

Michigan's Nonpoint Source Program Plan

**Michigan Department of Environmental Quality
Water Resources Division
Nonpoint Source Program
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LIST OF ACRONYMS

AOC	Area of Concern
AIS	Aquatic Invasive Species
BEACH Act	Beaches Environmental Assessment and Coastal Health Act
BMP	Best Management Practices
BUI	Beneficial Use Impairment
CNMP	Coastal Nonpoint Management Plan
CMI	Clean Michigan Initiative
CREP	Conservation Reserve Enhancement Program
CSO	Combined Sewer Overflow
CWA	Clean Water Act
EQIP	Environmental Quality Incentives Program
FY	Fiscal Year
GI	Green Infrastructure
GIS	Geographic Information System
GLRI	Great Lakes Restoration Initiative
GLWQA	Great Lakes Water Quality Agreement
GRTS	Grants Reporting and Tracking System
HUC	Hydrologic Unit Code
LaMP	Lakewide Management Plan
LHD	Local Health Department
LID	Low impact development
LLWFA	Landscape Level Wetland Functional Assessment
MAEAP	Michigan Agriculture Environmental Assurance Program
MDARD	Michigan Department of Agriculture and Rural Development
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MDOT	Michigan Department of Transportation
MiCorps	Michigan Clean Water Corps
MILP	Michigan Inland Lakes Partnership
MiRAM	Michigan Rapid Assessment Method
MNSP	Michigan Natural Shoreline Partnership
MS4	Municipal Separate Storm Sewer Systems
MSU	Michigan State University
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service
NREPA	Natural Resources and Environmental Protection Act
NWCA	National Wetland Condition Assessment
PCB	Polychlorinated biphenyl
QAPP	Quality Assurance Project Plan
RAP	Remedial Action Plan
R-B Index	Richards-Baker Flashiness Index
RFP	Request for Proposal
RPST	Recovery Potential Screening Tool
SAW	Stormwater, Asset Management and Wastewater
SBCI	Saginaw Bay Coastal Initiative
SEMCOG	Southeast Michigan Council of Governments
SESC	Soil Erosion and Sedimentation Control
SIDMA	Social Indicators Data Management and Analysis
SIPES	Social Indicators Planning and Evaluation System
SRF	State Revolving Fund
SSO	Sanitary Sewer Overflow
STORET	Storage and Retrieval System
SUSTAIN	System for Urban Stormwater Treatment and Analysis INtegration
SWAS	Surface Water Assessment Section
SWQIF	Strategic Water Quality Initiatives Fund
TMDL	Total Maximum Daily Load
USEPA	U.S. Environmental Protection Agency

USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WMP	Watershed Management Plan
WRD	Water Resources Division (formerly known as Water Bureau [WB])
WQS	Water Quality Standards

CHAPTER 1: INTRODUCTION

Pollutants that originate from diffuse sources such as fields and parking lots remain among the most significant problems degrading or threatening the water quality of Michigan's lakes, streams, wetlands, and groundwater. These nonpoint source (NPS) pollutants encompass a diverse range of substances varying from natural compounds, such as sediment, to commercially produced chemical pesticides. The pervasive nature of the problem is widely recognized, although often not well understood, and there are numerous organizations and groups throughout Michigan taking action to address the causes, sources, or impairments.

Eliminating NPS pollution is a critical task for the Michigan Department of Environmental Quality (MDEQ) given that most of the remaining water quality impacts in Michigan are caused, in part, by these sources. The NPS Pollution Control Program (NPS Program) is unique compared to many programs managed by the MDEQ because of the variety and diversity of public and private entities involved in NPS pollution control, the variety and diversity of NPS pollution, and the lack of the MDEQ's control over many decisions that impact water quality. Most of the actions taken to control NPS pollution are best coordinated and implemented at the local level. Some actions can only be implemented at the local level, for example, land use planning decisions, or ordinances. The responsibilities of the various local, state, and federal entities for NPS pollution control must be coordinated to make certain that limited resources are used efficiently and effectively to ensure that the shared responsibility for protecting water resources is achieved.

1.1 Background

The federal Clean Water Act (CWA) of 1987 directed the Governor of each state to assess the extent of NPS pollution and prepare a four-year management plan to address NPS pollution.

NPS Assessment

Early in 1988, Michigan conducted a survey of natural resources, environmental, and agricultural agencies in Michigan regarding their perception of the extent of NPS pollution. The results of that survey were published as *Michigan's 1988 Nonpoint Pollution Assessment Report*. This report was Michigan's response to the CWA requirement to assess the extent of NPS pollution in the state. Michigan's NPS assessment has been updated every two years since 1988 via Michigan's biennial report to the U. S. Environmental Protection Agency (USEPA) regarding water quality and pollution control in Michigan. The CWA requires Michigan to prepare a biennial report on the quality of its water resources as the principal means of conveying water quality protection/monitoring information to the USEPA and the U.S. Congress. The "Integrated Report" satisfies the listing requirements of Section 303(d) and the reporting requirements of Sections 305(b) and 314 of the CWA. The Section 303(d) list includes Michigan water bodies that are not attaining one or more designated uses and require the establishment of Total Maximum Daily Loads (TMDLs) to meet and maintain water quality standards (WQS). The 2014 Integrated Report titled, *Water Quality and Pollution Control in Michigan 2014 Sections 303(d), 305(b), and 314 Integrated Report*, was approved by the USEPA.

NPS Pollution Control Management Plan

Also early in 1988, Michigan began work on the four-year management plan required by the CWA. A 23-member NPS Advisory Committee and nine NPS technical committees comprised of 147 members used the information regarding sources and the extent of NPS pollution provided in the 1988 Assessment Report to develop *Michigan's NPS Pollution Control*

Management Plan. The purpose of this management plan was to improve and protect the waters of the state from impacts of NPS pollution and to achieve and maintain WQS, including meeting designated uses.

The NPS Program Plan was updated in 1999 with *Michigan's Response to the Nine Key Elements of an Effective Nonpoint Source Management Program*. The 1999 update was developed following the USEPA's 1996 release of its *Nonpoint Source Program Guidance for Fiscal Year (FY) 1997 and Future Years*. The USEPA's guidance document presented a framework for reviewing, revising, and approving enhanced state NPS management programs, and a new framework for the national NPS grants program. The USEPA guidance presented a list of nine key elements that characterize an effective and dynamic state NPS Program designed to achieve and maintain WQS and designated uses. States were instructed to review and, as appropriate, revise their NPS management plans to reflect each element.

NPS Reengineering Report

In 2005, the MDEQ initiated an effort to review Michigan's NPS Program. The purpose of the review was to ensure that the program goals and approach were appropriate, and to evaluate how the NPS Program interacts with other programs developed to control diffuse pollution. To accomplish this task, the MDEQ invited a diverse group of 33 internal and external stakeholders to join the NPS Program Reengineering Committee. The committee was charged to identify core NPS pollution issues and activities that could address those core issues, provide recommended changes and enhancements to the MDEQ's existing NPS Program, and develop recommendations to realign the MDEQ's resources to effectively administer the NPS Program in Michigan.

The committee reviewed available NPS Program materials and summaries of water quality monitoring reports, conducted surveys of internal and external programs, conducted a survey of other state programs, and conducted surveys of external stakeholders. In 2006, the committee produced a final report that identified the most serious NPS pollution threats on a statewide and regional basis; identified areas in which the NPS Program could better support and interact with local groups and other external stakeholders; and identified external programs that affect NPS pollution abatement programs and described how those programs interface with the NPS Program. In addition, the report included a series of recommendations intended to help establish program direction and communicate results as well as identify the most important types of activities to address NPS threats to water quality.

The MDEQ used the re-engineering report and the NPS Program Plan to focus attention on the following areas of action:

- **Education and Outreach:** The Program Plan identifies a number of strategies and short-term actions to advance education and outreach activities including prioritizing watersheds for restoration and protection; identifying specific targets for education and outreach projects; and identifying measures of success.
- **Monitoring:** The Program Plan identifies strategies and short-term actions necessary to identify NPS impairments, measure program effectiveness, and report program success.
- **Technical Assistance:** The Program Plan includes a number of strategies and short-term actions intended to enhance efforts to provide technical assistance such as development of best management practice (BMP) manuals; providing geographic

information system (GIS) expertise to stakeholders; providing technical assistance to local groups working to develop and implement watershed management plans (WMPs); and providing technical assistance to other programs.

- **Partnerships:** The Program Plan includes some strategies and short-term actions intended to improve partnerships with programs internal to the MDEQ as well as partnerships with external stakeholders.
- **Enforcement:** The Program Plan includes strategies and short-term actions to better integrate enforcement activities.

Finally, the reengineering report noted the need to prioritize water bodies and watersheds for action and the Program Plan includes several long- and short-term goals intended to prioritize watersheds for plan development and implementation as well as prioritize education and outreach activities.

2007 NPS Program Plan Update

Development of the 2007 Program Plan update was guided by the NPS Program Committee comprised of MDEQ NPS staff. The NPS Program Committee divided into technical teams to address specific issues. They reviewed the original 1988 Management Plan, 1999 Nine Key Elements document, and 2006 NPS Reengineering Report as well as NPS Management Plans developed by other USEPA, Region 5, states prior to developing the update.

The 2007 Program Plan update addressed the USEPA's nine key elements of an effective and dynamic state NPS Program. Staff reviewed the commitments included in the 1999 Nine Key Elements Document and retained or updated the best of those commitments. In addition, staff reviewed the recommendations from the 2006 NPS Reengineering Report and translated the relatively general recommendations from that report into the specific long- and short-term commitments incorporated in the 2007 Program Plan update.

2009 NPS Program Plan Update

The 2009 Program Plan update was again guided by the NPS Program Committee comprised of MDEQ staff. The revisions were relatively minor compared to the 1999 and 2007 updates. The 2009 updates included a new section with long- and short-term goals related to identifying and addressing water quality impairments caused by on-site septic systems; new short-term goals related to dam removal projects; removal of short-term goals that were completed; and revisions to some short-term goals that are ongoing. The 2009 Program Plan was used to guide NPS Program annual work plans for 2009, 2010, 2011 and 2012.

2012 NPS Program Plan Update

The NPS Program Committee revised the Program Plan in 2012. The 2012 updates included the addition of new program measures of success; revisions to the education and outreach long- and short-term goals; new long- and short-term goals related to green infrastructure (GI); and updates to the list of NPS priority watersheds. In addition, completed short-term goals were removed and "next steps" added. The 2012 Program Plan was used to guide NPS Program annual work plans for 2013, 2014, and 2015.

Michigan's Water Strategy

On June 9, 2015, the DEQ's Office of the Great Lakes released a draft "*Sustaining Michigan's Water Heritage; A Strategy for the Next Generation*" (Water Strategy) for public review. Governor Snyder requested a Water Strategy during his 2012 Energy and Environment Message. The Water Strategy is Intended to encourage an ecosystem approach to restoring and protecting surface and groundwater resources; enhance economic opportunities; encourage recreational opportunities; and strengthen the connection of Michigan's citizens to our water resources. Development of the draft Water Strategy was led by the Office of the Great Lakes with support from WRD, DNR, MDARD, and the Michigan Economic Development Corporation. In addition, an external ad hoc stakeholder advisory group assisted with development of the draft Water Strategy.

There are six key Water Strategy priorities:

1. Prevent introduction of new aquatic invasive species and control established populations
2. Achieve a 40% phosphorus reduction in western Lake Erie basin
3. Support investments in commercial and recreational harbors and maritime infrastructure
4. Develop a water trails system
5. Accelerate water technologies to address critical water problems using an entrepreneurial business-led initiative
6. Establish a durable Water Fund to achieve Water Strategy goals including water infrastructure management

The draft Water Strategy includes 62 recommendations to address the most pressing issues. NPS Program staff were involved in the development of the draft Water Strategy. Several NPS Program Plan goals, objectives, and strategies are integrated into the draft Water Strategy and the NPS Program Plan includes recommendations that are consistent with the draft Water Strategy.

In addition, in June of 2015, Governor Snyder along with the Governor of Ohio and the Premier of Ontario endorsed the goal of achieving a 40% phosphorus reduction to Lake Erie by 2025 (using 2008 as a base year). Both the short-term actions from the NPS Program Plan and the NPS related recommendations from the draft Water Strategy will be used to achieve this goal.

2015 Update and Future Updates of the NPS Program Plan

The NPS Program Committee revised the Program Plan again in 2015. The 2015 update reflects the new Federal Register Guidance (*Nonpoint Source Program and Grants Guidelines for States and Territories* including the new *Key Components of an Effective State NPS Management Program*) released on April 12, 2013. In addition, the revisions to the NPS Program Plan include a more detailed description of the NPS Program's watershed prioritization process; a focus on a more comprehensive approach to addressing agricultural NPS pollution; and a section covering NPS pollutants and threats to water quality associated with climate change and aquatic invasive species (AIS).

The NPS Program Committee intends to update the NPS Program Plan on a regular basis and the 2015 Program Plan update is the latest effort. The routine updates serve several purposes. First, the MDEQ intends to use the Program Plan to develop the annual work plans and portions of the Program Plan such as references to specific short-term projects must be updated frequently. In addition, the NPS Program Plan must be kept current to remain eligible for the federal Section 319 funding.

Second, the MDEQ intends to use the NPS Program Plan and the Annual Plan to consolidate other planning activities relevant to the NPS Program. For example, in 2004, the NPS Program adopted a *Statewide Nonpoint Source Program Effectiveness Evaluation Strategy* and a *Nonpoint Source Environmental Monitoring Strategy*. Both of these strategies include a series of specific commitments for MDEQ staff. Recommendations relevant to the NPS Program have been and will continue to be pulled from these strategies as appropriate. Annual updates of portions of the NPS Program Plan will ensure that all of these efforts will be efficiently coordinated and implemented.

Third, NPS Program Plan updates will be used to reevaluate, and revise, as necessary, long-term goals and objectives and add new strategies and short-term actions to incorporate “lessons learned” into future Program Plans. Future Program Plan updates will ensure that program staff activities are continually evaluated and modified as appropriate.

Existing Staff Resources

The Section 319 grant supports staff in the MDEQ to implement the NPS Program Plan. These staff members are located centrally in Lansing and in eight district offices across the state. The Water Resources Division (WRD) is responsible for administering most elements of the NPS Program including grant administration, program planning and priority setting, compliance and enforcement, information and education outreach, monitoring, and technical assistance to stakeholders. Much of the program planning, grant administration, education and outreach, and monitoring is coordinated centrally by staff in Lansing. District office staff duties generally include more decentralized activities such as developing partnerships with local watershed groups or stakeholders, technical advice to local entities, NPS complaint response, problem verification, compliance and enforcement, and helping to identify and develop BMPs to address NPS threats.

The long-term goals, objectives, strategies and short-term actions included in the NPS Program Plan are intended to direct staff to identify priority watersheds or water bodies; identify problems that need to be fixed or places that should be protected; restore or protect those priority areas using tools that are identified throughout the Program Plan; and measure and communicate those successes.

1.2 NPS Program Vision and Goals

Setting program goals is the first step toward integrating the NPS Program’s Vision into an outcome-based strategic management process. Goals are necessary to provide a clear and unified direction and goals are the standard by which the NPS Program measures its performance.

NPS Program Vision

The NPS Program will protect high quality waters from NPS threats and restore waters impaired by NPS pollution or causes.

NPS Program Goals

- I. Develop and implement WMPs to restore and protect priority watersheds.
- II. Eliminate or reduce NPS pollutants and causes of impairments.

- III. Increase public awareness of NPS pollutants and causes of impairment and encourage individuals to adopt behaviors to reduce NPS pollutants and causes of impairments.
- IV. Efficiently manage pass-through grants and help stakeholders identify funding sources to restore and protect watersheds.
- V. Support compliance and enforcement efforts to restore and protect priority watersheds.
- VI. Focus monitoring to document impairments and threats to high quality waters, and assess the effectiveness of efforts to restore and protect priority watersheds.
- VII. Efficient program operations.

CHAPTER 2: MICHIGAN WATER RESOURCES INVENTORY

2.1 Designated Uses

Designated uses of the waters of the state are described in the Part 4 Rules, WQS, promulgated under Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). At a minimum, all of Michigan's surface waters are designated for, and shall be protected for, all of the following uses: agriculture, navigation, industrial water supply, fish consumption, warmwater fisheries, other aquatic life and wildlife, and partial body contact recreation. Coldwater fisheries and public water supply are protected in certain designated waters, and all surface waters of the state serving as migratory routes for anadromous salmonids shall be protected as necessary to assure that migration is not adversely affected. In addition, all waters of the state are designated for, and shall be protected for, total body contact recreation from May 1 to October 31. Also, the WQS include specific numeric or narrative criteria for microorganisms, plant nutrients, dissolved oxygen, toxic pollutants, and temperature.

Any Michigan water body that is not attaining one or more designated uses or is not meeting WQS is placed on Michigan's nonattainment list and reported to the USEPA as required by Section 303(d) of the federal CWA.

The primary NPS pollutants and causes of impairment addressed by this program are:

- Pollutants such as nutrients and sediments from diffuse sources or erosion including agricultural runoff, un-permitted storm water run-off, erosion from road stream crossing and erosion due to hydrologic alteration of streams.
- Bacteria from NPS sources such as on-site septic systems or other un-permitted decentralized wastewater treatment systems, non-permitted agricultural sources, pet waste and in some circumstances wildlife (e.g., concentrated waterfowl at beaches).
- Hydrologic alterations or other flow regime alterations caused by impervious surfaces or channel alterations.
- Direct habitat alterations that cause designated use impairments.
- Impairments from legacy mining operations that were never covered by permits.
- Impairments from legacy forestry operations that were never covered by permits.
- Water quality impairments caused by dams.

2.2 Resource Inventory

[Michigan's 2014 Integrated Report](#) includes an inventory of surface water resources including Great Lakes and their connecting channels, inland lakes, rivers, and wetlands (Table 2.1). Michigan's Integrated Report summarizes water quality as follows:

In general, the open waters of the Great Lakes have good to excellent water quality. The inland waters of Michigan's Upper Peninsula and the northern half of the Lower Peninsula support diverse aquatic communities and are commonly found to have good to excellent water quality. Many lakes and rivers in this mostly forested area of the state support coldwater fish populations. Lakes and rivers in the southern half of Michigan's Lower Peninsula generally have good water quality and support warmwater biological communities as well as some coldwater fish populations. The southern portion of the state contains Michigan's major urban areas with much of the rural land in agricultural production. Many of Michigan's rivers and lakes

receive direct discharge of treated effluent from municipal and industrial sources as well as runoff from urbanized areas, construction sites, and agricultural areas. Sedimentation, nutrient enrichment, and toxic pollutant loading are problems associated with runoff that can impact surface water quality. Surface water quality is generally showing improvement where programs are in place to correct problems and restore water quality.

Table 2.1 Michigan’s Water Resources.

Resource	Number	Area	Length	Source
Great Lakes, Great Lakes bays, and Lake St. Clair		42,167 mi ² (~45% of total Great Lakes area)		USGS National Hydrography Dataset (1:24,000 scale)
Inland lakes and reservoirs with surface area ≥ 0.1 acre	46,000	872,109 acres		USGS National Hydrography Dataset (1:24,000 scale)
Rivers and streams (including connecting channels)			76,439 mi	USGS National Hydrography Dataset (1:24,000 scale)
Wetlands		6,465,109 acres		USFWS National Wetland Inventory

2.2.1 Great Lakes

The Great Lakes contain 20 percent of the world’s fresh surface water and are a unique natural resource. Generally, the open waters of the upper Great Lakes (Superior, Michigan, and Huron) have excellent water quality. Exceptions include a few impaired locations restricted to nearshore zones influenced by large, densely populated, and heavily industrialized urban areas. Phosphorus load reductions have contributed to water quality improvements in the Great Lakes and Connecting Channels. These load reductions are the result of numerous efforts to control point and nonpoint sources including efforts to develop and implement WMPs; phosphorus limits on point source discharges; and statewide bans or limits on the use of phosphorus in laundry detergent, dishwashing detergent, and lawn fertilizers.

Detailed designated use support summaries for Michigan waters of the Great Lakes are provided in the 2014 Integrated Report. Key findings for Michigan waters of the Great Lakes, connecting channels, and Lake St. Clair include:

- Periodic taste and odor problems were reported at the Bay City municipal drinking water intake in Saginaw Bay. As a result of this occasional problem, the Bay City drinking water intake zone in Saginaw Bay is listed as not supporting the public water supply designated use. The causes of the designated use impairment are listed at phosphorus and nutrients/eutrophication.
- Deposits of dead and decaying organic matter continue to periodically foul beaches along Michigan’s Great Lakes shoreline including, but not limited to, Grand Traverse Bay,

Saginaw Bay, and western Lake Erie. Although phosphorus concentrations do not appear to be solely responsible for the shoreline deposits, programs and policies intended to reduce phosphorus in all waters of the state remain important components of efforts to improve and protect water quality. Qualitative monitoring has been conducted by the MDEQ every two weeks at eight Lake Erie Beaches during the 2012 season and seven beaches during the 2013 season in an effort to understand the scope and persistence of beach debris and harmful algal bloom conditions.

- In 2011, 254 public beaches (owned by a city, county, etc.) on the Great Lakes were monitored and 161 reported no exceedances of the *E. coli* WQS for total body contact. There were 93 beaches that reported a total of 215 exceedances. In 2012, 252 public beaches were monitored and 168 reported no exceedances of the *E. coli* WQS for total body contact. There were 84 beaches that reported a total of 161 exceedances.

2.2.2 Inland Lakes

Michigan has approximately 46,000 inland lakes (including lakes, ponds, and river impoundments) with a surface area of at least one-tenth of an acre or greater. Of these, 730 have public access. Although Michigan’s inland lakes generally have good to excellent water quality, some water quality issues occur. The majority of Michigan’s public access lakes have moderate or low nutrient levels; however, nutrient levels are high enough in several lakes to warrant corrective action through the implementation of a TMDL.

The majority (72 percent) of Michigan’s public access lakes have moderate (mesotrophic) or low (oligotrophic) nutrient levels. The trophic status of Michigan’s public access lakes is summarized in Table 2.2.

Table 2.2. Trophic status summary of Michigan’s public access lakes.

Trophic Status	Number of Lakes
Oligotrophic (low nutrients)	129 (18%)
Mesotrophic (moderate nutrients)	399 (54%)
Eutrophic (high nutrients)	174 (24%)
Hypereutrophic (excessive nutrients)	28 (4%)
Total Assessed	730

Many lakes with moderate to high nutrient levels are located in the southern Lower Peninsula where large population centers and fertile soils exist. Many lakes with low nutrient levels are located in the northern Lower Peninsula where the population density is lower, soils are less fertile, and lakes tend to be larger and deeper.

In 2011, a total of 146 public beaches (owned by a city, county, etc.) on inland lakes were monitored and 126 had no exceedances of the *E. coli* WQS for total body contact. There were 20 beaches that reported a total of 36 exceedances. In 2012, a total of 203 public beaches on inland lakes were monitored and 164 had no exceedances of the *E. coli* WQS for total body contact. There were 39 beaches that reported a total of 57 exceedances

According to the 2014 Integrated Report, approximately 6,700 acres of inland lakes and reservoirs are not supporting designated uses due to excessive nutrients; 4,300 acres are not supporting designated uses due to excess algal growth; and 2,000 acres are not

supporting designated uses due to pathogens. Detailed designated use support summaries for Michigan's Inland lakes are available in the 2014 Integrated Report.

In 2007, the MDEQ assisted the USEPA with the National Lakes Assessment survey. The MDEQ led efforts to monitor 50 of Michigan's inland lakes with a surface area greater than 10 acres. These lakes were selected randomly and assessments included chemical, biological, and physical indicators. The survey indicated that 86% of Michigan's lakes supported healthy communities while only 3% were in poor biological condition. Approximately 84% of Michigan's lakes were low (oligotrophic) to moderately (mesotrophic) productive and less than 4% exhibited excessive biological productivity (hypereutrophic). However, physical impacts to lakeshore and littoral habitats were found to be the greatest stressors for lakes in Michigan with nearly 40% of Michigan's lakes in poor condition. The National Lakes Assessment survey was repeated in 2012 and the USEPA's final report is not yet available.

2.2.3 Rivers and Streams

Michigan has an estimated 76,439 total river miles identified in the U.S. Geological Survey's (USGS) National Hydrography Database. 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 (Figure 2.1). Factors used to delineate ecoregions include climate, soils, vegetation, land slope, and land use. This framework provides information on the environmental characteristics that tend to occur within each ecoregion. In order by size (largest to smallest area), the five ecoregions in Michigan are Southern Michigan/Northern Indiana Till Plains, Northern Lakes and Forests, North Central Hardwood Forests, Huron-Erie Lake Plains, and Eastern Corn Belt Plains.

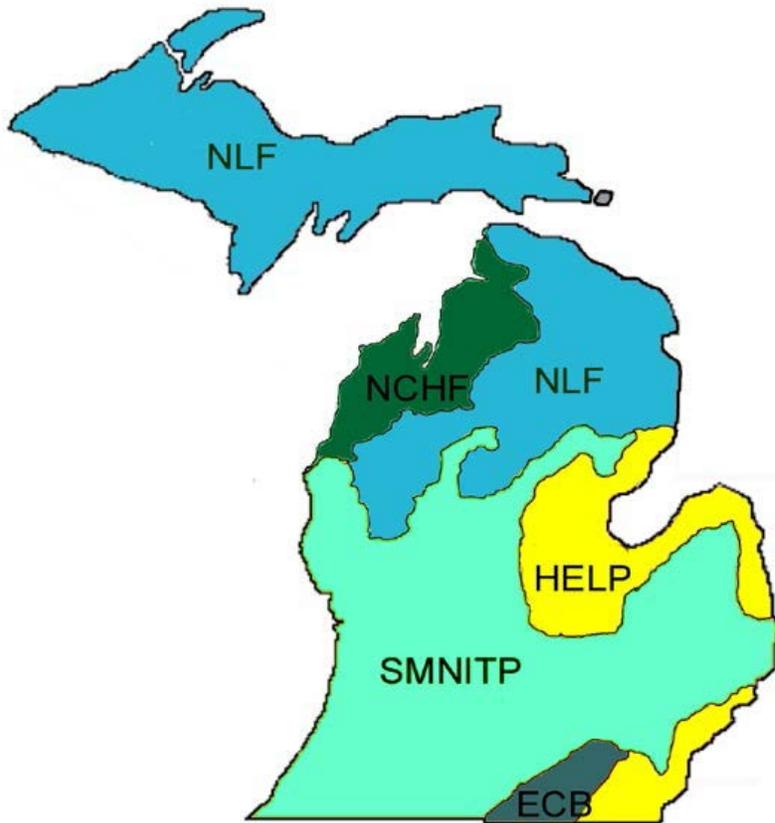
Rivers in the Northern Lakes and Forests and North Central Hardwood Forest ecoregions tend to support coldwater fish within at least a portion of their systems. These rivers commonly have relatively small watersheds, high relief topography, substantial groundwater inputs, and are naturally low in productivity. Most rivers in the Northern Lakes and Forests ecoregion are perennial, often originating from lakes or wetlands. Although relatively free of sediment, surface waters in this ecoregion often have a characteristic brownish color because of elevated concentrations of dissolved organic material, including tannins and lignins. In the North Central Hardwood Forests ecoregion, river flow is highly variable, being entirely intermittent in some portions of the ecoregion and entirely perennial in others. These rivers typically drain soils with much poorer nutrient content than in bordering ecoregions to the south.

Rivers in the Southern Michigan/Northern Indiana Till Plains ecoregion are generally of good quality in the headwaters. This ecoregion is drained predominantly by perennial rivers. Such rivers are typically sluggish and are bordered, often extensively, by wetland tracts. Drainage ditches and channelized rivers have been a common solution to assist drainage of areas that are too wet for development or agriculture.

Upland features related to poor soil drainage heavily influence the rivers in the Huron-Erie Lake Plains and Eastern Corn Belt Plains ecoregions. Broad and nearly level lake plain is crossed by beach ridges and low moraines, which has resulted in the formation of poorly drained soils. More than half of the rivers in the Huron-Erie Lake Plains ecoregion are intermittent, and river flows are commonly runoff-dependent. In addition to the construction of numerous drainage ditches, the headwaters of many rivers are extensively channelized

for quicker drainage and to improve upland field conditions. About half of the rivers in the Eastern Corn Belt Plains ecoregion are perennial and many have been channelized to assist soil drainage. This ecoregion is almost entirely farmland, and river quality is influenced by increased soil and water runoff from agricultural land uses.

Detailed designated use support summaries for Michigan's rivers and streams are available in the 2014 Integrated Report. Key findings for rivers and streams include:



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

Figure 2.1. Ecoregions of Michigan (adapted from Omernick and Gallant, 1988).¹

- Approximately 80 percent of the river miles assessed support the other indigenous aquatic life and wildlife designated use. Habitat alterations are a common cause of this designated use impairment.

¹ Omernick, J. and A. Gallant. 1988. Ecoregions of the Upper Midwest States. USEPA, Envir. Res. Lab. Publication #EPA/600/3-88/037.

- The majority of the river miles that are not supporting one or more designated uses indicated by poor biological communities have been highly modified by channel maintenance activities carried out primarily by Michigan's county drain commissions. These channel maintenance activities (including channel straightening, dredging, riparian vegetation removal, and snag removal) may result in poor biological communities caused by non-pollutants (habitat and/or flow alterations).
- Of the approximately 7,733 river miles assessed for the total body contact recreation designated use, about 1.4% were determined to support this designated use.
- Over 4,100 river and stream miles are not supporting designated uses due to sedimentation/siltation, oxygen depletion, nutrients, and excess algal growth.

2.2.4 Wetlands

Michigan's aquatic resources include approximately 6,465,109 acres of wetlands, some of exceptional quality and rarity. The MDEQ administers a statewide wetland regulatory program. It also manages Michigan's wetland resources through public education, with programs to encourage wetland preservation and restoration, by cooperating with governmental and nongovernmental agencies to encourage the evaluation and management of wetlands on a local and watershed basis, and through a developing monitoring and assessment program.

Estimates of wetland losses since European settlement range from 35 percent, based on the Michigan Natural Features Inventory pre-settlement inventory, to 50 percent, based on the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory. Sources of wetland loss include permitted activities; unpermitted activities (i.e., violations of state and federal law); agricultural and silvicultural practices, which are exempt under state and federal law; the loss of small, isolated wetlands that are not under state or federal jurisdiction; natural processes (e.g., beaver activity); and indirect effects (e.g., alteration of drainage networks due to urbanization). Wetland acreage may increase for some of the same reasons (e.g., changes in drainage pathways). However, most wetland gains are attributed to voluntary wetland restoration projects, pond construction, and mitigation for permitted impacts.

Michigan's WQS apply to all surface waters of the state, including wetlands. However, some criteria may not be applicable to wetlands. For example, a highly productive wetland with abundant vegetation in shallow water and high organic content in the sediment may naturally exhibit low dissolved oxygen levels in the water column. Based on Rule 100(10) (R 323.1100[10]) of the Part 4 Rules, WQS, promulgated under Part 31, Water Resources Protection, of the NREPA, use attainability studies are allowed for certain wetlands to address this situation.

Michigan's wetlands are currently assessed for designated use support on an as-needed basis. Designated use support summaries are available in the 2014 Integrated Report.

2.2.5 Groundwater

While Michigan has abundant, high quality surface water resources, slightly less than half of all residents rely on groundwater for their drinking water supply. Approximately 2.6 million Michigan residents are served by privately owned wells and 1.7 million residents are served by public water systems that rely on groundwater. In addition, a wide range of commercial interests ranging from agriculture, manufacturing, and mining to tourism require high quality

groundwater. Michigan Industries withdraw 180 million gallons of groundwater daily from on-site wells and over 100 million gallons of groundwater are withdrawn daily in Michigan for irrigation.

Agricultural practices, industrial discharges, and waste disposal practices can lead to groundwater contamination. Michigan's groundwater report to congress noted that while there has been some water quality degradation, groundwater quality overall remains very good. Groundwater contamination has resulted in the need to replace approximately 8,000 drinking water wells but these numbers are relatively small compared to the total number of wells supplying drinking water to residents of the state.

Michigan's groundwater is protected through a number of regulatory and non-regulatory programs, several of which are described in Appendix 1.

CHAPTER 3: WATERSHED MANAGEMENT

GOAL I: Develop and Implement WMPs to Restore and Protect Priority Watersheds

NPS pollution threats and impacts on water quality are diverse, widespread, and often interconnected. Each water body has distinct water quality characteristics, issues, and stakeholders. A watershed approach, which provides a flexible framework for managing water quality within hydrologically defined areas, is viewed as the most effective means to address water quality concerns on a comprehensive basis. This approach requires active stakeholder involvement, sound scientific analysis and quantification of causes and sources of water quality problems, identification of measurable water quality goals, and specific actions needed to reach the watershed goals. Typically, a planning process takes place first, which identifies an overall management strategy with implementation options that will achieve the water quality goals. The process is meant to be iterative, holistic, hydrologically defined, integrated, and collaborative.

Michigan's NPS Program approves plans that focus on measurable improvements in water quality leading to restoration of impaired waters and protection of high quality waters. Additionally, Michigan's approach encourages identification of local desired uses (e.g., public access, hiking trails, wildlife corridors), in addition to threats and impairments to state designated uses. Michigan's NPS Program has historically followed a policy of getting as many local organizations involved in addressing water quality issues in as many watersheds as possible, thereby leveraging scarce dollars, resources, and local interest to obtain as much water quality improvement or protection activity as possible throughout Michigan. Before state or federal NPS grant funds will be given to implement practices in a watershed, the project must be supported by an approved plan developed via a watershed approach.

The local community approach to addressing water quality is often initially prompted by a single watershed-specific issue such as flooding, bank erosion, increasing development pressure, recreation, aesthetics, or protection of high-quality waters. The specific BMPs proposed to address the identified problem often end up being those for which grant funding is available. As a result, more effective BMPs, or higher priority activities, may be overlooked or not considered. In these cases, the MDEQ generally seeks to encourage local efforts to address the problem identified, but will work with the community to expand their interest and effort into a comprehensive and coordinated watershed level planning project that identifies and prioritizes all water quality issues within the larger watershed.

Objective I-1: Prioritize watersheds for development and implementation of WMPs and implementation of NPS pollutant control activities

The NPS Program recognizes the benefits of distributing resources broadly in an effort to build local capacity and encourage "local ownership" of efforts to restore and protect watersheds. In many cases, small investments can serve as seed money or catalysts for larger efforts with multiple benefits. The NPS Program also acknowledges the benefits of targeting resources to simultaneously correct multiple threats in a single watershed. Many believe this approach provides the best opportunity to obtain measurable on-site improvements in water quality.

There are a variety of issues that need to be considered when deciding which approach, or combination of approaches, provides the best potential for protecting or restoring water quality throughout the state, including the following:

- Limited state and federal resources available to assist in the implementation of WMPs.
- Varying levels of local interest and participation.
- A wide spectrum of existing water quality conditions ranging from nearly pristine water bodies to those that are severely degraded.
- Differences in the complexity and magnitude of water quality issues.
- Specific local, state, and federal goals for many watersheds.

As a result, priorities are needed to not only guide where protection and restoration resources will be directed in the future, but to help decide how those resources will be provided. Again, it is important to note that watershed prioritization will not necessarily preclude conducting work in non-priority watersheds, but it will help focus overall efforts of the NPS Program.

The NPS Program gives primacy to an area by designating it as a priority watershed or targeted water body. The NPS program focuses resources on priority watersheds. A priority watershed's increased focus may come in the form of grants, technical assistance, monitoring, education and outreach, or enforcement activities. Priority watersheds are reviewed with each update to the NPS Program Plan.

Pass-through grant proposals from targeted water bodies receive a higher priority for funding. Targeted water bodies are typically a subset of the priority watershed list. Water bodies may be targeted for restoration or preservation activities. Targeted water bodies are updated every year and distributed with the pass-through grant Request for Proposals (RFP).

The NPS Program developed a prioritization process to assist with the selection of priority watersheds and targeted water bodies. The prioritization process allows for watersheds to be ranked based on (1) the potential to restore impaired water bodies; and (2) attributes worthy of protection in high quality watersheds. A secondary goal of this process is to maintain datasets to share with stakeholders for inclusion in the development of WMPs. Based on a review of several prioritization processes, the NPS Program selected USEPA's Recovery Potential Screening Tool (RPST) to prioritize Michigan's watersheds. The RPST is meant to provide objective criteria for staff to evaluate when determining priority watersheds and targeted water bodies and it serves to enhance, not supplant, best professional judgment.

The current prioritization process uses the ten-digit Hydrologic Unit Codes (HUC) as the unit of analysis. Staff evaluated and compiled 115 metrics that fall into the following three general categories: ecological indicators, stressor indicators and social context indicators. The following subset of metrics was selected to populate the RPST in prioritizing Michigan's watersheds:

Ecological Indicators:

- Percent of watershed forested
- Percent of watershed wetland
- Percent of historic wetland remaining
- Percent of 150 meter river buffer in natural landforms
- Percent of 150 meter lake buffer in natural landforms
- Percent of 100 meter wetland in natural landforms

Stressor Indicators:

- Percent of watershed in agricultural landforms
- Percent of watershed in urban landforms
- Percent of watershed tiled
- Watershed road density
- Change in the number of housing units from 1990 to 2000
- Number of septic systems within the watershed
- Percent of river miles with a non-attainment listing
- Percent of 150 meter river buffer in anthropogenic landforms

Social Context indicators:

- Jurisdictional complexity of the watershed
- Percent of watershed in protected lands
- Percent of river miles within the Natural or Scenic Rivers Programs
- Percent of river miles covered by a TMDL
- Number of jurisdictions with a point-of-sale on-site septic ordinance

The RPST normalizes the value of each metric, with the highest value adjusted to 1 or 100 and the remaining values adjusted proportionally. Summary scores are calculated for each general category, as well as a combined score of the three. Resulting combined summary scores are visualized as bubble plots with the x axis representing the stressor summary score, the y axis representing the ecological summary score, and the bubble size representing the social summary score (Figure 3.1). Median scores of the ecological and stressor summary scores are established on the plot, dividing it into four quadrants. The highest quality watersheds have low stressor summary scores and high ecological summary scores and reside in the upper left quadrant of the plot. Impaired watersheds in the upper left and right quadrants have the highest potential for restoration. Unimpaired watersheds in the upper left quadrant are the highest priority for protection efforts.

Strategy:

I-1-A: The NPS Program staff will refine the watershed prioritization process and periodically update the lists of priority watersheds.

Short-Term Actions:

I-1-A-1: By March 30, 2016, NPS Program staff will evaluate and determine a scalable unit of analysis and examine the incorporation of ecoregions into the next prioritization process update.

I-1-A-2: By September 30, 2016, NPS Program staff will pilot the U. S. Department of Agriculture's (USDA) Agricultural Research Service GIS analysis for siting BMPs in a subwatershed and evaluate the feasibility of incorporating the analysis into the NPS Program's prioritization process.

I-1-A-3: By December 31, 2016, NPS Program staff will work with the Michigan Inland Lake Partnership (MILP) to identify ecological metrics, stressor metrics and social metrics relevant to inland lakes that can be incorporated into the prioritization process.

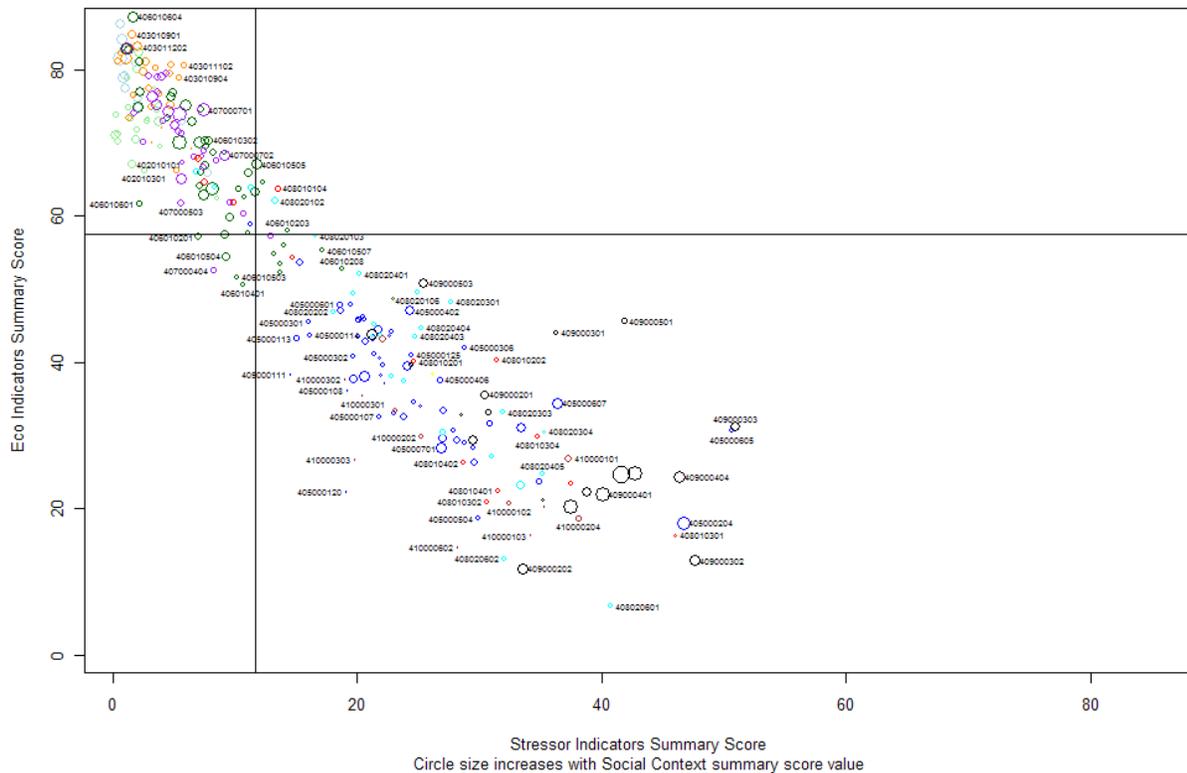


Figure 3.1. Plot of summary scores for Michigan’s watersheds color coded by sub-basin.

I-1-A-4: By December 31, 2016, NPS Program staff will identify and incorporate ecologic metrics, stressor metrics, and social metrics relevant to prioritizing groundwater resources.

I-1-A-5: By September 30, 2017, NPS Program staff will test a project to use GIS to identify The Nature Conservancy’s active river area and evaluate the feasibility of incorporation it into the NPS Program’s prioritization process update.

I-1-A-6: By June 30, 2018, NPS Program staff will evaluate additional factors, including the following, to determine if usable and scalable metrics can be developed:

- Ability to show in-stream water quality improvement.
- Ability to demonstrate changes in public awareness of NPS problems or changes in public behavior to address water quality problems.
- Water quality monitoring data.
- Aquatic community types and populations.
- Uniqueness of a particular water body type in specific geographic areas of the state (i.e., regional significance of the resource).
- Recreational use of the water body.
- Importance of the water body to the state (e.g., the Little Manistee River is the only river in the state where steelhead eggs are collected for the state fish stocking program, which also provides steelhead for stocking programs in other Midwestern states).
- Importance of the water body to the local community.

- Local community interest and their ability to coordinate and implement protection or restoration actions.
- Type and number of other state and federal agencies currently participating, or anticipated to participate, in protection or restoration actions.
- Rate of ongoing land development and urban sprawl in a watershed, as well as the status and effectiveness of local programs underway to address these issues.
- Financial resources available.
- Technical resources available.

I-1-A-7: By, December 31, 2018, NPS Program Staff will update the Program's prioritization process.

I-1-A-8: NPS staff will update the list of priority watersheds with each update of the NPS Program Plan.

I-1-A-9: NPS staff will update the list of targeted water bodies each year with the request for proposals (RFP).

Strategy:

I-1-B: NPS Program staff will continue to document the approach used to identify priority watersheds.

Short Term Action:

I-1-B-1: By July 31, 2019, NPS Program Staff will develop a report documenting the process used to prioritize watersheds.

Objective I-2: Provide information, guidance and technical assistance to stakeholders working to develop and implement WMPs.

Stakeholders surveyed as part of the NPS re-engineering process identified technical assistance as a high priority activity of Michigan's NPS Program. Stakeholders are especially interested in technical assistance related to development of WMPs and implementation of priority activities to restore and protect water quality.

Strategy

I-2-A: NPS Program staff will develop technical updates to the state's "*Developing a Watershed Management Plan for Water Quality*" (i.e., the Blue Book) watershed management planning guidance document. As an interim step, technical "white papers" will be developed on individual topics as appropriate.

The "Blue Book" update will ultimately better incorporate the following:

- The USEPA's nine minimum elements, including the new nine element's sub-criteria developed as part of the Tetra Tech, Inc. watershed planning Section 319 project.
- Land use planning, zoning, and ordinances, particularly relevant recommendations of the Land Use Leadership Council.
- Local funding options.

- Hydrology and geomorphology.
- Market awareness (as it relates to information and education target audiences for outreach activities).
- Role of point source loads.
- TMDL load allocations.
- Involving representatives from appropriate state and local programs.
- Expected level of detail given watershed size and complexity.
- Time period for which the plan is valid (many plans are written to cover a ten-year period) given that the MDEQ plan approvals are not for an indefinite period.

Short-Term Actions:

I-2-A-1: By October 31, 2015, NPS Program staff will develop a draft white paper outlining what constitutes a technical revision to a WMP.

I-2-A-2: By October 31, 2015, NPS Program staff will develop a draft white paper outlining the process for revising and updating WMPs.

I-2-A-3: By December 31, 2017, NPS Program staff will develop a draft template of a presentation which will be given to grantees and stakeholders at the beginning of all new planning projects. The presentation will outline the NPS Program's expectations for the project to:

- Identify the primary goals of the WMP as the restoration and protection of designated uses and meeting relevant TMDL load allocations.
- Identify impaired waters.
- Link pollutant/sources/causes/ to specific water bodies or reaches.
- Conduct appropriate field inventories based on the pollutants of concern.
- Use appropriate methods for calculating pollutant loads.
- Define critical and priority preservation areas.
- Tie action to addressing specific use impairments, degraded water quality conditions, or threats to water quality.
- Use identified numeric criteria for loads reductions targets based on WQS or informal criteria identified by the NPS Program.

I-2-A-4: By March 31, 2016, NPS Program staff will develop a draft white paper on watershed characterization within a management plan.

I-2-A-5: By October 31, 2015, the NPS Program's monitoring coordinator will develop Quality Assurance Project Plan (QAPP) guidance for field inventories.

I-2-A-6: By October 31, 2016, NPS Program staff will develop a draft white paper outlining the appropriate use and approaches for using the Spreadsheet Tool for Estimating Pollutant Load model to develop WMPs.

Strategy:

I-2-B: Look for opportunities to build and sustain watershed management capacity at the local level. Capacity in this sense includes the number of people and organizations involved in addressing NPS issues in a watershed; the available funding and technical support; public

expectations and political will; and commitment to continual improvement and protection of water quality.

- Work with watershed groups to develop sustainable funding strategies and mechanisms for watershed management.
- Encourage watershed groups developing or conducting volunteer water quality monitoring to seek coordination and assistance through the Michigan Clean Water Corps (MiCorps) Volunteer Monitoring Program.
- Where no watershed planning effort exists and the NPS Program has identified a need, bring together key partners and facilitate a discussion to promote a watershed planning effort.
- Assist local watershed planning leaders with assembling diverse and representative steering committees.
- Participate on watershed project steering committees and continue to serve on the committees following completion of NPS-funded grant projects.
- Provide networking assistance related to NPS pollution control and establishing working partnerships.
- Encourage interstate partnerships and participation on bi-state watershed projects where appropriate.

Short-Term Actions:

I-2-B-1: NPS Program staff will provide technical assistance to local groups using the NPS watershed prioritization results to manage the degree of technical assistance provided. Topics on which to provide assistance could be watershed management, land use, ordinance development, watershed strategic planning, stream protection and restoration, and market-based awareness.

I-2-B-2: NPS staff will assist with TMDL development for NPS impacted watersheds according to the WRD TMDL prioritization plan and associated schedules. Assistance will include helping identify NPS pollutant sources to be addressed to meet TMDL load allocations.

Strategy:

I-2-C: The NPS Program will continue to improve its statewide use of geospatial analytic tools and data sets to characterize and prioritize watersheds. These data will be used to assist the NPS Program and its stakeholders in identifying potential sources of NPS Pollutants.

Short-Term Actions:

- I-2-C-1: Continue to have a core group of NPS staff to:
- a. Serve as a point of contact with other agencies, departments, divisions, and WRD programs regarding GIS.
 - b. Review and evaluate NPS projects use of GIS and geospatial data, recommending modification as appropriate.
 - c. Provide spatial and temporal tracking of NPS projects.
 - d. Provide technical assistance to program staff, grantees, stakeholders, and consultants on acceptable geospatial datasets, tools, and evaluation techniques.
 - e. Promote the acquisition of key geospatial data sets.

I-2-C-2: By October 31, 2015, NPS Program staff will evaluate the current status of light detection and ranging (LIDAR) data available in Michigan, determine cost to attain statewide coverage, and determine what role the NPS Program can play in its acquisition.

I-2-C-3: By September 30, 2016, NPS Program staff will evaluate the USDA's Agricultural Research Service GIS analysis for siting BMPs in a subwatershed and assess the feasibility of incorporating this approach in WMP development guidance.

I-2-C-4: By September 30, 2017, NPS Program staff will evaluate The Nature Conservancy's active river area and GIS application and evaluate the feasibility of incorporation it into WMP development guidance.

Strategy:

I-2-D: NPS Program staff will develop and evaluate field inventory approaches for agricultural lands for use in the development of WMPs.

Short Term Action

I-2-D-1: By September 30, 2016, NPS Program staff will develop and evaluate a field level agricultural survey of the Lapointe Drain Subwatershed. This will include identifying:

- Spring and fall tillage practices and crops;
- Fields adjacent to water bodies;
- Presence of buffer strips;
- Livestock operations; and
- Susceptibility of soils within particular fields to sheet and rill erosion.

Objective I-3: Review and approve WMPs

The MDEQ formally approves NPS WMPs that: (1) demonstrate sound scientific evaluation of the sources, causes, and mitigation of pollutants impairing or threatening a water body's designated uses; and (2) provide a prioritized action plan with timelines and provisions for documenting water quality improvement and protection; (3) are considered current only for the effective life of the plan, which generally corresponds to the task implementation timeline; and (4) meet the USEPA's 9 elements and Michigan's Clean Michigan Initiative (CMI) criteria. The MDEQ approval allows activities identified in WMPs to be eligible for funding consideration under the state CMI bond program, the federal Section 319 program, or both.

In 2007, the NPS Program provided guidance and training to MDEQ staff who review NPS WMPs under the CMI or Section 319 programs. The guidance materials and training were provided by Tetra Tech, Inc. Since that time, NPS Program staff has used these materials to review and approve WMPs. However, the NPS Program continues to provide additional guidance and training as new issues and tools arise.

Strategy:

I-3-A: All NPS WMPs submitted for MDEQ approval from throughout the state will be evaluated consistently with respect to the criteria established for the relevant program(s) for which approval is sought, while accounting for differences in watershed size, land use, and the complexity of relevant water quality issues.

Short-Term Actions:

I-3-A-1: NPS Program staff will review draft WMPs against CMI and Section 319 criteria. Detailed comments will be provided when plans are determined to be deficient. Approval letters will be signed by District Supervisors or the NPS Unit Chief when plans are determined to meet appropriate criteria.

I-3-A-2: NPS Program staff will continue to provide guidance and training to all MDEQ staff who review NPS WMPs for approval under the CMI or Section 319 criteria. The guidance will include the following:

- Criteria described in state administrative rules for approval of plans under the CMI bond program.
- A description of the USEPA nine minimum elements of watershed planning required for Section 319 approved plans.
- Narrative documents that identify the necessary level of information needed to satisfy each of the criteria for both programs, accounting for size and complexity differences among watersheds.

Objective I-4: Coordinate TMDL development and implementation with NPS WMP development and implementation.

TMDLs are required by the federal CWA for most water bodies that do not meet WQS due to a pollutant. A TMDL is developed by calculating the maximum daily load of a pollutant that a water body can assimilate and meet WQS. This load is then allocated to point sources, NPS, and a margin of safety reserve (to account for technical uncertainties).

TMDLs are typically developed by the MDEQ and approved by the USEPA. Public involvement is a key aspect of the development process and is particularly important during discussion of allocation and implementation issues. Experience has demonstrated that participation by local communities and landowners leads to more representative TMDLs that can be more readily implemented.

TMDLs are typically implemented through existing programs, such as National Pollutant Discharge Elimination System (NPDES) permits for point source discharges and voluntary, incentive-based NPS control programs, to achieve the necessary pollutant reductions. The MDEQ and USEPA have an interest in better integrating NPS pollutant control activities with TMDL development and implementation activities.

Strategy:

I-4-A: The WRD will work to better coordinate TMDL development and implementation with NPS Program implementation.

Short-Term Actions:

I-4-A-1: The WRD will continue to place a priority on pass-through grant projects that address TMDL load reductions targets in water bodies that are not attaining designated uses due, at least in part, to NPS causes.

I-4-A-2: NPS Program staff have reviewed approved TMDLs and developed a list of significant NPS issues. This information along with the WRD's TMDL prioritization plan will be considered when prioritizing NPS watersheds and selecting pass-through grant projects.

I-4-A-3: NPS pass-through grant projects that propose water quality monitoring to determine the status of designated uses will be required to meet or exceed the State's sampling protocols for 303(d) listing/delisting so the state can make a decision on use support using project data. This requirement does not apply to other water quality monitoring that might be proposed as part of the project, such as pollutant source identification monitoring and some types of project effectiveness monitoring.

I-4-A-4: MDEQ NPS and TMDL staff will work with USEPA NPS and TMDL staff to develop a hybrid TMDL/WMP for Bad Axe Creek by March of 2016. The intent of this project is to develop a plan that meets the needs of both programs and serves as a model for other watersheds.

Objective I-5: Protect high quality waters from NPS impairments.

Michigan is blessed with an abundance of high quality waters as evidenced by the number of water bodies meeting all designated uses as described in the 2014 Integrated Report (when impairments due to atmospheric sources of Polychlorinated biphenyl [PCB] and mercury are excluded). Michigan's NPS Program has long recognized the benefits of long-term protection of high quality watersheds especially since the cost of restoration is often much higher than the cost of protection. The NPS Program has placed a priority on long-term protection projects funded through the pass-through grant process, prioritizes water bodies for protection, and developed measures of success related to long-term protection of high quality waters (See Chapter 9).

Strategy:

I-5-A: The NPS Program will continue to place a priority on the protection of high quality waters and watersheds.

Short-Term Actions:

I-5-A-1: The NPS Program will support pass-through grant projects to limit the contribution of pollutants to high quality waters due to land development. Also, the NPS Program will estimate and report (via Grants Reporting and Tracking System [GRTS]) sediment and nutrient load reductions that are prevented from entering high quality waters due to long-term protective measures such as conservation easements, ordinances or other protective actions that limit development of riparian land.

I-5-A-2: The NPS Program will place a priority on grant funded projects to restore and protect priority wetlands. Landscape Level Wetland Functional Assessment (LLWFA) will be used to prioritize grant funding for wetland restoration and protection projects. In addition, the NPS Program will maximize opportunities to use Farm Bill Programs and Section 319 WMPs to restore and protect wetlands.

I-5-A-3: The NPS Program will look for opportunities to work with USEPA staff on their "Healthy Waters Initiative." Specifically, the Program will look for opportunities to develop NPS Program goals and measures of effectiveness associated with protecting the ecological health of high quality waters and watersheds.

Objective I-6: Protect Great Lake coastal areas from NPS pollution and causes of impairment.

The NPS Program has been working with Michigan's Coastal Zone Management Program, the National Oceanic and Atmospheric Administration (NOAA) and USEPA to develop a Coastal Nonpoint Management Plan (CNMP) to meet the requirements of Section 6217 of the Coastal Zone Reauthorization Amendments of 1990 and effectively address NPS pollution and causes of impairment in coastal watersheds along the Great Lakes and Connecting Channels. Michigan's original CNMP was reviewed by the USEPA and NOAA and approved with conditions. Work among federal and state partners to address the remaining conditions continues.

Strategy

I-6-A: The NPS Program will continue to work with Michigan's Coastal Zone Management Program, NOAA and USEPA to develop and implement an approvable CNMP.

Short-Term Action:

I-6-A-1: The NPS Program will lead efforts to develop a CNMP and obtain NOAA and USEPA approval by June 30, 2019.

Objective I-7: Protect groundwater from NPS pollution and causes of impairment.

Michigan's groundwater is used by almost half of the population for drinking water and provides base flow for many of Michigan's rivers. Protecting this resource from NPS pollution is a priority for the Program. The connections between groundwater and surface water can be complex and the potential impacts to groundwater must be considered prior to implementation of many BMPs intended to restore or protect surface water.

In addition, the effectiveness of BMPs implemented to restore or protect surface water can often be measured relatively quickly compared to BMPs intended to improve groundwater. This lag time must be considered prior to assessing BMP effectiveness.

Michigan's NPS Program will not fund groundwater restoration or protection efforts that are being addressed through other groundwater protection programs. In addition, the NPS Program will not fund infiltration practices that exacerbate groundwater contamination from contaminated sites listed under Part 201, Environmental Remediation, or Part 213, Leaking Underground Storage Tanks, of the NREPA. NPS Unit Staff will provide technical assistance in regards to proper design and location of infiltration practices.

Strategy:

I-7-A: Provide technical assistance to NPS Program Staff, communities, universities and watershed groups regarding groundwater issues.

Short-Term Actions:

I-7-A-1: Upon request, NPS Unit staff will assist with the development and review of groundwater related portions of WMPs developed by stakeholders.

I-7-A-2: Upon request, NPS Unit staff will help stakeholders to develop pass-through grant proposals to implement groundwater restoration or protection recommendations from approved WMPs.

I-7-A-3: Upon request, NPS Unit staff will provide assistance to stakeholders working to develop or implement BMPs that include infiltration practices or may otherwise impact groundwater resources.

I-7-A-4: NPS Unit staff will review all 319 and CMI proposals that include infiltration practices and identify those practices that have the potential to negatively impact groundwater resources.

I-7-A-5: By October 31, 2016, NPS Unit Staff will review existing BMPs included in the *MDEQ Best Management Practice Manual*; recommend changes as appropriate and identify other groundwater related BMPs that may be added to the Manual.

Objective I-8: Protect inland lakes and reservoirs from NPS pollutants and causes of impairment.

As noted in Chapter 2, Michigan has approximately 46,000 inland lakes and reservoirs with a surface area greater than 0.1 acres (approximately 870,000 inland lake acres total). Less than 1 percent (6,700 acres) of inland lake and reservoir acres have designated use impairments due to nutrients; less than 1 percent (4,300 acres) have designated use impairments due to excessive algal growth; and less than 1 percent (2,000 acres) have designated use impairments due to pathogens. However, the 2007 National Lake Assessment Survey found that the greatest stressor for lakes larger than 10 acres was physical impacts to lakeshore and littoral habitats with nearly 40 percent of Michigan lakes rated poor (see Chapter 2 for additional information).

Michigan's inland lakes are typically supported by motivated stakeholder groups interested in restoration and preservation activities such as developing management plans; participating in Michigan's Cooperative Lakes Monitoring Program; or participating in programs such as the Michigan Natural Shoreline Partnership (MNSP) and MILP. The NPS Program will continue to support the efforts of lake associations and other stakeholder groups to restore and protect inland lake water quality from NPS pollutants and causes of impairment.

Strategy:

I-8-A: NPS Program staff will work with stakeholders such as the MNSP and the Michigan Inland Lakes partnership to develop and promote educational, planning and management tools to assist local communities and citizens to protect their lakes.

Short-Term Actions:

I-8-A-1: By March 31, 2016, develop a guidebook and training program for local officials regarding protection of inland lakes.

I-8-A-2: By March 31, 2017, work with inland lake partners to create an action plan for assisting lake associations to develop lake management plans.

I-8-A-3: By January 30, 2016, NPS staff will work with MNSP partners to develop the first phase of an on-line based "Michigan Shoreline Stewards" program to encourage and recognize

the efforts of lakeshore property owners to protect their lake through natural shoreline restoration and protection.

I-8-A-4: NPS Program staff will continue to work with inland lake partners to educate property owners on the benefits of natural shorelines. Activities will include expanding the “Shoreline Educator Network” to provide educational information to shoreline property owners.

CHAPTER 4: SOURCE CONTROL STRATEGIES

Goal II: Eliminate or reduce priority NPS pollutants and causes of impairment.

The primary NPS pollutants, causes of impairment and threats to high quality waters addressed by Michigan's NPS program are:

- Nutrients and sediments from diffuse sources or erosion including agricultural runoff, un-permitted storm water run-off, erosion from road stream crossing and erosion due to hydrologic alteration of streams.
- Bacteria from NPS sources such as on-site septic systems or other un-permitted decentralized wastewater treatment systems, non-permitted agricultural sources, pet waste and in some circumstances wildlife (e.g., concentrated waterfowl at beaches).
- Hydrologic alterations or other flow regime alterations caused by impervious surfaces, channel alterations, or improperly designed road stream crossings.
- Direct habitat alterations that cause designated use impairments.

In addition, NPS threats and causes of impairments that are relatively minor on a statewide basis may be locally important within individual watersheds and best addressed through implementation of a WMP. For example:

- Impairments from legacy mining operations that were never covered by permits are a priority in some Upper Peninsula watersheds;
- Impairments from legacy forestry operations that were never covered by permits are a priority in some Northern Michigan watersheds; and
- Alterations to natural stream morphology caused by dams and dam failures are a priority in some watersheds.

Michigan's NPS Program does not deal with all NPS threats to Michigan's waters. For example, long-range atmospheric transport of persistent, bioaccumulative, toxic pollutants such as mercury, PCBs, dioxins and furans, chlordane, and other banned and canceled pesticides are beyond the scope of this program. Mercury and PCB deposition are being addressed in statewide TMDLs for Michigan's inland waters. In addition, contaminated sediment issues are better addressed by other state and federal programs.

Objective II-1: Develop, update and encourage the use of BMPs to eliminate or control NPS pollutants and causes of impairments.

The NPS Program promotes the use of BMPs to control NPS pollution. In addition, the NPS Program continually supports the development and implementation of new BMPs. Typically, BMPs are structural, vegetative, or managerial conservation practices that reduce or prevent detachment, transport, and delivery of NPS pollutants to surface or groundwater. The NPS Program relies on several BMP manuals and actively works to update these manuals and keep information current.

Agricultural BMPs: The NPS Program utilizes the USDA, Natural Resources Conservation Service (NRCS), [Field Office Technical Guide](#) for BMPs intended to reduce or prevent detachment, transport, and delivery of NPS pollutants from agricultural sources. In addition, the NPS Program works with the NRCS and other partners to design and test new BMPs to control agricultural inputs.

Strategy:

II-1-A: Continue to work with the NRCS, the Michigan Department of Agriculture and Rural Development (MDARD), and others to identify and develop new agricultural BMP standards and specifications, and incorporate the cost effectiveness of implementing agricultural conservation practices in Michigan's watersheds.

Short-Term Actions:

II-1-A-1: The NPS Program will continue to work with the Michigan Livestock Wastewater Workgroup to develop effective and affordable practices to address milking parlor/milk house wastewater, and polluted runoff from areas such as feedlots, and silage storage bunkers. The workgroup consists of partners from the NRCS, Michigan State University (MSU), MDARD, Michigan Milk Producers Association, Clinton Conservation District and the Michigan Land Improvement Contractors of America. The goal is to develop standards for the new practices that can be incorporated into the NRCS *Field Office Technical Guide* and implemented with cost-share through Farm Bill programs.

Forestry BMPs: The NPS Program worked with the Michigan Department of Natural Resources (MDNR), Forestry Division, to develop the [Sustainable Soil and Water Quality Practices on Forest Land](#). This document identifies BMPs intended to reduce or prevent NPS pollution resulting from forestry practices and describes responsible actions necessary to maintain high water quality.

Strategy:

II-1-B: The NPS Program will continue to look for opportunities to work with the MDNR, Forestry Division, to develop new Forestry BMPs.

Urban BMPs: The NPS Program led efforts to produce the [MDEQ Best Management Practice Manual](#) (formerly titled *Guidebook of Best Management Practices for Michigan Watersheds*). This document is a compilation of BMPs that can be used to address NPS pollution from a variety of urban settings including construction sites and large recreational areas. The NPS Program will continue to look for opportunities to develop and update BMPs. The NPS Program intends to review 20 percent of all existing BMP Manual content with the goal that no portion of the BMP Manual will ever be more than five years old, without at least having been reviewed.

Strategy:

II-1-C: Update and maintain the *MDEQ Best Management Practice Manual* as new urban BMPs are developed or as existing ones are revised.

- The NPS Program will continue to work with Part 91, Soil Erosion and Sedimentation Control (SESC), Storm Water Program staff and other partners to identify, develop, and maintain new BMPs, standards, and specifications.

- The NPS Program will compile existing research focusing on the cost effectiveness of select urban conservation practices such as cluster development, low impact development (LID), and selected urban BMPs over traditional practices.

Short-Term Action:

II-1-C-1: The NPS Unit will, in partnership with NPS engineers, WRD wet-weather staff, and external partners, continue updating the *MDEQ Best Management Practice Manual*. By October 1 of each year, at least 20 percent of the existing BMPs will be reviewed and either updated and republished on the NPS Program Web site, or, removed from the Manual.

The impact of climate change on BMPs

Climate change has the potential to exacerbate NPS related sources and causes of impairments. In addition, climate change has the potential to impact the effectiveness of BMPs. Climate change is addressed in more detail in Section II-12. That section includes a strategy and short-term actions to address the effectiveness of BMPs.

Objective II-2: Address causes of hydrologic alteration of water bodies and watersheds.

The NPS Program will work to address the causes of hydrologic alteration of water bodies and watersheds. The *National Water Quality Inventory: 2000 Report to Congress* lists hydrologic modification as a source of water quality impairment in 20 percent of rivers and streams nationally and 18 percent of lakes, ponds, and reservoirs. Hydrologic modification can be caused by a number of activities including dams, channelization of streams to facilitate drainage, agricultural activities like tiles and drains, or land use practices like impervious surfaces and storm drains that result in increased surface water runoff. Altering the hydrology of a water body or watershed can increase soil erosion and sediment loads resulting in impaired aquatic life.

Michigan NPS Program staff has worked with partners to produce necessary guidance documents and manuals to address the causes of hydrologic alteration. The NPS Program provides trained staff partnering with other state and federal agencies as well as local municipalities and universities to identify and develop opportunities to address hydrologic alteration of watersheds.

The NPS Program encourages the use of existing federal, state, and local programs as well as selection and implementation of appropriate BMPs through development and implementation of WMPs. Some of the state and federal programs used to address urban sources include Phase I and Phase II storm water permits and the State Revolving Fund (SRF). In addition, local ordinances are a powerful tool for local governments. Some communities in Michigan have passed ordinances requiring that the hydrologic regime is maintained after development.

There are 2,500 known dams in Michigan and many are unregulated. Any dam changes the natural morphology of the stream by changing the flow, pattern, and stream dimensions; and trapping sediment. The NPS Program supports the removal of dams that are contributing to the degradation of water quality-based designated uses. Dams can negatively impact water quality in a number of ways, including increasing downstream channel erosion, increasing phosphorus loadings from reservoir sediments, and decreasing dissolved oxygen concentrations within the reservoir. Poorly executed dam removal projects can also impact

water quality, primarily by excessive erosion and transport of reservoir sediments to sensitive downstream habitats.

The NPS Program will consider the use of program funds for portions of dam removal projects that will contribute toward improvements in water quality. Activities eligible for Section 319 or matching funds:

- Pre-removal engineering designs for dam deconstruction and stream restoration.
- Analysis of reservoir sediment samples for contaminants, as necessary to generate the removal design.
- Stream channel restoration or stabilization practices following, or performed in conjunction with, dam removal.
- Pre- and post-removal monitoring, especially to assess sediment and hydrologic impacts or biological changes.

Dam removal projects proposed for Section 319 or matching funds support must be consistent with prioritized designated uses, pollutants, sources, sites, and recommendations in approved nine element WMPs, and be clearly expected to result in measurable water quality improvements. WMPs can either list specific dams for removal or recommend dam removals in general; in either case the removal must be clearly expected to result in water quality improvements. Section 319 or matching funds will not be used to deconstruct existing dam structures, to stabilize or remove contaminated sediments, or on dam removal projects that will not address in-stream water quality problems.

Strategy:

II-2-A: The NPS Program will work to address the causes of hydrologic alteration of water bodies and watersheds. This will be accomplished through the development and implementation of WMPs and by providing funding and technical support to watershed-based projects designed to control hydrologic alteration of watersheds.

Short-Term Actions:

II-2-A-1: The NPS Program will place a priority in the RFP for pass-through grant projects to restore or protect water bodies by addressing hydrologic alteration of watersheds.

II-2-A-2: The NPS Unit staff will continue to provide technical assistance to watershed groups and municipalities to implement LID practices and stable stream design techniques.

II-2-A-3: NPS Program staff will provide training and technical assistance to other MDEQ programs and staff upon request and as resources allow.

II-2-A-4: NPS Program staff will continue to support the development of two-stage ditches in watersheds where channelization is contributing to or threatening WQS attainment. NPS Program support could include technical assistance or pass-through grants.

Strategy:

II-2-B: The NPS Program will develop tools and BMPs to control runoff and stabilize stream channels.

Short-Term Action:

II-2-B-1: The NPS Unit Staff will continue to work in partnership with other agencies on the Michigan Stream team to collect additional data and develop regional curves for areas of the state that had insufficient data for curve development in the project completed in 2009. An additional \$60,000 in state funding has been committed to developing regional reference curves in the lake plain watersheds draining to Saginaw Bay and Western Lake Erie.

Strategy:

II-2-C: Provide hydrology and stream morphology training to NPS Program staff, other agency staff, consultants, municipal staff, and watershed managers.

Short-Term Actions:

II-2-C-1: The NPS Unit will continue to provide bankfull indicator training to MDEQ staff, consultants, drain commissioners, and others.

II-2-C-2: The NPS Program will continue to implement the geomorphology training plan (*Stream Geomorphology Training for the NPS Program*). Tasks include obtaining outside training for a core group of NPS Program experts and introductory or intermediate training for all NPS Program staff.

II-2-C-3: NPS Program staff will continue to look for opportunities to provide training to local watershed groups and other stakeholders. The purpose of the training will be to introduce the topics of stream morphology and hydrology to NPS project administrators and local watershed groups involved in developing and implementing WMPs.

Strategy:

II-2-D: Strengthen relationships with county drain commissioners to work toward a better drainage maintenance program that will enable drain commissions to meet drainage needs while minimizing negative water quality impacts.

Short-Term Actions:

II-2-D-1: NPS Program staff will continue to work with county drain commissioners and intercounty drainage boards on projects to restore modified drainage ways to a more natural state and evaluate success of addressing hydrologic modification issues in county and intercounty drains as appropriate.

Objective II-3: Eliminate or reduce agricultural NPS pollutants and causes of impairment

Michigan's 52,000 farms and the commodities that they produce, contribute \$13 billion annually to the State's economy. The total land area in agricultural production is nearly 10 million acres, which comprises over 29 percent of the land in the state. Corn and soybean production consists of 4.5 million acres and there are 21,000 farms with livestock.

While agricultural production activities occur statewide, the majority of agricultural production occurs in the southern half of the Lower Peninsula. The major potential NPS pollutants

impacting water quality from agricultural operations are sediment, nutrients, pesticides, and pathogens. The primary agricultural sources of sediment are cropland erosion caused by tillage practices, and streambank erosion caused by increased flows due to increased runoff and livestock access. The primary agricultural sources of nutrients are misapplied (improper method, rate, or timing of application) commercial fertilizer and manure. Runoff from livestock/poultry operations (feedlot, milk house waste, silage), including runoff from misapplied manure applications, can result in degraded water quality and habitat.

Targeted and comprehensive approach to farm conservation planning

To be most effective, agricultural BMPs must be implemented in a comprehensive, systematic manner and targeted to critical areas of the watershed. Agricultural sources of NPS pollution from particularly sensitive areas in a watershed can have a disproportionately large impact on water quality and the idea that targeted approaches can improve outcomes is not new. Therefore, critical locations where nutrient and sediment losses occur within watersheds must be identified and targeted. In addition, practices that are not implemented in a coordinated fashion may not yield optimal results. The installation of BMPs must be viewed holistically so that practices are installed in a comprehensive manner and work together to maximize efficiency.

The NPS Program will encourage the use of the following NRCS practices as the highest priority Agricultural BMPs. NPS Program staff will advocate for Environmental Quality Incentives Program (EQIP) application scoring and selection processes that favor these practices. Also, the NPS Program will place a higher priority on financial and technical assistance efforts that favor these practices. Use of these practices will address nutrients, sediment, and bacteria sources related to agricultural operations:

1. Nutrient Management (590)
2. Cover Crop (340)
3. Residue and Tillage Management, no-till/strip till (329)
4. Drainage Water Management (554)
5. Filter Strips (393)
6. Wetland Restoration (657)
7. Access Control (472) – to restrict/limit livestock access to surface waters

Other agricultural BMPs may be a priority on a case by case basis. In those cases, priority will be determined based on recommendations developed as part of approved nine element WMPs.

Strategy:

II-3-A: Encourage the use of a targeted, comprehensive systems approach when selecting agricultural BMPs needed for implementation, in order to maximize pollutant reductions and water quality benefits.

Short-Term Action:

II-3-A-1: The NPS Program will include language in the pass-through grant RFP that places a higher priority on proposals that require the implementation of a system of the highest priority agricultural BMPs. Priority projects funded with Section 319 or matching funds must meet the following criteria:

- Priority projects to address sediment and nutrients from cropland (where there is no manure application) must implement (at a minimum) the following NRCS practices on all farms receiving grant or matching funds:
 1. Nutrient Management (590)
 2. Residue and Tillage Management, no-till/strip till (329)
 3. Cover Crops (340)
 4. Filter Strips (393)
- The landowner may already be implementing some of the practices and agree to implement the remaining practices as part of a grant or match funded project.
- Grant funding is only available for implementation of new practices, including the required practices listed above or other new practices that are needed to restore and/or protect water quality provided that the required practices are also being implemented. Other practices will be selected on a case-by-case basis after considering the causes and sources described in the WMP; the high priority recommendations from the WMP; and the anticipated outcomes described in the grant application.

Livestock Management Strategies

The application of manure from livestock operations should be based on agronomic need and focused on utilizing manure as a substitute for commercial fertilizer. When manure is misapplied in excess amounts, in critical areas, on frozen fields or shortly before precipitation events, it may result in the transport of nutrients or *E. coli* to water bodies. Excessive manure inputs may result in partial or total body contact advisories; fish kills and other impacts to aquatic life; nuisance algal growths; and other designated use impairments. In addition, uncontrolled livestock access to water bodies, uncontrolled runoff from livestock feeding or production areas, and inputs from other heavy use or high traffic areas can impair designated uses.

Strategy:

II-3-B: Encourage the targeted and comprehensive implementation of practices to control nutrient, pathogen and sediment inputs from livestock operations and manure applications.

Short-Term Action:

II-3-B-1: The NPS Program's pass-through grant RFP will place a priority on projects addressing nutrients and bacteria from manure application as long as the following practices (at a minimum) on all farms receiving grant funds:

- Comprehensive nutrient management plan (includes no manure application on frozen or snow covered fields)
- Controlled/restricted livestock access to surface waters
- Residue and tillage management, no-till/strip till
 - For summer or fall manure applications, if tillage is needed for manure incorporation, a cover crop will be planted and no tillage will occur the following spring.
 - For spring applications of manure, if tillage is needed for manure incorporation, then no tillage shall occur the previous summer/fall and a cover crop will be planted during the previous summer/fall.
- Filter Strips

CAFOs requiring permits will only be eligible to receive grant funds for practices that are above and beyond the CAFO permit requirements.

Drainage Water Management Strategies

The drainage water management strategy is focused on managing the flow of water from fields that have already tiled as opposed to installing new systems to drain lands for crop production. Managing agricultural drainage water in Michigan can provide benefits such as; conserving subsoil moisture, increasing productivity on tile drained fields and reducing nutrient loading to surface waters. Drainage water management can reduce loadings of nitrates and soluble reactive phosphorus to surface waters and works most effectively on flat or very gently sloped fields with slopes of 0.5 percent or less. Nitrate losses from tile-drained fields have been reduced by 15 percent to 75 percent depending on location, climate, soil type, and cropping system. Most of the reduction resulted from the reduction in water flow from the field through the tile.

Strategy:

II-3-C: Encourage the use of drainage water management practices, to address the surface water quality impacts of nutrients and hydrology contributions from tile drained farm land.

Short-Term Actions:

II-3-C-1: By September 30, 2016, NPS Program staff will identify watersheds that are impacted by nutrients and/or flow; have tile drainage systems in place; and have the land use, soil types and topography that would be conducive to drainage water management strategies.

II-3-C-2: Once watersheds have been identified, NPS Program staff will work with local Conservation Districts to promote drainage water management strategies. This could include demonstration sites in priority watersheds, educational sessions for farmers, and providing cost-share for the installation of tile line control structures.

II-3-C-3: NPS Program staff will include language in the pass-through grant RFP that will give priority to watershed proposals that promote drainage water management strategies. Priority will be given to proposals in watersheds with appropriate soils and slopes as well as nutrient impairments or flow related impairments caused in part by tile line inputs.

Collaborate with other stakeholders to address agricultural NPS pollution

The WRD works in partnership with a number of organizations or programs to address agricultural NPS pollution. The WRD works in partnership with the MDARD to identify and correct impairments caused by agricultural sources through the Right to Farm Memorandum of Understanding between the MDEQ and MDARD and by monitoring the effectiveness of agricultural programs. In addition, the NPS Program supports MDARD's Michigan Agriculture Environmental Assurance Program (MAEAP) by funding technical support for local stakeholders via pass-through grants. Also, pass-through grants to County Conservation Districts and other stakeholders are used to implement agricultural BMPs. Finally, NPS Program staff participate on NRCS committees and provide input on the implementation of Farm Bill programs.

Strategy:

II-3-D: The NPS Program will work with the MDARD, NRCS, other WRD programs, and other stakeholders to identify priority NPS load elimination or reduction activities for Great Lakes Restoration Initiative (GLRI) funding.

Short-Term Actions:

II-3-D-1: The NPS Program will administer a \$370,000 FY13 Section 319 grant and a \$350,000 FY 2012 GLRI grant with the Lenawee Conservation District to implement agricultural BMPs to address a nitrogen TMDL in the River Raisin Watershed.

II-3-D-2: The NPS Program will administer an \$890,000 FY 2011 GLRI grant with the Huron Conservation District to implement agricultural BMPs to reduce phosphorus loadings from the Pigeon River Watershed to Saginaw Bay.

II-3-D-3: The NPS Program will administer a \$995,000 FY 2012 GLRI grant to implement BMPs to reduce phosphorus and *E. coli* loads to the Kawkawlin River and Saginaw Bay watersheds.

Strategy:

II-3-E: Support the implementation of NPS controls on agricultural land by providing technical and financial assistance and through collaboration with stakeholders.

Short-Term Actions:

II-3-E-1: The NPS Program will continue to administer a \$4 million CMI grant with Pheasants Forever to implement Conservation Reserve Enhancement Program (CREP) practices within the Saginaw Bay, River Raisin, and Lake Macatawa watersheds. Beginning in 2007, Michigan worked with the USDA to expand the CREP program to the western Lake Erie basin and increased the CREP acreage implementation goal from 80,000 to 85,000 acres. The \$4 million provides the state's matching funds to implement the CREP practices in the four watersheds, with a goal to reach the 85,000 acres implemented by the end of FY 2017.

II-3-E-2: NPS Program staff will continue to provide advice upon request to the NRCS as they work to implement the National Water Quality Initiative. This includes advice regarding priority watersheds, eligible BMPs, and critical areas within those watersheds.

II-3-E-3: NPS Program staff will collaborate with agricultural stakeholders through participation on the NRCS's Michigan Technical Committee, EQIP sub-committee, Conservation Reserve Program/CREP sub-committee, and Wetland Restoration Program sub-committee. In addition, NPS staff will provide information to direct Farm Bill funding such as lists of impaired waters and lists of NPS Program priority watersheds.

II-3-E-4: The NPS Program will collaborate with community stakeholders in south west Michigan to explore the development of the *Healthy Waters, Working Farms* initiative for integrating water quality protection measures into local farmland preservation ordinances to reduce sediment and nutrients.

Objective II-4: Reduce or eliminate NPS pollution from urban sources.

The NPS Program will work in partnership with stakeholders to reduce or eliminate NPS pollution from urban sources. Over 82 percent of Michigan's residents live in a metropolitan area. According to the 2000 U.S. census, almost 72 percent of residents live in the 15 most populous counties, which account for only 17.2 percent of the total land area in Michigan. The expansion of urban infrastructure produces impervious surfaces that are viewed as one of the dominant factors associated with urban hydrology. Impervious surfaces alter the hydrology of an area by preventing the infiltration of precipitation into the soil, which results in a greater portion of a precipitation event being converted to overland flow. Increased surface runoff flowing into rivers causes stream bank erosion, habitat loss, and flooding. In addition, impervious surfaces act as a collector and conveyance system for a myriad of NPS pollutants including sediments, nutrients, pathogens, anthropogenic contaminants, and debris.

According to the *Michigan Land Use and Leadership Council's 2003* report, Michigan's population density fell from 3.8 people per acre in the 1980s to 2.8 people per acre by the late 1990s. Similarly the number of people per household declined from 3.27 in 1970 to 2.66 in 2000. Households in Michigan grew 43 percent from 1970 to 2000 while in that same time period Michigan's population grew by 12 percent. The report indicates that Michigan on average developed its land eight times faster than its population grew. The report generally finds land use policies that are sprawling and overly land consumptive. Increasing the footprint of the built environment has negative impacts on the quality and quantity of runoff delivered to surface waters.

The NPS Program encourages the use of existing federal, state, and local programs as well as selection and implementation of appropriate BMPs through development and implementation of WMPs. Some of the state and federal programs used to address urban sources include Phase I and Phase II storm water permits, Combined Sewer Overflow (CSO) and Sanitary Sewer Overflow (SSO) control, NPDES permits, SESC, Construction Storm Water, and the SRF. In addition, local ordinances are a powerful tool for local governments. Some communities in Michigan have passed ordinances requiring soil erosion control and predevelopment hydrologic regime after development. Also, a statewide ban on phosphorus in lawn fertilizer has been adopted to reduce phosphorus loads to water bodies.

Strategy:

II-4-A: The NPS Program will provide technical assistance to local governments (village, township, county) around the state. Technical assistance efforts will focus on the following NPS issues:

- Promoting the concept of compact development and mixed use as more sustainable forms of development that consume less land; help preserve natural features, farmland, and open space; and better retain an area's natural hydrology.
- Continue to promote the local development of GI through the use of conservation easements, restoration of riparian corridors, and implementation of low impact designs such as bioretention and green roofs.
- Providing priority protection to headwater areas, wetlands, areas with high slopes and erodible soils, and groundwater recharge locations.
- Supporting projects that attempt to minimize storm water runoff by incorporating LID techniques to address impervious surfaces.

- Promoting development patterns, such as cluster development, that reduce the footprint of the built environment and protect environmentally sensitive areas.

Short-Term Action:

II-4-A-1: NPS Program staff will help Plaster Creek stakeholders implement the System for Urban Stormwater Treatment and Analysis INtegration (SUSTAIN) Pilot project to accomplish the following:

- Provide planning tools to support TMDL implementation and watershed protection.
- Provide a watershed planning tool that will estimate pollutant loadings in the watershed and identify high priority areas for targeted BMP implementation.
- Provide a summary of cost-effective BMPs that will help to address the impaired biota in Plaster Creek resulting from nutrient and sediment loading.
- Test SUSTAIN's capacity to address agricultural land uses and associated BMPs.

Green Infrastructure (GI) is a strategic approach to land conservation that focuses on the importance of the natural environment in decisions about land-use planning.

On a broad scale, GI consists of public and private natural assets, with and without public access, located in both urban and rural areas. GI is considered to be a natural life support system — an inter-connected network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas; greenways, parks and other conservation lands; working farms, ranches and forests; and wilderness and other open spaces that support native species, maintain natural ecological processes, sustain air and water resources and contribute to the health and quality of life for communities and people.

On a smaller scale, the concept can be applied to the management of storm water runoff at the local level through the use of natural systems, or engineered systems that mimic natural systems, to treat polluted runoff. GI applied in this way is often referred to as LID practices and include rain gardens, porous pavements, green roofs, infiltration planters, trees and tree boxes, and rainwater harvesting for non-potable uses. These techniques mimic natural functions that infiltrate, evapotranspire, capture and treat storm runoff to maintain or restore natural hydrology and improve water quality.

The use of LID and other GI techniques can reduce stress on traditional water drainage infrastructure (storm sewers and combined sewers) which are typically extensive networks of underground pipes and/or surface water channels in cities, towns and suburban areas. Properly applied, GI has the potential to reduce the frequency of CSOs and SSOs, and provides other environmental benefits.

Michigan's NPS Program promotes the use of GI to eliminate NPS pollution in the following ways:

- Partnering with local government to develop WMPs that use both large and small scale GI measures to control the quality and quantity of storm runoff, and thereby improve water quality and stream channel stability.
- Providing technical assistance to stakeholders on pre-design site investigation, design, and implementation of specific GI techniques.

- Developing criteria for design and application of GI and LID techniques. In 2008 NPS Program staff partnered with Southeast Michigan Council of Governments (SEMCOG) to develop the “Low Impact Development Manual for Michigan” which provides design information for specific LID practices. This document is provided as guidance for Michigan communities applying LID practices.
- Promoting the application of the MDEQ Wetlands Program GIS based LLWFA to identify and prioritize existing and historic wetlands for protection, enhancement or restoration based on the ecological or water quality functions they can provide. Specific wetlands identified by the LLWFA can then be included in WMPs and linked to NPS tools to estimate load reductions.

Strategy:

II-4-B: Promote the inclusion and implementation of GI and LID techniques in WMPs to achieve reduction of NPS pollution and storm water.

Short-Term Actions:

II-4-B-1: The NPS pass-through grant RFP will place a priority on GI projects in impaired watersheds that result in stream channel stabilization and habitat protection via modification of a contributing watershed’s hydrograph. Also, the RFP will place a priority on projects in impaired watersheds that implement GI based on runoff volume reduction targets to achieve stream channel stability or habitat protection and achieve quantifiable runoff volume reduction toward achieving the targets.

II-4-B-2: Provide technical assistance to GI projects in urban areas which will likely result in measureable storm water flow reductions.

Strategy:

II-4-C: Provide technical assistance to communities and watershed groups with the pre-design site investigation, design and application of GI and LID practices to expand their use throughout the state. Particularly look to expand the use of GI techniques in dense urban areas throughout the state that provide significant challenges to overcome.

Short Term Action:

II-4-C-1: Participate on the Southeast Michigan GI Team, which was formed in 2011 in response to Governor Snyder’s October 2011 Infrastructure message. Other agencies represented on the team include: MDNR, Michigan Department of Transportation (MDOT), SEMCOG, and the Detroit Water & Sewer Department. The result of this effort will be the development of flow volume reduction targets for Southeast Michigan and identification of measures to achieve those reductions.

Objective II-5: Reduce or eliminate NPS pollution from transportation sources.

In 1985, the MDNR and MDOT jointly published the *Strategy for Reduction of NPS from Transportation-Related Activities in Michigan*, which documents the scope of the transportation-related NPS problem and the types of pollutants of concern. As of 2000, Michigan had nearly 120,000 miles of roadway at the state, county, and local levels. An estimate of the amount of

impervious area these roadways represent is 0.4 percent of the entire state; for roadways only (not including parking lots or other facilities). Possibly the largest and most severe impacts are from improperly designed or maintained road stream crossings. However, other impacts are caused by eroding embankments from upland runoff, perched culverts causing plunge pools, undersized culverts causing bank erosion, and horizontally misaligned culverts causing bank erosion.

The MDEQ's *Best Management Practices Manual* includes BMPs that deal specifically with transportation-related sources of NPS impacts. In addition, the NPDES Storm Water Program deals with construction-related runoff, including transportation projects from sites that have a point source discharge to waters of the state. Under the current program, construction sites that are one to five acres in size must comply with all requirements of the NPDES Storm Water Program. Construction sites greater than five acres in size must also apply for a Notice of Coverage. All construction sites covered by the NPDES Storm Water Program must also comply with the SESC Program.

The NPS Program will continue to identify and address NPS threats from transportation sources through the development and implementation of WMPs, and work in partnership with the various agencies that are involved in or have an interest in road stream crossings. These agencies include the following: (1) MDEQ, WRD (reviews permit applications for new or replacement crossings and determines the minimum flow that crossings must pass without adverse effects); (2) MDNR, Fisheries Division (fish passage and habitat); (3) MDOT; and (4) county road commissions (install most road stream crossings).

Strategy:

II-5-A: Protect and restore waters of the state through control of NPS pollution from transportation-related sources.

Short-Term Action:

II-5-A-1: NPS Program staff will provide technical assistance to stakeholders working on transportation infrastructure projects such as the I-75 corridor improvement project and other projects as they arise.

Objective II-6: Reduce or eliminate NPS pollution from forestry sources.

Michigan has 19 million acres of timberland covering 51 percent of the state. Nonindustrial private owners are the predominant Michigan timberland owners. Private timberland ownership is spread among 312,500 individuals. Ownership is broken out as follows:

- Private Individual: 46 percent
- Private Corporate: 11 percent
- National Forest: 14 percent
- Forest Industry: 8 percent
- State: 20 percent
- County, Municipal, and Other (Tribes, National Parks, etc.): 1 percent

Several existing programs currently address NPS pollution from forestry practices. The Sustainable Forestry Initiative is a voluntary program developed by the forestry industry and

administered by an independent Sustainable Forestry Board. This program requires independent and internal audits to ensure compliance with WQS. Also, the Forest Stewardship Council is a nonprofit organization that promotes an environmental, social, and economically sustainable approach to forest harvesting. Audits of forest practices are conducted by Forest Stewardship Council-certified entities.

The NPS Program will work to eliminate NPS pollution from forestry practices. Water quality impacts from forestry practices remain a significant issue primarily in the northern Lower Peninsula and the Upper Peninsula. The NPS Program will continue to provide updated BMP manuals and education to this target audience through coordination with the MDNR and other partners. Also, the NPS Program will continue to address forestry sources of NPS pollution through the development and implementation of WMPs.

Strategy:

II-6-A: Protect and restore waters of the state through control of NPS pollution from forestry activities targeting these efforts through development and implementation of WMPs and expansion of partnerships.

Short-term Action:

II-6-A-1: The NPS Program's UP District Staff will participate on Michigan's Sustainable Forestry Initiative Implementation Committee. The committee is charged with developing and overseeing the annual monitoring program and auditing forestry BMPs. NPS Program staff participation will improve implementation and monitoring of forestry BMPs.

Objective II-7: Reduce or eliminate NPS pollution from improperly functioning on-site wastewater treatment systems.

A significant and growing percentage of homes and businesses in Michigan are not served by public water or public sewer. It is estimated that statewide there may be as many as 1.4 million individual on-site wastewater systems. It is also estimated that over 50 percent of new homes and businesses will rely upon on-site wastewater systems and individual wells. This higher percentage of new construction served by on-site systems is consistent with the higher rates of growth exhibited by nonmetropolitan areas in Michigan. The MDEQ programs involving individual on-site systems include review and approval of subdivisions and condominiums not served by public sewer and/or water and nonresidential on-site wastewater systems utilizing subsurface dispersal with flows up to 10,000 gallons per day. These activities are conducted in partnership with local health departments (LHDs). The MDEQ also conducts periodic reviews of local health on-site wastewater programs as part of the Local Public Health Accreditation Program and administers contracts with LHDs amounting to over \$5 million annually, funding a significant but insufficient portion of local on-site wastewater programs. A secure long-term state funding mechanism for the conduct of MDEQ on-site wastewater program activities does not exist.

It is estimated that the volume of on-site sewage disposed of annually in Michigan is 112 billion gallons, or 308 million gallons per day. This is based on the current number of systems and a flow of 220 gallons per day of wastewater per system, which is believed to be a realistic figure supported by actual flow monitoring.

LHDs that are actively conducting a mortgage evaluation or an inspection at the time of a real estate transaction, report a wide variation in failure rates ranging up to 23 percent. The rather wide variation is explainable when considering differences in geology, age of the community, proportion of year-round homes, and stringency of regulations. For instance, areas with older homes having systems installed prior to permits being required by LHDs are more likely to have higher rates of failure. On a statewide basis it is presently speculated that less than 10 percent (i.e., 140,000) of all systems may be experiencing problems at any point in time, equating to an estimate of 31 million gallons per day discharged into failing systems. Annually, LHDs issue repair/replacement permits for an estimated 12,000 systems, reflecting a significant number of unidentified systems that may be failing.

It is well documented that improperly managed on-site wastewater systems present public health concerns and that on-site systems are cited as significant contributors to impairment of surface waters due to discharge of pathogens and nutrients. On-site systems also contribute to contamination of groundwater and wells relied upon as drinking water sources. As of March 2015, 55 of Michigan's 102 TMDLs are for *E. coli*. Over half of the 55 *E. coli* TMDLs specifically identify septic systems as a potential pollutant source. This increases to two-thirds of the *E. coli* TMDLs having on-site septic related sources if "sources typical of suburban land use" is assumed to include failed and failing septic systems.

Resources are limited at both the state and local levels to provide regulatory oversight of on-site wastewater treatment systems. In order to effectively address pollution from this source, a combined and coordinated voluntary and regulatory approach is necessary. In an effort to understand the broader framework of how on-site wastewater treatment systems have been addressed, financial, regulatory, and voluntary approaches in Michigan and other states were evaluated. A summary of this research is available upon request.

Strategy:

II-7-A: Protect and restore waters of the state through control of discharges from inadequately functioning on-site wastewater treatment systems targeting these efforts through development and implementation of WMPs and regulatory compliance actions.

Short-Term Action:

II-7-A-1: The NPS Program will encourage LHDs and other stakeholders to develop pass-through grant proposals to find and fix failing onsite septic systems that are causing or contributing to designated use impairments.

Regulatory Approaches

Michigan has no statewide sanitary code. Development of a statewide sanitary code for on-site wastewater treatment is one component of a comprehensive plan to protect waters of the state. Passage of a statewide sanitary code would strengthen and standardize regulatory oversight of on-site wastewater treatment systems. In the interim, the NPS Program will work with LHDs to strengthen their county sanitary codes and programs.

Strategy:

II-7-B: The NPS Program will continue to support LHDs in regulating on-site wastewater treatment systems.

Short-Term Action:

II-7-B-1: The NPS Program will continue investigating and taking compliance/enforcement actions related to community-wide failure of on-site wastewater treatment systems in watersheds where this issue is a priority. These actions support efforts of the LHDs by identifying and addressing the need for a more comprehensive community-wide approach to wastewater treatment.

Financial Approaches

Michigan does not have a dedicated financing mechanism to provide grants or loans to address individual failing septic systems. Several states utilize a linked deposit program through their SRF to direct low interest loan funding to individuals through local lenders (banks) for repair of failing septic systems. The linked deposit program is a mechanism for financing certain projects. Instead of borrowing directly from the SRF, a linked deposit loan is made to the applicant by a private lending institution. The below-market interest rate for the loan is supported by an SRF certificate of deposit with the lender. However, legislative action would be required in Michigan to develop a linked deposit system. In addition, several states have successfully used Section 319 pass-through grants to restore water quality impaired by failing on-site septic systems.

Strategy:

II-7-C: Enhance on-site wastewater treatment system voluntary compliance approaches in the NPS Program's Section 319 and CMI grant RFPs, and watershed management efforts.

Short-Term Action:

II-7-C-1: The NPS Program will use the following criteria to determine the eligibility and priority of Section 319 and CMI pass-through grant funds to repair failing on-site wastewater systems:

- The on-site wastewater treatment system is causing impairment. The system must be within an impacted critical area specifically identified in an approved nine element WMP. Also the plan must identify water bodies where WQS are not being met due to failing on site wastewater treatment systems. Priority will be given to areas where correction of failing on-site wastewater treatment systems will result in measurable water quality improvement.
- The on-site wastewater treatment system is not within an area identified as having a concentrated community-wide problem with failing on-site wastewater treatment systems (that would best be resolved with a centralized wastewater treatment system).
- The county or local unit of government, where the on-site wastewater treatment system is being repaired/replaced has a point of sale ordinance.

- Prior to funding and septic system repairs, all failing septic systems identified through the watershed planning process have been formally referred to the LHD for parallel regulatory follow-up.
- The homeowner agrees to sign a maintenance agreement to ensure the septic system will be operated and maintained appropriately.

Education and Outreach

Homeowner education is one of the most common approaches to addressing impacts caused by failing on-site septic systems. The NPS Program will continue to provide technical assistance and funding for education and outreach activities.

Strategy:

II-7-D: The NPS Program will continue to support homeowner education and awareness of technical and financial options related to on-site wastewater treatment systems.

Short-Term Action:

II-7-D-1: The NPS Program will look for opportunities to fund information and education activities, identified as high priority activities in approved WMPs, to address impairments caused by failing on-site septic systems.

Objective II-8: Reduce or eliminate NPS pollution and causes of impairment from recreational activities.

NPS pollution affects recreation and is caused by certain types of recreation. Bathing beaches are sometimes impacted by NPS pollution; whereas marinas, off-road vehicles, and golf courses can be sources of recreational NPS pollution. Michigan has many different programs and laws that monitor and regulate these types of activities, as well as voluntary approaches to educate individuals and organizations about recreational NPS pollution.

On a statewide basis, recreational activities cause a relatively small number of water quality impairments. However, within individual watersheds, recreational activities may be an important source of NPS pollutants. The NPS Program deals with recreational sources through development and implementation of WMPs.

Marinas

Michigan leads the nation in the boating business with more than one million registered boats; 40 percent of Michigan residents are boaters. Michigan currently has approximately 750 licensed marinas on inland lakes and streams and connecting channels (St. Marys, St. Clair, and Detroit Rivers) of the Great Lakes and 81 marina leases for marina operations on the Great Lakes. The marinas vary from large, full-service, commercial facilities to small residential operations where only slips are provided. The largest concentrations of marinas and recreational boating facilities (such as public access launch sites) are found in large rivers or drowned river mouths that are navigable to the Great Lakes and/or connecting channels. These are often located in or near urban settings where intensive waterfront development has already occurred or where pressure to develop is great. Most new marina development on inland lakes has been residential facilities to service subdivision or condominium associations.

Possible NPS impacts from marinas include:

- Toxic agents, such as metals, pesticides, biocides, and antifouling agents associated with marine paints can accumulate in sediment, marine plants, and animals and are persistent in the marine environments.
- Antifreeze sinks in water and settles in the sediment. Even in low doses, ethylene glycol is hazardous to humans, animals, and marine life.
- Oil and gas dissolve slowly in water and accumulate on particles in marine sediment. When disturbed, the sediment will release these contaminants, which are toxic to marine plants and animals. Some ingredients are carcinogenic and can cause mutations and birth defects.
- Most cleaning products, including household detergents and soaps, act as dispersants, contain mercury, and accumulate in sediment. They are toxic to marine plants and animals, impair breathing in fish, reduce oxygen in the water, and produce foam on water surfaces.

The Michigan Clean Marina Program encourages marinas to develop technically sound and economically achievable approaches that minimize environmental impact and reduce the generation of waste. This public-private partnership includes three primary organizations: (1) the marina industry (Michigan Boating Industries Association); (2) academic institutions (MSU and the University of Michigan via the Michigan Sea Grant College Program); and (3) federal and state government (National Oceanic and Atmospheric Administration, National Sea Grant, and the MDEQ).

Off-Road Vehicles

Michigan's public Off-Road Vehicle trails offer thousands of miles of single and double track riding opportunity. These trails are lightly groomed and riders are likely to encounter narrow sand trails, rough moguls, steep hills, stumps, rocks, brush, loose surfaces, and other hazards.

Indiscriminate Off-Road Vehicle use has damaged fragile ecosystems on both public and private lands. Complaints of erosion on hills and trails, destruction of stream banks and beds, and conflicts with other users have led to more restrictive rules to control Off-Road Vehicle abuses.

Golf Courses

There are over 975 golf courses in Michigan. The state ranks among the national leaders in total number of golf courses and number of golf courses per capita. Numerous regulatory programs oversee the erosion control and wetland impact issues related to construction of golf courses in Michigan. Water quality issues related to runoff from golf courses is regulated under Part 31, Water Resources Protection, of the NREPA. The principal approach to addressing these NPS runoff issues in Michigan, however, is a voluntary program, the Michigan Turfgrass Environmental Stewardship Program, which was launched in June 1998.

Outdoor Recreationists

Over 25 million campers visit Michigan's park system each year with the majority of use during the June through August time frame. There are approximately 100 state parks with over 14,000 campsites in Michigan; many along the shorelines of the Great Lakes. The state ranks first in the U.S. for total number of sites and overnight attendance.

The MDNR offers hundreds of miles of trails and pathways used primarily for bicycling, hiking, and cross country skiing (some also allow horseback riding and snowmobiling). These trails provide scenic routes through the Michigan countryside, running by rivers and through forests or farm country, connecting small communities and many state forest campgrounds.

Foot traffic from unmanaged recreational access sites can cause streambank erosion. The NPS Program has funded implementation of BMPs at recreational access sites to reduce erosion to the water bodies and demonstrate these practices.

Strategy:

II-8-A: Protect and restore waters of the state through control of NPS discharges caused by recreational activities, targeting these efforts through development and implementation of WMPs.

Objective II-9: Reduce or eliminate NPS pollution and causes of impairment from resource extraction activities.

The MDEQ is responsible for assuring that the development of fossil fuel and mineral resources follows sound conservation principles and incorporates proper protection for other natural resources, the environment, property, and public health and safety. The MDEQ regulates the drilling and operation of wells used for oil and gas production, exploration and production of brine and other minerals, and underground storage and disposal. The MDEQ regulates the operation and reclamation of mines for industrial sand, metals, and other minerals. The MDEQ also develops and distributes a variety of maps, publications, and data on fossil fuels, minerals, and groundwater for industry and public use.

Resource extraction practices were not always well regulated. Water bodies located in portions of the Upper Peninsula were significantly impacted by past mineral extraction practices and continue to be impaired. On a statewide basis, resource extraction activities cause a relatively small number of water quality impairments. However, within individual watersheds, impacts caused by past practices may be an important source of NPS pollutants. The NPS Program deals with these historical sources through the development and implementation of WMPs.

Strategy:

II-9-A: Protect and restore waters of the state through control of NPS discharges caused by resource extraction activities, targeting these efforts through development and implementation of WMPs and in coordination with existing regulatory and voluntary programs.

Objective II-10 Reduce or eliminate NPS pollution and causes of impairment from land disposal activities.

In Michigan, several different agencies are involved with overseeing proper waste management. State agencies include the MDEQ. Federal agencies include the USEPA and the U.S. Department of Transportation. In addition, local entities, including wastewater treatment plant authorities, local fire departments, and county health departments may have jurisdiction.

Land disposal of waste materials is sufficiently regulated in Michigan to address most NPS issues. The NPS Program will continue to address impacts caused by waste disposal activities

through the development and implementation of WMPs. Remediation projects intended to address landfill leachate will not be supported with Section 319 or matching funds. However, the NPS Program will encourage local watershed groups to seek alternative sources of funding such as the SRF.

Strategy:

II-10-A: Protect and restore waters of the state through control of NPS discharges caused by unpermitted land disposal of waste materials, targeting these efforts through coordination of existing regulatory and voluntary programs and development and implementation of WMPs.

Objective II-11: Reduce or eliminate excessive sediment sources that impair or threaten aquatic life or alter stream morphology.

Clean sediments, from upland erosion and stream bank erosion, are a significant source of pollution to Michigan's rivers and lakes. Excessive sedimentation damages in-stream habitat, decreases aquatic organism survival and reproduction, reduces primary productivity, and alters stream channel morphology. Excessive sedimentation is also the causative agent identified in many aquatic biota TMDLs.

The NPS Program has funded, and will continue to fund, projects that reduce clean sediment loadings from both upland and in-stream sources, including bank stabilization, livestock exclusion, upland agricultural practices, and the creation of in-stream sand traps and certain storm water practices (detention and retention basins, storm water infiltration BMPs, etc.). The NPS Program does not fund the maintenance of sand traps, maintenance of storm water BMPs, or dredging projects in ponds, lakes, or streams.

A complication in executing projects to reduce clean sediment loadings is to correctly identify both the scale of the problem and its cause, since these factors influence selection of appropriate BMPs. For example, a bank erosion problem due to a local problem like cattle access can be addressed with a local BMP like fencing, while bank erosion due to a large-scale problem like altered hydrology caused by watershed-scale urbanization can only be addressed with a large-scale BMP(s). The NPS Program has [guidance](#) to help grantees identify the scale of a sedimentation problem and will continue to advocate the use of these tools for all sediment load reduction projects.

Strategy:

II-11-A: Michigan's NPS Program will continue to fund projects that reduce clean sediment loadings to wetlands, streams, and lakes. When addressing sources of excess sediment from unstable stream channels, the NPS Program will emphasize the correction of the underlying cause of the erosion, such as hydrologic alteration and channelization, before implementing measures to stabilize the channel and bank erosion directly.

Objective II-12: Identify and track NPS threats and causes of impairment due to climate change and respond to those threats.

Climate change in Michigan is expected to result in significantly higher average temperatures and more frequent, large, precipitation events. Additionally, it is anticipated that precipitation patterns will shift, with more precipitation occurring in the late winter and spring, falling as rain instead of snow, when soils are often saturated and many farm fields lack vegetation. A

corresponding decrease in precipitation is expected during the summer, potentially leading to more frequent drought conditions. Precipitation projections vary for different areas of the state as well, with wetter conditions anticipated in the north. However, the predictions for precipitation changes are less certain than those for temperature and vary more significantly from one geographic area to another.

Overall, rainfall may not be sufficient in some areas of the state to compensate for the drying effects of a warming climate. This will likely lead to lower stream flows and lake levels in the summer, lowering water levels below shoreline habitat such as wetlands and fallen trees, depriving some species of important habitat needed for survival. In some cases, the loss of these absorbent filters in the riparian zone will increase the potential for pollutants to enter the water bodies.

Warming temperatures are expected to shift vegetation species ranges north, leading to the replacement of cold weather species with those tolerant of warmer conditions. Between 1990 and 2006, plant hardiness zones shifted about half a zone northward. The composition of forests in the Great Lakes region is changing with many tree species shifting northward while being replaced by more southerly varieties. As changes in vegetation occur, loss of vegetation along stream banks could exacerbate erosion, reduce filtering of runoff, and contribute to increases in water temperature due to the loss of an overhead canopy.

In the aquatic environment, warmer weather is expected to decrease the amount of coldwater streams in Michigan and native species adapted to coldwater streams may disappear. Water bodies in general may be more susceptible to invasive species as well as increased occurrences of nuisance population levels of both plants and algae. It is anticipated that the length of summer stratification in many inland lakes will increase, producing a greater risk of oxygen depletion. Such anoxic conditions could also mobilize sediment-bound phosphorus, perhaps making BMPs that reduce phosphorus delivery to water bodies even more important in the future.

The changing climate is likely to change the design criteria for some BMPs implemented through Michigan's NPS Program. For instance, the use of some vegetative species for BMPs and natural channel design may no longer be appropriate. The NPS program will determine appropriate design criteria to provide the control expected from BMPs and other control measures as climate changes. The BMPs used and promoted by Michigan's NPS Program will be designed, implemented and evaluated accounting for the projected changes in temperature, precipitation and vegetation patterns. Guidance documents produced and updated by the NPS program will provide criteria to account for climate change in BMP design.

When selecting BMPs to control NPS pollution, it is important to keep in mind the difference between mitigating climate change effects, versus adapting to those effects. The design or use of many BMPs will require adaptation to a new climate in order that they continue to function as intended. BMPs cannot effectively mitigate climate change but some may be able to reduce exposure to the hazard of climate change. An example would be the increased use of infiltration along coldwater streams to reduce or slow the magnitude of temperature change in that stream. Adaptation reduces the vulnerability to the hazard of climate change. One example would be planting some warm-weather tree varieties in a greenbelt to increase the chance that some species will survive as the climate changes. Another example would be sizing road culverts and stream crossings larger to accommodate predicted larger precipitation events. BMPs should be implemented to prevent the exacerbation of instabilities and other water quality problems caused by a changing climate.

Strategy

II-12-A: NPS Program Staff will research and develop and update design criteria for BMPs, particularly rainfall and vegetation criteria, to ensure expected performance as climate change occurs, and apply the criteria to appropriate BMPs.

Short Term Actions:

II-12-A-1: By January 1, 2016, NPS staff will update precipitation information in NPS Program guidance documents to most current precipitation data in NOAA Atlas 14. This includes updating Table 1 (24-hour rainfall event for given recurrence interval) and Table 2 (10 percent exceedance rainfall events) from the Introduction Section of the *MDEQ Best Management Practices Manual*.

II-12-A-2: Beginning June 1, 2015, NPS, staff will consider climate change performance in routine updates of all BMP design documents as those documents are updated.

Strategy:

II-12-B: Given that weather and environmental conditions can vary substantially from one area of Michigan to another, much of the responsibility for selecting and implementing appropriate BMPs will be coordinated through the implementation of local WMPs.

Stakeholders involved in the development of WMPs have requested help preparing plans that consider the impacts of climate change on efforts to restore and protect water quality as climate change occurs. While the predicted impacts of climate change vary among areas of the state, a few general concepts that stakeholders should consider are listed below. Some of these concepts (e.g., GI and buffer strips) are high priority activities for the NPS Program and are covered in more detail elsewhere in the NPS Program Plan. Other activities (such as removing dams to reduce surface area impounded) may be locally important but would not be considered for NPS funding.

- Expand the use of GI and LID to (1) reduce summer storm water runoff of warm water into surface waters, and (2) enhance groundwater recharge to provide more coolwater input to surface waters.
- Increase riparian tree canopies to decrease the amount of direct solar radiation heating surface waters, wetlands and floodplains.
- Remove dams that no longer serve their purpose to reduce the surface area of impounded river water warmed by solar radiation in the summer.
- Design storm water related infrastructure large enough to accommodate increased storm water and river flows from predicted increases in precipitation over the life of the practice.
- Expand the use of buffer strips to filter increased storm water runoff before it reaches surface waters.
- Protect and restore wetlands and floodplains to rivers to absorb storm water runoff to: (1) minimize the magnitude of streambank erosion from high flow stream events, and (2)

increase the amount of groundwater recharge to streams during the low-flow summer period. Minimize development and conversion of wetlands and floodplains.

- Install rain barrels at buildings to reduce storm water runoff rate and volume for stream channel protection. Also, rain barrels can provide irrigation water for nearby vegetation, particularly during the summer.
- Increase the use of conservation easements to reduce storm water runoff and soil erosion, while preserving groundwater recharge.
- When installing a new greenbelt or enhancing/expanding an existing one, use a diverse set of plant species paying particular attention to those species with the ability to survive warmer, longer and drier summers, yet are also able to withstand longer periods of saturated spring soil. A diverse plant assemblage is also important to help mitigate the impacts of anticipated increases in pest populations and the arrival of new pests due to a warming environment.
- Encourage the concept of using “the right plant for the right place.” This could include drought tolerant native species in exceptionally sunny, dry locations to minimize the need for summer irrigation.
- Plant more trees to increase the acreage of forested land cover, which protects against soil erosion and minimizes storm water runoff, while enhancing groundwater recharge and sequestering carbon from the atmosphere.

Short-Term Action:

II-12-B-1: Beginning June 1, 2015, NPS staff will work with local partners as needed when WMP updates are prepared to encourage the consideration of potential climate change impacts when selecting BMPs.

Objective II-13: Prevent the spread of invasive species during the implementation of activities to restore impaired waters and protect high quality waters from NPS threats.

Michigan’s aquatic ecosystems are negatively impacted by AIS that are already present and the state’s waters are continually threatened by new invasions. The introduction of AIS into state waters has had a significant negative effect on natural resources, human health and recreational opportunities. Also, AIS and terrestrial invasive species can have significant economic impacts on waterfront property values, tourism, utilities and other industries.

NPS Program staff and stakeholders have opportunities to minimize the risk of spreading invasive species during the course of implementing activities to reduce NPS pollutant sources and causes of impairment. Examples include:

- Conducting monitoring in upstream areas before downstream areas to decrease the likelihood of carrying species farther up into the watershed or visiting the least invaded sites before invaded sites during monitoring trips.
- Before moving between sites, perform basic decontamination steps such as:
 - Visually inspecting and removing any plants or mud from footwear.
 - Visually inspecting and removing and properly disposing of any plants and mud from field equipment and vehicles.

- Draining all water from boats and equipment prior to leaving the site and before entering a new waterbody.
- Thoroughly drying boats and equipment between sites.
- Disinfecting boats and equipment between sites.
- Using only native plants and seed for restoration and BMPs

In addition, the WRD is asking all stakeholders to be on the look for invasive species that have a limited distribution or are not yet known to be established in Michigan. A “Watch List” of Michigan’s high priority AIS and instructions for reporting sightings are available on the MDNR’s website.

Strategy:

II-13-A: NPS Program staff will take steps to minimize the risk of spreading terrestrial and aquatic invasive species during the implementation of measures to address NPS pollutant sources and causes of impairment.

Short Term Actions:

II-13-A-1: The NPS Program will add language to all NPS pass-through grants requiring grantees to take appropriate steps to minimize the risk of spreading terrestrial and aquatic invasive species.

II-13-A-2: The NPS Program will not fund pass-through grant projects that propose to use invasive species as part of their BMPs. BMP site plans that include vegetation must include species lists that will be reviewed against lists of invasive exotic species (such as [Michigan Invasive Plant Species Accounts](#), [A Field Identification Guide to Invasive Plants in Michigan’s Natural Communities](#), and [A Field Guide to Invasive Plants of Aquatic and Wetland Habitats for Michigan](#)). Native species will be promoted and the use of invasive exotic species will be prohibited in grant funded projects.

CHAPTER 5: INFORMATION AND EDUCATION

Goal III: Increase public awareness of NPS pollutants and causes of impairments and encourage individuals to adopt behaviors to reduce NPS pollutants and causes of impairments.

While surveys indicate a growing awareness of NPS issues and specific BMPs, many people do not comprehend how their daily actions and individual decisions contribute to NPS pollution. Effective information and education efforts have been shown to raise awareness leading to changes in social norms which are the precursor to changes in behavior. Changed behavior such as implementation of managerial or physical BMPs result in reduced NPS pollution and improvements to water quality.

Confirming that awareness and attitudes are changing and behaviors are being adopted in a watershed through social monitoring is one way to demonstrate interim progress toward meeting WMP goals. Monitoring social indicators, like monitoring environmental indicators, will provide valuable information about how well management strategies are working. Developing an evaluation process will provide a mechanism for continuous improvement of an information and education program and help determine whether objectives have been achieved.

The NPS Program's information and education strategy will focus on developing an informed and engaged public, providing clear guidance and direction, and evaluating the success of efforts to restore and protect our rivers and lakes from NPS pollution impacts. The issues and solutions vary across the state so specific actions will focus at a statewide, regional, and local watershed scale as appropriate. The information and education activities will involve a variety of approaches including developing and distributing education materials, sponsoring workshops/trainings, providing assistance, evaluating progress and building partnerships.

Objective III-1: Help stakeholders become aware and engaged in protecting surface and groundwater from NPS pollution.

The challenges of finding guidance, technical support, or financial assistance to address NPS problems can be overwhelming for watershed stakeholders. The information may be complicated to understand, scattered in numerous locations, unclear in the objectives, or out of date. It is therefore important that the educational tools provided by the NPS Program be current, relevant and provided in a readily accessible manner. Educational efforts will connect stakeholders with tools specific to their issues utilizing different available methodologies.

Strategy:

III-1-A: The NPS Program will maintain a multimedia collection of information and education outreach materials for distribution to watershed groups, grantees, and other stakeholders.

Short-Term Action:

III-1-A-1: Each fiscal year, NPS Unit staff will identify publications that are still relevant and determine which should be updated. Out-of-date materials will be retired or updated and produced for distribution as resources allow. Relevant materials in short supply will also be reprinted as resources allow.

Strategy:

III-1-B: The NPS Program will work to make local governments aware of and enact ordinances for long-term protection of water quality in all priority watersheds of the state.

Short-Term Actions:

III-1-B-1: The NPS pass-through grant RFP will place a priority on projects to implement long-term protection activities with a focus on actions such as water quality based local ordinance assessment and development.

III-1-B-2: By October 31, 2015, NPS Unit staff will work with the MNSP Policy Sub-Committee and the Surface Water Assessment Section's (SWAS) Wetlands Lakes and Streams unit to coordinate information and education efforts with regards to model ordinances for water quality protection in riparian areas.

Strategy:

III-1-C: The NPS Program will look for opportunities to develop partnerships for training to integrate program process and messages.

Short-Term Actions:

III-1-C-1: NPS Program Staff will partner with other organizations and agencies to provide statewide trainings specifically related to watersheds, (such as the Michigan Water Environment Association's Watershed Summit, the Shoreline and Shallows Conference, and the Inland Lake Convention) or specific NPS pollution sources (storm water and shoreline erosion for example).

III-1-C-2: NPS Program Staff will work with MSU Extension's Lake and Stream Leaders Institute to integrate and promote the NPS message and train stakeholders.

III-1-C-3: NPS Program Staff will work with local stakeholders in targeted watersheds with approved WMPs to identify and implement priority information/education recommendations to reduce NPS pollutants.

Objective III-2: Communicate effectively to provide clear guidance and direction to stakeholders.

The NPS Program is complex and communicating program goals and guidance is critical to program success. Different methodologies are used to describe how the program components are connected, provide a consistent message, and communicate expectations so that staff and stakeholders know their roles and how their contributions fit.

Strategy:

III-2-A: The NPS Program will maintain a Web site with accurate up to date information. This will include specific information covering grant administration, technical information and guidance on topics such as: land use planning and zoning; environmental and storm water ordinances; water quality BMP design and implementation; and water quality information and education materials from around the state.

Short-term Action:

III-2-A-1: By October 31, 2015, NPS Unit staff will complete a review of publications and links to ordinances for water quality/land use planning. The Web site will be updated to include up-to-date and pertinent information on watershed protection.

Strategy:

III-2-B: The NPS Program will communicate clearly regarding program goals, objectives, resources and services utilizing traditional and new technological methods.

Short-term Action:

III-2-B-1: The NPS Unit will annually develop a series of webinars to educate stakeholders about the NPS Program priorities and pass-through grants.

Objective III-3: Monitor the effectiveness of information and education activities to determine program and project success.

Social monitoring is necessary to assess attitudes and conditions in the social, economic and political structures that impact decisions related to water quality. This monitoring is an important part of efforts to target outreach towards the intended audience, and measure the effectiveness of efforts to change knowledge and behavior regarding NPS pollution.

The USEPA, Region 5, has teamed with the Region 5 State NPS Programs and the six Land Grant Universities to develop methods for measuring social change regarding watershed projects and evaluate state and local activities regarding watershed education. A key charge to this work group was to create a toolkit for local governments, watershed groups, and other stakeholders to use to conduct social monitoring. The Social Indicators Data Management and Analysis (SIDMA) toolkit includes a spatial analysis tool with key demographic data, samples of surveys, samples of QAPPs, and themes or messages for watershed outreach. NPS grantees began using the toolkit in 2009 and the NPS Program expects that future grant-funded programs that include social monitoring tasks will use the protocols.

The SIDMA tool was developed by MSU with support from a Section 319 pass-through grant from the MDEQ. SIDMA will be used to build locally appropriate surveys, analyze and compare survey results among watersheds, and quantify NPS social indicator status. MSU will maintain this system allowing for continued access and updates to the SIDMA system. In addition, the Region 5 Social Indicators Workgroup developed the Social Indicators Planning and Evaluation System (SIPES) to help stakeholders plan and implement social monitoring projects.

NPS programs within each Region 5 state have agreed to support social indicators in the following ways:

- Work closely with project staff to help them understand which steps in the SIPES apply to their projects.
- Help project staff determine what types of mid-project evaluations are necessary.
- Help stakeholders collect data using the SIPES protocols.
- Communicate with USEPA and the regional social indicators team on refining and improving SIPES.

- Begin using social indicator data as part of their state program evaluation framework to help identify opportunities to improve program impacts.
- Consider long-term monitoring approaches and opportunities for using social indicators.

Strategy:

III-3-A: The NPS Program will work in partnership with the USEPA Region 5 and Social Indicators partners to provide statewide, regional, and local measures for evaluating the effectiveness of educational efforts. Social monitoring will be based on SIPES protocols and SIDMA will be the primary tool for social measure.

Short-Term Actions:

III-3-A-1: On an ongoing basis, the NPS Unit staff will provide guidance on social monitoring to NPS Staff and watershed stakeholders. Examples of this guidance includes: assistance in developing grants/contracts, reviewing QAPPs, assistance during the survey process and reviewing the final analysis.

III-3-A-2: NPS Unit staff will continue to work with the USEPA Region 5 and Social Indicators partners to promote a social monitoring toolkit to help stakeholders collect, in a consistent manner, social indicator and other pertinent information of targeted audiences. The NPS information and education coordinator will continue to provide input to the USEPA.

Strategy:

III-3-B: The NPS Program will continue to communicate program successes and the benefits of improved water quality achieved through NPS pollution control.

Short-Term Actions:

III-3-B-1: The NPS Program will develop two information and education success stories each year. These success stories will be posted on the MDEQ's NPS Web site. Success stories could be instances where there is a document increase in knowledge or change in behavior that positively impacts water quality, or where work on a project spurs others to follow-up and address NPS water pollution. These success stories will be reported to the USEPA by August 1 of each year.

III-3-B-2: NPS Program staff will update *Michigan's Nonpoint Source Program; Program Highlights 2007-2012* in 2018. This update will summarize the status of efforts between 2012 and 2017 to meet Program measures of success and will be used as an information and education piece.

CHAPTER 6: FUNDING

Goal IV: Efficiently manage pass-through grants and help stakeholders identify funding sources to restore and protect watersheds.

Since 1988, the MDEQ has utilized an annual award from the USEPA under the CWA, Section 319, to fund Michigan's NPS Program. This is the primary source of NPS funding for most state agencies and constitutes approximately \$4.6M annually for Michigan. With this, Michigan funds NPS staff throughout the state to provide technical and administrative support to the program and grantees. Approximately 50 percent of the Section 319 grant funds are provided competitively to sub-state units of government (counties, cities, townships, and villages), public and private colleges and universities, regional planning agencies, and incorporated nonprofit organizations to develop and implement WMPs.

Some federal CWA water quality planning funds, under Sections 604(b) and 205(j), are also used by the NPS Program to provide pass-through grants for planning projects.

Complementing the federal NPS funds are CMI bond funds. The CMI was approved by Michigan voters in November 1998 and included \$50 million for NPS pollution control grants. These CMI NPS grants have been made available through a competitive pass-through process like the Section 319 grants, and whenever possible, the two funds are coordinated into one RFP process and set of awards.

Each of the Michigan NPS pollution control grants requires matching funds as specified in the RFP. For example, watershed planning grants (when available) require a 15 percent minimum match, while watershed implementation projects require 25 percent minimum match. The sources of match have included grants from other entities, foundation funding, in-kind services, time and labor from consultants and other partners, donations from local businesses, donated volunteer time, and "bargain sales" for conservation easements.

Objective IV-1: Efficiently select and manage 319 and CMI-NPS pass-through grants to provide support to stakeholders to restore and protect watersheds

Strategy:

IV-1-A: The NPS Program will continue to administer a pass-through grants program with the goal of providing support to sub-state units of government (counties, cities, townships, and villages), public and private colleges and universities, regional planning agencies, and incorporated nonprofit organizations to develop and implement WMPs.

Short-Term Actions:

IV-1-A-1: By June 1 of each year, NPS Staff will identify WMP development and implementation priorities consistent with the NPS Program Plan. These priorities will favor projects that yield measurable in situ improvements resulting in the restoration of water bodies or projects that result in long-term protection of water bodies.

IV-1-A-2: By October 1 of each year, the NPS Program will release a pass-through grant RFP with priorities consistent with the NPS Program Plan as well as applicable Section 319 and CMI funding restrictions.

IV-1-A-3: The NPS Program staff will provide technical and administrative assistance to grant applicants.

IV-1-A-4: The NPS Program staff will review proposals each year and select the projects that best meet the RFP priorities.

IV-1-A-5: The NPS Program will administer pass-through grants. This includes administration of the Section 319, CMI, 205(j), GLRI, and state license plate funded projects listed in Appendix 3. The NPS Program staff will do the following tasks:

- The NPS project administrators will provide assistance to each grantee to ensure that projects are successfully implemented.
- The NPS Program district staff will provide technical assistance to potential applicants and grantees in coordination with unit staff.
- The NPS Program engineers will provide technical assistance, review, and approve (as appropriate) all BMP plans to be implemented with grant funds.
- The NPS Monitoring Coordinator will provide technical assistance with the development and implementation of grant-funded environmental monitoring. In addition, the NPS Unit Chief will approve all QAPPs for grantee environmental monitoring prior to initiation of monitoring projects.
- The NPS Information and Education Coordinator will provide technical assistance with the development and implementation of grant funded social monitoring. In addition, the NPS Unit Chief will approve all QAPPs for grantee social monitoring prior to initiation of monitoring projects.
- The NPS Program staff will provide technical assistance in the area of hydrology and stream morphology to grantees.
- The NPS Program financial analysts will work with project administrators and assist grantees with the financial aspects of grants administration and ensure that appropriate payments are made.

IV-1-A-6: NPS staff will continue to improve the NPS sub-grant project selection process by reviewing the process on an annual basis and incorporating recommended changes as needed. This will include periodic reviews to verify that the grant administrative requirements for Section 319 and CMI funded grants are appropriate for both staff and grantees given the requirements of similar grant programs within the MDEQ.

Objective IV-2: Provide technical support to other state grant and loan programs to eliminate or reduce NPS pollutants and causes of impairments.

SRF: The NPS pollution portion of the SRF provides low interest loans to local municipalities to address NPS pollution issues. Applications must be consistent with an approved WMP and Michigan's NPS Program Plan submitted to the USEPA. However, the use of SRF loans for NPS activities is underutilized in Michigan compared to other states. The SRF program has been used in other states to fund the correction of on-site/decentralized wastewater treatment,

agricultural cropland conservation practices, stream hydromodification BMPs, forestry BMPs, groundwater remediation, and urban storm water BMPs. In addition, other states have used SRF loans to supplement their grants program and EQIP dollars.

Strategy:

IV-2-A: The NPS Program will look for opportunities to use NPS SRF loans to eliminate or reduce NPS sources of pollution.

Short-Term Actions:

IV-2-A-1: NPS pass-through grant RFPs and RFP announcements will include a link to the SRF Program.

IV-2-A-2: NPS Program Staff will review and score SRF-NPS loan applications and review site plans upon request and as resources allow.

Other state grant funds: The State of Michigan awards grants and loans for a variety of activities related to NPS pollution control. Examples include the dam removal grants administered by the MDNR; Stormwater, Asset Management and Wastewater (SAW) grants and loans administered by the MDEQ, Office of Drinking Water and Municipal Assistance; and monitoring grants administered by the MDEQ, WRD.

Strategy:

IV-2-B: The NPS Program will continue to look for opportunities to coordinate funding with other pass-through grant programs within the MDEQ and other state agencies.

Short-Term Action:

IV-2-B-1: NPS Program staff will continue to review applications for state grants such as the SAW, and MiCorps grants. NPS Program staff will assist with SAW plan development as resources allow.

Objective IV-3: Provide technical support to other federal grant programs intended to eliminate or reduce NPS pollutants and causes of impairment.

The NPS Program works with various federal agencies to leverage and coordinate funds. For example, the MDOT's Transportation Enhancement Program offers a variety of federal transportation-related grants including grants for projects to implement environmental mitigation to address water pollution due to highway runoff and the NPS Program continues to look for opportunities to coordinate with them.

The NPS Program works with the NRCS and the Farm Service Agency to leverage and coordinate federal Farm Bill dollars that have the potential to address agricultural-related NPS water quality issues. This includes having input on the spending priorities for the EQIP funds for Michigan; annual involvement in the selection of watersheds to receive Conservation Security Program funding; input into the Wetland Reserve and Conservation Reserve Programs; and providing assistance to stakeholders developing and implementing Regional Conservation Partnership Program grants.

In addition, to providing input into the selection of priorities for federal grant RFPs, the NPS Program reviews grant applications for other programs with similar objectives. For example, the NPS Program staff reviewed National Fish and Wildlife Federation grant proposals and Great Lakes Commission soil erosion control grant proposals.

NPS staff also administers several GLRI grants and provide technical assistance to outside entities managing GLRI nonpoint source grants.

Strategy:

IV-3-A: The NPS Program will continue to work with federal, state, and local entities to coordinate and leverage federal grant funds to maximize water quality restoration and protection.

Short-Term Actions:

IV-3-A-1: The NPS Program staff will continue to coordinate efforts to provide RFP priorities for federal pass-through grant programs (such as EQIP). The recommended RFP priorities will be consistent with the NPS Program's priorities related to controlling NPS pollution to protect or restore water quality.

IV-3-A-2: The NPS Program staff will continue to review grant applications for federal grant funds (such as the Great Lakes Commission soil erosion control grants) and recommend projects that best meet the NPS Program's priorities related to controlling NPS pollution to protect or restore water quality.

IV-3-A-3: The NPS Program staff will continue to pursue funding for and provide administration of NPS related GLRI grants awarded from the USEPA, and provide technical assistance to other agencies receiving NPS grants in Michigan, as appropriate.

IV-3-A-4: The NPS Program staff will continue to assist with the development and implementation of Regional Conservation Partnership Program grants upon stakeholder requests and as resources allow. Participation could include participating in stakeholder meetings and seeking USEPA approval to use Section 319 and CMI grant projects as match.

Objective IV-4: Work in partnership with foundations to support local watershed groups.

Watershed organizations struggle to maintain sustainable funding for staff that solely focuses on implementing watershed plans, providing technical support to municipalities, and providing information and education support. Some organizations have been able to accomplish this through the establishment of endowment funds, membership dues, grants, donations, and local fundraising events.

In addition, local watershed groups have benefited from the support of foundations. The NPS Program will identify opportunities to work in partnership with foundations to support local watershed groups. The Council of Michigan Foundations produces a directory of over 2,500 foundations that give money in Michigan. This directory can be purchased online at *published link was broken and has been removed*.

Strategy:

IV-4-A: The NPS Program will work to improve relationships with foundations, both locally and at the statewide level.

Short-Term Actions:

IV-4-A-1: The Saginaw Bay District NPS staff will continue to work with the Bay Area Community Foundation on development of the Saginaw Bay Watershed Restoration Fund.

IV-4-A-2: The Saginaw Bay District NPS staff will continue to work with the Saginaw Bay Watershed Initiative Network in their proposal development and review process to address NPS pollution in the context of sustainable communities.

CHAPTER 7: COMPLIANCE AND ENFORCEMENT

Goal V: Support compliance and enforcement efforts to restore and protect priority watersheds

There are instances where water quality impacts can be directly attributed to a specific NPS. In these cases, the MDEQ staff work with the landowner or responsible party or refer the situation to the proper agency to address the problem and obtain compliance with state environmental laws. If the responsible party does not satisfactorily address the problem and its cause, it may be appropriate for the MDEQ to take enforcement action to protect Michigan's water resources.

Objective V-1: Provide technical assistance to regulatory programs as appropriate to increase compliance effectiveness.

Strategy:

V-1-A: NPS Program staff will provide assistance to regulatory programs.

Short-Term Actions:

V-1-A-1: NPS Program staff will provide geomorphology and natural channel design expertise to Part 301, Inland Lakes and Streams, of the NREPA, permit staff upon request.

V-1-A-2: NPS Program staff will consult with Parts 31, Water Resources Protection; Part 91, Soil Erosion and Sedimentation Control; Part 301, Inland Lakes and Streams; and Part 303, Wetlands Protection, of the NREPA, staff before developing or updating BMPs.

V-1-A-3: Staff in the Saginaw Bay District Office will annually document communities with identified problems due to failing on-site wastewater treatment systems and report corrective actions taken.

Objective V-2: Provide technical assistance to enforcement efforts to increase effectiveness.

Strategy:

V-2-A: NPS Program staff will provide assistance to enforcement staff building cases to address impairments caused by NPS pollutants.

Short-term Action:

V-2-A-1: NPS Program staff will provide technical assistance to enforcement staff upon request.

Objective V-3: Investigate complaints related to NPS pollution or water quality impacts.

Strategy:

V-3-A: Citizen complaints regarding nonpoint source related water quality issues will be investigated and follow-up actions taken.

Short-term Action:

V-3-A-1: NPS Program staff will investigate nonpoint source related water quality complaints delivered by citizens directly to staff or via the Pollution Emergency Alerting System. Staff will take appropriate follow-up actions that may include public outreach to stakeholders on NPS or issues.

CHAPTER 8: MONITORING

Goal VI: Focus monitoring to document impairments and threats to high quality waters, and assess the effectiveness efforts to restore and protect priority watersheds.

Accurate problem identification and effectiveness monitoring are necessary to target NPS pollution control efforts and link NPS pollution control activities with changes in water quality. In addition, organizations funding NPS control efforts desire more confirmation that these activities are making a difference in water quality, especially since significant amounts of money and time have been, and will continue to be, spent at the local, state, and federal levels to address NPS problems.

In September 2004, the MDEQ completed the *Nonpoint Source Environmental Monitoring Strategy*. The strategy describes how Michigan's water monitoring programs support the pollution control efforts of the NPS Program. The strategy describes how the NPS monitoring priorities are set, how monitoring is used to track improvements in water quality following implementation of NPS control actions, and how the monitoring results are communicated and used in program decisions.

The strategy groups NPS monitoring into four broad categories for discussion purposes: (1) statewide trend monitoring; (2) problem identification monitoring; (3) TMDL development and effectiveness monitoring; and (4) NPS control effectiveness monitoring. The strategy also identifies and describes the various NPS monitoring tools used by the MDEQ and its contractors. A key part of the strategy is a description of how monitoring results are conveyed to resource managers and the public, and how study conclusions are used in NPS Program decision making. The NPS Program Plan incorporates recommendations from the monitoring strategy.

Objective VI-1: Identify NPS monitoring priorities, plan monitoring studies and report results.

Priority setting and planning activities include evaluating available resources, establishing NPS monitoring priorities, and determining monitoring needs. Study design and implementation includes selecting specific monitoring objectives, projects, and locations; developing monitoring plans for implementation by MDEQ staff; and working with grantees and contractors to develop monitoring plans and QAPPs. Data management and reporting includes storing data electronically and preparing final reports.

Strategy:

VI-1-A: The MDEQ will establish NPS monitoring priorities and allocate NPS monitoring resources in a manner that ensures that monitoring results can be used to target future actions, measure program and project success, and make program adjustments based on lessons learned.

Short-Term Actions:

VI-1-A-1: The NPS monitoring coordinator will annually update the *NPS Program Multi-Year Plan* by December 31 of each year. The *NPS Program Multi-Year Plan* update will include the following elements:

1. The status of NPS Program monitoring priorities and recommendations developed to date.
2. A description of any multi-year effectiveness monitoring projects underway (including NPS related TMDL effectiveness monitoring projects) and a list of watersheds that may be targeted for short-term effectiveness monitoring projects.

VI-1-A-2: Each year the MDEQ'S SWAS will distribute a letter to internal and external partners seeking water quality monitoring recommendations. The NPS monitoring coordinator and NPS District staff will work with local groups to identify sites that may require future monitoring.

VI-1-A-3: Each year the SWAS staff will convene meetings to discuss monitoring needs in each of the major watersheds targeted for monitoring. Meeting participants will include NPS Program staff, SWAS monitoring staff, WRD permit staff and MDEQ's Area of Concern (AOC) staff as appropriate. Participants will discuss problem identification, TMDL, trend and project effectiveness monitoring

VI-1-A-4: Before March 30 of each year, SWAS managers will review all of the NPS monitoring needs, balance those needs against other WRD monitoring needs and allocate available monitoring full-time equivalent positions and funding.

VI-1-A-5: The NPS monitoring coordinator will work with grantees and NPS staff to develop and approve monitoring plans and QAPPs. The NPS Unit Chief will approve QAPPs.

VI-1-A-6: The SWAS monitoring staff and NPS Program staff will ensure that data are entered into the appropriate electronic databases including USEPA's Storage and Retrieval System (STORET). The NPS project administrators will ensure that contractors and grantees provide appropriate data in a STORET-ready format before a grant or contract is closed. The SWAS STORET coordinator will enter a grantee's and contractor's STORET-ready data into STORET.

VI-1-A-7: The SWAS staff reports summarizing water quality in target watersheds will include a separate section highlighting the NPS problem identification results.

Objective VI-2: Identify waters of the state that are not meeting designated uses or where designated uses are threatened due to NPS causes and sources.

The MDEQ implements a number of routine monitoring activities designed to assess the waters of the state on a regular basis, respond to complaints about water quality, and monitor conditions at sites with known or suspected water quality problems. Much of the problem identification monitoring is conducted on a five-year rotating basin-year monitoring schedule (Table 8.1).

Water quality measurements are compared to specific WQS that have been established in Michigan to protect surface waters for certain designated uses. Designated uses and WQS are briefly described in Chapter 2.

Most of the routine water quality assessment monitoring conducted by WRD staff includes rapid assessment techniques, such as the SWAS surveys. The SWAS surveys include biological assessments as well as water and sediment chemistry monitoring to identify impaired water bodies and causes of impairment. NPS pollution problems observed during the SWAS surveys are reported to appropriate NPS Program staff for additional monitoring or follow-up corrective action.

Table 8.1. Five-Year rotating watershed monitoring schedule.

2015	2016	2017	2018	2019
Au Train-Chocolay	Carp (Marquette County)	Menominee	Iron	Carp (Mackinac County)
Cedar	Misery	Au Sable	Montreal	Charlotte and Upper St. Marys
Escanaba	Portage	Black (Alcona County)	Ontonagon	Millecoquins
Fishdam	Sturgeon (Houghton County)	Black (Van Buren County)	Presque Isle	Manistique
Ford	Salmon	Galien	Upper Wisconsin	Munuscong and Lower St. Marys
Rapid	Tobacco	Huron	Bear	Pendill's Creek
Sturgeon (Delta County)	Au Gres/Tawas	Looking Glass	Betsie	Pine
Whitefish	Cass	Maple	Boardman	Tahquamenon
Black (Cheboygan County)	Detroit	St. Clair	Cherry	Two Hearted
Kawkawlin-Pine	Upper Grand	Tittabawassee	Elk	Waiska
Macatawa	Muskegon	White	Flat	Big Sable
Ocqueoc	Paw Paw		Flint	Clinton
Pentwater	Red Cedar		Lake Michigan Shoreline Tribs	Lower Grand
Pere Marquette	Lower St. Joseph		Lake St. Clair Tribs	Kalamazoo
Rouge			Pigeon	Manistee
Shiawassee			Pine	Rifle
Upper St. Joseph			Platte	Saginaw
Swan			Rabbit	
Thunder Bay			Raisin	
Wiscoggin			Rogue	
			Thornapple	

WRD district staff responds to citizen complaints and the results of these actions are used to direct future NPS pollution control actions or additional monitoring.

Finally, if the MDEQ or its NPS grantees discover NPS problems on federal lands in the course of the monitoring activities described above (e.g., inappropriate forest management practices on national forest lands that result in NPS pollution), or that federal programs are not being run consistent with our program (e.g., federal farm dollars are improperly supporting practices that do not address NPS problems), this issue will be brought to the attention of the appropriate federal agency. If a satisfactory resolution to the problem cannot be achieved, the issue will be brought to the attention of appropriate USEPA staff.

Strategy:

VI-2-A: The MDEQ will conduct problem identification monitoring to ensure that new water quality problems caused by NPS pollution are identified and corrected in a timely manner.

Short-Term Actions:

VI-2-A-1: Each year, the MDEQ will target problem identification monitoring to cover the appropriate watersheds listed in Table 8.1.

VI-2-A-2: In the event that MDEQ staff discovers NPS problems on federal lands during the course of routine monitoring, staff will bring these problems to the attention of the appropriate federal agency. If that agency is unwilling or unable to address problems identified by the MDEQ, then the MDEQ will notify the USEPA.

Objective VI-3: Develop new monitoring and assessment tools and provide technical assistance to stakeholders.

The NPS Program is continually looking for new tools to help staff and stakeholders identify NPS problems and assess the effectiveness of NPS BMPs. The NPS Program is particularly interested in tools that will help stakeholders conduct watershed inventories; identify critical areas and sites; and identify critical pollutants. Also, the MDEQ's rapid assessment protocol, Procedure 51, is a multi-habitat semi-quantitative assessment of macroinvertebrate community composition that is frequently used to assess BMP effectiveness. However, the NPS Program recognizes that collecting more quantitative macroinvertebrate community data is useful for certain BMP effectiveness studies. More quantitative procedures, focused on sampling the habitat feature(s) most impacted by certain NPS BMPs, like stream bank stabilization or road stream crossing repairs (usually riffles), are being evaluated by the WRD.

In addition, alteration of stream hydrologic regimes resulting from large-scale land use changes is a major problem in watersheds throughout Michigan. Changes in storm water runoff rates, post-storm peak flows, and base flow discharges impact stream bank and stream bed erosion rates, in-stream habitat features, and aquatic and riparian biological communities. Many Section 319 project proposals aim to address these problems via BMPs like stream bank stabilization and stream channel restoration. Problems like bank erosion and in-stream habitat degradation can be caused by factors other than hydrologic alteration, so it is desirable to distinguish problems caused by large-scale storm water flows from those caused by local factors like livestock access or poorly maintained road stream crossings. The MDEQ is developing monitoring tools to address this need. This effort currently focuses on assessing the following:

- Hydrologic alteration.
- Stream geomorphic condition.
- Watershed and stream channel stability.

One manifestation of large-scale hydrologic alteration is an increase in post-storm peak flows. A common tool for assessing the magnitude of change in peak flows over time is a stream flashiness index. There are several stream flashiness indexes in the literature, and the MDEQ has chosen to use the Richards-Baker flashiness index (R-B Index). An R-B Index value is calculated with discharge data at USGS stream gage stations for each year of record, and trends in the index values over time are assessed with regression statistics. MDEQ staff has identified over 300 USGS gage stations with an appropriately long period of record, calculated R-B Index values, and performed trend analyses.

Another tool under development is stream geomorphology regional reference curves. The results of this project (graphs of drainage area versus channel width, depth, and cross-sectional

area) will be used for problem identification, and for designing stream restoration projects and evaluating their success.

The flashiness index and the regional reference curves are two components of a suite of tools developed to assist NPS grant applicants to assess the scale of their perceived NPS problem. Another tool currently recommended by the NPS Program is the Bank Erosion Hazard Index; a field procedure for rapidly and quantitatively assessing the condition of stream banks. Other tools, such as channel evolution models, excess shear stress calculations, and more qualitative indicators of stream condition are also being evaluated.

Strategy:

VI-3-A: Continue to develop monitoring tools and provide technical support to NPS grantees, watershed groups, and other interested parties.

Short-Term Actions:

VI-3-A-1: The flashiness index data will be updated for all the current USGS gages every five years, with the last update completed in 2012. In 2017, the NPS Program will post the updated stream flashiness report on the NPS Web site.

VI-3-A-2: On an ongoing basis, the NPS Program will support volunteer monitoring groups through technical assistance and training, as well as direct them to the MiCorps Volunteer Monitoring Program.

Objective VI-4: Assess the effectiveness of NPS restoration and protection activities.

Trend Monitoring: In 1998, the MDEQ began implementing a monitoring plan designed to provide a comprehensive assessment of the quality of Michigan's surface waters. The monitoring plan consists of nine program elements: fish contaminants, water chemistry, sediment chemistry, biological integrity, wildlife contaminants, beach monitoring, volunteer monitoring, inland lake quality and eutrophication, and stream flow. The trend monitoring elements of the MDEQ's water quality monitoring plan are an important part of Michigan's effort to assess the combined effectiveness of all point and NPS load reduction activities.

Strategy:

VI-4-A: The MDEQ will coordinate and integrate trend monitoring activities with other NPS monitoring and program priorities to ensure that trend monitoring data are available to assess NPS project and program effectiveness as appropriate.

Project Effectiveness monitoring: Documenting the effectiveness of NPS pollution control activities is essential to the long-term success of the NPS Program. While the benefits of a particular BMP may be intuitive to those closest to the watershed, sound effectiveness monitoring strategies must be developed and implemented wherever necessary to provide objective assessments of the merits of NPS pollution control projects.

Developing a procedure for monitoring the effectiveness of NPS pollution control projects in Michigan is confounded by the complexity of aquatic ecosystems and pollution sources to be monitored. Effectiveness monitoring strategies that are appropriate for the largest lakes in the world may not be appropriate for an inland lake. Likewise, Michigan's rivers and streams range

from relatively small, high energy event responsive systems to low energy connecting channel rivers, which rank among the largest rivers in the world by volume of discharge. Effectiveness monitoring activities are therefore highly diverse, often with little similarity between seemingly common NPS problems.

The NPS effectiveness monitoring methodologies will range along a continuum of monitoring techniques, from quantitative to qualitative, described in more detail in the 2004 *NPS Environmental Monitoring Strategy*. The main factors in deciding whether a given BMP will be monitored qualitatively or quantitatively are:

1. The scale of the impairment's cause(s) (local or widespread).
2. The scale of the impairment's manifestation (local or widespread).
3. The characteristics of the watershed.
4. The size, scale, and type of the NPS pollution control effort.
5. The ability to control sources of variability.
6. The expected lag time in the response of the water body to the BMP.
7. Logistical considerations.

Strategy:

VI-4-B: The MDEQ, grantees, or contractors will evaluate the effectiveness of all CMI and Section 319 pass-through grant projects.

Short-Term Action:

VI-4-B-1: The NPS monitoring coordinator will work with NPS staff, grantees, and stakeholders to determine the appropriate level of effectiveness monitoring for each pass-through grant project. The NPS Program staff will provide descriptions of BMPs or NPS treatments to assist with the effectiveness design studies.

Strategy:

VI-4-C: The WRD will look for opportunities to develop "showcase" monitoring studies to highlight program success.

Short-Term Actions:

VI-4-C-1: The NPS Unit monitoring coordinator and district staff will work to identify at least one "success story" project for implementation per district per year. "Success" will be broadly defined, to include alternative measures of progress or BMP effectiveness, as well as measureable environmental improvements. Success stories will be submitted to the USEPA by August 1 of each year.

VI-4-C-2: Each year, the NPS monitoring coordinator will develop a list of potential long-term success story projects to be monitored in that year. This list will include pre-BMP and post-BMP monitoring locations. The list will be included in the NPS Program Multi-Year Plan.

VI-4-C-3: The NPS monitoring coordinator will continue to collaborate with NPS district staff and SWAS monitoring staff to implement the National Monitoring Project at the Eagle River. Post-construction monitoring is scheduled to continue intermittently until 2021.

VI-4-C-4: The WRD will continue to implement a 10-year effectiveness monitoring study at Hayworth Creek in the Upper Maple River watershed. The purpose of the study is to assess the effectiveness of the National Water Quality Initiative. Hayworth Creek was selected by the NRCS for targeted funding. The monitoring is scheduled to be completed in 2023.

CHAPTER 9: PROGRAM OPERATION

Goal VII: Efficient Program Operations

Objective VII-1: Encourage professional development for all NPS staff.

The NPS Program trains staff to ensure that they are capable of providing expert guidance regarding the development and implementation of WMPs; are knowledgeable regarding BMPs and current practices recommended by the program; and are aware of other regulatory requirements and programs used to protect water quality.

Several strategies and short-term actions regarding specific training opportunities are presented in the preceding chapters. However, the following actions are more general and intended to ensure that staff members are well-rounded experts in a variety of topics related to developing and implementing WMPs.

Strategy:

VII-1-A: Ensure that NPS Program staff are well trained and capable of providing expert guidance in the watershed approach to addressing NPS water quality issues.

Short-Term Actions:

VII-1-A-1: Each new NPS Program staff is assigned a NPS Program staff mentor, preferably in the same district/unit. The mentor is responsible for the following:

- Reviewing the state NPS Program approach with the new staff.
- Including the new staff in representative district NPS activities.
- Accompanying the new staff on representative initial tasks.
- Serving as an expert resource on the state NPS Program and NPS issues.

VII-1-A-2: The NPS Program will maintain a training plan for Program staff.

VII-1-A-3: The NPS Program will annually identify staff training needs and opportunities to gain technical knowledge and expertise in areas of importance to the NPS Program (such as land use planning, LID, emerging contaminants, or the use of GIS).

VII-1-A-4: The NPS Program Committee will develop and/or revise procedures and policies so that the day-to-day program activities are carried out consistently across the state. These procedures will be aimed at efficiently achieving program goals.

VII-1-A-5: All NPS staff are encouraged to attend at least one significant training session/workshop/conference each year. Newly hired staff will attend several training opportunities in the first two years of employment.

Objective VII-2: Align staff and resources to meet NPS Program goals; and document and communicate program successes.

The NPS Program has established a series of strategies and short-term actions to ensure effective program implementation.

Strategy:

VII-2-A: The NPS Program will look for opportunities to leverage private, federal, state and local sources of funding to develop and implement WMPs to restore impaired waters and protect high quality waters.

Short-Term Actions:

VII-2-A-1: The NPS Program will continue to leverage matching funds for Section 319 and CMI-NPS grants. These matching funds and matching grants will be reported in the NPS Program's grants database and GRTS.

VII-2-A-2: The NPS Program will target implementation of BMPs in priority watersheds. In addition, the NPS Program will track the number of grant funded practices implemented in GRTS and in the grants database.

Strategy:

VII-2-B: The NPS Program will conduct planning and reporting activities necessary to operate an efficient and effective program. This includes documenting the status of program measures of success; planning and reporting requirements necessary to meet statutory requirements and grant obligations; and meeting reporting requirements necessary to demonstrate that Michigan's NPS Program is making "satisfactory progress" toward achieving program goals.

Short-Term Actions:

VII-2-B-1: The NPS Program plan will be routinely revised to ensure that priority watersheds as well as program goals, strategies and short-term actions are up-to-date. The Program Plan updates will be completed approximately every two years and a minimum of once every five years.

VII-2-B-2: By October 15 of each year, the NPS Program will develop an annual work plan. This work plan will include all of the relevant short-term actions from the NPS Program Plan. The annual work plan will be used by the WRD for planning purposes and by WRD's NPS Program staff to develop annual performance objectives. In addition, the annual work plan will be provided to the USEPA.

VII-2-B-3: On an ongoing basis, the NPS Program will compile all of the information necessary to comply with regulations regarding the expenditure of state and federal funds. In addition, the NPS Program will continue to participate in financial audits as well as the periodic internal and external NPS Program reviews.

VII-2-B-4: By October 15 of each year, all NPS Program staff will assist with the development of a summary of the status of each of the short-term actions from the annual work plan. This summary will be provided to the WRD management team as well as the USEPA in partial fulfillment of annual reporting requirements.

VII-2-B-5: By October 15 of each year, the NPS Program will provide to the USEPA Region 5 the information necessary to satisfy the Section 319 grant reporting requirements outlined the 2013 *Nonpoint Source Program Grants Guidelines for States and Territories*.

VII-2-B-6: The NPS Unit will develop a summary of measures of success every two years. The summary will be developed in the winter of even years (beginning in 2014) following release of the latest draft of the integrated report. The summary will be posted on the NPS Web site and submitted to the USEPA via GRTS.

VII-2-B-7: NPS Program staff, in conjunction with the annual "Partner Awards", will produce a short synopsis of the prior year's program successes which will serve as the focus of a press release and letters to appropriate members of the legislature also announcing the current Partner Award recipients.

NPS Program Measures of Success

The NPS Program will use measures of success to assess and report Program effectiveness. The measures of success cover three main categories: environmental, public outreach and administrative. Attaining measures of success in each of these areas is key to an effective program.

Environmental Measures of Success

The NPS Program has established a series of environmental measures of success related to restoration of impaired waters, protection of high quality waters, protection of wetlands and control of NPS pollution.

Restoration of Impaired Waters

The NPS Program will work with other local, state, and federal programs to meet Michigan's share of the following three strategic targets established by the USEPA:

Measures of Success:

MOS-1: Between October 1, 2012 and September 30, 2017, the NPS Program, in collaboration with other programs, will target restoration of ten water bodies (impaired by pollutants other than mercury or PCB) included on the state's nonattainment list in 2006.

MOS-2: Between October 1, 2012 and September 30, 2017, the NPS Program will target restoration of 20 specific causes of water body impairment included on the state's nonattainment list in 2006.

MOS-3: Between October 1, 2012 and September 30, 2017, The NPS Program will improve water quality conditions in five 12-digit HUC watersheds in Michigan.

MOS-4: Between October 1, 2012 and September 30, 2017, the NPS monitoring coordinator and NPS district staff will develop 20 environmental success stories.

Protect and Restore Natural Hydrology

The NPS Program will focus on activities to restore and protect the natural hydrology of streams. In addition, the NPS Program will look for opportunities to use stable stream design BMPs as appropriate.

Measure of Success:

MOS-5: Between 2012 and 2017, the number of streams in Michigan showing increased flashiness as measured by the R-B Index will not increase. Gauged streams will be divided into three categories: (1) increasing flashiness, (2) decreasing flashiness, and (3) no change. The number of streams with increasing flashiness in 2017 will not increase compared to the number with increasing flashiness in 2012. The number of streams with decreasing flashiness will increase between 2012 and 2017. The 2012 baseline for this measure of success is 39 streams with increasing flashiness and 31 streams with decreasing flashiness.

Protection of High Quality Waters

The NPS Program will focus water quality protection activities on priority watersheds with a goal of preventing the degradation of existing high quality waters by NPS pollution. In watersheds covered by a WMP, the NPS Program will seek to control NPS pollution so that existing designated uses are maintained and protected. Where, for individual pollutants, the quality of the waters is better than the WQS, that water will be considered high quality and the NPS Program will strive to maintain and protect these high quality waters.

Measures of Success:

MOS-6: The NPS Program will target long term protection of 5,000 acres in priority watersheds between January 1, 2013, and December 31, 2017. Conservation easements are the primary form of long-term protection.

MOS-7: The NPS Program will target sediment, nitrogen, and phosphorus reductions of 760 tons, 14,000 pounds and 2,300 pounds, respectively, from long-term protection practices implemented at priority watersheds between January 1, 2013, and December 31, 2017.

MOS-8: No water bodies or reaches in “healthy watersheds”, covered by approved nine element WMPs, and identified as attaining WQS in the 2012 Integrated Report will be moved to the nonattainment list due to NPS causes or pollution. “Healthy watersheds” are defined by the NPS Program as those with high ecological capacity and low stressor scores as determined from the NPS Program’s watershed prioritization process (Figure 3.1).

MOS-9: Using the 2012 Integrated Report as the baseline, no water bodies or reaches will be moved to the nonattainment list in watersheds covered by the MDEQ approved WMPs administered by “very active” watershed groups. Very active watershed groups are defined by NPS District Staff and have the following characteristics: regularly advance policies promoting a healthier watershed, continually engage stakeholder through information and education activities, have active monitoring programs, are economically supported by their stakeholders, acknowledged as local experts, and are viewed as critical participants in discussion and decisions related to the watershed.

Elimination or Reduction of NPS Pollution

The NPS Program has established the following measures of success related to pollutant load reductions.

Measure of Success:

MOS-10: For the years 2013 through 2017, the annual sum of pollutant load reductions from NPS pass-through grant funded projects will be at least 2 percent of the U.S. EPA's 2010 annual national goal for NPS pollutant load reduction. Pollutant reduction estimates will be reported to the USEPA via GRTS.

Pollutant	2010 National Reduction Goal	Michigan's Annual Reduction Goal
Phosphorus	4,500,000 pounds	90,000 pounds
Nitrogen	8,500,000 pounds	170,000 pounds
Sediment	700,000 tons	14,000 tons

Protection and Restoration of Wetlands

The NPS Program recognizes the important function of wetlands in filtering pollutants and protecting the natural hydrology of watersheds.

Measures of Success:

MOS-11: Between October 1, 2012 and September 30, 2017, the NPS Program will create or restore at least 60 acres of wetlands using pass-through grants.

Public Outreach Measures of Success

The NPS Program has established short-term actions regarding the development of information and education success stories. Success stories document measurable changes in behavior or knowledge and are used to assess the effectiveness of information and education activities and communicate program success.

Measure of Success:

MOS-12: The NPS Program will develop ten information and education "success stories" by 2017. These "success stories" will be posted on the NPS Web site.

Administrative Measures of Success

The NPS Program has established the following measures of effective program administration.

Measures of Success:

MOS-13: The NPS Program will continue to make satisfactory progress in meeting the schedule of short-term actions. Satisfactory progress determinations are made by USEPA after reviewing annual reporting information.

MOS-14: The NPS Program will continue to leverage more than the required 40 percent state and local matching funds (total) for 319 grants.

MOS-15: The NPS Program will review and approve at least 20 new nine-element WMPs between January 2012 and December 2016.

APPENDIX 1: WATER PROTECTION PROGRAMS

The 2014 Integrated Report describes a number of MDEQ programs designed to protect and restore water quality. These programs establish WQS, provide regulatory oversight for public water supplies, issue permits to regulate the discharge of industrial and municipal wastewaters, provide technical and financial assistance to reduce pollutant runoff, ensure compliance with state laws, and educate the public about water quality issues. This appendix includes the 2014 Integrated Report descriptions of selected water quality protection programs implemented in Michigan.

Abandoned Well Management

Unplugged abandoned wells threaten the quality of drinking water obtained from privately owned and publicly owned drinking water supply wells. The Office of Drinking Water and Municipal Assistance, Drinking Water and Environmental Health Section, has implemented a comprehensive Abandoned Well Management Program to coordinate statewide abandoned well location and plugging activities. Plugging abandoned wells protects the groundwater source aquifers that are used by nearly one-half of Michigan's citizens for drinking water. The goal of the Abandoned Well Management Program is to identify and properly plug as many abandoned wells as possible.

The WRD also administers an Abandoned Well Management Grants Program that is funded by the CMI. Abandoned well management grants target and fund the location and plugging of abandoned wells in community public water supply wellhead protection areas.

The MDEQ conducts training and public education/outreach activities to raise the level of public awareness concerning the environmental and public health threats associated with unplugged abandoned wells. Groundwater protection seminars that include abandoned well-related topics are sponsored for general audiences. Technical training programs covering abandoned well plugging techniques and requirements are conducted for registered water well drilling contractors, LHD staff members, environmental consultants, and other state of Michigan departments.

MDARD administers a cost share grants program, the "Farm*A*Syst" Program that can pay up to 90 percent of the cost for plugging abandoned wells on agricultural lands.

LHDs enforce abandoned well plugging requirements through field inspections and review of abandoned well plugging records that are submitted by registered well drilling contractors and property owners. The WRD conducts compliance and enforcement actions in cooperation with the Office of Criminal Investigations, the Michigan Department of Attorney General, and LHDs. Many successful enforcement actions have been taken in recent years.

Beach Protection

In Michigan, LHDs have jurisdiction to test and otherwise evaluate water quality at bathing beaches to determine whether the water is safe for swimming. The LHDs advise beach owners when beaches should be closed and the local health officer may petition the county circuit court to close a beach if needed. Beach monitoring results collected by the LHDs and swimming advisories are made available to the public by the LHDs via the MDEQ's statewide beach monitoring Web site at <http://www.deq.state.mi.us/beach>. Signs are posted at bathing beaches stating whether or not the beach has been tested for *E. coli*. Since 2000, the MDEQ has provided grants to LHDs to support and augment beach monitoring throughout Michigan. These

grants are funded by a combination of state CMI bond money and federal Beaches Environmental Assessment and Coastal Health Act (BEACH Act) funds. The BEACH Act authorizes the USEPA to award program development and implementation grants to eligible states, territories, tribes, and local governments. These annual grants support microbiological monitoring of coastal recreation waters, including the Great Lakes, which are adjacent to beaches or similar points of access used by the public. BEACH Act grants also support development and implementation of programs to notify the public of the potential exposure to disease-causing microorganisms in coastal recreation waters.

Biosolids

The treatment of municipal wastewater generates a residual sewage sludge that may be disposed through incineration or landfilling, or these materials can undergo additional stabilization to become biosolids. Recycling biosolids on the land has proven to be a safe and cost-effective alternative for wastewater treatment plants. Biosolids contain essential macro and micro nutrients and are an excellent source as a fertilizer or soil conditioner. The MDEQ encourages the use of biosolids to enhance agricultural and silvicultural production in Michigan and in some cases biosolids can be used for landscaping purposes. However, if biosolids are not properly handled, the potential exists that these materials could enter surface water or groundwater and degrade water quality. To prevent such problems, the land application of biosolids is a highly regulated activity.

Under the federal regulations contained in Title 40 of the Code of Federal Regulations (CFR), Part 503, Standards for the Use or Disposal of Sewage Sludge; and the Part 24 Rules, Land Application of Biosolids, of the NREPA, criteria for biosolids land application have been established. NPDES and state groundwater discharge permits require management of biosolids and other residuals from wastewater treatment facilities. Permittees are required to develop and obtain MDEQ approval of a Residuals Management Program. The MDEQ has district staff dedicated to overseeing the Biosolids Land Application Program by inspecting the facilities generating biosolids and the land application sites.

Coastal Management

The Michigan Coastal Zone Management Program is one of more than 30 state coastal programs established under the authority of the Federal Coastal Zone Management Act of 1972 (PL 92-583). The National Oceanic and Atmospheric Administration (NOAA) provides annual funding to these state programs for the protection, preservation, and restoration of coastal cultural and natural resources. Michigan's Coastal Zone Management Program was established as a networked program in 1978 with the central focus to improve administration of existing state shoreline statutes (e.g., Shorelands Act, Submerged Land Act, Sand Dunes Act); provide substantial technical and financial assistance to local units of governments for creative coastal projects; and to improve governmental coordination to reduce time delays, duplication, and conflicts in coastal management decision-making.

Community Water Supply, Source Water Assessment, and Protection

The MDEQ oversees approximately 1,390 community water systems that furnish drinking water year-round to residential populations of 25 or more, to ensure that the USEPA's minimum standards for safe drinking water and the requirements of the Michigan Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), are met. In the last year for which data has been collected, over 99 percent of the population served by community water supplies in Michigan received drinking water meeting all health standards. Since 2005, the percentage of the population served by water systems meeting all standards has exceeded 96 percent annually.

Since 1998, the Drinking Water Revolving Loan Fund has provided \$758 million in low interest loans for 252 projects designed to prevent public health threats from occurring in community water supply systems.

The reauthorization of Act 399 requires federal guidance and defines state requirements for a Source Water Assessment Program. Act 399 requires the state to identify the areas that supply public tap water, inventory contaminants and assess source water susceptibility to contamination, and inform the public of the results. In 1998, the MDEQ convened a Source Water Assessment Program Advisory Committee composed of key stakeholders to assist with Source Water Assessment Program development. Michigan's Source Water Assessment Program was approved by the USEPA in October 1999.

Information on nearly 18,000 drinking water sources, serving approximately 10,600 noncommunity water systems and 1,250 community water systems, was collected over a 6-year period. Potential sources of contamination were inventoried, and susceptibility to contamination was determined. The completed Source Water Assessment Program Report and all data were transmitted to the USEPA in December 2004. The Source Water Assessment Program Report is available at <http://www.michigan.gov/degwater> under Drinking Water, Water Well Construction, Source Water Assessment. New sources undergo a source water assessment as they are approved. Currently, the MDEQ is re-assessing all of the community water system sources and will report the susceptibility ratings back to the water suppliers. The MDEQ also continues to encourage surface water suppliers to plan and implement protection activities. To date, six communities have obtained state approval for their Source Water Intake Protection Program Plans.

The MDEQ's Wellhead Protection Program assists local communities that utilize groundwater for their municipal drinking water supply systems to protect their water source. A Wellhead Protection Plan minimizes the potential for contamination by identifying and protecting the area that contributes water to municipal water supply wells. Such protection help avoids costly groundwater cleanups.

Funding for activities is available through a state Wellhead Protection grant program and is designed to assist communities in the development and implementation of a Wellhead Protection Program. The state grant program funds 50 percent of eligible activities while the other 50 percent is matched with local funds. Grant money is awarded each year to public water supply systems based on a scoring system that ranks communities of similar size. The MDEQ will also provide a 50 percent match in funding for the development and implementation of a surface water intake protection program. Funding will be available in fiscal year 2015 and prioritized by the susceptibility of the source as determined in the source water assessments.

Compliance and Enforcement

The MDEQ, WRD, Enforcement Unit and Field Operations Division staff are responsible for conducting compliance and enforcement actions taken by the WRD. Field Operations Division staff conducts compliance inspections to ensure they are following the requirements of state water pollution control statutes and rules, surface and groundwater discharge permits, and violations of administrative or judicial orders. Other compliance and enforcement activities include response and investigation of complaints and the follow-up of corrective actions.

Enforcement action may be used to bring the entity into compliance as quickly as possible, restore any natural resource damages caused by the violation, assess appropriate penalties, eliminate financial gain that may have been realized as a result of noncompliance, and drive

improvements in water quality. Enforcement actions are generally progressive in nature. They include any number of possible actions, including issuance of notices of violation, preparation of final orders of abatement, settlement via administrative consent orders, or referrals to the Michigan Department of Attorney General for civil or criminal litigation. The Enforcement Unit serves as the WRD's liaison with the Michigan Department of Attorney General and also works with the USEPA and the United States Department of Justice on joint state/federal enforcement cases.

MDEQ staff collect effluent samples from NPDES facilities to evaluate compliance with permit limits. Additionally, the MDEQ conducts special studies to support water quality enforcement actions. These studies may include water, sediment, biological, and/or toxicity sampling, depending on the specific issue. Water quality monitoring in response to spills is also conducted. Monitoring activities to support enforcement actions are implemented as needed, and are always developed with input from Enforcement Unit and Field Operations Division staff.

Conservation Reserve Enhancement

The MDEQ works closely with the MDARD to implement the CREP, a federal-state-local conservation partnership designed to reduce significant environmental effects related to agriculture. The CREP is being implemented in four critical watersheds (Saginaw Bay, Macatawa River, River Raisin, and western Lake Erie basin) that have intense agricultural land use. The objectives of the program are to improve and protect water quality and to promote and enhance wildlife habitat by providing incentives to Michigan citizens for implementing conservation practices for a period of 15 years. Eligible conservation practices include grass plantings, filter strips, riparian buffer strips, field windbreaks, and wetland restoration. The MDEQ also supplied Section 319 and CMI funds for livestock exclusion, implementation of NRCS approved conservation practices, CREP technical assistance, and permanent conservation easements. The program has enrolled nearly 74,000 acres of the 85,000 acre goal in the priority watersheds.

Contaminated Sediment

The Contaminated Sediment Program consists of activities to coordinate and implement remediation at sites of environmental contamination that impact water quality. Sites range from current incidents of spills or losses of pollutants due to accidents or poor facility operations, to historic incidents where pollutants have been in the environment for many years. Some of these sites impact surface waters directly. Others may impact surface waters by the movement of contaminated groundwater, through treatment and permitted discharge of contaminated groundwater, or through discharges of contaminated groundwater to treatment facilities. The MDEQ staff members investigate sites of environmental contamination, make recommendations regarding proposed site remediation and treatment, evaluate treatment proposals and pollutant discharges from remediation systems, and provide other technical and project management support as necessary. As part of the CMI, \$25 million was set aside for the investigation and remediation of contaminated sediments in Michigan lakes, rivers, and streams. Summaries of these projects are contained in the MDEQ's Consolidated Report.

Drinking Water Contamination Investigation

The MDEQ assists LHDs in drinking water quality/contamination investigations of known, potential, or suspected groundwater contamination. Technical assistance includes consultation, analytical support, toxicological assessment, well construction design, well permitting activities, and development of health advisories.

MDEQ staff is responsible for administering well replacement activities when drinking water wells are found to be contaminated through no fault of the well owner. Water supply alternatives include temporary provision of bottled water, temporary provision of treatment devices when the concentration of contaminants exceeds body contact advisory levels, construction of a permanent replacement well to a protected aquifer, or connection to community water, if available. Activities related to connection to community water may include construction of a basic community water system, extension of water main, or connection to an existing water main.

MDEQ staff administers the statewide drinking water monitoring program for water supplies located in areas of known groundwater contamination. Sites are reviewed on an annual basis for funding eligibility. Contracts are established annually with LHDs for collection of water samples and reporting results to well owners at specified sites of groundwater contamination.

Drinking Water and Wastewater Infrastructure Financial Assistance

The MDEQ, in conjunction with the Michigan Finance Authority, operates three revolving fund loan programs that can provide financial assistance to local units of government and public water suppliers for the construction of needed wastewater and drinking water infrastructure. These programs provide loan assistance at interest rates well below open market, with the intention of supporting the department's compliance programs and reducing the costs to be passed on to the users of water and wastewater systems. Debt service payments are returned to the funds and hence "revolved" as they are lent out again. The three programs are:

- **Clean Water State Revolving Fund (CWSRF):** The CWSRF has been in operation in Michigan since 1989 and to date has tendered 499 loans totaling over \$4.1 billion. The CWSRF has played a critical role in the state's CSO and SSO Control Programs, and will operate in perpetuity to provide assistance to wastewater system owners for ongoing capital improvement needs. In addition to financing Section 212 projects (Publicly Owned Treatment Works) the CWSRF can also fund Section 319 projects (nonpoint source [NPS] pollution control projects). The fund is capitalized by an annual federal grant and a required state match, with potential access to proceeds from the sale of Great Lakes Water Quality Bonds.
- **Drinking Water Revolving Fund:** The Drinking Water Revolving Fund has been in operation in Michigan since 1998 and to date has tendered 238 loans totaling over \$691 million. Patterned after the SRF, the Drinking Water Revolving Fund continues to play a critical role in furthering the MDEQ's public water system program and ensuring the protection of the health of Michigan citizens who are served by public water supplies.
- **Strategic Water Quality Initiatives Fund (SWQIF):** The SWQIF program was created in 2002 and is capitalized solely by proceeds from the sale of Great Lakes Water Quality Bonds. The SWQIF can fund two specific kinds of projects that are not eligible under the CWSRF because the facilities constructed would not be in public ownership: (1) The on-site upgrade or replacement of failing septic tanks/tile fields; and (2) The removal of storm water or groundwater from sanitary or combined sewer leads. Through fiscal year 2013 the SWQIF has tendered 21 loans totaling over \$24 million.
- **The new state-funded Stormwater, Asset Management, and Wastewater (SAW) Program** is making available up to \$450 million of additional loan and grant financing to Michigan municipalities as defined in Section 5301 of Part 53, Clean Water Assistance,

of the NREPA, starting in April 2014. The new SAW Program will operate alongside the established SRF, SWQIF loan programs, and the S2 Grant Program, thereby, increasing the total financing options available to support water pollution control efforts in Michigan.

SAW grants are available to assist with the development of (1) wastewater and stormwater asset management plans, (2) testing and demonstration of innovative stormwater and wastewater technologies, (3) planning, design, and user charge development for wastewater and stormwater systems, or (4) stormwater management plans.

Great Lakes

The Great Lakes form a portion of the international boundary between the United States and Canada, and both countries have jurisdiction over their use. The first Great Lakes Water Quality Agreement (GLWQA) between the two federal governments was developed in 1972 and established objectives and criteria for the restoration and enhancement of water quality in the Great Lakes system. A revised GLWQA Agreement was signed in 1978 recognizing the need to understand and effectively reduce toxic substance loads to the Great Lakes. The 1978 GLWQA adopted general and specific objectives and outlined programs and practices necessary to reduce pollutant discharges to the Great Lakes system. Under the 1987 Protocol that amended the 1978 GLWQA, the United States and Canadian governments identified 43 of the most polluted areas in the Great Lakes basin that had serious water quality problems known to cause Beneficial Use Impairments (BUIs) of the shared aquatic resources. These areas have been formally designated by the two governments as AOCs. Five AOCs were subsequently restored and delisted.

Ten AOCs are exclusively under Michigan jurisdiction: Clinton River, Deer Lake, Kalamazoo River, Manistique River, Muskegon Lake, River Raisin, River Rouge, Saginaw River/Bay, Torch Lake, and White Lake. The Menominee River AOC is shared with Wisconsin. The Detroit River, St. Clair River, and St. Marys River are bi-national AOCs. The latter AOCs are managed jointly by a bi-national governance structure created under the Four Agency Letter of Commitment (also called the Four Agency Agreement) that was signed on by the Environment Canada, USEPA, MDEQ, and Ontario Ministry of the Environment.

The 1987 Protocol called for cleanup of the AOCs through the development of remedial action plans (RAP). The GLWQA was revised again in 2012, but the latest revision did not significantly change the requirements for RAPs. Each RAP is required to identify problems that have led to BUIs, identify actions needed to restore the beneficial uses, and provide documentation when beneficial uses are restored. Both federal governments play an active role in the implementation of the RAPs. All of Michigan's 14 AOCs have completed RAPs that are currently at various stages of implementation. Information regarding Michigan's AOCs and RAPs is available at <http://www.michigan.gov/deqwater> in the AOC section under the Great Lakes, Protection and Restoration, or from the Michigan Statewide Public Advisory Council at <http://www.glc.org/work/SPAC>. A copy of the state's Guidance for Delisting Michigan's Great Lakes AOCs can be found at <http://www.michigan.gov/deqwater> in the AOC section under Great Lakes, Protection and Restoration.

The 1987 and 2012 Protocol required the development and implementation of Lakewide Management Plan (LaMP) for each of the Great Lakes. The purpose of the LaMPs is to address critical pollutants and provide a strategy to protect and restore beneficial uses impacted in the open waters of each Great Lake. The USEPA, in cooperation with other government and nongovernment agencies, has developed LaMPs for Lakes Erie, Michigan, and Superior. Each

LaMP includes an assessment of BUIs, causes of the impairment, and recommendations on actions necessary to restore the beneficial uses. In undertaking the development of the LaMPs, the stakeholders recognized the need to address other water quality issues unique to each Great Lakes basin. The LaMPs were updated biennially, with the most recent updates completed in 2008.

A formal LaMP has not yet been developed for Lake Huron. Instead, the MDEQ, the USEPA, Environment Canada, Ontario Ministry of the Environment, and Ontario Ministry of Natural Resources have formed the core of a Lake Huron Bi-national Partnership to coordinate environmental activities in the Lake Huron basin. The group developed a Lake Huron Bi-national Partnership Action Plan and has updated it biennially on the same schedule as the LaMPs.

Saginaw Bay Coastal Initiative (SBCI)

The SBCI was formed in August 2006. Through the Saginaw Bay Coastal Initiative, the MDEQ and other state agencies started working with citizens, local government officials, and multiple regional and federal agencies to develop and implement a comprehensive approach to promoting environmentally sound economic development and resource restoration in the Saginaw Bay coastal areas. The MDEQ continues to be engaged in the process, but the leadership of this effort has shifted to the local stakeholders and the increased local ownership this brings better enables the continued work toward the goals of:

- Identifying methods to enhance the economic development of the Saginaw Bay coastal area and the quality of its parks and beaches and other natural areas.
- Seeking partnerships to develop new cultural, recreational, and social resources for Saginaw Bay area citizens and visitors.
- Working with local interests to improve water quality in Saginaw Bay and its associated waterways.

The SBCI encourages regular discussions to determine how state, federal, and local interests can work together to achieve resource protection, improve environmental quality, and expand economic development. This includes opportunities to discuss the local impact of state and federal programs and to look for opportunities to meet the goals of these programs through new and innovative means. Additional information regarding the SBCI can be found at <http://www.michigan.gov/deq> under Issues to Watch.

Shoreline deposits of decaying organic matter, abundant plant and algae growth, and beach closures are a concern along Saginaw Bay and other Great Lakes near shore areas. In 2008, the National Oceanic and Atmospheric Administration initiated an extensive, five-year study of Saginaw Bay to generate a better understanding of the multiple stressors that are affecting the character of both the nearshore and open water regions of Saginaw Bay. This study is devoted to understanding the mechanisms and processes that are affecting the bay. The NOAA multi-stressors final report can be viewed at: https://www.glerl.noaa.gov/pubs/tech_reports/glerl-160/tm-160.pdf. The MDEQ is collaborating with researchers in an effort to address questions about designated use support.

GLRI

To accelerate the restoration and protection of the Great Lakes, Congress has appropriated new funding for an interagency initiative to address issues that affect the Great Lakes including NPS pollution. The GLRI builds on the work of the Great Lakes Interagency Task Force and stakeholders, guided by the Great Lakes Regional Collaboration Strategy. The GLRI is

intended to support federal projects and provide pass-through grant funding for stakeholders. The Great Lakes Interagency Task Force intends to focus efforts in five key areas including: (1) Accountability, Monitoring, Evaluation, Communication, and Partnerships; (2) Habitat and Wildlife Protection and Restoration; (3) Invasive Species; (4) Nearshore Health and NPS; and (5) Toxic Substances and AOCs.

Groundwater Discharge

The MDEQ's Groundwater Discharge Program regulates discharges to the ground through the development and issuance of permits and self-certifications. A "program review team" was established to develop and implement recommendations as needed for the Groundwater Discharge Program. Some specific program accomplishments include the conversion of the groundwater permit database into the NPDES Management System to increase permitting effectiveness, section procedure updates to consolidate and streamline groundwater permitting procedures, and review of the groundwater permit application to improve permit applications and decrease processing time.

Industrial Pretreatment

The MDEQ implements federal and state rules designed to limit pollution from industrial discharges to municipal wastewater treatment facilities. In 1983, the USEPA approved Michigan's pretreatment program and formally authorized the state of Michigan to oversee the program. To assure that pollutant discharges are controlled, many municipalities have been required to develop and implement local industrial pretreatment programs as a condition of their NPDES permit. Michigan operates under a two-tiered system: municipalities subject to industrial pretreatment program regulation with design flows greater than five million gallons per day must develop a federal local industrial pretreatment program, while municipalities subject to industrial pretreatment program regulation with design flows less than or equal to five million gallons per day must develop a Michigan local industrial pretreatment program.

Municipalities developing industrial pretreatment programs are required to submit them to the MDEQ, WRD, for review and approval. Subsequent changes to an approved local industrial pretreatment program, as well as periodic reports of local program operations, must also be submitted for review. MDEQ field staff conducts periodic inspections of local industrial pretreatment programs to identify deficiencies and initiate actions necessary to assure effective operation. Information derived from inspections and reports submitted by the municipalities are entered into the NPDES Management System database.

Infrastructure Security

Due to terrorist attacks on September 11, 2001, and recent federal legislation and state authorizations, the MDEQ actively participates in numerous Infrastructure Security Program activities. The federal Public Health Security and Bioterrorism Preparedness and Response Act of 2002 requires drinking water systems to comply with requirements by certain dates as a part of the nation's homeland security efforts. The MDEQ plays a critical role in training and assisting the drinking water and wastewater system personnel to comply with the federal Infrastructure Security Program. The MDEQ helps to protect supply systems from malevolent acts by providing training to complete vulnerability assessments and emergency response plans, participating in water security tabletop exercises, and helping local units of governments to receive the Threat Advisory Notification System.

Inland Lakes and Streams

The Inland Lakes and Streams Program is responsible for the protection of the natural resources and the public trust waters of the inland lakes and streams of the state. The program

oversees and regulates activities including dredging, filling, constructing or placement of a structure on bottomlands, constructing a marina, interfering with natural flow of water, or connecting a ditch or canal to an inland lake or stream.

The most common projects associated with inland lakes and streams regulated under Part 301, Inland Lakes and Streams, of the NREPA, include shore protection, permanent docks or boat hoists, beach sanding, and dredging or excavation. Other types of activities may also require permits.

MAEAP

MAEAP is a voluntary program that offers environmental risk assessments to all types and sizes of farms. The program teaches effective land stewardship practice and shows farmers how to identify and prevent agricultural pollution risks on their farms while keeping their business operations sustainable. The program is led by MDARD with support from a coalition of agricultural stakeholders as well as local, state and federal government agencies. The MDARD oversees and tracks a verification process focused on the environmental risks associated with livestock, farmstead and cropping activities. Public Acts 1 and 2 of 2011 codify MAEAP into law and provides incentives for participation in the program.

NPDES

Discharges to state surface waters from municipal, industrial, and commercial facilities must be authorized by permit under the NPDES Program. The purpose of an NPDES permit is to control the discharge of pollutants into surface waters of the state to protect the environment. The USEPA delegated the program to Michigan in 1973, and the MDEQ has responsibility for processing NPDES permits. The maximum term for an NPDES permit is five years, after which they must be reissued.

The MDEQ reissues NPDES permits according to the five-year rotating watershed cycle, two years after the monitoring year (Figure 3.1). Under this approach, all of the permits in each individual watershed expire and are reissued in the same year. This approach allows the MDEQ to consider cumulative impacts of all dischargers on water quality in the watershed. Discharges to lakes, streams, and wetlands must not cause a violation of Michigan WQS. As part of the permit issuance process, limits are developed for pollutants to avoid a violation of WQS and ensure compliance with the treatment technology regulations of the CWA. Draft permits are prepared containing pollutant limits and any appropriate special conditions. The draft permits are placed on public notice, allowing the opportunity for public comment.

Permits for regulated storm water discharges are also processed and issued by the MDEQ under the NPDES program. The Storm Water Program is also funded by fees collected from the dischargers. Under Phase I of the Storm Water Program, individual NPDES permits were issued to owners or operators of Municipal Separate Storm Sewer Systems (MS4s) serving a population of 100,000 or greater. In 2003, the MDEQ promulgated rules to obtain the legal authority to implement Phase II requirements. As a result, owners or operators of MS4s serving populations less than 100,000 within urbanized areas were required to apply for NPDES permits by March 2003. Phase II permittees include cities, villages, townships, county road commissions, and county drain commissions, among others. A jurisdictional-based general permit, as well as the watershed-based general storm water permit, is used to provide permit coverage.

Michigan uses a general permit for industrial storm water discharges. The general permit requires the permittee to have a certified storm water operator and prepare and implement a Storm Water Pollution Prevention Plan. The applicability of this permit includes storm water discharges associated with industrial activity as defined in the federal regulations, and from special use areas (state- or federally-mandated secondary containment structures, areas designated on Michigan's List of Sites of Environmental Contamination pursuant to Part 201, Environmental Remediation, of the NREPA, and other activities subject to federal storm water regulation where storm water monitoring is necessary on a case-by-case basis). Monitoring is required only from the special use areas. Industrial storm water general permits and Certificates of Coverage are reissued on a watershed-basis with approximately one-fifth of the five-year permits reissued each year.

The MDEQ has continued implementation of the state's CSO Control Program, which has resulted in annual reductions of the volume of untreated combined sewage discharged to the surface waters of the state. Through implementation of the CSO Control Program, numerous CSO discharges are being eliminated at various locations around the state, while at other locations, treatment and disinfection of combined sewage discharges that comply with WQS and protect public health are being provided on an increasing basis.

Nutrient Reduction Framework

Nutrient pollution of our nation's surface waters has been implicated as one of the top causes of water quality impairment. In a March 16, 2011, memo the USEPA stated its commitment to working with states and other stakeholders to accelerate the reduction of nitrogen and phosphorus loadings to our nation's waters. In response to this memo, the MDEQ is developing Michigan's Framework for Managing Nitrogen and Phosphorus Pollution. Working in partnership with the USEPA, the MDEQ is presenting the steps that have been and will be taken in Michigan to protect surface waters from excessive nitrogen and phosphorus pollution. The MDEQ intends to work with the USEPA to explain how those efforts meet the general guidance from the USEPA to set load-reduction goals for prioritized watersheds and reduce nutrient loadings through a combination of point-source and nonpoint source reduction activities.

Phosphorus Bans

The state of Michigan has instituted several laws and rules banning or restricting certain uses of phosphorus. A statewide laundry detergent law took effect in 1977, limiting the phosphorus content of laundry detergents to 0.5 percent by weight. In 2010, a statewide dish detergent law took effect limiting the phosphorus content of automatic dishwasher detergents to 0.5 percent by weight. Finally, a statewide lawn fertilizer law took effect on January 1, 2012 banning the use of lawn fertilizers that contain phosphorus unless a soil test indicates that phosphorus is required to support healthy turf grass.

Septage

Septage is a domestic waste pumped from septic tanks, portable toilets, etc. The Septage Program regulates the septage hauling industry and septage disposal practices. Companies, as well as the vehicles they use, must be licensed. In addition, a permit is required to apply septage to the land. Septage may be taken to a municipal wastewater treatment facility or may be applied to agricultural land. The MDEQ administers the program with assistance from participating LHDs.

SESC

The SESC Program is administered under the authority of Part 91, Soil Erosion and Sedimentation Control, of the NREPA. Part 91 provides for the control of erosion and

prevention of off-site sedimentation from earth change activities. Part 91 is administered and enforced by state, county, and municipal agencies with oversight by the MDEQ.

The MDEQ's major responsibilities are to train staff members of the Part 91 agencies in the proper administration and enforcement of Part 91 and to conduct periodic audits of the administering agencies to ensure their SESC Programs are in compliance with Part 91.

Wetlands Protection

The MDEQ, WRD, has administered a statewide wetland regulatory program for 30 years. The WRD also manages Michigan's wetland resources through public education programs that encourage wetland preservation and restoration, cooperation with governmental and nongovernmental agencies to encourage the evaluation and management of wetlands on a local and watershed basis, and development of a monitoring and assessment program.

Michigan's Goemaere-Anderson Wetland Protection Act was passed in 1979 (Part 303, Wetlands Protection, of the NREPA). Through passage of the Wetland Protection Act, Michigan took direct legislative action to regulate and minimize wetland losses. This act provides for the preservation, management, protection, and use of wetlands; requires permits to alter wetlands; and provides penalties for illegal wetland alteration. A wetland is defined in Part 303 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 Wetland Protection Act further defines regulated wetlands as those wetlands contiguous to the Great Lakes or Lake St. Clair, an inland lake, pond, river, or stream; and noncontiguous wetlands greater than five acres in size. The state also has the authority to regulate any noncontiguous wetlands that are determined to be essential to the preservation of the natural resources of the state once the landowner has been notified. Part 303 requires that persons planning to conduct certain activities in regulated wetlands apply for, and receive, a permit from the state before beginning the activity.

Michigan's regulatory program generally requires mitigation for all wetland impacts, although the MDEQ staff may waive this requirement for projects impacting less than one-third acre if no reasonable opportunity for mitigation exists, or for projects having a basic purpose of creating or restoring wetlands. Mitigation may be considered only after the applicant has demonstrated avoidance and minimization of impacts, and it has been determined that a project is otherwise permissible. A mitigation proposal must result in no net loss of wetlands upon completion of a project. Mitigation requirements and ratios are established by rule and are defined by staff as a condition of the permit decision. Financial assurances are required to ensure completion of any mitigation project that is not completed in advance of associated impacts. Mitigation sites must be permanently protected through a conservation easement. Administrative rules defining the establishment and use of mitigation banks were promulgated in 1997 (see R 281.951, Wetland Mitigation Banking). Nineteen mitigation banks are currently listed in Michigan's Wetland Mitigation Bank Registry. A number of other mitigation bank sites are currently under consideration or development. Recent changes to state and federal laws have resulted in preference for wetland banks to mitigate for unavoidable losses to wetland resources. New legislation was enacted in Michigan in 2013 to develop a Wetland Mitigation Bank Funding Program to provide grants and low interest loans to eligible municipalities interested in pursuing a wetland bank. The legislation was aimed at promoting wetland banking in Michigan. In 2014, a total of \$3,000,000 is available for this program.

Michigan also has developed other regulatory and nonregulatory programs to manage Michigan's wetland resources, including:

- Part 303 authorizes regulation of wetlands by a local unit of government provided that the local unit uses the same definition of wetlands as Part 303, and permit criteria that are consistent with Part 303. Currently, over 40 communities in Michigan have local wetland protection ordinances.
- The MDEQ has organized and leads the Wetland Work Group, an informal interagency team including various state, federal, and nongovernmental organizations concerned with wetland restoration and management.
- To encourage consideration of wetland issues, the WRD provides technical assistance to local watershed planning organizations. WRD staff have been working closely with watershed groups to assist in locating areas that have a high potential for wetland restoration. Using existing datasets and GIS technology, WRD staff created a GIS layer that highlights these wetland restoration areas and ranks them in terms of their potential (high, moderate, and low).
- The WRD has developed a landscape-scale wetland assessment method to assist watershed groups in managing, protecting, and restoring wetlands in the context of watershed management planning. Originally developed by the USFWS, the WRD makes use of GIS data, including National Wetland Inventory maps, to provide an evaluation of wetland functions to make more effective decisions regarding the need for wetland protection, restoration, or management in watershed. All counties were completed and certified in January 1, 2007, and are available on the MDEQ online GIS tool - Wetlands Map Viewer (<http://www.mcgi.state.mi.us/wetlands/>).
- The MDEQ provides for protection of wetlands through the use of conservation easements that offer comprehensive and permanent protection to high quality wetlands. Conservation easements over exceptional wetland sites may be provided to fulfill mitigation requirements, when appropriate, or wetlands that are avoided during the planning of an authorized construction project may also be protected under an easement.

The WRD is working with partners to develop a wetland monitoring and assessment program to assess the quality and quantity of Michigan's wetland resources and guide future program development. This includes recent development of the Michigan Rapid Assessment Method (MiRAM) and Landscape Level Wetland Assessment, as well as working with Great Lakes researchers on coastal wetland monitoring, developing Indices of Biological Integrity, and the National Wetland Condition Assessment (NWCA).

The MiRAM was finalized in 2010, and is used by regulatory staff as appropriate to propose preservation mitigation sites, compliance sites, etc. Future plans exist to implement a MiRAM monitoring program, on a five-year cycle. The Great Lakes Coastal Wetland Monitoring Plan (Great Lakes Coastal Wetland Consortium, 2008; <https://www.glc.org/library/2008-great-lakes-coastal-wetland-monitoring-plan>) was developed addressing Fish, Invertebrates, Amphibians, Birds, Vegetation, and Chemistry indicators. Additionally, future plans include implementation an intensification of the NWCA, to continue partnership with Great Lakes Coastal Wetland monitoring group, and to incorporate aquatic invasive species and climate change monitoring protocols when they become available.

CWA Section 404 Permit Program

Michigan's Wetland Protection Program was approved by the USEPA in accordance with the requirements of Section 404(h) of the CWA in August 1984. With this approval, Michigan

became the first state to assume administration of Section 404. Although at least 34 states have their own wetlands program, only 2 states, Michigan and New Jersey, have been able to meet all the requirements to assume the CWA's Section 404 Program. The CWA limits state assumption of Section 404 authority in "traditionally navigable waters." The United States Army Corps of Engineers, Detroit District, retains Section 404 jurisdiction in these waters, which includes the Great Lakes, connecting channels (such as the Detroit River), and river mouth areas upstream to the limits of the traditional navigational channel or the Great Lakes ordinary high water mark.

To maintain Michigan's authorization under Section 404, state law must remain consistent with federal regulation including exemptions, general permits, public notice procedures, and review criteria. In addition to meeting these requirements, Michigan's law provides the citizens of the state with a significant savings in time and money while providing efficient and effective protection of wetland, lake, and stream resources by clearly defining wetlands that are regulated, providing permitting time frame requirements, and streamlining and consolidating permit review.

The MDEQ processes approximately 4,000 to 6,000 permit applications per year under Section 404. About 1,500 of these applications propose wetland impacts; the remainder propose to alter lakes and streams only. The MDEQ staff work with permit applicants to redesign proposals, when necessary, to avoid and minimize resource impacts. The MDEQ is currently working, under a U.S. EPA Water Permits Division Grant, to develop a comprehensive database for Michigan's Section 404 Program that will incorporate new technologies and methods for screening, evaluating, and tracking impacts.

In 2008, the USEPA published findings from a 10-year review of Michigan's Section 404 Program and although the USEPA found that, in general, Michigan's administration of the program was good, they identified changes that are needed to maintain federal consistency. These changes include administrative actions/procedures, revision of administrative rules, statute amendments to clarify exemptions, and updating the program Memorandum of Agreement. After working with stakeholders on the changes required to maintain our state program, Michigan's legislature passed a new law in 2013 that includes many of the necessary changes for Michigan's 404 program as well as several other programmatic changes. The USEPA is currently evaluating these changes to determine whether they are consistent with the CWA.

APPENDIX 2: KEY COMPONENTS OF AN EFFECTIVE STATE NPS MANAGEMENT PROGRAM

In 1997, the USEPA developed *Nine Key Elements of an Effective State NPS Management Program* to guide state efforts to develop approvable NPS Program Plans. In 2013, the USEPA updated their guidance and produced *Key components of an effective state NPS management program*. The following summary identifies how Michigan's NPS Program Plan addresses each of the key components:

Key Component 1: The state program contains explicit short- and long-term goals, objectives, and strategies to protect surface and groundwater, as appropriate.

The NPS Program Plan identifies seven major goals for Michigan's NPS Program. Each goal identifies specific objectives, strategies and short-term actions to ensure that Michigan meets NPS Program goals. In addition, the document includes a series "measures of success" to help the NPS Program measure progress and communicate success. The goals and objectives are relatively general and identify program priorities and direction. The strategies and short-term actions are more specific commitments and identify responsible parties, products, and completion dates.

Key Component 2: The state strengthens its working partnerships and linkages to appropriate state, interstate, tribal, regional, and local entities (including conservation districts), private sector groups, citizens groups, and federal agencies.

Working in partnership with other stakeholders is a key goal of Michigan's program and specific partnership opportunities are identified throughout the document. Numerous partners and stakeholders are specifically mentioned in short-term actions.

Key Component 3: The state uses a combination of statewide programs and on-the-ground projects to achieve water quality benefits; efforts are well-integrated with other relevant state and federal programs.

The NPS Program Plan emphasizes statewide activities and integration with other relevant state and federal programs in several chapters, including Chapters 4 (Source Control Strategies), 5 (Information and Education), 6 (Funding), 7 (Compliance and Enforcement), and 8 (Monitoring). In addition, Chapter 3 describes Michigan's commitment to the development and implementation of WMPs for priority watersheds. Each water body has distinct water quality characteristics, issues, and stakeholders. Michigan's NPS Program views local WMPs as the most effective way to address water quality issues.

Key Component 4: The state program describes how resources will be allocated between (a) abating known water quality impairments from NPS pollution and (b) protecting threatened and high quality waters from significant threats caused by present and future NPS impacts.

The NPS Program Plan has goals, objectives, strategies and short-term actions related to protection and restoration of water bodies and watersheds. Also, the update includes a summary of threats and impairments (Chapter 2); describes how monitoring will be used to identify impairments in the future (Chapter 8); and describes how threats and impairments will be addressed at the state and local level.

Key Component 5: The state program identifies waters and their watersheds impaired by NPS pollution as well as priority unimpaired waters for protection. The state establishes a process to assign priority and to progressively address these identified watersheds by conducting more detailed watershed assessments, developing watershed-based plans and by implementing plans.

Michigan's NPS Program relies on the Integrated Report to identify waters and their watersheds impaired by NPS pollution and the NPS Program Plan includes a summary of threats and impairments. In addition, Chapter 8 (Monitoring) describes how new threats and impairments will be identified while Chapter 3 (Watershed Management) describes how watersheds are prioritized and watershed plans are developed and implemented. In addition, Appendix 4 includes a list a brief description of NPS priority watersheds.

Key Component 6: The state implements all program components required by Section 319(b) of the CWA, and establishes strategic approaches and adaptive management to achieve and maintain WQS as expeditiously as practicable. The state reviews and upgrades program components as appropriate. The state program includes a mix of regulatory, nonregulatory, financial and technical assistance as needed.

The 2015 updates to the NPS Program Plan is the latest in a series of updates to the original *1988 Nonpoint Source Pollution Control Management Plan*. The 2015 update addresses the following components required by Section 319(b) of the CWA:

- A. The update includes specific references to BMP manuals and provides short-term goals (with target completion dates) to update BMP manuals.
- B. The update includes a description of other state, federal, and local programs that will be used to implement BMPs and restore impaired waters.
- C. The update includes a schedule for short-term actions intended to reduce or eliminate NPS pollution and restore and protect waters of the state from NPS pollution.
- D. The MDEQ continues to have the authority to use the laws of the state to implement this Program Plan.
- E. The update identifies available state and federal sources of funding and includes strategies and short-term actions intended to identify nongovernmental funds that could be used by stakeholders to develop and implement WMPs.

In addition, the NPS Program Plan includes regulatory, nonregulatory, financial and technical assistance strategies and short-term actions necessary to protect high quality waters and restore waters impaired by NPS pollution or causes.

Key Component 7: The state manages and implements its NPS Program efficiently and effectively, including necessary financial management.

The NPS Program manages a pass-through grant program efficiently and effectively. The process used to help staff identify priority watersheds is identified in Chapter 3 (Watershed Management). Goals, objectives, strategies and short-term actions related to the management of pass-through grants are described primarily in Chapter 6 (Funding). Strategies and short-

term actions associated with the pass-through grant program are included throughout the document.

Key Component 8: The state reviews and evaluates its NPS management program using environmental and functional measures of success, and revises its NPS management program at least every five years.

The NPS Program Plan describes environmental measures of success (Chapter 9) including restoration of impaired waters documented with “success stories” and pollutant load reductions.

Also, the 2015 NPS Program Plan update represents the latest effort to update the original 1988 NPS Pollution Control Management Plan. The update includes a commitment to revise the NPS Program Plan routinely and use the Program Plan to develop annual work plans.

**APPENDIX 3: OPEN OR PENDING PASS-THROUGH GRANT PROJECTS
(June 1, 2015)**

Tracking Code	Project Name	Funding Source	Water Body
2005-0007	CREP Implementation	CMINPS	Saginaw Bay, River Raisin, Lake Macatawa
2007-0200	Stamp Sand Stabilization Project at Central and Winona Mine	319	Eagle River, Sleepy River
2010-0105	Black Creek Sedimentation and Phosphorus Reduction	GLRI	Black Creek, Mona Lake
2011-0005	Belle River Watershed Planning	319	Belle River
2011-0007	West Grand Traverse Bay Watershed Protection Project, Phase II	CMINPS	Grand Traverse Bay
2011-0013	Houghton Lake <i>E. coli</i> Reduction	319	Muskegon River Watershed, Houghton Lake
2011-0014	Red Cedar River Watershed Planning	319	Red Cedar River
2011-0016	Upper Maple River Implementation	319	Upper Maple River
2011-0017	Tyler Creek <i>E. Coli</i> Reduction	319	Tyler Creek , Pratt Lake Drain, Bear Creek
2011-0032	Grand Traverse Bay Watershed Storm Water and Restoration Initiative	319	Kids Creek, Grand Traverse Bay, Boardman River
2011-0050	Augusta Creek Conservation	319	Augusta Creek, Gull Lake, Prairieville Creek, Kalamazoo River
2011-0101	Pigeon River GLRI	GLRI	Pigeon River
2011-0104	Wayne County Storm Water Green Infrastructure Planning	205j	
2012-0002	The Betsie River/Crystal Lake Watershed Management Plan	319	Betsie River/Crystal Lake
2012-0008	North Branch Clinton River Wetland Restoration	CMINPS	North Branch Clinton River
2012-0010	Lake Creek Watershed Planning	319	Lake Creek, Morrison Lake
2012-0016	Davis Creek Stream Stabilization	319	Davis Creek
2012-0017	Portage River/Little Portage Creek Watershed Planning	319	Portage River/ Little Portage Creek
2012-0023	Plaster Creek Watershed Restoration	319	Plaster Creek
2012-0024	Upper Grand Bacteria Reduction	319	Upper Grand River

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2012-0026	Duncan and Grass Bay Watershed Management	205j	Lake Huron
2012-0027	Portage Creek Watershed Plan Implementation	319	Portage Creek
2012-0029	Mid-Shiawassee River Watershed Restoration	319	Shiawassee River
2012-0030	Kalamazoo River Watershed Targeted Implementation	319	Fenner Creek; Davis Creek; Lake Allegan
2012-0032	Rogue River Watershed/Development of a Stormwater Guidebook	319	Rogue River
2012-0033	Improving Water Quality in the South Branch Watershed	CMINPS	Paw Paw River South Branch ; Eagle Lake Drain and Three Mile Lake Drain
2012-0102	River Raisin and Lake Erie Nutrient Reduction	GLRI	River Raisin
2012-0103	Kawkawlin River - Targeted Phosphorus and <i>E. Coli</i> Reduction	GLRI	Kawkawlin River
2012-0104	Model Lake Ordinance	205j	
2013-0002	Portage Creek Priority Protection	CMINPS	Portage Creek
2013-0006	Lapointe Drain Watershed Management Plan	319	Lapointe Drain
2013-0008	Church St. Parking Lot LID Rehabilitation	CMINPS	River Raisin
2013-0009	Nitrate Reduction via Water Management in the River Raisin	319	River Raisin
2013-0010	Kids Creek Restoration - Phase 1	319	Grand Traverse Bay, Kids Creek
2013-0014	Paint Creek Watershed Critical Wetlands Preservation	CMINPS	Paint Creek
2013-0016	Bass River/Deer Creek Restoration	319	Bass River, Bass Creek, Deer Creek
2013-0018	Flat River Watershed Planning	319	Flat River
2013-0022	Big South Branch Stream Connectivity Restoration and Easements	319	Big South Branch of the Pere Marquette River
2013-0028	Measuring Educational Successes for Protection of the Stony Point	319	Stony and Paint Creek
2013-0034	Lake Charlevoix Watershed Protection Through Action	319	Lake Charlevoix
2013-0035	Burt Lake-Sturgeon River Watershed Plan	319	Burt Lake and Sturgeon River

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2014-0004	Huron Creek Watershed Improvements Phase 1	CMINPS	Huron Creek
2014-0005	Lower Grand River Education Initiative	319	Lower Grand River
2014-0010	Rain Garden University	319	Huron River
2014-0011	Kids Creek Restoration - Phase II	319	Grand Traverse Bay Watershed
2014-0018	West Fork Portage Creek TMDL Compliance	319	West Fork Portage Creek
2014-0019	Plaster Creek Watershed Restoration 2	319	Plaster Creek
2014-0030	Green Infrastructure in Swift Run	319	Swift Run, Huron River
2015-0006	Phase 3 Upper River Raisin Riparian Protection	319	River Raisin
2015-0016	Duck Creek Protection, Information, and Outreach	319	Duck Creek
2015-0018	Upper Maple River Implementation Step 2	319	Upper Maple River
2015-0021	Bass and Deer Restoration Stage 2	319 CMI	Bass River, Deer Creek and Bass Creek
2015-0027	Measuring Educational Successes for Protection of East Pond Creek	319	East Pond Creek and Unnamed Tributaries
2015-0030	Elk River Watershed Protection	319	Elk River
2015-0031	Bad Axe Creek Targeted Nutrient Reduction	319	Bad Axe Creek
2015-0038	Rouge River Green Infrastructure Education, Installation and Marketing	319	Rouge River
2015-0040	Paw Paw Priority Wetland Riparian Conservation	319 CMI	Paw Paw River Mainstem, North Branch, East Branch, Ox Creek
2015-0044	Greater Bear Watershed Protection	CMINPS	Bear Creek

APPENDIX 4: 2015 NPS PRIORITY WATERSHEDS

Lake Superior Basin

- **Eagle River Watershed (HUC 040201030404)**

The Eagle River watershed historically received waste products from the operation of stamp mills in the mid to late 1800s. The stamp mills separated copper from the rock, and the resulting waste product was termed stamp sand. Stamp sands were disposed of into the river system, and caused physical and chemical degradation. The MDEQ has secured funding to remediate several areas within this watershed, and is also conducting monitoring as part of the NPS National Monitoring Program for the next 10+ years. The MDEQ has been working with local organizations to continue remediation and monitoring efforts.

- **Carp Creek/Partridge Creek (HUC 0402010501)**

Partridge Creek is a tributary to Carp Creek, which flows into Deer Lake; a Great Lakes AOC. In 1970, Partridge Creek was diverted from the city of Ishpeming's combined sewer system into underground mine workings to help alleviate flooding and CSOs. It has since been determined that the vented mixed water discharge to Carp Creek represents roughly 21 percent of the annual mercury load to Deer Lake and is the last known "controllable" source of mercury in the watershed. Removing Partridge Creek from the mine workings and post remedial monitoring to show the expected water quality improvements are the only remaining actions needed to potentially remove the BUI for fish and wildlife consumption and delist the AOC. Area stakeholders are working toward removing Partridge Creek from the mine workings while maximizing the amount of daylighted stream channel with restored natural channel functions.

- **Eastern Upper Peninsula Tributaries to St. Marys River (HUCs 04020203 and 04070001)**

Forty-five miles of the St. Marys River was identified as impaired for partial and total body contact recreation due to *E. coli*. An 18-week monitoring project was completed in the summer of 2010 on the St. Marys River and Michigan tributaries to determine if a TMDL was needed for the sampled water bodies. The tributaries included the Charlotte (HUC 0407000101), Waiska (HUC 04020203), Little Munuscong (HUC 0407000101), and Munuscong Rivers (HUC 0407000102), as well as several smaller tributaries in the Sault Ste. Marie, Michigan area. *E. coli* sampling results in the tributaries show widespread exceedances of the total body contact daily maximum WQS and total body contact 30-day geometric mean WQS with a lesser percentage of exceedances of the partial body contact daily maximum WQS. The daily geometric means for all 14 of the St. Marys River transects did not have water quality exceedances during the 16 weeks of sampling.

The St. Marys River is the connecting channel between Lake Superior and Lake Huron and is an important source of drinking water, recreation, sport fishery, shipping and commerce, and tourism, and is also an area of historical significance for Michigan. Emphasis needs to be placed on implementing BMPs to reduce *E. coli* contributions at high priority sites within the Sault Ste. Marie Area WMP and the Munuscong River WMP (currently under development). Emphasis is also needed for developing a WMP that

identifies and prioritizes sources of *E. coli* in the remaining tributary watersheds to the St. Marys River.

Lake Michigan Basin

- **Little Lake and East Bass Lake (HUC 040301100302)**

There are a number of lakes in Michigan that historically received waste products from the operation of sawmills over a century ago; and those include Little Lake and East Bass Lake within the Lake Michigan Basin. Sawmills operated along the lakeshore and disposed of the unwanted wood products (i.e., sawdust, bark, wood residues) in the lake. The disposal of these waste products has destroyed habitat and has caused a deterioration of overall water quality and the residing aquatic organisms. The Little Lake Watershed Council is in the process of being reorganized to include East Bass Lake, and the members are working with the MDEQ to foster a pilot project to determine the best course of remediation of these waste products. Also, the MDEQ has been working with this group to develop a CMI and Section 319 approved WMP.

- **Bear River, Little Traverse Bay (HUC 04060105-0101 through -0103)**

The Bear River is the major tributary to Little Traverse Bay, a high quality oligotrophic embayment of Lake Michigan. This high-gradient river is impacted by urban storm water runoff as it flows through the steep topography of the city of Petoskey. The river's elevation drop in the last mile is the greatest in Michigan's Lower Peninsula. Sedimentation from stream bank erosion and road crossings are problems in the upstream reaches. The coldwater fishery has been impacted by hydrological changes from development and dams. A "Healing the Bear" initiative is sponsored by area organizations and has been successful at implementing several restoration and protection projects. Environmental issues in the Bear River are addressed through actions identified in the Little Traverse Bay WMP.

- **Lake Charlevoix (HUC 04060105-0201 through -0207)**

Lake Charlevoix is a high quality oligotrophic lake and its largest tributary—the Jordan River—is a state designated Natural River. Lake Charlevoix is Michigan's fourth largest inland lake with the second longest shoreline and the fifth largest watershed, which also includes the Boyne River. The primary lake pollutants of concern are nutrients, with both nutrients and sediment being issues in the tributaries. The Lake Charlevoix Watershed Advisory Committee is one of the most active in northern Michigan and has excellent participation by local governments. Area organizations have implemented numerous projects over the last several years as identified in the Lake Charlevoix WMP.

- **Grand Traverse Bay Shoreline Watersheds along West Bay and East Bay (HUCs 04060105-0702 through -0707)**

The Grand Traverse Bay watershed is one of the premier tourist and outdoor recreation areas in the Midwest, primarily because of the high quality of its water resources. But this popularity has contributed to rapid population growth that threatens the oligotrophic waters of Grand Traverse Bay as well as the numerous small tributaries that flow from the shoreline watersheds bordering the bay. These small tributaries drain much of Traverse City—the largest city in northern lower Michigan—and portions of two of the three fastest growing counties in the state; Grand Traverse and Leelanau.

The primary pollutants of concern for the bay are nutrients and pathogens. Several swimming beach areas have periodically been identified as not meeting the state total body and partial body contact designated uses because of occasional elevated levels of *E. coli* and TMDL calculations are scheduled to be completed for these areas in 2015 and 2016. Nutrient inputs to the nearshore waters are a concern because of documented increases in the number and areal extent of macrophyte beds over the past two decades. Sand sedimentation and thermal warming is the largest concern within the small tributary watersheds. In addition, Mitchell Creek has also been identified as not meeting the total and partial body contact designated uses because of occasional elevated levels of *E. coli* and a TMDL is scheduled for 2015.

Recognition of the aesthetic, recreational, and economic value of the Grand Traverse Bay watershed's high quality waters, along with a concentration of many relatively affluent and well-educated residents, has resulted in the formation of numerous active environmental organizations and inland lake/river associations in the area. These organizations worked jointly with local governments and business representatives to develop a WMP for Grand Traverse Bay. The organizations have continued to cooperatively pursue the funding and effective implementation of many environmental protection actions. Significant work is underway to address storm water inputs from Traverse City, Suttons Bay, and Northport.

- **Boardman River Downstream from the Confluence of the North Branch and the South Branch (HUC 04060105-0504 through -0507)**

This watershed includes the mainstream of the Boardman River—a blue ribbon trout stream and state designated natural river—and extends from the river's mouth at Grand Traverse Bay south and east about 20 miles to Supply Road. The watershed includes most of Traverse City west of Old Mission Peninsula. Deposition of sediment originating from road stream crossings, stream bank erosion, and construction, is the primary pollutant problem in the Boardman River. This watershed is covered by the Grand Traverse Bay WMP and a new Boardman River sub-WMP that is unique in that this "prosperity plan" includes economic planning projected out to the year 2050, in addition to addressing water quality issues.

The Boardman River is currently receiving increased local attention as three major dams on the mainstream are being removed, providing a unique opportunity to educate the public on NPS pollution issues and potentially create large expanses of riparian buffers in the newly exposed bottomlands of the drained reservoirs. This is the largest dam removal project in Michigan's history, and the largest wetlands restoration in the Great Lakes basin. The removal of the most upstream dam—Brown Bridge Dam—was completed in 2013.

Kids Creek, which enters the Boardman River in Traverse City, is the most significant tributary within the boundaries of this watershed area. The indigenous aquatic life and wildlife designated use is not supported due to flow regime alterations, anthropogenic substrate alterations, and sedimentation/siltation. Sources of sediment are post-development erosion, urban runoff/storm sewers, and impervious surface/parking lot runoff. Significant work has been conducted implementing storm water BMPs in this watershed over the last several years and a Kids Creek subwatershed action plan was recently completed to identify specific remaining areas where restoration work is

needed. Additionally, a multi-year hydrology study was performed to facilitate the 2014 TMDL development.

- **Glen Lake/Crystal River (HUC 040601040402)**

The Glen Lake watershed includes portions of the famed Sleeping Bear Dunes National Lakeshore, the only national park in Michigan's Lower Peninsula, which comprises 40 percent of the land in the watershed. Glen Lake is oligotrophic with excellent water quality. The Crystal River is a coldwater stream that flows from Glen Lake to Lake Michigan through a large dune and swale wetland community, which is considered by the Michigan Natural Features Inventory and other management agencies as a globally rare ecological community. Furthermore, the Michigan Natural Features Inventory has stated that few, if any, higher quality and less impacted examples of a dune/swale community exist in Michigan. Partly as a result, the watershed is home to several species that are either of concern, threatened, or endangered at both the state and federal levels. Increasing development pressure threatens to degrade conditions in the lake through nutrient enrichment, in the river through sedimentation, and in the wetland areas associated with the groundwater-fed streams through the loss of habitat. The Glen Lake/Crystal River watershed is covered by a WMP.

- **Betsie River from Dair Creek Downstream (HUC 04060104-0304 through -0307)**

The Betsie River was the second river in Michigan to be designated a state Natural River and land use zoning covers building setbacks and vegetated buffers. The river is noted for its salmon and steelhead fishing throughout the main stem. Dair Creek is the most downstream of the two important tributaries that contain exceptional trout habitat and provide coldwater to the warmer lower Betsie River. Sediment, nutrients, and thermal inputs are the most significant pollutants of concern. Sources include road stream crossings, stream bank erosion at historical log roll away sites, construction sites, and riparian land uses. There is a CMI approved WMP for the Betsie River watershed, which includes Crystal Lake.

Crystal Lake is a cold, oligotrophic lake that drains to the Betsie River through the Crystal Lake Outlet, an artificial channel built in 1873. Crystal Lake is Michigan's ninth largest inland lake with a surface area over 15 square miles, and the state's third deepest lake (behind only Torch and Elk Lakes), reaching a maximum depth of 190 feet. Part of the northern portion of the watershed is adjacent to the Sleeping Bear Dunes National Lakeshore. Bellows Beach, at the west end of Crystal Lake, is not meeting the total and partial body contact state designated uses because of occasional elevated levels of *E. coli* from unknown sources and will be addressed under the statewide *E. coli* TMDL. Storm water runoff concerns and periodic elevated levels of *E. coli* also exist at the Village of Beulah.

- **Portage Lake, Manistee County (HUC 040601040405)**

Portage Lake is a mesotrophic lake whose watershed drains to Lake Michigan through an outlet channel originally constructed in 1871, which lowered the lake level by several feet. Unlike many watersheds in Michigan's northern Lower Peninsula, there is very little state or federal public land in the watershed. Private land practices associated with forestry, agriculture, recreation, commercial, industrial, and residential uses have had a significant impact on water quality. Nutrient enrichment and habitat loss are the primary environmental concerns. Dissolved oxygen levels in Portage Lake during the summer

are typically below 2.0 milligrams per liter at depths greater than 40 feet, and reach near zero at depths of 60 feet.

A WMP has been completed for Portage Lake and plan implementation is being coordinated through the Portage Lake Watershed Forever committees with remarkable success. One of the most significant successes was when Onekama Township and the village of Onekama formed a joint planning commission and completed a joint master plan that was only the sixth such plan in Michigan. This "Onekama Community Master Plan" included all major elements and priorities of the WMP, enhancing the potential to successfully protect water quality throughout the watershed.

- **Bear Creek and Bear Lake, Manistee River Watershed (HUC 04060103-0501 through -0505)**

The Manistee River supports one of Michigan's best coldwater fisheries and is particularly renowned for salmon. The Manistee River system's high water quality has resulted in the designation of two large areas under the state Natural River program, as well as federal designation of three distinct river reaches as Wild and Scenic rivers, one of which is Bear Creek. The primary pollutant of concern in Bear Creek is excessive sand bedload from sediment erosion, whereas nutrients are the main pollutants of concern for Bear Lake. Water quality protection efforts are coordinated through the Bear Creek Watershed Council and the Bear Lake Watershed Alliance using the recently completed "Greater Bear" WMP

- **Big South Branch, Pere Marquette River Watershed (HUC 0406010104)**

Often referred to as one of the finest trout streams in the Midwest, the Pere Marquette River is rather unique in Michigan for a river of its size in that it has remained free-flowing, with no dams on the mainstream. Partly because of its high water quality, the Pere Marquette River has been designated both a federal Wild and Scenic River and a state Natural River, which provide it special protection status. The Pere Marquette River has also been identified by the Nature Conservancy as one of only two watersheds in the northern Lower Peninsula (the Au Sable River is the other) that is a priority watershed for conservation action because of its high biological significance, ongoing threats, and opportunities for protective action.

Some of the earliest watershed protection efforts in Michigan were taken in the Pere Marquette watershed, and the Pere Marquette Watershed Council remains active in implementing additional protection measures. Excessive sand bedload in the river from sediment erosion is the most significant water quality issue, although there are signs of potential nutrient enrichment in some areas. The Pere Marquette River WMP identifies the Big South Branch tributary as a priority subwatershed due to a mix of pollutant sources that should be addressed and a number of high quality areas needing protection efforts.

- **White River (HUC 04060101-07 through -09)**

The White River watershed encompasses 344,166 acres in Newaygo, Muskegon, and Oceana Counties and is considered to be the southern-most major trout stream in the Lake Michigan drainage. The majority of the watershed is forested and nearly one-quarter of the watershed is included in the Manistee National Forest. The

White River WMP identifies rising water temperature, sedimentation from runoff, and the loss of the naturally vegetated areas (primarily forested) as threats to the watershed.

Many collaborative projects are currently taking place in the watershed with a variety of funding sources to address water quality concerns. The projects are directed through local groups such as the Land Conservancy of West Michigan, Muskegon County Conservation District, White River Watershed Partnership, and White Lake Public Advisory Council, as well as state and federal agencies. Projects include conservation easements, stabilizing erosive stream banks, replacing road stream crossings, and fish and wildlife habitat restoration.

- **Duck Creek (HUC 040601011008)**

The Duck Creek watershed is approximately 14,000 acres in size and located entirely within Muskegon County. Duck Creek and its tributaries converge and empty into Duck Lake, a drowned river mouth that drains into Lake Michigan. The majority of the watershed is forested. In 2013, a WMP was developed and approved with a focus on protecting existing high quality waters. MDEQ staff are working with local partners to implement goals recommended in the WMP to protect water quality, especially from sedimentation and thermal pollution. Efforts include conservation easements to permanently protect critical riparian lands, outreach and education to local citizens and government officials and development of master plans and zoning ordinances for adoption by local townships.

- **Mona Lake (HUC 040601011011)**

Mona Lake is a small, urbanized watershed near Muskegon. This watershed faces a mix of problems including sedimentation, excessive nutrients, pathogens, and invasive plants. The local watershed group has strong leadership, good community support, a working relationship with a wide variety of stakeholders, and a focus on finding innovative solutions.

- **Upper Muskegon River, from Butterfield Creek confluence north (HUC 0406010201 through 0202)**

The Muskegon River is unique among large Michigan river systems (second largest) in that it blends coldwater stream reaches with other areas that have warmwater conditions. Consequently, it has many characteristics midway between those of coldwater and warmwater rivers, and therefore, supports a very diverse aquatic community. The area in the river's headwaters surrounding Higgins and Houghton Lakes, and immediately downstream, contains by far the largest acreage of biodiversity priority areas identified by the Nature Conservancy in the entire Muskegon River watershed, particularly for aquatic species.

The varying aquatic characteristics within the watershed are dramatically represented by the stark differences between Houghton and Higgins Lakes, which are separated by only three miles. Houghton Lake is a shallow eutrophic lake, and though it is Michigan's largest inland lake with a surface area over 30 square miles, it has a maximum depth of only 22 feet and an average depth of just 7.5 feet. Conversely, Higgins Lake, Michigan's seventh largest with a surface area over 16 square miles, is a deep oligotrophic lake reaching a maximum depth over 130 feet and half the lake is over 50 feet deep. Higgins

Lake was declared by National Geographic magazine as the sixth most beautiful lake in the world.

The primary pollutants of concern for the lakes are nutrients and *E. coli*, and for the river are nutrients, temperature, sediment, and hydrologic flow. A TMDL is scheduled for 2018 to address elevated *E. coli* levels that are not meeting the total and partial body contact designated uses at several Houghton Lake beaches. Butterfield Creek and the West Branch Muskegon River are both identified in the Muskegon River WMP as critical areas because of temperature fluctuation, surface water runoff, and land use issues. A subwatershed plan for the Upper Muskegon River area is being developed with an expected completion date of 2014.

- **Upper Grand River (HUC 04050004)**

The Upper Grand River watershed is the headwaters to Michigan's longest river and encompasses 700 square miles that include parts of 5 counties. Overall land use in the watershed consists of 44 percent agriculture, 12 percent residential, 3 percent commercial/industrial, 19 percent wetlands, and 22 percent of forested land, rangeland, urban green space, and water.

The Upper Grand River watershed has a number of designated use impairments. The North Branch of the Grand River and the Portage River fail to meet WQS for biota, dissolved oxygen, and *E. coli*. TMDL allocations were developed for these sections of the Upper Grand River and Albrow Creek in 2003 and 2007, respectively. In 2009, a sanitary sewer was installed in the community of Rives Junction, which should result in improvements to the Albrow Creek watershed.

Several areas in the watershed contain high quality habitat and natural lands that need to be preserved.

The Jackson County Conservation District has worked for several years with local communities to implement agricultural BMPs, educate citizens and farmers, restore wetlands, and produce Natural Resource Inventories in several communities to guide growth and protection efforts. They were recently awarded a grant to monitor dissolved oxygen, total suspended solids, and *E. coli* to help track progress made from past implementation activities.

This watershed is a priority for implementation projects that continue to address both the restoration and protection activities that have been identified in the WMP.

- **Upper Maple River (HUCs 0405000501, 0405000502, and 0405000505)**

The Upper Maple River has a significant amount of agriculture with several Concentrated Animal Feeding Operations. Scattered among the many small towns and village are new homes on five- to ten-acre lots and occasional pockets of subdivision carved out of farm fields. There is little, if any, LID. Traveling downstream through the watersheds, the Maple River cannot maintain the current geomorphology, and cuts away at the banks re-depositing sediment. Besides the development, the previous drain practices altered flows and increased sediment deposition. Impacts from agricultural drainage, water withdrawal, and failing septic systems need to be evaluated.

There are multiple stretches of the Upper Maple River on the Section 303(d) list for biota and phosphorus. Phosphorus TMDLs were approved for Pine Creek and the Upper Maple River. An active watershed group includes the Clinton Conservation District and Clinton County Drain Commissioner. This watershed is a priority for continued support of implementation efforts, provided it extends throughout the watersheds and includes cooperative efforts between the MDEQ, county agencies, and local communities.

- **Red Cedar River (HUC 0405000404 and 0405000405)**

The Red Cedar River includes both rural and urban areas. Urban land use is mainly located within several cities and surrounding townships and includes MSU. Areas of the watersheds require restoration to address the impacts of urban development and agricultural practices in the rural areas. Prior to discharging to the Grand River, the Red Cedar River is characterized by heavy sedimentation deposition, urban debris, and high flow fluctuations. Pathogens have been identified as a pollutant impairing both the urban and rural areas. An active watershed group exists for the urban areas. There is a need to coordinate planning efforts between the urban and rural areas.

- **Sebewa Creek (HUC 0405000407)**

This watershed includes both rural and urban areas and includes the Carrier Creek subwatershed. Biological surveys in the urban areas have identified poor macroinvertebrate populations. Areas of the watershed require restoration to address the impacts of urban development and agricultural practices in the rural areas.

Low dissolved oxygen has been identified as impairing the warmwater fisheries designated use. An active watershed group exists for the urban areas and the Eaton Conservation District has recently been awarded a planning grant.

- **Rogue River (HUC 0405000604)**

The Rogue River is a major tributary of the Grand River and its 167,625-acre watershed includes urban and rural areas with pastureland, crops, and forestland in portions of Kent, Montcalm, Muskegon, Newaygo, and Ottawa Counties. The Rogue River has the distinction of being one of Michigan's southernmost trout streams; however, the Rogue River WMP identifies rising summer water temperatures and sedimentation as threats to the watershed. The Lower Grand River WMP identifies the Rogue River as a priority for both restoration and preservation. Partnerships in the watershed are aimed to protect and restore the Rogue River watershed and address the impacts of development and other pressures due to its location in an urban area by working with local governments and educating citizens. In addition to an active local watershed group and good community support, Trout Unlimited recently launched a new watershed-scale restoration project (Home Rivers Initiative) on the Rogue River.

- **Thornapple River (HUC 04050007)**

The Thornapple River watershed, located in the southwestern portion of Michigan, includes 31 subwatersheds and is the largest subbasin of the lower Grand River watershed. The Thornapple River watershed extends from Potterville westward to the western portion of Barry County then north to its confluence with the Grand River in Ada. Though the prevalent land use in the watershed is agricultural, 17 of its streams are designated trout streams, including the main stem of the Coldwater River.

Streams in much of the upper and middle portions of the watershed were historically channelized for agricultural purposes and are currently maintained as drains. Channelization affects the ability of several of the watershed's designated trout streams to support a coldwater fishery.

Many collaborative projects are currently taking place in the watershed with a variety of funding sources to address water quality concerns. These projects are directed through local groups such as Barry-Eaton District Health Department, Barry County Conservation District, the city of Hastings, Trout Unlimited, Thornapple River Watershed Council, and Coldwater River Watershed Council as well as state and federal agencies such as the MDEQ and USFWS. Projects include a well and septic inspection ordinance, riparian protection ordinances, volunteer monitoring, ongoing dam removals, development of WMPs, and fisheries habitat restoration and protection.

- **Lake Macatawa (HUC 04050002)**

Lake Macatawa, in southern Ottawa County and northern Allegan County, is a 1,780-acre drowned river mouth lake that discharges to Lake Michigan. The prevalent land use in the watershed is agricultural. Turbidity, color, settleable solids, suspended solids, and deposits are problems in the lake.

Many collaborative projects are currently taking place in the watershed with a variety of funding sources to address water quality concerns. These projects are directed through the Macatawa Area Coordinating Council and Project Clarity. The Macatawa Area Coordinating Council is an area-wide association, comprised of government units located adjacent to Lake Macatawa, which facilitates consensus building on public policy decisions that impact the greater Holland/Zeeland communities. Project Clarity is a consortium of public and private organizations working to remediate water quality issues in Lake Macatawa and the Macatawa Watershed.

- **Kalamazoo River, downstream of Morrow Pond to Lake Allegan (HUCs 04050003-05 through -09)**

The middle portion of the Kalamazoo River is the most critical area for the transport of nutrients to Lake Allegan; an instream impoundment. Lake Allegan has a TMDL for phosphorus that is currently in its implementation stage. Further BMPs are needed in both urban and agricultural areas to reduce phosphorus loadings. In addition, many areas of the mainstem of the Kalamazoo River remain undeveloped due to past industrial activities, which resulted in air and water pollution. As the Kalamazoo River becomes increasingly popular for recreation, it is critical that riparian areas be preserved for water quality protection.

- **Rabbit River (HUC 0405000308)**

The Rabbit River is a tributary of the Kalamazoo River located primarily in Allegan County with a watershed that encompasses 187,200 acres. Land use in the watershed is primarily agricultural, but forested and urban areas are also represented. The Rabbit River WMP states that water quality threats and impairments are caused by sedimentation, nutrient inputs, and high-flow occurrences. The sources of sediment include stream banks, cropland, construction sites, and road crossings/road ditches. Nutrients enter the stream from agricultural production and residential area runoff.

Damaging high flows result from uncontrolled storm water runoff due to development and past drainage practices.

- **Gun River (HUC 0405000307)**

The Gun River watershed encompasses an area of 73,272 acres in Allegan and Barry Counties. The Gun River flows from Gun Lake through agricultural land into the urbanizing area of Otsego Township, Allegan County, where it joins the Kalamazoo River. The watershed has been significantly altered from its pre-settlement conditions, primarily due to agricultural development. Many of the forests have been cleared and the wetlands drained. Sedimentation and excessive nutrient inputs have resulted in areas of the watershed exhibiting degraded aquatic habitat, decline of biodiversity, and reduced fish populations.

- **Spring Brook (HUC 0405000306)**

Spring Brook is a coldwater tributary to the Kalamazoo River immediately downstream of the City of Kalamazoo. A 1991 MDEQ biological survey conducted on Spring Brook indicated that this stream had the highest habitat quality for fish and other aquatic life of any coldwater stream of similar size that was sampled in southwestern Michigan. Brown trout of varying sizes were observed as well as high numbers and diversity of aquatic insects. A more recent biosurvey, conducted in 2004, found that approximately one mile of the riparian zone had been completely removed and replaced by subdivisions and lawns near Riverview Drive. A survey conducted farther upstream, at DE Avenue, found a largely unimpacted riparian zone and an excellent macroinvertebrate community. Pollutants associated with development including sediment, phosphorus, and thermal inputs are the primary threats to this watershed. Preservation and restoration of riparian buffers are needed in this watershed.

- **Battle Creek (HUC 040500030503)**

The 10 digit HUC for the Battle Creek River encompasses three of the top 10 scoring subwatersheds for preservation, as determined by the Kalamazoo River Conservation Plan, which was completed in 2014. Ackley Creek, Wanadoga Creek, and Clear Lake-Battle Creek were all identified as priority subwatersheds for land preservation, in a process that heavily weighted water quality metrics. This determination is consistent with MDEQ's Ten Digit HUC Prioritization Summary Score. This subwatershed is ranked 4th out of 8 for the Kalamazoo River Watershed based on MDEQ's process, and scores high for preservation, yet also has a fairly high score for stressors. MDEQ staff believe that this subwatershed should be targeted for conservation easements and storm water and riparian ordinances.

- **Black River (HUC 0405000202)**

Sediment and nutrients are the largest pollutants of concern in the Black River watershed (Allegan and Van Buren Counties). The Two Rivers Coalition, a recently incorporated nonprofit organization, is a strong, proactive watershed group representing the Black River watershed (and the adjacent Paw Paw River watershed). The Two Rivers Coalition is a partner on a Section 319 NPS grant recently awarded to the Van Buren Conservation District, which will focus on wetland protection in the watershed.

- **Paw Paw River (HUCs 04050001-24 and -25)**

The St. Joseph WMP identified the Paw Paw River subwatershed as one of the highest priority (i.e., the top three critical areas) for preservation efforts based on: (1) a scoring system for percentage of wetland and forest cover as well as trout lakes and streams in the subwatershed; (2) the top three preservation subwatersheds form a contiguous land mass surrounded on all sides by urban and developing areas; (3) potential for regional cooperation; and (4) existence of a subwatershed WMP.

The Paw Paw River has several designated trout streams. In particular, the east branch of the Paw Paw River is identified as a top quality, coldwater fishery. The mouth area of the watershed is impacted by urbanization, but there is a need for protection in the form of land use planning in the middle and upper portions of the watershed.

The Two Rivers Coalition, a recently incorporated nonprofit organization, is a strong proactive watershed group representing the Paw Paw River watershed (and the adjacent Black River watershed). Sediment and nutrients are the largest pollutants of concern in the Paw Paw River watershed. The Two Rivers Coalition is a partner on a Section 319 NPS grant recently awarded to the Van Buren Conservation District, which will focus on wetland protection and restoration in the watershed.

- **Prairie River (HUC 0405000107)**

Channelization and agricultural land drainage have been identified as a concern in the Prairie River subwatershed. A 2002 MDEQ biological survey indicated that macroinvertebrate communities rated “acceptable” (although nearly excellent) to “excellent.” Stream habitat was mostly “fair” with one station “good.” A 2007 MDEQ biological survey report indicated support of the coldwater fisheries designated use at the Bowers Road station. Another site farther downstream supported an abundance of warmwater fish taxa, although this segment is designated as coldwater. A watershed management planning grant has recently been initiated through the Branch County Conservation District.

- **Fawn River (HUC 0405000108)**

Based on results of Soil and Water Assessment Tool modeling, the Fawn River watershed was identified in the St. Joseph River WMP as one of the top three critical subwatersheds for mitigation of agricultural impacts. Sediments and nutrients are the primary pollutants of concern. Recent MDEQ biological surveys indicated largely “excellent” macroinvertebrate populations, minimal disturbance of stream habitat despite abundance of agricultural land use, diverse stream habitat, wide-wooded floodplain, and

“good” water quality. The LaGrange Soil and Water Conservation District in Indiana is pursuing a WMP grant for the Fawn River watershed.

- **Little Portage Creek (HUC 0405000109)**

Biosurvey sampling conducted at a single station in 2005 resulted in a poor fish metric score, and an acceptable macroinvertebrate metric score. The total and partial body contact recreation designated uses are impaired, with an *E. coli* TMDL completed in 2012. Additionally the warmwater fishery designated use is impaired due to anthropogenic substrate alterations. There is local interest in developing a WMP.

- **Portage River (HUC 0405000105)**

Biosurvey sampling conducted at a single station in 2005 resulted in an acceptable fish metric score, and an excellent macroinvertebrate metric score. The total and partial body contact recreation designated uses are impaired in Dorrance Creek, with an *E. coli* TMDL scheduled for 2018. The current WMP was developed by an MS4 group; however, it does not meet CMI or Section 319 criteria. There is local interest in upgrading the WMP to meet the aforementioned criteria.

- **Galien River (HUC 0404000102)**

The Galien River is a priority due to the existing problems with pathogens with source areas covering a majority of the watershed. Other major pollutants threatening and impairing the watershed are sediment and nutrients. The Conservation Fund leads a local watershed group and is currently implementing a Section 319 NPS grant focusing on septic system awareness efforts, including a social indicators survey.

Lake Huron Basin

- **Lake Huron Coast - Duncan and Grass Bays (HUC 040700030103)**

Located just east of the city of Cheboygan (Cheboygan County), the Duncan and Grass Bays area was identified as the most significant priority area to protect along the Lake Huron coast in the Northeast Michigan Coastal Stewardship Project completed in 2009. The area is a state designated environmentally sensitive area with high biological rarity, and includes shoreline ridge swale habitats, dune swale complexes, large tracts of public land, and extensive wetlands. Protecting adjacent land is a priority considering the high rate of population growth and development in the area, which contributes to sedimentation from construction site erosion as well as habitat loss and fragmentation. A WMP is currently being developed for this watershed.

- **Ocqueoc River - Silver Creek (HUC 040700030205)**

Silver Creek is one of only two major tributaries to the Ocqueoc River and provides the majority of high quality, coldwater habitat within the Ocqueoc River system. Silver Creek is a designated trout stream home to native brook trout and used by steelhead and possibly salmon from Lake Huron. Sedimentation from eroding stream banks, road crossings, and livestock access is the most significant pollutant problem in Silver Creek. Temperature is also a concern given the importance of maintaining this coldwater tributary within the overall warmer waters of the Ocqueoc River watershed. A CMI and Section 319 approved WMP is used by the Ocqueoc River Commission to improve and

protect the water resources. A significant project was recently undertaken in Silver Creek to implement a series of BMPs in a focused area to not only improve water quality in this important stream, but to also document the water quality improvements with comprehensive before and after environmental monitoring.

- **Devils River (HUC 04070003-0401 through -0404)**

Devils Lake, located just south of the city of Alpena in the Devils River watershed of Lake Huron's Thunder Bay, ranked high in the Northeast Michigan Coastal Stewardship Project. The Devils River watershed contains an extensive wetlands complex threatened by development and subsequent sedimentation issues from construction sites and road stream crossings. Starlight Beach on Thunder Bay is not meeting the total and partial body contact designated uses because of elevated levels of *E. coli* from unknown sources. A TMDL is scheduled for 2017. This area does not have a CMI or Section 319 approved WMP, but funding is currently being sought to develop one.

- **Sturgeon (HUC 0407000401) and Pigeon Rivers (HUC 0407000403)**

The Sturgeon and Pigeon Rivers are high quality, medium-sized, coldwater streams that drain into Burt and Mullett Lakes, respectively, in the Cheboygan River watershed. The Sturgeon River is one of the most pristine and high gradient streams in Michigan's Lower Peninsula and is one of the largest free-flowing trout streams in the state. The Pigeon River is also a high quality trout stream and flows through the Pigeon River Country State Forest. Sediment is the primary NPS pollutant of concern in both these rivers and several dam failures on the Pigeon River have negatively impacted macroinvertebrates and fish.

As a result of a recent grant project, there is renewed focus on these rivers and a watershed coalition has been established to coordinate long-term sustainability. A WMP is currently being developed for the Sturgeon River as part of the Burt Lake watershed planning effort.

- **South Branch Au Sable River (HUCs 04070007-0101 through -0110)**

The Au Sable River is a federally designated Wild and Scenic River and is often referred to as providing the finest brown trout fly fishing east of the Rocky Mountains. The Au Sable River watershed has also been identified by the Nature Conservancy as one of only two watersheds in the northern Lower Peninsula (the Pere Marquette River is the other) that is a priority watershed for conservation action because of its high biological significance, ongoing threats, and opportunities for protective action.

The South Branch of the Au Sable River is a state designated Natural River that flows through the famed Mason Tract in the Au Sable State Forest. The primary pollutants affecting this world-class trout stream are sand bedload from stream bank and road crossing sediment erosion, as well as urban storm water runoff from the village of Roscommon. Actions to address water quality in the upper Au Sable River, which includes the South Branch, are coordinated through the Au Sable River Watershed Restoration Committee and the Upper Au Sable River CMI approved WMP.

- **Rifle River (HUC 04080101)**

The Rifle River is a state designated Natural River and is heavily used for recreation including fishing and canoeing. The Rifle River is threatened by sediment inputs from uncontrolled livestock access, gully erosion sites, stream bank erosion, and erosion from road stream crossings. Urban storm water discharges from the city of West Branch also pose a potential threat to this coldwater river. A watershed implementation grant has been completed for the Rifle River and the Rifle River Restoration Committee is currently active in implementation practices. This committee is well supported by the two resource conservation and development councils that cover the area.

- **Kawkawlin River (HUC 04080102)**

The Kawkawlin River has been identified as a critical watershed as part of the SBCI Program. The Kawkawlin River watershed drains to the southwestern portion of Saginaw Bay and provides important recreational opportunities. This area has, and continues to experience, problems with pathogens. Historically, the Kawkawlin River has also experienced impacts from elevated phosphorus levels (nuisance algae and duckweed). The local community is working on a watershed planning grant.

- **Pigeon River (HUC 0408010302)**

The Pigeon River watershed is located in the “thumb” area of Michigan’s Lower Peninsula in Huron County and very small portions of Tuscola and Sanilac Counties. Spanning approximately 145 square miles (92,799 acres), the watershed is part of the Eastern Coastal Basin in the larger Saginaw Bay Drainage Basin, and includes coastal shoreline along Saginaw Bay in Lake Huron. The Pigeon River originates as a series of agricultural drains and flows approximately 40 miles north to its confluence with Saginaw Bay. Over 190 miles of tributary channels have been established as county drains throughout the watershed. Approximately 8 miles are currently established as inter-county drains. Land use in the watershed consists of 82 percent agricultural, 5 percent urban, 10 percent forestland, and 3 percent wetland. Five main categories of causes of NPS pollution were identified in the Pigeon River WMP including stream bank erosion, rill and gully erosion, tile outlets, road-stream crossing erosion, and livestock access. Failing septic systems are also a suspected source of pollution in the watershed. Reduction of phosphorus loadings from this watershed to the Saginaw Bay is a key goal identified in the WMP.

- **Pinnebog River (HUC 0408010303)**

The Pinnebog River has been identified as a critical watershed as part of the SBCI Program. The Pinnebog River has been noted as having elevated phosphorus levels, and organic deposits have been a problem near the river mouth for the last several years. The local community has completed a WMP for this water body and is working to implement the WMP.

- **Cedar River (HUC 0408020102)**

The Cedar River, a tributary to the Tittabawassee River, has stretches that are declared blue ribbon trout streams. The watershed is threatened by sediment inputs from uncontrolled livestock access, gully erosion sites, stream bank erosion, and erosion from road stream crossings. The watershed should be a focus for protection as it remains

relatively undeveloped. The local community currently has two watershed grants to implement BMPs and permanent conservation easements. Restoration of existing NPS pollution sites is important to maintain the high quality nature of this watershed.

- **Shiawassee River (HUC 04080203)**

The Shiawassee River is a good quality warmwater stream that flows in a northerly direction from its genesis in Livingston and Oakland Counties and discharges into the Saginaw River and eventually into the Saginaw Bay of Lake Huron. The Shiawassee River watershed consists of mixed agricultural and urban land uses and covers 1,266 square miles or 742,400 acres. NPS Program efforts to date have focused on the Mid-Shiawassee River watershed, which makes up the central portion of the watershed and is 227 square miles or 138,178 total acres in size.

Portions of the Holly Drain (HUC 040802030203), a subwatershed to the Mid-Shiawassee River, are covered by an *E. coli* TMDL. In addition, designated use impairments due to anthropogenic substrate alterations and flow regime alterations have been documented in the Webb Creek subwatershed (HUC 040802030201). These tributaries flow primarily through rural areas where NPS such as failing septic systems, agricultural runoff, animal access sites, and stream bank erosion have been identified. An update to the Mid-Shiawassee River WMP was completed and approved under CMI and Section 319 criteria in 2011. It is a priority for the NPS Program to continue to work with the local watershed group in addressing NPS pollution in the nonattainment areas of the river.

- **Flint River (HUC 04080204)**

The Flint River watershed drains approximately 1,332 square miles and has 18 subwatersheds. The watershed has a population of over 600,000 people, 250,000 of which depend on the Flint River as an emergency backup supply for drinking water. Major tributaries include the South and North Branch Flint Rivers, and Kearsley, Thread, Swartz, and Misteguay Creeks. Moderately stable flow is found in the upper South Branch Flint River and in the headwater reaches of some tributaries. Land use in the Flint River watershed is dominated by agriculture (49 percent) followed by forested (16 percent), non-forested (15 percent), urban development (15 percent), and wetland (3 percent). The loss of wetlands from channelization and tiling has decreased flow stability, increased erosion and sedimentation, and altered stream temperature regimes.

The North Branch of the Flint River (HUC 0408020404) and the South Branch of the Flint River (HUC 0408020401) are prioritized for NPS control activities. These watersheds include Kearsley Creek, Gilkey Creek, and the South Branch of the Flint River, which have approved WMPs and active stakeholder involvement. NPS pollution from septic systems, stream bank erosion, agricultural runoff, fertilizers, pesticides, urban storm water runoff, and increased development are of concern within these watersheds. The South Branch of the Flint River watershed is a high priority for protection practices due to its hydrologic stability, in-stream habitat, and biologic diversity.

The North Branch of the Flint River includes the Holloway Reservoir and Mott Lake, which provide recreational opportunities in the region with numerous local parks, beaches, and access points located on these water bodies. NPS pollution has been

identified as contributing to designated use impairments in the Holloway Reservoir and Mott Lake.

- **Cass River (HUC 04080205)**

The Cass River watershed encompasses an area of 908 square miles (approximately 578,812 acres), contains 1,352 total river miles, and hundreds of miles of county drain. Of the total river miles, only 352 linear miles are classified as perennial. The Cass River flows to the Saginaw River and eventually to Saginaw Bay. Located in Michigan's Lower Peninsula's thumb region, the watershed includes portions of Genesee, Huron, Lapeer, Saginaw, Sanilac, and Tuscola Counties. The watershed has a number of designated use impairments and is currently covered by TMDLs for *E. coli* and dissolved oxygen. While relatively clean water flows in the Cass River system, sediment and nutrient enrichment continue to threaten water quality. The major sources of sediments and nutrients are eroding stream banks and road crossings as well as agriculture. Restoration of the impaired stream reaches and protection of the natural forested riverine corridor are key priorities for this watershed.

Lake Erie Basin

- **St. Clair River/Lake St. Clair (HUCs 04090001 and 04090002)**

This high priority area includes the Pine, Black, and Belle Rivers, as well as direct drainage watersheds to the St. Clair River and Lake St. Clair in St. Clair and Macomb Counties. Lake St. Clair and the St. Clair River provide drinking water to more than five million residents in Michigan and Ontario, and are among the most heavily used recreational areas in the Great Lakes for fishing, boating, and swimming. It is estimated that nearly 50 percent of all sport fish caught in the Great Lakes are caught in Lake St. Clair, and that recreational boating in the lake contributes over \$200 million a year to the economy of southeast Michigan. Abundant shoreline along the river and lake also provides many recreational opportunities for local residents and tourists.

The St. Clair River has been identified as a Great Lakes AOC by the United States and Canadian federal governments. Lake St. Clair was identified as a Biodiversity Investment Area at the 2000 State of the Lakes Ecosystem Conference as well as a priority "eco-reach" that provides critical habitat for numerous plant and animal species, especially in the region's coastal wetlands. In the Belle River watershed, recent surveys have confirmed very high mussel species diversity that includes endangered mussel species.

Intermittent beach closures due to elevated bacteria levels, failing or inadequate septic systems, sites of unrestricted cattle access, and illicit discharges are problems in the area. Despite the significant progress made over the past five years to correct problems, issues remain due to soil type and historical development in the area.

At this time, a WMP has not yet been developed for the Belle River watershed; however, an active watershed group has formed and a grant was awarded to St. Clair County in July 2011 for the development of a Belle River WMP to be completed in 2015. . A CMI and Section 319 approved WMP was developed for the Black River in October 2010.

- **Clinton River North Branch (HUC 0408000303)**

The Clinton River North Branch subwatershed is located primarily in Macomb County, encompassing a large portion of the central and northern areas of the county and extending into Oakland, Lapeer, and St. Clair Counties. These headwater streams are high quality, coldwater designated trout streams that provide recreational activities for the region.

Historically, the Clinton River North Branch subwatershed experienced a significant loss of wetlands as agriculture and other land uses expanded in the region. Today, the land use in the Clinton River North Branch remains predominately agricultural. However, due to the area's close proximity to metro Detroit, development pressure continues to threaten the remaining wetlands, natural areas, and agricultural land of the subwatershed. This development pressure has created an increasing need to take preventive/proactive actions to help preserve the water quality of the Clinton River North Branch.

The Clinton River North Branch has an active watershed advisory group, which was instrumental in the development of a WMP for the Clinton River North Branch. The Clinton River North Branch WMP was CMI and Section 319 approved in 2011 and since its approval, the watershed advisory group has been seeking opportunities to implement actions from the WMP. One example of a project that is currently in progress is the North Branch Clinton River Wetland Restoration Project. In 2012, a CMI/319 grant was awarded to the Macomb County Public Works Office to restore 40 acres of wetlands in the North Branch watershed. The project will result in wetlands restoration that exceeds the five year target for wetlands restoration in catchment No. 612 and will accomplish 62 percent of the ten year target established in the WMP. Additionally, the project will meet 9 percent of the wetlands restoration AOC delisting target for this watershed.

- **Stony (HUC 0409000301) and Paint Creeks (HUC 040900030104)**

Stony and Paint Creeks are hydrologically separate subwatersheds; however, they are considered as one by the Stony/Paint subwatershed group due to their close proximity and shared communities within their drainage areas. Both creeks are high quality, coldwater tributaries of the Clinton River. Stony Creek continues to retain many high quality characteristics, but it is threatened by increasing development, particularly in the southern end of the subwatershed. Stony Creek is home to a wealth of unique natural areas that are protected in both the public and private domains. Paint Creek is managed as a trout stream from Lake Orion to its confluence with the Clinton River. Brown trout reproduce in Paint Creek, but they are supplemented with an annual stocking by the MDNR. Much of the stream is bordered by public land and recreational trails, making it valued by the public in southeast Michigan due to its numerous recreational opportunities and high potential for sport fishing.

As development in the watershed continues, the potential for negative environmental effects on Stony and Paint Creeks increases. Problems of concern include water quality impacts from erosion, sedimentation, and increased inputs of storm water pollutants, as well as water quantity impacts from more impervious surfaces and the loss of wetlands, woodlands, and riparian vegetation.

Fourteen communities, two counties, and two school districts were involved in the development of the CMI and Section 319 approved Stony Creek/Paint Creek WMP and they continue to meet at least bi-annually.

- **Pebble Creek (040900040404)**

Pebble Creek, located in south central Oakland County (primarily Farmington Hills, Southfield, and West Bloomfield Township), is a headwater tributary to the Main 1-2 Branch of the Rouge River. Dominated by low/medium density residential land use, urbanization and urban storm water runoff are significant sources to the creek's impaired designated uses (Partial/Total Body Contact Recreation, Warm Water Fishery, Indigenous Aquatic Life and Wildlife, and Fish Consumption) and Rouge-wide TMDL's [*E. coli* (2007); Sediment (2007); and, scheduled, PCB (2014) and DO (2022)]. To help address these issues, the constituent communities are in the process of undertaking a watershed management planning effort for the sub-watershed that capitalizes on previous plans, including a current planning effort focused on target-setting for GI in the Pebble Creek subwatershed.

- **Rouge River Main 3-4 in the City of Detroit – Upper Rouge Tributary Area (040900040404)**

The Main Branch of the Rouge River enters the city of Detroit at its northwest corner, then flowing south along its western border and through two environmentally significant park lands – Eliza Howell Park (where the Upper Branch converges) and Rouge Park. This reach of the Rouge is an important resource to the city, which although defined by the Detroit River on its south-eastern front, is otherwise virtually devoid of inland surface water features being primarily served by combined sewers. As is the case in many areas of this highly urbanized watershed, this reach has several impaired designated uses (Partial/Total Body Contact Recreation, Warm Water Fishery, Indigenous Aquatic Life and Wildlife, and Fish Consumption) and Rouge-wide TMDL's [*E. coli* (2007); Sediment (2007); and, scheduled, PCB (2014) and DO (2022)]. This reach is plagued, most notably, by uncontrolled CSO's directly from Detroit and indirectly (via tributaries) from neighboring communities (Dearborn Heights and Redford Township). Multiple control and treatment facilities and structures have made substantial progress toward reducing and/or eliminating CSO's in this area, yet significant investments are still needed to address remaining uncontrolled CSO's. Due to financial reasons, the City had to abandon a \$1 billion Upper Rouge Tunnel project (now used interchangeably with Upper Rouge Tributary; URT) that was expected to largely address the CSO issues for Detroit (and the two neighbors). The MDEQ and the USEPA worked with the Detroit Water and Sewerage Department to develop a Green Infrastructure (GI) program (\$50M over 20 years), integrated with the City's 2012 NPDES permit, intended to reduce flows into the system and potentially limit additional gray infrastructure needed to fully address CSO's in the URT area. The Detroit Water and Sewerage Department's GI Program along with urban revitalization efforts, such as blight removal and vacant land repurposing (e.g. highlighted by the 2012 Detroit Strategic Framework, Detroit Future City), have drawn broad interest in GI planning and investment from public, private, nonprofit and philanthropic groups at the local, regional, state and national levels.

- **Ecorse Creek (HUC 040900040501)**

Ecorse Creek is a highly urbanized watershed located in Wayne County. There are three primary water courses within the watershed that drain into the Ecorse Creek, which then drains to the Detroit River. These are the North Branch, the LeBlanc Drain, and the

Sexton-Kilfoil Drain. All three major water courses within the watershed have extensive hydraulic and pollution problems.

The Ecorse Creek watershed, in its entirety, is identified on Michigan's Section 303(d) list as failing to meet Michigan WQS for pathogens and for the protection of warmwater aquatic life. A TMDL, water quality targets, and quantifiable pollutant load reductions have been developed to protect aquatic biota within the Ecorse Creek watershed. In 2008, a TMDL for *E. coli* was developed for the Ecorse Creek watershed.

The Ecorse Creek watershed has a CMI and 319 approved WMP. Communities in the Ecorse Creek watershed are part of a larger combined watershed group called Alliance of the Downriver Watersheds. This is comprised of the Ecorse Creek watershed, the combined downriver watershed, and the Lower Huron River watershed. The Alliance of the Downriver Watersheds is active and continues to meet regularly.

- **Upper Huron River/Kent Lake (HUC 040900050106)**

The Kent Lake subwatershed of the Huron River is located in southwestern Oakland County and extends into Brighton and Green Oak Townships in Livingston County. The drainage area is 556 square miles extending from the headwaters of the Huron River downstream to the Kent Lake impoundment in the Kensington Metropark. The subwatershed contains nearly 700 individual lakes comprising approximately 9,000 acres, Pettibone and Norton Creeks, and innumerable wetlands.

Land use in the Kent Lake subwatershed ranges from heavily commercial and residential areas in the east and south to small rural farms and housing in the north and west. There are two Metroparks and four state recreation areas in the subwatershed, along with numerous county, city, and village parks totaling roughly 22,000 acres of publicly owned land. So exceptional is the ecological value of this area that the Nature Conservancy recently deemed portions of the subwatershed as "globally significant."

Water quality concerns in the watershed range from nutrient and bacterial loading issues that result in many beach closings in the area, to issues of water clarity and toxicity. Additional water quality concerns include turbidity, conductivity, pesticides, and pollutants such as PCBs and mercury. Fourteen communities, one county, and one school district were involved in the development of the Kent Lake/Upper Huron WMP and they continue to meet periodically.

The Huron River Watershed Council received a SAW grant in 2014 to develop a nine element WMP for Norton Creek. An approved TMDL for dissolved oxygen and sedimentation/siltation was written for Norton Creek in 2009. The WMP is expected to be completed in the fall of 2015.

- **Middle Huron River Subbasins (HUCs 04090005-02 through -04)**

The Huron River watershed is a Michigan natural treasure. More than 525,000 residents use the river for recreation, drinking water, and power generation. The river supports one of Michigan's finest smallmouth bass fisheries, and is the only designated Scenic River in southeastern Michigan. The watershed contains two-thirds of the area's public recreation lands, and is home to numerous threatened and endangered plant and

animal species and habitat types. The Nature Conservancy has recognized the ecological value of portions of the watershed and counts it among the Conservancy's aquatic conservation priorities in Michigan.

The Middle Huron watershed, located in the vicinity of Ann Arbor, has water quality issues related to phosphorus, sediment, altered hydrology, and pathogens.

There is an active group of communities and institutions that have been implementing activities to reduce phosphorus and other pollutants since 1995. The highest ranking subwatersheds for phosphorus loading are Mill Creek, Mallets Creek, and Fleming Creek. Of these, Fleming Creek is in need of a WMP to guide restoration activity. Sediment is a concern in several Middle Huron subwatersheds including Honey Creek, Millers Creek, Mallets Creek, and Swift Run. Many of these subwatersheds have also been highly modified by hydrologic alterations and need restoration activities aimed at detention, wetland restoration, LID, or other means of GI that retains water on-site longer.

- **Portage Creek Subbasin (HUC 0409000503)**

The Portage Creek watershed covers 89 square miles of the 908 square mile Huron River watershed. It lies upstream of the Middle Huron section. It encompasses parts of six townships, two villages, and four counties. Nearly 16,000 acres of lakes and wetlands are located in the watershed. More than 11,300 acres are publicly-owned state land. The protected natural areas contain some of the most diverse and rich native ecosystems remaining in the Portage Creek watershed and southeastern Michigan. It is also one of the most unstable streams in the Huron River watershed and is threatened by altered hydrology as well as lack of development standards and protection ordinances.

Areas of high habitat quality and species diversity persist in the watershed due to the extent of state-owned lands, undeveloped private lands, and land protected through conservation easements. The connectedness and expansiveness of the remaining natural areas and native habitats directly impact the water quality in the watershed. As the Portage Creek watershed communities develop, there is potential for negative environmental impacts to increase, including water quality impacts from erosion, sedimentation, and increased inputs of storm water pollutants. Hydrology is impacted as wetlands, woodlands, floodplains, and other natural features that regulate water quantity are altered or replaced with impervious surfaces.

The remaining natural areas in the Huron River watershed were mapped and prioritized in 2002, and updated in 2007, through the Bioreserve Project of the Huron River Watershed Council. One hundred and two sites (23,908 acres) in the Portage Creek watershed were identified as priority natural areas.

The priority goals and objectives in the Portage Creek watershed include maintaining and increasing the natural buffers, increasing the amount of protected land through ordinances and conservation easements, restoring converted wetlands, increasing the use of development standards, and promoting low-impact development concepts.

- **Raisin River – Headwaters (HUC 0410000201)**

The headwater portions of the Raisin River, specifically Iron Creek, Goose Creek, Evans Creek, and the Upper Raisin River, have been identified by the Nature Conservancy as having significant regional ecological importance due to the remaining diverse mussel beds. This region has the most historically intact assemblage of mussels and other aquatic species of any river in southern Michigan. Currently, water quality is fairly good in these upper reaches. The Raisin River WMP lists these as high priority areas for protection measures including land use controls, buffers, easements, and ordinances.