West Michigan Watershed Partners Inventory

December 2008

WEST MICHIGAN SHORELINE
REGIONAL DEVELOPMENT COMMISSION

WEST MICHIGAN SHORELINE REGIONAL DEVELOPMENT COMMISSION (WMSRDC)

The WMSRDC is a regional council of governments representing 127 local governments in the West Michigan counties of Lake, Mason, Muskegon, Newaygo, Oceana, and northern Ottawa.

The mission of WMSRDC is to promote and foster regional development in West Michigan… through cooperation amongst local governments.

WEST MICHIGAN SHORELINE
REGIONAL DEVELOPMENT COMMISSION

Project Staff:

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CHAPTER 1 INTRODUCTION AND OVERVIEW

The West Michigan Shoreline Regional Development Commission (WMSRDC) includes 2,954.56 square miles of Lake Michigan watershed. Freshwater heads a long list of the many natural resources found within the region, including more than 400 lakes, 250 streams and over 75 miles of Lake Michigan coastline and pristine beaches. Traversed by eight major river systems, including the Lower Grand, Muskegon, White, Pentwater, Pere Marquette, Big Sable/Lincoln, Little Manistee and the Manistee/Pine, it is also home to twelve coastal, drowned river-mouth lakes. They include Hamlin, Pere Marquette, Bass, Pentwater, Silver, Stony, White, Duck, Muskegon, Mona, Little Black and Spring Lake. Virtually all of these lakes and streams receive some level of stewardship by active watershed-based volunteer organizations, lake associations, conservation groups, agency partners and the general public.

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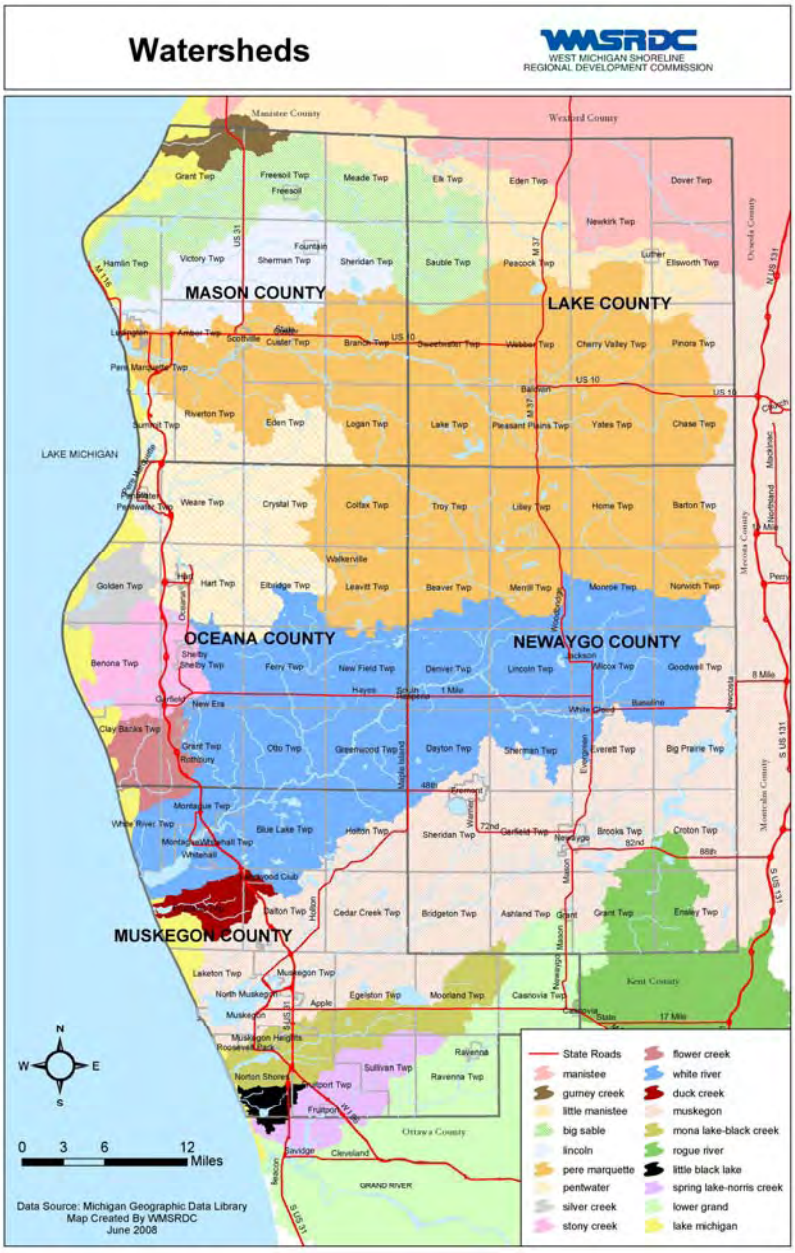


Figure 1: The WMSRDC Region and its Watersheds

A. PURPOSE OF THE WATERSHED PARTNERS INVENTORY

The purpose of the Watershed Partners Inventory is to summarize the watershed-based stewardship activity occurring within the region. The inventory pulls together otherwise disparate information about watershed plans, regulatory programs and natural resource priorities within the region. The information can assist local governments and other watershed partners in determining regional priorities for restoration and protection. The inventory can be used to develop

collaborative efforts to improve and protect west Michigan's quality of life, economy and the sensitive, water based ecosystems upon which they depend.

B. Natural Resources and Land Use

The protection or degradation of natural resources can be tied directly to the way a region grows. The amount and type of open space that is developed by a growing population can ultimately determine the quality of lakes, wetlands, forests and other sensitive natural resources.

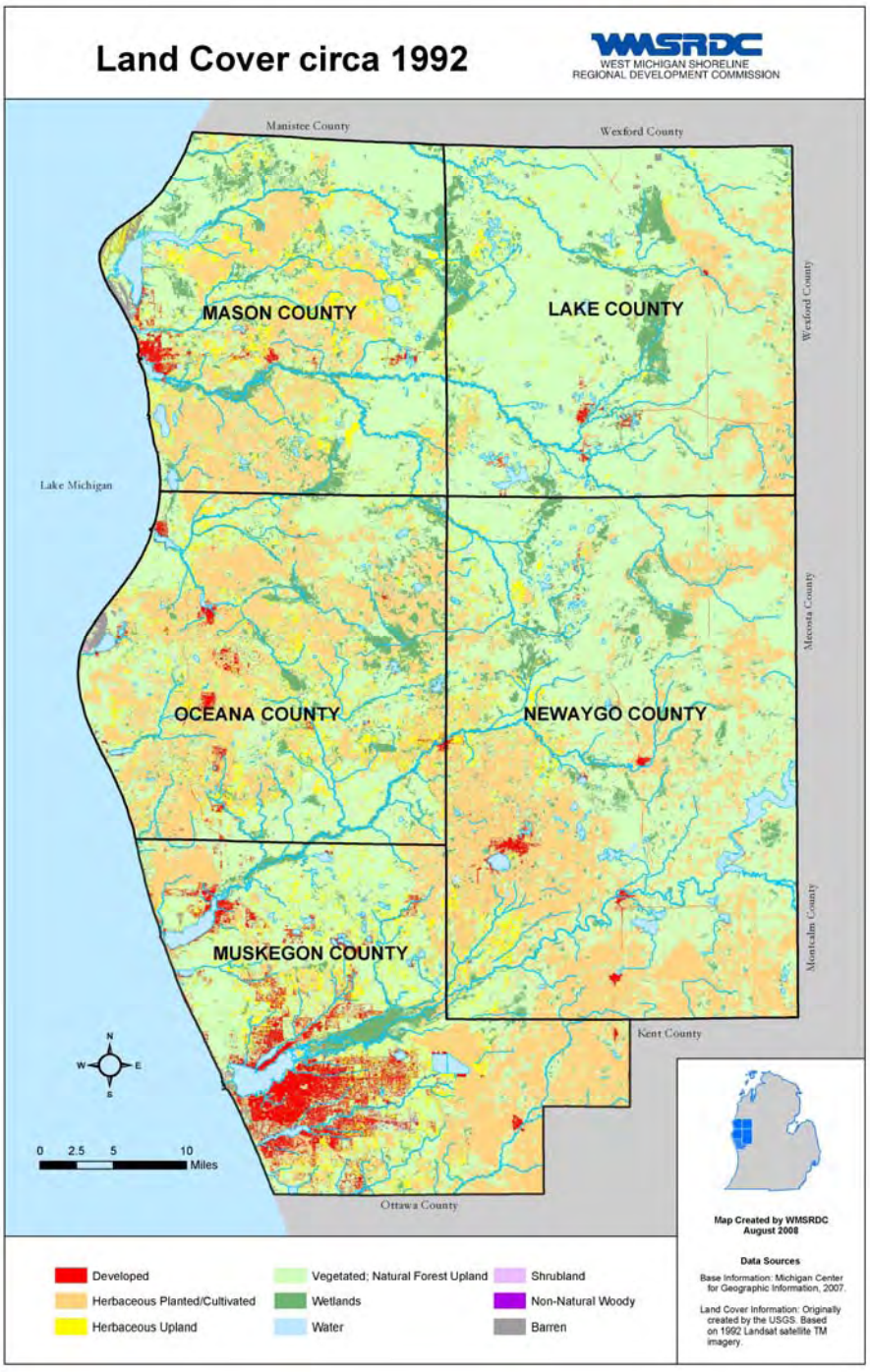


Figure 2: WMSRDC Region Land Cover

The West Michigan Shoreline Regional Development Commission prepares population projections using information provided by the U.S. Census Bureau. Between 2000 and 2005, the five-county region experienced a higher growth rate than the state. WMSRDC projects that the current long term growth trend will continue through 2035.

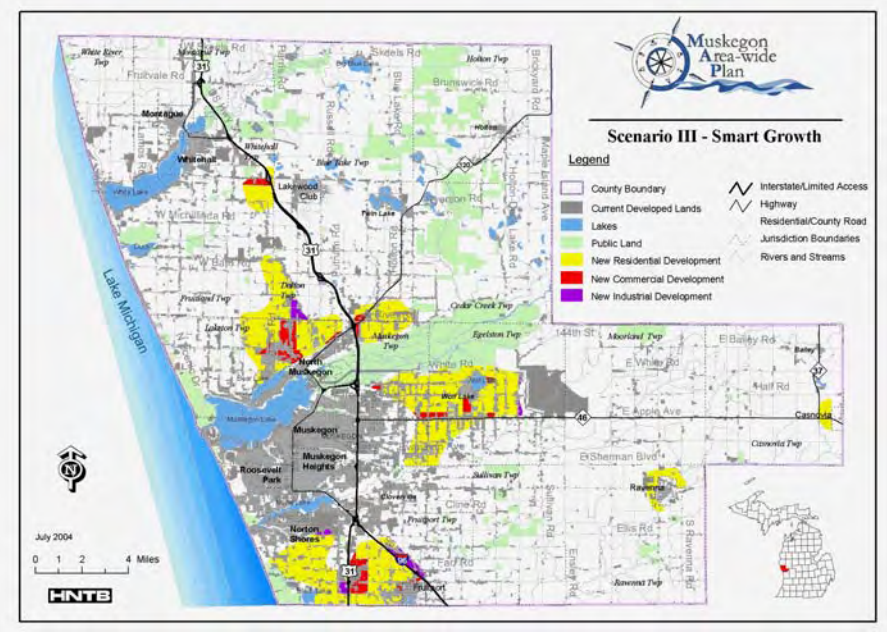
The total square mile area for each county is: Lake - 567.44, Mason - 495.17, Muskegon - 509.12, Newaygo - 842.37 and Oceana - 540.46.

This map and the associated table presents the acreages and percentages of land cover within the WMSRDC region under the categories of Natural Forest Upland, Herbaceous Cultivated, Wetlands, Lakes and Rivers, Creeks and Streams, Developed, Herbaceous Upland, Barren, Shrubland and Open Water.

Table #1

WMSRDC REGION LAND COVER IN ACRES					
land cover class	*land cover types*	*nlcd code #*	*regional acreage*	*% (types)*	*% (class)*
Water	open water	11	44,767.86	2.32%	2.32%
Developed	low intensity residential	21	33,089.91	1.71%	2.46%
	high intensity residential	22	5,520.73	0.29%	
	commerce/industry/transport	23	8,851.76	0.46%	
Barren	bare rock/sand/clay	31	6,565.09	0.34%	0.45%
	quarries/strip mines/gravel pits	32	592.69	0.03%	
	transitional	33	1,551.20	0.08%	
Vegetated; Natural Forest Upland	deciduous forest	41	696,775.11	36.08%	55.85%
	evergreen forest	42	285,764.27	14.80%	
	mixed forest	43	96,137.07	4.98%	
Shrubland	shrubland	51	5,830.97	0.30%	0.30%
Non-natural Woody	orchards/vineyards/other	61	454.80	0.02%	0.02%
Herbaceous Upland	grasslands/herbaceous	71	97,225.03	5.03%	5.03%
Herbaceous Planted/ Cultivated	pasture/hay	81	198,634.19	10.29%	24.48%
	row crops	82	257,262.81	13.32%	
	small grains	83	5,549.20	0.29%	
	urban/recreational grasses	85	11,264.30	0.58%	
Wetland	woody wetlands	91	143,215.39	7.42%	9.08%
	emergent herbaceous wetlands	92	32,241.25	1.67%	

Within the WMSRDC region, there is a disproportional consumption of land in Muskegon County compared to the other counties. Muskegon County's population is expected to grow by 13.3 percent to nearly 195,064 people over the next 20 years. The amount of land that is predicted to be developed during that same time period is nearly 20,000 acres. ***(Muskegon Areawide Plan, 2005, WMSRDC)***. The map illustrates Muskegon County's vision for a "smart growth" approach to guide development in a way that has minimal impact on natural resources, utilizes existing and planned infrastructure and paves the way for a greater use of existing green infrastructure.



According to the National Oceanic and Atmospheric Administration (NOAA) Coastal Management and Mark Wyckoff, President of Planning & Zoning Center,

Inc., "How we use land is the foundation of environmental quality." Statewide there are more than 1800 units of local government that have the authority to make land use decisions. A 2003 publication, ***Filling the Gaps: Environmental Protection Options for Local Governments***, was created to provide local officials with information to consider when making local land use plans, reviewing proposed development or considering the adoption of new environmentally-focused rules and regulations. The publication is available through the Michigan Department of Environmental Quality Coastal Management Program at (517) 335-3168 or electronically at http://www.michigan.gov/deq/0,1607,7-135-3313_3677_3696-73358--,00.html

A 2007 report by the Brookings Institution presents the economic benefits of restoring the Great Lakes ecosystem. ***Healthy Waters, Strong Economy: The Benefits of Restoring the Great Lakes Ecosystem*** is available electronically at http://www.brookings.edu. The report is based on recommendations in the 2005 Great Lakes Regional Collaboration Strategy, available electronically at http://www.glrc.us/strategy.html Topics include: Aquatic Invasive Species, Habitat/Species, Coastal Health, Areas of Concern/Sediments, Nonpoint Source, Toxic Pollutants, Indicators and information and Sustainable Development.

C. Water Quality Programs and the WMSRDC Region

Within the WMSRDC region, eleven (11) watershed plans have been approved by the Michigan Department of Environmental Quality (MDEQ) Clean Michigan Initiative (CMI), with one approved by the US Environmental Protection Agency (EPA) Section 319 Federal Clean Water Act and others pending approval. Two watersheds include water quality plans approved by the MDEQ Area of Concern (AOC) Remedial Action Plan (RAP) Program. Additionally, communities are working to meet federal stormwater regulations through watershed management plans, approved by MDEQ and EPA. All of the watersheds within the WMSRDC region are addressed by the Lake Michigan Lakewide Management Plan, approved by US EPA.

In Michigan, grant programs for 319 Watershed Plans, Remedial Action Plans (RAPs), Lakewide Management Plans (LaMPs) and Stormwater Management Plans and projects are administered by the MDEQ Water Bureau. Where plans have been approved, they often qualify for grant funds through the MDEQ's Clean Michigan Initiative (CMI) bond program and other state and federal grant programs. The US EPA Great Lakes National Programs Office (GLNPO) also provides grant support for projects consistent with the goals and objectives of the Clean Water Act (CWA) and the Great Lakes Water Quality Agreement (GLWQA). Within the WMSRDC region, the following watersheds have produced approved watershed, remedial action or stormwater management plans that are eligible for funding through state and federal programs:

Table # 2

WATER QUALITY MANAGEMENT PLANS AND PROGRAMS COMPLETED BY WATERSHED							
Watershed Name	*Wellhead Protection*	*Watershed*	*Stormwater*	*TMDL Study*	*Remedial Action*	*Fisheries*	*Other*
Great Lakes						x	Great Lakes Regional Collaboration (GLRC) Strategy
Lake Michigan						x	Lakewide Management Plan (LaMP) & Mass Balance Study
Lower Grand River		319	Phase I	x			
Rogue River		319	Phase I	x		x	
Spring Lake		319	Phase I				
Mona Lake		604-b	Phase II	x			
Muskegon River	3	319				x	
Muskegon Lake		AOC RAP	Phase II	x	Muskegon Lake RAP	x	
Bear Creek & Bear Lake		319	Phase II	x	Muskegon Lake RAP		
White River	3	319 underway				x	Natural Rivers Designation
White Lake	2	AOC RAP			White Lake RAP	x	
Pere Marquette River	1	319				x	Natural Rivers Designation
Pentwater River South Branch		319				x	
Little Manistee River		319				x	
Hamlin Lake/ Big Sable River		319				x	
Manistee River		319				x	
Pine River						x	Natural Rivers Designation
Totals	**9**	**14**	**6**	**5**	**2**	**13**	**4**

Table # 3

WATER QUALITY CONCERNS BY WATERSHED					
Watershed	*TMDL Water Bodies in non-attainment of Water Quality Standards*	*TMDL Water Bodies in non-attainment due to Stream Habitat Modifications*	*Water Bodies within Area of Concern (AOC) Designation*	*Eutrophic and Hypereutorphic Public Access Lakes*	*Beach Closings from 2004-2007*
Lower Grand River	3			1	1 - *Crockery Lake*
Rogue River	1				
Spring Lake				1	
Mona Lake	3	1		1	
Muskegon River				6	
Muskegon Lake	3		X	1	1
Bear Lake	1		X	3	
White River		3		2	
White Lake	2		X	1	3 - *Fox Lake*
Pentwater River South Branch					
Pentwater River	1	2		1	
Pere Marquette River	1			1	
Lincoln River/Lake				3	
Little Manistee River					
Hamlin Lake/ Big Sable River				1	
Manistee River/ Pine River					
Lake Michigan Direct Drainage		5		4	9
Totals	**15**	**11**	**3**	**26**	**14**

The MDEQ also works with communities to conduct Total Maximum Daily Load assessments (TMDL) for water bodies that do not meet water quality standards under Section 303d of the Clean Water Act. Within six (6) WMSRDC watersheds, there are fifteen (15) water bodies scheduled for TMDL assessments over the next five years. They include Muskegon, White and Mona Lakes and the Pere Marquette, Pentwater and Grand Rivers.

The MDEQ often partners with contractors, local agencies and universities to carry out TMDL monitoring assessments through cooperative agreements and grants.

A. GREAT LAKES WATERSHED

The Great Lakes watershed is vast, ecologically sensitive and diverse. There are few organizations whose mission is to improve and protect the Great Lakes as a whole, compared to the many organizations whose missions are to care for its sub-watersheds.

This document provides an overview about watershed stewardship and water quality programs within the WMSRDC region. It summarizes information about local water quality and habitat conditions, stewardship organizations and watershed management plans that have been approved by the state and federal governments. Local governments often partner with watershed organizations to carry out projects that improve water quality, wildlife habitat, the local economy and quality of life in west Michigan communities. Approved watershed plans are eligible for funding through a variety of sources.

The Great Lakes contain about 23,000 km^3 (5,500 cu. mi.) of water, covering a total area of 244,000 km^2 (94,000 sq. mi.) The Great Lakes are the largest system of fresh, surface water on Earth, containing roughly 21 percent of the world supply and 84 percent of North America's supply. Only the polar ice caps contain more fresh water.

The Great Lakes basin is home to 25 million people in the United States and 8.5 million in Canada. This means that about 10 percent of the U.S. population and 31 percent of the Canadian population live in the Great Lakes basin.

Despite their large size, the Great Lakes are sensitive to the effects of pollution. Sources of pollution include soil runoff and farm chemicals from agricultural lands, waste from urban areas, discharges from industrial areas and leachate from disposal sites. The large surface area of the lakes also makes them vulnerable to the direct deposit of pollutants that fall with rain, snow, or dust onto the lakes' surface. In December 2004, the Great Lakes Regional Collaboration of National Significance created a unique, broad and inclusive partnership of stakeholders representing federal, state, and local governments, tribes, watersheds, conservation organizations, industry and other interests. As a result, the Great Lakes Regional Collaboration Strategy was developed to guide communities in working toward a common goal of restoring and protecting the Great Lakes ecosystem for this and future generations. The strategy identifies priorities and provides a framework and catalyst for working together. To view the ***Great Lakes Regional Collaboration Strategy***, please visit the GLRC web site at: http://www.glrc.us/strategy.html.

B. LAKE MICHIGAN WATERSHED

Under the *Great Lakes Water Quality Agreement*, the United States and Canada agreed "to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes basin ecosystem." To achieve this objective, the parties agreed to develop and implement, in consultation with state and provincial governments, Lakewide Management Plans (LaMPs) for open waters. Work on the *Lake Michigan LaMP* began in the early 1990s. The LaMP's goals are linked with environmental indicators contained in the State of the Lakes Ecosystem Conference (SOLEC) biennial reports. For Lake Michigan, SOLEC reports that the watershed is undergoing an intermediate to high rate of land development conversions. Of the 3.0 million acre watershed, 24,028 acres of wetland, 193,624 acres of agricultural land, and 142,157 acres of forest land were developed between 1992 and 2001.

Lake Michigan Watershed with The Nature Conservancy (TNC) Biodiversity Areas (in green)

The LaMP vision is: A sustainable Lake Michigan ecosystem that ensures environmental integrity and that supports and is supported by economically viable, healthy human communities. The LaMP goal is: To restore and protect the integrity of the Lake Michigan ecosystem through collaborative, place-based partnerships. The LaMP framework is led by a technical coordinating committee (federal, state and tribal agencies) that develops partnerships of organizations to solve problems too complex to be dealt with by one agency with a limited mission. The Lake Michigan Stakeholder Forum provides input on issues from representative stakeholders of the Lake Michigan basin. The forum has a number of responsibilities, including 1) representing the diverse interests and geography of the Lake Michigan basin and creating important communication links; 2) identifying targets of opportunities for demonstration projects; and 3) building a constituency for improving Lake Michigan. For more information, visit www.lkmichiganforum.org.

As part of the LaMP process, the Lake Michigan Watershed Academy (LMWA) formed to undertake the challenge of translating Lake Michigan scale watershed data and planning to local governments divided by political boundaries. The LMWA provides a "packaging and delivery system" that brings together the tools, data and expertise of many federal, state, local and tribal agencies, as well as nongovernmental organizations to explore opportunities for new partnerships, thereby impacting the quality of land use plans and partners in the Lake Michigan watershed. WMSRDC hosted the West Michigan Regional Watershed Conference with the LMWA in December, 2003 and continues to work in partnership with LMWA programs.

Lake Michigan Direct Drainage Watersheds
In addition to the region's major river watersheds (described below), smaller watersheds drain to Lake Michigan through creeks and groundwater. They include:

- Gurney Creek, Cooper Creek, and Porter Creek in Mason County
- Au Sable Creek/Silver Lake, Mason Creek/Stony Lake, and Flower Creek in Oceana County
- Duck Creek/Lake and Little Black Lake in Muskegon County
- Other small coastal drainage areas remain un-named

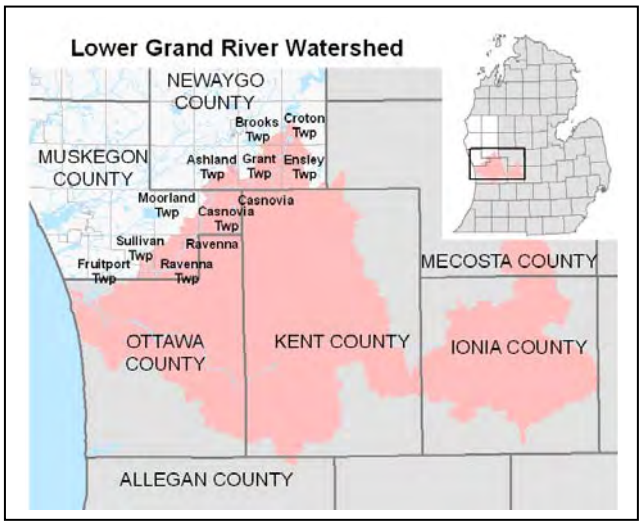
An important tool for the protection and enhancement of all coastal watersheds is the Coastal Zone Management (CZM) program, administered by MDEQ.

Michigan's CZM Program was developed under the federal Coastal Zone Management Act. Since 1978 it has assisted local governments, watershed groups and community organizations by funding coastal management projects that enhance Great Lakes coastal habitats and increase recreational opportunities.

Another tool that addresses environmental quality along with community safety is the National Flood Insurance Program. It includes: 1) floodplain identification and mapping 2) floodplain management and 3) flood insurance. For assistance with flood mitigation planning, please call WMSRDC at (231) 722-7878. Ask for Nan Emmer, WMSRDC Planning Director or Stephen Carlson, Associate Planner. For details about the NFIP, see http://www.fema.gov/business/nfip/.

C. LOWER GRAND RIVER WATERSHED – HUC Code: 04050006

Size and Location:
The Lower Grand River watershed is approximately 3,020 square miles, and includes the Thornapple River, Flat River, and Rogue River Watersheds. The Grand River flows into Lake Michigan at Grand Haven. Most of the watershed is covered by residences, urban centers, forests, and agriculture. The watershed is 53% agricultural, and includes the metropolitan area of Grand Rapids. The riparian habitat is 25-50% forested and includes 1,108 perennial stream/river miles.



Watershed Management:
The Lower Grand River Watershed Management Plan (WMP) was completed by the Grand Valley Metropolitan Council in September, 2004. It studied the portion of the Grand River Watershed (Watershed) below the Looking Glass River confluence, near the City of Portland. The drainage area encompasses portions of Ottawa, Muskegon, Newaygo, Kent, Ionia and Mecosta Counties. The plan is approved under the Clean Michigan Initiative (CMI) administrative rules and was funded under section 319 of the US Federal Clean Water Act. The 319 project reduced sediment and nutrients that helped to repair the poor fish and macroinvertebrate communities, sedimentation, elevated nutrient levels, and excessive algae growth. It reduced mercury, pathogens, and Polychlorinated Biphenyls contamination to protect and preserve fisheries, agricultural, and recreational opportunities.

Total Maximum Daily Load Assessment:
The Total Maximum Daily Load (TMDL) assessment for Escherichia coli for Rio Grande Creek in Muskegon and Ottawa Counties was completed by MDEQ in January, 2003. The MDEQ has identified 36 water bodies within the LGRW that require TMDLs. Pollutants of concern include polychlorinated biphenyls (PCBs), mercury, sediment, nutrients, pathogens (E. coli), low dissolved oxygen, and untreated sewer discharges. MDEQ biological surveys have reported that urbanization of the watershed, with increased impervious surfaces, is accelerating sedimentation and flow fluctuations from storm water runoff, which causes impairments to its streams. Nonpoint source pollution from agricultural sources was cited as a source of nutrients and possibly pathogens. Biota TMDLs have been approved by the USEPA for reaches totaling 107 stream/river miles in this watershed, while 53 miles still require TMDL development. *E. coli* TMDLs have been approved by the USEPA for reaches totaling 86 stream/river miles in this watershed, while 62 miles still require TMDL development. Approximately 11.5% (127 of 1,108 perennial stream/river miles) of the Grand River watershed is listed as impaired due to a fish consumption advisory for PCBs or elevated fish tissue mercury concentrations. The entire lower Grand River watershed (1,108 miles) is impaired due to water quality standard (WQS) exceedances for PCBs in water. In addition, 92 stream/river miles are impaired due to WQS exceedances for mercury in water, while 47 miles are impaired due to other water quality parameters. In 2004, macroinvertebrate and habitat surveys were conducted at 45 sites. Of these, 41 were attaining WQS for aquatic life (MDEQ, Rockafellow, 2005). Based on 2004 and previous

data, a total of 181 miles are not attaining WQS due to a poor macroinvertebrate/fish community.

Stormwater Management:
The Lower Grand River Watershed (LGRW) includes 39 governmental entities working on stormwater management through the National Pollutant Distribution and Elimination System (NPDES) and the MDEQ's voluntary stormwater permit program. Within the WMSRDC region, there are seven (7) jurisdictions working cooperatively on the watershed-based program, including Ferrysburg, Grand Haven, Spring Lake Village, Spring Lake Township, Ottawa County Road Commission and Ottawa County Administration and Drain Commission. Robinson Township is utilizing the jurisdictional permit to meet NPDES stormwater regulations.

Fisheries and Habitat:
A Michigan DNR acquisition, through the Michigan Natural Resource Trust Fund and other sources preserved the 550-acre Bakale Tract (Ottawa County) parcel on the Grand River by Grand Haven. It protects a diverse wetland habitat complex and provides recreational opportunity. The project generated sufficient partner match to facilitate a $1 million North American Waterfowl Conservation Act (NAWCA) grant for the Grand River watershed. It was administered by Ducks Unlimited and provided almost 2,000 additional acres of wetland and associated upland habitat projects in the Grand River watershed.

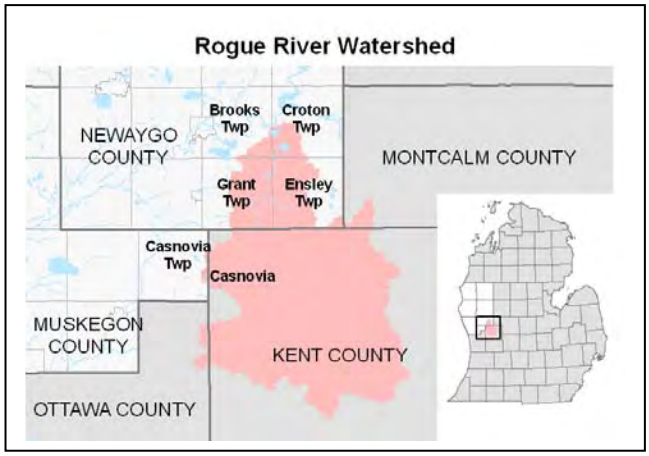
Watershed Highlights:
Recent and ongoing monitoring and protection activities for the lower Grand River watershed include: in FY 2004, ongoing NPS grant projects in the lower Grand River watershed included one Section 319, one Clean Water Action Program, and four CMI grants (MDEQ, 2004a); MDEQ-approved NPS watershed management plans have been written for several streams/rivers in the watershed; the MDNR, Fisheries Division, has completed the first two years of a five-year river assessment project (the completion date is scheduled for 2007); the MDNR, Fisheries Division, awarded an Inland Fisheries Grant to the village of Diamondale to remove the Wilson Dam (Diamondale Dam); and several volunteer monitoring organizations, including the Coldwater River Watershed Council, Friends of the Looking Glass River, and West Michigan Environmental Action Council, monitor sites in the lower Grand River watershed.

Contact Information:

Lower Grand River Organization of Watersheds
c/o Grand Valley Metro Council, 40 Pearl St. NW, Suite 410, Grand Rapids, MI 49401
Contact: Andy Bowman
Phone: (616) 776-3876
Email: bowmana@gvmc.org

D. ROGUE RIVER WATERSHED – HUC Code: 04050006

Size and Location:
The Rogue River is a major tributary of the Grand River. Its watershed is 167,625 acres in size, with the southern-most portion designated as a coldwater fishery. Land use throughout the watershed consists of 8% developed, 38% agricultural, 30% forested, 4% wetlands, and 20% other.



Watershed Management:
The Rogue River Watershed Management Plan was approved in 2000 under the CMI administrative rules and was funded under section 319. Since that time, several best management practices have been implemented (four road stream crossings, 700 foot stream bank stabilized, planting of riparian vegetation along the Rogue) and educational activities have been held for watershed stakeholders. In 2006, the Land Conservancy of West Michigan (LCWM) was awarded $483,623.00 from the MDEQ Non Point Source Program to secure permanent protection of privately held natural lands that are essential to maintaining water quality. The Rogue River and its tributaries are threatened by urbanization and the resulting sediment and thermal pollution. LCWM has identified the highest priority lands in the watershed that need to be protected. Easements will be placed on one or two of the highest priority parcels in the watershed. Additionally, part of these funds is being used by the Annis Water Resources Institute (AWRI) of GVSU to update the Rogue River Watershed 319 Management Plan

Fisheries and Habitat:
The 1973 Rogue River Natural River Management Plan was revised and updated by the Michigan Department of Natural Resources Fisheries Division in March, 2002. The Rogue River Natural River District is a strip of land 300 feet wide on each side of and parallel to the river and its specified tributaries. The Rogue River's headwaters are a series of ditches that drain the old Rice Lake bed in southern Newaygo County. In this area the stream has been dredged and straightened for drainage purposes leaving limited fish habitat. Private ownership within the Natural River District is estimated to be about 9,000 acres. Tributaries of the Rogue maintain its excellent water quality. Cold water tributaries include Spring, Cedar, Duke, Stegman, Rum, Shaw and Barkely Creeks. There are also warm-water tributaries such as Post, Hickory, Walter, and Ball Creeks. In addition, Ransom, Camp, Freska, Grass (Bella Vista), Indian and Spring Lakes all have outlets flowing into the Rogue. This creates a delicate ecological balance. If the cold water conditions were altered and the waters of the Rogue warmed, the trout fishery would probably be destroyed. The present combination of cold, clean, fresh water and habitat contribute to the superior growth exhibited by trout and helps provide a fishery capable of supporting extensive fishing pressure.

Total Maximum Daily Load Assessment:
Bills Lake, within the Rogue River watershed in Newaygo County, does not meet water quality standards for mercury. There are no other water bodies within the WMSRDC region of the Rogue River that do not meet water quality standards.

Stormwater Management:
Stormwater management issues in the Rogue River watershed are addressed in the Lower Grand River Stormwater Management Plan and by the County Drain Commissioners. Also, several communities within the Rogue River Watershed have adopted the standards in the Proposed Model Storm Water Ordinance for Kent County Townships and Municipalities which was produced in 2001.

Watershed Highlights:
The Rogue River Watershed Council is dedicated to the long-term protection and restoration of the Rogue River and its tributaries through community stewardship, education and watershed-based land-use planning. The Rogue River Watershed Council website is: www.gvsu.edu/wri/isc/rogue/council.htm.

Contact Information:

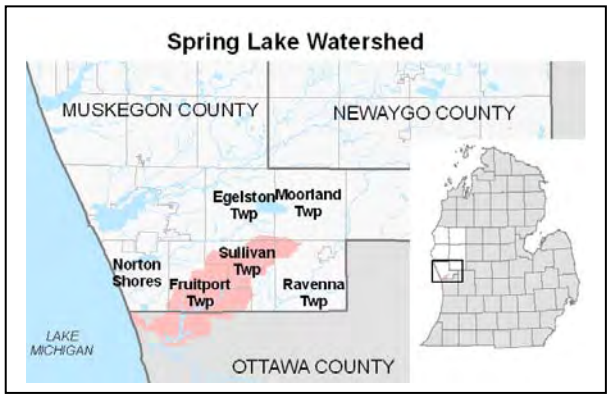
Rogue River Watershed Council
c/o Grand Valley Metro Council, 40 Pearl St. NW, Suite 410, Grand Rapids, MI 49401
Contact: Andy Bowman
Phone: (616) 776-3876
Contact Email: bowmana@gvmc.org

GVSU-Annis Water Resources Institute
Contact: Nichol DeMol
Phone: (616) 331-3092
Email: demoln@gvsu.edu

Land Conservancy of West Michigan
1345 Monroe Avenue, Grand Rapids, MI 49505
Phone: (616) 451-9476 Fax: 616-451-1874
Email: lcwm@naturenearby.org
Web Site: www.naturenearby.org

E. SPRING LAKE WATERSHED – HUC Code: 04050006

Size and Location:
Spring Lake is eutrophic lake, located in west Michigan along the shores of Lake Michigan near the mouth of the Grand River. The Ottawa County lake was being impacted by agricultural land in the headwater region of the 16,263-acre watershed. Spring Lake and the Grand River are impacted by high levels of phosphorus and potentially-toxic cyanobacteria blooms and the nearshore areas of Lake Michigan are showing signs of impairment from nonpoint source pollution.



Watershed Management:
The Spring Lake Watershed Plan (Spring Lake – Lake Board, 2001) was approved under the CMI administrative rules and was funded under section 319. The overall goal of the plan is to protect threatened designated uses and restore impaired designated uses of navigation, warm water fishery, indigenous aquatic wildlife, partial body contact recreation, and total body contact recreation. Spring Lake is also included in the Lower Grand River Watershed Management Plan (Grand Valley Metro Council, 2004).

Stormwater Management:
The *Lower Grand River Stormwater Management Plan* addresses the Spring Lake watershed. Spring Lake Village, Spring Lake Township, Village of Fruitport, Fruitport Township and Ferrysburg are the Phase II communities included in the plan. (For more information about Phase II Stormwater Communities, see chapter 5).

Township and Village officials would like to identify the causes, consequences, and correctives of storm water discharges to the watersheds surrounding Spring Lake Township and the Village of Spring Lake, to Spring Lake, the Grand River, and ultimately, Lake Michigan.

Total Maximum Daily Load Assessment:
Information to be updated

Fisheries and Habitat:
Information to be updated

Watershed Highlights:
Stormwater Management in Spring Lake, a GVSU-Annis Water Resources Institute project funded by Michigan Sea Grant is designed to do the following:

- Increase Spring Lake area residents' and decisionmakers' general knowledge and understanding of the causes and consequences of stormwater runoff, and how they apply specifically to Spring Lake, the Grand River, and Lake Michigan
- Increase stakeholder stewardship of the water resources surrounding Spring Lake Township and the Village of Spring Lake, and in particular, increase participation in stormwater control and management

- Identify inconsistencies between state regulations and/or local ordinances that can improve local stormwater management and control
- Provide a suite of alternative stormwater management Best Management Practices (BMPs) tailored to Spring Lake Township and the Village of Spring Lake

The Reduction of Internal Phosphorus Loading Using Alum in Spring Lake, Michigan was published by GVSU-AWRI in February, 2004.

Contact Information:

Spring Lake – Lake Board c/o Spring Lake Township
106 S. Buchanan St
Spring Lake, M I 49456
Phone: 616-842-1340
Email: webinfo@charterinternet.com

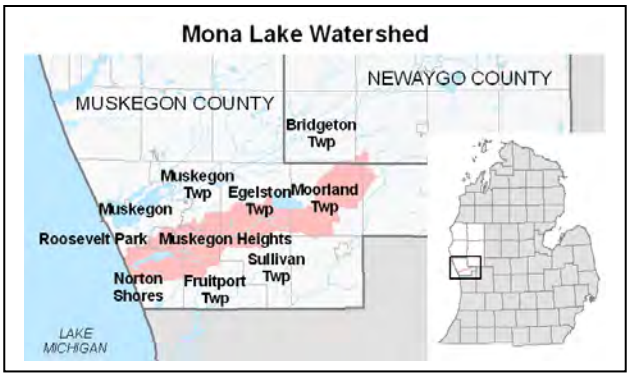
Thomas Huizingh, Spring Lake Watershed
Phone: (616) 460-3366 or (616) 460-3366
Email: tomhuizingh@kellogg.com

Lower Grand River Watershed Council
(For contact information, see Chapter 9)

GVSU – Annis Water Resources Institute
740 West Shoreline Dr., Muskegon, MI 49441
Phone: (231) 728-3601
Alan Steinman, steinmaa@gvsu.edu
Elaine Sterrett Isely, iselyel@gvsu.edu

F. MONA LAKE WATERSHED – HUC Code: 04060101

Size and Location:
The Mona Lake watershed is 46,000 acres in size, covering areas of Muskegon and Newaygo counties. The watershed includes portions of the cities of Norton Shores, Muskegon, Muskegon Heights, and Roosevelt Park and the townships of Fruitport, Sullivan, Egelston, Muskegon, Moorland, Bridgeton, Casnovia, Ashland and Ravenna.



Watershed Management:
The Mona Lake Watershed Study was published by WMSRDC in 1996 as a service to the Mona Lake Watershed Study Steering committee. The document served as both a policy guide for decision-makers and as a useful reference tool regarding conditions in the watershed.

In December, 2003 Grand Valley State University Annis Water Resources Institute published a preliminary watershed / ecological assessment. It was conducted to provide a new baseline of information, in the hope that this effort would catalyze actions to improve the health of the watershed. Mona Lake water quality has improved since the early 1970s, although nutrient concentrations are still above water quality standards. The complete study can be viewed at www.gvsu.edu/wri/director.

The Mona Lake Watershed Council received a 604(b) grant from the Michigan Department of Environmental Quality in October 2004 to develop a Watershed Management Plan, outlining pollutants, sources and causes and specific projects for implementation. The completed plan is posted on the MDEQ website at http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3714_4012-95955--,00.html. The Citizen's Version of the plan can be downloaded from the Mona Lake Watershed Council's website at www.monalakewatershed.org.

Total Maximum Daily Load Assessment:
The MDEQ performed a Total Maximum Daily Load assessment for biota in Black Creek in August, 2003 and in September, 2003 completed one for Little Black Creek. (For more information about TMDLs, see chapter 3 and 4.)

Stormwater Management:
Municipalities within the Mona Lake watershed participate in the MDEQ voluntary stormwater permit program to meet Phase II stormwater requirements. A Mona Lake watershed management plan was developed for the Muskegon County Municipal Stormwater Committee and approved by MDEQ. In 2007, GVSU Annis Water Resources Institute (AWRI) began a $348,415 project to study the effects of surface runoff from the highly concentrated road network impacting the Little Black Creek basin. The study will assist decision makers in selecting and implementing appropriate restoration and remediation activities.

Fisheries and Habitat:

A reach of Black Creek, above Maple Island Road does not meet water quality standards due to habitat modifications from channelization.

Watershed Highlights:
During the spring and summer of 2003, the Lake Michigan Forum, a committee of public stakeholders providing input to the US Environmental Protection Agency on the Lake Michigan Lakewide Management Plan (LaMP), conducted an assessment of environmental stewardship in Michigan's Mona Lake watershed. The Mona Lake Watershed Stewardship Assessment process was aimed at identifying opportunities for creating a permanent ethic of environmental stewardship among leaders and the general public in the local watershed. The study provided baseline information about the watershed tributaries and water quality.

Contact Information:

Mona Lake Watershed Council
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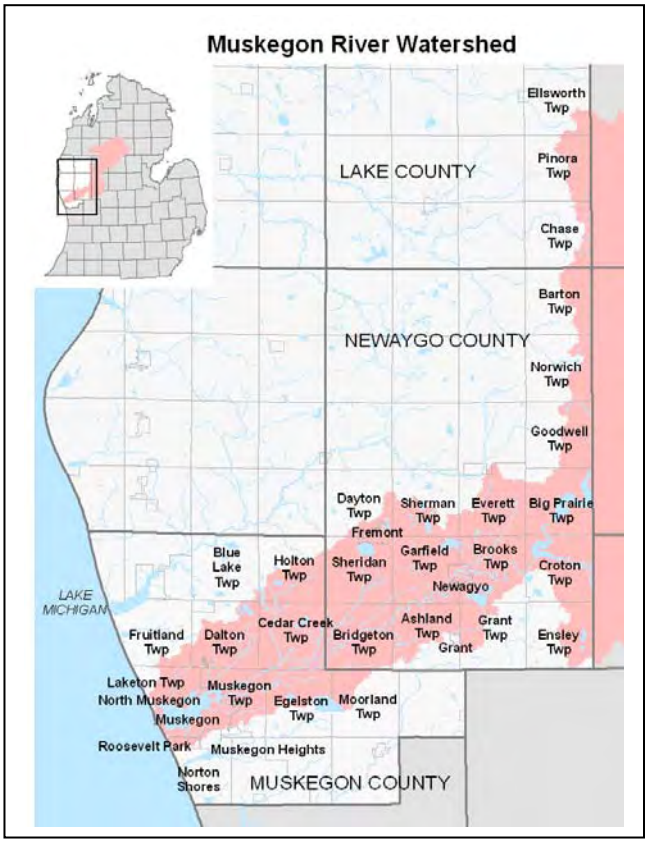
Web Site: www.monalakewatershed.org

G. MUSKEGON RIVER WATERSHED – HUC Code: 04060102

Size and Location:
The Muskegon River Watershed (Clare, Lake, Mecosta, Missaukee, Montcalm, Muskegon, Newaygo, Osceola, Roscommon, and Wexford Counties) is the second largest watershed in Michigan.



Watershed Management:
A watershed management plan was approved under the CMI administrative rules and was funded under section 319. The Muskegon River was originally threatened by development and a variety of nonpoint sources. Logging, the clearing of land for agriculture, development, and the location of hydro dams on the river have aggravated the impact of sedimentation on the waterways.

Total Maximum Daily Load Assessments:
All TMDL water bodies are in the Muskegon Lake watershed. For more information, see the Muskegon Lake Watershed summary (below) and Chapter 3.

Stormwater Management:
All of the Muskegon River watershed Phase II, regulated stormwater communities are within the Muskegon Lake portion of the watershed. They are summarized under **H. Muskegon Lake Watershed** (below).

Fisheries and Habitat:
The Muskegon River Management Plan was published by the Michigan Department of Natural Resources Fisheries Division in February, 2003. The Plan is a companion document to the Muskegon River Watershed Assessment, (O'Neal 1997). The river assessment describes physical characteristics and biological communities of the Muskegon River as well as unique resources found within the watershed. The purpose of the river assessment is to identify opportunities and problems related to the aquatic resources and fisheries within the watershed; provide a mechanism for public comment into fisheries management decisions; and serve as a reference document for those seeking information regarding the Muskegon River watershed. The Muskegon River Watershed Assessment was drafted by Fisheries Division personnel, then went through a significant period of peer and public review and comment, and was completed in July, 1997.

The following reports and management plans are available to guide fisheries and watershed management efforts in Muskegon Lake and the Muskegon River watershed:

- O'Neal, R. P. 1997. Muskegon River Watershed Assessment. Michigan Department of Natural Resources, Fisheries Division Special Report 19, Ann Arbor.

- O'Neal, R. P. 2003. Muskegon River Management Plan, River Management Plan 04, Michigan Department of Natural Resources, Fisheries Division, Ann Arbor.

- O'Neal, R. P., and G. J. Soulliere. 2006. Conservation Guidelines for Michigan Lakes and Associated Natural Resources. Michigan Department of Natural Resources, Fisheries Division Special Report 38, Ann Arbor.

The Muskegon River Watershed Assessment can be found at this website:
http://www.michigan.gov/dnr/0,1607,7-153-10364_10951_19056---,00.html

The Walleye Population and Fishery of the Muskegon Lake System, Muskegon and Newaygo Counties, Michigan in 2002 can be found at this website:
http://www.michigan.gov/documents/dnr/Sr40_199576_7.pdf

For additional information, contact: Richard P. O'Neal, Michigan Department of Natural Resources Fisheries Division Muskegon State Game Area 7550 E. Messenger Road Twin Lake, MI 49457 Telephone, 231-788-6798; Fax, 231-788-5249; E-mail: onealr@michigan.gov

Watershed Highlights:
The Muskegon River watershed begins at Houghton and Higgins Lake and enters Lake Michigan at Muskegon Lake. The river is considered a "cool" water stream, including warm and cold water fisheries. Muskegon Lake is a "drowned river mouth" lake and an internationally designated Area of Concern (AOC). For more information about watershed improvement and stewardship in the Muskegon River watershed, please visit the Muskegon River Watershed Assembly web site at www.mrwa.org

Contact Information:

Muskegon River Watershed Assembly
Contact: Gary Noble, Executive Director
Phone: (231) 591 2334
E-mail: nobleg@ferris.edu

Contact: Terry Stilson, Program Manager
E-mail: muskegonriverwateshed@ferris.edu
Phone: (231) 591-2324

MRWA @ Ferris State University
1009 Campus Drive, JOH200
Big Rapids, MI 49307-2280

Fax: (231) 591-2306
Web Site: www.mrwa.org

H. MUSKEGON LAKE WATERSHED – HUC Code: 04060102

Size and Location:
Muskegon Lake is a 4,149 acre drowned river-mouth coastal lake located in Muskegon County, Michigan along the east shoreline of Lake Michigan.

Watershed Management:
Muskegon Lake is a high quality fishery, but it is impacted by urban storm water runoff, agricultural runoff, erosion, and sedimentation. Boating, fishing, urban runoff, road-stream crossings and residential encroachments all deliver sediment to Muskegon Lake tributaries, which alters channel morphology and increases bank erosion. Several non-point source projects have been implemented to reduce sediment, nutrient and storm water pollution into the Muskegon River and Muskegon Lake by stabilizing eroding banks and installing vegetative buffers along the water's edge.

Remedial Action Plan:
The 1978 Muskegon Lake Remedial Action Plan, along with the 1994 and 2002 updates, were developed to address the 1985 Muskegon Lake designation as an Area of Concern (AOC). The lake was identified as an AOC because of water quality and habitat problems associated with shoreline alterations, the historical discharge of pollutants into the AOC, and the potential adverse effect the pollutants could have on Lake Michigan. The high levels of nutrients, solids, and toxics entering the lake had caused a series of problems including nuisance algal blooms, reduced oxygen in the lake's deeper water, tainted taste of fish due to petroleum products in the water and contaminated sediments. The pollutant discharges also were suspected of contributing to the degradation of benthos (bottom-dwelling organisms, also referred to as the benthic community), the contamination of fish, and the reduction in fish and wildlife habitat. In addition, the post-World War II development of chemical, petrochemical, and heavy industries was causing localized groundwater contamination that was moving toward the lake and its tributaries.

The AOC includes the entire lake and its immediate tributaries, including Ryerson Creek, Ruddiman Creek, Green Creek, Four Mile Creek, Bear Lake and a portion of Little Bear Creek. Mosquito Creek and Cedar Creek are not within the AOC boundary.

The Muskegon Lake Watershed Partnership (MLWP) provides coordination, educational and technical support to implement the 2002 Muskegon Lake Community Action Plan. Priorities include remediation of contaminated sediments in the lake and tributaries, prevention of eutrophication, nonpoint source pollution control, brownfield and waterfront restoration, and habitat restoration. The MLWP works on projects to improve the ecosystem and to restore nine Beneficial Use Impairments (BUIs). In 2006 and 2007, the MLWP worked with Grand Valley State University-Annis Water Resources Institute and the MDEQ to develop a set of targets to measure progress toward restoring BUIs.

Total Maximum Daily Load Assessment:
A total of four TMDL assessments are scheduled for the Muskegon Lake watershed, including each of the following water bodies: Muskegon Lake, Bear Lake, Ruddiman Creek and Ryerson Creek. (For more information about TMDLs, see chapter 3.)

Stormwater Management:
The Muskegon Lake Stormwater Management Plan was completed by Fishbeck, Thompson, Carr & Huber for the Muskegon County Municipal Stormwater Committee, in consultation with the Muskegon Lake Watershed Partnership. The plan was approved by the MDEQ in 2005. The watershed municipalities have each developed Storm Water Pollution Prevention Initiatives (SWPPIs), outlining Best Management Practices that meet the goals of the watershed plan.

Fisheries and Habitat:
The following reports and management plans are available to guide fisheries and watershed management efforts in Muskegon Lake and the Muskegon River watershed:

- O'Neal, R. P. 1997. Muskegon River Watershed Assessment. Michigan Department of Natural Resources, Fisheries Division Special Report 19, Ann Arbor.

- O'Neal, R. P. 2003. Muskegon River Management Plan, River Management Plan 04, Michigan Department of Natural Resources, Fisheries Division, Ann Arbor.

- O'Neal, R. P., and G. J. Soulliere. 2006. Conservation Guidelines for Michigan Lakes and Associated Natural Resources. Michigan Department of Natural Resources, Fisheries Division Special Report 38, Ann Arbor.

The Muskegon River Watershed Assessment can be found at this website:
http://www.michigan.gov/dnr/0,1607,7-153-10364_10951_19056---,00.html

The Walleye Population and Fishery of the Muskegon Lake System, Muskegon and Newaygo Counties, Michigan in 2002 can be found at this website:
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For additional information, contact: Richard P. O'Neal, Michigan Department of Natural Resources Fisheries Division Muskegon State Game Area 7550 E. Messenger Road Twin Lake, MI 49457 Telephone, 231-788-6798; Fax, 231-788-5249; E-mail: onealr@michigan.gov

Watershed Highlights:
In 2006, 90,000 cubic yards of contaminated sediments in Ruddiman Creek were cleaned up through the US Environmental Protection Agency (EPA) Great Lakes Legacy Act and Michigan Clean Michigan Initiative (CMI) partnership.

In 2007, the Division Street Outfall sediment investigation was completed and a 2008 feasibility study is underway to develop alternatives for the cleanup of approximately 180,000 cubic yards of sediment contaminated with mercury, oil, grease and PAHs.

In 2007, the US EPA Great Lakes National Programs Office, Biohabitats and the MLWP developed a community-based ecological habitat restoration master plan for a portion of Muskegon Lake's south shoreline and the Ruddiman Creek riparian corridor. The US Fish and Wildlife Service Coastal Program is partnering with MLWP and Muskegon River

Watershed Assembly with support for fish and wildlife habitat restoration, invasive species management and monitoring.

Contact Information:

Muskegon Lake Watershed Partnership
Contact: Kathy Evans, Director
200 Viridian Drive, Suite 122, Muskegon, MI 49440
Phone: (231) 903-7442
E-Mail: kevansmlwp@google.com

Web site: www.muskegonlake.org

I. BEAR CREEK / BEAR LAKE WATERSHED – HUC Code: 04060102

Size and Location:
The Bear Creek / Bear Lake Watershed is located north of Muskegon Lake and is approximately 11.5 miles long from its start in Dalton Township down to its mouth at Bear Lake Channel at Muskegon Lake. The Bear Creek and Bear Lake Watershed covers a land area of 19,058 acres or approximately 29 square miles. The watershed lies entirely within Muskegon County and is shared by five local governments: Dalton Township, Laketon Township, Cedar Creek Township, Muskegon Township, and the City of North Muskegon.

Watershed Management:
The Bear Creek and Bear Lake Watershed Management Plan was completed by the Muskegon River Watershed Assembly and the Muskegon Conservation District in 2005. It was approved under the CMI administrative rules and was funded under section 319. It improved the water quality of its watershed by reducing non-point source pollutants to restore warm-water and cold-water fishery.

Remedial Action Plan:
The Bear Creek / Bear Lake watershed also lies within the boundary of the Muskegon Lake Area of Concern (AOC). In 2006, the Muskegon Lake Watershed Partnership set a water quality improvement target to restore water quality and to remove eutrophication as one of the AOC's Beneficial Use Impairments.

Stormwater Management:
The Muskegon County Municipal Stormwater Committee includes all of the Bear Creek / Bear Lake watershed local governments. They work together to meet requirements of the Phase II stormwater rules through MDEQ's Voluntary Stormwater Permit Program. The Muskegon Area Stormwater Committee (MASC) completed their watershed plan in November, 2005. The Muskegon Lake Watershed Partnership provides public input for the watershed plan and stormwater pollution prevention initiatives. The Muskegon Conservation District provides public education. The City of North Muskegon developed a Phase II stormwater permit program independently from the MASC.

Total Maximum Daily Load Assessment:
The 2008 TMDL Assessment for Bear Lake is being developed by the Michigan Department of Environmental Quality. Water quality sampling for nutrients was completed by GVSU-Annis Water Resources Institute in 2007. Three public meetings have been held to engage the public in the TMDL process. The MDEQ developed the TMDL Assessment and it was approved by US EPA in December, 2008.

Fisheries and Habitat:
Little Bear Creek is a designated coldwater trout stream.

Watershed Highlights:

As of 2008, the Phase II stormwater regulated townships no longer participate in the voluntary stormwater permit program. Local organizations and agencies are developing a watershed-based partnership to utilize the TMDL and to build on the 319 Plan to develop a focused Information & Education Strategy and to work with local governments to develop policies for improved natural resources and water quality.

Contact Information:

Bear Lake Area Preservation
Kim Arter, Laketon Township Supervisor
Phone: (231) 744-2454

Muskegon Lake Watershed Partnership
Contact: Kathy Evans
Phone: (231) 903-7442
E-mail: kevansmlwp@google.com
Web site: www.muskegonlake.org

Muskegon River Watershed Assembly
Contact: Terry Stilson, Program Manager
Phone: (231) 591-2324
E-mail: mrwa@ferris.edu
Web site: www.mrwa.org

Muskegon Conservation District
940 Van Eyck Street, Muskegon, MI 49442
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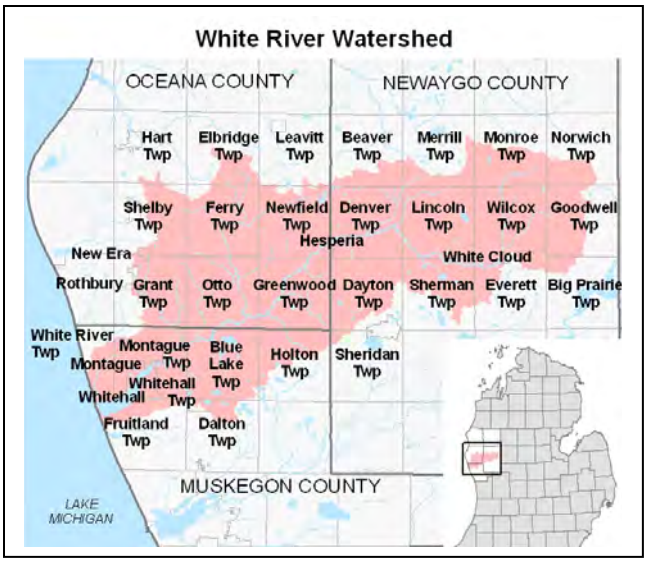
E-mail: steve.coverly@macd.org
Web site: www.mcd.org

J. WHITE RIVER WATERSHED – HUC Code: 04060101

Size and Location:
The White River flows 120 miles through Michigan. Its watershed covers 344,166 acres of mostly forested and agricultural land. The continued loss of stream-side vegetation and the resulting erosion is affecting the system.



Watershed Management:
The Michigan Department of Environmental Quality has awarded GVSU-Annis Water Resources Institute $154,918 to develop a 319 watershed management plan to reduce the negative impact that nonpoint source pollutants are having on water quality. The White River Watershed Partnership, the White Lake Association, the Muskegon Conservation District, the White Lake Public Advisory Council, and the Annis Water Resources Institute have committed match to the project bringing the project total to $177,000. The project will be carried out over a two-year period, beginning November 1st, 2006. Project updates, events, and volunteer opportunities will be posted on the White River Watershed Partnership website and in the newsletter.

Total Maximum Daily Load Assessment:
Information to be updated

Stormwater Management:
There are no Phase II-regulated stormwater communities in the watershed.

Fisheries and Habitat:
Information to be updated

Watershed Highlights:
Michigan's White River and its watershed comprise one of the few urban river systems in the United States that still contains large tracts of relatively pristine landscape. As pressure to develop this land increased, Alcoa and more than 40 local stakeholders worked together to develop preservation strategies to ensure the unique and irreplaceable assets of the river system would not be lost forever. In 2002, Alcoa Foundation provided a $100,000 grant to initiate the preservation of this freshwater ecosystem, a task carried out by the Community Foundation for Muskegon County, Alcoa, its Howmet Castings Whitehall Operations, and local stakeholder groups. These groups included environmental organizations, citizens groups, corporate interests, school districts, regional university scientists, governmental agencies, and elected officials.

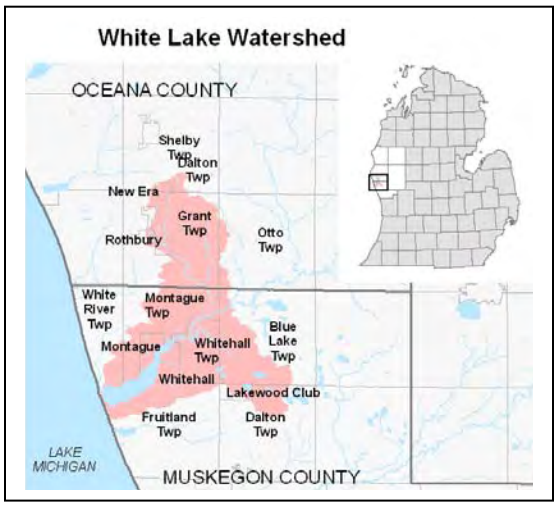
The White River Watershed Partnership (WRWP) is a Michigan 501 (c)(3) Not-for-Profit Organization, established in 2003. The WRWP recognized that the White River Watershed is a unique resource that needs protection. The White River is a MDED designated Natural River.

Contact Information:

White River Watershed Partnership
P.O. Box 416 Hesperia, MI 49421
Contact: Tom Thompson, Chairman
Phone: 231-894-4313
Web Site: www.wrwp.org

Annis Water Resources Institute
Contact: Nichol De Mol, 319 Watershed Project Manager
Phone: (616) 331-3092
Email: demoln@gvsu.edu

K. WHITE LAKE WATERSHED – HUC Code: 04060101



Size and Location:
White Lake is a 2,570 acre coastal, drowned river mouth lake located in Muskegon County along the east shore of Lake Michigan, in the vicinity of the communities of Montague and Whitehall. The Area of Concern (AOC) includes White Lake and White River Watershed. Most of the land around the lake is wooded or grassy, with sand dunes located along Lake Michigan. Land use in the White River Watershed is primarily recreational and agricultural, with the uses around White Lake being residential, commercial, industrial, and agricultural.

Watershed Management:
White Lake / White River priorities for watershed management are eutrophication and nutrient management, and riparian corridor restoration. These White Lake issues are being addressed as part of the White River Watershed Management Plan (described in White River section, above).

Remedial Action Plan:
The original White Lake AOC Remedial Action Plan (RAP) was developed in 1987. It was updated in 1995 and again in 2002 as the White Lake Community Action Plan. The Muskegon Conservation District and the Natural Resources Conservation Service assist the White Lake Public Advisory Council (PAC) with project staff, as well as educational and technical support to coordinate implementation of the White Lake RAP.

AOC priorities include contaminated sediment remediation, eutrophication control, remediation of groundwater and former industrial site contamination, and wildlife habitat and population restoration. White Lake was originally listed as an AOC primarily due to contaminated groundwater migrating to the lake from the Occidental Chemical Site (formerly Hooker Chemical Company). There are eight other sites of contamination with the potential to affect the lake, some of them in varying states of remediation.

The RAP process identified seven of the Great Lakes Water Quality Agreement's 14 beneficial uses as being impaired. Beneficial Use Impairments (BUI) in the AOC include Restrictions on Fish and Wildlife Consumption, Loss of Fish and Wildlife Habitat, Degradation of Fish and Wildlife Populations, Degradation of Benthos, Restrictions on Dredging Activities, Restrictions on Drinking Water Consumption or Taste and Odor Problems, and Degradation of Aesthetics.

Total Maximum Daily Load Assessments:
The Mill Pond Creek TMDL assessment was completed by MDEQ in 2004. The White Lake TMDL assessment is scheduled for 2009.

Stormwater Management:
There are no NPDES regulated municipal stormwater communities within the White Lake watershed.

Fisheries and Habitat:
Information to be updated

Watershed Highlights:
The White Lake Public Advisory Council (PAC) worked with Grand Valley State University - Annis Water Research Institute (GVSU-AWRI) to develop delisting targets for five of the seven BUIs in 2006. The targets have been approved by the PAC and will go through a technical review by the MDEQ to be officially approved. In 2007, the White Lake Public Advisory Council worked with the Muskegon Conservation District to develop restoration and delisting targets for the Degradation of Fish and Wildlife Populations, Loss of Fish and Wildlife Habitat BUIs and Restrictions on Drinking Water Consumption, to be reviewed for MDEQ approval in 2008.

Contact Information:

White Lake Public Advisory Council (PAC)
524 E. Colby, Whitehall, MI 49461
Contact: Norm Ulman, Chair
Email: nullman524@aol.com

Muskegon Conservation District
Jeff Auch, White Lake PAC Support Staff
940 N. Van Eyck Street, Muskegon, MI 49442
Phone: (231) 773-0008
Fax: (231) 767-1207
Email: jeff.auch@macd.org

White Lake Association
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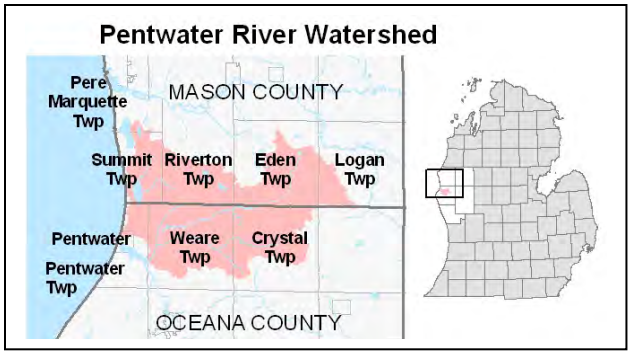
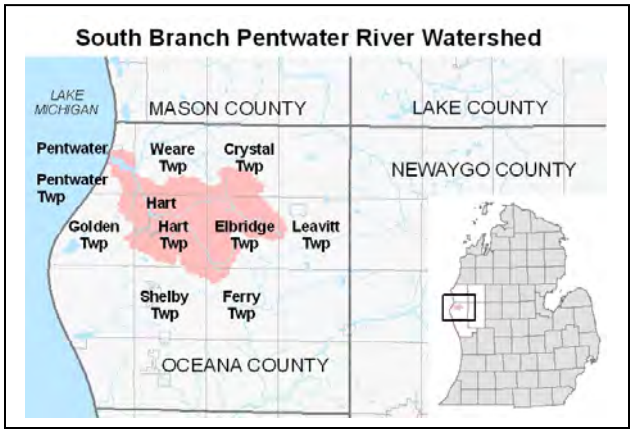
Contact: Phil Dakin
Phone: (231) 750-2381

L. PENTWATER RIVER WATERSHED – HUC Code: 04060101

Size and Location:
The South Branch of the Pentwater River Watershed is approximately 57,014 acres (89.3 square miles) and covers a portion of nine townships in Oceana County. The South Branch contains 127 miles of rivers, streams, and drains and runs directly through the City of Hart and the Village of Pentwater before emptying into Pentwater Lake. Land uses are 48% agricultural, 31% forest land, 14% open land, 4% urban, 2% wetlands, and 2% water. Land uses are threatened by excessive sediment, nutrients, and fecal coliform, and agricultural chemicals from agricultural and residential sources. This project installed practices to protect surface water, including grade stabilization structures and vegetation establishment practices, as well as practices to protect groundwater, such as agrichemical containment facilities, fuel storage, waste utilization, and cover crops.





Watershed Management:
The Oceana Conservation District was awarded a $272,200 MDEQ grant, with matching funds of $98,200 to complete the South Branch of the Pentwater River Watershed Management Plan. The plan was approved under the CMI administrative rules and was funded under section 319. In October, 2000, WMSRDC produced the Pentwater River (South Branch) Watershed – Local Government Guidebook. The document describes the three management tools created through the 319 grant process including the Management Plan, GIS Decision Support System and the Guidebook, as well as how local governments in the watershed can work together. It identifies six development principles that can be applied locally to maintain and improve water quality. Finally, it contains demographic information for the communities located within the watershed.

Total Maximum Daily Load Assessment:
The Chippewa Creek TMDL assessment was listed due to fish and macroinvertebrate communities rated poor in the vicinity of Hart. Waldron Drain, at the confluence at the South Branch and the Pentwater River upstream is listed for a TMDL due to habitat modification from channelization. Big Springs Creek at the North Branch of the Pentwater River and its confluence are listed for a TMDL due to beaver dam modifications.

Stormwater Management:
There are no NPDES regulated municipal stormwater communities within the Pentwater River watershed.

Fisheries and Habitat:
Information to be updated

Watershed Highlights:
Information to be updated

Contact Information:

Oceana Conservation District
1064 Industrial Park Dr., Shelby, MI 49455
Contact: Willidene Hutton
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Pentwater Lake Association
P.O. Box 825, Pentwater, MI 49449
Contact: Jerry Saylor
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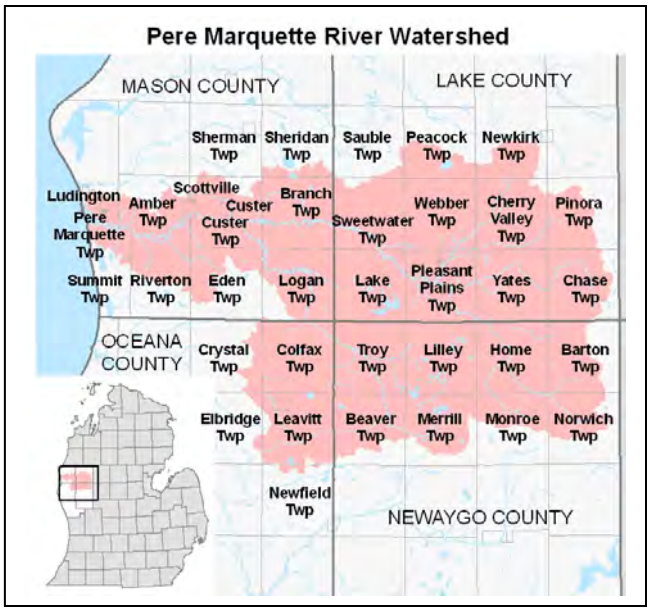
Email: jerry_saylor@yahoo.com

M. PERE MARQUETTE WATERSHED – HUC Code: 04060101

Size and Location:
The Pere Marquette Watershed is a 755 square mile watershed located in Lake, Mason, Newago, and Oceana counties. It includes the Main Branch, Big South Branch, Middle Branch, Little South Branch and the Baldwin River.



Watershed Management:
The *Pere Marquette Watershed Management Plan* was approved under the CMI administrative rules and was funded under section 319. The Pere Marquette is a Blue Ribbon Trout Stream which was impacted by hundreds of road-stream crossings and eroding stream banks.

The Pere Marquette Watershed Council, Conservation Resource Alliance (CRA) and the Pere Marquette River Restoration Committee built on the original 10-year, $1.5 million restoration project with a 319 Nonpoint Source Pollution grant for $373,646. The project included Mason, Lake, Newaygo and Oceana counties. Nine road/stream crossing sites have been formally selected for repair with the four County Road Commissions. CRA has also applied for a $720,000 grant to complete streambank stabilization, road/stream crossing improvements, and livestock and agricultural projects throughout the watershed.

Stormwater Management:
The Pere Marquette Transportation Equity Act for the 21st Century (TEA-21) Projects - Phases 1, 2 and 3 (Mason, Lake and Newaygo counties) brought three County Road Commissions together with CRA to complete reconstruction at 23 road stream crossings over a 7-year period. Phase 1 funding was for $102,800, Phase 2 funding for $109,287 and Phase 3 for $103,450, with project partners providing one-to-one match. CRA is responsible for public education of the project and site plan reviews for Best Management Practices to preserve water quality.

Total Maximum Daily Load Assessment:
There are no TMDL water bodies in the watershed.

Fisheries and Habitat:
Information to be updated

Watershed Highlights:
For highlights on the Pere Marquette River improvement projects, visit the Conservation Resource Alliance web site at www.rivercare.org

Contact Information:

Pere Marquette Watershed Council
P.O. Box 212 -- Baldwin, MI 49304
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Email: info@peremarquette.org

Conservation Resource Alliance, Grandview Plaza Building
10850 Traverse Hwy., Ste 1111, Traverse City, MI 49684
Phone: (231) 946-6817
Fax: (231) 947-5441
Email: cra@rivercare.org

N. LINCOLN RIVER WATERSHED – HUC Code: 04060101

Size and Location:

The Big Sable River and Lincoln River watersheds are located in the western Lower Peninsula and include 118 perennial stream/river miles (Figure N.2). The Big Sable River is situated in both the Northern Lakes and Forests and the Southern Michigan Northern Indiana Till Plains ecoregions, while the Lincoln River watershed is located entirely in the Southern Michigan Northern Indiana Till Plains ecoregion (Omernik and Gallant, 1988). Most of the waters in these watersheds are designated as a coldwater fishery. The Big Sable River flows into Hamlin Lake, which was formed by damming the river near Lake Michigan, and drains a total watershed area of 178 square miles. The Lincoln River flows into Lincoln Lake prior to discharging to Lake Michigan, and drains a watershed area of 101 square miles. Both watersheds contain outwash and lake plain soils, with some areas of sandy and loamy soil groups. Both watersheds contain large amounts of forested land use, and agricultural land uses also are common.

Watershed Management:

A CMI Non Point Source Pollution Control grant surveyed macroinvertebrate and habitat in 2004 at seven sites in the Big Sable River watershed and five sites in the Lincoln River watershed. All sites were found to be attaining WQS for aquatic life (Roush, unpublished data). Recent restoration activities in the Big Sable River watershed include the stabilization of a road-stream crossing and six eroding stream banks.

Total Maximum Daily Load Assessment:

No rivers or streams in this watershed are known to be impaired due to fish consumption advisories, exceedances of pollutant trigger levels in fish tissue, or WQS exceedances in water.

Stormwater Management:

There are no Phase II stormwater-regulated communities in the watershed.

Fisheries and Habitat:

Information to be updated

Watershed Highlights:

Many lakes lie within the Lincoln River watershed and several county drains outlet to the Lincoln River Lincoln, Hackert, Thunder, Blue and Round lakes currently have Lake Improvement Boards (LIB). Efforts are under way to form LIB's for Gunn and Ford Lakes.
In 2004, Mason County upgraded its wastewater collection and treatment system along US-10, east of Ludington. Improvements were made to the system, including a lift station that delivers wastewater to the Pere Marquette Township wastewater collection system west of US-31. Another wastewater collection system in the city of Scottville, 7 miles east of Ludington was repaired.

While the primary focus in the Mason County sewer project was the City of Scottville discharges to the Pere Marquette, the project also did eliminate all on site sewerage facilities on the campus of West Shore Community College. Besides the health issues involved, the intent was to minimize impacts to the Lincoln River which is nearby the campus. The project also provided a sewer force main for the future use of the Hackert Lake area within the Lincoln Lake watershed.

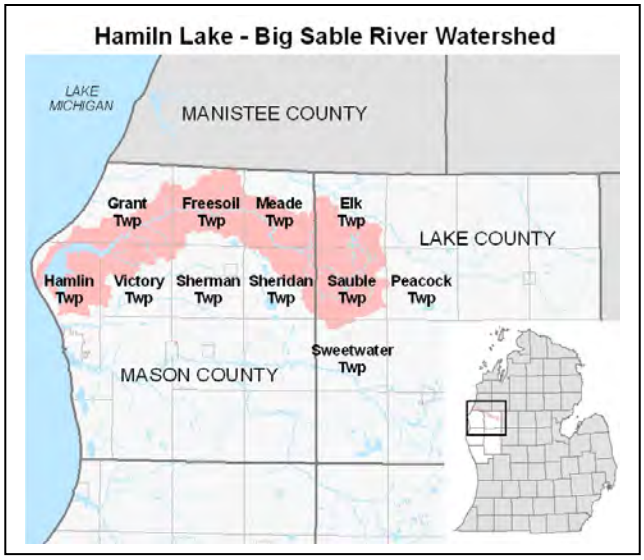
The south branch of the Lincoln River is located at the very north end of the project area. It is a small trout stream and eventually makes its way into Lincoln Lake and Lake Michigan one mile north of the city of Ludington. Hackert Lake, one mile east of Stiles Road, is 100 acres. Most of the development in that area is on the east side of the lake. All of these areas are expected to forecast a population growth of around 18 percent for a 20-year period.

Contact Information:

Contact Mason County Drain Commissioner Office

O. HAMLIN LAKE / BIG SABLE WATERSHED – HUC Code: 04060101

Size and Location:
Hamlin Lake is located in western Mason County adjacent to the shoreline of Lake Michigan. The Big Sable River begins in Lake County. The watershed is 178 square miles in area, a land area approximately 23 times the size of the lake. Over 70% of land cover in the watershed is forested.



Watershed Management:
The Hamlin Lake watershed plan was approved under the CMI administrative rules and was funded under section 319.

Total Maximum Daily Load Assessment:
There are no TMDL water bodies in the watershed.

Stormwater Management:
There are no Phase II stormwater-regulated communities in the watershed.

Fisheries and Habitat:
Information to be updated

Watershed Highlights:
The Big Sable River includes 24 miles of mainstream and a number of tributaries that flow through Lake and Mason counties and empty into Hamlin Lake. The river's headwaters and upstream are recognized for both brook and brown trout, while downstream to Hamlin Lake is noted mostly for brown trout. Hamlin Lake is recognized as one of west Michigan's best fishing spots.

The Hamlin Lake Improvement Board worked with professional engineers on a water quality study in 1993 that concluded an increase in pollution inputs to the lake as little as 10% above current levels would cause the quality of the lake to rapidly decline. The monitoring results indicated that the quality of Hamlin Lake is directly influenced by the quality of the Big Sable River, which is the largest single source of water to the lake and potentially, the greatest source of pollution. The goal of this project was to reduce several of the larger contributors of sediment into Hamlin Lake.

In 2007, many projects were planned to control erosion and improve fish and wildlife habitat. The Big Sable Watershed Restoration Committee and Conservation Resource Alliance (CRA) has been actively pursuing funds to help reduce the sediment load and to improve habitat and water quality in the Big Sable River and Hamlin Lake.

Contact Information:

Conservation Resource Alliance
Chris Pierce, Phone: (231) 946-6817

Hamlin Lake Preservation Society
Kent Gage
Phone: (231) 843-3169
E-mail: khgage@aol.com

P. LITTLE MANISTEE RIVER WATERSHED – HUC Code: 04060103

Size and Location:
The Little Manistee River Watershed is located in northwestern Michigan. The Little Manistee is a trout stream and one of only a few Michigan streams capable of providing wild, adult steelhead in sufficient quantities to support Michigan's stocking program.

Watershed Management:
The Little Manistee Watershed Plan was approved under CMI administrative rules and funded under section 319.

Total Maximum Daily Load Assessment:
There are no TMDL water bodies in the watershed.

Stormwater Management:
There are no Phase II regulated stormwater communities in the watershed.

Fisheries and Habitat:
Information to be updated

Watershed Highlights:
The Little Manistee Restoration Project is managed by the Little Manistee Restoration Committee, formed through a partnership of over 30 signatories to the Little Manistee Partnership Agreement. The partnership was formed in 1996, as was the Little Manistee Watershed Conservation Council (LMWCC), an important partner on the committee. To date, LMWCC, Conservation Resource Alliance (CRA) and the committee have improved dozens of erosion and fish habitat sites on the river. The group works cooperatively with landowners, road commissions, and others on finding creative solutions to natural resource issues within the watershed. The committee maintains an inventory of stream banks, road crossings and sediment basins in the watershed. LMWCC is supportive of a Natural Rivers designation for the river to put in zoning ordinances and best management practices along the river corridor. The Michigan Department of Natural Resources has yet to move the Little Manistee into the Natural Rivers program.

Contact Information:

Little Manistee Watershed Conservation Council
P.O. Box 52, Irons, MI 49644
Contact: Dave McIntire
E-Mail: dave@lmwcc.org
Website: www.lmwcc.org

Conservation Resource Alliance
0850 Traverse Highway, Suite 1111, Traverse City MI 49684
231-946-6817
Website: www.rivercare.org

Q. MANISTEE (AND PINE) RIVER WATERSHED – HUC Code: 04060103

Size and Location:
The Manistee Watershed is a 1.4 million acre watershed in the northwestern counties of Antrim, Benzie, Crawford, Grand Traverse, Kalkaska, Lake, Manistee, Missaukee, Osceola, Otsego and Wexford. The Manistee National Forest and Pere Marquette State Forest comprise a large portion of the watershed.

Land use in the watershed is approximately 41% forested, 39% agriculture, 13% wetland and the rest other. The Manistee River watershed includes 876 perennial stream/river miles. Major tributaries of the Manistee include the Pine River, the North Branch Manistee, and Bear Creek. The Manistee River watershed is mainly in the Northern Lakes and Forests ecoregion, but a small portion of the watershed is in the North Central Hardwoods and Southern Michigan Northern Indiana Till Plains ecoregions (Omernik and Gallant, 1988). Near the shore of Lake Michigan, the Manistee River flows into Manistee Lake before discharging to Lake Michigan via a 1.5-mile long channel.

Watershed Management:
The watershed plan was approved under the CMI administrative rules and was funded under section 319. Monitoring and protection activities for the Manistee River watershed have included two 319 grants and a 2004 CMI grant. MDEQ-approved NPS watershed management plans have been written for Bear Creek, the Little Manistee River, and the Manistee River. The Little Manistee Watershed Council, a volunteer monitoring organization, assessed 11 sites during 4 sampling events from 2001 to 2004.

Total Maximum Daily Load Assessment:
The entire Manistee River watershed is impaired due to WQS exceedances for PCBs in water. There are no fish consumption advisories in the watershed. In 2004, macroinvertebrate and habitat surveys were conducted at 45 sites. All were found to be attaining WQS for aquatic life (Walker, unpublished data).

Stormwater Management:
There are no Phase II regulated stormwater communities in the watershed.

Fisheries and Habitat:
The vast majority of the Manistee River watershed and its tributaries are designated coldwater streams. The MDNR, Fisheries Division 1998 assessment of the Manistee River indicates that the original fish community in the Manistee River was composed of approximately 75 species of fish. The present-day fish community in the Manistee River is thought to contain 80 species of fish. Thirteen nonnative species of fish have been introduced into the watershed through accidental and intentional introductions or migrations.

Aquatic pest species found in the Manistee River watershed include the chestnut lamprey, sea lamprey, zebra mussels, rusty crayfish, purple loosestrife, and Eurasian milfoil. According to the MDNR, Fisheries Division, Manistee River Assessment, overall water quality in the Manistee River basin is very good, due in large part to the geology of the basin. The deep, permeable sands allow precipitation to rapidly absorb, and therefore groundwater is the dominant contributor to stream flow. In addition, limited land development due to the large state and federal holdings (Manistee National Forest and Pere Marquette State Forest) within the watershed has helped to protect water quality. Sediment (sand bedload) from road stream crossings and historical activities from the logging era is a problem in the watershed (Rozich, 1998).

National Pollutant Discharge Elimination System Permits:
The watershed contains 16 NPDES discharges. These point sources include discharges from industrial or commercial facilities, municipal wastewater treatment facilities, a fish hatchery, the MDEQ, Remediation and Redevelopment Division, Sunoco 205 site, and permitted storm water outfalls.

Watershed Highlights:
The upper Manistee River and several of its tributaries are currently designated as "Natural Rivers" under Part 305 of the NREPA. Six and one-half miles of Bear Creek and 26 miles of the Pine River, both tributaries to the Manistee River, as well as 26 miles of the Manistee River, are designated under the Federal Michigan Scenic Rivers Act of 1991 (PL 102-249).

Contact Information:

Conservation Resource Alliance
0850 Traverse Highway, Suite 1111, Traverse City, MI 49684
Phone: (231) 946-6817
Website: www.rivercare.org


Water Features
WMSRDC
WEST MICHIGAN SHORELINE
REGIONAL DEVELOPMENT COMMISSION
MASON COUNTY
LAKE COUNTY
OCEANA COUNTY
NEWAYGO COUNTY
MUSKEGON COUNTY
LAKE MICHIGAN
N
W
E
S
0 2.5 5 10
Miles
Data Source: Michigan Geographic Data Library
Map Created By WMSRDC
May 2007
Lakes & Rivers
Unnamed Lakes & Ponds
Creeks & Streams
Unnamed Creeks
County Boundary
Municipal Boundary
City or Village

Local stewardship and oversight is critical to the long-term restoration and protection of the natural resources and watersheds within the WMSRDC region. Each watershed is made up of many rivers, lakes, streams and the wetlands, prairies, dunes and forests and developed land that affect their quality.

Many water bodies and natural areas are being protected and restored by concerned citizens, local governments, watershed groups and conservation organizations. Many efforts are completely volunteer-based and begin with a few concerned citizens, a neighborhood group or schools.

The most successful volunteer efforts are coordinated closely with local government plans to ensure that restoration is maintained as part of the communities' long-term natural resource protection plans. Communities can complete a natural features inventory and plans to protect existing "green infrastructure" for the benefits that people value, such as forests and wetlands that maintain clean surface and groundwater for drinking, swimming, flood control, hunting and fishing.

More often than not, local, state and federal agencies lack the funding necessary for important natural resource monitoring programs. So, it is critical that local people report any unusual changes in water bodies, wetlands and other natural resources. It is nearly impossible for agencies to determine when a particular water body begins to show signs of problems without monitoring and public involvement. It is important for local people to report any observed changes in water and habitat conditions to environmental agencies or watershed groups as soon as they are noticed.

The Great Lakes Volunteer Marsh Monitoring Program is one way that concerned citizens can be involved in assessing the health of wetlands.

The program trains volunteers to learn calls of certain marsh bird, frog and toad species. Information is collected and reported to Bird Studies Canada. In West Michigan, the volunteer data is also used by local watershed and conservation organizations to prioritize restoration needs and to design projects that improve wetland habitats. For more information about the Great Lakes Marsh Monitoring Program or to find out how you can help by hosting a volunteer training program in your community, please contact Kathy Evans, WMSRDC Program Manager at (231) 722-7878 or kevans@wmsrdc.org.

The State of Michigan is responsible under the federal Clean Water Act (CWA) to provide the US Environmental Protection Agency (EPA) and Congress with an assessment of the quality of their waters [Section 305(b)], a list of waters that do not support their designated uses or attain Water Quality Standards (WQS) [Section 303(d)], and an assessment of status and trends of significant publicly owned lakes (Section 314), every two years. The MDEQ is fulfilling these CWA reporting requirements through the submission of an Integrated Report (IR). Where possible, Michigan's 2006 IR was developed consistent with the EPA's "Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b), and 314 of the Clean Water Act" (IR Guidance).

The MDEQ conducts a number of special studies each year to support the development and implementation of Total Maximum Daily Load assessments (TMDLs), as required by Section 303(d) of the Clean Water Act. MDEQ carries out some of these monitoring activities, and contractors conduct others (using MDEQ designs and procedures). MDEQ has completed some TMDLs, has several under development, and has an extensive list of waters requiring TMDLs through 2017.

Table # 4

MDEQ TMDL SCHEDULE
BY WMSRDC COUNTY, LAKE AND STREAM

WMSRDC County and TMDL Water Body	*Number of TMDLs by County*	*Year Completed*	*Year Scheduled*	*Watershed*
Muskegon County	9			
Muskegon Lake			2008	Muskegon Lake
Bear Lake		2008	2007	Muskegon Lake
Ruddiman Creek			2009	Muskegon Lake
Ryerson Creek			2008	Muskegon Lake
White Lake			2009	White Lake
Mill Pond Creek			2004	White Lake
Mona Lake			2009	Mona Lake
Black Creek		2003		Mona Lake
Little Black Creek		2003		Mona Lake
Mason County	1			
Pere Marquette River				Pere Marquette
Newaygo County	1			
Bills Lake				Rogue River
Oceana County	1			
Chippewa Creek				Pentwater River
Ottawa County	3			
Grand River in vicinity of Grand Haven				Grand River
Grand River in area of Lake Michigan				Grand River
Rio Grande Creek				Grand River
Total TMDL Water Bodies	15			

Source: MDEQ Water Bureau
Compiled by: West Michigan Shoreline Regional Development Commission

TMDL support will continue to be a high MDEQ monitoring priority for at least the next decade. For each TMDL, extensive monitoring is conducted to identify causes and sources of impairment(s) at non-attaining waters, to determine the assimilative capacity of the waterbody for the pollutant(s) of concern, and to evaluate the effectiveness of pollutant load reduction efforts during and after TMDL implementation. The EPA approves the list of waters on the 303(d) list, the schedule for TMDL development, and each specific TMDL developed by MDEQ. Based on the fact that EPA has approved the 303(d) list, the development schedule, and all specific TMDLs submitted to date, the monitoring program is effectively supporting this effort.

Table # 5

IMPAIRED WATER BODY PROBLEM SUMMARY BY WATERSHED, LAKE AND STREAM

Waterbody ID	*Name*	*Problem Summary*	*Local Description*	*Size*	*County*	*Watershed*
Muskegon Lake Watershed TDML Water Bodies:						
082701A	Bear Lake	FCA-PCBs; nutrient enrichment, nuisance algal growths	Tributary to Muskegon Lake located north of Muskegon Lake, Laketon Twp., T10N,R17W, Section 13, 14 and 23. Entire lake	415 acres	Muskegon	4060102
082701B	Muskegon Lake	WQS exceedances for PCBs and mercury	Located in Laketon and Muskegon Twps. T10N,R17W and R16W. Entire lake		Muskegon	4060102
082701D	Ruddiman Creek	Fish and macroinvertebrate communities rated poor; pathogens (Rule 100)	Trib. to Muskegon Lake. Laketon Twp., T10N,R17W, Sec.36		Muskegon	4060102
082701Q	Ryerson Creek	Fish and macroinvertebrate communities rated poor	Tributary to Muskegon Lake		Muskegon	4060102
Mona Lake						
082701J	Black Creek	Fish community rated poor	Trib. to Mona Lake		Muskegon	
082701T	Little Black Creek	Fish and macroinvertebrate communities rated poor; pathogens (Rule 100); nuisance algae, nutrient enrichment	Tributary to Mona Lake S. of Muskegon. Seven mile reach from Muskegon Twp., T10N,R16W, Sec. 26. Dis. to Norton Shores Twp., T9N,R16W, Sec. 5 (inlet to Mona Lake)		Muskegon	
082701U	Mona Lake	FCA-PCBs	Trib to Lake Michigan		Muskegon	
White Lake						
082301A	White Lake	FCA-PCBs and chlordane	Located in Fruitland and Whitehall Twp USGS Quad Maps- Flower Creek, Michillinda and Montague. Entire lake		Muskegon	
082701V	Mill Pond Creek	WQS exceedances for triethylene glycol dichloride, bis-2-chloroethyl ether and tetrachloroethylene	Tributary to White Lake just west of Whitehall		Muskegon	
Pentwater River						
082201H	Chippewa Creek	Fish and macroinvertebrate communities rated poor	Vicinity of Hart, T15N, R17W, Sec. u/s of Oceana Drive (undefined RF3 segment)		Oceana	
Pere Marquette						
082101E	Pere Marquette River	WQS exceedances for mercury and PCBs	Scottville Road south of Scottville		Mason	
Grand River						
082801F	Grand River	FCA-PCBs; WQS exceedances for PCBs	Sheridan Rd. d/s to Clintonia Rd. in Clinton Co. and the vicinity of Grand Haven in Ottawa County		Clinton, Ottawa	
082801J	Grand River	WQS exceedances for mercury	In the vicinity of Grand Haven near the gaging station located towards the east end of the navigational channel upstream from Lake Michigan		Ottawa	
082803F	Rio Grande Creek	Untreated sewage discharges, pathogens (Rule 100)	D/S of Chester Twp., flows into main branch of Crockery Creek		Ottawa	
082804N	Bills Lake	Mercury			Newaygo	

Source: Institute of Water Research, Michigan State University and Michigan Department of Environmental Quality
Compiled by: WMSRDC

The WMSRDC region includes seven (7) watersheds with lakes and streams that require TMDL assessments. They are located in the Muskegon Lake, White Lake, Mona Lake and the lower Grand River, Rogue, Pentwater and Pere Marquette River watersheds.

Within those watersheds are fifteen (15) water bodies that do not meet state and federal water quality standards. The MDEQ is required to perform TMDL assessments to help determine actions that will assist communities in bringing them into attainment.

Muskegon County includes nine (9) TMDL water bodies. They are Muskegon Lake, Bear Lake, Ruddiman Creek, Ryerson Creek; White Lake, Mill Pond Creek; Mona Lake, Black Creek and Little Black Creek. There are three (3) TMDL water bodies within northern Ottawa County. They are the Grand River near Grand Haven, Grand River near Lake Michigan and the Rio Grande Creek. Mason, Newaygo and Oceana Counties each have one (1) TMDL water body and Lake County has none.

Areas of Concern

Within the WMSRDC region, there are two water bodies that are internationally designated Areas of Concern (AOC). The Great Lakes Water Quality Agreement, between the United States and Canada provides the framework for a program to clean up contaminated sediment and to restore beneficial uses in 42 AOCs.

Muskegon Lake and White Lake are two Great Lakes AOCs, located in Muskegon County. Nearly all of the TMDL water bodies within the WMSRDC region are located in Muskegon County and the AOC watersheds. There are local watershed-based organizations actively partnering with community organizations and state and federal agencies to clean up and restore the AOCs. The problems in the AOC watersheds can be found in the watershed summaries, under Muskegon Lake Watershed and White Lake Watershed in Chapter 2.

If the biological community of a water body is impaired due to causes other than a pollutant, for example, dredging or channelization of the stream, the MDEQ will list the water body in Category 4c.

Water bodies are placed in Category 4c when water quality data and information demonstrate that at least one designated use is not being attained but the impairment(s) is not caused by a pollutant. For example, habitat can be insufficient to support an acceptable biological community due to channel maintenance and other activities. The biological community may also be assessed for water quality standard attainment using the results of sediment toxicity testing data, if available.

Key factors considered by MDEQ biologists to differentiate whether pollutants or other sources are responsible for impaired habitat include: water/sediment chemistry and microbiological data when such data are available; riparian land use characteristics; Procedure 51 habitat specific metric scores, particularly those for the epifaunal substrate/available cover, embeddedness, sediment deposition, channel alteration, channel sinuosity, bank stability, bank vegetative protection, and riparian vegetative zone width. If MDEQ biologists determine that a pollutant (including riparian sediment) is responsible for the impairment, then that stream segment is listed in Category 5 (described in Chapter 3).

Mona Lake Watershed

Black Creek (Muskegon/Newaygo Drain)
County: Muskegon. Size: 16 M
Location: Vicinity of Maple Island Hwy. crossing and Cranberry Creek confluence upstream (u/s).
NHD Reach Code: 04060101000024
Problem Summary: Habitat modification - channelization.

White River Watershed

Pierson Drain
County: Muskegon. Size: 2.5 M
Location: Old Hwy 99 u/s.
NHD Reach Code: 04060101000781
Problem Summary: Habitat modification - channelization.

Racoon Creek (upper)
County: Muskegon. Size: 2 M
Location: Hancock Rd u/s.
NHD Reach Code: no code
Problem Summary: Habitat modification - channelization.

Brayton Creek
County: Muskegon/Newaygo. Size: 5 M
Location: Wilke Rd u/s.
NHD Reach Code: 04060101000279
Problem Summary: Habitat modification – channelization.

Lake Michigan Direct Drainage Watersheds

Flower Creek
County: Muskegon/Oceana. Size: 5.6 M
Location: Starting about 2,500' u/s of Flower Rd and all u/s.
NHD Reach Code: 04060101000768
Problem Summary: Habitat modification - channelization.

North Branch of Flower Creek
County: Oceana. Size: 13 M
Location: Flower Creek confluence u/s.
NHD Reach Code: 04060101000760
Problem Summary: Habitat modification - channelization.

Cushman Creek
County: Oceana. Size: 5.1 M
Location: From fork at 0.4 mile west of M-82/county line u/s to Evans Lake Outlet.
NHD Reach Code: 04060101000312
Problem Summary: Habitat modification - channelization.

Minnie Creek
County: Newaygo. Size: 5 M
Location: Blair Drain confluence in vicinity of 100th Avenue u/s.
NHD Reach Code: 04060102000353
Problem Summary: Habitat modification - channelization.

Black (DeLong) Creek
County: Newaygo. Size: 5 M
Location: Just downstream of Warner Road u/s.
NHD Reach Code: 04060101000806
Problem Summary: Habitat modification - channelization.

Pentwater River Watershed

Waldron Drain
County: Oceana. Size: 4.5 M
Location: From confluence at S. Br. Pentwater River and u/s.
NHD Reach Code: 04060101000724
Problem Summary: Habitat modification - channelization.

Big Springs Creek
County: Oceana. Size: 2 M
Location: N. Br. Pentwater River confluence (d/s of 112 Avenue, NE of Pentwater) u/s to Thistle Rd.
NHD Reach Code: 04060101000148
Problem Summary: Beaver dam modified.

CHAPTER 6 STORMWATER COMMUNITIES

The Clean Water Act (CWA) has enabled us to improve our ability to protect and restore water bodies in our region. Despite our progress, however, degraded water bodies still exist and others continue to be threatened. According to the 2000 National Water Quality Inventory, a biennial summary of State water quality surveys, approximately 40 percent of surveyed U.S. water bodies are impaired by pollution and do not meet water quality standards. A leading source of this impairment is polluted runoff.

Phase I of the U.S. Environmental Protection Agency's (EPA) stormwater program was promulgated in 1990 under the Clean Water Act. It relies on the National Pollutant Discharge Elimination System (NPDES) permit coverage to address stormwater runoff from 1) medium and large municipal separate storm sewer systems (MS4s) generally serving populations of 100,000 or greater and 2) construction activity disturbing 5 acres of land or greater and 3) ten categories of industrial activity.

There are no Phase I stormwater communities located within the WMSRDC region.

In 2000, The EPA's Phase II Stormwater Rule expanded Phase I by requiring smaller urbanized communities and operators of smaller construction sites to control runoff through NPDES permits. Phase II was designed for urbanized areas, as defined by the Bureau of the Census, with a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile. Phase II reduces impacts to water quality and aquatic habitat by controlling unregulated sources of stormwater discharges that have the greatest likelihood of causing degradation. As a result of a 2007 court ruling in Kalamazoo, Michigan townships no longer comply with Phase II stormwater permit programs. In the WMSRDC region, the cities and townships affected by Phase II have established watershed-based

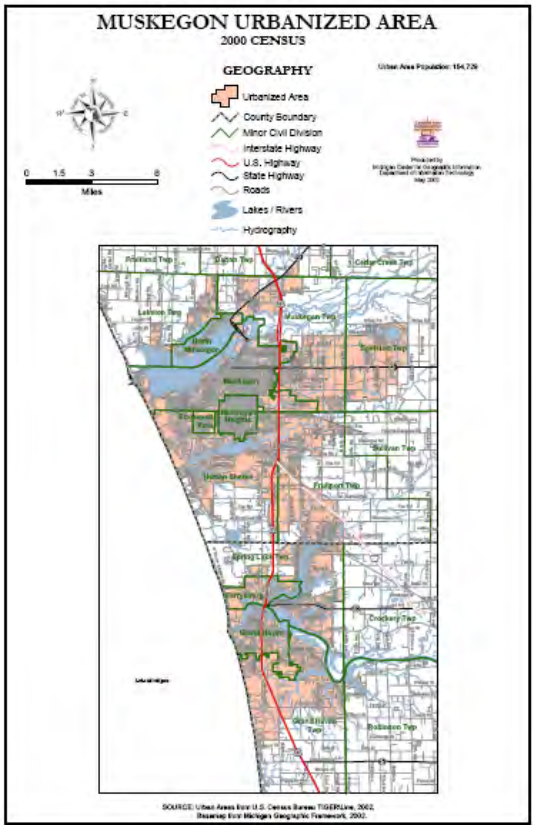
Table # 6

PHASE II STORMWATER COMMUNITIES IN THE WMSRDC REGION

WMSRDC Counties and Phase II Stormwater Communities:	*Watershed Management Plan - MDEQ Approved*	*Stormwater Pollution Prevention Initiative – MDEQ Approved*
Ottawa County		
Crockery Twp	Lower Grand River	Check w/FTCH
Ferrysburg	Lower Grand River	Check w/FTCH
Grand Haven	Lower Grand River	Check w/FTCH
Grand Haven Twp	Lower Grand River	"
Robinson Twp	Lower Grand River	"
Spring Lake Village	Lower Grand River	"
Spring Lake Twp	Lower Grand River	"
Muskegon County		
Laketon Twp	Muskegon Lake	May, 2006
Muskegon	Muskegon Lake	May, 2006
Muskegon Twp	Muskegon Lake	May, 2006
North Muskegon	Muskegon Lake	May, 2006
Roosevelt Park	Muskegon Lake	May, 2006
Norton Shores	Muskegon Lake	May, 2006
Dalton Twp	Muskegon Lake	May, 2006
Egelston Twp	Muskegon Lake	May, 2006
Muskegon Heights	Muskegon Lake	May, 2006
Muskegon Heights	Mona Lake	May, 2006
Sullivan Twp	Mona Lake	May, 2006
Norton Shores	Mona Lake	May, 2006
Roosevelt Park	Mona Lake	May, 2006
Fruitport	Mona Lake	May, 2006
Fruitport Twp	Mona Lake	May, 2006

Source: Michigan Department of Environmental Quality Water Bureau
Compiled by: West Michigan Shoreline Regional Development Commission

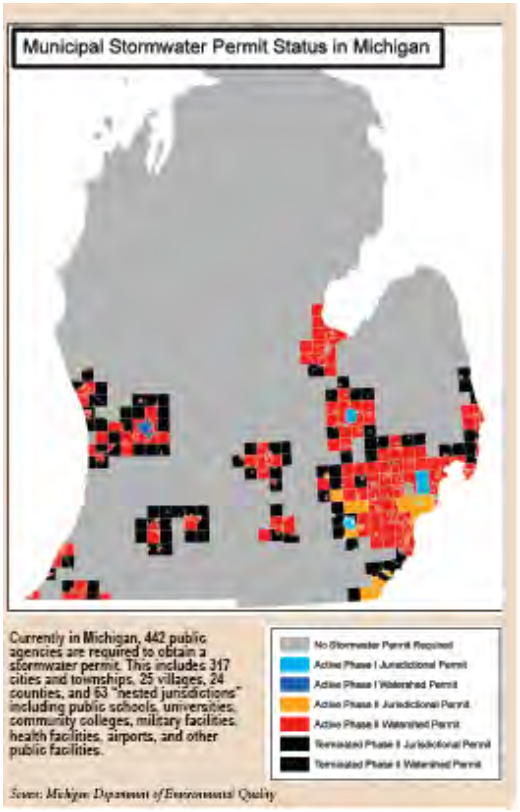
stormwater plans and Stormwater Pollution Prevention Initiatives (SWPPI) as part of the MDEQ Voluntary Stormwater Permit Program. The SWPPIs identify Best Management Practices (BMP) designed to preserve, protect and improve water resources from polluted stormwater runoff in west Michigan.



Within the WMSRDC region, Phase II cities, road commissions, institutions, industries and other stormwater operators are required to meet Phase II requirements and to implement BMPs listed in their SWPPIs. A major concern for communities is how to pay for BMPs. Michigan law does not allow stormwater utilities to fund regulated programs and the required management practices cannot be paid for through state or federal watershed grants or loans.

Urban stormwater runoff is a big concern because it contains high concentrations of pollutants. Urban development, by nature, includes hard impervious surfaces. However, projects can be designed to include attractive, low maintenance landscapes that act as stormwater filters. Rain gardens, porous pavement and other green construction techniques slow down and even cleanup stormwater before it soaks into the ground or runs into the nearby storm drain and into our lakes and streams.

City streets, driveways, parking lots, and sidewalks are places where pollutants from human activities settle and remain until a storm event washes them into storm drains. Common pollutants include pesticides, fertilizers, oils, salt, litter and sediment. Another concern is the possible illicit connections of sanitary sewers, which can result in fecal coliform bacteria entering the storm sewer system. Stormwater runoff picks up and carries these and other harmful pollutants then discharges them – untreated – to waterways via storm sewer systems. Uncontrolled, stormwater can result in the destruction of spawning and wildlife habitats, a loss of water quality and aesthetics, fish kills and even the contamination of drinking water supplies and recreational waterways that can threaten public health.



Michigan Department of Transportation (MDOT)
In 2004, the MDEQ issued a NPDES Permit to MDOT for MDOT-operated stormwater drainage systems. MDOT developed a Stormwater Management Plan addressing storm water pollution control related to highway planning, design, construction, and maintenance activities. The plan identifies responsibilities within MDOT for stormwater management procedures, practices, staff training, public education and participation, program evaluation, and reporting.

Contact Information:

Grand Region Office
Engineer: Roger Safford
Storm Water Coordinator: Steve Houtteman
1420 Front Avenue NW, Gr. Rapids, MI 49504
Phone: 616-451-3091
Fax: 616-451-0707

North Region Office
Engineer: Brian Ness
Storm Water Coordinator: Gary Niemi
2927 D&M Drive, Gaylord, MI 49735
Phone: 989-731-5090
Fax: 989-731-0536

MDOT: Toll Free: 888-304-MDOT (6368)

CHAPTER 7 PUBLIC ACCSS LAKES AND WATER QUALITY

Within the WMSRDC region, there are 49 public access lakes with a total of 30,020 acres of surface water area. Muskegon, Newaygo and Mason counties combined offer public access to 25,049 acres of surface water.

Muskegon County includes eleven (11) public access lakes with 8,989 acres of surface water, similar to Mason County, with nine (9) public access lakes and 7,428 acres. In comparison, Newaygo County offers 19 public access water bodies (as many as Muskegon and Mason combined) with a similar surface water area of 8,632 acres.

Oceana, Lake, and northern Ottawa counties combined include 5,368 acres of surface water. Ottawa County has an additional 2,005 acres located outside of the WMSRDC region.

Lakes can be classified according to their trophic state. "Trophic" means nutrition or growth. A hypereutrophic lake is very nutrient-rich lake, characterized by frequent and severe nuisance algal blooms and low transparency. A eutrophic ("well-nourished") lake has high nutrients and high plant growth. An oligotrophic lake has low nutrient concentrations and low plant growth. Mesotrophic lakes fall between eutrophic and oligotrophic. While lakes may be lumped into a few trophic classes, each lake has unique attributes that contribute to its trophic status.

The three main factors that regulate the trophic state of a lake are 1) the rate of nutrient supply, 2) climate, 3) and the shape of the lake basin. Lakes can be culturally eutrophied by accelerating their natural rate of nutrient inflow. This occurs through poor management of the watershed and introduction of human wastes through failing septic systems. Such changes may occur over periods of only decades and are reversible if anthropogenic nutrient loading can be controlled.

In West Michigan, most of the problems associated with the direct discharge of domestic wastewater have been successfully mitigated. Now the regulatory focus is on the much more difficult problem of controlling non-point sources (NPS) of nutrient pollution such as agricultural drainage, stormwater runoff, and inadequate on-site septic systems. NPS pollution is particularly difficult to address because it is diffuse, not attributable to a small number of polluters, and associated with fundamental changes in the landscape, such as agriculture, urbanization and shoreline development.

The following information indicates the location of each public access lake by county and by watershed. Water quality information is provided by a trophic status ranking for each lake.

Table # 7

PUBLIC ACCESS AND WATER QUALITY IN THE WMSRDC REGION				
County and Watershed	*Lake Name*	*MDEQ I.D. Code*	*Lake Area (acres)*	*Lake Trophic Status*
Lake County				
1. Big Sable River	Big Bass	MI430029	290	M
2. Pere Marquette River	Big Star	MI430022	912	M
3. Little Manistee River	Harper	MI430030	76	M
4. Pere Marquette River	Idlewild	MI430032	105	M
5 Pere Marquette River	Paradise	MI430049	39.3	O
6. Pere Marquette River	Reed	MI430050	45	O
7. Pere Marquette River	Wolf	MI430026	418	M
			Surface Acres: 1,885	
Mason County				
1. Lake Michigan Direct Drain	Bass	MI530075	524	E
2. Lincoln River/Lake	Ford	MI530105	208	M
3. Lincoln River/Lake	Gun	MI530104	219	M
4. Lincoln River	Hackert (Crystal)	MI530142	125	M
5. Big Sable River	Hamlin	MI530073	4990	E
6. Lincoln River	Lincoln	MI530143	156	E
7. Pere Marquette	Pere Marquette	MI530170	554	E
8. Lincoln River/Lake	Pliness	MI530144	81	E
9. Lincoln River/Lake	Round	MI530076	571	E
			Surface Acres: 7,428	
Muskegon County				
1. Muskegon River	Bear	MI610358	415	H
2. White River	Blue	MI610404	330	M
3. Duck Creek	Duck	MI610253	313	M
4. Bear Creek/Lake	East Twin	MI610407	111	E
5. White River	Fox	MI610321	80	H
6. Crockery Creek	Half Moon	MI610406	58	M
7. Mona Lake	Mona	MI610225	695	E
8. Muskegon Lake/River	Muskegon	MI610229	4150	E
9. Bear Creek/Lake	North	MI610440	59	E
10. White River	White	MI610230	2571	E
11. Muskegon River	Wolf	MI610408	207	E
			Surface Acres: 8,989	
Newaygo County				
1. Muskegon River	Baptist	MI620057	85	M
2. White River	Benton	MI620188	33.3	M
3. Rogue River	Bills	MI620062	204	O
4. Muskegon River	Blanch	MI620058	63	E
5. Muskegon River	Brooks	MI620063	293	E
6. Muskegon River	Croton Dam Pond	MI620064	1235	M
7. Muskegon River	Crystal	MI620106	125	O
8. White River	Diamond	MI620035	171	M
9. Muskegon River	Englewright	MI620059	54	M
10. Muskegon River	Fremont	MI620029	790	E
11. Muskegon River	Hardy	MI620065	3750	M
12. Muskegon River	Hess	MI620032	755	H
13. Muskegon River	Kimball	MI620107	153	E
14. Pere Marquette River	Nichols	MI620060	160	O
15. Pere Marquette River	Pettibone	MI620189	44.4	M
16. Pere Marquette River	Pickeral	MI620066	318	M
17. White River	Robinson	MI620061	137	E
18. Muskegon River	Sand	MI620040	58	M
19. Pere Marquette River	Woodland	MI620191	203	M
			Surface Acres: 8,632	

County and Watershed	*Lake Name*	*MDEQ I.D. Code*	*Lake Area (acres)*	*Lake Trophic Status*
Oceana County				
1. Stony Lake	Crystal	MI640062	76	E
2. White River	McLaren	MI640064	271	M
3. Pentwater River	Pentwater	MI640089	436	E
4. Pere Marquette/White River	School Section	MI640065	182	M
5. Au Sable Creek	Silver	MI640034	690	E
6. Mason Creek	Stoney	MI640049	276	E
			Surface Acres: 1,931	
Ottawa County				
1. Grand River	Crockery	MI700422	108	E
2. Grand River	Spring	MI700239	1047	E
			Surface Acres: 1,1552	
3. Macatawa River/Lake	Macatawa*	MI700237	1780	H
4. Pigeon River	Pigeon*	MI700415	225	E
			Surface Acres: 2,005	
*Located in Ottawa County, outside of WMSRDC's northern Ottawa County region Trophic Status Key: O = Oligotrophic; M = Mesotrophic; E = Eutrophic; H = Hypereutrophic				

Source: MDEQ Water Quality and Pollution Control in Michigan 2006 Sections 303(d), 305(b), and 314 Integrated Report; Michigan Center for Geographic Information, Dept. of Information Technology; MDEQ Land and Water Management Division, Hydrologic Studies Unit. Compiled by West Michigan Shoreline Regional Development Commission

SUMMARY

Totals	*Oligitrophic*	*Mesotrophic*	*Eutrophic*	*Hypereutrophic*
49 Public Access Lakes	5	21	21	2
30,020 Surface Water Acres	573	9,459	18,738	1,250

In September 2003, WMSRDC and Progressive AE completed the Muskegon County Road Endings at Water Study. To view an on-line copy of the study, go to: http://www.wmsrdc.org/programs/special.htm

CHAPTER 8 MONITORING PROGRAMS

A. ASSESSMENT OF MICHIGAN WATERS

The MDEQ describes a variety of water quality monitoring programs and opportunities for grants in this section of the water quality monitoring web site.

The MDEQ conducts targeted monitoring to support NPDES and non-point source programs. For more information about MDEQ water quality monitoring programs, go to www.michigan.gov and choose the Department of Environmental Quality (MDEQ). Click on "water." Scroll down along the left side of the page and click on "water quality monitoring." Overall, the information presented below is only a snapshot of a few types of monitoring that MDEQ performs. There is additional information listed under wetlands and beaches, due to their significance to west Michigan local officials who are directly concerned with public health and development in west Michigan.

Biological Surveys

The MDEQ conducts biological surveys through its Surface Water Quality Assessment Survey program. The program operates on a five-year rotation. The survey includes characterizing the macroinvertebrate community and its habitat at selected sampling points and analyzing surface water samples obtained from these locations for water quality parameters. Availability of MDEQ biological surveys

Nonpoint Source

The MDEQ recently completed development of a strategy that describes how the MDEQ monitors the effectiveness of nonpoint source activities.

B. WETLANDS

Michigan's wetland statute, Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, defines a wetland as "land characterized by the presence of water at a frequency and duration sufficient to support, and that under normal circumstances does support, wetland vegetation or aquatic life, and is commonly referred to as a bog, swamp, or marsh." The definition applies to public and private lands regardless of zoning or ownership. Most people are familiar with the cattail or lily pad wetland found in areas with standing water, but wetlands can also be grassy meadows, shrubby fields, or mature forests. Many wetland areas have only a high ground water table and standing water may not be visible. Types of wetlands include deciduous swamps, wet meadows, emergent marshes, conifer swamps, wet prairies, shrub-scrub swamps, fens, and bogs.

Wetland Permits

The MDEQ Land and Water Division maintains the Coastal and inland Waters permit Information System (CIWPIS). CIWPIS provides summaries of Land/Water Joint Permit applications (JPA) received since 2000. The JPA covers activities regulated under Parts 301, 303, 325, 315, 323 and 353 and Part 31 (Floodplains) of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. CIWPIS is located at: http://www.deq.state.mi.us/ciwpis/

Wetland Benefits
Wetlands are a significant factor in the health and existence of other natural resources of the state, such as inland lakes, ground water, fisheries, wildlife, and the Great Lakes. Michigan's wetland statute recognizes the following benefits provided by wetlands:

- Flood and storm control by the hydrologic absorption and storage capacity of wetlands.
- Wildlife habitat by providing breeding, nesting, and feeding grounds and cover for many forms of wildlife, waterfowl, including migratory waterfowl, and rare, threatened, or endangered wildlife species.
- Protection of subsurface water resources and provision of valuable watersheds and recharging ground water supplies.
- Pollution treatment by serving as a biological and chemical oxidation basin.
- Erosion control by serving as a sedimentation area and filtering basin, absorbing silt and organic matter.
- Sources of nutrients in water food cycles and nursery grounds and sanctuaries for fish.

These benefits, often referred to as wetland functions and values, often play a vital role in recreation, tourism, and the economy in Michigan. According to a 1991 United States Fish and Wildlife Service Wetland Status and Trends report, over 50% of Michigan's original wetlands have been drained or filled, thereby making the protection of remaining wetlands that much more important.

Wetland Monitoring
The MDEQ conducts only minimal monitoring of wetlands at present, primarily because of a lack of guidance and assessment tools for these waters. Current wetlands monitoring is based on a targeted approach, often following complaints from the public or observations during watershed surveys. The MDEQ is in the process of producing a wetlands monitoring strategy which may incorporate other monitoring designs as appropriate. One approach being considered is tiered monitoring, which incorporates one or a combination of landscape assessment, on-site rapid wetland assessment, and intensive site assessment, depending on the monitoring objective.

Wetland Inventory Maps
The MDEQ wetland inventory provides county-level maps of potential and approximate locations of wetlands and wetland conditions. It is intended that the inventories be used as one tool in planning for development, open space designations, zoning, etc. as a way to protect wetland resources. The maps are not intended to be used to determine the specific locations and jurisdictional boundaries of wetland areas subject to regulation under Part 303. Only an on-site evaluation performed by the MDEQ in accordance with Part 303 can be used for jurisdictional determinations. The MDEQ has a wetland identification program to assist property owners with identifying the location of any wetlands on their property and whether the wetlands are regulated.

Contact
MDEQ Wetland Program Staff 517-373-1170 or go to the website at: www.michigan.gov/deqwetlands

C. GROUNDWATER

The Michigan Groundwater Discharge Program targets groundwater monitoring to specific sites with groundwater permits, to assess potential impacts on private wells from these sites.

The Groundwater Program regulates discharge to groundwater under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451 and Part 22 Rules. Groundwater staff reviews applications for authorizations to discharge wastes and wastewaters to the ground or groundwaters of the state. Authorizations include permits, self-certifications, and exemptions. Upon completion of an application review, staff makes recommendations leading to the determination of appropriate action including issuance or denial of an authorization to discharge.

Field staff review effluent and groundwater sampling data. Field staff also inspects discharge facilities to ensure legal requirements are being met. Field staff review and issues permits for the construction of public sewerage systems, under Part 41 of the NREPA. Field staff also review compliance with requirements for storage of hazardous material under the Part 5 Rules issued under Part 31 of the NREPA.

The Groundwater Program also provides toxicological support for the Waste Management Division.

The issuance of a Groundwater Discharge permit does not authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other DEQ permits, or approvals from other units of government as may be required by law.

Community Water Supply Program

The Community Water Supply Program oversees the primary EPA program that sets forth minimum standards for safe drinking water as well as administering the requirements of Michigan's Safe Drinking Water Act. The program's primary function is regulatory oversight of approximately 1,450 community public water supplies in Michigan.

Table # 8

PUBLIC WATER SUPPLY CLASSIFICATIONS		
Classification	*Description*	*Examples*
Type I Community Public Water Supply	Provides year-round service to not less than 25 residents OR not less than 15 living units	Municipalities, Apartments, Nursing Homes, Mobile Home Parks
Type II Nontransient Noncommunity Public Water Supply	Serves not less than 25 of the SAME people for at least six months per year	Schools, Industries, Places of Employment
Type II Transient Noncommunity Public Water Supply	Serves not less than 25 people OR not less than 15 connections for at least 60 days per year	Hotels and Restaurants (with less than 25 employees), Campgrounds
Type III Public Water Supply	Anything not considered a Type I or Type II water supply; serves less than 25 people AND 15 connections, OR operates for less than 60 days per year	Small Apartment Complexes and Condominiums, Duplexes, all Others
Private Water Supply	Serves a single living unit	Single Family Home

A Noncommunity Water Supply (otherwise known as a "Type II") is a water system that provides water for drinking or household purposes to 25 or more persons at least 60 days per year or has 15 or more service connections. A few examples are schools, restaurants, churches, campgrounds, industries and highway rest stops with their own water supply. In contrast, a Community Water Supply (or Type I) is a water system that provides year-round service to at least 15 living units or 25 *residents*. Examples include cities, villages, apartment complexes and mobile home parks.

Table # 9

WELLHEAD PROTECTION WATERSHEDS AND COMMUNITIES as of June 2007		
Watershed	*Community*	*Status*
Muskegon River	Newaygo	Program
	Fremont	Program
	Grant	Program
White River	Whitehall	Program
	Montague	Program
	White Cloud	Grant
	Shelby	Program
	Hart	Program
Pere Marquette River	Baldwin	Delineation

Table # 10

SURFACE WATER INTAKES FOR PUBLIC WATER SUPPLY				
Community	*County*	*Description*	*Population Served*	*Permit*
Spring Lake Township	Ottawa	Purchased Surface Water	9,000	MI0006235
Village of Spring Lake	Ottawa	Purchased Surface Water	3,040	MI0006230
Crockery Township	Ottawa	Purchased Surface Water	927	MI0001664
City of Ferrysburg	Ottawa	Purchased Surface Water	3,270	MI0002285
Fruitport Township	Muskegon	Purchased Surface Water	7,144	MI0002507
City of Grand Haven	Ottawa	Purchased Surface Water	12,245	MI0002750
Grand Haven Township	Ottawa	Purchased Surface Water	11,562	MI0002760

D. Beaches

The MDEQ provides grants for local monitoring, emerging issue monitoring and beach monitoring to local governments and organizations each year to support specific, targeted water quality monitoring projects. With regard to the total and partial body contact recreation, county health departments have primary responsibility in Michigan for beach monitoring.

The Michigan Department of Environmental Quality provides information about public beaches and recreational-use waterways. The MDEQ web site contains information about beach closings, monitoring efforts and E. coli test results. Information on the site is entered and maintained by local health department offices. Local health departments that perform beach water quality sampling are required to report beach testing results to MDEQ. Federally owned beaches are not included in the MDEQ state-funded monitoring program. For updated information on beach quality, visit the MDEQ web site at: http://www.deq.state.mi.us/beach/public/default.aspx

MDEQ provides funding to counties that submit beach monitoring proposals, though not always at the full level requested. Whenever a location is found that does not meet the recreation designated use, the MDEQ extensively monitors the site and develops a TMDL.

Within the WMSRDC coastal region, county health departments have identified a total of eighty (80) beaches. Thirty-seven (37) are on Lake Michigan, with thirteen (13) of them in Mason County, thirteen (13) in Muskegon County, six (6) in Oceana County and five (5) in northern Ottawa County. Fifty-six (56) beaches are maintained by local, state or federal governments and twenty-four (24) are private.

In addition to the coastal beaches, the District 10 County Health Department has identified an additional eighty (80) public/quasi-public beaches in Newaygo County and another twelve (12) in Lake County.

Table # 11

BEACH MONITORING					
Beaches in the WMSRDC Region	*Total Public Beaches*	*Public-Monitored in 2007*	*Public-Not Monitored in 2007*	*Private Beaches*	*Beach Closings 2004-2007*
Lake County Public/Quasi Public Beaches	12	0	0	0	0
Mason County Public Beaches	13	7	6	6	0
Muskegon County Public Beaches	30	28	2	6	5
Newaygo County Public Beaches	80	0	0	0	0
Oceana County Public Beaches	8	6	2	8	2
Ottawa County Public Beaches* Adam Lunden (616) 396-5266	5	4	1	4	6
Totals	**56**	**30**	**26**	**24**	**13**

* Nine of Ottawa County's nineteen beaches are located in the WMSRDC region

According to county health officials, the definition of "public" beaches varies within the region. For example, there are private campgrounds and beach associations that are quasi-public. Mason County is exploring the possibility of including beach monitoring in their sanitary code. This would give the health department the authority, for example, to require that public beach owners/managers sample twice a week. Otherwise, posting would be required.

Some lake associations and owners of private beaches sample water quality, but the results are not readily available to the public.

Table # 12

BEACH CLOSURE HISTORY FROM 2004 TO 2007 IN WMSRDC REGION						
Beach	*Start Date*	*Reopen Date*	*Days Closed*	*Warning Type*	*Reason*	*Source*
Mason County						
Lake Michigan – Bass Lake Outlet	8-10-04	8-12-04	2	Contamination Advisory		
Lake Michigan – Summit Township	8-17-04	8-19-04	2	Contamination Advisory		
Muskegon County						
Fox Lake – Fox Lake Park	1-1-07	6-8-07	158	Contamination Advisory	High Bacteria Levels	Stormwater Runoff
	8-8-06	10-31-06	84	Contamination Advisory	High Bacteria Levels	Unknown
	8-2-06	8-3-06	1	Contamination Advisory	High Bacteria Levels	Unknown
Lake Michigan – Pere Marquette Park	6-19-07	6-20-07	1	Beach Closure	High Bacteria Levels	Unknown
Muskegon Lake – Harbor Towne	8-22-06	8-23-06	1	Beach Closure	High Bacteria Levels	Unknown
Oceana County						
Lake Michigan – Whiskey Creek	7-11-06	7-13-06	2	Beach Closure	High Bacteria Levels	Unknown
Silver Lake-Lake Michigan – Silver Creek Channel	7-3-07	ongoing	…	Beach Closure	High Bacteria Levels	Unknown
Northern Ottawa County						
Crockery Lake – Grose Park	6-3-04	6-4-04	1	Contamination Advisory		
Lake Michigan – Grand Haven City	8-11-04	8-13-04	2	Contamination Advisory		
Lake Michigan – Grand Haven State Park	7-19-05	7-20-05	1	Contamination Advisory	High Bacteria Levels	Unknown
Lake Michigan – North Beach Park – Ferrysburg	7-14-04	7-17-04	3	Contamination Advisory		
Lake Michigan – Rosey Mound Recreation Area	7-19-05	7-20-05	1	Contamination Advisory	High Bacteria Levels	Unknown
	6-23-05	6-25-05	2	Contamination Advisory		

CHAPTER 9 NATURAL RIVERS PROGRAM

According to the Michigan Department of Natural Resources (MDNR), "the Natural Rivers Program was developed to preserve, protect and enhance Michigan's finest river systems for the use and enjoyment of current and future generations by allowing property owners their right to reasonable development, while protecting Michigan's unique river resources."

The MDNR has the responsibility for guiding the protection of designated natural rivers under the Natural River Act (Part 305 of P.A. 451 of 1994). Under the program, state and local units of government take actions to preserve and enhance rivers and their tributaries, and to address existing and potential problems.

The Natural Rivers Program provides opportunities for local participation in developing natural rivers plans. The MDNR realizes that local involvement is necessary to ensure that development controls for land adjacent to a river be reasonable and realistic to property owners. Michigan local units of government maintain control of local land use.

Part 305 enables local units of government to adopt Natural River zoning standards and to become the Program administrators on private lands within their jurisdiction. Partnerships with local units of government are critical to the success of the program. Administration of the Program works through a permit process, similar to any local zoning permit. In state-zoned areas, a property owner applies for a state Natural River zoning permit.

Development standards typically include structural and septic system setbacks (100-200 feet from the water's edge), native vegetation protection (25-100 feet from the water's edge), minimum lot size and frontage requirements (one acre with 100-200 feet of frontage), and prohibit filling or building within the 100-year floodplain or wetlands. The standards also limit uses to residential development and address timber harvest, oil and gas activity, public access, riverbank stabilization and fisheries habitat projects, and management of public lands.

There are three broad classes of rivers, related to the general setting of each. The criteria for each class are flexible and are aimed at guiding use and development in order to maintain a certain "feeling" and environment. The classes are:

- Wilderness – a free flowing river, with essentially primitive, undeveloped adjacent lands.
- Wild-Scenic – a river with wild, forested borders; near development; and moderately accessible.
- Country-Scenic – a river in an agricultural setting with pastoral borders, some homes, and readily accessible.

The WMSRDC region contains three designated natural rivers, which are listed below.

Pere Marquette River

Mainstream: Lake and Mason counties

Lake County Tributaries:

- Baldwin River
- Blood Creek
- Bray Creek
- Cole Creek, North and South Branch
- Danaher Creek

- Kinney Creek
- Leverentz Creek
- Little South Branch
- Middle Branch
- Sandborn Creek
- Sweetwater Creek

Mason County Tributaries:
- Big South Branch
- Carr Creek
- Swan Creek
- Weldon Creek

Newaygo County Tributaries:
- Big South Branch
- Cedar Creek
- Little South Branch
- McDuffee Creek
- Pease Creek

Oceana County Tributaries:
- Big South Branch
- Ruby Creek

Pine River

Mainstream: Osceola, Lake, Wexford and Manistee counties

Lake County Tributaries:
- Unnamed stream with source in Section 14, Ellsworth Twp.
- Coe Creek
- Sellars Creek
- Unnamed stream with source in Section 20, Dover Twp.
- Unnamed stream with source in Section 19, Dover Twp.
- Unnamed stream with source in Section 24, Newkirk Twp.
- Silver Creek including all perennial tributaries
- Unnamed stream with source in Section 13, Newkirk Twp.
- Unnamed stream with source in Section 11, Newkirk Twp.
- Unnamed stream with source in Section 7, Dover Twp.
- Unnamed stream with source in Section 1, Newkirk Twp.
- Poplar Creek

White River

Mainstream: Muskegon, Newaygo and Oceana counties

Muskegon County Tributaries:
- Carlton Creek
- Carleton (Lanford) Creek
- Cleveland Creek
- Sand Creek

- Silver Creek
- Skeels Creek

Newaygo County Tributaries

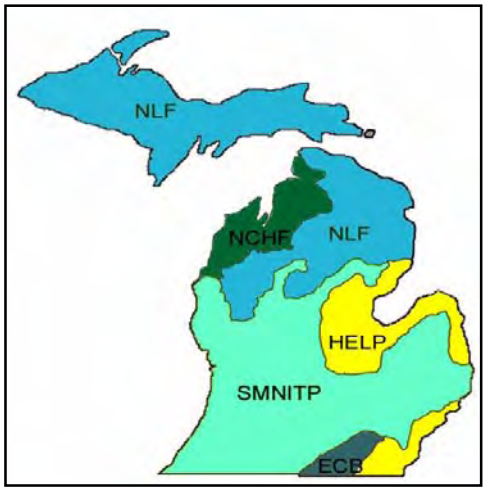
- East Branch Heald Creek
- Five Mile Creek
- Flinton Creek
- Martin Creek
- Mena Creek
- Mullen Creek
- Wrights Creek

Oceana County Tributaries:

- Braton Creek
- Carlton Creek
- Cobmoosa (Osborn) Creek
- Cushman Creek
- Knutson Creek
- Mud Creek
- Newman Creek
- North Branch White River
- Robinson Creek
- Sand Creek

Ecogregions

Michigan's rivers may also be grouped by the distinct ecoregions through which they flow. Each of the five ecoregions in Michigan consists of areas that exhibit relatively similar geological landform characteristics (Omernik and Gallant, 1988). Factors used to delineate ecoregions include climate, soils, vegetation, land slope, and land use.



SMNITP - Southern Michigan/Northern Indiana Till Plains
NCHF - North Central Hardwood Forests
NLF - Northern Lakes and Forests
HELP - Huron-Erie Lake Plains
ECB - Eastern Corn Belt Plains

Ecoregions of Michigan (Level III)
(adapted by MDEQ from Omernik and Gallant, 1988)

Alliance for the Great Lakes
700 Washington Ave, Suite 150, Grand Haven, MI 49417
Phone 1: (616) 850-0745
Fax: (616) 850-0765
Website: www.greatlakes.org

Bear Creek Watershed Council

Big Sable Watershed Restoration Committee
c/o Conservation Resource Alliance
10850 E Traverse Hwy., Suite 2204, Traverse City, MI 49684-1363
Phone: (231) 946-6817
Fax: (231) 947-5441
Email: cra@traverse.com
Website: www.rivercare.org

Bird Studies Canada
Great Lakes Marsh Monitoring Program

Conservation Resource Alliance
10850 E Traverse Hwy., Suite 2204, Traverse City, MI 49684-1363
Phone: (231) 946-6817
Fax: (231) 947-5441
Email: cra@traverse.com
Website: www.rivercare.org

Duck Creek Watershed Assembly
2785 Weesies Road, Montague, MI 49437
Contact: Thomas Hamilton
Phone: (231) 894-4301
E-mail: hamiltreef@aol.com

Ducks Unlimited
Ann Arbor, Michigan

Freshwater Future – www.freshwaterfuture.org
(See Great Lakes Aquatic Habitat Network and Fund, below)

Grand Valley State University - Annis Water Resources Institute
740 West Shoreline Dr., Muskegon, MI 49440
Phone: (231) 728-3601
Website: http://www.gvsu.edu/wri/index.htm

Great Lakes Aquatic Habitat Network and Fund
426 Bay Street, Petoskey, MI 49770
Phone 1: (231) 347-1181 Ext: 106
Fax: (231) 347-5928
Email: jill@watershedcouncil.org
Website: http://www.glhabitat.org, http://GreatLakesDirectory.org

Great Lakes Commission
2805 S Industrial Hwy, Ste 100, Ann Arbor, MI 48104-6791
Phone 1: (734) 971-9135
Fax: (734) 971-9150
Website: http://www.glc.org

Great Lakes Fishery Commission
11300 Island Lake Rd., Dexter, MI 481308513
Phone 1: (734) 426-3669
Fax: (734) 426-7089
Website: http://wplt.org

Great Lakes Natural Resources Center
National Wildlife Federation (NWF)
213 W. Liberty, Suite 200, Ann Arbor, MI 48104-1398
Phone: (734) 769-3351
Fax: (734) 769-1449
Email: greatlakes@nwf.org

Healing Our Waters – Great Lakes Coalition
Website: www.healthylakes.org
Phone: c/o National Wildlife Federation: (734) 769-3351

Huron Pines Resource Conservation and Development Area Council, Inc.
501 Norway, Grayling, MI 49738
Phone 1: (989) 348-9319
Phone 2: (989) 344-0753
Fax: (989) 348-7945
Website: http://www.huronpines.org

International Joint Commission - Great Lakes Regional Office
P.O. Box 32869, Detroit, MI 48232
Phone: 313-226-2170, Ext. 6733

Izaak Walton League – Dwight Lydell Chapter
5461 Myers Lake Road, Belmont, MI 49306
Phone: (616) 874-7549

Lake Michigan Lakewide Management Plan (LaMP)
LaMP Stakeholder Forum
www.lamp

Land Conservancy of West Michigan
1345 Monroe Ave., Grand Rapids, MI 49505
Phone: (616)-451-9476
Fax: (616) 451-1874
Email: lacwm@naturenearby.org
Website: www.naturenearby.org

Little Manistee River Partnership

Little Manistee Watershed Conservation Council
P.O. Box 52, Irons, MI 49644
Contact: Dave McIntire
E-Mail: dave@lmwcc.org
Website: www.lmwcc.org

Lower Manistee River Partnership

Lower Grand River Council of Watershed Organizations
c/o Grand Valley Metropolitan Council
40 Pearl St. NW, Ste. 410
Grand Rapids, MI 49503
(616) 776-3876
Email: bowmana@gvmc.org
Website: www.lowergrandriver.org or www.gvmc.org

Mason-Lake Conservation District (covers West Lake County)
862 West US 10, Scottville, MI 49454
Phone: (231) 832-2950, Ext 3
Fax: (231) 832-2683
Email: Lynda.herremans@mi.nacdnet.net
Website: www.mason-lakeconservation.org

Osceola-Lake Conservation District (covers East Lake County)
138 West Upton, Suite 2, Reed City, MI 49677
Phone: (231) 832-2950, Ext. 3
Fax: (231) 832-2683
Email: kathy.fischer@mi.nacdnet.net
Website: www.osceolalakecd.org

Michigan Association of Conservation Districts
3001 Coolidge Road Suite 250, East Lansing, MI 48823
Phone: 517-324-4421
Fax: 517-324-4435

Michigan Clean Water Fund
c/o Clean Water Action
959 Wealthy Street SE #2, Grand Rapids, MI 49506-1514
Phone 1: (616) 742-4084
Fax: (616) 742-4072

Michigan Department of Environmental Quality (MDEQ) – Water Bureau
P.O. Box 30273, Lansing, MI 48909
Phone 1: (517) 373-1949
Fax: (517) 373-9958

MDEQ Coastal Zone Management
P.O. Box 30273, Lansing, MI 48909
Phone 1: (517) 373-1949
Fax: (517) 373-9958

MDEQ Grand Rapids District Office
350 Ottawa Ave., NW
Unit 10
Grand Rapids, MI 49503
Phone: (616) 356-0500
Fax: 358-0202

MDEQ Cadillac District Office
120 W. Chapin St.
Cadillac, MI 49601-2158
Phone: (231) 775-3960
Fax: (231) 775-1511

Michigan Department of Natural Resources
Natural Rivers Program
P.O. Box 30446, Lansing, MI 48909
Phone 1: (517) 241-9049
Phone 2: (517) 373-1280
Fax: (517) 373-0381
Website: http://www.michigan.gov/dnr

Michigan Environmental Council
3216 Thorncrest SE, Grand Rapids, MI 49546

Michigan Envirothon
Michigan Association of Conservation Districts
3001 Coolidge Road, Suite 250, East Lansing, MI 48823
Phone: (517) 324-4421
Fax: (517) 324-4435
Website: www.michiganenvirothon.org

Michigan Hydro Relicensing Coalition
P.O. Box 828, Pentwater, MI 49449-0828
Phone 1: (616) 869-5487
Phone 2: (616) 869-5487

Michigan Lake & Stream Association
PO Box 303, Long Lake, MI 48743-0303
Phone: (989) 257-3583
Fax: (989) 257-2073

Michigan Land Use Institute
148 E. Front St., Suite 301, Traverse City, MI 49684-5725
Phone: (231) 941-6584
Fax: (231) 929-0937
Website: www.mlui.org

Michigan River Network
426 Bay Street, Petoskey, MI 49770
Phone 1: (231) 347-1181

Fax: (231) 347-5928
Email: scott@watershedcouncil.org
Website: http://www.glhabitat.org/mrn/

Michigan Water Resources Commission
331 Metty Dr., Ste 4, Ann Arbor, MI 48103
Phone 1: (734) 623-2000
Fax: (734) 623-2035
Email: dbrakhage@ducks.org
Website: www.ducks.org

Michigan Wetland Action Council
c/o Tip of the Mitt Watershed Council
426 Bay Street
Petoskey, MI 49770
Phone: 231.347.1181
Fax: 231.347.5928

Michigan Wildlife Conservancy
6380 Drumheller Rd., PO Box 393, Bath, MI 48808
Phone 1: (517) 641-7677
Fax: (517) 641-7877

Mona Lake Watershed Council
143 West Sherman Blvd., Suite 100
Muskegon Heights, MI 49444
Phone: (231) 725-4218
Email: info@monalakewatershed.org

Muskegon Conservation District
940 Van Eyck Street
Muskegon, MI 49442
Phone: (231) 773-0008
Fax: (231) 767-1207
Email: jeff.auch@macd.org
Website: www.muskegoncd.org

Muskegon Lake Public Advisory Council
200 Viridian Drive, Muskegon, MI 49440
Phone: (231) 903-7442
Email: kevansmlwp@google.com
Website: www.muskegonlake.org

Muskegon River Watershed Assembly
@ Ferris State University
1009 Campus Drive, JOH200
Big Rapids, MI 49307-2280
Phone: (231) 591-2324 or 591-2334
Fax: (231) 591-2306
Email: mrwa@ferris.edu
Website: www.mrwa.org

National Audubon Society Michigan
6011 W. Joseph Hwy Ste 403, PO Box 80527, Lansing, MI 48908-0527
Phone 1: (517) 886-9144
Fax: (517) 886-9466

National Park Service - Michigan Office
Rivers & Trails, 9922 Front St., Empire, MI 49630
Phone 1: (231) 334-3130
Fax: (231) 334-3135
Email: barbara_nelson-jameson@nps.gov
Website: www.nps.gov/rtca

National Wildlife Federation
Great Lakes Natural Resource Center
506 E Liberty St., 2nd Floor, Ann Arbor, MI 48104-2210
Phone 1: (734) 769-3351
Fax: (734) 769-1449
Website: http://www.nwf.org/greatlakes/

Nature Conservancy - Michigan Field Office
101 E Grand River Ave, Lansing, MI 48906-4348
Phone: (517) 332-1741
Website: http://www.tnc.org

Newaygo Conservation District
940 West Rex Street, Fremont, MI 49412
Phone: (231) 924-2420 ext. 5
Fax: (231) 924-4140

Oceana Conservation District
1064 Industrial Park Dr., Shelby, MI 49455
Phone: (231) 861-5946
Email: willidene.hutton@mi.nacdnet.net

Office of the Great Lakes
PO Box 30273, Lansing, MI 48909

Pere Marquette Watershed Council, Inc.
PO Box 212, Baldwin, MI 49304-0212
Phone 1: (616) 745-7692
Phone 2: (616) 745-2583
Fax: (616) 745-7692
Website: http://www.il-icom.net/~pmwc

Pine River Watershed Restoration Committee

Rogue River Watershed Council
c/o Grand Valley Metro Council
(See Lower Grand River Council of Watershed Organizations, above)

Sierra Club - Mackinac Chapter
109 E. Grand River, Lansing, MI 48906
Phone 1: (517) 484-2372
Fax: (517) 484-3108

The Wildlife Society - Michigan Chapter
PO Box 828
Pentwater, MI 494490828

Timberland Resource Conservation and Development
3260 Eagle Park Drive, Suite 2, Grand Rapids, MI 49525
Phone 1: (616) 942-4111 Ext. 8

Tip of the Mitt Watershed Council
426 Bay Street
Petoskey, MI 49770
P: 231.347.1181
F: 231.347.5928

Trout Unlimited - Michigan Council

Upper Manistee River Watershed Committee

West Michigan Environmental Action Council
1514 Wealthy St. SE Suite 280, Grand Rapids, MI 49506-2755
Phone 1: (616) 451-3051
Phone 2: (616) 336-9427
Fax: (616) 451-3054
Email: swessell@wmeac.org
Website: http://www.wmeac.org

West Michigan Shoreline Regional Development Commission
316 Morris Avenue, Suite 340, P.O. Box 387
Muskegon, MI 49443-0387
Phone: (231) 722-7878
Fax: (231) 722-9362
Email: wmsrdc@wmsrdc.org
Website: www.wmsrdc.org

White Lake Association
P.O. Box 151, Montague, MI 49437
Contact: Phil Dakin
Phone: (231) 750-2381

White River Watershed Partnership
P.O. Box 416, Hesperia, MI 49421
Phone: (231) 894-4313
Website: www.wrwp.org

United States Department of Agriculture (USDA)
National Resources Conservation Services

www.mi.nrcs.usda.gov.

Michigan State University Extension (MSU-E) Offices:

Muskegon County
97 E. Apple Avenue
Muskegon, MI 49442
Ph: 231-724-6361
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msue.muskegon@county.msu.edu

Mason County
102 S. Main St., Suite 4
Scottville, MI 49454
Ph: 231-757-4789
Email: msue.mason@county.msu.edu

Newaygo County
817 S. Stewart Ave.
Fremont, MI 49412
Ph: 231-924-0500
Email: msue.newaygo@county.msu.edu

Lake County
915 Michigan Ave.
Baldwin, MI 49304
Ph: 231-745-2732
Email: msue.lake@county.msu.edu

Oceana County
210 Johnson St. E
Hart, MI 49420
Ph: 231-873-2129
Email: msue.oceana@county.msu.edu

CHAPTER 11 CONCLUSION

The information compiled and presented in this inventory is the first phase of an effort to inspire collaborative watershed stewardship progress within the WMSRDC region. This publication is a living document and, as such, will become outdated quickly. It is intended to serve as a useful reference tool regarding the current condition of watersheds in our region. It pulls together otherwise disparate and sometimes inaccessible information into one document. It can serve as a catalyst for new partnerships between local governments, watershed groups, conservation organizations and agencies who seek to improve water resources in West Michigan. A review and analysis of the information presented will increase our collective ability to efficiently identify common ground projects and water resource priorities for the benefit of our communities and our region as a whole.

The West Michigan Watershed Partners Inventory was compiled by utilizing information publicly available during 2007 and 2008 from the following watershed organizations, reports, public agencies and web sites:

- Michigan Department of Environmental Quality Water Bureau
- Michigan Department of Natural Resources Fisheries Division
- US Environmental Protection Agency – Great Lakes National Programs Office
- US Fish and Wildlife Service
- Great Lakes Commission
- Michigan Department of Community Health
- Grand Valley State University - Annis Water Resources Institute
- Institute of Water Research-Michigan State University
- Michigan Association of Conservation Districts
- Muskegon River Watershed Assembly
- White River Watershed Partnership
- Mason County Department of Public Works
- Conservation Resource Alliance
- Pere Marquette Watershed Council
- Water Quality and Pollution Control in Michigan 2006 Sections 303(d), 305(b), and 314 Integrated Report, Michigan Department of Environmental Quality, June 5, 2006
- Michigan's 2006 Methodology for Determining Water Bodies Requiring Total Maximum Daily Loads, Michigan Department of Environmental Quality - Water Bureau
- Great Lakes Regional Collaboration Strategy, December 2005
- Lake Michigan Lakewide Management Plan, US EPA Great Lakes National Program Office
- State of Michigan Department of Natural Resources Special Report 38, Conservation Guidelines for Michigan Lakes and Associated Natural Resources, SR38 March 2006, Richard P. O'Neal and Gregory J. Soulliere

GLOSSARY

- **Adaptive management** - A type of natural resource management that implies making decisions as part of an on-going process. Monitoring the results of actions will provide a flow of information that may indicate the need to change a course of action. Scientific findings, management experience and the needs of society may also indicate the need to adapt resource management to new information.

- **Attainment of Water Quality Standards** – The Clean Water Act (CWA) specifies that Water Quality Standards (WQS) for navigable waters shall consist of designated uses that protect the public health or welfare and enhance the quality of water. Each state develops WQS and provides the USEPA with an assessment of the quality of their waters [Section 305(b)], a list of waters that do not support their designated uses or attain WQS and require the development of Total Maximum Daily Load Assessments (TMDL) [Section 303(d)], and an assessment of status and trends of publicly owned lakes (Section 314). The final authority regarding CWA jurisdiction remains with the U.S. Environmental Protection Agency (US EPA).

- **Biodiversity** (biological diversity) - The variety of life on earth

- **Biological Community** - An assemblage of species living together in a particular area, at a particular time, in a prescribed habitat. Communities usually bear the name of their dominant plant species, but include all the microbes, plants, and animals living in association with the dominant plant species at a given time

- **Conservation easement:** A voluntary, legally binding agreement that limits certain types of uses or prevents development from taking place on a piece of property now and in the future, while protecting the property's ecological or open-space values.

- **Corridor:** A defined tract of land connecting two or more areas of similar management or habitat type that allows movement of species to facilitate reproduction and other life sustaining needs. Small reserves of natural habitat that link larger reserves so that species can move from one area to another.

- **Designated use** – At a minimum, all surface waters of the state are designated and protected for all of the following designated uses: agriculture, navigation, industrial water supply, warm water fishery, other indigenous aquatic life and wildlife, partial body contact recreation, and fish consumption [Rule 100; R 323.1100(1)(a)-(g)] of the Part 4 rules, WQS, promulgated under Part 31, Water Resources Protection, of the NREPA). In addition, all surface waters of the state are designated and protected for total body contact recreation from May 1 to October 1 [R 323.1100(2)]. Specific rivers and inland lakes as well as all Great Lakes and specific Great Lakes connecting waters are designated and protected for coldwater fisheries [R 323.1100(4)-(7)]. Several specific segments or areas of inland waters, Great Lakes, Great Lakes bays, and connecting channels are designated and protected as public water supply sources [R 323.1100(8)].

- **Ecoregion** - Areas of relatively homogeneous ecological systems. Ecoregions are usually based on patterns of land use, topography, present and potential natural vegetation and soils. Ecoregion designations are used by resource managers to develop logical, regional strategies for land acquisition and management. Michigan's rivers can be grouped by the distinct ecoregions through which they flow. Each of the five

ecoregions in Michigan consists of areas that exhibit relatively similar geological landform characteristics (Omernik and Gallant, 1988)

- **Fragmentation** - The breaking up of large and continuous ecosystems, communities, and habitats into smaller areas surrounded by altered or disturbed land or aquatic substrate

- **Green Infrastructure** – Green infrastructure is the interconnected network of open spaces and natural areas, such as greenways, wetlands, parks, forest preserves and native plant vegetation, that naturally manages stormwater, reduces flooding risk and improves water quality.

- **Habitat** - The place where a plant or animal naturally lives or grows – where it finds everything it needs to live

- **Impaired / Impairment** - Not meeting standards for water quality or fish and wildlife habitat and their designated uses

- **Indicators:** Measurable or describable characteristics of a criteria that provides a means for tracking changes in environmental, social, or economic conditions affecting natural resources

- **Public involvement -** The use of appropriate procedures to inform the public, obtain early and continuing public participation, and consider the views of interested parties in planning and decision making

- **Riparian** - Pertaining to or occupying areas along rivers, lakes or ponds

- **Sustainable Development** – Sustainable development is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but in the indefinite future.

- **Stormwater** – Stormwater is a term used to describe water that originates during precipitation events. It may also be used to apply to water that originates with snowmelt or runoff water from overwatering that enters the stormwater system. Stormwater that does not soak into the ground becomes surface runoff, which either flows into surface waterways or is channeled into storm sewers. Stormwater is of concern for two main issues: one related to the volume and timing of runoff water (flood control and water supplies) and the other related to potential contaminants that the water is carrying, i.e. water pollution.

- **Watershed – Watershed/Basin** - Geographic areas from which all water (i.e. precipitation runoff, irrigation channels, groundwater, ditches, rivers, lakes, etc.) flows toward and drains through a single common outlet. As water travels over land and through various water channels in a watershed, the quality and quantity of that water is affected by local environmental conditions; therefore management of aquatic ecosystems must consider watershed characteristics. The river or body of water that serves as the outlet or receiver of the water often identifies basins and watersheds.

- **Wetland** - Areas where soils are wet or saturated for at least part of the year:
    - **Marsh** - Wetland where the ground is covered with water for large portions of the year and is populated by soft-stemmed plants that rise above the water surface, such as cattails and rushes
    - **Swamp** - Wetland that is covered by trees or shrubs.
    - **Bogs and Fens** - Wetlands found in northern areas that accumulate peat, a spongy soil made up mostly of partially decomposed plants.

Acronyms:
BUI – Beneficial Use Impairment
D/S - Downstream
CWA – Clean Water Act
GLWQA – Great Lakes Water Quality Agreement
GLRCS – Great Lakes Regional Collaboration Strategy
HOW – Healing Our Waters
LaMP/Lake Michigan LaMP – Lakewide Management Plan
MDNR/DNR – Michigan Department of Natural Resources
MDEQ/DEQ – Michigan Department of Environmental Quality
MDOT – Michigan Department of Transportation
NPDES – National Pollutant Distribution and Elimination System
NPS – Non Point Source pollution
NREPA – Natural Resources and Environmental Protection Act
RAP – Remedial Action Plan
TMDL – Total Maximum Daily Load
US EPA/EPA – United States Environmental Protection Agency
USACE – United States Army Corps of Engineers
U/S - Upstream
WQS – Water Quality Standard
WMSRDC – West Michigan Shoreline Regional Development Commission

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