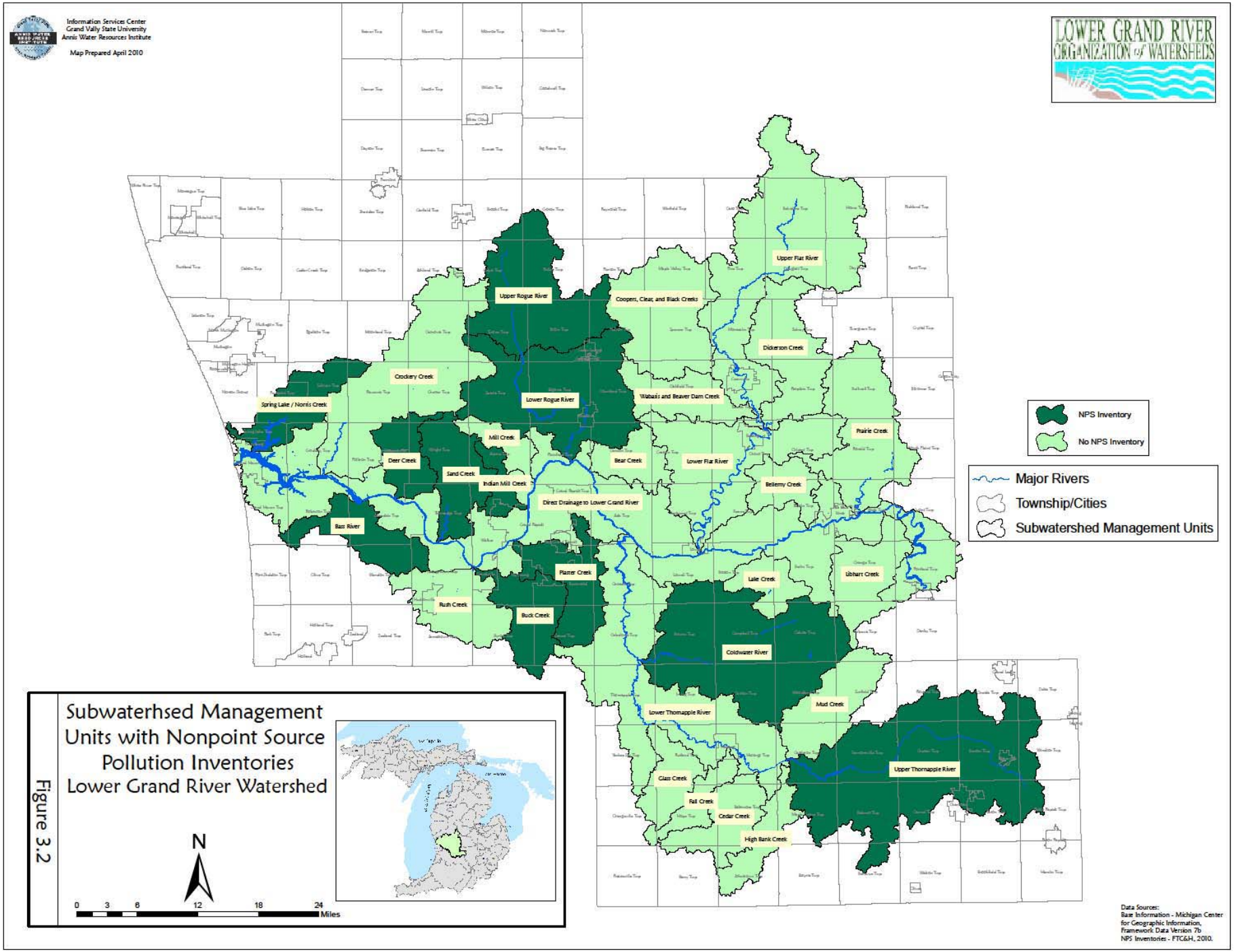
Watershed Management Process



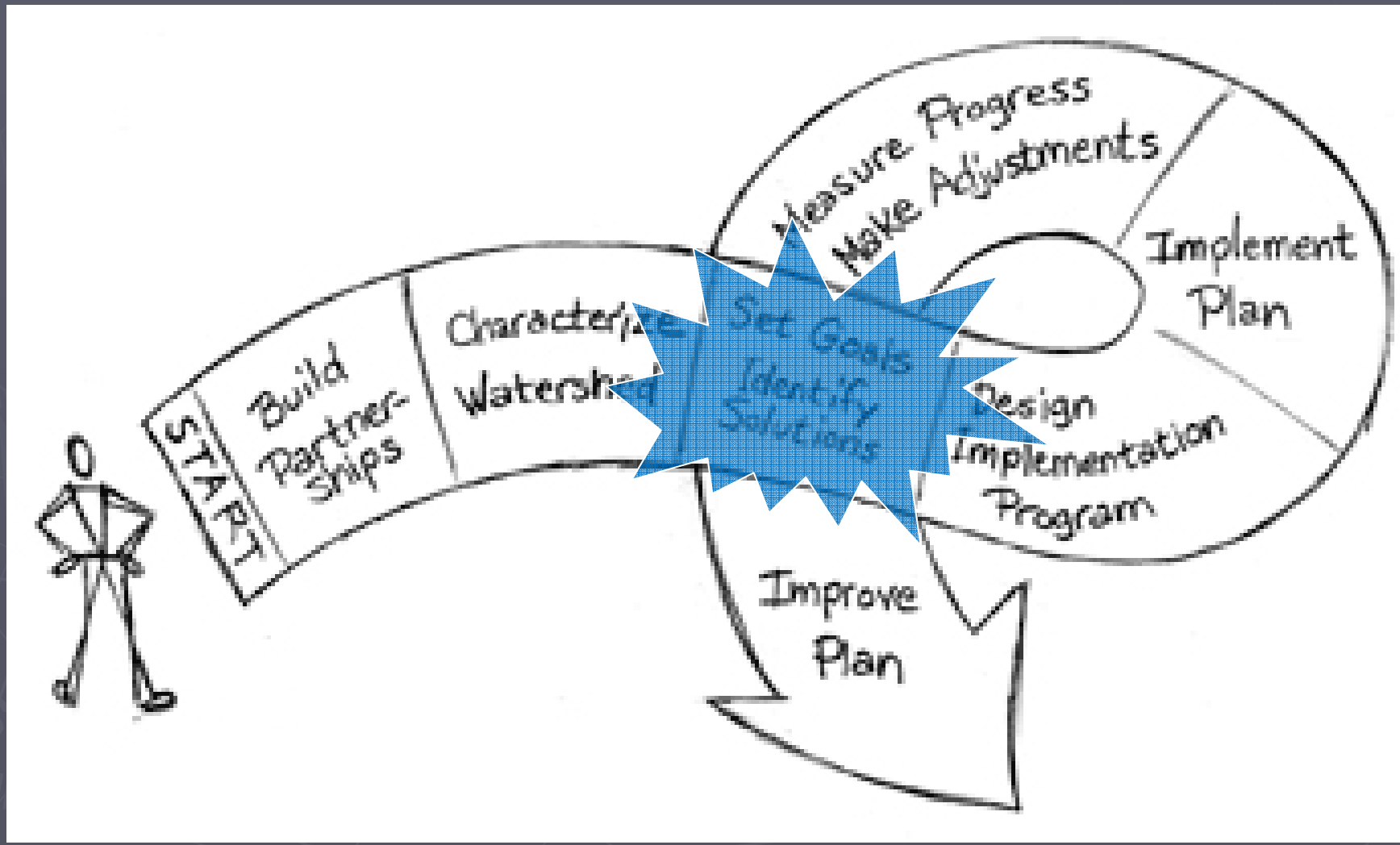

Rogue River Subwatershed
Flat River Subwatershed
Thornapple River Subwatershed
Direct drainage to the Grand River
Major Rivers
Township/Cities
Major Subwatersheds
Subwatershed Management Units
Figure 2.2
LGRW Major Subwatersheds and Subwatershed Management Units
Lower Grand River Watershed
N
0 3 6 12 18 24
Miles

Watershed Management Process



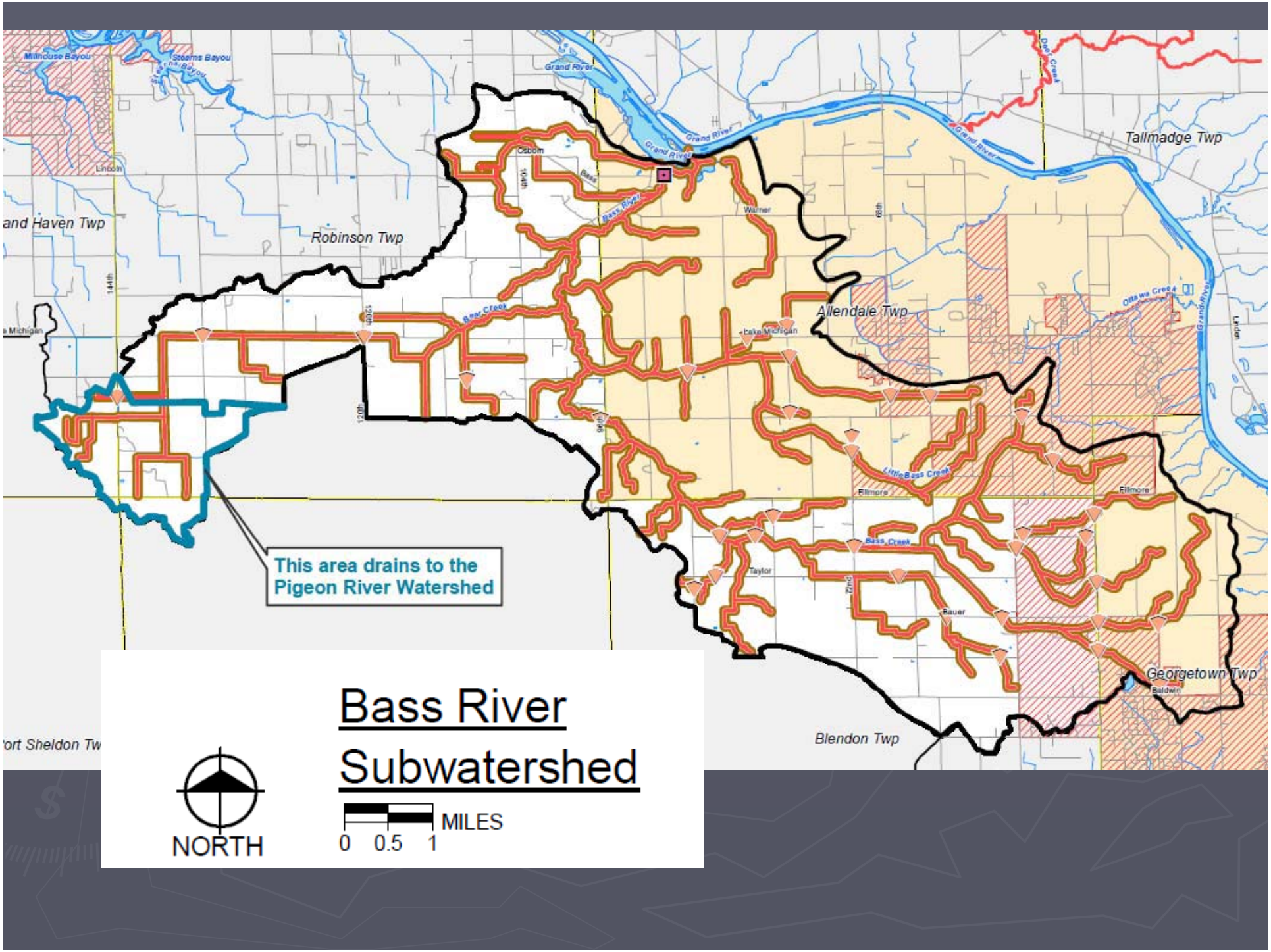

Information Services Center
Grand Valley State University
Annis Water Resources Institute
Map Prepared April 2010
LOWER GRAND RIVER ORGANIZATION of WATERSHEDS
Upper Rogue River
Coopers, Clear, and Black Creeks
Upper Flat River
Dickerson Creek
Crockery Creek
Spring Lake / Norris Creek
Lower Rogue River
Wabasis and Beaver Dam Creek
Prairie Creek
Mill Creek
Deer Creek
Bear Creek
Lower Flat River
Sand Creek
Indian Mill Creek
Bellamy Creek
Direct Drainage to Lower Grand River
Bass River
Plaster Creek
Lake Creek
Ubhart Creek
Ruth Creek
Buck Creek
Coldwater River
Mud Creek
Lower Thornapple River
Upper Thornapple River
Glass Creek
Fall Creek
Cedar Creek
High Bank Creek
NPS Inventory
No NPS Inventory
Major Rivers
Township/Cities
Subwatershed Management Units
Figure 3.2
Subwaterhsed Management Units with Nonpoint Source Pollution Inventories
Lower Grand River Watershed
N
0 3 6 12 18 24
Miles
Data Sources:
Base Information - Michigan Center for Geographic Information, Framework Data Version 7b
NPS Inventories - FTC&H, 2010.

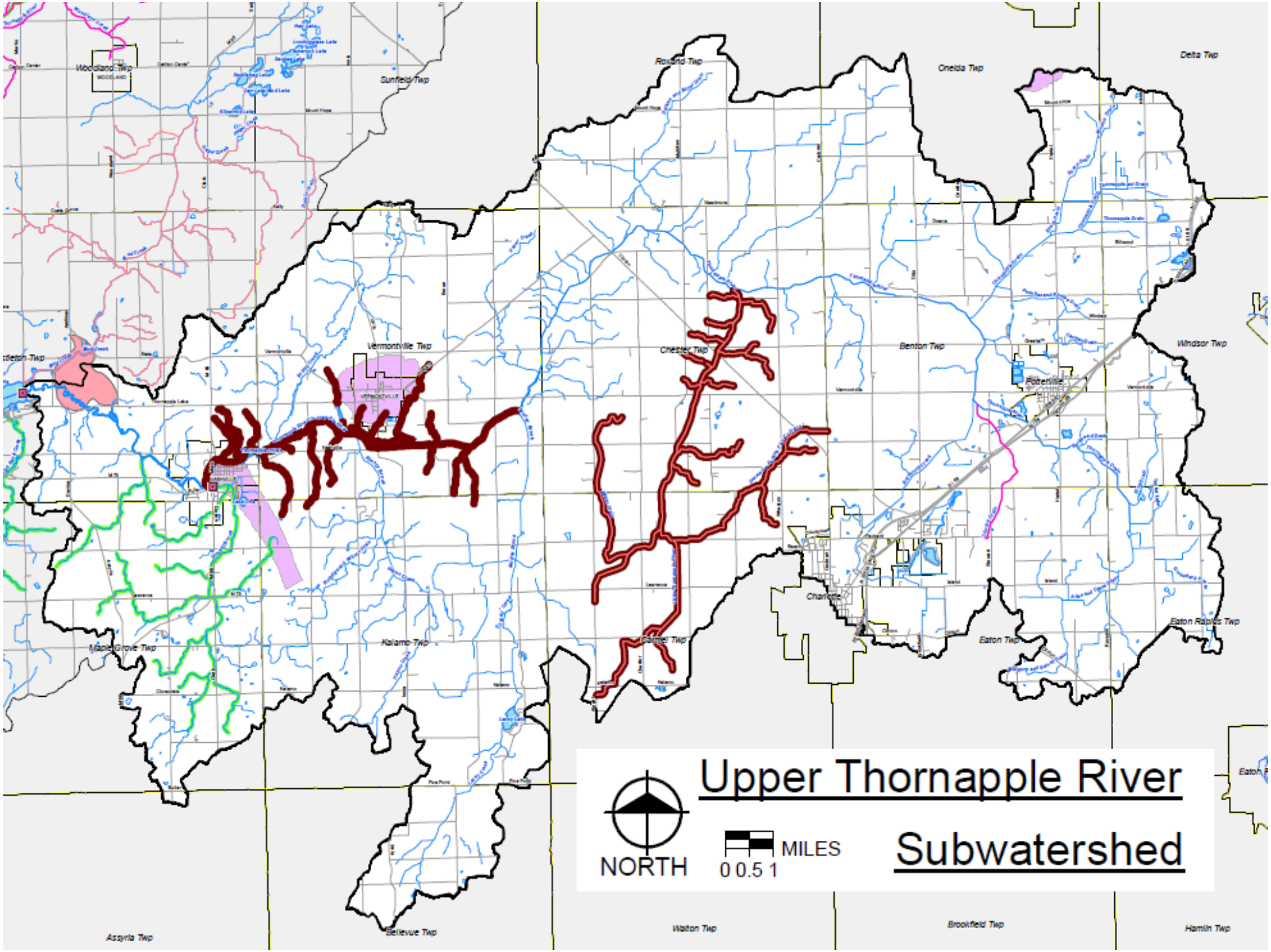
Watershed Management Process

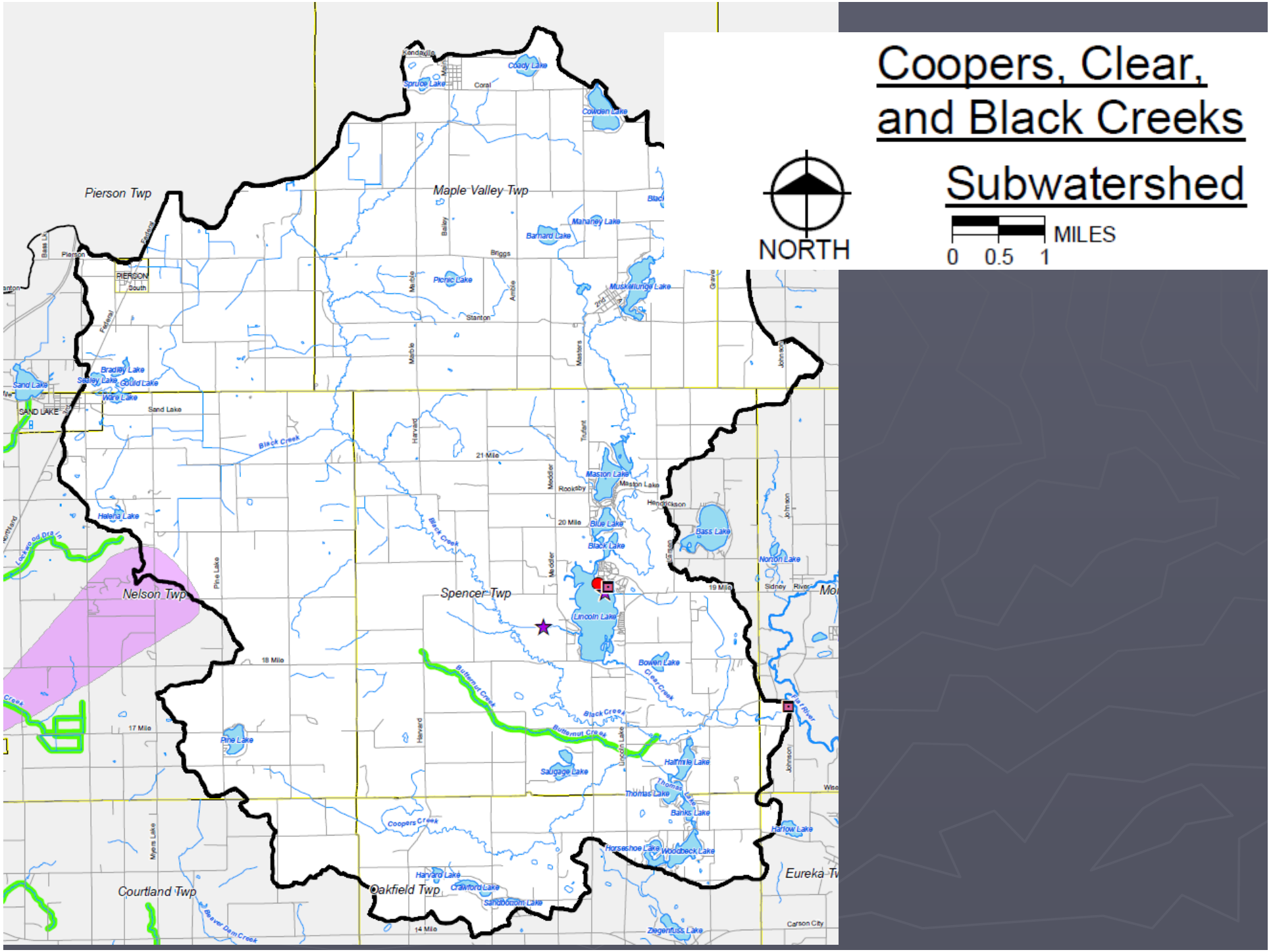


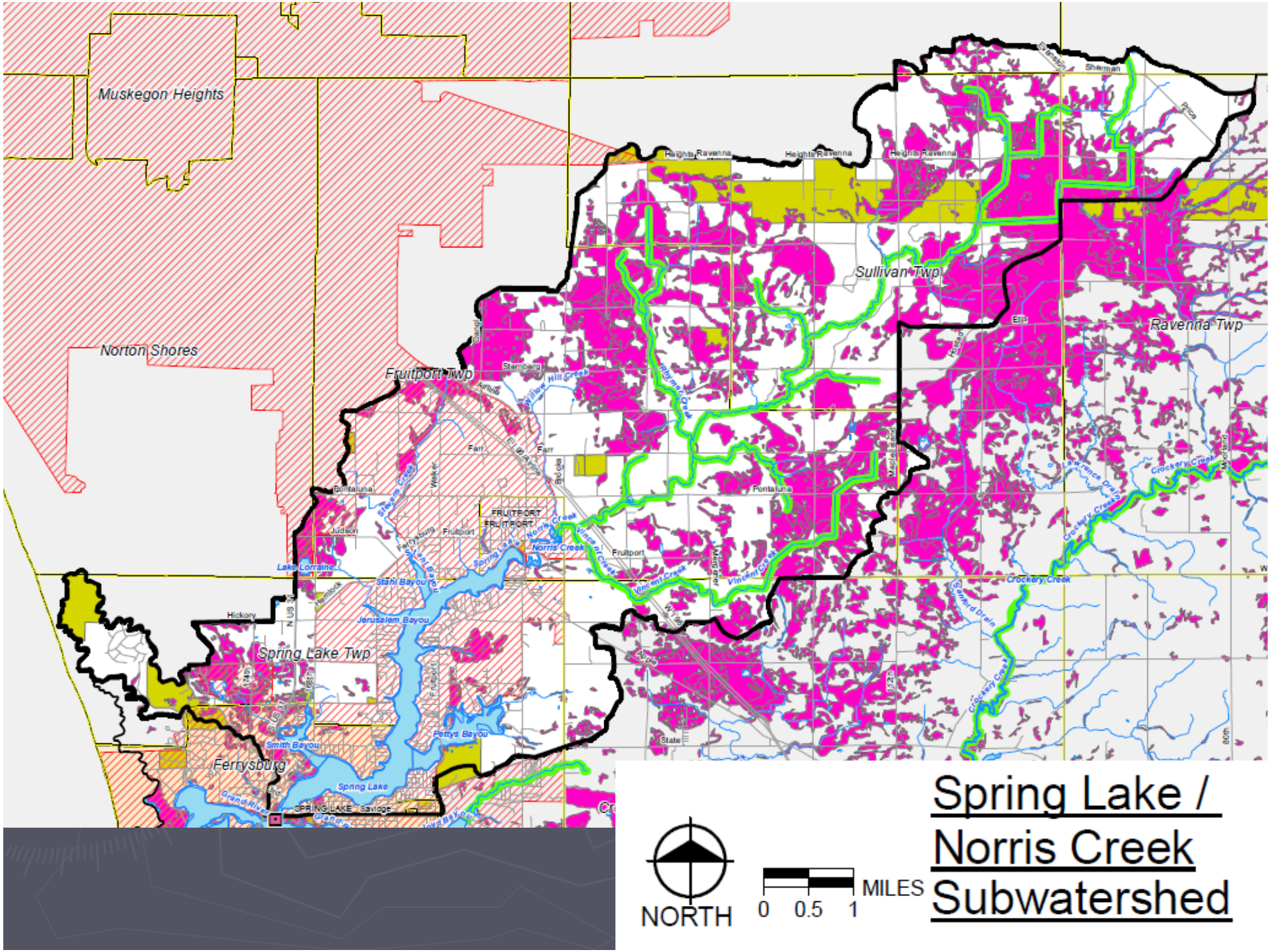
Goals & Objectives

- Restore and maintain impaired uses
- Protect and preserve non-impaired uses
- Conserve high quality areas
- Increase watershed awareness
- Create a sustainable strategy for implementation


Millhouse Bayou
Stearns Bayou
Grand River
Grand River
Grand River
Grand River
Tallmadge Twp
Osborn
Bass
Bass River
Warner
Robinson Twp
Allendale Twp
Bear Creek
Lake Michigan
Ottawa Creek
Grandriver
Little Bass Creek
Fillmore
Fillmore
Bass Creek
Taylor
Bauer
Georgetown Twp
Baldwin
Blendon Twp
This area drains to the Pigeon River Watershed
Bass River Subwatershed
NORTH
MILES
0 0.5 1

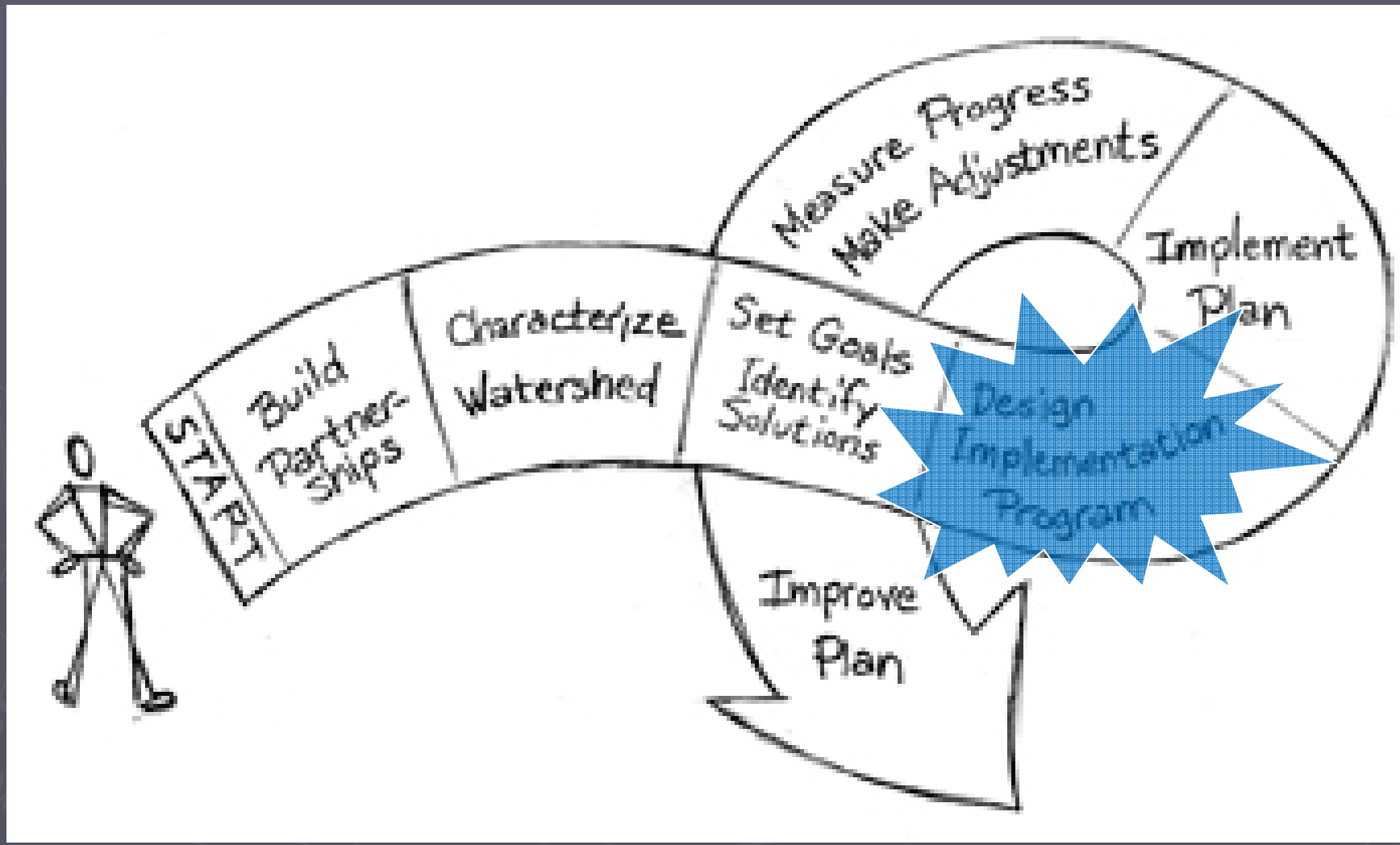

Upper Thornapple River
Subwatershed
NORTH
MILES
0 0.5 1
Woodland Twp
Sunfield Twp
Roxand Twp
Oneida Twp
Delta Twp
Vermontville Twp
Chester Twp
Benton Twp
Windsor Twp
Potterville
Charlotte
Eaton Rapids Twp
Eaton Twp
Carmel Twp
Kalamo Twp
Maple Grove Twp
Assyria Twp
Bellevue Twp
Walton Twp
Brookfield Twp
Hamlin Twp


Coopers, Clear, and Black Creeks Subwatershed
NORTH
MILES
0 0.5 1
Pierson Twp
Maple Valley Twp
Nelson Twp
Spencer Twp
Courtland Twp
Oakfield Twp
Eureka Tw
Coral
Stanton
SAND LAKE
PIERSON
Sand Lake
Bradley Lake
Salley Lake
Gould Lake
Ware Lake
Helena Lake
Pine Lake
Coody Lake
Spruce Lake
Cowden Lake
Mahaney Lake
Barnard Lake
Picnic Lake
Muskellunge Lake
Maston Lake
Blue Lake
Black Lake
Lincoln Lake
Bass Lake
Norton Lake
Bowen Lake
Sausage Lake
Thomas Lake
Banks Lake
Harlow Lake
Horseshoe Lake
Woodbeck Lake
Harvard Lake
Crawford Lake
Sandbodom Lake
Ziegenfuss Lake
Carson City
Black Creek
Buttermut Creek
Coopers Creek
Clear Creek
Sidney
River
21 Mile
20 Mile
19 Mile
18 Mile
17 Mile
14 Mile
Rockby
Hendrickson
Myers Lake
Beaver Dam Creek



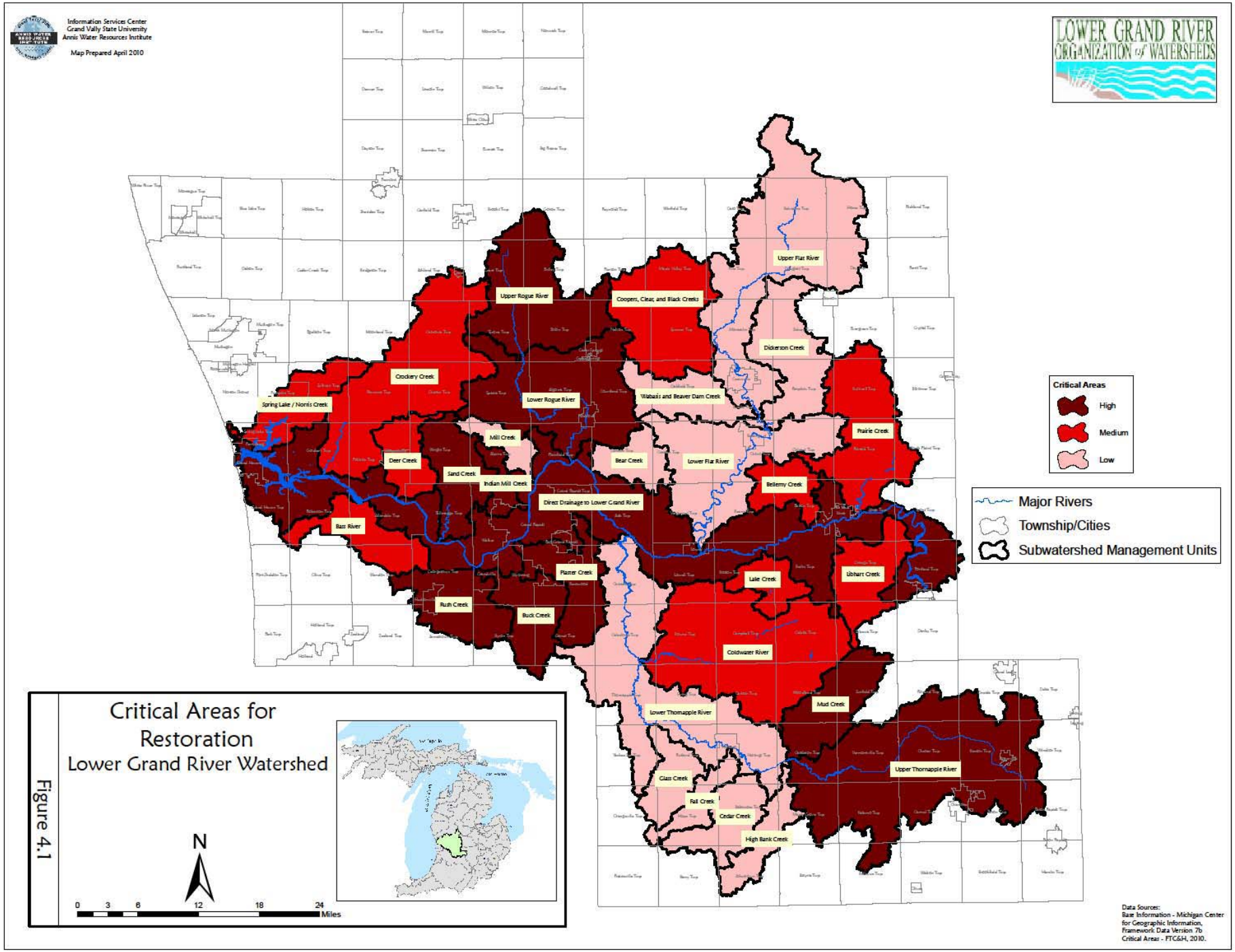
Spring Lake / Norris Creek Subwatershed

Watershed Management Process



Top 10 High Priority Critical Areas for Restoration

- Buck Creek
- Upper Rogue River
- Upper Thornapple River
- Direct Drainage to Lower Grand River
- Plaster Creek
- Rush Creek
- Sand Creek
- Indian Mill Creek
- Mud Creek
- Lower Rogue River


Information Services Center
Grand Valley State University
Annis Water Resources Institute
Map Prepared April 2010
LOWER GRAND RIVER ORGANIZATION of WATERSHEDS
Upper Flat River
Upper Rogue River
Coopers, Clear, and Black Creeks
Dickerson Creek
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Sand Creek
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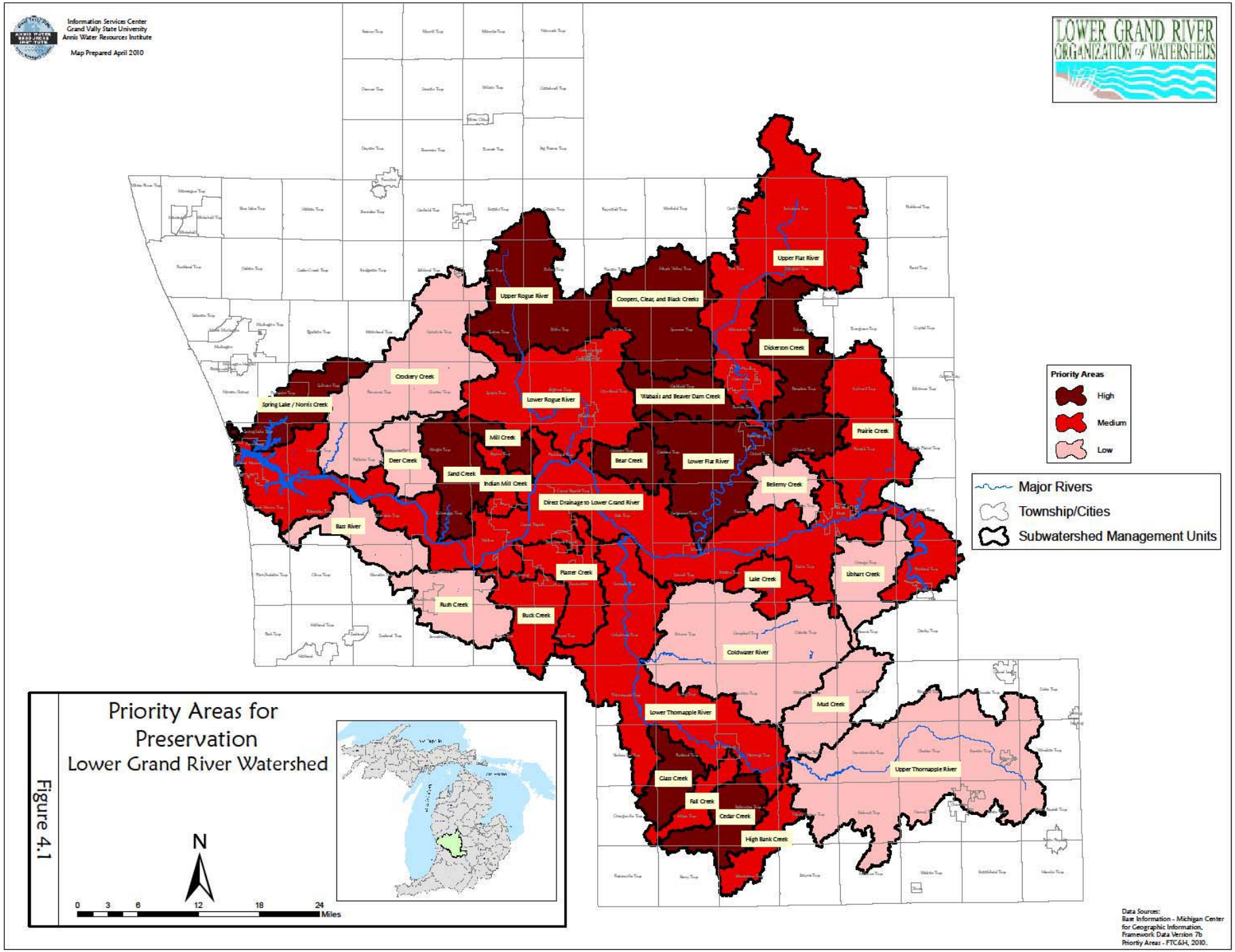
Bellamy Creek
Direct Drainage to Lower Grand River
Bass River
Planter Creek
Lake Creek
Ubhart Creek
Ruth Creek
Buck Creek
Coldwater River
Mud Creek
Lower Thornapple River
Upper Thornapple River
Glass Creek
Fall Creek
Cedar Creek
High Bank Creek
Critical Areas
High
Medium
Low
Major Rivers
Township/Cities
Subwatershed Management Units
Critical Areas for Restoration
Lower Grand River Watershed
Figure 4.1
N
0 3 6 12 18 24
Miles
Data Sources:
Base Information - Michigan Center for Geographic Information, Framework Data Version 7b
Critical Areas - FTC&H, 2010.

Priority Areas for Preservation– Top 10 High Priority SMUs

- Glass Creek
- Bear Creek
- Spring Lake / Norris Creek
- Dickerson Creek
- Mill Creek
- Upper Rogue River
- Wabasis and Beaver Dam Creek
- Cedar Creek
- Sand Creek
- Lower Flat River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Buck Creek
Coldwater River
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Fall Creek
Cedar Creek
High Bank Creek
Priority Areas
High
Medium
Low
Major Rivers
Township/Cities
Subwatershed Management Units
Priority Areas for Preservation
Lower Grand River Watershed
Figure 4.1
N
0 3 6 12 18 24
Miles
Data Sources:
Base Information - Michigan Center for Geographic Information, Framework Data Version 7b
Priority Areas - FTC&H, 2010.

Information & Education

LOWER GRAND RIVER ORGANIZATION of WATERSHEDS

Your watershed needs your help!




We strive to protect the watersheds where we live, work and play.

Join us!

WHERE'S *YOUR* WATERSHED?

You live in a watershed, the area of land that drains to a single body of water.

Lower Grand River Watershed
12345 square miles

Grand River Watershed
5,572 square miles
The Grand River is Michigan's longest at 260 miles.

LOWER GRAND RIVER ORGANIZATION of WATERSHEDS

Help Prevent These Sources of Pollution:

Keep farm runoff on the farm.

Your local storm drain goes straight to the river! *Only rain down the drain.*

Pick the right fertilizer and use it with care.

LOWER GRAND RIVER ORGANIZATION of WATERSHEDS

Keep Your Watershed Clean by Going Green!

Your agricultural buffer soaks up farm runoff before it reaches the water.

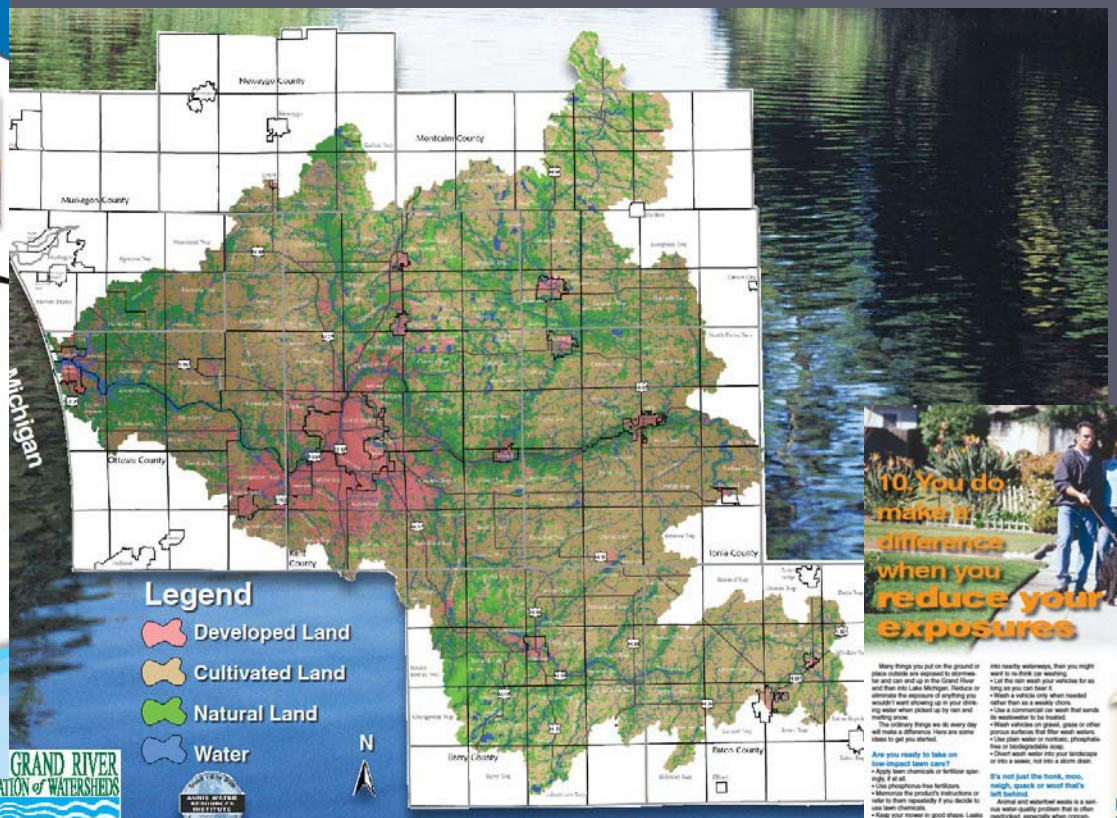
Save your rain for a sunny day! Green roofs and rain garden help manage rain where it falls.

Your landscape makes a difference. Native plantings ar easy care and need little to no fertilize

LOWER GRAND RIVER ORGANIZATION of WATERSHEDS

Ten things your parents never told you about Nonpoint source pollution

Part 2 of 3



Introduction to the Watershed Series

Part One
What watershed are you drinking?

Part Two
Ten things your parents didn't tell you about nonpoint source pollution

Part Three
Have you hugged your green infrastructure today?

GRAND RIVER ORGANIZATION of WATERSHEDS

Let's talk watershed

The Grand River Watershed, the Lower Grand in those of us east of Portland in Ionia County, is defined by the flow of water to the river — or Grand River.

The high points of the land mark a watershed where water is pulled by gravity to the river itself. Water is almost constantly on the move as it heads from the clouds to your yard into the river or lake and back into the clouds through the hydrologic, or water cycle.

Watersheds are more than water — they also include all of the land over which water travels. Notice how rain flows in your yard and how it either stays or moves along into the street.

Do you know where rain goes after it leaves your yard?

1. Today most water pollution has become "nonpoint."

Many people still think that most pollution in the Grand River comes directly from a factory — known as "point-source pollution."

At one time, this was true. Pollutants were discharged through pipes — a single point — directly into the river. Pollution could be traced to a single source, a specific business or activity.

Since the passage of pollution-control laws in the 1970s, most point-sources of pollution have been cleaned up significantly.

Today we have to look into the entire Grand River Watershed to find and fight "nonpoint sources of pollution." These pollutants can't be as easily traced to one single source, but they more cause the most pollution.

There is also no easy way to measure how much pollution is entering the river. Rainwater or snowmelt carries a mix of pollutants from farm fields, suburban lawns and city streets. This runoff may carry with it such pollutants as fertilizer, road salt, sediment, bacteria, motor oil or pesticides that enter lakes and streams or seep into groundwater.

2. Hard surfaces are hard on rain — we can't protect water quality with parking lots.

When early settlers entered the Grand River watershed, they were in the middle of a very large forest that caught the rain as it trickled down to the ground. Then it either soaked into the soil or slowly made its way into streams and then into the river.

Today, rain falls on the hard surfaces of pavement and rooftops. These hard or "impervious" surfaces keep water from soaking into the ground. They include driveways, paved roads, sidewalks and parking lots — and even our lawns can be impervious.

When rain is not absorbed by the ground, the heat, quantity and speed of rain running off increases and a variety of pollutants are carried away. When the runoff reaches nearby streams and the Grand River, water quality is reduced.

In some cities, such as Grand Rapids, it may take only 15 to 30 minutes for pollutants to travel from your street to the Grand River via the storm sewer system.

The more houses, shops, factories and other development a watershed contains, the more impervious surfaces and water-quality problems. Many studies have found that the percentage of imperviousness can be an indicator of water quality in a watershed.

With less than 10 percent impervious surfaces, water quality is usually fairly good. Impervious surfaces at 10 to 25 percent have a noticeable impact on water quality and in watersheds with more than 25 percent, water quality can be seriously degraded.

returns to rivers often loaded with pollutants.

The flowing water may pick up salt, sand, soil, pesticides, fertilizers, leaves, grass clippings, animal waste, oils, grease, litter and many other pollutants.

It then carries these wastes and chemicals through storm sewers or by direct discharge into waterways. These pollutants seriously harm our waters, contributing to beach closures and damaging wildlife habitat.

Storm drains are designed to handle stormwater to prevent flooding — they are not designed to remove pollutants. Some people treat them like garbage cans, dumping waste into the drain.

Storm sewers are not connected to wastewater treatment plants. Instead everything that flows or is poured into them is discharged into the nearest water body.

This is the largest source of pollution for the Grand River. Stormwater runoff from developed areas tends to carry higher pollutant loads than runoff from undisturbed, natural sites.

Whatever we put on the land will eventually end up mixing with stormwater. Stormwater is only as clean as the land it flows over.

4. Even if you don't live near the Grand River, you still can pollute it — and Lake Michigan.

Even if you live miles away, your backyard is connected to some part of the watershed's drainage network.

It's easy for those who live directly on the river to understand the impact we have on its health. It is more difficult for those who never see the river to understand how water flowing from their yards and farms and businesses reach it.

Understanding this personal connection is critical to the actions under way to restore the Grand River. Making the extra effort to reduce chemical and nutrient applications, prevent soil erosion and maintain wildlife-friendly yards helps the river and Lake Michigan.

5. Land use can predict nonpoint source pollution problems.

When you look at the patchwork of land use across the Lower Grand River Watershed, you can see distinct and broadly defined patterns of developed lands, cultivated lands and natural lands. The map above offers a glimpse of the watershed and its broad land uses.

This pattern of land use is the most important factor affecting water quality in the watershed. Some uses involve more hard surfaces where stormwater can't soak in. Pollutants that wash off from the land surface reflect the way the land is used.

Look at the watershed's land uses and where you are located.

6. Developed lands - RISK ON MAP

In neighborhoods layered with impervious surfaces, nonpoint source pollution can be intense. Developed areas, whether in cities or rural subdivisions, include neighborhoods where more than 10 percent of the area contains hard surfaces. These include rooftops, driveways, streets, parking lots, sidewalks and other surfaces that don't allow water to readily soak into the ground. Most lawns are included in this category.

Storm sewers that take stormwater runoff quickly and directly into streams may or may not be present.

Most nonpoint source pollution associated with developed land uses is intensified by these impervious surfaces, where pollutants build up and high loads are discharged through stormwater runoff.

Those pollutants may include:

- Nutrients from fertilizers over-applied to lawns and plantings and overloaded septic systems
- Soil and sediment from erosion of unprotected bare soils or construction sites
- Oil and other fluids dripping from vehicles
- Debris from littering and inappropriate dumping
- Disease-causing pathogens from overloaded septic systems, unmanaged pet waste and waterfowl loading
- Thermal pollution from hot surfaces which heat the stormwater runoff

• Toxic chemicals from spills of hazardous products

Preserving water quality doesn't mean stopping development. Development can be planned and designed to minimize nonpoint source pollution and then controlled by the actions of individuals.

7. Cultivated land uses - TAN ON MAP

"Producing the goods" can help in producing clean water.

These are the working lands of the Grand River Watershed, where land is used to grow crops, support orchards and raise livestock, among a variety of other economically important activities.

Cultivated lands are celebrated in efforts to protect open spaces, retain scenic views and preserve rural character. With impervious land cover often less than 10 percent, cultivation can protect the watershed by filtering stormwater runoff and recharging groundwater and local streams.

Cultivated lands require special considerations as the properties range in size from small family farms to highly intensive operations. Their impact on water quality will similarly vary by the location of operations relative to surface water, the type and intensity of production methods and involvement in conservation programs, such as use of buffer strips between crops or feedlots and surface water.

Nonpoint source pollutants from cultivated lands might include:

- Disease-causing pathogens from unmanaged animal waste and overloaded septic system
- Nutrients from animal wastes, over-applied fertilizers and overloaded septic systems
- Soil and sediment from erosion of unprotected bare soils
- Oil and other fluids that drip from machinery and vehicles
- Debris from inappropriate dumping and littering
- Harmful chemicals spills and improper pesticide uses

8. Natural land uses - GREEN ON MAP

Where nature leads, clean water follows.

As you look around the watershed, you may notice what seems to be lots of open space. Most of these open spaces are cultivated lands. Only a few natural remnants of forests, wetlands, and prairies exist in the watershed and most are found along waterways.

Some are uncultivated or idle fields that are returning to more-natural conditions. These natural lands can be sources of our cleanest water, providing a bounty of trees, plants and soils that contribute to filtration.

Many things you put on the ground or place outside are exposed to stormwater and can end up in the Grand River and then into Lake Michigan. Reduce or eliminate the exposure of anything you wouldn't want showing up in your drinking water when picked up by rain and melting snow.

The ordinary things we do every day will make a difference. Here are some ideas to get you started.

Are you ready to take on low-impact lawn care?

- Apply lawn chemicals or fertilizer sparingly, if at all.
- Use phosphorus-free fertilizers.
- Memorize the product's instructions or refer to them repeatedly if you decide to use lawn chemicals.
- Keep your mower in good shape. Leaks from oil, gasoline or hydraulic fluids can pollute thousands of gallons of water.
- Choose native landscape plants better suited to watershed conditions.

Is your yard shedding water it can be absorbing?

Depending on soil and topography, your lawn can be quite impervious, so

- Where rain runs, make it walk.
- Where rain walks, make it crawl.
- Where rain crawls, find ways to make it linger and sink into the ground.

Did you know that each time you pick up litter, an angel gets its wings?

Litter on the ground becomes litter in our waterways.

- Set the example for others, especially children.
- Chase litter down. Don't let it get away from you.
- Keep and use a litter bag in your car.
- Participate in community cleanups.
- "Adopt a spot" in your neighborhood to remove litter on a regular basis.
- Start a "litter index" to spot problems and track trends in your community.
- Get behind local "litter-free" outdoor events and activities.

Does cleaning a car dirty the river?

Runoff from cleaning your car, boat or recreational vehicle contains a nasty mix of oils, detergents and engine grime. If this mix flows across pavement into a storm drain and discharges untreated into nearby waterways, then you might want to re-think car washing.

- Let the rain wash your vehicles for as long as you can bear it.
- Wash a vehicle only when needed rather than as a weekly chore.
- Use a commercial car wash that sends its wastewater to be treated.
- Wash vehicles on gravel, grass or other porous surfaces that filter wash waters.
- Use plain water or nontoxic, phosphate-free or biodegradable soap.
- Divert wash water into your landscape or into a sewer, not into a storm drain.

It's not just the honk, moo, neigh, quack or woof that's left behind

Animal and waterfowl waste is a serious water-quality problem that is often overlooked, especially when concentrated near waterways.

Waste from our pets, livestock and fed waterfowl can contain disease-causing organisms which are carried by storm-water into our waterways. Such waste also contains nutrients that encourage undesired weed growth in ponds and streams.

- It's different when fish do it. For example, there are well over 200,000 dogs in the Lower Grand River watershed contributing nearly 100,000 pounds of waste each day. When it rains or as the snow melts, a lot of it can end up in our waterways, causing serious problems.
- Attend responsible pet owners do their duty. Scoop it up and dispose of it as determined appropriate in your community.
- Feeding geese and ducks seems so nice. However when we feed waterfowl, we overload the natural systems of our water resources. Those resources can naturally handle the waste from food provided in the wild, but when we add unnatural foods, wastes build up and overload the natural system. One goose produces 1 to 2 pounds of feces each day. Please don't feed waterfowl.
- Our larger animals contribute, too. Livestock and other large animals allowed access to a stream's edge can trample vegetation and cause erosion. Responsible large-animal owners fence them away from ponds, ditches, wetlands and streams while managing manure so it does not run off with stormwater.

Living in the Lower Grand River Watershed - It's like sharing your bathtub with 1 million other people

This watershed is a gathering place where people's lives are connected by falling rain and flowing water and where water quality is a vital part of its economic possibility.

Who speaks for the watershed?

The Lower Grand River Organization of Watersheds (LGROW) was formed to work with West Michigan communities in restoring, protecting and enhancing water quality in the Grand River Watershed. LGROW, an agency of the Grand Valley Metropolitan Council, provides a framework for creating opportunities to achieve local benefits that can carry over across watersheds.

Sub-watershed groups take the lead in improving water quality at the grassroots level, emphasizing local interest and local commitment. LGROW serves as an umbrella organization for these groups, made up of people living and working in several sub-watersheds, such as the Rogue River, Thornapple River, Sand Creek, Coldwater River, Spring Lake and Bear Creek.

Through the joint efforts of its many partners, LGROW is acting to ensure a healthy and sustainable Grand River Watershed by:

1. Providing opportunities for partners to work together in solving watershed problems
2. Recognizing and sharing accomplishments and successes
3. Ensuring that local priorities are represented in regional and statewide efforts
4. Identifying and pursuing common goals and strategies
5. Collectively seeking priorities
6. Preparing a Grand River Watershed Management Plan
7. Organizing and maintaining watershed-based information system
8. Tracking watershed conditions and measuring results
9. Promoting land management practices
10. Preserving local decision-making authority while encouraging regional cooperation

Watershed management is a strategic action for West Michigan. The more partners that sign on, the stronger and more influential LGROW will be for improving water quality. LGROW sees its efforts as a long-term investment in West Michigan communities.

Stay in touch with your watershed at www.lgrov

LOWER GRAND RIVER ORGANIZATION of WATERSHEDS

No resource is a precious as clean and safe water.
Our legacy starts with our commitment to improving water quality.
Our responsibility is to go in that direction.

Michigan's Nonpoint Source Program

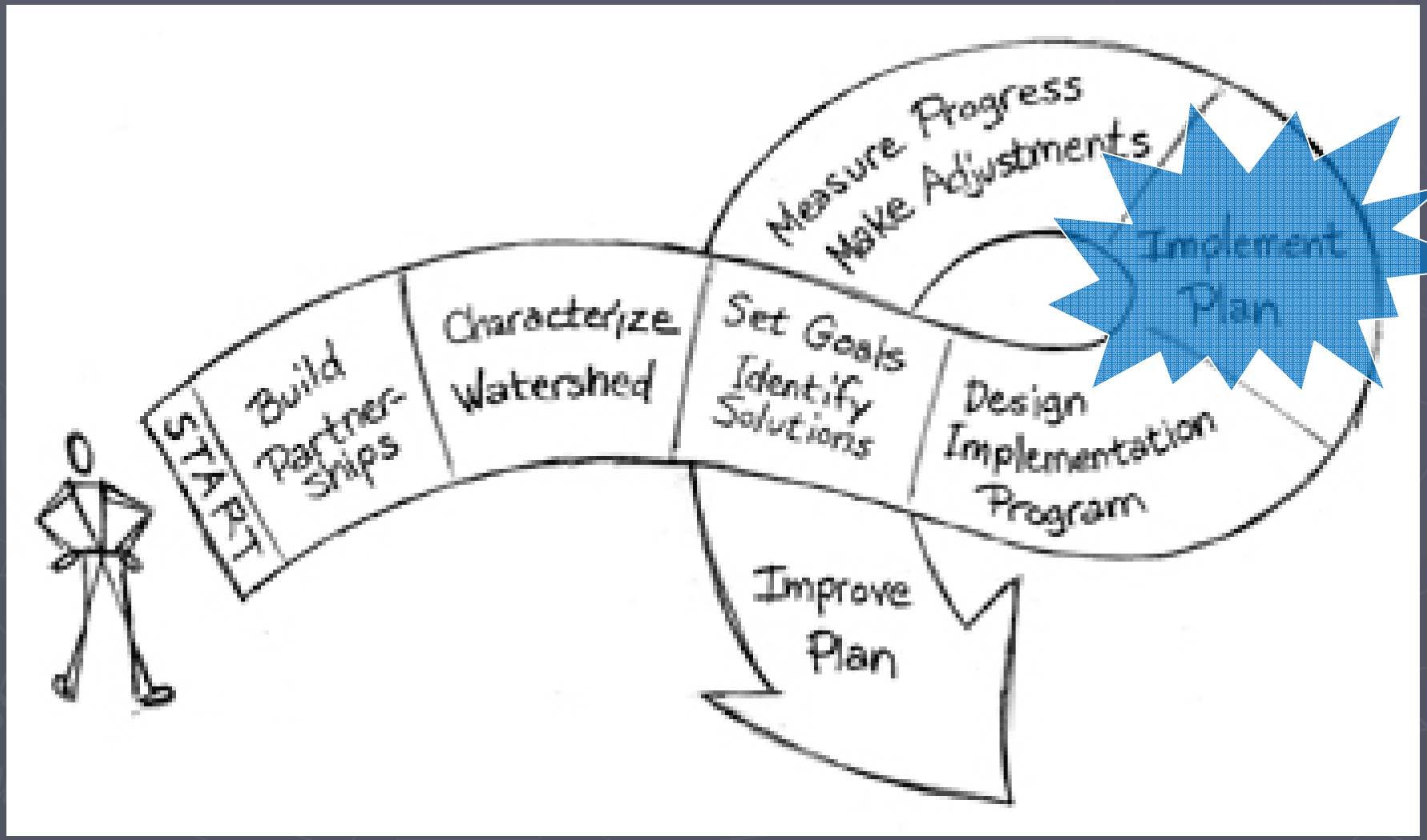
This Nonpoint Source Pollution Control project has been funded in part through the Michigan Nonpoint Source Program by the United States Environmental Protection Agency under assistance agreement C9975474-01 to Grand Valley Metropolitan Council for the Lower Grand River Watershed initiatives project. The contents of the document do not necessarily reflect the views and policies of the EPA, nor does the mention of trade names or commercial products constitute endorsement or recommendation for use.

Next: Part 3 of 3
Have you hugged your green infrastructure today?

Social Profile

- Identify the ZIP codes associated with the subwatershed
  - **ZIP Code Profile - 48809 Belding** (Bear Creek, Bellemy Creek, Deer Creek, Direct drainage to Grand River, Flat River, Prairie Creek, Wabasis/Beaver Dam Creeks)
- Tailor messages to reflect their interest and motivate change.
  - Population, Age, Housing, Education, Language, Labor, Income

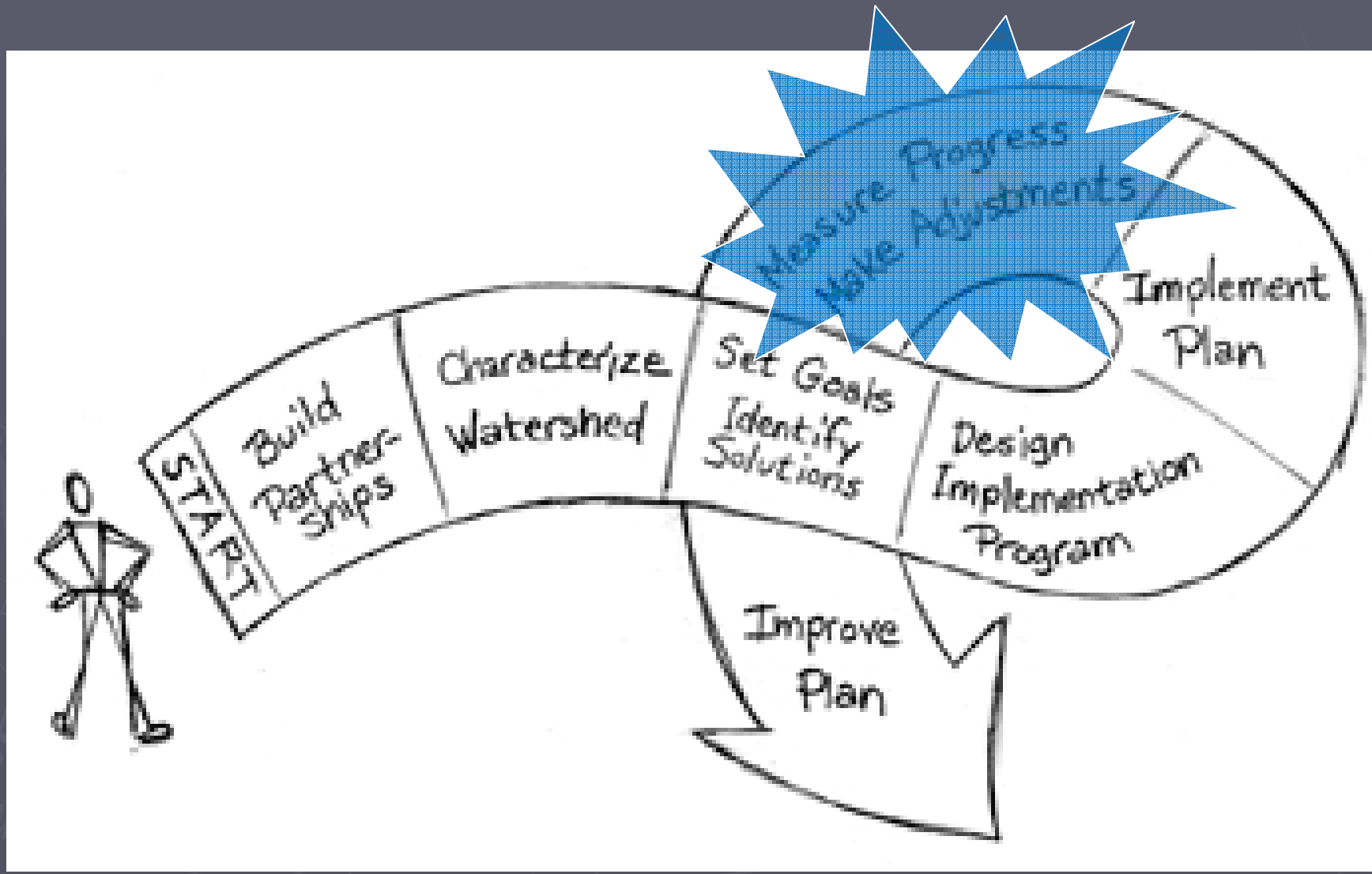
Watershed Management Process



Action Plan Examples

- Eliminate 47 sites of livestock access
- Plant 1,203 miles of stream buffers
- Repair 8,740 failing septic systems
- Install 194 rain gardens
- Restore 170,003 acres of wetlands
- Adopt storm water ordinance
- Purchase conservation easements

Watershed Management Process



Evaluation

- Accomplishment Assessment
  - Partners' Questionnaires
- Methods of Measuring Progress
  - Environmental Assessments
  - Volunteer Monitoring Toolbox
  - Subwatershed Monitoring
- Future Strategy
  - Outcome based performance
- Lessons Learned

previous slide

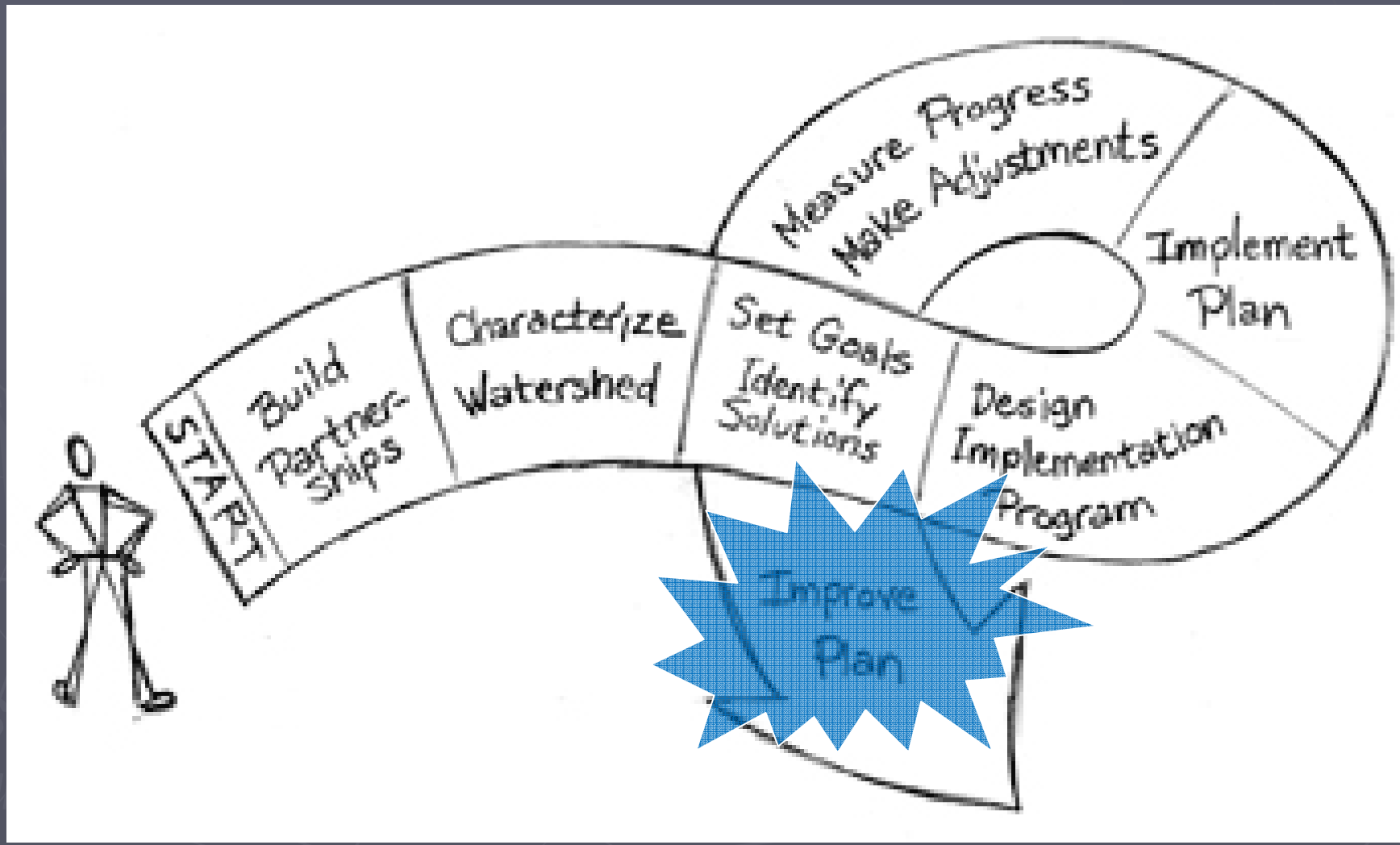
back to start

What is your monitoring objective?

- Watershed-scale spatial assessment. ?
- Stream segment assessment. ?
- Temporal trend assessment. ?
- BMP Effectiveness. ?
- Education.
- Problem identification.

Pathogens/Bacteria

Watershed Management Process



Sustainability

- Lower Grand River Organization of Watersheds (LGROW)
  - Board of Directors
  - Executive Board
  - Membership
  - Strategic Business Plan
  - Communications Plan
- WMP Implementation Assistance

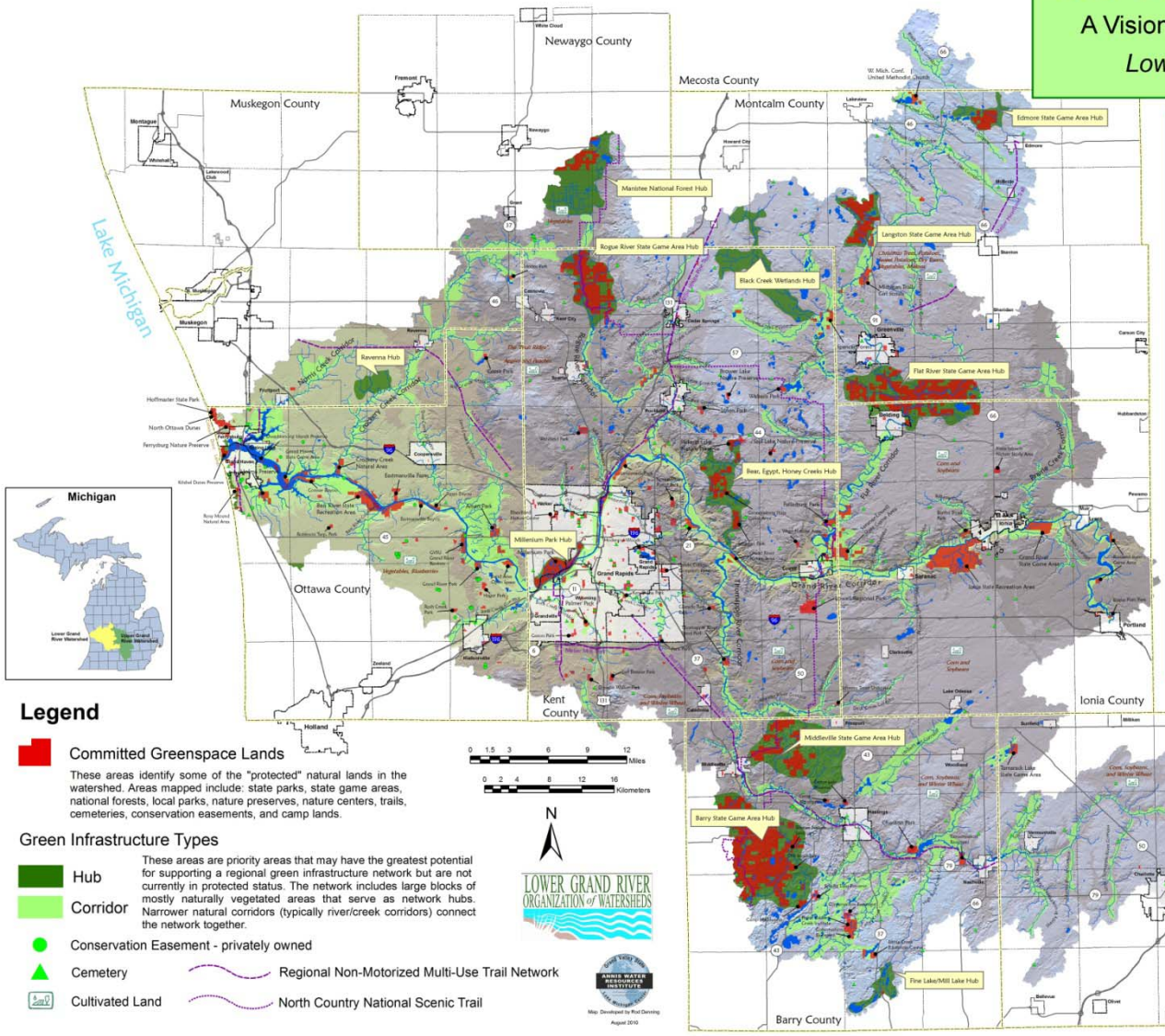
www.lowergrandriver.org
www.lgrow.org
http://gvsu.edu/wri/isc/

The Grand Vision

Photo: The New York Times, 2009

NATURAL CONNECTIONS

A Vision of Green Infrastructure for the *Lower Grand River Watershed*



Legend

Committed Greenspace Lands

These areas identify some of the "protected" natural lands in the watershed. Areas mapped include: state parks, state game areas, national forests, local parks, nature preserves, nature centers, trails, cemeteries, conservation easements, and camp lands.

Green Infrastructure Types

Hub

Corridor

These areas are priority areas that may have the greatest potential for supporting a regional green infrastructure network but are not currently in protected status. The network includes large blocks of mostly naturally vegetated areas that serve as network hubs. Narrower natural corridors (typically river/creek corridors) connect the network together.

- Conservation Easement - privately owned
- Cemetery
- Cultivated Land
- Regional Non-Motorized Multi-Use Trail Network
- North Country National Scenic Trail

LOWER GRAND RIVER ORGANIZATION of WATERSHEDS

Map Developed by Rod Denning, August 2010

What is Green Infrastructure?

Green infrastructure refers to an interconnected green space network (including natural areas and features, public and private conservation lands, working lands with conservation values, and other protected open spaces) that is planned and managed for its natural resource values and for the associated benefits it confers to human populations. (From: Green Infrastructure—Linking Landscapes and Communities, by Mark A. Benedict and Edward T. McMahon, The Conservation Fund, 2006)

In the Lower Grand River Watershed, the green infrastructure framework consists primarily of upland forests (mostly southern forest communities) typically associated with larger hub areas, and lowland forests (commonly southern hardwood swamp and floodplain forest) and wetlands (commonly emergent and submergent marsh, southern wet meadow, southern shrub-car, and inundated shrub swamp) associated with the riparian lands along river, creeks, lakes, and ponds. The hubs and corridors identified on the map have the greatest potential to provide an interconnected network of land and water that supports native plant and animal species, maintains ecological processes and services, sustains air and water resources, and contributes to the health, well being and quality of life of people and communities throughout the region.

Committed Greenspace Statistics

Management Type	Sq.Miles	Comments:
Conservation Easement	2.2	On private lands, however many CE's are mapped with points only, total area is larger than that reported
Forest Management	3.5	U.S. Forest Service lands
Greenspace	4.7	Includes natural areas not designated park or preserve. Area measure includes cemeteries in urban areas, rural cemetaries are mapped as points
Nature Preserve	5.8	Inludes sanctuaries, natural areas, preserves and nature center lands
Recreation Area	19.8	Includes camps, campgrounds and state recreation areas
Park	23.1	Properties with "Park" designation
Wildlife Area	75.2	Includes Michigan state game areas and U.S. Fish and Wildlife Service lands
TOTAL	134.3	

Ownership	Sq. Miles	Comments:
Non-Governmental Organization	1.8	Local land conservancies, Michigan Nature Association, conservation districts, state/local Audubon Society
Federal	3.8	U.S. Fish and Wildlife Service and U.S. Forest Service
Private	5.1	Camps, campgrounds, conservation easements, and some cemeteries
Local	13.5	City, village, and township governments
County	15.9	County government
State	94.2	Michigan Department of Natural Resources and Environment and Michigan Department of Transportation
TOTAL	134.3	

Project Partners:

Fishbeck Thompson Carr & Huber, Inc. (FTC&H)

Grand Valley Metro Council—Lower Grand River Organization of Watersheds (GVMC—LGROW)

Grand Valley State University—Annis Water Resources Institute (GVSU—AWRI)

Michigan Department of Natural Resources and Environment (MDNRE)

Data Sources:

Base Information: Michigan Department of Technology, Management & Budget, Office of Shared Solutions, base framework 9b, 2009.

Committed Greenspace Lands: Identified from county plat books, public information (maps, brochures), Ottawa County Parks Department, Great Lakes Conservation and Recreation Lands (CARL) database, Great Lakes/Atlantic Regional office of Ducks Unlimited, Inc., and personal communication.

Green Infrastructure Types: Derived from the National Oceanic and Atmospheric Administration (NOAA) Coastal Change Analysis Program, 2006 (C-CAP), Land Conservancy of West Michigan, Natural Connections Map—A Vision of Regional Green Infrastructure in West Michigan, 2004, U.S. Department of Agriculture, Farm Service Agency, National Agriculture Imagery Program orthophotography, 2009.

Trail Information: Regional trails data from the West Michigan Trails and Greenways Coalition, 2010. North Country National Scenic Trail from the North Country Trail Association, 2010.

LOWER GRAND RIVER ORGANIZATION of WATERSHEDS

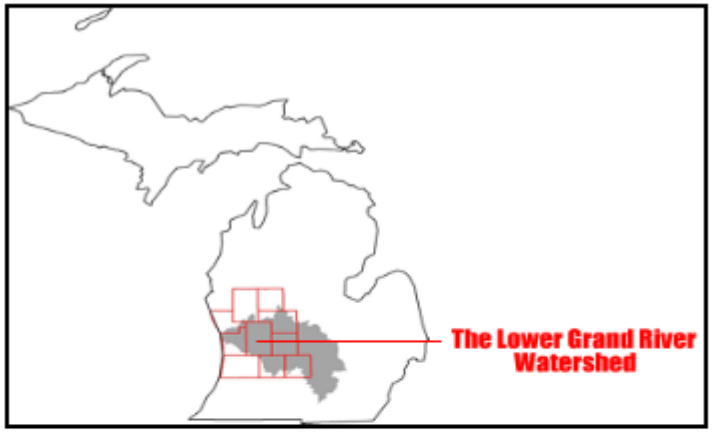
Lower Grand River Watershed Data Repository

Home | Hydrologic Data | Biological Data | Water Chemistry | Geomorphology | Land Cover | Policies | Organizations | Social/land Activity | GIS Data

Select a Subbasin.....

The Data, Information, and Prodecures (DIP) subcomittee was created as part of the larger effort to organize a Lower Grand River Watershed Council.

It is the goal of the DIP subcommittee to organize all current data for the Lower Grand and make it readily available for everyone.



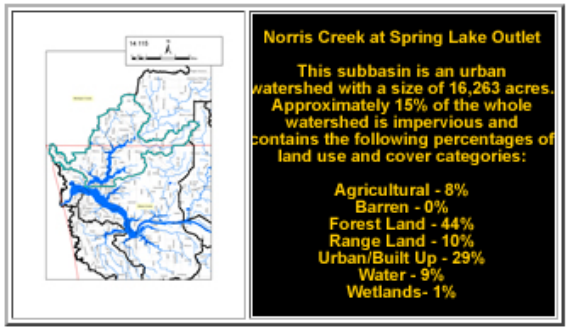
The menu at the top of each page contains links describing the various kinds of data. Using the "Select a Subbasin" drop down menu will allow you to choose a single subwatershed and search for data within the ten data fields. You may also download a PDF of the Lower Grand River Watershed to see what subbasins fall into the larger watershed management units or go to the Lower Grand River County Index Map.

LOWER GRAND RIVER ORGANIZATION of WATERSHEDS

Lower Grand River Watershed Data Repository

Home | Hydrologic Data | Biological Data | Water Chemistry | Geomorphology | Land Cover | Policies | Organizations | Social/land Activity | GIS Data

Spring Lake at Outlet (14 115)



Norris Creek at Spring Lake Outlet

This subbasin is an urban watershed with a size of 16,263 acres. Approximately 15% of the whole watershed is impervious and contains the following percentages of land use and cover categories:

Agricultural - 8%
Barren - 0%
Forest Land - 44%
Range Land - 10%
Urban/Built Up - 29%
Water - 9%
Wetlands- 1%

Hydrologic Data | Biological Data
Water Chemistry | Land Cover/Use
Geomorphology | Policies
Organizations | Social/Land Activity
GIS Data | Media Resource Database

Position the cursor over one of the fields to the left and select from the submenu. There is no submenu for fields with no data.

Select a Subbasin.....

Spring Lake Township's Wetland Review Board
Spring Lake Township Fertilizer Ordinance
Model Stormwater Ordinance and Performance Standards
Model Animal Waste Management Ordinances

Do you have data you would like to submit? Click Here

The HIT Model:
Better information leads to better decisions

Developed by:

USDA Natural Resources Conservation Service (NRCS)
Michigan Department of Agriculture (MDS)
Huron Conservation District
Michigan State University's Institute of Water Research (IWR)

Distributed in west Michigan by:

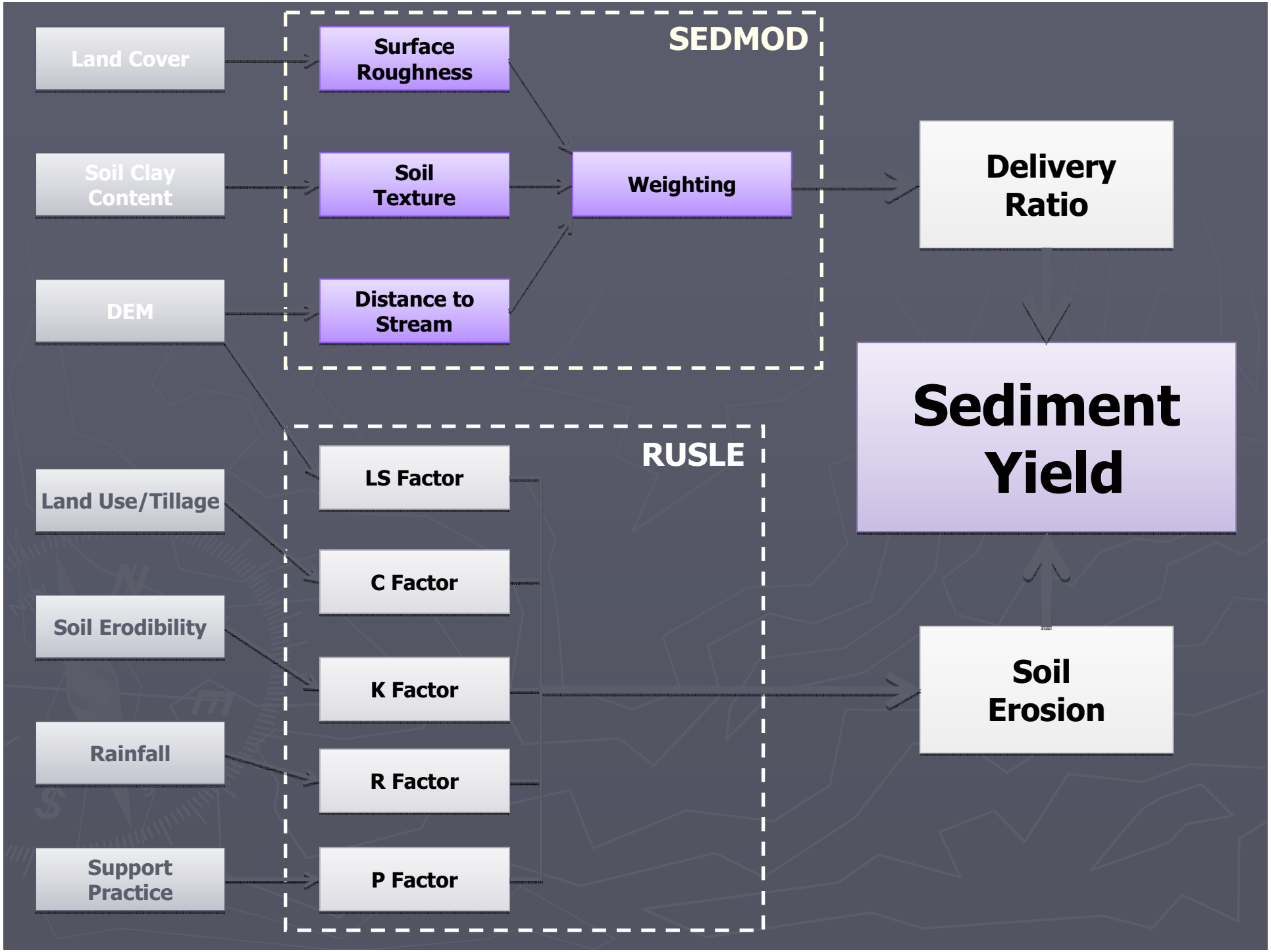
Timberland RC&D
Annis Water Resources Institute (AWRI)

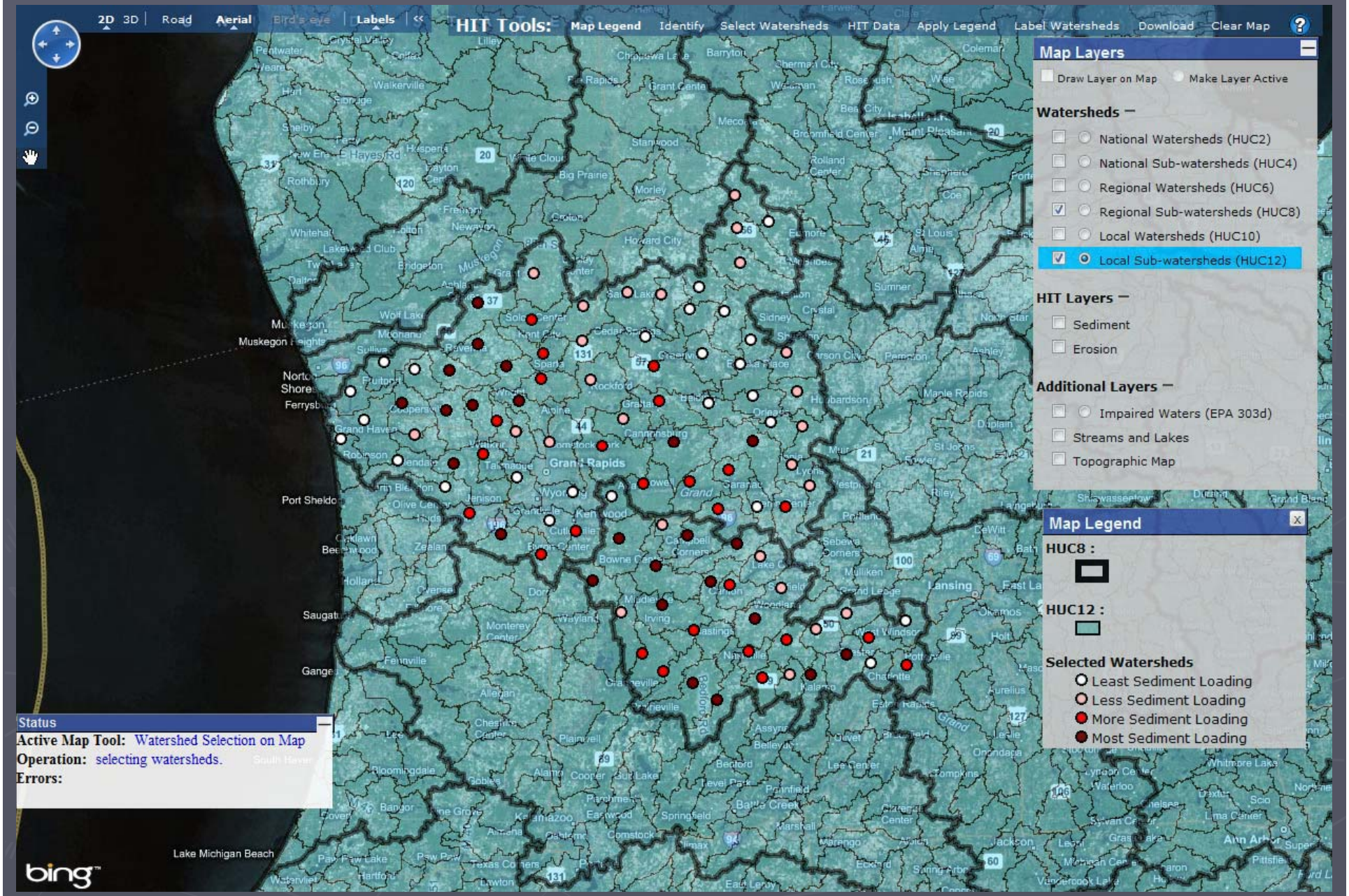
The HIT Model

The **High Impact Targeting (HIT) Model** is an online tool designed to **identify** and **prioritize** areas of **extreme sedimentation and erosion** within agricultural areas in any watershed.

www.iwr.msu.edu/hit2

www.gvsu.edu/wri/isc


SEDMOD
Land Cover
Soil Clay Content
DEM
Surface Roughness
Soil Texture
Distance to Stream
Weighting
Delivery Ratio
Sediment Yield
RUSLE
Land Use/Tillage
Soil Erodibility
Rainfall
Support Practice
LS Factor
C Factor
K Factor
R Factor
P Factor
Soil Erosion

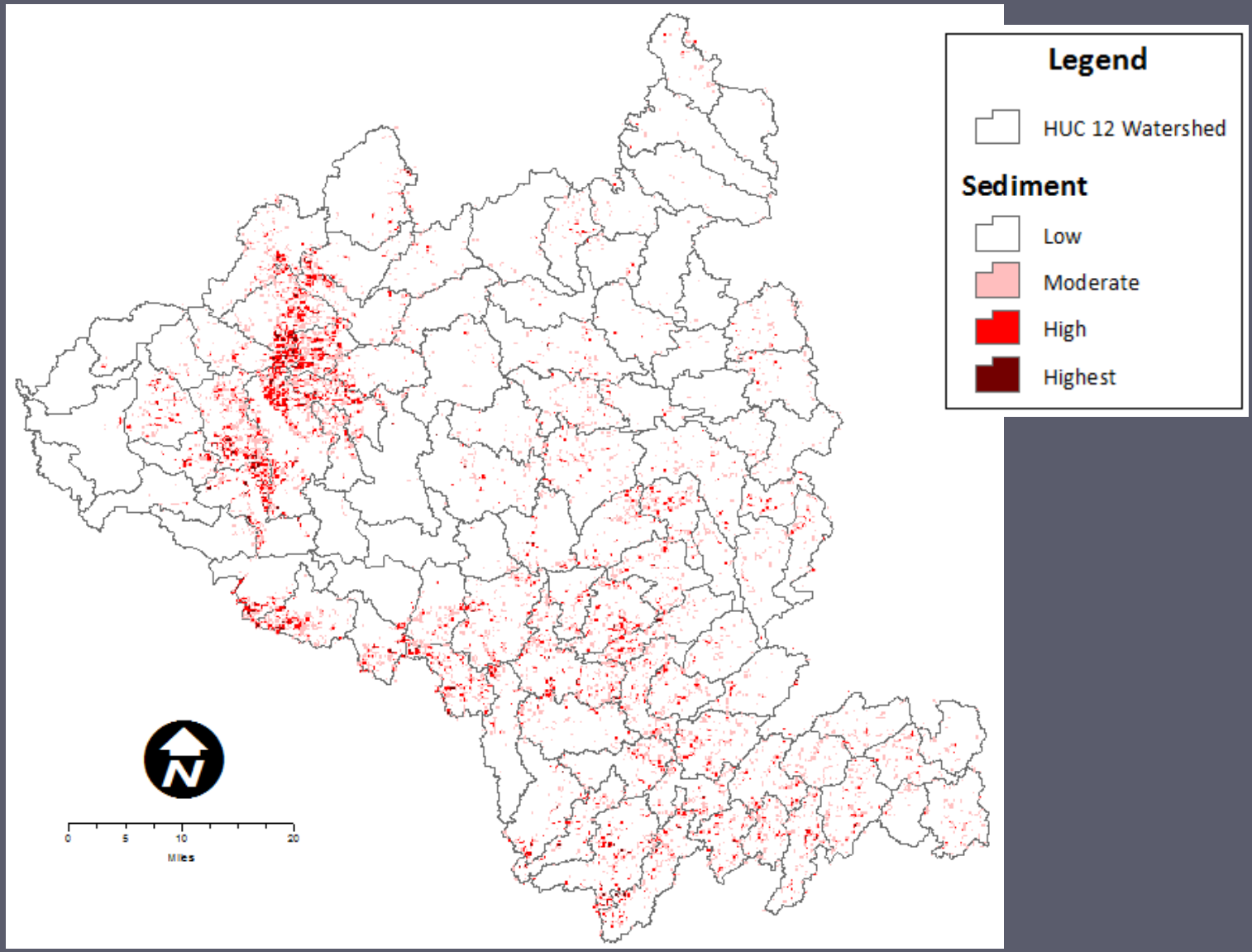

2D 3D | Road Aerial Bird's eye | Labels
HIT Tools: Map Legend Identify Select Watersheds HIT Data Apply Legend Label Watersheds Download Clear Map
Map Layers
Draw Layer on Map
Make Layer Active
Watersheds
National Watersheds (HUC2)
National Sub-watersheds (HUC4)
Regional Watersheds (HUC6)
Regional Sub-watersheds (HUC8)
Local Watersheds (HUC10)
Local Sub-watersheds (HUC12)
HIT Layers
Sediment
Erosion
Additional Layers
Impaired Waters (EPA 303d)
Streams and Lakes
Topographic Map
Map Legend
HUC8 :
HUC12 :
Selected Watersheds
Least Sediment Loading
Less Sediment Loading
More Sediment Loading
Most Sediment Loading
Status
Active Map Tool: Watershed Selection on Map
Operation: selecting watersheds.
Errors:
Grand Rapids
Lansing
Muskegon
Port Sheldo
Saugat
Gange
Lake Michigan Beach
bing

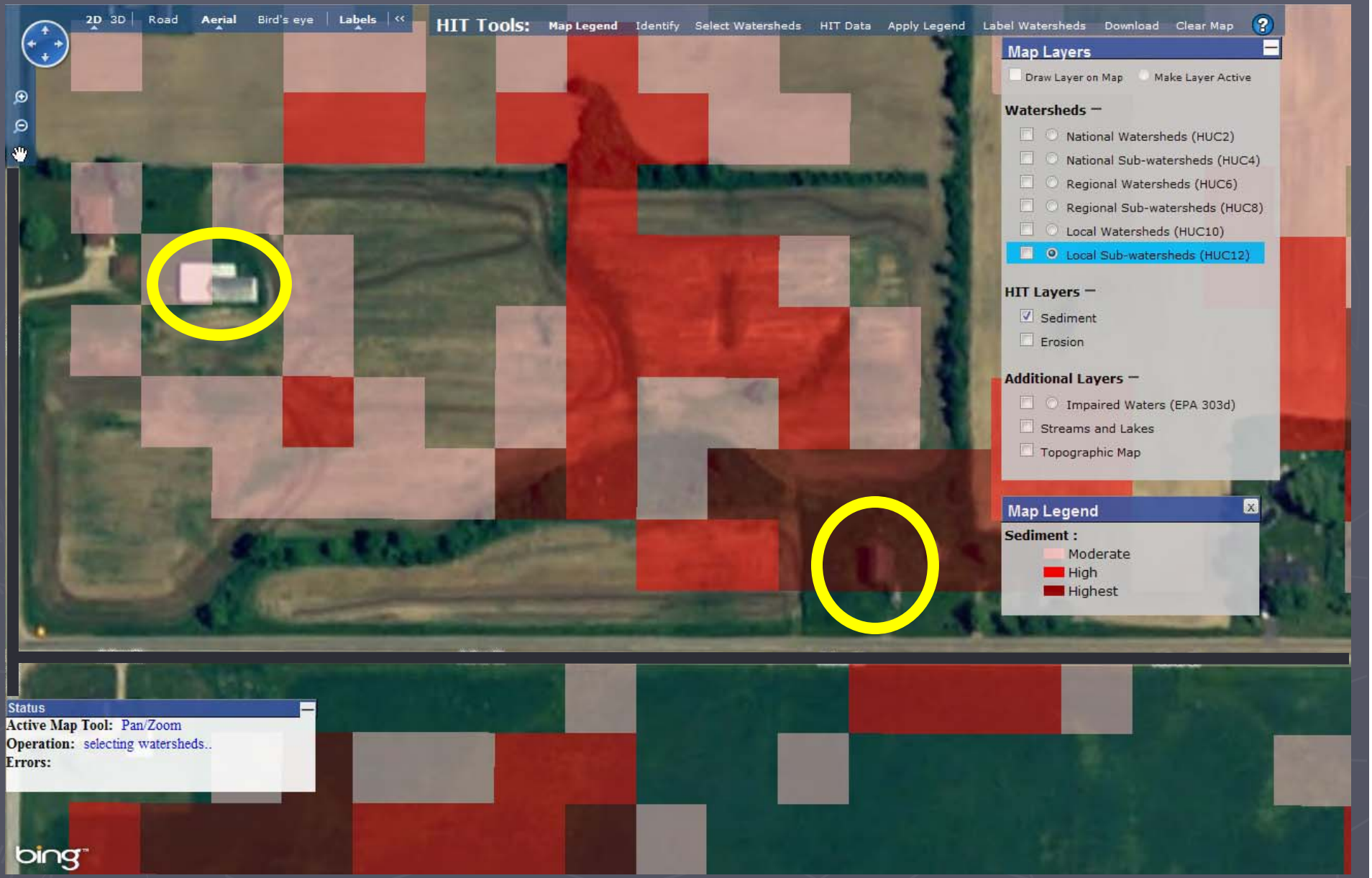
5 Worst Watersheds for Sediment

Sub-Watershed (HUC 12)	Total Sediment (Tons)
N. Branch Crockery Creek (040500060601)	3,866
Deer Creek (040500060704)	3,831
Coldwater River (040500070307)	3,065
Cedar Creek (040500070210)	2,774
Ottawa Creek (040500060705)	2,754

Total for Lower Grand **126,875**

HIT Model Sediment Outputs for Lower Grand




2D 3D | Road Aerial Bird's eye | Labels <<
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HIT Layers
Sediment
Erosion
Additional Layers
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Streams and Lakes
Topographic Map
Map Legend
Sediment :
Moderate
High
Highest
Status
Active Map Tool: Pan/Zoom
Operation: selecting watersheds..
Errors:
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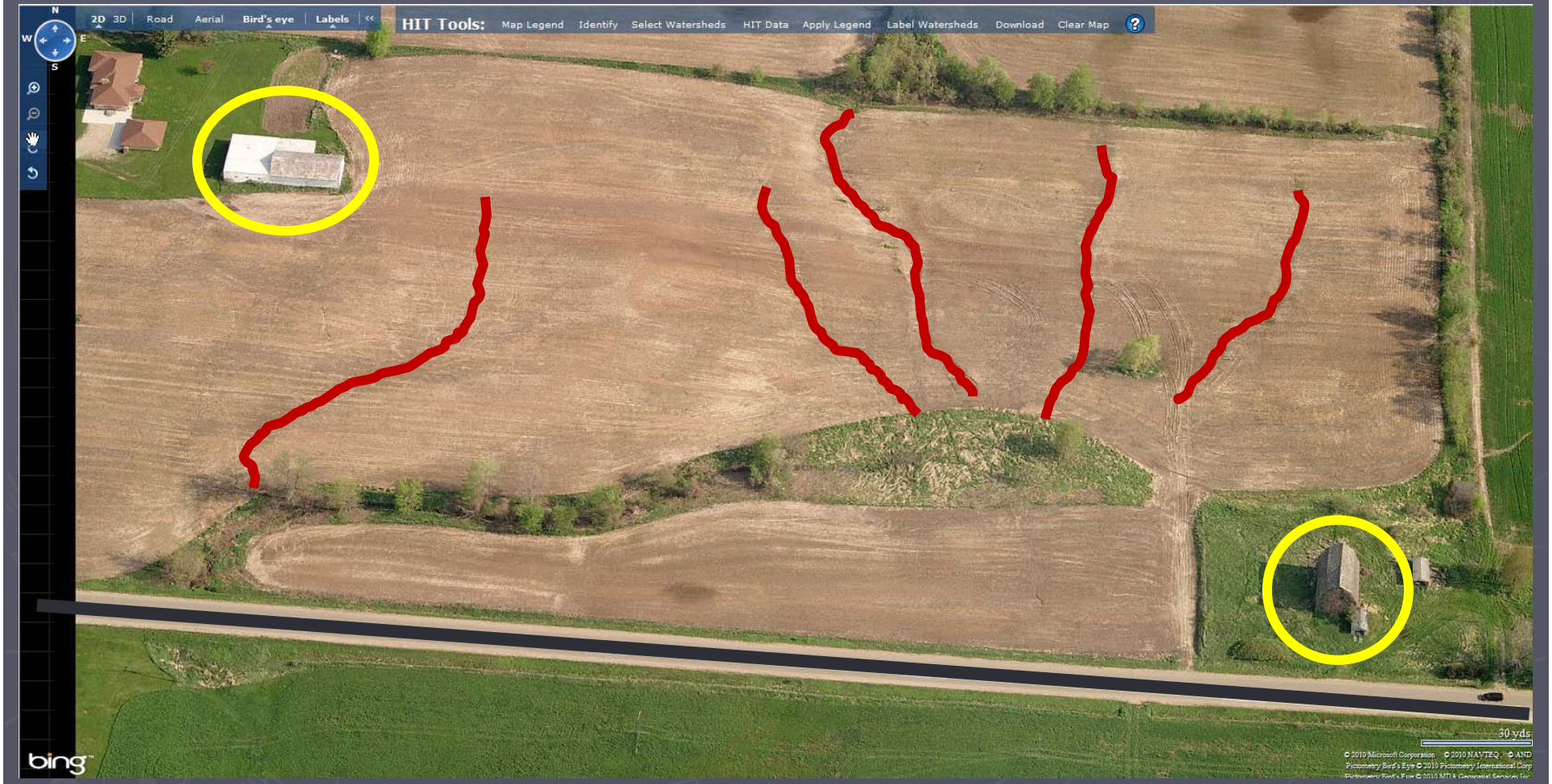
2D 3D | Road Aerial Bird's eye | Labels
HIT Tools: Map Legend Identify Select Watersheds HIT Data Apply Legend Label Watersheds Download Clear Map
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HIT Table

Sediment

Click on a column title to sort ascending.

Name	HUC	Acres	Total(tons/yr)	Rate(tons/ac/yr)	BMP: Mulch Till on Worst 5% of Area				BMP: No Till on Worst 5% of Area				BMP: Grass on Worst 5% of Area			
					Total Reduction (tons/yr)	Reduction %	BMP Cost at $10 per acre	BMP Cost Benefit ($/ton reduced)	Total Reduction (tons/yr)	Reduction %	BMP Cost at $14 per acre	BMP Cost Benefit ($/ton reduced)	Total Reduction (tons/yr)	Reduction %	BMP Cost at $44 per acre	BMP Cost Benefit ($/ton reduced)
East Fork	040500060701	11,186	1,445	0.129	158	11%	$5,593	$35	379	26%	$7,830	$21	600	41%	$24,609	$41
Headwaters Sand Creek	040500060702	13,766	2,735	0.199	377	14%	$6,883	$18	691	25%	$9,636	$14	1,126	41%	$30,285	$27
Sand Creek	040500060703	10,154	1,310	0.129	233	18%	$5,077	$22	429	33%	$7,108	$17	699	53%	$22,339	$32
TABLE TOTALS		35,106	5,490	0.156	768	14	$17,553	$23	1,498	27	$24,574	$16	2,425	44	$77,233	$32
Specify new values to recalculate BMP cost:							$ 10				$ 14				$ 44	

Recalculate BMP Cost

HIT Model Review

- Prioritize areas for BMP development
- Used in Lower Grand's Watershed Management Plan
- Not suitable for sediment estimates in urban areas

Landscape Level Functional Wetlands Assessment

Lower Grand River Watershed

- **Funded by a grant from the U.S. Environmental Protection Agency**

- **With additional funding provided by the MDEQ Lower Grand River Organizational Watersheds Initiatives Project**

FTC&H

Fishbeck, Thompson, Carr & Huber, Inc.

GVMC

LOWER GRAND RIVER ORGANIZATION of WATERSHEDS

Grand Valley State ANNIS WATER RESOURCES INSTITUTE Lake Michigan Center

Michigan DNRE Department of NATURAL RESOURCES and ENVIRONMENT

Land and Water Management Division
Wetlands, Lakes and Streams Unit

U.S. FISH & WILDLIFE SERVICE

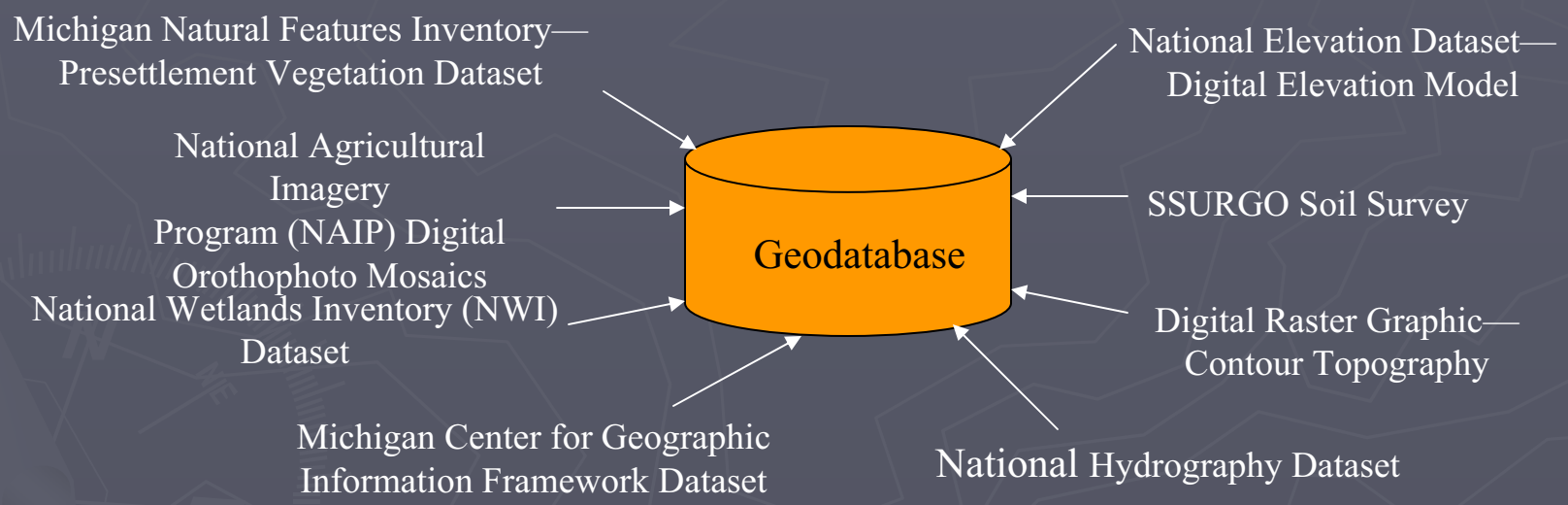
U.S. Fish and Wildlife Service
Northeast Region
Ralph W. Tiner – Wetland Ecologist

W-PAWF Technique

- The "Watershed-based Preliminary Assessment of Wetland Functions" technique
- This approach provides a perspective on the magnitude of the losses from a functional standpoint

Described by Tiner, 2005, in "Assessing Cumulative Loss of Wetland Functions in the Nanticoke River Watershed Using Enhanced National Wetlands Inventory Data", Wetlands, Vol. 25, No. 2, The Society of Wetland Scientists.

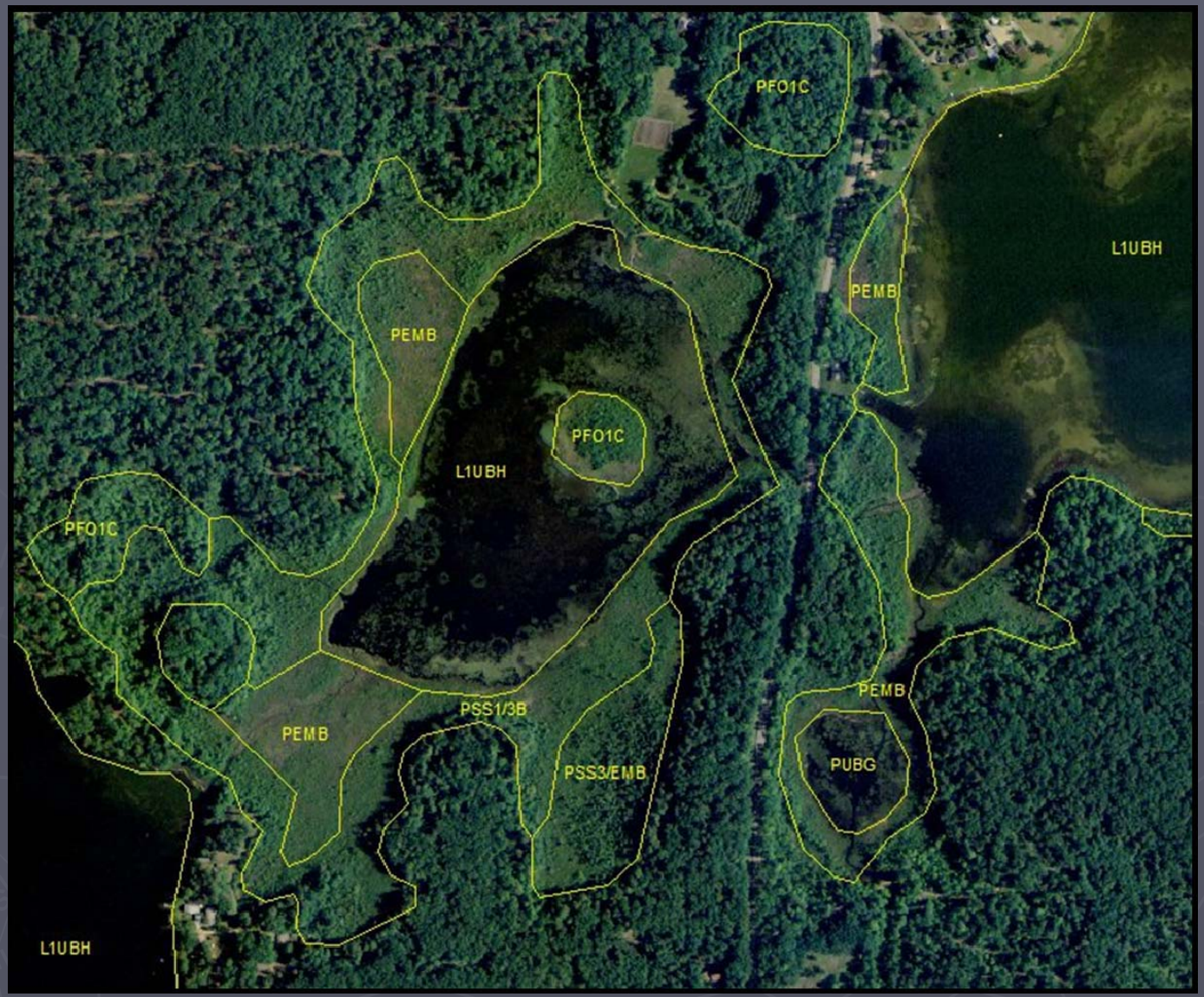
Step 1: Collect and Integrate GIS datasets



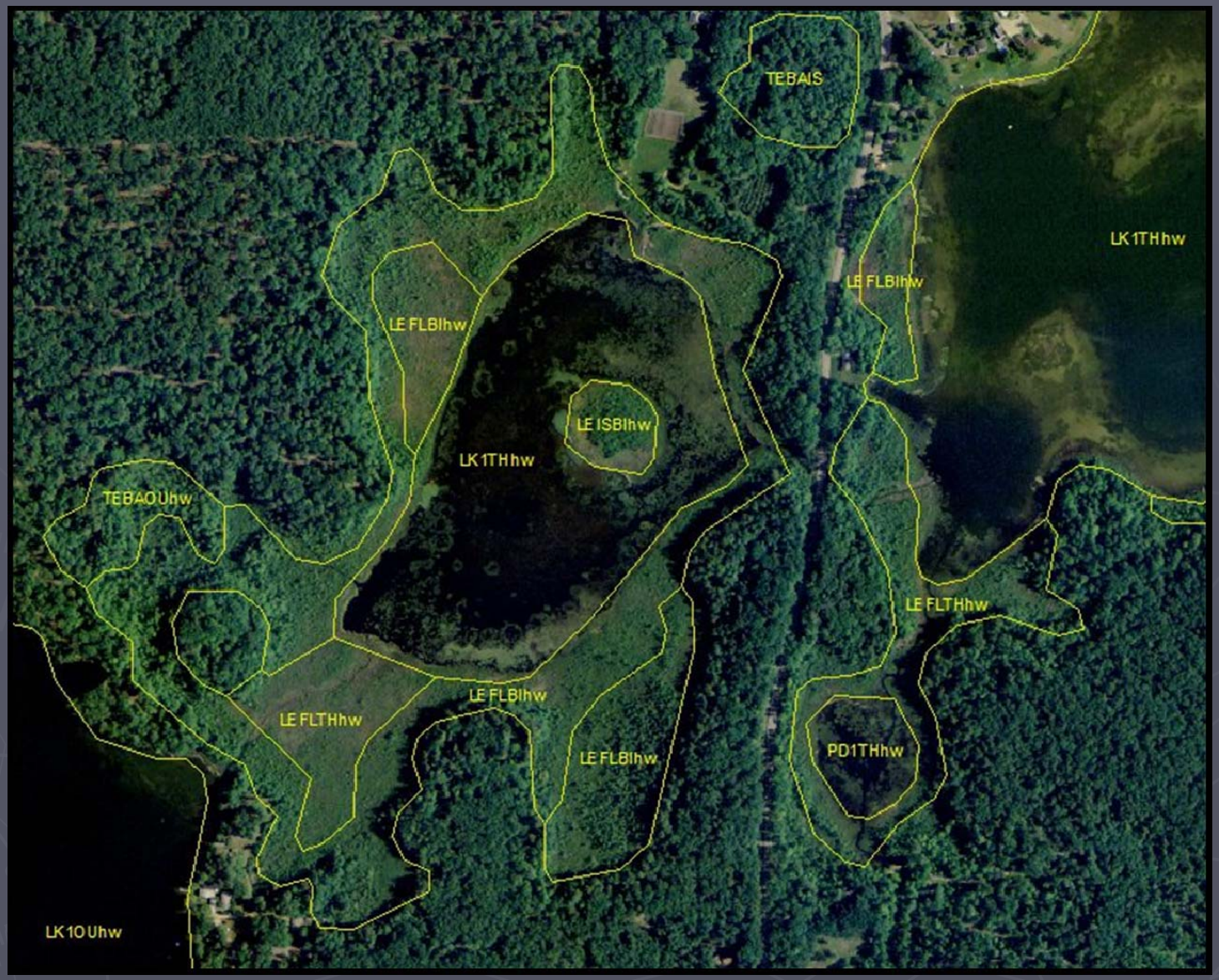
Step 2: Enhance NWI datasets with HGM descriptors

Landscape Position*	Landform	Water flow Path	Waterbody Type
Terrene (TE)	Slope (SL)	Isolated (IS)	Natural Pond (PD1)
Lentic (LE)	Island (IS)	Inflow (IN)	Diked/Impounded Pond (PD2)
Lotic River (LR)	Fringe (FR)	***Outflow (OU)	Excavated Pond (PD3)
Lotic Stream (LS)	Floodplain** (FP)	Bidirectional (BI)	Natural Lake (LK1)
* can also be identified with hw modifier = headwater	Basin (BA)	***Throughflow (TH)	Dammed River Valley (LK2)
	Flat (FL)		Excavated Lake (LK3)
	** modifiers ba = basin or fl = flat	*** = can also be artificial or intermittent	River (RV)

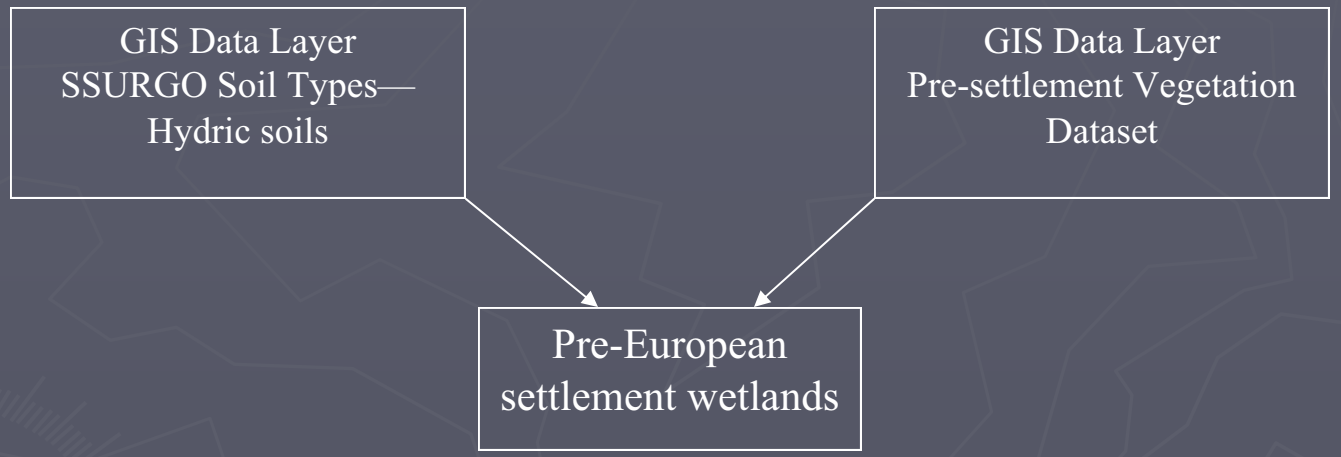
Typical NWI wetland classification



Becomes a HGM description



Step 3: Develop a dataset that represents the extent of Pre-European settlement wetlands



NOTE: All hydric soil polygons were identified as historic wetland polygons. The wetland polygons were then classified based on: 1) NWI wetland classification to determine vegetation class, and 2) information on soil series to determine appropriate water regime.

Types of Wetland Functions

- Functions of importance:
  - Floodwater storage
  - Streamflow maintenance
  - Nutrient transformation
  - Retention of sediment
  - Shoreline stabilization
  - Fish habitat
  - Waterfowl/Waterbird habitat
  - Other wildlife habitat
  - Stream shading
  - Shorebird habitat
  - Interior forest bird habitat
  - Amphibian habitat
  - Groundwater influence
  - Conservation of rare or imperiled wetlands

So what did we find out about the

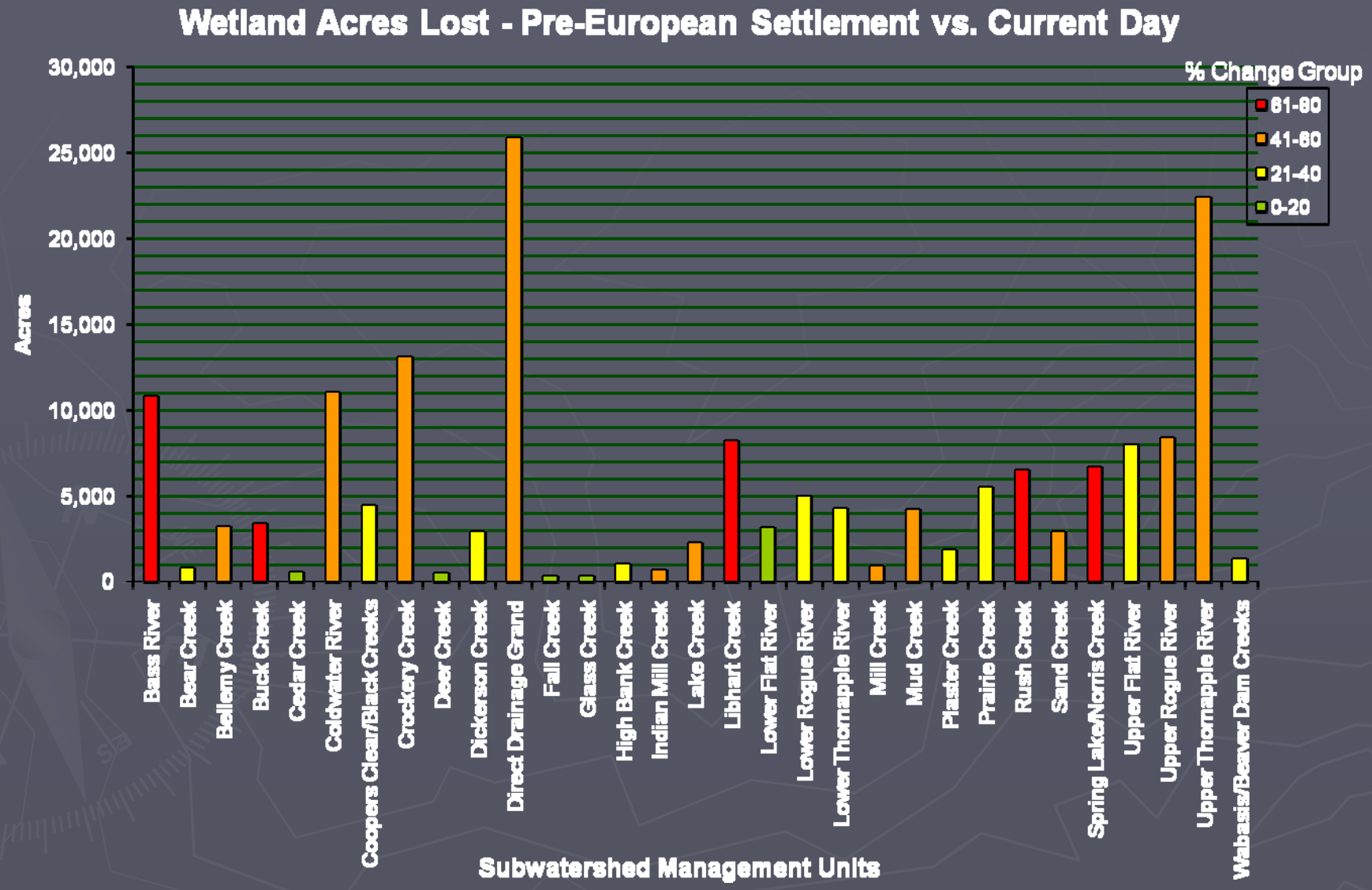
Lower Grand River Watershed?

Change in Wetland Extent

Pre-European Settlement Wetlands	Current Wetlands
407,522 Acres	237,519 Acres
17 Acres Average Size	4.5 Acres Average Size

42% Loss of Total Wetland Resource

Which Subwatersheds have lost the most wetlands?



How much function have we lost?

Function	Pre-European Settlement Acreage	Current Acreage	Acreage Lost	% Change in Acreage
Floodwater Storage	286,445	128,742	157,703	-55
Streamflow Maintenance	294,232	158,432	135,800	-46
Nutrient Transformation	377,054	173,816	203,238	-54
Sediment and Other Particulate Retention	331,074	152,432	178,642	-54
Shoreline Stabilization	261,248	145,177	116,070	-44
Fish Habitat	301,330	170,919	130,411	-43
Stream Shading	122,642	58,289	64,353	-52
Waterfowl and Waterbird Habitat	141,734	141,718	-16	-1
Shorebird Habitat	235,295	195,437	41,351	-17
Interior Forest Bird Habitat	373,198	140,658	232,540	-62
Amphibian Habitat	100,611	82,346	18,265	-18
Ground Water Influence	203,998	128,779	75,219	-37
Conservation of Rare Imperiled	N/A	8,964	N/A	N/A

Digital Atlas

Landscape Level Functional Wetlands Assessment

Lower Grand River Watershed


Lentic fringe wetland


American white water-lily


Cardinal flower


Green arrow arum


Michigan holly


Lotic river forested floodplain wetland


Cinnamon fern


Terrene basin wetland


Western chorus frog

Project Partners:

Department of Natural Resources and Environment

FTC&H
Fishbeck, Thompson, Carr & Huber, Inc.

GVMC

Lower Grand River Organization of Watersheds

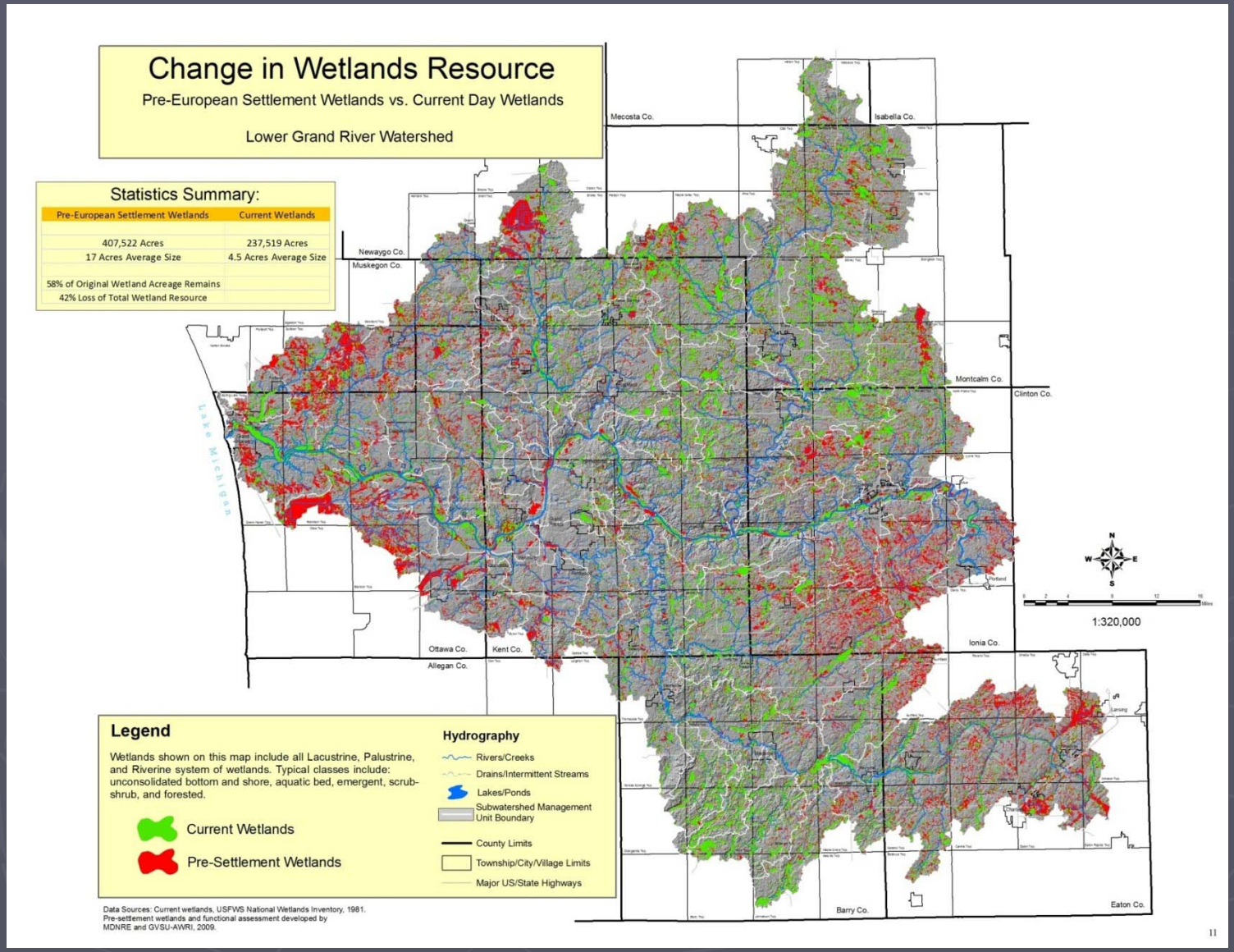
Atlas developed by:

Grand Valley State University
Annis Water Resources Institute
Lake Michigan Center

Information Services Center
May 2010
MR-2010-2

Project Funded By:
U.S. Environmental Protection Agency – Region 5 with additional support provided by the Michigan Department of Natural Resources and Environment, Lower Grand River Organizational Watersheds Initiatives Implementation Project

Digital Atlas



Subwatershed Action Plans

- Summarize the functional assessment results in:
  - Spring Lake Subbasin
  - Rogue River Subbasin
  - Dickerson Creek Subbasin
- Establish priorities for wetland restoration and preservation
- Detail approaches for wetland restoration and preservation
  - BMP's
  - Ordinances
  - Other tools

For More Information

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John K. Koches – AWRI/GVSU
kochesj@gvsu.edu