

Michigan's Nonpoint Source Program Plan

**Michigan Department of Environmental Quality
Water Bureau
Nonpoint Source Program
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TABLE OF CONTENTS

LIST OF TABLES.....	iii
LIST OF APPENDICES	iv
LIST OF ACRONYMS.....	v
CHAPTER 1: INTRODUCTION.....	1
1.1 Background	1
1.2 Long-term Program Goals.....	6
CHAPTER 2: MICHIGAN WATER RESOURCES INVENTORY	10
2.1 Designated Uses	10
2.2 Resource Inventory.....	10
2.2.1 Great Lakes.....	10
2.2.2 Inland Lakes.....	11
2.2.3 Rivers and Streams.....	13
2.2.4 Wetlands	17
2.2.5 Groundwater.....	18
CHAPTER 3: SOURCE CONTROL STRATEGIES	21
3.1 Summary of NPS Threats and Sources.....	21
3.2 BMPs	22
3.2.1 Agricultural BMPs	22
3.2.2 Forestry BMPs	23
3.2.3 Urban BMPs	23
3.3 Source-Specific Strategies to Address NPS Pollution	24
3.3.1 Hydrologic Modification.....	24
3.3.2 Agriculture	27
3.3.3 Urban	30
3.3.4 Transportation Infrastructure.....	31
3.3.5 Forestry.....	32
3.3.6 On-Site Wastewater Treatment Systems.....	33
3.3.7 Recreational.....	36
3.3.8 Resource Extraction	39
3.3.9 Land Disposal.....	39
3.3.10 Atmospheric Deposition.....	40
3.3.11 Contaminated Sediments	41
3.3.12 Clean Sediments	42
CHAPTER 4: WATERSHED MANAGEMENT.....	43
4.1 Watershed Approach	43
4.2 Watershed Prioritization	44

4.2.1	Concepts	44
4.2.2	Priority Watersheds	44
4.2.3	State Watershed Plan	48
4.3	Watershed Plans	49
4.3.1	NPS Watershed Plan Definition	49
4.3.2	NPS Watershed Plan Development Priorities	50
4.3.3	Plan Approval	51
4.3.4	Other Watershed Management Plans	52
4.4	Implementing NPS Actions	54
4.4.1	Partnerships	54
4.4.2	Technical Assistance	55
4.4.3	TMDL Implementation	58
CHAPTER 5: MONITORING		60
5.1	Developing Priorities and Allocating Resources	60
5.2	Statewide Trend Monitoring	61
5.3	NPS Problem Identification Monitoring	62
5.4	TMDL Development and Effectiveness Monitoring	64
5.5	NPS Project Effectiveness Monitoring	65
5.6	Special NPS Effectiveness Monitoring Projects	66
5.7	Monitoring Tool Development and Assessment	68
CHAPTER 6: INFORMATION AND EDUCATION		70
6.1	Raise Awareness on a Statewide and Regional Scale	70
6.2	Ordinances for the Protection of Water Quality	72
6.3	Provide Information to Assist Stakeholders with Outreach Activities	73
6.4	Special Outreach Campaigns	74
CHAPTER 7: FUNDING		76
7.1	Overview of Michigan’s NPS Funding Sources	76
7.2	Other Funds Available to Support NPS Pollution Control	78
7.3	Nonsection 319 Federal Funds to Support Pass-Through Grants	78
7.4	Local Funds for Sustaining Watershed Organizations	79
7.5	Other Grant Programs Administered by the MDEQ	80
7.6	New Funding Opportunities	80
CHAPTER 8: PARTNERSHIPS		82
CHAPTER 9: COMPLIANCE AND ENFORCEMENT		84
CHAPTER 10: STAFF TRAINING		86

LIST OF TABLES

Table 2.1.	Trophic status summary of Michigan's public access lakes	12
Table 2.2	Michigan inland lake acres not attaining (or threatened) designated uses listed by cause.....	12
Table 2.3	Michigan inland lake acres not attaining (or threatened) designated uses listed by source.....	12
Table 2.4	Michigan river miles not attaining (or threatened) designated uses listed by cause based on assessments conducted from 1999 to 2004.....	14
Table 2.5	Michigan river miles not attaining (or threatened) designated uses listed by source based on assessments conducted from 1999 to 2004	15
Table 2.6	Extent of wetlands by type based on MIRIS data circa 1978-1979.....	18
Table 2.7	Michigan wetlands overall designated use support summary	18
Table 5.1	Five-Year rotating watershed monitoring schedule	63
Table 5.2	Potential "success story" projects monitored in 2009.....	68

LIST OF APPENDICES

Appendix 1	Water Protection Programs.....	88
Appendix 2	Nine Key Elements of a Successful NPS Management Program.....	103
Appendix 3	Open or Pending Pass-Through Grant Projects	106
Appendix 4	2010 NPS Priority Watersheds	110

LIST OF ACRONYMS

AOC	Area of Concern
BEACH Act	Beaches Environmental Assessment and Coastal Health Act
BMP	Best Management Practices
BUI	Beneficial Use Impairment
CMI	Clean Michigan Initiative
CMP	Coastal Management Plan
CREP	Conservation Reserve Enhancement Program
CSO	Combined Sewer Overflow
CWA	Clean Water Act
DDT	Dichlorodiphenyltrichloroethane
Farm-a-Syst	Farmstead Assessment System
FOD	Field Operations Division
FY	Fiscal Year
GIS	Geographic Information System
GLRI	Great Lakes Restoration Initiative
GLWQA	Great Lakes Water Quality Agreement
GSD	Geological Survey Division
I&E	Information and Education
IDEP	Illicit Discharge Elimination Program
IPP	Industrial Pretreatment Program
LaMP	Lakewide Management Plan
LID	Low impact development
LWMD	Land and Water Management Division
MACDC	Michigan Association of County Drain Commissioners
MAEAP	Michigan Agriculture Environmental Assurance Program
MDA	Michigan Department of Agriculture
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MDOT	Michigan Department of Transportation
mg/l	Milligrams per Liter
MiCorps	Michigan Clean Water Corps
MIRIS	Michigan Resource Information System
MS4	Municipal Separate Storm Sewer Systems
MSU	Michigan State University
ng/l	Nanograms per Liter
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service
NREPA	Natural Resources and Environmental Protection Act
PCB	Polychlorinated biphenyl
QAPP	Quality Assurance Project Plan
RAP	Remedial Action Plan
R-B Index	Richards-Baker Flashiness Index
RFP	Request for Proposal
RRD	Remediation and Redevelopment Division
SBCI	Saginaw Bay Coastal Initiative
SESC	Soil Erosion and Sedimentation Control
SIDMA	Social Indicators Data Management and Analysis
SRF	State Revolving Fund
SSO	Sanitary Sewer Overflow
STORET	Storage and Retrieval System
SWAS	Surface Water Assessment Section
TMDL	Total Maximum Daily Load
U.S. EPA	U.S. Environmental Protection Agency
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WB	Water Bureau
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 while some actions (such as land use planning decisions or ordinances) can only be implemented at the local level. The responsibilities of the various local, state, and federal entities for NPS pollution control must be coordinated to ensure that limited resources are used efficiently and effectively to ensure that the shared responsibility for protecting water resources is achieved.

The NPS Program focuses to eliminate NPS pollution in a way that considers business and economic impacts and their corresponding social impacts. Some NPS Program partners use the "triple bottom line" when engaging in business activities. The triple bottom line is a way to consider economic, social, and environmental impacts of these activities as one. The NPS Program is focused on sustainability in our partner's activities, not only in partnering with organizations that are environmentally sustainable, but ensuring that their activities make sense from a business standpoint as well. The NPS Program encourages NPS control at the beginning of projects as it has been shown that minimizing pollutant runoff at the start of a project can actually minimize costs for builders and owners in the long and short run. This makes sense socially, environmentally, and economically. The NPS Program is focused on not only minimizing the impact of NPS pollutants, but also encouraging sustainability by promoting the consideration of economic and social costs of polluted runoff.

1.1 Background

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

NPS Assessment

Early in 1988, the state of Michigan conducted a survey of natural resources, environmental, and agricultural agencies in Michigan regarding their perception of the extent of NPS pollution in Michigan. 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 United States Environmental

Protection Agency (U.S. EPA) 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 U.S. EPA 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 draft 2006 Integrated Report titled, *Water Quality and Pollution Control in Michigan 2006 Sections 303(d), 305(b), and 314 Integrated Report*, was revised to reflect public comments and submitted to the U.S. EPA for review and approval on April 1, 2006. The U.S. EPA approved the Section 303(d) portion of the 2006 Integrated Report on June 5, 2006.

NPS Pollution Control Management Plan

Also early in 1988, the state of Michigan began work on the four-year management plan required by the CWA. A 23-member NPS Advisory Committee and 9 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.

Prior to the 2007 program plan update, Michigan's NPS Management Plan was most recently 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 U.S. EPA's 1996 release of its *Nonpoint Source Program Guidance for Fiscal Year (FY) 1997 and Future Years*. The U.S. EPA'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 U.S. EPA 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, Water Bureau (WB) 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 WB 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 WB's existing NPS Program, and develop recommendations to realign the WB's resources to effectively administer the NPS Program in Michigan.

To accomplish this charge, 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 committee recognized that given funding and staffing realities, the recommendations included in the reengineering report could not be implemented equally across all watersheds by all NPS Program staff. In addition, recommended activities varied in importance across regions and among watersheds. Therefore, the committee was unable to develop a prioritized list of recommendations. However, the committee recognized that the NPS Program Plan was the appropriate place to set priorities and develop specific long- and short-term goals.

The WB's senior managers reviewed the report recommendations and directed the NPS Program to focus action in several areas including:

- Education and Outreach
- Monitoring
- Technical Assistance
- Partnerships
- Enforcement

The WB intends to use the Program Plan to focus attention on these areas as follows.

- **Education and Outreach:** The Program Plan identifies a number of long- and short-term goals to advance education and outreach activities including prioritizing watersheds for actions and identifying specific targets for education and outreach projects and measures of success.
- **Monitoring:** The reengineering report specifically identified hydrologic alteration as one of the major NPS threats and the Program Plan includes long- and short-term commitments to the development of regional reference curves to help the program identify and address impacted watersheds. In addition, the program continues to emphasize monitoring projects to demonstrate measurable improvements in water quality and the Program Plan describes the process that will be used to select projects as well as specific, short-term monitoring commitments.
- **Technical Assistance:** The Program Plan includes a number of long- and short-term goals intended to enhance our efforts to provide technical assistance such as development of best management practice (BMP) manuals; providing geographic information system (GIS) expertise to stakeholders; and providing technical assistance to local groups working to develop and implement watershed management plans.
- **Partnerships:** The Program Plan includes some long- and short-term goals intended to improve partnerships with programs internal to the MDEQ as well as partnerships with external stakeholders.
- **Enforcement:** The Program Plan includes a number of recommendations from the reengineering report regarding the need to better integrate enforcement activities across WB and MDEQ programs.

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 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 U.S. EPA, Region 5, states prior to developing the update.

The 2007 Program Plan update addressed the U.S. EPA's nine key elements of an effective and dynamic state NPS Program (Appendix 2). 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. However, given resource constraints, not all of the 2006 NPS Reengineering Report recommendations were translated into specific commitments. The NPS Program Committee intends to develop specific commitments in future updates of the Program Plan.

The MDEQ used the Program Plan update to develop annual plans to guide the actions of staff working in the NPS Program. Annual plans were a key recommendation from the 2006 NPS Reengineering Report. The Reengineering Committee felt that annual plans were necessary to ensure that the NPS Program resources were directed in a coordinated, efficient, and effective manner. In addition, the Reengineering Committee recommended that the annual plans be used to track program performance. The NPS Program Plan was used to develop annual work plans in FYs 2008 and 2009.

The Program Plan update included a series of long-term, short-term, or "as time allows" goals. Long-term goals represent the general direction that the program intends to take over the life of this Program Plan. The highest priority long-term goals are followed by more specific short-term goals. The short-term goals are designed to achieve or make progress toward achieving the long-term goals and represent the highest priority areas of activity over the next five years. The "as time allows" goals are also intended to achieve or make progress toward achieving the long-term goals. However, these actions are a lower priority than the short-term goals and will only be achieved as resources allow. Long-term goals without any corresponding short-term goals are a lower priority for the Program Plan and in many cases will not be pursued until existing short-term or "as-time-allows" goals are completed.

In addition, most of the long-term, short-term, and "as time allows" goals require collaboration among NPS Program staff. In these cases, ad hoc teams of NPS Program staff were formed to address specific goals and then either disbanded or reformed to address new goals. For example, the watershed management team, comprised of NPS Program staff, was charged to address several of the goals included in Chapter 4. The composition of the team will be recommended by the NPS Program Committee and approved by the WB management team. Specific work products of the ad hoc teams will be vetted through the NPS Program Committee and WB management team, as necessary, prior to completion. In addition to the watershed

management team, the NPS Program Committee formed a monitoring team and an on-site wastewater treatment system team. The annual plans described above will identify the ad hoc teams, team members, and their specific charges. Also, in cases where collaboration among NPS Program staff and other programs is required to complete specific goals, those other programs are identified.

Future Updates of the NPS Program Plan

The NPS Program Committee intends to update the NPS Program Plan on a regular basis and the FY 2009 Program Plan 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 described above. Therefore, portions of the Program Plan (such as the list of ongoing “success story” monitoring efforts listed in Chapter 5) must be updated annually. 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 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. In addition, the MDEQ is currently developing a wet weather strategy that will include specific recommendations 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, as noted above, many of the recommendations from the 2006 NPS Reengineering Report have not been sufficiently developed to ensure implementation given the existing resource constraints. For example, the Reengineering Report includes numerous recommendations regarding general opportunities to work in partnership with other stakeholders. However, developing partnerships that involve shared long-term goals, common short-term outcomes, and shared work plans require time and resource commitments. Therefore, the NPS Committee expects to use an iterative approach to address Reengineering Report recommendations. In many cases, long-term goals are included in the Program Plan without corresponding short-term goals. In these cases, the short-term goals will be established during future Program Plan updates.

Finally, future Program Plan updates will be used to reevaluate, and revise, as necessary, long-term goals and add new short-term goals 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 are located centrally in Lansing and in eight district offices across the state. The duties of these staff are summarized as follows:

- **WB:** The WB is responsible for administering most elements of the NPS Program including grant administration, program planning and priority setting, compliance and enforcement, information and education (I&E) 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- and short-term goals included in the 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.

- **Land and Water Management Division (LWMD):** The LWMD is responsible for providing technical support in the areas of hydrology and wetland restoration and protection. Specific duties are covered by long- and short-term goals.

1.2 Long-term Program Goals

NPS Program Vision

The MDEQ, NPS Program is: highly recognized for its technical expertise in NPS pollution control; successfully engaged in comprehensive watershed management statewide through extensive partnerships with stakeholders; coordinating all available information and resources effectively to focus on identifying, prioritizing, and solving NPS problems on a watershed basis; and achieving sustainable long-term solutions to NPS pollution.

NPS Program Mission

The mission of Michigan's NPS Program is to: (1) proactively reduce and prevent NPS of pollution in order to provide for healthy and diverse aquatic ecosystems, protect public health, and enhance environmentally compatible recreation opportunities; (2) develop public recognition of the value of Michigan's lakes, streams, wetlands, and groundwater; and (3) encourage stewardship of these resources.

Program Principle Statements

Watershed Approach

The NPS Program abates known water quality impairments from NPS pollution and prevents significant threats to water quality from present and future activities by working on a watershed basis.

Land Use

The NPS Program supports, promotes, and facilitates sustainable land use practices and planning that protect and enhance water quality through the development and distribution of educational materials and by providing technical assistance.

Partnerships

The NPS Program works in partnership with others to achieve water quality objectives. Internally, the MDEQ seeks to coordinate and integrate programs addressing threats to water

quality caused by NPS pollution. The NPS Program serves as leaders to support, enhance, and encourage the efforts of appropriate state, interstate, tribal, regional, and local entities, private sector groups, citizen groups, and federal agencies to prevent and eliminate NPS pollution.

Tools: What They Are and How We Use Them

The NPS Program utilizes and effectively implements a variety of approaches such as financial and technical assistance, I&E, regulatory actions, and collaborative partnerships to prevent and resolve NPS problems and to achieve and sustain the desired water quality for the benefit of the environment and the public.

Balanced Resources

The NPS Program uses annual and long-term strategic planning to determine desired program outcomes, target its resources in an efficient and effective manner, and evaluate progress.

Michigan's NPS Program's Long-term Goals

- 1) Strengthen existing partnerships and seek new partners needed to implement an effective NPS control program over time.
- 2) Implement effective education/outreach programs targeting statewide and watershed specific NPS issues.
- 3) Improve the identification of nonpoint pollution sources and impacts in Michigan watersheds to more effectively target resources.
- 4) Develop and implement strategies to reduce NPS pollution loads.
- 5) Provide effective leadership for NPS pollution control in Michigan.

Long-term Environmental Targets

Michigan NPS Program's long-term environmental goals include restoration of impaired waters, protection of high quality waters, and elimination or reduction of NPS pollution.

Restoration of Impaired Waters

Long-term Goals:

1-1. The NPS Program will use problem identification monitoring and the watershed approach to identify and begin to restore impaired waters as quickly as they are discovered.

1-2. The NPS Program will work with other local, state, and federal programs to meet Michigan's share of the following three strategic targets established in Subobjective 2.2.1, *Improve Water Quality on a Watershed Basis*, of the U.S. EPA's FYs 2006-2011 Strategic Plan:

- 1-3 "By 2012, attain water quality standards for all pollutants and impairments in more than 2,250 water bodies identified in 2002 as not attaining standards" (excluding water bodies impacted by mercury). The U.S. EPA estimates that approximately 40,000 water bodies were identified by the states as not meeting WQS and their goal of 2,250

represents approximately five percent of the waters of the nation. Also, in 2002, Michigan identified approximately 200 water bodies impaired by pollutants other than mercury. Therefore, the NPS Program, in collaboration with other programs, will target restoration of ten water bodies included on the state's nonattainment list in 2002.

- 1-4 "By 2012, remove at least 5,600 of the specific causes of water body impairment identified by states in 2002." The U.S. EPA estimates that approximately 70,000 specific causes of water body impairment were identified by the states in 2002 and their goal of 5,600 represents approximately eight percent of this baseline. Also in 2002, the estimated number of water body impairments in Michigan was approximately 250. Therefore, the NPS Program will target restoration of 20 specific causes of water body impairment included on the state's nonattainment list in 2002.
- 1-5 "By 2012, improve water quality conditions in 250 impaired watersheds nationwide using the watershed approach." The U.S. EPA notes that the watershed boundaries for this measure are those established at the 12-digit hydrologic unit code by the U.S. Geological Survey (USGS). Also, "improved" means that "one or more of the impairment causes identified in 2002 are removed for at least 40 percent of the impaired water bodies or impaired miles/acres, or there are significant watershed-wide improvements, as demonstrated by valid scientific information, in one or more water quality parameters associated with the impairments." The NPS Program will improve water quality conditions in five watersheds in Michigan.

Short-term Goal:

1-5.1: Annually develop "success stories" to document measurable improvements in water quality and restoration of impaired waters.

1-5.2: Work with U.S. EPA staff to develop interim measures of NPS Program effectiveness relevant to impaired waters or watersheds that may take decades to restore.

Protection of High Quality Waters

The NPS Program will focus water quality protection activities on waters of the state with a goal of preventing the degradation of existing high quality waters by NPS pollution. The NPS Program has the following goals:

Long-term Goal:

1-6 In watersheds covered by a watershed management plan, the NPS Program will seek to control NPS pollution so that the level of water quality necessary to protect existing uses will be 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.

Short-term Goal:

1-6.1 Look for opportunities to work with U.S. EPA staff on their "Healthy Waters Initiative." Specifically, look for opportunities to develop NPS Program goals and measures of effectiveness associated with protecting the ecological health of high quality waters and watersheds.

Elimination or Reduction of NPS Pollution

The NPS Program will seek to reduce or eliminate NPS pollution using a variety of tools.

Long-term Goals:

1-7 The NPS Program will estimate load and report reductions as a measure of the success of projects designed to assess the effectiveness of new BMPs.

1-8 The NPS Program will estimate load reductions associated with NPS pollutant control projects as a measure of project effectiveness.

Protection and Restoration of Wetlands

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

Long-term Goals:

1-9 The NPS Program will work to restore and protect wetlands that are most important to restore and protect water quality. In addition, the NPS Program will maximize opportunities to use Farm Bill Programs and Section 319 watershed management plans to restore and protect wetlands.

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, public water supply, warmwater fisheries, other aquatic life and wildlife, and partial body contact recreation. Cold water fisheries 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.

The waters of the state are monitored on a five-year rotation described in more detail in Section 5.3. 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 U.S. EPA as required by Section 303(d) of the federal CWA. Also, water bodies on the nonattainment list require the establishment of TMDLs to meet and maintain WQS.

2.2 Resource 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. Lake Huron water quality has benefited from pollutant control and remedial efforts occurring in the Saginaw Bay watershed, and Lake Erie water quality has improved dramatically in the last two decades because of substantial reductions in loads of conventional and toxic pollutants including nutrients, persistent organics, metals, and oils.

Water quality impairments associated with selected persistent bioaccumulative chemicals have been documented in the Great Lakes. Fish consumption advisories serve as constant reminders that certain pollutants, such as polychlorinated biphenyls (PCBs), chlordane, dioxins, and mercury remain elevated in the water column and fish tissue. Atmospheric deposition, tributary loadings, and the dynamic exchange and cycling between air, water, and sediment within the Great Lakes basins are the key factors influencing contaminant levels in Great Lakes fish.

Detailed designated use support summaries for Michigan waters of the Great Lakes are provided in the 2006 Integrated Report. Key findings for Michigan waters of the Great Lakes, connecting channels, and Lake St. Clair include:

- Most of the Great Lakes and Lake St. Clair are meeting the total and partial body contact recreation designated uses. Less than one percent of the Great Lakes shoreline miles are not meeting the total and partial body contact recreation designated uses due to

elevated bacterial contamination mainly from Combined Sewer Overflows (CSOs). Approximately three shoreline miles of Lake St. Clair are not attaining the total body contact recreation designated use due to elevated bacterial contamination.

- All 97 miles of Great Lakes connecting channels are listed as not attaining the total body contact recreation designated use due to elevated bacterial contamination primarily from CSOs.
- Excluding fish consumption advisories, all Great Lakes shoreline miles, connecting channel miles, and Lake St. Clair miles support healthy fish and macroinvertebrate communities.
- Periodic taste and odor problems associated with nuisance growths of the blue-green algae, *Microcystis*, occur in the municipal drinking water intakes in Saginaw Bay. As a result of this occasional problem, 80 miles of shoreline are listed as not fully supporting the public water supply designated use.
- Water chemistry results indicate that all 97 Great Lakes connecting channel miles are not attaining WQS due to elevated concentrations of PCBs in the water column. The primary source of PCBs is atmospheric deposition; however, there are some localized sources, such as contaminated sediments and industrial and municipal point sources. Mercury concentrations in the St. Marys and St. Clair Rivers are usually below the 1.3 nanograms per liter (ng/L) WQS, but mercury concentrations in the Detroit River often exceed 1.3 ng/L.
- The Michigan waters of the Great Lakes, their connecting channels, Saginaw and Grand Traverse Bays, and Lake St. Clair are listed as not attaining the fish consumption designated use due to elevated concentrations of PCBs, Dichlorodiphenyltrichloroethane (DDT), mercury, chlordane, and/or dioxin. Atmospheric deposition is considered to be the major source of these persistent, bioaccumulative chemicals, but localized pockets of contaminated sediment, selected industrial/municipal point source discharges, and agriculture are also contributing sources.
- The Michigan waters of the Great Lakes, their connecting channels, Saginaw and Grand Traverse Bays, and Lake St. Clair support the agriculture, industrial water supply, and navigation designated uses.

2.2.2 Inland Lakes

Michigan has approximately 35,000 inland lakes (includes lakes, ponds, and river impoundments) with a surface area of at least one-tenth of an acre or greater. Approximately 11,000 of these inland lakes are larger than five acres in surface area, and over 2,000 are more than 50 acres. Michigan has a total of 730 lakes with public access. Inland lakes cover approximately 889,600 acres of the state. Approximately 36 percent of the total inland lake acreage is designated for cold water fisheries protection and the remaining 64 percent is designated for warmwater fisheries protection.

Although Michigan's inland lakes generally have good to excellent water quality, some water quality issues remain. Of the public access lakes that do not meet WQS, the primary cause is fish consumption advisories for PCBs or mercury. In general, where trends have been detected in fish from inland lakes, mercury concentrations are decreasing; however, a statewide

mercury-based fish consumption advisory applies to all of Michigan's inland lakes, reservoirs, and impoundments.

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. Contaminated sediments are also an issue in several inland lakes, and remediation efforts are being planned or have been undertaken.

The majority (69 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 2.1.

Table 2.1. Trophic status summary of Michigan's public access lakes.

Trophic Status	Number of Lakes	Acres
Oligotrophic (low nutrients)	118 (16%)	164,595 (33%)
Mesotrophic (moderate nutrients)	386 (53%)	200,651 (40%)
Eutrophic (high nutrients)	196 (27%)	121,046 (24%)
Hypereutrophic (excessive nutrients)	30 (4%)	16,697 (3%)
Total Assessed	730	502,989

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.

Detailed designated use support summaries for Michigan's inland lakes are available in the 2006 Integrated Report. Tables 2.2 and 2.3 include a summary of lake acres not meeting WQS and sources of impairment.

Table 2.2. Michigan inland lake acres not attaining (or threatened) designated uses listed by cause.

Cause Description	Nonattaining Acres
Mercury	215,108
Priority organic compound(s)	141,630
Pesticides	36,276
Nuisance plant growths/phosphorus	8,185
Copper	2,659
Pathogens	1,106
Taste and odor	500
Other metals	500

Table 2.3. Michigan inland lake acres not attaining (or threatened) designated uses listed by source.

Description	Nonattaining Acres
Atmospheric deposition	278,667
Inconclusively identified source(s)	37,820
Contaminated sediments	13,452
Municipal and/or industrial point sources	9,306

Table 2.3 cont.

Description	Nonattaining Acres
Nonpoint source(s) – unspecified	4,410
Agriculture	3,990
Mine/Mill tailings	2,659
Waste storage/storage tank leaks (above ground)	1,320
Urban runoff/storm sewers	1,265
Combined Sewer Overflow	930
Illicit connections/illegal hook-ups/dry weather flows	160
Intensive animal feeding operations	27
Inappropriate waste disposal/wildcat dumping	2

Key findings for inland lakes and impoundments include:

- Less than one percent of the inland lake and impoundment acreage in Michigan is not supporting the total or partial body contact recreation designated uses due to elevated bacteria levels from CSOs or failing septic systems.
- Monitoring shows that 81 percent of the assessed inland lake and impoundment acreage in Michigan is supporting designated uses if fish consumption issues are excluded. When fish consumption issues are included, only 14 percent of the assessed inland lake and impoundment acreage is supporting designated uses. Mercury is responsible for 215,108 inland lake and impoundment acres not supporting the fish consumption designated use, while 143,117 inland lake and impoundment acres are not supporting the fish consumption designated use due to PCBs. Atmospheric deposition continues to be a major source of PCBs and mercury to Michigan’s inland lakes and impoundments; however, localized sources are still contributing to mercury and PCB fish contamination problems in some inland lakes and impoundments.
- All but one of Michigan’s inland lakes and impoundments are supporting acceptable macroinvertebrate and fish communities. However, Torch Lake (a Great Lakes Area of Concern [AOC]) is not supporting acceptable macroinvertebrate communities.
- Approximately one percent of the inland lake and impoundment acreage in Michigan is not attaining WQS due to nuisance plant/algae growth problems caused by elevated phosphorus concentrations in the water column and/or sediments. Municipal point sources, unspecified NPS, and agriculture were identified as the primary phosphorus sources.
- All inland lake and impoundment acres support the public water supply, agriculture, industrial water supply, and navigation designated uses.

2.2.3 Rivers and Streams

Michigan has an estimated 54,301 total river miles identified in the National Hydrography Database. This estimate includes both *perennial* (typically flow continuously year-round) and *intermittent* (some seasonal periods of no flow) rivers. Using the National Hydrography Database, an estimated 33,856 river miles are perennial based on selected reach type properties. Perennial river flows are commonly sustained by groundwater inputs. Intermittent

stream flows are commonly dependent on precipitation, runoff, and to a lesser extent groundwater inputs.

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. 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 cold water 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 2006 Integrated Report. Tables 2.4 and 2.5 include a summary of river miles not meeting WQS and sources of impairment.

Table 2.4. Michigan river miles not attaining (or threatened) designated uses listed by cause based on assessments conducted from 1999 to 2004.

Cause Description	Nonattaining River Miles
Priority organic compound(s)	19,506
Habitat alterations	3,027
Mercury	844

Table 2.4 cont.

Cause Description	Nonattaining River Miles
Pathogens	597
Sedimentation/Siltation	371
Organic enrichment/Low dissolved oxygen	221
Nuisance plant growths/phosphorus	212
Flow alterations	169
Other metals	67
Pesticides	44
Nitrate/Ammonia	33
Thermal modifications	24
Copper	19
Oil and grease	17
Salinity/total dissolved solids/chlorides	14
Chromium	3
Taste and odor	2.5
Bacterial slimes	2.5

Key findings for rivers include:

- Many of the river segments that are not attaining WQS are located in the southern half of the Lower Peninsula. This area of the state has the greatest concentration of the population, housing development, industries, municipalities, roads, expressways, and prime agricultural lands.
- Available *E. coli* monitoring data indicate that 597 of Michigan's 33,856 perennial river miles are not supporting the total body contact recreation designated use, and 19 of those 597 perennial river miles are also not supporting the partial body contact recreation designated use. The primary sources of *E. coli* to these nonattaining water bodies included CSOs, urban runoff/storm sewers, and/or illicit connections. U.S. EPA-approved TMDLs or other water pollution control requirements are now in place to remediate 270 of these nonattaining river miles. TMDLs will be developed for the remainder, as scheduled.
- Approximately ten percent (3,457 miles) of Michigan's perennial river miles are not attaining WQS due to degraded benthic macroinvertebrate and/or fish communities. The majority (2,888) of these river miles have been highly modified by channel maintenance activities carried out primarily by Michigan's county drain commissions. U.S. EPA-approved TMDLs or other water pollution control requirements are in place to remediate 235 of the nonattaining river miles.

Table 2.5. Michigan river miles not attaining (or threatened) designated uses listed by source based on assessments conducted from 1999 to 2004.

Source Description	Nonattaining River Miles
Atmospheric deposition	19,696
Industrial point sources	11,599
Municipal point sources	9,182
Contaminated sediments	8,970
Channelization	3,145
Agriculture	594

Table 2.5 cont.

Source Description	Nonattaining River Miles
Urban runoff/storm sewers	434
Nonpoint source(s) – unspecified	420
Inconclusive source(s)	319
Combined Sewer Overflow	295
Pasture grazing - riparian and/or upland	214
Bank or shoreline modification/destabilization	173
Nonirrigated crop production	131
Illicit connections/illegal hook-ups/dry weather flows	122
Removal of riparian vegetation	121
Highway/road/bridge/culvert construction	74
Concentrated animal feeding operations	64
Intensive animal feeding operations	35
Hydromodification	34
Flow regulation/modification	25
Irrigated crop production	24
Land development (e.g., subdivisions)	19
Habitat Modification (other than hydromodification)	19
Mine/Mill tailings	17
Draining/filling of wetlands	16
Groundwater loadings	16
Highway maintenance and runoff	16
Active mining	13
Natural source	10
Waste storage/Storage tank leaks (above ground)	9
Land disposal	9
Landfills	8
On-site wastewater treatment systems (septic tanks)	8
Placer mining (glacial deposit mining)	8
Dam construction	5
Inactive mining	5
Petroleum activities	5
Construction	4
Golf course	4
Wastewater application	3
Inappropriate waste disposal/wildcat dumping	2

- Only 212 of Michigan's perennial river miles are not attaining WQS due to nuisance plant/algae growth problems. CSO discharges and improper agriculture practices are the primary sources identified as contributing excess nutrients to these nonattaining water bodies. U.S. EPA-approved TMDLs or other water pollution control requirements are in place to remediate 105 of the nonattaining river miles. TMDLs will be developed for the remainder, as scheduled.
- PCB monitoring using highly sophisticated and sensitive sampling/analytical techniques has been conducted on 19,044 of Michigan's perennial river miles. Data produced from this effort show that 100 percent of these assessed river miles are not attaining the PCB WQS of 0.026 ng/L. Atmospheric deposition is considered to be the major source of this

persistent, bioaccumulative chemical; however, some localized sources such as contaminated sediments and industrial/municipal point sources still exist.

- Mercury monitoring of the water column using low level sample collection/handling and analytical techniques has been conducted at 66 river stations spread across 24 Michigan watersheds. The geometric mean mercury concentration at 30 of these river stations exceeded the mercury WQS of 1.3 ng/L. Atmospheric deposition is considered to be the major source of mercury; however, some localized sources such as contaminated sediments and industrial/municipal point sources still exist.
- Fish contaminant monitoring has been conducted on 3,769 of Michigan's perennial river miles. Approximately 52 percent of these perennial river miles are not attaining the fish consumption designated use due to elevated concentrations of PCBs, polybrominated biphenyls, DDT, mercury, chlordane, and/or dioxin.
- All of the perennial river miles in Michigan are attaining the public water supply designated use, except for a 16-mile reach of the River Raisin (Lenawee County). This 16-mile river reach is not supporting the public water supply designated use because nitrate-nitrogen concentrations in the source water are above the U.S. EPA's maximum contaminant level for nitrates of 10 milligrams per liter (mg/L). A U.S. EPA-approved TMDL is in place to remediate this problem.
- All of Michigan's perennial rivers are supporting the agriculture, industrial water supply, and navigation designated uses.

2.2.4 Wetlands

Michigan's aquatic resources include approximately 5,583,400 acres of wetlands, some of exceptional quality and rarity. About 15 percent of Michigan's land area is wetland. The MDEQ, LWMD, has administered a statewide wetland regulatory program for over 25 years. 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 presettlement 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 Resource Information System (MIRIS) land use/land cover maps provide an approximation of wetland types and extent based on the interpretation of aerial photographs from 1978 and 1979 (1:24,000 scale) (Table 2.6). The total statewide acreage estimated by MIRIS is somewhat higher than the National Wetlands Inventory figure because the "lowland

hardwood” and “lowland conifer” categories include some areas that are not wetland (e.g., some upland portions of floodplains).

Table 2.6. Extent of wetlands by type based on MIRIS data circa 1978-1979.

Wetland Type	Acres	Percent of Land Area
Lowland hardwoods	2,484,328	6.7
Lowland conifers	1,825,978	4.9
Wooded wetlands	259,456	0.7
Shrub/Scrub wetlands	1,182,868	3.2
Aquatic bed	60,251	0.2
Emergent wetlands	419,109	1.0
Unvegetated flats	7,773	0.02
Total	6,239,763	16.8

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) of the WQS, 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. The known designated use support information is listed in Table 2.7. One wetland (ten acres) previously listed as nonattaining was remediated in 1997. Tobico Marsh (Bay County) is not attaining Michigan WQS due to elevated PCBs in carp and northern pike populations. This 680-acre marsh is adjacent to Saginaw Bay. The other 21 acres of wetlands that are not attaining Michigan WQS are located in Ruddiman Creek (Muskegon County). This wetland is the subject of a major sediment remediation project that involves the removal of approximately 80,000 cubic yards of sediments contaminated with PCBs, metals, and polynuclear aromatic hydrocarbons.

Table 2.7. Michigan wetlands overall designated use support summary.

Degree of Use Support	Monitored (acres)
Attaining	10
Not attaining	701
Total assessed	711

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 in Michigan for irrigation.

Groundwater may be contaminated by a number of point or NPS pollution. 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 nonregulatory programs, several of which are described in Appendix 1. In addition, some key programs are summarized below:

NREPA

Part 31 of the NREPA is used to control discharges of pollution to groundwater or surface water and establishes designated uses that must be met (See Section 2.1). Part 201 of the NREPA provides the authority to identify and remediate contaminated sites.

On-site Wastewater Treatment Systems

Failing on-site wastewater treatment systems are a threat to groundwater quality and the MDEQ is working to develop a statewide code for these treatment systems. In the interim, the MDEQ continues to work on activities to effectively manage all on-site/decentralized wastewater treatment systems or pursue other methodologies that can be authorized under current rules and guidelines. (See Section 3.3.6)

Contamination Investigations

The WB's Contamination Investigation Unit assists local health departments in conducting drinking water quality investigations in areas of known or suspected environmental contamination. Staff provide groundwater monitoring assistance to local health departments and others. In addition, staff work with local entities to find alternative drinking water sources to replace contaminated water wells.

Source Water Assessment and Wellhead Protection Programs

The WB's Source Water Assessment Program staff identify the areas that supply public drinking water, inventory contaminants and assess water susceptibility to contamination, and inform the public of the results of these assessments. In addition, the Wellhead Protection Program staff work with local communities utilizing groundwater for their municipal drinking water supply systems to protect their water source. Staff assist with the development of wellhead protection plans to minimize the potential for contamination by identifying and protecting areas that contribute water to municipal water supply wells.

Abandoned Well Management Program

The MDEQ implements an Abandoned Well Management Program to coordinate statewide abandoned well location and plugging activities. Plugging abandoned wells protects the drinking water aquifers. The Abandoned Well Management Program is implemented, in part, at the local level through grants to local health departments. Also, the Michigan Department of Agriculture (MDA) administers the Farmstead Assessment System (Farm-a-Syst) Program to identify and properly plug abandoned wells on farms or on property zoned "agricultural." This program is described in more detail in Appendix 1.

Farm-a-Syst

In addition to “Farm-a-Syst,” the MDA implements several initiatives to protect groundwater resources including the Michigan Groundwater Stewardship Program and the Pesticide Management Plan. The goal of the Michigan Groundwater Stewardship Program is to protect groundwater resources through voluntary, locally driven initiatives. The Pesticide Management Plans are required by the U.S. EPA and describe how Michigan will reduce groundwater risks posed by certain pesticides.

CHAPTER 3: SOURCE CONTROL STRATEGIES

3.1 Summary of NPS Threats and Sources

Based on assessments summarized in Michigan's 2006 Integrated Report, atmospheric deposition is the most prevalent NPS cause of impairments to waters of the state. Atmospheric deposition is a significant source of certain persistent, bioaccumulative, toxic pollutants that are primarily responsible for fish consumption advisories and exceedences of WQS.

Impacts from hydrologic modification (e.g., stream channelization, bank or shoreline modification-destabilization, removal of riparian vegetation, and flow modification) are a major cause of stream impairment. Approximately ten percent of Michigan's perennial river miles are not meeting designated uses because benthic macroinvertebrate and/or fish communities are degraded. The majority of these river miles have been highly modified by channel maintenance activities. These water bodies are listed on the nonattainment list in the 4c subcategory "Impairment is not caused by a pollutant." Water bodies are placed in this subcategory when the designated use impairment is not caused by a pollutant; for example, when habitat is insufficient to support an acceptable biological community due to channel maintenance activities. The hydromodification description above includes these maintained channels within the nonattaining river miles.

Agricultural practices such as livestock operations and crop production as well as urban practices are major sources of NPS pollutants causing impairments to Michigan's rivers, lakes, and streams. Transportation and mining round out the top NPS categories and on-site wastewater treatment systems are an emerging issue.

In addition, NPS threats that are relatively minor on a statewide basis may be locally important within individual watersheds and best addressed through implementation of a watershed management plan.

Long-term Goals:

3-1 The MDEQ will continue to assess the waters of the state, identify major sources of pollution, and work to address those sources; and will develop landscape watershed level assessments to enhance statewide analysis of NPS pollutants by source category and watershed. This landscape level analysis will assist the NPS Program in identifying the primary NPS pollutants in a particular geographic area and determining where actions are needed to address the pollutants and causes.

Short-term Goals:

3-2 The NPS Unit will designate a GIS coordinator in the NPS unit to accomplish the following:

- a. Provide point of contact with other departments, agencies, divisions, and WB programs regarding GIS data.
- b. Provide point of contact for consultants on data sources and procedures for watershed level evaluation.
- c. Provide spatial and temporal tracking of NPS project activities for the NPS Program.
- d. Review NPS projects use of GIS and recommend appropriate modification to GIS applications.

- e. Provide or obtain training and support for NPS Program staff on current GIS applications for watershed management.
- f. Provide technical assistance to grantees, local watershed groups, and other stakeholders. Technical assistance may include advice about GIS software, programs, or data sources.

3-3 In consultation with other efforts the NPS Unit GIS coordinator will develop a landscape/watershed level evaluation guidance for watershed grantees and consultants that identifies available data sources and acceptable models that will produce representative data outputs.

- a. Identify location of data sources useful for watershed management planning and develop a report with appropriate metadata by July 2010. This will be posted to the NPS Program Web site.
- b. Review and develop guidance on the application of watershed models for calculating loads and load reductions for use by consultants and grantees. One to three models will be reviewed annually with results posted on the NPS Program Web site beginning in 2010.

As Time Allows:

3-4 Develop a Quality Assurance Project Plan (QAPP) review process for landscape/watershed level evaluation methods to ensure that GIS work produced through NPS watershed grants provides representative data and meets federal quality assurance requirements.

- a. Review watershed evaluations completed through previous watershed grant projects and identify pros and cons to the use of various approaches and datasets, and provide a report to the NPS Program.
- b. Develop a QAPP for GIS watershed evaluation that includes the following:
 - Acceptable datasets to use
 - Acceptable models to use for specific types of evaluations
 - Acceptable assumptions to include
 - Metadata to be included in the evaluation

3.2 BMPs

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 either 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.

3.2.1 Agricultural BMPs

The NPS Program utilizes the U.S. Department of Agriculture (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 USDA, NRCS, and other partners to design and test new BMPs to control agricultural inputs.

Long-term Goal:

3-5 Continue to work with the NRCS, MDA, 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 Goal:

3-7 The NPS Program staff will work with Michigan State University (MSU) and the USDA, NRCS, to acquire monitoring data from additional filter mounds to assess the magnitude of iron and manganese groundwater contamination, prior to incorporating this new BMP into the NRCS technical guide.

3.2.2 Forestry BMPs

The NPS Program worked with the Michigan Department of Natural Resources (MDNR), Forestry Division, to develop the *Water Quality Management 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. The MDNR, Forestry Division, and the MDEQ, WB, are currently leading efforts to update this manual.

Long-term Goal:

3-8 The NPS Program will continue to work with the MDNR, Forestry Division, to develop new Forestry BMPs and update the BMP manual.

Short-term Goal:

3-9 The Forestry BMP manual (*Sustainable Soil and Water Quality Practices on Forest Land*) was completed and hard copies were printed for distribution. In addition, electronic copies are available via the NPS Web page.

3.2.3 Urban BMPs

The NPS Program led efforts to produce the *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. In addition, the NPS Program works to identify and promote new BMPs to address NPS pollution sources.

Long-term Goal:

3-10 Update and maintain the *Guidebook of Best Management Practices for Michigan Watersheds* 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 Goals:

3-11 The statewide LID Manual (*Low Impact Development Manual for Michigan*) was completed by The Southeast Michigan Council of Governments in 2008 and the NPS Program continues to distribute hard copies and make electronic copies available via the NPS Web site.

3-12 The NPS Unit will work in partnership with NPS engineers, other MDEQ wet weather program staff, and external partners to update the *Guidebook of Best Management Practices for Michigan Watersheds* by October 1, 2010.

3.3 Source-Specific Strategies to Address NPS Pollution

There are a number of federal, state, and local programs designed to address pollution from wet weather discharges or pollution from diffuse sources. Several of these programs are described in Appendix 1. In addition, approaches to several NPS or threat categories are summarized below. Based on the impairments listed above, the program will focus much of its available resources on addressing NPS-related impairments caused by hydrologic modification of watersheds, agriculture practices, and urban sources.

3.3.1 Hydrologic Modification

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, or land use practices 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.

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. In addition, nearly 4,000 miles of maintained county drains are not supporting designated uses because of impairments associated with drain maintenance practices. 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 Clean Michigan Initiative (CMI) NPS funding are:

- Pre-removal engineering designs for dam deconstruction and stream restoration.
- 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 CMI NPS support must be consistent with prioritized designated uses, pollutants, sources, sites, and recommendations in approved watershed management plans, and be clearly expected to result in measurable water quality improvements. Program 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.

Michigan's NPS Program 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. For example, the NPS Program is currently participating with a group of state and federal agency staff that work on various aspects of stream morphology. This group is called Michigan's Stream Team and has begun work to take the necessary stream measurements to create regional reference curves that identify stable stream dimensions and flow characteristics for the entire state. The development of these curves will help provide design information for stream restoration work. Michigan's NPS Program has provided funding and technical support to the regional reference curve project. In addition, the Michigan Stream Team has provided training in basic stream morphology to NPS Program staff and stakeholders. Additional training is planned for the summer of 2008. The training is targeted to agency staff and consultants evaluating the physical condition of a stream or designing stream restoration projects.

The NPS Program encourages the use of existing federal, state, and local programs as well as selection and implementation of appropriate BMPs (See Section 3.2.3) through development and implementation of watershed management plans. Some of the state and federal programs used to address urban sources include Phase I and Phase II stormwater 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 predevelopment hydrologic regime after development.

Long-term Goals:

3-13 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 watershed management plans and by providing funding and technical support to watershed-based projects designed to control hydrologic alteration of watersheds.

Short-term Goals:

3-14 In FY 2010, a priority in the Request for Proposal (RFP) for pass-through grant projects will be to restore or protect water bodies by addressing hydrologic alteration of watersheds.

3-15 The NPS Unit and LWMD staff will continue to provide technical assistance to watershed groups and municipalities to implement LID practices and stable stream design techniques.

Long-term Goal:

3-16 The NPS Program will develop tools and BMPs to control runoff and stabilize stream channels.

Short-term Goal:

3-17 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. Data will be collected during the 2010 and subsequent field seasons until sufficient data are obtained to create additional regional curves for full coverage of the entire state. (NPS Unit, LWMD-NPS Hydrologist).

Long-term Goal:

3-18 Provide hydrology and stream morphology training to NPS Program staff, other agency staff, consultants, municipal staff, and watershed managers.

Short-term Goals:

3-19 The NPS Unit worked with the Michigan Stream Team to provide morphology training in the fall of 2009 and will continue to look for opportunities to provide training targeted toward NPS engineers and other partners who intend to conduct morphology studies or implement morphology projects.

As Time Allows:

3-20 NPS Unit and LWMD staff will work with the Michigan Stream Team to develop a training program in morphology and hydrology. This less intensive training will be targeted toward NPS staff and other partners such as local watershed groups. 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 watershed management plans.

Long-term Goal:

3-21 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 Goals:

3-22 The NPS Program 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. Examples of projects to be implemented and evaluated include the Whitney Intercounty Drain

Restoration Project, the Carrier Creek Project, and the Sebewaing River Intercounty Drain Project.

As Time Allows:

3-23 WB staff will work with Michigan Association of County Drain Commissioners (MACDC) to identify, develop, and exchange information on how to manage drainage in ways that cause less harm to the environment.

3.3.2 Agriculture

Agriculture is the second largest industry in Michigan with 51,000 farms. The total land area in agricultural production is nearly 10.7 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. With agriculture, like all industries, comes the potential for impacts to the environment and public health.

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 increased soil nutrient levels due to commercial fertilizer and land applied manure. Runoff from livestock/poultry operations, including manure application, feedlot, milkhouse waste, and silage runoff results in degraded water quality and habitat.

In addition to the programs mentioned in Appendix 1, the NPS Program works in partnership with a number of organizations or programs including the following:

Conservation Districts

Conservation Districts provide technical assistance to farmers in all counties in Michigan. The MDA supports Conservation District staff in a few counties with Section 319 funds. These staff assist small and medium livestock operations to reduce or eliminate NPS pollution through the Progressive Planning process. The Progressive Planning process offers farm operations a systematic approach to identify and eliminate sources of NPS pollution.

Michigan Right to Farm

The Michigan Right to Farm Act, 1981 PA 93, as amended, was enacted to provide farmers with protection from nuisance lawsuits. This state statute authorizes the Michigan Commission of Agriculture to develop and adopt Generally Accepted Agricultural and Management Practices for farms and farm operations in Michigan. These voluntary practices are based on available technology and scientific research to promote sound environmental stewardship and help maintain a farmer's right to farm.

Michigan Agriculture Environmental Assurance Program (MAEAP)

MAEAP is a voluntary, proactive program designed by state and federal agencies, farmers, and

industry partners to reduce producers' environmental risks. It teaches effective land stewardship practices and shows producers how to find and prevent agricultural pollution risks on their farms.

The program encompasses three systems (livestock, farmstead, and cropping) designed to help producers evaluate the environmental risks of their operation. Each system examines a different aspect of a farm, as each has a different environmental impact. Through each phase, producers will develop and implement economically feasible, effective, and environmentally sound pollution prevention practices.

MAEAP is designed as a multiyear program allowing producers to meet personal objectives, while best managing both time and resources. By participating in all three systems, producers comprehensively evaluate their entire farming operation for potential environmental risks.

Farm-a-Syst

The Farm-a-Syst is another program that helps livestock producers assess the vulnerability of surface and groundwater. In 1995, Americorps personnel were employed by the USDA to initiate this program statewide. The MDA is a cooperator in this project and the MSU Extension Service promotes this program statewide on a county basis.

Agriculture Pollution Prevention

The MDEQ initiated a partnership with the MDA, Michigan agricultural associations, and farmers to promote voluntary pollution prevention in agriculture. Key partnership goals focus on preventing agricultural pollution through increased efficiency while maintaining and improving on-farm profitability. In 1998, both the MDEQ and MDA endorsed the state's *Agricultural Pollution Prevention Strategy and Implementation Plan*, which set forth pollution prevention efforts in Michigan. Inventories such as the *Michigan Agricultural P2 Directory* have been developed to organize current pollution prevention activities and resources.

Conservation Reserve and Enhancement Program (CREP)

The CREP is administered by the USDA. The purpose of the program is to remove from commodity production cropland that causes degradation to water quality. Farmers participating in the program receive a financial incentive to keep the land out of production and stabilize the land with permanent vegetative cover, filter strips, or forest plantations. Statewide, over 250,000 acres are enrolled in the program.

Water Quality Incentives Program

This program is administered by the USDA. Projects completed through this program are funded at the watershed level. The process is similar to the Section 319 NPS program in that the local agency develops a watershed plan and implements the most cost-effective BMPs in the watershed plan to address NPS problems.

Environmental Quality Incentives Program

The Environmental Quality Incentives Program is a voluntary conservation program for farmers and ranchers that promotes agricultural production and environmental quality as compatible national goals. This program offers financial and technical help to assist eligible participants

install or implement structural and management practices on eligible agricultural land. The practices are subject to NRCS technical standards adapted for local conditions.

Long-term Goal:

3-24 Protect and restore waters of the state through control of agricultural discharges, targeting these efforts through development and implementation of watershed management plans and educational outreach.

Short-term Goals:

3-25 The NPS Program will work with the MDA, NRCS, other MDEQ WB programs, and other stakeholders to identify priority NPS load elimination or reduction activities for Great Lakes Restoration Initiative (GLRI) funding.

As Time Allows:

3-29 Field Operations Division (FOD) staff will propose a partnership with MSU Extension to create a training guide for farm employees on manure application. This training measure will consider farm employees that use English and Spanish as a first language. This information will be distributed to MSU Extension and MAEAP as part of their training and certification procedures.

Long-term Goal:

3-30 Protect and restore waters of the state through coordination of voluntary and regulatory efforts to control soil erosion discharges from agricultural activities in Michigan.

Long-term Goal:

3-32 Continue to support the implementation of NPS pollution controls through implementation of the CREP in the Saginaw Bay, Lake Macatawa, Raisin River, and western Lake Erie basin watersheds, and promoting the expansion of CREP to other watersheds.

Short-term Goals:

3-33 The NPS Program will continue to administer a \$4 million CMI grant with Pheasants Forever to implement 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 2010.

3-34 The NPS Program will continue to administer a \$7.5 million grant with the Saginaw Basin Land Conservancy to purchase permanent conservation easements on CREP filter strips and wetland restoration practices. The goal of the project is to acquire easements on over 4,500 acres of CREP practices by the end of 2009.

3.3.3 Urban

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.

In February 2003, Governor Jennifer M. Granholm established the Michigan Land Use and Leadership Council. One of the Council's charges was to identify trends in development patterns within Michigan. According to the report, Michigan's population density has fallen 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 (See Section 3.2.3) through development and implementation of watershed management plans. Some of the state and federal programs used to address urban sources include Phase I and Phase II stormwater permits, CSO and Sanitary Sewer Overflow (SSO) control, National Pollutant Discharge Elimination System (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, local ordinances regulating the content of phosphorus in fertilizer have been adopted to reduce phosphorus loads to water bodies.

Long-term Goals:

3-35 Protect and restore waters of the state through control of NPS pollution resulting from urban land use, targeting these efforts through increased coordination with regulatory programs focused on Urban NPS issues, development and implementation of watershed management plans, urban BMP demonstration projects, and educational outreach.

Short-term Goal:

3-36 The NPS Program staff will participate, as requested, on work groups to discuss ways to better coordinate WB programs addressing wet weather issues. Work groups have been established in five focus areas, which are: Wastes to Land Programs; Urban Living Programs; Earth Change Programs; Wet Weather Monitoring; and Water Quality-Based Effluent Limits Development and WQS Applicability. The work groups will provide recommendations to a full committee (the WB Wet Weather Committee) by March 15, 2010.

Long-term Goals:

3-37 The NPS Program will provide technical assistance to local governments (village, township, county) around the state. This outreach will, as appropriate, support the recommendations in Governor Granholm's Land Use Leadership Council report by working directly with these target audiences to help them plan, design, implement, and enforce local land use protection measures that affect storm water runoff and water quality (e.g., master plans, zoning, environmental ordinances, physical BMPs).

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

3.3.4 Transportation Infrastructure

In 1985, the MDNR and Michigan Department of Transportation (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 NPS Program's *Guidebook of Best Management Practices for Michigan Watersheds* 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 watershed management plans, 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, LWMD (who reviews permit applications for new or replacement crossings and determines the minimum flow that crossings must pass without adverse effects); (2) MDNR, Fisheries Division (whose concerns are fish passage and habitat); (3) MDOT; and (4) county road commissions (who install most road stream crossings).

Long-term Goals:

3-38 Protect and restore waters of the state through control of NPS pollution from transportation-related sources.

3.3.5 Forestry

The NPS Program will work to eliminate NPS pollution from forestry practices. Water quality impacts from forestry practices remain a significant issue primarily in northern lower Michigan and the Upper Peninsula. The NPS Program has successfully partnered with the MDNR to initiate a certification program for loggers. 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 watershed management plans.

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.

Long-term Goal:

3-40 Protect and restore waters of the state through control of NPS pollution from forestry activities targeting these efforts through development and implementation of watershed management plans and expansion of partnerships.

Short-term Goals:

3-42 The NPS Program will administer a grant to Michigan Technological University to develop a forestry BMP demonstration site for use as an education center to train loggers and foresters.

This project will be completed by the end of FY 2010.

3.3.6 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. 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 local health departments 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.

Local health departments 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 local health departments 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, local health departments 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 April 2009, 40 of Michigan's 84 TMDLs are for *E. coli*. Twenty-seven of the 40 *E. coli* TMDLs specifically identify septic systems as a potential pollutant source.

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.

Long-term Goal:

3-43 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 watershed management plans and regulatory compliance actions.

Short-term Goal:

3-44 By January 2010, the NPS On-site Wastewater Treatment System work group will develop a recommendation to the NPS Program Committee regarding a coordination team to oversee the implementation of the on-site wastewater treatment system section of the NPS Program Plan. This team should include the following representation: Local health departments; county drain commissioners; road commissions; MDEQ On-Site Wastewater Unit; and NPS district staff.

Regulatory Approaches

Michigan remains one of two states without a 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.

Long-term Goals:

3-45 The MDEQ WB will continue to work with the Legislature to develop a statewide sanitary code regulating on-site wastewater treatment systems.

3-46 The NPS program will continue investigating and taking compliance/enforcement actions related to community-wide failure of on-site wastewater treatment systems. These actions support efforts of the local health departments by identifying and addressing the need for a more centralized wastewater treatment system approach.

Short-term Goals:

3-47 By January 2010, the FOD will develop a recommendation to the NPS Program Committee regarding a district staff on-site investigation work group to ensure statewide consistency in implementing sanitary wastewater surveys and associated enforcement actions.

3-48 NPS Program district staff will continue to conduct sanitary surveys to determine whether discharges of raw or inadequately treated sanitary sewage exists within a municipality. Sanitary surveys are an evaluation of waters of the state near, or direct discharges from, communities that are likely to have on-site septic system problems due to various factors such as poor soils, high water tables, small lot sizes, or older systems. Based on information collected through these surveys, appropriate actions will be taken to address these discharges. Actions to correct identified problems will include involvement from WB Enforcement Unit staff, Part 41 wastewater engineers, and NPDES compliance staff.

Long-term Goal:

3-49 The MDEQ WB will support the development of a uniform statewide data management system to provide a comprehensive record of system type, locations, etc., and for mandatory

reporting of information collected at the time of maintenance events.

Short-term Goal:

3-50 By October 2011, the On-Site Wastewater Unit will develop the framework for a statewide data management system for on-site wastewater treatment information, in conjunction with local health departments and applicable state agencies, which provides a comprehensive record (system type, locations, etc.) and reporting of information collected at the time of maintenance events. Based on the framework developed, the NPS Program will assess what role it can play in facilitating the implementation of the statewide database.

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.

Long-term Goal:

3-51 The MDEQ WB will evaluate the feasibility of a linked deposit loan program through the SRF to address failing septic systems.

Long-term Goal:

3-52 Incorporate on-site wastewater treatment system voluntary compliance approach into the NPS Program's Section 319 and CMI grant RFPs, and watershed management efforts.

Short-term Goals:

3-53 By August 2010, the NPS Program will define RFP criteria to use grant funding for development of local on-site inspection programs and ordinances, such as point of sale inspections, change in use inspections, and mandatory inspection/reporting at the time of maintenance events.

3-54 By August 2010, the NPS Program will define RFP criteria to use pass-through grant funds to repair failing on-site wastewater systems that meet the following criteria:

- The on-site wastewater treatment system is causing impairment. The system must be within an impacted critical area specifically identified in a watershed plan that has been approved by the MDEQ and meets *Federal Register Guidance (Nonpoint Source Program and Grants Guidelines for States and Territories)* regarding watershed management plans. 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 a direct discharge to waters of the state.
- 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 or a change in use ordinance.
- Prior to funding and septic system repairs, all failing septic systems identified through the watershed planning process have been formally referred to the local health department for parallel regulatory follow-up.
- The homeowner agrees to sign a maintenance agreement to ensure the septic system will be operated and maintained appropriately.

Long-term Goal:

3-55 The NPS Program will seek funding to support a Community Incentive Program for treatment system upgrades.

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.

Long-term Goal:

3-56 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 Goals:

3-57 By October 2010, the On-Site Wastewater Unit will develop an on-site wastewater treatment resource list and post on Michigan's NPS Program Web site.

3-58 By October 2011, the NPS Program will develop and incorporate an on-site wastewater treatment system education/outreach strategy into watershed management plan development guidance and review criteria.

3.3.7 Recreational

NPS pollution both 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 watershed management plans.

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. In the last several years, 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 Wetlands and Submerged Lands Unit staff are responsible for the Marina Operating Permit Program that regulates the operation of marinas on the state's 10,000 inland lakes and 35,000 miles of streams in Michigan, under authority of Part 301, Inland Lakes and Streams, of the NREPA. There are over 1,600 Marina Operating Permit files as of 2004, including those that have been closed or are still pending. Approximately 500 Marina Operating Permits come due for renewal each year. Marinas with certain Standard Industrial Classification codes are required to obtain NPDES storm water discharge permits based on the type of services they provide.

In addition to regulatory programs that oversee the construction and management of marinas, 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). To date, 40 Michigan marinas have pledged to become certified as a Clean Marina.

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. Four river miles were listed as nonattaining in the 2006 Integrated Report due to impacts from golf courses in Michigan.

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 of Act 451. 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. As of August 1, 2006, there are 234 golf courses participating in the program. One hundred and twenty-eight of these golf courses have completed a one-on-one site visit and 62 are certified in the program. These golf courses are making improvements to protect and enhance the environment that often go beyond what is required by law.

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.

Long-term Goals:

3-60 Protect and restore waters of the state through control of NPS discharges caused by recreational activities, targeting these efforts through development and implementation of watershed management plans.

3.3.8 Resource Extraction

Michigan ranks seventh nationally in nonfuel mineral production. Nearly 6,000 workers are employed in the state's mining industry and approximately \$19 billion of economic activity is generated each year in Michigan by its mining industry. Since commercial oil and gas production began in Michigan in 1925, over 56,000 oil and gas wells have been drilled. Approximately 18,000 of these wells are in use today producing 28 percent of the natural gas and four percent of the oil used within the state. Nine hundred twenty-one new wells were drilled during 2003 and 2004.

The MDEQ's Geological Survey Division (GSD) 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 GSD 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 GSD regulates the operation and reclamation of mines for industrial sand, metals, and other minerals. The GSD 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 watershed management plans.

Long-term Goal:

3-61 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 watershed management plans and in coordination with existing regulatory and voluntary programs.

3.3.9 Land Disposal

In Michigan, several different agencies are involved with overseeing proper waste management. State agencies include the MDEQ (Waste and Hazardous Materials Division, WB, and Air Quality Division), the Department of Labor and Economic Growth, and the Michigan State Police. Federal agencies include the U.S. EPA 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.

The Waste and Hazardous Materials Division administers a diverse number of prevention programs to protect the environment and the public's health through proper management of hazardous products; solid, liquid, and hazardous waste; medical waste; radioactive materials; and radioactive waste. Total waste disposal in Michigan landfills was reported at 63,927,564 cubic yards, an increase of 10,598 cubic yards or less than 1 percent over the FY 2004 data. Waste generated in Michigan decreased from 45,780,664 cubic yards in the previous reporting period to 45,437,244 cubic yards, a decrease of about 1 percent. Total

imports of waste into Michigan landfills increased from the previous reporting period from 18,136,302 cubic yards to 18,490,320 cubic yards, an increase of about 2 percent.

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 watershed management plans. Remediation projects intended to address landfill leachate will not be supported with Section 319 or CMI NPS funds. However, the NPS Program will encourage local watershed groups to seek alternative sources of funding such as the SRF.

Long-term Goal:

3-62 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 watershed management plans.

3.3.10 Atmospheric Deposition

The atmosphere is a significant pathway for many persistent toxic pollutants to be deposited into the Great Lakes and other waterways. Although the new uses of some of these toxic substances have been banned in the U.S., research indicates that new inputs of persistent toxics into the Great Lakes basin continues to occur through long-range transport and deposition.

Atmospheric deposition is a significant source of certain toxic pollutants entering the Great Lakes. In fact, as much as 90 percent of some toxic loadings to the Great Lakes are believed to be the result of airborne deposition. Because the transport and deposition of airborne toxics is not localized, this phenomenon needs to be evaluated and regulated on a regional or even international scale. Various efforts to understand and curtail atmospheric deposition are under way. These efforts include emissions inventories, modeling, and mass balance studies that inform new laws and policies. Such efforts will help us to understand and combat atmospheric deposition of pollution on the Great Lakes.

Michigan first began regulating toxic air pollutants in the late 1970s by including toxic pollutants in permit reviews for new sources. In 1992, specific rules were promulgated to control toxic air pollutants from new or modified sources. Michigan's air toxics rules require facilities to use the best available technology to control all toxic air pollutants. In addition, the rules require that any remaining emissions of a toxic air pollutant be evaluated for residual risk using a health-based screening level approach. Michigan's rules regulating new or modified sources are now in effect, whereas the toxic air pollution provisions of the Clean Air Act, affecting both new and existing sources is being phased in over a period of time.

Other efforts to address atmospheric deposition issues in Michigan include the MDEQ's mercury reduction initiative focused on quantifying mercury concentrations in the environmental media, identifying all sources that contribute mercury to the environment, and reducing or eliminating these sources. Numerous tools will be utilized including regional agreements, state legislation, statewide regulations and policies, the state permitting processes, outreach/education and pollution prevention efforts, as well as voluntary partnerships with various stakeholders.

While atmospheric deposition is a significant NPS contributor to water quality impairments in Michigan, the NPS Program will continue to rely on regulatory programs at the state and federal level to reduce or eliminate sources of pollutants that impair water quality. However, the NPS Program will continue to support activities to track changes in pollutant loads or water quality impacts caused by atmospheric deposition of contaminants.

3.3.11 Contaminated Sediments

Contaminated sediments are a significant source of pollution to Michigan's rivers and lakes contributing to nonattainment of WQS in 8,970 river miles and 13,452 acres of inland lakes. Although discharges of toxic substances to the Great Lakes have been reduced in the last 20 years, persistent high concentrations of contaminants in the bottom sediments of rivers and harbors continue to contribute to degraded aquatic life communities in localized areas, particularly in heavily urbanized locations.

The MDEQ's Remediation and Redevelopment Division (RRD) administers programs that drive the cleanup and redevelopment of environmental sites of contamination in Michigan. The RRD administers Part 201, Environmental Remediation; Part 213, Leaking Underground Storage Tanks; and portions of Part 215, Refined Petroleum Fund, of the NREPA. In addition, the RRD manages portions of the federal Superfund Program, established under the Comprehensive Environmental Response, Compensation, and Liability Act. Together, these four statutes and the related administrative rules guide the RRD's efforts in the remediation and redevelopment of brownfield sites throughout Michigan. The RRD oversees regulated party cleanups, addresses public health and environmental threats at sites of environmental contamination, and facilitates brownfield redevelopment.

The Hazardous Waste Program staff in the Waste and Hazardous Materials Division reviews construction permits and operating license applications and makes recommendations for the approval or denial of permits and operating licenses for treatment, storage, and disposal facilities accepting hazardous waste. Public participation in the form of public meetings and submittal of written documentation is part of this review and recommendation process. Staff conducts sampling along with operation and maintenance inspections to ensure a facility is in compliance with its permit specifications. Plans for permanent closure and cleanup of regulated hazardous waste treatment, storage, and disposal facilities are reviewed and approved by staff. This program is responsible for administration of the federal Resource Conservation and Recovery Act; and Part 111, Hazardous Waste Management; Part 121, Liquid Industrial Wastes; Part 167, Used Oil Recycling; and Part 171, Battery Disposal; of the NREPA.

The Great Lakes Legacy Act, signed into law in 2002, authorizes \$270 million over five years to remediate contaminated sediments in Great Lakes AOCs. The Act authorizes \$50 million annually to monitor, evaluate, or remediate contaminated sediments, or prevent new contamination. The Act also authorizes \$3 million annually for research on innovative remediation technologies, and \$1 million annually for public outreach and education. The Act requires a minimum of 35 percent nonfederal cost share for remediation projects. (Additional information is available from the U.S. EPA's Great Lakes National Program Office at www.epa.gov/GLLA.)

As part of the CMI, \$25 million was set aside for the investigation and remediation of contaminated sediments in Michigan lakes, rivers, and streams. To date, the MDEQ has used CMI funds for the remedial investigation of contaminated sediments in Deer Lake, the Detroit River, Muskegon Lake, the River Raisin, and White Lake. The MDEQ has also used CMI funds

for the remediation of contaminated sediments in White Lake, the Detroit River, and Muskegon Lake. In September 2003, the MDEQ completed the White Lake Tannery Bay contaminated sediment remediation. Approximately 85,000 cubic yards of sediment contaminated with tannery wastes, including hides, hair, arsenic, and chromium were removed. In September 2004, the MDEQ used CMI funds to provide the 35 percent nonfederal match and leverage Great Lakes Legacy Act federal funds for the remediation of contaminated sediments in the Black Lagoon of the Trenton Channel in the Detroit River. This remediation was completed in November 2005 and resulted in the removal of approximately 115,000 cubic yards of sediment contaminated with metals, including mercury, as well as PCBs, oil, and grease.

While contaminated sediments are a significant NPS contributor to water quality impairments in Michigan, the NPS Program will continue to rely on regulatory and grant programs at the state and federal level to reduce or eliminate sources of pollutants that impair water quality. The NPS Program will not be using Section 319 or CMI NPS grants to dredge or cap contaminated sediments in waters of the state. However, the NPS Program will continue to support activities to track changes in pollutant loads or water quality impacts caused by contaminated sediments.

3.3.12 Clean Sediments

Clean sediments, from upland erosion and stream bank erosion, are also 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 or storm water BMPs, nor 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 recently developed guidance to help grantees identify the scale of a sedimentation problem (see Section 5.7), and will continue to advocate the use of these tools for all sediment load reduction projects.

Long-term Goal:

3-63 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 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.

CHAPTER 4: WATERSHED MANAGEMENT

4.1 Watershed Approach

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.

Many of the watershed actions needed to control NPS pollution are federal or state programs that are coordinated and implemented at the local level. Some actions, such as land use planning decisions or ordinances, are entirely local initiatives. The responsibilities of the various local, state, and federal entities for NPS pollution control must be coordinated so that limited resources are used efficiently and effectively to ensure that the shared responsibility for protecting water resources is achieved. However, watershed management processes often differ from one watershed to another based on the perspective of participating organizations along with the location, size, and complexity of the watershed.

The U.S. EPA has a national focus on states achieving measurable progress in reducing specific pollutant loads and has established a national goal of achieving full or partial restoration of at least 250 water bodies on the list of impaired waters by the end of FY 2011. The U.S. EPA currently advocates a watershed planning approach that, while covering all aspects of water quality in a given watershed, places a high priority on *quantitative assessments* of: pollutant sources, pollutant loads, estimated load reductions to be achieved by implementing identified actions, and expected water quality improvements. This watershed planning approach is a better fit for restorative plans than protective efforts, although the federal NPS Program encompasses both protection and restoration.

The state NPS Program incorporates both the inclusive and measurable improvement concepts of the federal perspective, and also places an emphasis on protective actions that prevent a water body from being further degraded. 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. The state 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 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.

Long-term Goal:

4-1 The NPS Program will address NPS pollution issues throughout the state with a watershed management approach, which balances the needs of the following:

- Protection of high quality waters with restoration of impaired waters.
- Leveraging resources to achieve the best possible environmental benefit throughout the state, versus focusing available resources on a particular issue or watershed to obtain measurable improvements in water quality in a given area.
- Incentive methods and compliance activities.

4.2 Watershed Prioritization

4.2.1 Concepts

When resources are limited, it is often appropriate to prioritize where those resources should be directed to have the best chance of obtaining desired goals. Given the NPS Program's "watershed approach" to addressing NPS pollution problems, it makes sense to consider prioritizing watersheds for receipt of limited program resources. Although this has been done informally in the past (often as part of separate processes for funding, technical assistance, monitoring, and others), the NPS Program has not formally designated priority watersheds.

It appears this is an important time to consider prioritizing watersheds for NPS Program assistance for a variety of reasons: (1) the recent NPS Program reengineering review identified watershed prioritization as an important tool, not only for the NPS Program, but for the WB as a whole; (2) federal, state, and local financial resources for environmental protection and restoration efforts continue to decline; and (3) because of the recent NPS Program emphasis on developing watershed plans for many watersheds throughout the state, much more detail is now known about NPS problems and their significance in particular watersheds, as well as the methods and costs of addressing many of these problems.

The following discussions address the concepts of identifying priority watersheds at two levels: that of the WB as a whole; and for the NPS Program specifically. Both processes would facilitate the designation of priority watersheds for overall focus, but allow for deviation from the priority designations for specific programs and/or actions with appropriate reasons. For instance, the NPS Program may designate certain watersheds as priorities for overall program focus, yet have another watershed where it might be very important to have a watershed management plan developed (or implement I&E efforts, or monitoring, etc.) that is not one of the overall NPS Program priority watersheds. If the reasons for doing work in that watershed were appropriate and justified, the work would not be precluded from being done just because it was not one of the priority watersheds. However, the priority watersheds would generally receive increased program attention over watersheds that were not priority watersheds.

4.2.2 Priority Watersheds

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 watershed management plans.
- 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 nonpriority watersheds, but it will help focus overall efforts of both the NPS Program and the WB.

Long-term Goal:

4-2 The NPS Program will develop and maintain a list prioritizing watershed areas that will be targeted for restoration and protection efforts by the NPS Program over the next five years.

Short-term Goals:

4-3 The NPS Program Watershed Committee will develop a prioritization process for determining which watersheds will receive priority consideration from the NPS Program for restoration and protection. The committee will consider factors such as the following in the prioritization scheme:

- 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.
- Designation by other WB programs as an important geographic area.
- Water quality and aquatic communities of the water body.
- Uniqueness of that type of water body in that geographic area of the state (i.e., regional significance of the resource).
- Recreational use of the water body.
- Presence of any public health issues related to the water body.
- Significance of potential NPS pollutant sources in the watershed.
- 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.

- Listing of the water body on special designation lists including the following:
 - Federal wild and scenic rivers
 - State Natural Rivers
 - Cold water/trout stream
 - State nonattainment list
 - State TMDL list and development schedule
 - Great Lakes AOC, and other Great Lakes initiatives such as the Saginaw Bay Coastal Initiative (SBCI), and Lake Erie Phosphorus Strategy
 - Public surface water supply for drinking water

- 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.
- Size and complexity of the watershed relative to meeting the U.S. EPA nine minimum elements of watershed planning.
- Designation as a critical subwatershed as part of a larger watershed management plan.
- 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.
- Geographic distribution of priority watersheds, particularly related to NPS staff time available.
- Coordination with other WB programs (e.g., monitoring, permits, TMDLs).

4-4 By September 15, 2011, the NPS Program Watershed Committee will use the prioritization process developed above to update the list of water bodies (Appendix 4) that will receive priority attention from the NPS Program over the next five years, specifying why each is a priority and the particular water quality issues that will be addressed.

4-6 NPS district staff will continually solicit input on NPS compliance issues from WB district staff (perhaps through existing routine staff meetings) to make recommendations to district supervisors about targeting watersheds for certain actions.

4-7 The NPS priority water bodies will be evaluated for target compliance and enforcement activities as appropriate to achieve NPS pollution goals.

- Coordinate with other regulatory programs to increase compliance and enforcement effectiveness (e.g., wet weather programs; Act 451, Parts 31, 91, 301, and 303 programs).
- Work jointly with compliance staff in the FOD on special initiatives, as defined in the WB annual strategic plan, to target a certain area (e.g., geography, sector, or problem category) for focused, intense work.
- Be proactive about addressing certain site-specific problems or potential problems, dependent on the water quality significance of the issue, staff ability to influence corrective actions, and consideration of the NPS priority watersheds.

As Time Allows:

4-5 The NPS Watershed Committee will work with permits staff to develop an NPDES Management System database query, customized by NPS priority watershed, which could be used to target coordinated efforts.

Long-term Goal:

4-8 The NPS Program will collaborate with other WB programs to maintain a list prioritizing watershed areas that will be targeted for restoration and protection efforts by the WB over the next five years. This goal builds upon the NPS Program watershed prioritization effort described previously, and is dependent upon the interest of other WB programs in participating with the effort to identify priority watershed areas for the WB.

As Time Allows:

4-9 Following completion of the previously described NPS Program watershed prioritization process, the Watershed Committee will collaborate with other WB programs to develop a prioritization process for determining which watersheds will receive priority consideration by the WB for restoration and protection. The committee will utilize as much of the NPS Program watershed prioritization process as applicable, modifying it as appropriate to account for differences among WB programs.

4-10 The NPS Program Watershed Committee will coordinate with other WB programs and use the WB prioritization process developed for Goal 4-9 to create a list of water bodies that will receive priority attention from the WB over the next five years, specifying the following for each identified water body:

- Why it is a priority.
- The particular water quality issues that will be addressed (e.g., Section 303(d) list, TMDL with no implementation plan, specific violations that need stepped up enforcement).
- What will be done (e.g., provide technical assistance, work in partnership, provide monitoring support, enforcement, prioritize for pass-through grants), how, and by what WB program(s).
- A proposed timeline/schedule for implementation of the outcomes developed under the previous bullet.

4-11 The WB will consider targeting priority watersheds, or water body reaches, identified from the above WB prioritization process as a pilot to create a framework for integrating various WB programs to restore water bodies using a more holistic watershed management approach. This could then be used as a model to implement throughout the state based on evaluation of success. Intensive NPS control could include devoting a substantial portion of the pass-through grant allocation to the target watershed; focusing regulatory or nonregulatory activities; and identifying other resources that could be used for restoration. The target watershed should be selected as part of the long-term planning process so that staff and organizations have several years to adequately plan and organize implementation. Intensive pre- and post-implementation monitoring would be part of this effort.

4.2.3 State Watershed Plan

Governor Granholm's Land Use Leadership Council report stated that "Michigan's natural environment is one of its most valued assets" and "To help assure its sustainability, the council recommends that: appropriate state agencies should participate in the development of statewide plans for biodiversity conservation, wildlife habitat protection, water quality, and other potential environmental impacts, and the MDOT should consider these plans when developing its statewide transportation plans." A statewide water quality plan would be useful to the WB to help various programs collaborate with each other; it could also help other state and local agencies look at the statewide significance of local or regional natural resources, with respect to water quality, and also facilitate the incorporation of this information into local master plans.

As a first step in this process, the NPS program will develop a statewide watershed management plan that identifies particular watersheds throughout the state that are priorities for implementing additional actions to address NPS water quality issues. This approach incorporates the general framework concept advocated by both the U.S. EPA and the state for watershed management plans that address large watersheds. The statewide watershed management plan will describe the major NPS issues of concern on both a statewide and regional basis, and identify which watersheds in the state are priorities for restoration and/or protection actions. This list of priority watersheds will be the list developed under Goal 4-4. The focus of the statewide watershed management plan will be on identifying *priority watersheds* where the state will focus NPS program efforts, not specifying particular water quality actions to be implemented. It will not be a statewide *water quality* plan.

Long-term Goal:

4-12 Michigan will have a statewide watershed management plan that identifies priority watersheds. Initially, this plan will identify watersheds that will receive priority attention under the NPS Program, but it is envisioned that eventually the statewide plan will be expanded to identify priority watersheds at the WB level as well. The statewide watershed plan will cover the following topics:

- NPS Program priority watersheds (established under Goal 4-4), along with descriptions of why they are priority watersheds and the designation process used (from Goal 4-3).
- Other geographic areas that have been designated as important areas to implement actions specific to a particular NPS Program topic area over the next five years, but did not rise to the level of a statewide NPS priority watershed (e.g., for watershed plan development or implementation, NPS monitoring, education, and information efforts, etc.).
- Watersheds with CMI and/or Section 319 approved watershed management plans; those with ongoing plan development efforts; and watersheds currently without plans that are targeted for plan development efforts.
- A statewide resource inventory summary section that geographically identifies important natural resource issues or features that are of special statewide significance such as the following:
 - Cold water lakes and streams
 - Federal wild and scenic rivers
 - State Natural Rivers
 - National heritage rivers

- Critical dunes
- Environmentally sensitive areas
- Public drinking water supply wellhead protection areas
- General presence of endangered or threatened species or habitats
- Wildlife corridors
- Land use
- Soil types
- Groundwater aquifers
- Public land

Short-term Goals:

4-13 The NPS Program GIS coordinator will continue to compile pertinent figures, tables, and maps for the statewide resource inventory summary for those topics listed above that are readily available. The maps will be used in the NPS watershed prioritization process to help identify NPS priority watersheds.

4-14 By October 1, 2010, the watershed management team will work with the GIS coordinator and the NPS Program I&E coordinator to determine if the statewide resource inventory summary information should be compiled into a printed document (or made available on the Web) for use by local watershed planning groups. If it is determined that distribution via printed documents or the Web is a desired goal and resources are available then the NPS I&E coordinator will lead efforts to make this information available.

4-15 By July 2010, the watershed management team will develop the initial statewide watershed assessment report documenting the status of the items listed in the long-term goal above.

4.3 Watershed Plans

4.3.1 NPS Watershed Plan Definition

Watershed level management is most effective when activities are conducted in a collaborative fashion. This coordination is often best provided through a comprehensive watershed management plan that is developed and implemented jointly by the myriad of interested or affected stakeholders. Consequently, the NPS Program addresses NPS issues primarily through watershed-specific management plans. The intent of NPS-funded watershed management plans is to define all water quality problems and threats within the watershed and to propose specific actions to address those problems (including priorities, responsible parties, costs, and schedules) in order to restore degraded waters or protect high quality waters.

The NPS Program approves watershed management plans for funding eligibility under two sets of criteria. The first criteria are defined in state legislation that established the CMI bond fund. The minimum requirements and suggested approaches for developing CMI plans are laid out in a "Blue Book" watershed plan guidance document prepared by the state titled, *Developing a Watershed Management Plan for Water Quality: An Introductory Guide*. In 2003, the U.S. EPA released the "Nine Elements of Watershed Planning" that must be included in all watershed management plans developed or implemented under the federal CWA Section 319 program. These elements are described in the *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* (available on the U.S. EPA Web site). Although these elements are generally covered in the Michigan CMI guidance, some U.S. EPA requirements are more

quantitative than those specified under the CMI legislation. The state also approves plans as meeting the minimum U.S. EPA elements.

4.3.2 NPS Watershed Plan Development Priorities

Over 100 watersheds in Michigan are now covered by a watershed management plan, but many others are not. Furthermore, some water bodies are covered by plans that meet state criteria under the CMI bond program, but do not meet federal CWA Section 319 criteria. For instance, although Lakewide Management Plans (LaMPs) are CMI approved and cover over 99 percent of the state, they generally lack sufficient detail to support site-specific NPS funded projects. Given that there are limited state and federal resources available to assist in the development of watershed management plans, and those with the most local interest have generally been completed, it is now necessary to prioritize where plan development resources will be directed in the future.

Long-term Goals:

4-16 All Great Lakes tributaries in Michigan will be covered by a NPS watershed management plan at a scale sufficient to address all water quality issues at an appropriate level of detail, given differences in watershed size and complexity.

4-18 The NPS Program will maintain an up-to-date list prioritizing watershed areas for the development or updating of NPS watershed management plans, identifying those that will be targeted for planning in the next five years.

Short-term Goal:

4-19 By August 31, 2010, the NPS Program will identify priority watersheds for watershed management plan development and identify those watersheds in the FY 2011 RFP.

Long-term Goal:

4-20 NPS staff will work with WB programs that may be interested in participating in the development of a watershed management plan (e.g., Surface Water Protection, Storm Water, Remedial Action Plans [RAPs], LaMPs, and others) and serve as a liaison between local watershed groups and program contacts as needed.

Short-term Goal:

4-21 For each new watershed planning project, NPS staff will contact appropriate representatives of the above programs, notifying them of the planning project, inviting them to participate, and describing the specific information or input needed, if any.

Long-term Goal:

4-22 NPS staff will work to ensure consistency and share successes among NPS watershed management plans in areas such as I&E outreach, how to meet the U.S. EPA nine minimum elements, monitoring, problem identification, and BMP selection.

As Time Allows:

4-23 The Watershed Committee and I&E Committee will develop technical updates to the state “Blue Book” guidance document of watershed management planning. This is an important activity to conduct, but since most of the information is already available to watershed planning groups, although scattered among a variety of sources, this was determined to be of lesser priority than the designated short-term goals. Once the NPS Program watershed prioritization effort is completed, this goal will be reevaluated to determine if resources are available to designate it as a short-term goal. The Blue Book update will better incorporate the following:

- The U.S. EPA’s nine minimum elements, including the new nine elements subcriteria developed as part of the recent Tetra Tech, Inc. watershed planning Section 319 project.
- Phase II Storm Water Watershed Planning.
- Land use planning, zoning, and ordinances, particularly relevant recommendations of the Governor Granholm’s Land Use Leadership Council.
- Local funding options.
- Hydrology and geomorphology.
- Market awareness (as it relates to I&E target audiences).
- Role of point source loads.
- Role of TMDL load reductions.
- 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 MDEQ plan approvals are not for an indefinite period.

4.3.3 Plan Approval

The MDEQ formally approves NPS watershed management plans 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/protection. MDEQ approval allows activities identified in watershed management plans 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 watershed management plans under the CMI or Section 319 programs. The guidance materials and training were provided by Tetra Tech, Inc.

Long-term Goal:

4-24 All NPS watershed management plans 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 Goals:

4-25 WB staff will review draft watershed management plans 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.

4-26 The NPS Unit will continue to provide guidance and training to all MDEQ staff who review NPS watershed management plans for approval under the CMI or Section 319 programs. 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 U.S. EPA 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.

4-27 By January 2010, the NPS Program will develop and implement a revised watershed management plan review process.

4.3.4 Other Watershed Management Plans

There are several other types of water resource plans developed by state or local organizations that often cover various aspects of watershed management. These plans include the following:

- RAPs and LaMPs are developed under the auspices of the Great Lakes Water Quality Agreement (GLWQA). RAPs are documents used to guide efforts to restore Great Lakes AOCs, which are so designated because they exhibit one or more impairments to beneficial uses. LaMPs for each of the Great Lakes are intended to guide efforts to restore and protect those water bodies.
- TMDLs are pollutant loading limits that are required by the federal CWA for water bodies that do not meet state WQS. A TMDL document typically contains a problem statement describing the pollutant and its presence in the water body, numeric targets to meet WQS, a source assessment, a description of the link between the pollutant and its potential sources, a description of TMDL development, an allocation of allowed waste loads from point sources and loads from NPS with a margin of safety, a description of TMDL-related monitoring, and a description of activities (current and future) that provide reasonable assurance that the TMDL allocations will be met.
- Watershed-Based Municipal Separate Storm Sewer Systems (MS4) NPDES permits require municipal permittees to prepare a joint watershed management plan for their regulated watershed area. The emphasis of the watershed management plan is to mitigate the undesirable impacts caused by wet weather discharges from separate storm water drainage systems. The permit states that the watershed management plan should be developed based on sound guidance, such as the U.S. EPA's *Watershed Approach Framework* and MDEQ's *Developing a Watershed Management Plan for Water Quality: An Introductory Guide* (February 2000--the "Blue Book"). Plans produced under this program are typically of high quality and meet CMI and most Section 319 requirements.
- Surface Water Intake Protection Programs for public drinking water supplies are required by the federal Safe Drinking Water Act amendments of 1996 and include: designation of

source water protection areas; identification of potential contaminant sources; education; and development of management strategies to protect source waters and control threats. The Surface Water Intake Protection Program encourages a regional focus and collaboration with other programs with similar goals.

- The MDNR's Fisheries Management Plans are developed as companion documents to River Assessments, which document the condition of aquatic resources and identify fishery-related problems along with management opportunities that may be carried out by other agencies or local partners, and are intended for use by the Fisheries Division to guide short-term division management activities in the watershed.
- The MDNR Natural Rivers Program is managed under the authority of the state Natural Rivers Act (Part 305 of P.A. 451 of 1994). The program allows for establishment of a protected statewide Natural Rivers system through a designation process. As part of the process, a river plan is developed, which describes river system conditions, segments proposed for designation, and recommended public and private land development standards.

The scope and content of these watershed plans, as well as the amount and type of MDEQ participation, varies by program. Although these plans have different objectives and requirements, substantial content overlap sometimes exists and there may be cases where these efforts can be combined or better coordinated during both development and implementation.

Long-term Goal:

4-28 The NPS Program will strengthen its working partnerships with appropriate state, interstate, tribal, regional, and local entities; private sector groups; citizen groups; and federal agencies to consolidate and update watershed plans in watersheds covered by multiple plans where there is a clear benefit to consolidating efforts.

As time allows:

4-29 The NPS Program Watershed Committee will identify staff representatives of other state programs that have some type of watershed management plan (including those described above) and convene a subcommittee to conduct the following:

- Examine common areas within the various plans and determine if opportunities/benefits for jointly addressing those issues in either plan development or implementation exist.
- If opportunities for collaboration exist, each program will develop a list of its current plans, plans that are being developed, or those that are planned for development.
- Establish mechanisms to facilitate the participation of other programs in the development, review, and implementation of common topic areas in plans.
- Complete a subcommittee report on the above.
- The subcommittee report will be reviewed by the NPS Program Committee.
- The NPS staff activities adopted by the NPS Program Committee will be incorporated in future NPS Program plan updates.

4.4 Implementing NPS Actions

4.4.1 Partnerships

Successful partnerships are one of the most important keys to implementing NPS actions to restore or protect water quality. Initially, watershed planning projects often provide an important mechanism for partnership development at the local watershed level. Local steering committees formed through the watershed projects provide direction for local watershed management efforts. They have diverse representation from stakeholders whose local knowledge and influence is essential to motivate change in behaviors that will improve or protect water quality in the watershed. NPS staff assist watershed planners with assembling a diverse steering committee that is representative of stakeholders in the watershed. NPS staff also assist watershed planners with obtaining supplemental advisory input where specific expertise is needed.

The NPS Program also provides important partnership roles in many implementation projects, including local initiatives, which are generally larger in scope than watershed grant projects and may not have NPS Program funding. Local implementation partnerships are important and can differ greatly among watersheds (and are too numerous and variable to document here) depending on watershed size, pollutants of concern and their sources, and the specific participating organizations. The NPS Program seeks to enhance cooperation and partnerships with stakeholders in a particular watershed to the maximum extent possible in order to best utilize available expertise, interest, and funding. The statewide NPS Program's interaction with watershed management decision makers and advocates at all levels provides staff with a diverse network from which to foster partnerships with local watershed efforts.

Long-term Goal:

4-30 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 (see Section 7.4).
- Encourage watershed groups developing or conducting volunteer water quality monitoring to seek coordination and guidance assistance through the Michigan Clean Water Corps (MiCorps) Volunteer Monitoring Program managed by the Great Lakes Basin Commission.
- 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 Goal:

4-31 NPS Program staff will maintain an active presence in ongoing watershed management efforts for each watershed where a local community is actively working to develop or implement an MDEQ-approved watershed management plan. At a minimum, this includes participation in one of the following types of meetings:

- Watershed steering committee.
- Watershed technical or restoration committee.
- Local government planning committee.
- Project committee for a specific implementation action.

4.4.2 Technical Assistance

Water quality is determined to a large extent by land uses within a watershed and local governments (e.g., townships, villages, counties, cities) are the entities with the most ability to influence and impact local land use decisions. Unfortunately, many local governments are understaffed (some township and village governments are comprised of only part-time volunteers), often have frequent turnover, and generally are not sufficiently aware of the potential negative impacts that poor land use practices have on water quality. Even in cases where there is environmental awareness at the local level, they may lack the expertise, tools, and resources to properly address the issues. Technical input and guidance provided by MDEQ staff can be a key factor in helping promote, start, or enhance effective community actions and decisions to protect water quality. These local actions and decisions are one of the strongest mechanisms for sustaining good watershed management.

Technical assistance is defined as providing expertise on subject matter related to watershed planning, water quality, water quality pollutants, NPS pollutants, and NPS BMPs. There are many related topics that fall under the scope of these broad technical assistance categories including land use, I&E product development and delivery, monitoring, etc., where staff should provide expertise or help identify appropriate sources of information.

In many ways, district and central NPS staff provide similar technical assistance; however, it is provided in different capacities. District staff typically provide technical assistance through direct interaction with local governments and watershed groups, providing assistance with the following: capacity building (e.g., partnerships, funding, public will); steering committee participation; delivering presentations; assisting with environmental inventories; monitoring and data interpretation; BMP selection; engineering design and review; and project implementation approaches. Central staff provide similar types of assistance from a programmatic standpoint, and are drawn upon by district staff to provide expertise where a specific need is identified for a project. Central staff typically coordinate program-wide initiatives such as the development of manuals and guidance documents, statewide education and outreach, staff training, watershed management training, and other topic-specific technical tools. Similarly, central staff draw upon district staff for input and assistance with program-wide initiatives.

The NPS Program uses a variety of tools to provide technical assistance. The program has staff with technical expertise in watershed planning, hydrology, land use, geomorphology,

stream restoration, monitoring, wetlands, engineering, and education. Though most staff have some level of knowledge associated with these topics, expertise for a specific topic often rests with an individual staff person. The program recognizes a strong need to convey its expertise to local watershed organizations in a manner that is understandable, facilitates watershed planning, and makes best use of staff resources. An identified program need is to strengthen district staff's expertise in program technical tools so that they may more directly assist local watershed managers. Many of the goals listed below address the development or improvement of tools, the mechanisms for disseminating tools, and staff training to maximize use of the tools.

One of the biggest challenges encountered in watershed management is sustaining the momentum initiated as part of a planning effort or a recent local water quality implementation project. Program staff attempt to encourage and maintain the resulting interest in environmental stewardship regardless of whether projects are funded through NPS grants or locally funded. Sustainability is directly related to funding, but it also depends on having appropriate local mechanisms in place to protect and improve water quality and support watershed management. Although this is a challenge, it is also one of the NPS Program's biggest opportunities.

The goals and activities identified below focus on the development and implementation of NPS watershed management plans: developing and implementing local NPS projects not directly funded by the NPS Program or those in watersheds without watershed management plans; BMP design and engineering review; source-specific technical assistance tools; and measures for sustaining watershed management capacity.

Long-term Goal:

4-32 Increase technical assistance to local groups through active participation in watershed projects that address NPS issues, including those funded by sources other than the NPS Program.

Short-term Goals:

4-33 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.

4-34 NPS staff will assist with TMDL development for NPS impacted watersheds according to the WB TMDL schedule. Additionally, NPS staff will work with local communities to develop watershed plans or implementation actions to address NPS pollutants of concern in watersheds listed on the Section 303(d) list consistent with priorities established by the NPS watershed priority list.

4-35 NPS staff will assist with TMDL implementation of NPS pollution control measures.

4-36 The NPS Program will work with watershed groups and other organizations to hold periodic statewide watershed conferences and NPS training on a yearly basis (or as needed). These conferences will focus on specific, current needs of Michigan watershed groups and other NPS partners. Each conference will focus on a specific issue and will be statewide or for a geographic region of Michigan.

Long-term Goal:

4-37 Improve the program watershed management toolbox by developing and/or improving tools targeting statewide and watershed-specific NPS issues including the following:

- GIS-based tools (e.g., nonattainment and TMDLs depicted by watershed, land use).
- Statewide hydrologic analyses.
- Build out analyses.
- Cost-benefit analysis of NPS controls.
- Michigan-specific benefits and challenges of LID.
- Landscape level wetland functional assessment.

As Time Allows:

4-38 The Watershed Committee will evaluate available Web-based tools and information, and make recommendations to the MDEQ Web page editors for providing links to these from the NPS home page.

4-39 The Watershed Committee and NPS I&E Coordinator will work with the MDEQ land use expert to create a specific designated area on the NPS Web site for land use guidance and information that is supported by the NPS Program and maintain it with current information. This can be used by staff and the public.

4-40 The Watershed Committee and NPS I&E Coordinator will evaluate an online reporting system that could be used voluntarily by watershed managers to enter specific watershed plan implementation accomplishments. The system could potentially be based on the current WB Beach Monitoring Web site database and would help the NPS Program track implementation actions, whether from grant-funded projects or locally-funded projects. Information entered could be useful in developing NPS Program annual reports and facilitate information distribution on successful efforts among watershed groups.

4-41 The NPS Program will establish a team to investigate the development of an “ice breaker” educational electronic tool (e.g., DVD or Web-based) to be shared with local government and new municipal officials (specifically township supervisors) to educate them on land use impacts of storm water runoff and water quality, state regulations, and available resources. The NPS Program Committee will partner with the Michigan Township Association, Michigan Water and Environment Association, and other interested entities (including MDEQ’s Coastal Zone Management Program and the MSU Land Use Policy Institute) in this effort.

4-42 The “ice breaker” subcommittee and/or its partners will investigate the benefits and drawbacks of potential formats for the tool relating to functionality and cost (i.e., Microsoft PowerPoint versus movie format, DVD versus Web-based, or both, etc.). The NPS Program Committee will also investigate the feasibility of having the tool produced by the Michigan Township Association or Michigan Water and Environment Association.

4-43 The NPS Program Committee will develop a proposed process for sharing the “ice breaker” tool with municipal officials (i.e., triggers for distribution, manner of distribution, etc.). The tool and process should build on or facilitate related tools already developed by the MDEQ’s Coastal Zone Management Program (e.g., the tool might be a very basic DVD that provides introductory information about land use change and water quality impacts that facilitate

greater local government use of *Filling the Gaps: Environmental Protection Options for Local Governments*).

4-44 The NPS Program Committee will make a recommendation to the NPS Unit regarding development of the “ice breaker” tool, including a proposed implementation schedule for development. Pending approval, the NPS Program Committee will develop the tool.

4-45 WB district NPS staff, with assistance from the NPS monitoring coordinator, will assist local watershed teams in priority watersheds by summarizing *existing* federal and state water quality data in a format that is useable in the local watershed planning, restoration, and protection process. The focus of this effort would be summarizing results reported in existing documents, not conducting an analysis of the individual data observations, although in some cases data pulls from existing databases may be made. The summary should identify the significance of the data results by explaining what they mean in lay terms (e.g., does the data indicate a problem, and if so, how significant is the problem). The format used for the priority watersheds could then be used as a template, or tool, by other watershed teams. In most cases, it is likely that staff time constraints will limit the amount of assistance provided, the particular reports or data examined, and the summary format (e.g., written report, tables/figures, maps, GIS data layers).

4.4.3 TMDL Implementation

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

TMDLs are typically developed by the MDEQ and approved by the U.S. EPA. 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 NPDES permits for point source discharges and NPS control programs, to achieve the necessary pollutant reductions. The MDEQ and U.S. EPA have an interest in better integrating NPS pollutant control activities with TMDL development and implementation activities.

Long-Term Goal:

4-46: The WB will work to better coordinate TMDL development and implementation with NPS Program implementation.

Short-Term Goals:

4-47: By December 31, 2009, the WB will select three to five pilot projects to demonstrate opportunities to better integrate the TMDL/NPS Programs. These pilot projects will be used to explore opportunities to integrate watershed management plan and TMDL development as well as identifying opportunities to use watershed management plans as implementation plans for TMDLs.

4-48: The WB will continue to place a priority on pass-through grant projects that address TMDL load allocation targets.

4-49: By December 31, 2010, the NPS Program Committee and TMDL staff will revise the NPS Program Plan to include additional recommendations for better integration between the two programs. Staff will evaluate lists of approved TMDLs with significant NPS issues, progress to date implementing the NPS load allocation goals of those TMDLs, and recommendations for specific priority activities in those watersheds.

4-50: By December 31, 2010, the WB will review the results of the U.S. EPA's TMDL implementation tracking pilot project and work with the U.S. EPA to develop a TMDL implementation tracking system for Michigan.

CHAPTER 5: MONITORING

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 MDEQ's NPS Program. The strategy describes how the MDEQ's 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 some of the key long-term and short-term goals from the monitoring strategy. In addition, several ongoing monitoring efforts are listed.

5.1 Developing Priorities and Allocating Resources

Water quality monitoring is necessary to determine the effectiveness of NPS control actions and support sound NPS-related water quality management decisions. Therefore, it is imperative that the WB's water quality monitoring and NPS Programs be effectively integrated in three key areas: (1) priority setting and planning; (2) study design and implementation; and (3) data management and reporting.

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.

Long-term Goal:

5-1 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, monitor program and project success, and make program adjustments based on lessons learned.

Short-term Goals:

5-2 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. NPS Program priorities developed to date.
2. Key aspects of the NPS problem identification monitoring schedule developed to date, such as the TMDL problem identification monitoring schedule.
3. A description of any multi-year effectiveness monitoring projects underway (including TMDL effectiveness monitoring projects) and a list of watersheds that may be targeted for short-term effectiveness monitoring projects.
4. A description of relevant trend monitoring activities that may be coordinated with NPS monitoring projects.

5-3 The MDEQ staff will implement all of the monitoring commitments included in the 2004 *NPS Environmental Monitoring Strategy* including the following:

- By July 15 of each year, the MDEQ, Surface Water Assessment Section (SWAS) will distribute a letter to internal and external partners seeking water quality monitoring recommendations. This letter will reflect current NPS Program goals and water quality monitoring priorities; identify priority watersheds to be monitored; and emphasize the WB's interest in soliciting water quality monitoring recommendations that are consistent with those goals and priorities.
- Before January 31 of each year, the NPS monitoring coordinator will convene meetings to discuss monitoring needs in each of the major watersheds targeted for monitoring. Meeting participants will include NPS district and Lansing staff, NPS grant administrators, SWAS monitoring staff, and LWMD hydrologists.
- Before March 30 of each year, SWAS managers will review all of the NPS monitoring needs, balance those needs against other WB monitoring needs, and allocate available monitoring full-time equivalents and funding.

5-4 FOD staff will work with local groups to identify sites that may require future monitoring.

5.2 Statewide 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. In some cases, the relative contributions from point versus NPS may be obvious, but in many cases they are not. For example, declines in total phosphorous loads from monitoring stations located above all point source discharges can be attributed to declines in NPS while declines in total phosphorus loads measured at the mouth of most major tributaries could be attributable to reductions in either point or NPS, or both. Monitoring staff generally assume that declines in contaminant concentrations in ambient water, sediments, or biota can be at least partly attributed to the success of NPS reduction activities.

Long-term Goal:

5-5 The MDEQ will coordinate and integrate water and sediment quality trend monitoring

activities with other NPS monitoring and program priorities to ensure that trend monitoring data are used to assess NPS project and program effectiveness.

Short-term Goal:

5-6 The MDEQ staff will implement all of the monitoring commitments included in the 2004 *NPS Environmental Monitoring Strategy* including the following:

- The NPS monitoring coordinator and other meeting participants will consider trend monitoring plans during annual discussion of monitoring needs for targeted watersheds, as prescribed in the strategy.
- MDEQ trend monitoring project coordinators will ensure that data are entered into the appropriate electronic databases (including the Storage and Retrieval System [STORET] database) as data become available.
- MDEQ trend monitoring project coordinators will prepare annual updates to be submitted to the NPS monitoring coordinator by August 1 of each year.
- NPS Unit staff will use relevant trend monitoring conclusions to help assess the overall NPS Program effectiveness and prepare the Annual NPS Program Report.

5.3 NPS Problem Identification Monitoring

Problem identification is the primary objective of many NPS pollution-related monitoring studies conducted by the MDEQ and its grantees or contractors. The MDEQ implements a number of routine monitoring activities (briefly described in the 2004 *NPS Environmental Monitoring Strategy*) 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 5.1).

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 Section 2.1

Most of the routine water quality assessment monitoring conducted by WB staff includes rapid assessment techniques, such as the SWAS surveys or FOD road stream crossing surveys. The SWAS surveys include biological assessments as well as water and sediment chemistry monitoring to identify impaired water bodies and causes of impairment. The FOD surveys are primarily visual assessments of stream conditions and nearby riparian land uses from road crossings over streams. NPS pollution problems observed during the SWAS surveys and FOD road stream crossing surveys are reported to appropriate NPS Program staff for additional monitoring or follow-up corrective action.

Local water quality monitoring grants or NPS grants are used in some cases to develop watershed plans that describe problems and identify NPS pollution. These projects are used to direct corrective actions and additional monitoring. In addition, volunteer groups monitor inland lakes and wadeable streams and these data are used to help identify impaired water quality.

Table 5.1. Five-Year rotating watershed monitoring schedule.

2009	2010	2011	2012	2013
Carp (Mackinac County)	Au Train-Chocolay	Carp (Marquette County)	Menominee	Iron
Charlotte and Upper St. Marys	Cedar	Misery	Au Sable	Montreal
Millecoquins	Escanaba	Portage	Black (Alcona County)	Ontonagon
Manistique	Fishdam	Sturgeon (Houghton County)	Black (Van Buren County)	Presque Isle
Munuscong and Lower St. Marys	Ford	Salmon	Galien	Upper Wisconsin
Pendill's Creek	Rapid	Tobacco	Huron	Bear
Pine	Sturgeon (Delta County)	Au Gres/Tawas	Looking Glass	Betsie
Tahquamenon	Whitefish	Cass	Maple	Boardman
Two Hearted	Black (Cheboygan County)	Detroit	St. Clair	Cherry
Waiska	Kawkawlin-Pine	Upper Grand	Tittabawassee	Elk
Big Sable	Macatawa	Muskegon	White	Flat
Clinton	Ocqueoc	Paw Paw		Flint
Lower Grand	Pentwater	Red Cedar		Lake Michigan Shoreline Tribs
Kalamazoo	Pere Marquette	Lower St. Joseph		Lake St. Clair Tribs
Manistee	Rouge			Pigeon
Rifle	Shiawassee			Pine
Saginaw	Upper St. Joseph			Platte
	Swan			Rabbit
	Thunder Bay			Raisin
	Wiscoggin			Rogue
				Thornapple

Stream hydrology studies are conducted to assess NPS pollution caused by or related to increasing flow variability.

The WB district staff respond 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 can not be achieved, the issue will be brought to the attention of appropriate U.S. EPA staff.

Long-term Goal:

5-7 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 Goal:

5-8 The MDEQ staff will implement all of the monitoring commitments included in the 2004 *NPS Environmental Monitoring Strategy* including the following:

- The NPS monitoring coordinator and other meeting participants will consider NPS Program priorities and NPS problem identification monitoring needs during the annual discussion of monitoring needs for targeted watersheds, as prescribed in the strategy.
- The SWAS monitoring staff will develop watershed monitoring plans for targeted watersheds by April of each year.
- 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.
- An inventory of NPS studies will be maintained by the NPS monitoring coordinator. The SWAS monitoring staff and NPS staff will help maintain the list by providing information regarding the status of NPS problem identification projects.
- The SWAS monitoring staff and NPS Program staff will ensure that data are entered into the appropriate electronic databases (including 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.
- The SWAS staff reports summarizing water quality in target watersheds will include a separate section highlighting the NPS problem identification results.
- The NPS monitoring coordinator will use reports and annual updates to develop program reports such as the Annual NPS Program Report and revise the NPS Program Multi-Year Plan.

5-9 In 2009, the MDEQ will target problem identification monitoring to cover the watersheds listed in Table 5.1.

5-10 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.

5-11 In the event that MDEQ staff discover 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 U.S. EPA.

5-12 On an ongoing basis, FOD staff will work with local groups to identify potential NPS projects and track identified sites.

5.4 TMDL Development and Effectiveness Monitoring

Section 303(d) of the federal CWA and the U.S. EPA's Water Quality Planning and Management Regulations (Title 40 of the Code of Federal Regulations, Part 130) require states to develop TMDLs for water bodies that do not meet applicable WQS. Each TMDL must include waste load allocations for point sources and load allocations for NPS such that the sum of the allocations (plus a margin of safety) is not greater than the loading capacity of the water for the pollutants addressed by the TMDL. The Section 303(d) list includes a number of water bodies

with impairments caused either partially or entirely by NPS of pollutants.

Monitoring conducted to support TMDLs can be divided into two categories. The first category is TMDL development monitoring. This includes the monitoring necessary to define the extent of the impairment, causes or sources of pollution, contaminant loads, and reductions necessary to restore a degraded water body. The second category is TMDL effectiveness monitoring. This category includes monitoring necessary to measure the impact of TMDL implementation and ultimately document that WQS are being met.

Long-term Goal:

5-13 The MDEQ will coordinate and integrate TMDL monitoring with other MDEQ monitoring priorities to ensure that TMDL development and implementation monitoring needs are met.

Short-term Goal:

5-14 The MDEQ staff will implement all of the monitoring commitments included in the 2004 *NPS Environmental Monitoring Strategy* including the following:

- The NPS monitoring coordinator and other meeting participants will consider NPS Program priorities and NPS-related TMDL monitoring needs during the annual discussion of monitoring needs for targeted watersheds, as prescribed in the strategy.
- The SWAS monitoring staff will develop TMDL monitoring plans for targeted watersheds by April of each year.
- The SWAS staff will ensure that TMDL monitoring data are entered into the appropriate electronic databases (including STORET).

5.5 NPS 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 an 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. Logistical considerations.

In 2009, the WB monitoring staff conducted monitoring at the sites listed in Table 5.2 in an effort to identify and report NPS “success stories.”

Long-term Goal:

5-15 The MDEQ, grantees, or contractors will measure the effectiveness of all CMI and Section 319 pass-through grant projects.

Short-term Goal:

5-16 The MDEQ staff will implement all of the monitoring commitments included in the 2004 *NPS Environmental Monitoring Strategy*, including the following, in accordance with a schedule developed annually by SWAS managers:

- The NPS monitoring coordinator and other meeting participants will consider NPS Program priorities and identify NPS effectiveness monitoring opportunities for MDEQ staff, grantees, or contractors during the annual discussion of monitoring needs for each targeted watershed, as prescribed in the strategy.
- The NPS monitoring coordinator will summarize meeting outcomes and identify NPS effectiveness monitoring needs to SWAS managers. This includes monitoring needed to supplement efforts of grantees.
- The SWAS managers will identify effectiveness monitoring projects that will be undertaken by MDEQ staff or contractors.
- The NPS Program staff (NPS monitoring coordinator or district staff) will provide descriptions of BMPs or NPS treatments to SWAS monitoring staff to assist with effectiveness design studies.
- The NPS monitoring coordinator will work with grantees and project administrators to develop effectiveness monitoring study designs. The NPS Unit Chief will approve QAPPs.
- The SWAS staff will ensure that project effectiveness monitoring data are entered into the appropriate electronic databases (including STORET).
- The NPS project administrators will ensure that grantees and contractors provide appropriate data in STORET-ready format.
- The NPS monitoring coordinator will use reports and annual updates to develop program reports such as the Annual NPS Program Report and revise the NPS Program Multi-Year Plan.
- The FOD staff will attempt 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.

5.6 Special NPS Effectiveness Monitoring Projects

The WB will look for opportunities to “showcase” the results of some NPS reduction efforts with effectiveness monitoring projects. The effort to identify “showcase” monitoring opportunities

could include relatively simple projects to identify and revisit NPS projects that were implemented a decade or more earlier in an effort to demonstrate improvements over time. Efforts could include more intensive studies to test new BMPs. In addition, efforts to “showcase” the results of NPS projects could include special long-term, intensive monitoring projects such as National Monitoring Program projects.

In the course of evaluating the effectiveness of selected NPS projects, the MDEQ also assesses whether BMP effectiveness studies qualify for the U.S. EPA’s Section 319 National Monitoring Program. The goal of this program is to support a small subset of watershed projects nationwide that meet a minimum set of project planning, implementation, monitoring, and evaluation requirements designed to lead to successful documentation of project effectiveness with respect to water quality protection or improvement. The MDEQ recently proposed the stamp sand remediation monitoring project for inclusion in the National Monitoring Program (Goal 5-21).

Long-term Goal:

5-17 The WB will look for opportunities to “showcase” the results of some NPS reduction efforts.

Short-term Goal:

5-18 Each year, the NPS monitoring coordinator will develop a list of potential success story projects to be monitored in that year. This list will include pre-BMP and post-BMP monitoring locations.

5-19 NPS staff will collaborate with MSU and the USDA, NRCS, to complete an assessment of the performance of low-cost filter mound BMPs for treating milkhouse waste at an unpermitted dairy farm. The final data report will be completed in 2010.

5-20 The following CREP monitoring activities will be performed:

- Heidelberg College will continue River Raisin water quality sampling.
- SWAS staff will continue sampling 15 stations in Saginaw Bay and in the River Raisin watershed, as part of the statewide water chemistry monitoring project.
- SWAS staff will conduct post-BMP (livestock exclusion) morphological and biological monitoring on the Sugar River.
- SWAS staff will continue compiling nitrate and turbidity regulatory data for the Blissfield and Deerfield drinking water intakes on the River Raisin to continue long-term trend analysis.

5-21 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 and Sleepy River.

Table 5.2. Potential “success story” projects monitored in 2009.

Location	Watershed	BMP(s)
Pre-BMP Monitoring		
Pearson Creek	Les Cheneaux tributaries	Road/stream crossing fix
Rochester Hills	Clinton River	Channel restoration
Post-BMP Monitoring		
West Branch Rifle River and Gamble Creek	Rifle River	Sand traps

5.7 Monitoring Tool Development and Assessment

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. The MDEQ’s LWMD staff have identified over 280 USGS gage stations with an appropriately long period of record, and 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. Two other tools currently recommended by the NPS Program are:

- The Bank Erosion Hazard Index; a field procedure for rapidly and quantitatively assessing the condition of stream banks.
- Tractive force calculations; a field procedure for qualitatively assessing the likely mobility of stream bed sediments.

Other tools, such as channel evolution models, excess shear stress calculations, and more

qualitative indicators of stream condition are also being evaluated.

In addition, the NPS Program will continue to assess existing tools such as the road stream crossing surveys. The road stream crossing survey protocol was developed to provide NPS Program staff and watershed groups a relatively simple tool to systematically identify NPS problems across an entire watershed or region. This tool has been utilized in Michigan for over five years with mixed results. The NPS Program will evaluate this program and determine whether or not the program should be modified or discontinued.

Finally, collecting quantitative macroinvertebrate community data would be useful for certain BMP effectiveness studies. The MDEQ's current protocol, Procedure 51, is a multi-habitat semi-quantitative assessment of macroinvertebrate community composition. A more quantitative procedure, focused on sampling the habitat feature(s) most impacted by certain NPS BMPs, like stream bank stabilization or road stream crossing repairs (usually riffles), will be evaluated by the WB.

Long-term Goals:

5-22 Continue to develop monitoring tools and provide technical support to NPS grantees, watershed groups, and other interested parties.

Short-term Goals:

5-23 In June 2007, the NPS monitoring coordinator posted the final data report on stream flashiness on the NPS Web site. The flashiness index data will be updated for all the current USGS gages every five years, starting in 2011.

Long-term Goal:

5-25 As time allows, the NPS monitoring coordinator and SWAS monitoring staff will assess the need for, and feasibility of, measuring stream geomorphic trends.

5-26 Train and otherwise provide guidance to NPS Program staff and stakeholders on the use and interpretation of hydrologic and geomorphic monitoring tools, and other monitoring techniques.

5-27 Continue to assess existing NPS monitoring tools and modify, enhance, or eliminate tools as appropriate.

Short-term Goal:

5-28 The NPS monitoring coordinator will lead an ad hoc committee of NPS district staff and SWAS monitoring staff to evaluate the utility of the road stream crossing surveys. The ad hoc committee will review the protocol including data collection, storage, and retrieval procedures; identify data uses; and make recommendations to the NPS Unit Chief regarding future uses of the protocol as well as modifications to the protocol (if any). The NPS Program will make revisions to the protocol prior to the 2010 field season.

CHAPTER 6: INFORMATION AND EDUCATION

The NPS Program's long-term goal for I&E outreach is raising public awareness of the extent of NPS threats to water quality and encouraging public involvement in efforts to protect water quality. The NPS Program will focus efforts to raise public awareness at the statewide, regional, and watershed scale. Also, the NPS Program will work to encourage changes in public behavior (such as support for local ordinances or changes in landscaping practices) to address NPS threats to water quality. Finally, the NPS Program seeks to measure these changes in awareness or behavior and use this information to evaluate program and project success.

Many people do not know that NPS problems exist, and many that do have little idea of its widespread nature or the significance of its impacts on Michigan's water bodies. Also, many people do not understand the impact of individual decisions, made on a daily basis, on the environment. The NPS Program will work to encourage awareness of NPS issues, which leads to interest, which invites questions that allow for opportunities for education.

Among people that are aware, many often do not know where to turn for guidance, technical support, or financial assistance to address NPS problems. For those that do know where to look, they often find the information they seek is scattered about in numerous places or organizations. Sometimes it is not clear which positions or actions agencies support. Furthermore, the evolving nature of NPS control results in some organizations implementing more advanced approaches, while abandoning less effective approaches that are still being widely implemented elsewhere. Therefore, the NPS Program will work to encourage information sharing between Michigan's stakeholders.

6.1 Raise Awareness on a Statewide and Regional Scale

The U.S. EPA, Region 5, has teamed with 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 is to create a toolkit for local governments, watershed groups, and other stakeholders to use to conduct social monitoring. This monitoring is an important part of efforts to target outreach towards the intended audience, and measure changes in attitudes regarding NPS pollution. The toolkit will include a spatial analysis tool with key demographic data; samples of surveys, samples of QAPPs, and themes or messages for watershed outreach. The U.S. EPA, Region 5, work group will also train state staff and grantees on social monitoring and outreach as part of the region-wide collaborative effort. The expected completion date of the toolkit and beginning of the training sessions is mid-2008.

MSU, as part of the Region 5 work group, is currently developing a social indicators data management and analysis (SIDMA) tool under a Section 319 pass-through grant from the MDEQ. This piece of the regional effort will be used to statistically analyze social monitoring data, compare watershed data among similar watersheds in Region 5, and provide demographic and other data for completing a social profile of the watershed. The expected completion date of the SIDMA is September 2010. MSU will maintain this system beyond the completion of the grant, for at least five years, allowing for continued access and updates to the SIDMA system.

The MDEQ will provide the spatial indicators database to all interested parties at the local and regional level including NPS grantees, local governments, watershed groups, and educational

institutions providing outreach for students. The MDEQ expects that all social monitoring funded with Section 319 grants will be conducted using the Region 5 work group's protocols.

Long-term Goals:

6-1 The WB will implement a statewide strategy to coordinate I&E outreach activities for WB programs. The objective is to raise public awareness of the extent of NPS threats to water quality and encourage public involvement in efforts to protect water quality.

6-2 The NPS Program will continue to communicate program successes and the benefits of improved water quality achieved through NPS pollution control.

Short-term Goals:

6-3 The NPS I&E coordinator will produce an annual report summarizing program successes by January 1 of each year. The audience for the report will be the general public and NPS Program stakeholders.

Long-term Goal:

6-4 The NPS Program will work in partnership with the U.S. EPA's, Region 5, social indicators work group to provide statewide, regional, and local measures for evaluating the effectiveness of educational efforts. The Region 5 work group will provide tools for evaluation.

Short-term Goals:

6-5 The NPS Unit will work with MSU to develop the SIDMA tool (via a Section 319 grant) for use by MDEQ grantees, storm water NPDES permittees, researchers, watershed organizations, MDEQ programs, and NPS partners in the U.S. EPA, Region 5. The expected completion date is September 2010.

6-6 The NPS Unit will continue to work in partnership with the U.S. EPA, Region 5, work group to use a social monitoring toolkit to help stakeholders collect, in a consistent manner, baseline information regarding the awareness of targeted audiences. The Region 5 social indicators work group developed guidance, surveys, and training for all of the Region 5 states. The NPS I&E Coordinator will continue to meet and provide input to the Region 5 work group. 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.

Long-term Goal:

6-7 The NPS Program will work to increase awareness of NPS issues and change public behavior at the watershed level. The NPS Program will work with local partners to identify the primary NPS pollutants and causes in a particular area, and determine where outreach activities are needed to address these pollutants. The NPS Program will identify the audience and determine their level of awareness and information needs.

Short-term Goals:

6-8 By March 30, 2010, the NPS Program will develop a social monitoring strategy that guides all social monitoring approaches and methods for use by MDEQ-funded projects.

6-10 The NPS Program provided a grant to measure changes in knowledge and understanding of NPS issues in the Grand Traverse Bay watershed. This project will be completed in 2009. Lessons learned will be evaluated and shared with other watershed groups via the NPS Web site, as appropriate, in early 2010.

As Time Allows:

6-11 WB districts, with assistance from the NPS Unit, will identify one watershed, or more as time allows, that was selected using the watershed prioritization process defined in Chapter 4, for targeting localized outreach to a key audience, devise a plan for outreach, and approach the key audience(s) with issue-specific information pieces that have been previously created and/or presented to statewide and local organizations. This outreach will be beyond the scope of current planning and implementation projects to help better inform locals of practices or other methods to reduce the threat from the local NPS issue.

6-12 WB district staff will work with NPS unit staff to evaluate the effectiveness of the targeted outreach activity undertaken by the program from Goal 6-11. Successful projects will be documented as program success stories.

6-13 The WB I&E coordinator will identify the various campaigns statewide (grant funded and self-sustaining) that are ongoing or proposed. NPS staff will host a meeting with the leaders of the various campaigns. This meeting will:

- a. Review the social monitoring conducted for each campaign.
- b. Look at aspects of each campaign such as target audience, message, distribution method and area, goals, and methods of assessment, if applicable.
- c. Use the available social monitoring information to determine commonalities in educational focus that will be effective.
- d. Assess what has been working and why.
- e. Identify approaches that will be helpful to each available campaign.
- f. Identify approaches that were determined to be unhelpful.

6.2 Ordinances for the Protection of Water Quality

The impacts of land use on water quality is well documented. In Michigan, most land use planning occurs at the local level. The NPS Program will place an emphasis on encouraging local support for the enactment and enforcement of ordinances for long-term protection of watersheds. The emphasis for these long-term measures is protecting water quality, wetlands, reducing nutrient runoff, preserving natural land use, and promoting buffer strips. These activities will be targeted to areas that are designated as impaired or to protect sensitive areas of the state. Establishing and maintaining environmentally friendly ordinances at the local level is an important part of the NPS Program's effort to ensure long-term protection of Michigan's watersheds.

Long-term Goal:

6-14 The MDEQ seeks the statewide enactment of laws to protect water quality in Michigan. The program seeks to encourage and support the efforts of local governments to enact and enforce ordinances for long-term protection of water quality in all watersheds of the state.

Short-term Goals:

6-15 In FY 2010, a priority in the RFP for pass-through grant projects will be for long-term protection activities (such as local ordinance development).

As Time Allows

6-16 NPS Staff will create presentations and present information to the Michigan Association of Counties, Michigan Municipal League, and Michigan Township Association on the benefits of long-term protection measures such as the development and implementation of ordinances to protect water quality. Staff will ensure that opportunities to team with other programs within the agency, specifically the Storm Water Program, is done as time and resources allow.

6-17 Additional outreach (based on Goal 6-16) to individual communities will be pursued by NPS Program staff on a case-by-case basis, consistent with the watershed targeting process outlined in Chapter 4, after initial presentation of information to the statewide interest groups. If the opportunity exists to strengthen local ordinances for water quality, NPS Unit and district staff will work with watershed groups and other interested parties to see them through the enactment of local ordinances.

6.3 Provide Information to Assist Stakeholders with Outreach Activities

The NPS Program will work to identify available information regarding outreach activities and make that information more readily accessible to stakeholders. Currently, pertinent information and resources are scattered about in various organizations and it is often difficult to find or to know what practices the NPS Program recommends. Many general I&E products can be obtained from numerous sources, including the MDEQ. The information most sought from the MDEQ is often specific to MDEQ programs or products tailored to Michigan applications. This information needs to be readily accessible, complete, accurate, and up-to-date.

Although local units of government will make the decisions about which technical guidance they choose to follow, the MDEQ should provide an annotated bibliography of the materials available. The bibliography should include notes on the strengths and weaknesses of the techniques presented, potential pit falls, and examples of where the documented techniques would be most effective.

The NPS Unit will maintain a Web page for publications and other information through the NPS Web site. The Web site will be updated annually for publishing additional information at the discretion of the NPS Program or as needed to meet program or partner needs. The NPS Program will continue to set aside a portion of the Section 319 grant to fund the update and printing of Michigan-specific I&E publications. The NPS Program will also look to provide stakeholders with relevant, up-to-date outreach publications and techniques as they become available.

Long-term Goal:

6-19 The NPS Program will maintain a multimedia collection of I&E outreach materials for distribution to watershed groups, grantees, and other stakeholders.

Short-term Goals:

6-20 Each fiscal year, WB staff will identify publications that are in need of an update, and will find the appropriate person (WB staff or grantee) to update the piece and print copies for distribution to the targeted audience as program resources and the Governor's Executive Directives allow.

6-21 The NPS Unit will create and promote a Web site for the dissemination of 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 I&E materials from around the state. The NPS Program will encourage stakeholders with Web sites to include a link to the MDEQ, NPS Web site.

6-22 The NPS Program staff in the central and district offices will facilitate the creation of one I&E success story, per district, per year. The success stories will be posted on the MDEQ's NPS Web site annually. Success stories could be instances where there is a documented increase in knowledge or change in behavior that positively impacts water quality, or where work on a project spurs others to follow up to increase knowledge and awareness of NPS pollution and water quality issues.

As Time Allows:

6-23 The NPS Program will create a list of guiding principles and program perspectives. These documents/fact sheets will focus on such topics as LID, ordinance development, green infrastructure, and I&E outreach techniques.

6.4 Special Outreach Campaigns

The need for targeted I&E outreach activities is noted throughout the program plan. Some of these activities are highlighted below:

Long-term Goals:

6-24 Develop targeted education/outreach process for road agencies. Efforts should be targeted to all road agencies operating within the state, at all levels (federal, state, county, and local), to show how to minimize pollution from transportation activities. There are many existing outlets for contacting these agencies and disseminating crucial information such as annual conferences held by the MDEQ, SESC Program; or LWMD, Transportation Review Program; and conferences, newsletters, and other modes of communication with every county road commission through the County Road Association of Michigan. Staff will ensure that opportunities to team with other programs within the agency, specifically the Storm Water Program, is done as time and resources allow.

6-27 Develop a mechanism for efficient information sharing between MDEQ programs and stakeholders regarding NPS issues.

As Time Allows:

6-28 The I&E and Watershed Committees will investigate and make a recommendation to the NPS Unit regarding the feasibility and potential logistics of a NPS Program electronic newsletter for the purpose of sharing information with grantees and other watershed stakeholders (e.g.,

NPS pollutants and impacts, announcements, available tools, grants, or other stakeholder watershed success stories).

CHAPTER 7: FUNDING

The NPS Program assists local stakeholders by helping to create a collaborative framework to address their watershed threats and impairments. Historically, the NPS Program has either provided funding sources or enabled locals to leverage funding in the following manner:

7.1 Overview of Michigan's NPS Funding Sources

Since 1988, the MDEQ has utilized an annual award from the U.S. EPA under the CWA, Section 319, to fund Michigan's NPS Program. This is the primary source of funding for most state agencies and constitutes approximately \$6M annually for Michigan. With this, Michigan funds NPS staff throughout the state to provide technical and administrative support to the program and its partners and grantees. Approximately 50 percent of the Section 319 grant funds are provided competitively to substate 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 watershed management plans.

Some federal CWA water quality planning funds, under Sections 604(b) and 205(j), are also used annually by the NPS Program. This funding, generally about \$200,000, is made available to the same entities as for Section 319 funds. This funding is offered via an RFP combined with Section 319 funds and used to fund one or two watershed planning projects annually.

Complimenting 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. As of February 2007, 79 grants totaling \$31.8 million have been awarded. The 33 grants that have closed collectively resulted in annual pollutant reductions of 80,114 tons of sediment, 78,974 pounds of phosphorus, and 185,385 pounds of nitrogen. Practices installed include: 28 livestock crossings; 22 alternate watering sources; 2 animal waste facilities; 6 grade stabilization structures; 16 grassed waterways; 180 catch basin inserts; and the stabilization of 22 recreational access sites, 81 road stream crossings, and 224 stream banks. In addition, the NPS Program has installed 2,235 acres of permanent conservation easements (not counting CREP easements, discussed below), which protect in perpetuity riparian corridors and wetlands.

The CMI also included several types of grants under a \$90 million Clean Water Fund, including grants to: 1) implement recommendations in watershed plans that emphasize the protection of high quality waters; 2) implement the water quality recommendations in RAPs and LaMPs; 3) implement watershed plans developed under a watershed-based municipal storm water permit; and 4) identify and/or correct failing on-site septic systems. The Michigan NPS Program staff administered all of these grants except the grants to identify failing on-site wastewater treatment systems. Since most of these CMI grants contained NPS controls, staff coordinated CMI funding with other NPS of funding. To date, the funds for each of these grant programs has been awarded, except about \$1 million for implementing watershed plans developed under a watershed-based MS4 permit. These funds were included in a FY 2007 RFP.

Each of the Michigan NPS pollution control grants requires matching funds as specified in the RFP. For example, watershed planning grants require a 10 percent minimum match, while watershed implementation projects require 25 percent minimum match for most projects, with conservation easements requiring a 50 percent match during the most recent RFPs. 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.

The CMI also included \$5 million for the CREP. This program offered enhanced soil rental payments and cost-share rates to farmers to implement agricultural conservation practices. The MDEQ ensured that the \$5 million was targeted to practices that addressed water quality such as riparian buffer strips, filter strips, wetland restorations, and wind breaks. As of August 2006, CMI funds, in addition to other state and federal funds, have implemented over 2,000 acres of riparian buffer strips, 33,500 acres of filter strips, 17,300 acres of wetland restorations, and 1,700 acres of windbreaks. When the numerous CMI and Section 319 CREP easement projects are fully implemented, over 4,000 acres of CREP practices will be permanently protected.

Long-term Goals:

7-1 The NPS Program will continue to administer a pass-through grants program with the goal of providing support to substate 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 watershed management plans.

Short-term Goals:

7-2 By August 30 of each year, NPS Staff will develop watershed management plan development and implementation priorities consistent with the 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.

7-3 By October 1 of each year, the NPS Program will release a pass-through grant RFP using the pass-through grant priorities consistent with the NPS Program Plan as well as applicable Section 319 and CMI funding restrictions.

7-4 The NPS Program staff will provide ongoing technical and other assistance to grant applicants.

7-5 The NPS Program staff will review proposals each year and select the projects that best meet the RFP priorities.

7-6 The NPS Program will administer pass-through grants. This includes administration of the projects listed in Appendix 3. The NPS Program staff will do the following tasks on an ongoing basis:

- The NPS project administrators provide ongoing assistance to each grantee to ensure that projects are successfully implemented.
- The NPS Program engineers will provide ongoing technical assistance, review, and approve (as appropriate) all BMP plans upon the request of grantees.
- The NPS Monitoring Coordinator will provide ongoing 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 I&E Coordinator will provide ongoing technical assistance with the development and implementation of 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 engineers, monitoring coordinator, or LWMD hydrologist will provide ongoing technical assistance in the area of hydrology and stream morphology to grantees.
- The NPS Program district staff will provide ongoing technical assistance to grantees upon the request of the grantee or project administrators.
- 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.

7.2 Other Funds Available to Support NPS Pollution Control

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 watershed management plan and Michigan's Section 319 Management Plan submitted to the U.S. EPA. 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 Environmental Quality Incentives Program dollars.

Long-term Goal:

7-7 The NPS Program will look for opportunities to use NPS SRF loans to eliminate or reduce NPS sources of pollution.

7.3 Nonsection 319 Federal Funds to Support Pass-Through Grants

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. Several of Michigan's NPS projects in the northern part of the state, in particular, involved stabilizing eroding road stream crossings, and where MDOT funds were awarded to one of the NPS Program's grantees, NPS staff worked with all of the partners to ensure that the funds complimented each other.

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 over \$16 million in Environmental Quality Incentive Program funds for Michigan; annual involvement in the

selection of watersheds to receive Conservation Security Program funding; and input into the Wetland Reserve and Conservation Reserve Programs.

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.

Long-term Goal:

7-8 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 Goals:

7-9 The WB will continue to coordinate efforts to provide RFP priorities for federal pass-through grant programs (such as the Environmental Quality Incentives Program). The recommended RFP priorities will be consistent with the NPS Program's priorities related to controlling NPS pollution to protect or restore water quality.

7-10 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.

7-11 The NPS Program staff will continue to review applications for state grants such as the CMI local monitoring and MiCorps grants.

7.4 Local Funds for Sustaining Watershed Organizations

Watershed organizations struggle to maintain sustainable funding for staff that solely focus on implementing watershed plans, providing technical support to municipalities, and providing I&E 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 work to 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 www.cmif.org.

Long-term Goal:

7-12 The NPS Program will explore options for long-term financial sustainability of the program both at the state and local level. These options include coordinating, integrating, and leveraging funding opportunities from environmental, social, and economic sources.

7-13 The NPS Program will work to improve relationships with foundations, both locally and at the statewide level.

Short-term Goals:

7-14 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.

7-15 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.

As time allows:

7-17 By January 31, 2010, NPS Staff will purchase and explore the directory of foundations and look for opportunities to influence the priorities and selection criteria of foundations, and where feasible, offer to help in proposal selection.

7.5 Other Grant Programs Administered by the MDEQ

In 2005, the MDEQ established a Grants Facilitation Team to better coordinate grant program administration throughout the department. The team consists of a representative of each of the department's grants programs, as well as members of the MDOT, MDNR, and MDA. The team is led by the NPS Grants Program Manager, which increases leveraging opportunities for the NPS Program. The team focused the first year of its efforts on developing common policies and procedures for grant administration as well as a template boilerplate that has common language for all grant contracts in the MDEQ. The team will also increase information sharing between programs, which over time will help local entities better leverage state grant program resources.

Long-term Goals:

7-18 The NPS Program will continue to look for opportunities to coordinate funding with other pass-through grant programs within the MDEQ.

7-19 Evaluate the grant administrative requirements for Section 319 and CMI-funded grants on a periodic basis to verify that they are appropriate for both staff and grantees given the requirements of similar grant-funded programs within the MDEQ.

Short-term Goals:

7-21 On an ongoing basis, NPS Staff will use the MDEQ's Grants Facilitation Team to review the grant administration requirements for Section 319 and CMI-funded grants relative to other MDEQ pass-through grant programs in the MDEQ.

7-22 NPS staff will continue to improve the NPS subgrant project selection process by reviewing the process on an annual basis and incorporating recommended changes as needed.

7.6 New Funding Opportunities

The NPS Program will continue to look for opportunities to find new sources of funds to support NPS pollution control projects. These opportunities could include the following:

- **User Fees:** Consider establishing fees on materials that have the potential to impact water quality, including phosphorous fertilizer and impervious materials (e.g., shingles,

asphalt, concrete, etc.) to fund watershed organizations to develop and implement watershed management plans.

- **Business Opportunities:** (1) Explore possibilities to work in partnership with Michigan businesses. For example, the Gun Lake Building and Supply donates \$1 to the Gun Lake Association when No/Low phosphorous fertilizer is purchased. (2) Consider developing a relationship with a “big box” company to install green roofs and other storm water control measures.
- **Check-off on State Income Tax:** Consider providing opportunities for citizens to support watershed protection with donations made via income tax forms.
- **Other Grants:** Identify other pass-through grant programs with similar objectives and work in partnership with those programs to address NPS pollution.

Long-term Goal:

7-23 The NPS Program will continue to look for new sources of funds to support NPS pollution control projects.

As Time Allows:

7-24 The NPS Program will look for opportunities to update the NPS Grants Administration Manual.

7-25 The NPS Program will obtain success stories from other states regarding the use of NPS SRF loans. These success stories will be shared with potential NPS SRF applicants.

7-26 NPS staff will compile a summary of examples of where foundations partnering with the MDEQ NPS Program has benefited both parties.

7-27 Develop a statewide collaborative funding strategy to enhance, replace, and match Section 319 and CMI funds.

CHAPTER 8: PARTNERSHIPS

It often takes a coordinated, joint effort of multiple organizations working together over the long term to address NPS problems. In many cases, the bulk of the protection or restoration work is implemented by local organizations. A key concept of the NPS Program is working with others to achieve water quality objectives.

The Michigan NPS Program works in partnership with federal and state agencies, universities, regional planning councils, local units of government, local organizations, watershed groups, private sector entities, and other local stakeholder groups to prevent and correct NPS pollution through a variety of activities including the following:

- Coordinate funding and technical assistance in restoration efforts.
- Develop and distribute I&E material to increase public awareness of NPS issues.
- Provide training on technical issues related to the identification and mitigation of NPS issues.
- Inventory NPS pollution sources and quantify pollutant loads.
- Monitor water quality and assess NPS pollution impacts.
- Assist with BMP implementation.
- Develop and evaluate innovative approach to mitigate NPS pollution.
- Provide funding for projects that demonstrate methods of NPS control.

The connection between land use and NPS pollution is well established. In Michigan, local units of government have authority over land use decisions, which makes developing and maintaining strong partnerships with these entities critical to protecting and restoring water quality. An important component of Michigan's NPS Program is strengthening partnerships with the Michigan Association of Counties, Michigan Township Association, MACDC, Michigan Planning Association, and the various Michigan Councils of Government to raise the awareness and provide technical assistance on preventing and mitigating NPS pollution.

Many long- and short-term goals related to working in partnership with specific stakeholders on individual issues have already been presented in the preceding chapters. However, the following partnership opportunities are broader and cover multiple stakeholder or NPS issues.

Long-term Goal:

8-1 Look for opportunities to enhance cooperation and partnerships with watershed stakeholders through: Great Lakes basin regional efforts such as the Great Lakes Regional Collaboration and the Cooperative States Research, Extension, and Education Service-Great Lakes Water Quality Team; statewide stakeholders such as the MDOT, MDA, MDNR, and the MSU Land Use Policy Team; and local stakeholders such as regional planning commissions, local watershed groups, and local units of government.

8-2 Continue to partner with the LWMD to integrate wetlands protection and restoration, and hydrology studies into watershed planning and implementation projects; particularly with respect to nutrient and hydrology issues.

Short-term Goal:

8-3 Michigan's NPS Program will partner with the MDEQ, LWMD's Wetland and Submerged

Lands Unit staff to conduct a GIS-based assessment of wetland functions statewide with the first priority placed on watersheds with Section 319 pass-through grants to develop watershed management plans.

Long-term Goal:

8-4 Promote the establishment of a NPS statewide government committee that will be charged to develop a statewide NPS pollution prevention implementation strategy for the various departments of the state of Michigan. This committee would work to engage state government in implementing a Michigan NPS approach, especially in areas of growth management and sustainability of natural resources in addition to specific pollution prevention activities.

CHAPTER 9: COMPLIANCE AND ENFORCEMENT

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.

Long-term Goals:

9-1 Target compliance and enforcement activities as appropriate to achieve NPS pollution abatement.

9-2 Coordinate with other regulatory programs as appropriate to increase compliance and enforcement effectiveness.

- Better coordinate the WB wet weather programs, and jointly identify and develop wet weather pollution prevention guidance or tools.
- Explore and identify opportunities to coordinate regulatory activities with other programs such as Act 451, Parts 31, 91, 301, and 303 programs.

9-3 Work jointly with compliance staff in the FOD on special initiatives, as defined in the WB annual strategic plan, to target a certain area (e.g., sector or problem category) for focused, intense work.

9-4 Focus NPS compliance and enforcement activities on a watershed basis using the watershed prioritization process described in Chapter 4.

Short-term Goal:

9-5 FOD 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.

Long-term Goals:

9-6 Increase WB efforts to identify significant contributors of storm water and bring them under the coverage of NPDES permits in order to address the storm water problems.

9-7 The NPS Program will lead efforts to develop general guidance that can be used to complement the MDEQ's Supplemental Environmental Projects policy and facilitate the selection of projects to develop and implement watershed management plans.

Short-term Goal:

9-8 The NPS Unit will work with the WB's Enforcement Unit to develop general guidance to complement the MDEQ's Supplemental Environmental Projects policy. The general guidance will identify the goals of the NPS Program, describe the watershed management planning process, describe the restoration and protection goals that are typically included in a watershed

management plan, and list the types of local stakeholders often involved in implementation of watershed management plans. The general guidance will be used as a tool by NPS Program staff or enforcement staff consistent with the MDEQ's policy.

CHAPTER 10: STAFF TRAINING

The NPS Program trains staff to ensure that they are capable of providing expert guidance regarding the development and implementation of watershed management plans; 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 long- and short-term goals regarding specific training opportunities are presented in the preceding chapters. For example, Section 3.3.1 describes long- and short-term goals related to providing stream morphology training to staff. However, the following goals are more general and intended to ensure that staff are well-rounded experts in a variety of topics related to developing and implementing watershed management plans.

Long-term Goal:

10-1 The NPS Program staff are well trained and capable of providing expert guidance in the watershed approach to addressing NPS water quality issues. Specific training topic areas should include: watershed planning; pollutant impacts, sources, loads, and load reductions; hydrology; and land use (e.g., LID), geomorphology, and stream restoration.

10-2: 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).

10-3 As the NPS Program continues to develop tools for use in watershed plan development and implementation, provide training annually, or as needed, for program staff on the use of these technical tools to ensure that staff are skilled in appropriate technical assistance topics. (Examples of tools that may be developed for which staff training would be needed include extended detention analysis, regional reference curves, and GIS-based applications).

Short-term Goals:

10-4 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.

10-5 Each new NPS staff person, and existing untrained staff, receive formal meeting facilitation training within two years.

10-6 By January 1, 2010, the NPS Unit Chief will designate someone in the NPS Program as the NPS Program technical expert and staff resource on land use, zoning, and ordinances.

10-7 By January 1, 2010, the NPS Program expert on land use planning, zoning, and ordinances will coordinate with the NPS I&E coordinator to hold a training workshop for NPS staff on these issues.

10-8 By January 1, 2010, the NPS Program Committee will develop program training plans, tools, and materials for new and existing staff to ensure that they receive the necessary knowledge and skills to successfully perform their jobs. Training plans, tools, and materials developed will be aimed at building program knowledge, implementing the program consistently, and producing high quality work products.

10-9 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.

As Time Allows:

10-10 A NPS Program and issue primer “checklist” (with descriptive guidance) is developed by NPS Program district and I&E staff. The checklist is to be used as a guide by NPS staff mentors to make sure all key NPS Program topics are addressed initially with new staff.

10-11 All NPS staff have the opportunity and 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.

APPENDIX 1: WATER PROTECTION PROGRAMS

The MDEQ has a number of 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 chapter provides descriptions of Michigan's water quality protection programs and highlights their special initiatives and costs/benefits.

Abandoned Well Management

Unplugged abandoned wells threaten the quality of drinking water obtained from privately owned and community public drinking water supply wells. It is estimated that as many as two million unplugged abandoned water wells exist in Michigan. The WB has implemented a comprehensive Abandoned Well Management Program to coordinate statewide abandoned well locations 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.

In 2005, approximately 9,400 abandoned wells were plugged around the state. Michigan now ranks second in the nation for plugging the greatest number of abandoned wells annually. Approximately 75,000 abandoned wells have been plugged since 1998. These plugging efforts are the result of Abandoned Well Management Program training efforts and enforcement support provided by the WB to each of Michigan's 44 local health departments under their individual environmental health services contracts.

The WB 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. As a result of this program, more than 600 abandoned wells have been plugged to date and more are expected.

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, local health department staff, environmental consultants, and other state of Michigan departments.

The MDA administers a cost share grants program (Farm-a-Syst) that can pay up to 90 percent of the cost for plugging abandoned wells on agricultural lands. To date, over 3,000 abandoned wells have been plugged under this MDA program.

Local health departments 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 WB conducts compliance and enforcement actions in cooperation with the Office of Criminal Investigations, the Michigan Department of

Attorney General, and local health departments. Many successful enforcement actions have been taken in recent years.

Beach Protection

Local health departments have the authority to test and otherwise evaluate water quality at public beaches to determine whether the water is safe for swimming. They also have the authority to close public beaches if the water is considered unsafe for recreational activities. Signs are posted at public beaches stating whether or not the water has been tested for *E. coli*. Beach monitoring results and swimming advisories are made available to the public by the local health departments via the MDEQ's beach monitoring Web site (<http://www.deq.state.mi.us/beach>). Since 2000, the MDEQ has awarded grants to local health departments and other nonprofit organizations 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 U.S. EPA to award grants to eligible states, territories, tribes, and local governments to support microbiological monitoring of coastal recreation waters, including the Great Lakes. BEACH Act funds can also be used to support the development and implementation of programs to notify the public of the potential exposure to disease-causing microorganisms in coastal recreational waters.

The MDEQ awarded CMI grants totaling approximately \$506,000 from 2000-2004 for inland and Great Lakes beach monitoring; and BEACH Act funds of approximately \$853,436 for Great Lakes beach monitoring from 2002-2004.

Biosolids

The treatment of municipal wastewater generates a residue called biosolids. Biosolids may be disposed of through incineration or landfilling, or they may be recycled. Because biosolids contain nutrients and can therefore have a beneficial use as fertilizer or soil conditioner, recycling often is more effective than incineration or landfilling. The MDEQ encourages the use of biosolids to enhance agricultural and silvicultural production in Michigan. However, if biosolids are not properly handled and enter surface water or groundwater, their associated chemical character could severely degrade water quality. To prevent such problems, the land application of biosolids is a regulated activity.

Under federal regulations, criteria for biosolids management have been established. The 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 district staff inspect the facilities generating the biosolids and the land application sites. In 2005, inspections were made at 174 facilities and their related land application fields.

Coastal Management

The Coastal Zone Management Act, originally passed in 1972, enables coastal states, including Great Lakes states, to develop a Coastal Management Program (CMP) to improve protection of sensitive shoreline resources, identify coastal areas appropriate for development, designate areas hazardous to development, and improve public access to the coastline. Michigan was one of the first states to have its CMP approved in 1978. Through Michigan's CMP, the MDEQ

provides financial and technical assistance to local units of government to address shoreline issues and improve their coastal resources.

A number of water quality protection projects have been funded in recent years by CMP grants, including:

- A three-year Michigan Natural Features Inventory project to survey Lake Michigan, Lake Huron, Lake Erie, and Lake St. Clair coastal wetlands, and identify areas that are critical breeding habitats for wetland birds (\$117,000).
- The Conservation Resource Alliance Manistee Watershed River Care project, which reduced sediment inputs to the Manistee River and Bear Creek through addressing eroding banks and road stream crossings (\$35,000).
- Wetland inventories for two townships in the Clinton River watershed (\$27,500).
- The Clinton River watershed storm water public education program (\$28,500).
- Restoration/stabilization of 1,900 feet of streambank at the mouth of the Tahquamenon River in Tahquamenon Falls State Park (\$11,000).
- An MDEQ project to map historic mineral wells in Bay County and assess the potential for groundwater contamination (\$30,000).

Community Water Supply

The MDEQ oversees approximately 1,470 community water systems that furnish drinking water year-round to residential populations of 25 or more, to ensure that the U.S. EPA's minimum standards for safe drinking water and Michigan Safe Drinking Water Act, 1976 PA 399, as amended requirements are met. Over the last decade, 99 percent or more of the population have been served by community water supplies meeting all health standards. Since 1998, the Drinking Water Revolving Loan Fund has committed over \$381 million in low-interest loans for 126 projects designed to protect community water supply systems; 77 of which have been completed.

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. MDEQ staff 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. To date, the MDEQ has used CMI funds for the remedial investigation of contaminated sediments in Deer Lake, the Detroit River, Muskegon Lake, the River Raisin, and White Lake. The MDEQ has also used CMI funds for the remediation of contaminated sediments in White Lake, the Detroit River, and Muskegon Lake. In September 2003, the MDEQ completed the White Lake Tannery Bay contaminated sediment remediation. Approximately 85,000 cubic yards of sediment contaminated with tannery wastes, including hides, hair, arsenic, and chromium, were removed. In September 2004, the MDEQ used CMI funds to provide the 35 percent nonfederal match and leverage Great Lakes Legacy Act federal funds for the remediation of contaminated sediments in the Black Lagoon of the Trenton Channel in the Detroit River. This remediation was completed in November 2005 and resulted in the removal of approximately 115,000 cubic yards of sediment contaminated with metals, including mercury, as well as PCBs and oil and grease. Additional sediment remediation efforts have occurred or are ongoing in the Iron River, Pine River/Horse Creek, Saginaw River, South Branch Black River, and Wolf Creek.

Drinking Water Contamination Investigation

The MDEQ assists local health departments in conducting drinking water quality investigations in areas of known or suspected environmental contamination. Such technical assistance may involve monitoring design, analytical support, toxicological assessment, and/or health advisory notice development.

The MDEQ is also responsible for administering drinking water replacement activities. Administration is primarily accomplished through contracts awarded to local units of government and/or private well drillers to extend community water lines and to replace contaminated water wells. Provision of bottled water, installation of treatment devices, and well abandonment is also addressed through this program.

The MDEQ also administers a statewide contract to monitor drinking water quality in wells adjacent to sites of environmental contamination. Over 2,400 drinking water wells at 344 sites are monitored at an average annual cost of over \$600,000. This contract is also used to replace contaminated water wells. Contaminated wells are replaced with water wells drilled to a deeper, protected aquifer, or the homes are connected to community water that is extended into the area. Contracts totaling \$1,518,541 and \$2,253,060 were administered in 2004 and 2005, respectively, to replace wells. These projects will address water supply needs for over 1,500 homes and businesses.

Enforcement

The MDEQ, WB, Enforcement Unit, is responsible for conducting escalated enforcement actions taken by the WB. Such actions are conducted in response to violations of state water pollution control statutes and rules, surface water discharge permits, and administrative or judicial orders. Enforcement Program goals are to bring the entity into compliance as quickly as possible, to restore any natural resource damages caused by the violation, to assess appropriate penalties, to eliminate financial gain that may have been realized as a result of noncompliance, and to drive improvements in water quality. The Enforcement Unit serves as the WB's liaison with the Michigan Department of Attorney General and also works with the U.S. EPA and the U.S. Department of Justice on joint state/federal enforcement cases.

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. In 2003 and 2004, more than \$1 million was collected as a result of enforcement actions. This included approximately \$690,000 for civil penalties, \$260,000 for supplemental environmental projects, and \$115,000 for cost reimbursement. Enforcement actions were taken throughout the state, with multiple actions taken in the Lime Lake watershed (Hillsdale County) and the Rouge River watershed. Groundwater, storm water, and drinking water violations were frequent problems addressed by the Enforcement Unit.

Environmental Health

Working closely with local health departments, the MDEQ protects public health and the environment through administration of regulatory programs dealing with manufactured housing communities, campgrounds, and public swimming pools. The MDEQ also assures that suitable site conditions are present for proposed residential or commercial developments dependent on individual on-site wastewater treatment systems and wells, and regulates the proper collection and disposal of wastes by septic tank pump and haul operators. These efforts directly protect approximately 300,000 residents at 1,100 manufactured housing communities, 1 million campers at 1,200 campgrounds, and 5 million public swimming pool users at 5,300 public swimming pools. Approximately 960 preliminary subdivision plats or condominium proposals are evaluated each year for suitability of on-site water supply and sewage disposal.

Great Lakes

The Great Lakes form a portion of the international boundary between the U.S. and Canada, and both countries have jurisdiction over their use. The first 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 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 amending the 1978 GLWQA, the U.S. 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. Two 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 and the Detroit River, St. Clair River, and St. Marys River are binational AOCs. The later AOCs are managed jointly by a binational governance structure created under the Four Agency Letter of Commitment (also called the Four Agency Agreement) that was signed on April 17, 1998, by Environment Canada, U.S. EPA, MDEQ, and Ontario Ministry of the Environment. AOCs are discussed in more detail in Chapter 4.

The 1987 protocol called for cleanup of the AOCs through the development of 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 Areas of Concern section under the Great Lakes, or from the Michigan Statewide Public Advisory Council at <http://www.glc.org/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 Areas of Concern section under Great Lakes.

The 1987 protocol required the development and implementation of LaMPs 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 U.S. EPA, in cooperation with other government and nongovernment agencies, has developed LaMPs for Lake Erie, Lake Michigan, and Lake 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 are updated biennially.

A LaMP has not yet been developed for Lake Huron. Instead, the MDEQ, U.S. EPA, Environment Canada, Ontario Ministry of the Environment, and Ontario Ministry of Natural Resources have formed the core of a Lake Huron Binational Partnership to coordinate environmental activities in the Lake Huron basin. A flexible membership is being promoted that is inclusive of other agencies and levels of government, tribes, nongovernment organizations, and the public on an issue-by-issue basis. The group developed a Lake Huron Binational Partnership Action Plan and updates it biennially on the same schedule as the LaMPs.

SBCI

The SBCI is a collaboration between the counties of Arenac, Bay, Huron, Iosco, Midland, Saginaw and Tuscola, and partnering with the MDEQ, MDA, and other regional, state, and federal agencies to develop and implement a comprehensive approach to promoting environmentally sound economic development and resource restoration in the Saginaw Bay coastal area. The goals of the SBCI include:

- Enhancing Tourism.
- Improving Fisheries.
- Understanding the algae (muck) problem, including evaluating potential human health risks.
- Protecting high quality coastal wetlands.
- Increasing access to the Saginaw Bay.
- Controlling Phragmites.
- Implementing the Kawkawlin River Watershed Initiative.
- Enhancing the Saginaw River corridor.

In March 2008, the SBCI formed a phosphorus committee to develop recommended next steps that could be taken that would result in phosphorus reductions to the Saginaw Bay. In June 2009, the phosphorus committee identified over-arching needs regarding further evaluation of phosphorus impacts on Saginaw Bay as well as recommendations for phosphorus reduction strategies in three major areas: agricultural phosphorus pollution prevention, storm water, and point sources.

GLRI

To accelerate the restoration and protection of the Great Lakes, the FY 2010 budget includes funding for a new 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 database to increase permitting effectiveness, section procedure updates to consolidate and streamline groundwater permitting procedures, development and implementation of the Groundwater Expired Permit Initiative to address permits that expired prior to March 1, 2005, 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 U.S. EPA approved Michigan's pretreatment program and formally delegated Industrial Pretreatment Program (IPP) authority to Michigan. To assure that pollutant discharges are controlled, many municipalities have been required to develop and implement local IPPs as a condition of their NPDES permit. Michigan operates under a two-tiered system: municipalities subject to IPP regulation with design flows greater than five million gallons per day must develop a federal local IPP, while municipalities subject to IPP regulation with design flows less than or equal to five million gallons per day must develop a Michigan local IPP. Michigan currently has 34 federal IPPs and 58 Michigan IPPs.

Municipalities developing IPPs are required to submit them to the MDEQ, WB, for review and approval. Subsequent changes to an approved local IPP, as well as periodic reports of local program operations, must also be submitted for review. MDEQ field staff conduct periodic inspections of local IPPs 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 Permit Compliance System database.

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 or operating a marina, interfering with natural flow of water, or connecting a ditch or canal to an inland lake or stream.

The following is a partial list of the most common projects associated with inland lakes and streams regulated under Part 301, Inland Lakes and Streams, of the NREPA. Other types of activities may also require permits.

- **Shore Protection** - Construction of any type of shore stabilization structure such as a sea wall, bulkhead, revetment, etc., at or below the ordinary high water mark of the lake or stream requires a permit. The MDEQ recommends the use of rock riprap for shore protection because rock provides better habitat for fish, reptiles, and aquatic insects.
- **Permanent Docks or Permanent Boat Hoists** - Permanent docks or boat hoists that are left in the lake year-round require a permit. Seasonal docks and hoists do not require a permit if they are for private, noncommercial use by a landowner, do not unreasonably interfere with the use of the water by others, and do not interfere with water flow.
- **Beach Sanding** - Placement of sand, pea stone, or other clean fill below the water line requires a permit. A reasonable amount of sand may be placed landward of the water line without a permit as long as the sand does not shift the location of the existing ordinary high water mark or the shoreline contour. The sand cannot be placed in a wetland.
- **Dredging or Excavation** - Any dredging below the ordinary high water mark of a lake or stream requires a permit. Dredging of a pond within 500 feet of a lake or stream also requires a permit. Excavation on the upland (dry land) within 500 feet of a lake or stream that does not extend below the water table does not require a permit from the MDEQ. However, a soil erosion permit is required from the county for this activity. A permit is needed for any excavation where the purpose is ultimate connection with an existing lake or stream.
- **Michigan Marinas Pollution Prevention Program** - The mission of the Michigan Marinas Pollution Prevention Program is to promote the voluntary adoption of measures that lead to reductions or eliminations in pollutants from marinas, recreational boats, and public access areas.

Michigan Turfgrass Environmental Stewardship Program

The Michigan Turfgrass Environmental Stewardship Program was launched in June 1998. The program is intended to organize efforts of the turfgrass industry, state agencies, MSU, and environmental advocacy groups to advance the environmental stewardship of the turfgrass industry and to recognize environmental achievements. The program was developed at MSU with support from the Michigan Turfgrass Foundation, Golf Association of Michigan, MDEQ, and MDA. Over the past seven years, the Michigan Groundwater Stewardship Program has provided the base funding to develop 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

U.S. EPA delegated the program to Michigan, 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. Under this approach, all of the permits in each individual watershed expire and are reissued in the same year. This 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.

The MDEQ was instrumental in amending the NREPA in 2004 to establish NPDES permit fees to assist in funding the NPDES Program. A total of 390 NPDES permits were issued in FY 2005, excluding storm water permits.

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. Currently, there are 45 NPDES permits that require implementation of the community's individual Long-term CSO Control Program to ultimately eliminate or provide adequate treatment of the overflows to comply with WQS at times of discharge.

Permits for regulated storm water discharges are also processed and issued by the MDEQ under the NPDES. 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 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.

The MDEQ uses two types of general permits for industrial storm water discharges. The standard permit, used by the majority of dischargers, requires the permittee to have a certified storm water operator and develop a Storm Water Pollution Prevention Plan. The deluxe storm water general permit is similar to the standard permit but also requires some monitoring of the storm water discharge. The latter is used for sites with secondary containment structures and sites that have environmental contamination. Industrial general permits and certificates of coverage are reissued on a five-year rotating watershed basis.

Water Bureau Significant Contributor Designation

The WB has developed a "Significant Contributor Designations for Storm Water" procedure (WB-03-027) and a "Designations for Small or Medium Concentrated Animal Feeding

Operation” Procedure (WB-017). These procedures are intended to provide a framework for making consistent decisions regarding the need for obtaining an NPDES permit to address storm water discharges or discharges from animal feeding operations.

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 local health departments.

The Septage Program is fully supported by fees as a result of recent amendments to the septage legislation. Two additional staff were hired in 2005, bringing the total number of full-time equivalents in the program to three. Continuing education hours are now required of septage firms, and a prescribed number of education hours are needed to renew septage licenses. The additional staff has also allowed the MDEQ to step up enforcement efforts to ensure program compliance.

SESC

The SESC Program is administered under the authority of Part 91, SESC, of the NREPA. The purpose of Part 91 is to prevent soil erosion and to protect the waters of the state from sedimentation. A permit is required for any earth change that disturbs one or more acres of land OR that is within 500 feet of a lake or stream. Plowing and tilling for crop production and integral activities associated with logging and mining do not require permits. Access roads leading to or from a logging area, and ancillary and support activities associated with logging and mining, are subject to permits. Whether or not a permit is required, the landowner is responsible for preventing off-site sedimentation. Activities that result in sedimentation to the waters of the state are a violation of Part 91 and are subject to enforcement actions by the state of Michigan.

Part 91 is administered and enforced by 324 state, county, and municipal agencies with oversight by the MDEQ. The 83 counties in Michigan are mandated by statute to administer and enforce Part 91. In addition, 241 state and municipal agencies elected to administer their own programs.

The MDEQ’s major responsibilities are to train staff 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. In 2004, the MDEQ provided training to 641 individuals responsible for administering and enforcing Part 91 for the various governmental agencies. A total of 524 individuals completed a 2-day classroom training course and passed a comprehensive final exam. The remaining 117 individuals completed a self-study course and passed the same comprehensive exam given to the classroom participants.

Program performance audits were conducted on 63 agencies during 2004. Of those agencies, 48 were either satisfactorily administering their SESC programs or made the necessary improvements to be given an approved rating. Fifteen small municipal programs could not be approved by the MDEQ and, subsequently, those municipalities lost their authority to administer

Part 91. When a municipal agency loses its authority, the county automatically assumes jurisdiction over all future projects in that area.

Source Water Assessment

The reauthorization of the Safe Drinking Water Act requires federal guidance and defines state requirements for a Source Water Assessment Program. The Safe Drinking Water Act 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 program development. Michigan's Source Water Assessment Program was approved by the U.S. EPA 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 U.S. EPA in December 2004. The MDEQ also continues to encourage surface water suppliers to plan and implement protection activities. Ira Township in St. Clair County is the first community to receive state approval for their Source Water Intake Protection Program.

The U.S. EPA has not yet made grant dollars available for surface water supplies to implement source water protection activities. However, to encourage source water protection, the MDEQ developed guidance material for development of a Surface Water Intake Protection Program and provides 100 priority points for Drinking Water Revolving Fund loans to a community that receives approval of a Surface Water Intake Protection Program.

Wellhead Protection

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.

Under the Wellhead Protection Grant Program communities using groundwater continue to develop wellhead (source water) protection programs. As of FY 2005, 475 wellhead protection grants totaling over \$7.4 million were awarded. There are 291 publicly owned groundwater supplies involved in wellhead protection activities in 2005, an increase from 205 in 1999. Currently, the 89 percent of the state's population that relies on public community groundwater supplies benefits from wellhead protection efforts.

Wetlands Protection

Michigan's Goemaere-Anderson Wetland Protection Act was passed in 1979, and is now codified as Part 303 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 Wetland Protection Program was approved by the U.S. EPA 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. The CWA limits state assumption of Section 404 authority in “traditionally navigable waters.” The U.S. Army Corps of Engineers, Detroit District, retains Section 404 jurisdiction in these waters, which include 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.

The MDEQ processes approximately 5,000-6,000 permit applications per year under Section 404, funded in part by permit fees but primarily by state general funds. About 3,000 of these applications propose wetland impacts; the remainder propose to alter lakes and streams only. MDEQ staff work with permit applicants to redesign proposals when necessary to avoid and minimize resource impacts.

Michigan's regulatory program generally requires mitigation for all wetland impacts, although 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 or deed restriction. Administrative rules defining the establishment and use of mitigation banks were promulgated in 1997. Three 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. Mitigation resulted in an overall ratio of 1.7 acres of created or restored wetland for each acre impacted by permitted activities during 2000-2004.

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. In 2004, the MDEQ initiated a program to encourage the protection of wetlands by local units of government. Workshops to explain and encourage local wetland regulation have been conducted at a number of locations across the state in cooperation with the East Michigan Environmental Action Council and the Tip of the Mitt Watershed Council. As of September 2005, 42 local units of government have notified the MDEQ that they regulate wetlands through an ordinance.

A Part 31 permit is required for any occupation, construction, filling, or grade change within the 100-year floodplain of a river, stream, drain, or lake. Bridges and culverts are considered an occupation of the floodplain, as are activities that involve storage of materials in the floodplain. A 100-year flood has a 1 percent chance of occurring or being exceeded in any given year. These activities are regulated by a permit system with the purpose of ensuring that the channels and floodways are kept clear and uninhabited and that structures placed outside the floodway are properly protected from flood damage. The floodway includes the stream channel and that portion of the floodplain that is required to convey the flow of floodwater. Structures that are placed outside of the floodway portion of the floodplain must be properly protected from flood damage. This can be accomplished by elevating structures above the 100-year floodplain elevation or by designing the structures to be water tight without human intervention.

Part 301 provides for protection of inland lakes and streams. The intent of the Inland Lake and Stream Protection Program is to protect the integrity of the land/water interface, the correlative rights of other riparian owners, and public trust in the inland waters of the state. Crossing a permanent or intermittent stream while skidding forest products or transporting them to the mill requires a Part 301 permit. Road and pedestrian crossings as well as utility crossings that disturb land below the ordinary high water mark are examples of common projects that require a Part 301 permit. A storm water outfall, with or without stream bank or streambed protection (riprap), stream relocations, and enclosures are also examples of projects requiring a permit.

Part 305 requires MDNR approval of plans for the location and construction of any utility or publicly provided facility, including roads, bridges, and culverts within a designated Natural River area. Each designated river system is managed according to a long-range management plan, which outlines the specific manner in which lands and waters are to be managed to protect the unique river values. Tributary areas are also controlled. All development and land uses are regulated within 400 feet of designated streams by a combination of activities including state and local zoning.

Part 305 provides for the designation and proper management of environmental areas, high-risk erosion areas and flood risk areas along the Great Lakes shoreline. These areas include coastal wetlands and the adjacent uplands that provide habitat and nursery for fish and wildlife.

Part 353 provides for sand dunes protection and management. The designated critical dune areas along the Great Lakes shoreline are areas where the most unique and fragile sand dunes are found. This program minimizes the impact of development on these critical dune areas. A permit is required for all proposed new uses in designated critical dune areas mapped in the "Atlas of Critical Dune Areas," prepared by the MDEQ.

Water Protection Program Special Initiatives

Nutrient Criteria

In an effort to reduce and prevent continued nutrient over-enrichment on a national scale, the U.S. EPA prepared the National Nutrient Strategy for the Development of Regional Nutrient Criteria. The National Nutrient Strategy was published in the June 25, 1998, *Federal Register*, and described the approach the U.S. EPA would follow in working with states to adopt nutrient criteria into state WQS. A January 9, 2001, *Federal Register* notice requested that, by the end of 2001, each state complete a plan for developing and adopting nutrient criteria into WQS. In general, plans must outline the specific strategy, milestones, and schedule for developing and adopting nutrient criteria into regulation. The MDEQ submitted a nutrient criteria development

plan to the U.S. EPA on January 18, 2002. This plan subsequently was revised to address the U.S. EPA's recommendations, and was approved by the U.S. EPA on September 29, 2004.

The MDEQ's nutrient criteria development process consists of five steps, which include: (1) an evaluation of Michigan's existing nutrient rule and other state/federal agency nutrient criteria; (2) an inventory of existing nutrient data; (3) an evaluation of different approaches for developing nutrient criteria based on a prioritization of water body types (inland lakes, reservoirs, rivers, streams, and select bay areas of the Great Lakes as resources allow); (4) development of numeric nutrient criteria using a combination of statistically defensible methods, including cause and effect relationships between nutrients and biological responses, and a narrative standard with a translator mechanism; and (5) an identification of additional data needs.

Since approval of the state nutrient criteria development plan by the U.S. EPA in 2004, efforts in Michigan have focused on evaluating the state's current nutrient-related data and evaluating the relationships between increasing nutrients and biological responses. Additional data needs have been identified, and the MDEQ is currently collaborating with the other U.S. EPA, Region 5, states and the USGS to evaluate the effects of increasing nutrients on diurnal dissolved oxygen cycling and biological responses. Data collection for this project commenced in June 2007, and the data will be used to verify nutrient relationships observed in rivers and streams across Region 5.

SSOs

SSOs are discharges of raw or inadequately treated sewage from MS4s, which are designed to carry domestic sanitary sewage but not storm water. These overflows may also contain industrial wastewater that is present in the sewer system.

When an SSO occurs, raw sewage may be released into basements, city streets, properties, rivers, and streams. SSOs are illegal and often constitute a serious environmental and public health threat. For the past 20 years, the MDEQ and its predecessor agency have been working with municipalities across the state to identify SSOs and correct SSO discharges. Most SSOs are associated with wet weather conditions, when sanitary sewer systems receive storm water in-flow or infiltrating groundwater. SSOs may occur during extreme hydrologic events, even though separate sanitary sewer systems are intended to collect and contain all the sewage that flows into them. An SSO occurrence indicates a malfunctioning system and such occurrences, when chronic, must be addressed to eliminate the SSOs.

The MDEQ has broad statutory and regulatory authority to deal with SSOs under Part 31 and Part 41, Sewerage Systems, of the NREPA. Under this authority, the MDEQ has taken enforcement actions requiring corrective measures to address chronic SSOs and their causes. Recently, the MDEQ entered a settlement agreement with Clinton Township that required a multimillion-dollar corrective program and the payment of \$250,000 in penalties for past illegal discharges.

Mercury Reduction/Prevention Efforts

There is widespread atmospheric mercury deposition into Michigan's surface waters. The organic form of mercury (methylmercury) is a highly bioaccumulative, toxic pollutant that is harmful to wildlife and human health. Elemental mercury is converted to the organic form through natural processes that occur particularly in inland lakes.

The MDEQ's mercury reduction initiative focuses on quantifying mercury concentrations in the environmental media, identifying all sources that contribute mercury to the environment, and reducing or eliminating these sources. Numerous tools will be utilized including regional agreements, state legislation, statewide regulations and policies, the state permitting processes, outreach/education and pollution prevention efforts, as well as voluntary partnerships with various stakeholders.

For example, the MDEQ will continue to work with the University of Michigan, MSU, USGS, U.S. EPA, and Michigan Department of Community Health to collect data on mercury concentrations in air, water, sediment cores, fish, eagles, and herring gulls. The MDEQ will continue to implement strict limits on air permits and implementation of the Mercury Permitting Strategy for discharges to surface waters including the requirement to develop and implement mercury minimization plans. The MDEQ will also continue to participate in the Binational Strategy with the U.S. EPA and Environment Canada, the Environmental Council of States Quicksilver Caucus, U.S. EPA's mercury roundtable efforts, and the U.S. EPA, Region 5, Mercury Workshop; and will also continue to work with various sectors on pollution prevention and energy efficiency initiatives to reduce mercury use and release.

Groundwater Mapping Project

The Michigan Legislature authorized the Groundwater Mapping Project, which required that a groundwater inventory and map be generated for the state by August 8, 2005. The cooperative research team consisted of groundwater and mapping experts from the MDEQ, USGS, and MSU. Funding was provided by the MDEQ through a cooperative agreement with the USGS and the MSU, Institute of Water Research. The total project budget, not including the in-kind staffing contributions from the MDEQ, was \$1,150,000. There is still much to learn about groundwater resources and stewardship in Michigan. Therefore, future funding is needed to maintain, enhance, and expand upon the initial Groundwater Mapping Project. The interactive map viewer, searchable groundwater information database, project reports, and associated material are available at <http://gwmap.rsgis.msu.edu/>.

APPENDIX 2: NINE KEY ELEMENTS OF A SUCCESSFUL NPS MANAGEMENT PROGRAM

On September 30, 1999, the MDEQ presented the U.S. EPA with *Michigan's Response to the Nine Key Elements of an Effective Nonpoint Source Management Program*. The NPS Program Plan replaces the nine key elements document. The following summary identifies how the NPS Program Plan addresses each of the nine key elements:

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

The document includes a series of long-term, short-term, and “as time allows” goals. The long-term goals are relatively general and identify program priorities and direction. The short-term goals are specific commitments and identify responsible parties, products, and completion dates. The “as time allows” are similar to short-term goals except they don't identify completion dates.

Key Element 2: The state strengthens its working partnerships and linkages with 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. In addition, Chapter 8 identifies a number of partnership opportunities that are broader in terms of either geographic or topical focus.

Key Element 3: The state uses a balanced approach that emphasizes both statewide NPS Programs and on-the-ground management of individual watersheds where waters are impaired or threatened.

The Program Plan emphasizes statewide activities in several chapters, including Chapters 3 (Source Control Strategies), 5 (Monitoring), 6 (Information and Education), 7 (Funding), 8 (Partnerships), 9 (Compliance and Enforcement), and 10 (Staff Training). However, Chapter 4 describes Michigan's commitment to the development and implementation of watershed management plans. Each water body has distinct water quality characteristics, issues, and stakeholders. Michigan's NPS Program views local watershed management plans as the most effective way to address water quality issues.

Key Element 4: The state program (a) abates known water quality impairments from NPS pollutions and (b) prevents significant threats to water quality from present and future activities.

The Program Plan has long-term and short-term goals 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 5); and describes how threats and impairments will be addressed at the state and local level.

Key Element 5: The state program identifies waters and their watersheds impaired by NPS pollution, and identifies important unimpaired waters that are threatened or otherwise at risk. Further, the state establishes a process to progressively address

these identified waters by conducting more detailed watershed assessments, developing watershed implementation plans, and then by implementing plans.

Michigan's NPS Program relies on the Integrated Report to identify waters and their watersheds impaired by NPS pollution and the Program Plan includes a summary of threats and impairments. In addition, Chapter 5 (Monitoring) describes how new threats and impairments will be identified while Chapter 4 (Watershed Management) describes how watershed plans are developed and implemented.

Key Element 6: The state reviews, upgrades, and implements all program components required by Section 319(b) of the CWA, and establishes flexible, targeted, and iterative approaches to achieve and maintain beneficial uses of water as expeditiously as practicable.

The Program Plan constitutes an update of the 1988 Nonpoint Source Pollution Control Management Plan. The 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 goals intended to reduce or eliminate NPS pollution and restore and protect waters of the state from NPS pollution.
- D. The NPS Program will obtain certification of the attorney general that the laws of the state provide the authority to implement this Program Plan.
- E. The update identifies available state and federal sources of funding and includes long-term and short-term goals intended to identify nongovernmental funds that could be used by stakeholders to develop and implement watershed management plans.

Key Element 7: The state identifies federal lands and activities that are not managed consistently with state NPS Program objectives. Where appropriate, the state seeks U.S. EPA assistance to help resolve issues.

Chapter 5 (Monitoring) includes long-term and short-term goals related to problem identification monitoring. In the event that the NPS Program identifies NPS impairments on federal land, the NPS Program will work with federal agencies to address those impairments. If those efforts are unsuccessful then the state will seek U.S. EPA assistance to help resolve those issues.

Key Element 8: 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. Long-term and short-term goals related to the management of pass-through grants are described primarily in Chapter 7. The long-term and short-term goals associated with the pass-through grant program are included throughout the document.

Key Element 9: The state periodically reviews and evaluates its NPS Management Program using environmental and functional measures of success, and revises its NPS assessment and its management program at least every five years.

The Program Plan describes environmental measures of success, such as restoration of impaired waters documented with “success stories” and pollutant load reductions.

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

The NPS Program will continue to rely on the Integrated Report to provide routine updates of the NPS assessment.

**APPENDIX 3: OPEN OR PENDING PASS-THROUGH GRANT PROJECTS
(July 1, 2008)**

Tracking Code	Project Name	Funding Source	Water Body
2000-0182	Middle Clinton River LID Demonstration	CMI NPS	Middle Clinton River
2001-0010	Bark River Wastewater Improvements	CMI CWF	Bark River
2001-0072	Village of Avoca Design and Construction of Innovative WW Treatment	CMI CWF	Mill Creek, County Drain #211
2002-0076	Hamilton Creek Watershed Implementation	CMI NPS	Hamilton Creek Watershed
2002-0079	Fumee Creek Watershed	CMI NPS	Fumee Creek
2002-0208	CREP Permanent Conservation Easement Acquisition	CMI CWF	Lake Macatawa, River Raisin, Saginaw Bay
2002-0220	Malletts Creek Wetland Detention	CMI CWF	Malletts Creek
2004-0103	Humbug Marsh Water Quality Enhancement	CMI NPS	Monguagon Drain-Detroit River
2004-0104	Detroit East Riverwalk/Tri-Centennial State Park and Harbor	CMI NPS	Detroit River
2004-0153	Boardman River Protection III	CMI NPS	Boardman River
2004-0167	Munising Bay Watershed Restoration	CMI NPS	Munising Bay Watershed
2005-0007	CREP Implementation	CMI NPS	Saginaw Bay, River Raisin, Lake Macatawa
2005-0108	Black River (Kzoo) Watershed Implementation	319	Black River
2005-0114	Thurston Pond Restoration	CMI NPS	Huron River
2005-0311	Lake Street Storm Sewer Treatment System	CMI CWF	Baldwin River
2005-0317	IDEP City of Lansing	CMI CWF	Grand River, Red Cedar River, Looking Glass River, Sycamore Creek and Tributaries
2005-0320	Monroe County IDEP	CMI CWF	Lake Erie
2005-0328	City of Grand Haven Storm Water Initiatives	CMI CWF	Grand River
2005-0335	IDEP Rouge River Watershed from Residential Areas	CMI CWF	Rouge River
2006-0001	MSU Social Indicators Analysis and Development Tool	319	
2006-0109	Les Cheneaux Watershed Implementation	CWAP	Les Cheneaux Islands Watershed
2006-0110	North Branch of Ecorse Creek Wetland and Greenway Implementation	CMI CWF	Ecorse Creek
2006-0119	Pine River/Van Etten Lake Watershed Planning	205j	Pine River Watershed
2006-0123	Metro Health Hospital BMPs for Buck Creek	CMI NPS	Lower Grand River
2006-0128	Lake Leelanau Watershed Permanent Land Protection 2	CWAP	Lake Leelanau and its Cold water Tributaries
2006-0137	Grow Zones Across the Alliance of Downriver Watersheds	CMI CWF	Combined Downriver

APPENDIX 3 cont.

Tracking Code	Project Name	Funding Source	Water Body
2006-0139	Grand Traverse Bay Watershed Buffer Initiative and Benchmark Survey	319	Grand Traverse Bay Watershed
2006-0141	Rogue River Watershed Update and Easement	CWAP	Rogue River
2006-0142	Michigan Avenue Bioretention Facilities	CMI NPS	Grand River
2006-0143	Long Lake Watershed Septic Inspection and Regulation	CWAP	Long Lake
2006-0145	Millers Creek Watershed BMP Implementation	CWAP	Millers Creek
2006-0148	Kalamazoo River Watershed Management Plan	CWAP	Kalamazoo River
2006-0150	Macatawa Watershed Stormwater Project	CMI CWF	Black River/Macatawa River
2006-0160	Upper Manistee Protection II	CMI NPS	Manistee River
2007-0110	Cool City by the Lake: Promoting the Connections of Walled Lake	CMI CWF	Walled Lake
2007-0112	Grand Traverse Bay Watershed Protection Phase II	CMI NPS	Grand Traverse Bay
2007-0113	Lower Grand River Watershed Storm Water Education	CMI CWF	Lower Grand River
2007-0114	Black River (Sanilac County) Watershed Planning	319	Upper Black River, Lower Black River, Mill Creek
2007-0116	CREP Technical Assistance	CMI NPS	Saginaw Bay, River Raisin
2007-0118	Upper Maple River Watershed Planning	205j	Maple River
2007-0122	State Street Parking Lot	CMI CWF	Battle Creek River
2007-0123	Waterford Oaks County Park Storm Water Improvements	CMI CWF	Pontiac Creek
2007-0125	Portage Creek (Livingston County) Watershed Management Planning	319	Huron River
2007-0127	Illicit Discharge Elimination to the Rouge River Watershed II	CMI CWF	Detroit River
2007-0137	Lower Grand River Watershed Initiatives	319	Lower Grand River
2007-0139	Healthy Lawns and Landscape in the Red Run Subwatershed, Clinton River Watershed	CMI CWF	Red Run Drain, Clinton River
2007-0142	Pere Marquette Planning and Easements	319	Pere Marquette River
2007-0143	Pontiac Creek Watershed Management Plan Implementation	CMI CWF	Pontiac Creek
2007-0144	Kawkawlin River Watershed Management Plan Revision		Kawkawlin River
2007-0150	Lower Muskegon River Watershed Critical Land Mapping and Easements	CMI NPS	Muskegon River
2007-0151	Prairieville Creek-Gull Lake Conservation	319	Gull Lake Subwatershed in Kalamazoo River Watershed
2007-0152	City of Sturgis Sustainable Storm Water Demonstration	319	Nye Drain

APPENDIX 3 cont.

Tracking Code	Project Name	Funding Source	Water Body
2007-0155	Grand Traverse Strategic Approach to Stormwater Pollution Reduction	319	Grand Traverse Bay
2007-0200	Central and Winona Mine Stamp Sand Stabilization Project	319	Eagle River, Sleepy River
2008-0006	Mona Lake Watershed Outreach and Education	319	Black Creek, Little Black Creek, Mona Lake
2008-0008	Ford Center Forest Water Quality Management Demo Area	319	Ogemaw Creek, Plumbago Creek, Sturgeon River
2008-0009	Black Creek Regional Curve Development and Implementation	319	Black Creek/Lower Grand River
2008-0011	North Branch Clinton River Watershed Plan	319	North Branch Clinton River
2008-0015	Healthy Beaches, Clean Runoff, and Social Values Assessment	319	Grand Traverse Bay Watershed
2008-0016	Macatawa Watershed Rural Program Development	319	Black – Macatawa
2008-0017	Rouge River Watershed IDEP Support	CMI-CWF	Upper and Main 3-4 Rouge River
2008-0018	Portage and Arcadia Creeks Implementation	CMI-NPS	Portage and Arcadia Creeks
2008-0023	Hollywood Road Storm Water Basin Wetland Demo Facility	CMI-NPS	Hollywood Drain
2008-0025	Gun River Greenbelt and Wetland Initiative/Implementation	319	Gun River
2008-0026	Upper Grand River Implementation	319	Upper Grand River
2008-0027	Pinnebog River Implementation	319	Pinnebog River
2008-0028	Pigeon River Watershed Plan	319	Pigeon River
2008-0029	Galien River Implementation	319	Galien River
2008-0030	Mill Creek Streambank Stabilization	319	Mill Creek Subwatershed Management Plan
2008-0100	Shiawassee River Restoration and Dam Removal Project	CMICWF	Shiawassee River
2009-0003	Munuscong River Watershed Planning Project	319	Munuscong River-St. Marys River
2009-0004	Lake Charlevoix Watershed: Urban and Rural Solutions	319	Lake Charlevoix
2009-0005	Grand Traverse Bay Watershed Protection Project Phase III	CMINPS	Grand Traverse Bay
2009-0006	Jordan River Watershed Protection Project	CMINPS	Jordan River and tributaries
2009-0012	Mid-Shiawassee River Watershed Restoration Project	319	Shiawassee River
2009-0020	Duck Creek Watershed Planning Project, Muskegon County	205j	Duck Creek Watershed
2009-0036	Cedar River Watershed Conservation Easement Acquisition Project	319	Cedar River
2009-0043	Crooked and Pigeon Creek Watershed Planning Project	319	Crooked Creek/Kalamazoo River
2009-0044	Rice Creek Floodplain Reconnection Project	CMINPS	Rice Creek/Kalamazoo River

APPENDIX 3 cont.

Tracking Code	Project Name	Funding Source	Water Body
2009-0046	South Branch Flint River Riparian Education Project	319	South Branch Flint River
2009-0056	Water Quality Improvements in Alliance Downriver Watersheds	319	Blakely Drain, Ecorse Creek Watershed, Combined Downriver Watershed, Lower Huron Watershed
2009-0059	Kid's Creek & Gr. Traverse Bay Watershed - Water Quality Solutions	319	Kid's Creek; Elk/Skegemog Lake; Torch River; Lake Bellaire; Maury Creek., Grand Traverse Bay
2009-0061	Paw Paw and Black Rivers Wetland Protection/Restoration	319	Black River, Paw Paw River
2009-0074	West Grand Traverse Bay Protection Project	CMINPS	West Grand Traverse Bay

APPENDIX 4: 2010 NPS PRIORITY WATERSHEDS

CADILLAC DISTRICT

Lake Michigan Drainage

Bear River (Little Traverse Bay)

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 also problems in the upstream reaches. The cold water 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 watershed management plan, which has been approved under both the state CMI and federal CWA Section 319 programs.

Lake Charlevoix

Lake Charlevoix is a high quality oligotrophic lake and its largest tributary (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 CMI-approved watershed management plan. Work is currently under way to update the watershed management plan to meet Section 319 criteria.

Grand Traverse Bay Shoreline Watersheds along West Bay and East Bay

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 been identified as not meeting the state total body and partial body contact designated uses because of occasional elevated levels of *E. coli*. TMDLs 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 decade. 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 body and partial body contact designated uses because of occasional elevated levels of *E. coli*. 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 watershed management plan that has been approved by the MDEQ as meeting both state CMI and federal Section 319 program requirements. The organizations have continued to cooperatively pursue the funding and effective implementation of many environmental protection actions.

Boardman River Downstream of Sleights Road

This watershed includes the downstream half 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 about 7.5 miles to the north boundary of Section 14 of Blair Township, where an unnamed tributary enters the Boardman River opposite the west end of Sleight 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 both the CMI-approved Boardman River watershed management plan and the CMI/Section 319-approved Grand Traverse Bay watershed management plan. The Boardman River is currently receiving increased local attention as three major dams on the mainstream have been identified for removal, providing a unique opportunity to educate the public on NPS issues and potentially create large expanses of riparian buffers in the newly exposed bottomlands of the drained reservoirs.

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. A TMDL is scheduled for 2010.

Glen Lake/Crystal River

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 cold water 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 and in the river through sedimentation and loss of habitat in the wetland areas associated with the groundwater-fed streams. The Glen Lake/Crystal River watershed is covered by a CMI/Section 319 approved watershed management plan.

Betsie River from Dair Creek Downstream

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 mainstream. Dair Creek is the most downstream of the two important tributaries that contain exceptional trout habitat and provide cold water to the warmer lower Betsie River. Sediment, nutrients, and thermal inputs are the most significant pollutants of concern. Sources include road stream crossings, streambank erosion at historical log roll away sites, construction sites, and riparian land uses. There is a CMI-approved watershed management plan 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 body and partial body contact designated uses because of occasional elevated levels of *E. coli* from unknown sources. A TMDL is scheduled to be completed for this area in 2015. The lake's main tributary, Cold Creek, is not meeting the indigenous aquatic life and wildlife designated use because of anthropogenic flow and substrate alterations from historical channelization. A TMDL is not scheduled for Cold Creek.

Portage Lake (Manistee County)

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 mg/L at depths greater than 40 feet, and reach near zero at depths of 60 feet. A CMI/Section 319-approved watershed management plan has been completed for Portage Lake and plan implementation is being coordinated through the Portage Lake Watershed Forever Committees.

Bear Creek and Bear Lake (Manistee River)

The Manistee River supports one of Michigan's best cold water 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. The Bear Creek watershed has a CMI-approved watershed management plan and funding is currently being sought to upgrade the plan to meet Section 319 criteria.

Pere Marquette River

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 as both a federal Wild and Scenic River and a state Natural River, which provides 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 has a CMI-approved watershed management plan and a Section 319 update is in progress.

Upper Muskegon River (From Wolf Creek Confluence North)

The Muskegon River is unique among large Michigan river systems (second largest) in that it is classified as a cool water system, blending cold water stream reaches with other areas that have warmwater conditions. Consequently, it has many characteristics midway between those of cold water 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 lake with a surface area over 16 square miles, is a deep oligotrophic lake reaching a maximum depth over 130 feet and half of 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 the major pollutants are nutrients, temperature, sediment, and hydrologic flow. A TMDL is scheduled for 2018 to address elevated *E. coli* counts measured at several Houghton Lake beaches, which are not meeting the total body and partial body contact designated uses. Butterfield Creek and the West Branch Muskegon River are both identified in the CMI/Section 319-approved Muskegon River watershed management plan as critical areas because of temperature fluctuation, surface water runoff, and land use issues.

Lake Huron Drainage

Silver Creek (Ocqueoc River)

Silver Creek is one of only two major tributaries to the Ocqueoc River and provides the majority of high-quality cold water 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 cold water tributary within the overall warmer waters of the Ocqueoc River watershed. A CMI/Section 319-approved watershed management plan is used by the Ocqueoc River Commission to improve and protect the water resources.

Duncan and Grass Bays on Lake Huron Coast (Cheboygan County)

Located just east of the city of Cheboygan, 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 lands 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. There is not a CMI or Section 319-approved watershed management plan that covers this area.

Devils River (Alpena County)

Devils Lake, located just south of the city of Alpena in the Devils River watershed of Lake Huron's Thunder Bay, also 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 body and partial body contact designated uses because of elevated levels of *E. coli* from unknown sources and a TMDL is scheduled for 2017. This area does not have a CMI or Section 319-approved watershed management plan.

South Branch Au Sable River

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 streambank 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 watershed management plan. There is current local interest in evaluating storm water runoff from the village of Roscommon, and Roscommon County is pursuing the development of storm water management standards. This interest follows the recent successful implementation of numerous storm water runoff controls in the city of Grayling, which were designed to decrease Grayling storm water runoff to the Au Sable River by 80 percent.

GRAND RAPIDS DISTRICT

Lake Macatawa

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

contribute to nonattainment of designated uses in the lake. It is on the Section 303(d) list and has a TMDL for phosphorus.

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. This 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 community.

Mona Lake

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

Duck Creek

Duck Creek is one of the remaining watersheds in the Grand Rapids district that is not covered by a watershed management plan. Based on Muskegon Conservation District data, this is the most threatened cold water stream in the district due to temperature problems. With the planned expansion of the Michigan Adventure amusement park near Muskegon and the resulting land use changes, this watershed is in critical need of having a watershed plan. MDEQ staff have been working with the local community for the last three years to develop a good proposal with planned participation by the right decision makers to make a real difference in the watershed. However, since the watershed is not on the Section 303(d) list, recent proposals to the NPS grant program have not ranked high enough to be funded. They did receive money from the West Michigan Strategic Alliance Green Infrastructure Program for the three townships involved in order to conduct a charette to vision how to incorporate smart growth and low impact development in the area around Michigan Adventure.

Thornapple River

The Thornapple River watershed located in the southwestern portion of lower 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 body of the Coldwater River.

The Coldwater River and Tyler/Bear Creek subwatersheds are impaired by *E. coli*. Several reaches of the watershed are identified as not supporting other aquatic life and wildlife due to anthropogenic substrate alterations and other flow regime alternations. 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 cold water 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 MDNR and USFWS.

Projects include a well and septic inspection ordinance, riparian protection ordinances, volunteer monitoring, ongoing dam removals, development of watershed management plans, and fisheries habitat restoration and protection.

JACKSON DISTRICT

St. Joseph/Maumee Watershed

West Branch of the Upper St. Joseph River Subbasin

Drainage from the west branch of the Upper St. Joseph/Maumee River (Hillsdale County) flows through three states before eventually entering Lake Erie. The west branch of the St. Joseph is a priority because of its importance as the headwaters of this river system, the mussel population and high quality habitat, the amounts of sediment and pesticides that may be attributed to it, and water quality issues related to the larger western Lake Erie basin. It is also one of the last remaining watersheds in the Jackson district without an MDEQ-approved watershed management plan, although it is covered by a larger tri-state watershed planning effort, which provides a lot of background and a framework for a planning project to build upon.

There is coordination among the Hillsdale Conservation district, the Nature Conservancy, and the St. Joseph River Watershed Initiative. The Nature Conservancy operates an upper St. Joseph River watershed project in Angola, Indiana, focused on protection of the east fork of the west branch due to a mussel population that represents the best remaining example of a river community once common in the western Lake Erie basin.

The St. Joseph River Watershed Initiative is a group working on behalf of the entire tri-state St. Joseph watershed and acts as a coordinator to use its resources and expertise to gather data, identify critical areas, and lead management planning in the subbasins. The St. Joseph River Watershed Initiative has overall goals to reduce the loads of sediment, pesticides, pathogens, and nutrients to meet target loads by organizing stakeholders in the subbasins and to develop watershed plans. The St. Joseph River Watershed Initiative has prepared a watershed plan for the larger tri-state St. Joseph watershed, which was submitted to the MDEQ for Section 319 approval. The MDEQ provided comments in response, but to date the plan has not been resubmitted, nor does it have CMI approval. Although the plan has been approved by Indiana for Section 319, a watershed plan should be developed for the Michigan portion of the watershed.

Huron River

Middle Huron Subbasins

The Huron River watershed is one of Michigan's natural treasures. It supplies drinking water to more than 150,000 people, supports one of Michigan's finest smallmouth bass fisheries, and is the only state designated Natural River in southeast Michigan. Yet, the Middle Huron watershed has five TMDLs related to phosphorus and pathogens.

The major TMDL is phosphorus (Ford and Belleville Lakes) and the entire Middle Huron River system is under mandate to reduce phosphorus loadings by 50 percent. There is an active group of communities and institutions that have been implementing actions to reduce phosphorus 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 watershed plan to guide restoration activity. Sediment is a concern in several Middle Huron

subbasins including Honey Creek, Millers Creek, Mallets Creek, and Swift Run. Of these, Honey Creek is in need of a watershed plan to guide restoration activity. These subbasins have also been highly modified by hydrologic alterations and need activities aimed at detention, wetland restoration, or other means of keeping water on site longer. In addition, Honey Creek has an *E. coli* TMDL with possible sources including failed septic systems, animal or pet waste, and illicit connection.

Portage Creek Subbasin

The Portage Creek watershed covers 56 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 being threatened by altered hydrology as well as lack of development standards and protection ordinances.

Areas of high quality habitat and diverse species 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 quality of water in the watershed. As the communities of the Portage Creek watershed 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; of these, 25 sites (15,257 acres) are ranked as highest priority for protection; 42 sites (6,813 acres) are ranked as medium priority for protection; and 35 sites (1,837 acres) are ranked as lower priority for protection.

The priority goals and objectives of the Portage Creek Planning project 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 LID concepts.

Raisin River

Upper Headwaters of the Raisin River

The upper headwater subbasins of the Raisin River, specifically Iron, Goose, and Evans Creeks and the Upper Raisin River, have been identified by the Nature Conservancy as having significant regional ecological importance due to the remaining rich 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 watershed management plan lists these as high priority areas for protection measures, including land use controls, buffers, easements, and ordinances.

Lower Raisin River Subbasin in the Vicinity of Deerfield and Blissfield

This portion of the Raisin River is located within an *E. coli* and a nitrate TMDL area and needs restoration to meet public water supply and body contact recreation uses. This area is a priority for the WB Drinking Water Program as well, because the Raisin River has three surface water intakes; more than any other watershed in Michigan. The main pollutants of concern are nitrogen, phosphorus, and pathogens from the largely agricultural land use. There are several Concentrated Animal Feeding Operations suspected of contributing pollutants. The River Raisin Watershed Council began a watershed planning project in 2006 and the plan will be complete in 2009. It lists agricultural fertilizers and animal waste as the priority sources of pollutants within the nitrate and *E. coli* TMDL reaches. Drain tiles are a suspected source of many of the pollutants. The highest priority subbasins to perform restoration activities related to the TMDLs are the South Branch of the Raisin River and Black Creek. Recommended practices include improving fertilizer and manure application rates and timing, applying cover crops, drain tile maintenance, constructed wetlands, buffers, and subirrigation systems.

Upper Grand River

Portage River Subbasin

There is a growing group, headed by the Jackson County Conservation District, that has momentum working in this area to address the Grand River and Portage River TMDLs. The Portage subbasin was listed in the watershed plan as critical for sediment issues related to the biota and dissolved oxygen TMDLs. Actions needed are buffers, wetland restoration, and improved agriculture practices.

KALAMAZOO DISTRICT

Kalamazoo River

The Kalamazoo River and its tributaries form a network draining approximately 2,020 square miles of southwest Michigan. The river includes both cold water and warmwater stretches, with some tributaries supporting trout populations. The hydrology of the Kalamazoo River watershed is strongly influenced by glacial deposits, which contribute to stable flows by providing permeable soils that allow groundwater inflow. But in some areas of the watershed, urbanization, stream channelization, filling of wetlands, and installation of drainage systems for agriculture have contributed to flow instability. Nutrient inputs from both point and NPS in the watershed have contributed to algal blooms, poor water clarity, and low dissolved oxygen levels in Lake Allegan, a downstream impoundment of the Kalamazoo River. As a result, Lake Allegan's fish population contains an overabundance of carp. To address these concerns, the Kalamazoo River/Lake Allegan phosphorus TMDL was developed by the MDEQ in 1998.

The TMDL implementation plan includes an innovative, voluntary, cooperative agreement among the majority of point source dischargers in the watershed. The point source signatories have agreed to reduce their phosphorus loadings in order to jointly meet the waste load allocation, in lieu of more restrictive phosphorus limits in individual permits. In addition to reducing point source loadings of phosphorus, these municipal and industrial dischargers have also agreed to implement NPS phosphorus reductions.

Due to historic discharges of PCB-containing paper mill effluent, the Kalamazoo River has been designated as a U.S. EPA superfund site because of PCB-contaminated sediment. This has resulted in a nearly complete ban on fish consumption between the city of Kalamazoo and Lake

Allegan. In 2007, an agreement was reached between the U.S. EPA and the potentially responsible parties. Cleanup activities and additional sediment monitoring are in progress. Since the Kalamazoo River has long been perceived as contaminated, many undeveloped wildlife corridors remain. Preserving green space will be an important consideration in the watershed planning process.

Currently, the Kalamazoo River Watershed Council has Section 319 grant funding to develop a watershed management plan that will cover the entire Kalamazoo River watershed. Watershed management plans for several tributaries already exist, but there have been no previous planning efforts addressing the entire watershed. The Kalamazoo River Watershed Council serves as an “umbrella organization” representing the entire watershed. This includes the role of providing support to other watershed organizations focusing on tributaries of the Kalamazoo River, or on specific issues within the watershed.

The Kalamazoo River Watershed Council recently partnered with the Michigan Association of Conservation Districts in a successful effort to bring \$27 million of targeted funding for water conservation and water quality improvements on agricultural working lands to the St. Joseph, Kalamazoo, and Black Rivers watersheds. The funding will be available for a five-year period through the USDA’s 2008 Farm Bill program called the Agricultural Water Enhancement Program.

- The Rabbit River is a Kalamazoo River tributary located primarily in Allegan County with a watershed that encompasses 187,200 acres. Land in the watershed is primarily agricultural, but also includes forested and urban areas. The Rabbit River watershed management plan 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 are entering the stream from agricultural production and residential area runoff. Damaging high flows are resulting from uncontrolled storm water runoff due to development and past drainage practices.

MDEQ staff are focusing efforts on restoring three Rabbit River subwatersheds that have been identified as impaired on the Section 303(d) list for the other indigenous aquatic life and wildlife designated use: Green Lake Creek (Tollenbar Drain), Headwaters Little Rabbit River (Red Run Drain), and Black Creek. Red Run Drain has an additional Section 303(d) listing due to an impaired warmwater fishery.

- 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 presettlement 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 biotic diversity, and reduced fish populations.

MDEQ staff are focusing efforts on restoring two Gun River subwatersheds that have been identified as impaired on the Section 303(d) list for the other indigenous aquatic life and wildlife designated use: Fenner Creek, and an upstream stretch of the Gun River between Gun Lake and Orangeville Creek.

- The Augusta and Gull Creeks watershed (including Gull Lake) within the Kalamazoo River watershed includes a number of high quality streams and lakes. Gull Lake is a large, historically oligotrophic lake supporting a cold water fishery. While phosphorus levels in the watershed remain at acceptable levels, development pressures are a concern. Agriculture is also a potential source of nutrients. There are three recently constructed Concentrated Animal Feeding Operations in the watershed (both new and expanded operations). Therefore, preservation of the riparian lands is critical to provide an adequate buffer between agricultural operations and the water bodies.
- Spring Brook is a cold water tributary to the Kalamazoo River immediately downstream (north) 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 cold water stream of similar size that was sampled in southwestern Michigan. Brown trout of varying sizes were observed, indicating that populations were self-sustaining. High numbers and diversity in aquatic insects indicated that an excellent food source was available for the fish species present. 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 further upstream, at DE Avenue, found a largely unimpacted riparian zone and an excellent macroinvertebrate community. Pollutants associated with development (sediment, phosphorus, and thermal inputs) are the primary threats to this watershed.

St. Joseph River

The St. Joseph River watershed covers nearly 4,700 square miles. The river dips south into Indiana before coming back into Michigan and discharging to Lake Michigan at St. Joseph. Numerous water bodies within the watershed are on the Section 303(d) list, and there is an *E. coli* TMDL for the lower St. Joseph River from the Indiana border downstream to the mouth. The watershed is impacted by a number of pollutants, but sediment, nutrients, and pathogens are large contributors.

This watershed is a priority not only because of Section 303(d) listings and the TMDL, but because the main watershed organization (The Friends of the St. Joseph River Association), is actively working to implement the St. Joseph River watershed management plan, initiate broad watershed-wide programs, improve coordination among subwatershed groups, and partner with Indiana stakeholders. The Friends of the St. Joseph River Association recently partnered with the Michigan Association of Conservation Districts in a successful effort to bring \$27 million of targeted funding for water conservation and water quality improvements on agricultural working lands to the St. Joseph, Kalamazoo, and Black Rivers watersheds. The funding will be available for a five-year period through the USDA's 2008 Farm Bill program called the Agricultural Water Enhancement Program. In addition, the Friends of the St. Joseph River Association recently submitted a proposal to the U.S. EPA for a Wetland Program Development Grant. If awarded, the grant project would develop a Landscape Level Wetland Functional Assessment for the entire St. Joseph River watershed, update National Wetland Inventory maps for four counties, develop and apply criteria to prioritize townships/counties to focus wetland protection outreach efforts, and develop and apply criteria to prioritize parcels or areas to focus wetland restoration and protection outreach efforts.

- The Paw Paw River watershed was identified in the St. Joseph River watershed management plan as one of the three most critical subwatersheds for preservation efforts based on: (1) a scoring system for percentage of wetland and forest cover and

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 management plan. The Paw Paw River has several designated trout streams (the east branch of the Paw Paw River is identified as a top quality, cold water fishery). In addition to its preservation value, the Paw Paw River watershed also has an existing *E. coli* TMDL for Pine and Mill Creeks, and a TMDL is being developed for Ox Creek for impairments to the other indigenous aquatic life and wildlife designated use related to storm water and historical industrial discharges. The mouth area of the watershed is very impacted by urbanization, but there is a need for protection in the form of good 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 both the Paw Paw River and Black River watersheds. 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.

- Channelization and agricultural land drainage have been identified as a concern in the Prairie River St. Joseph River subwatershed. A 2002 MDEQ biological survey report indicated that macroinvertebrate communities were “acceptable” (although nearly excellent) to “excellent.” Stream habitat was mostly “fair” with one station “good.” A 2007 MDEQ biological survey reported attainment of the cold water fisheries designated use at the Bowers Road station. Other sites supported an abundance of warmwater taxa rating acceptable with warmwater metrics; an indication that water temperature was the issue rather than water quality (it was indicated that further testing should be conducted to verify whether these streams attain cold water designation). There is one isolated, nonattainment listing for this watershed for partial body and total body contact recreation at Sand Lake’s Nottawa Beach Park. Local interest in watershed planning has been expressed for the Prairie River watershed.
- Based on results of Soil and Water Assessment Tool modeling, the Fawn River watershed was identified in the St. Joseph River watershed management plan 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 have 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 St. Joseph River watershed management plan identified the Rocky River subwatershed as one of the top three critical areas for preservation efforts based on: (1) a scoring system for percentage of wetland and forest cover and trout lakes and streams in the subwatershed; (2) the top three 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 watershed management plan.

This river is relatively undeveloped along the river corridor, but threatened by development along the US-131 corridor in the vicinity of the city of Three Rivers. Some natural trout production takes place in the cold headwaters. Macroinvertebrate communities and habitat are generally “good,” but there are undetermined sources of sediments in the watershed that may be natural. Historic channelization in tributaries has limited habitat and potential biological communities.

- The St. Joseph River watershed management plan identified the Dowagiac River subwatershed as one of the top three critical areas for preservation efforts based on: (1) a scoring system for percentage of wetland and forest cover and trout lakes and streams in the subwatershed; (2) the top three 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 watershed management plan.

Many tributaries to the Dowagiac River as well as the Dowagiac River itself are designated as cold water streams. The river is being considered by the MDNR for the Natural Rivers Program. A 2002 MDEQ biological survey found “acceptable” to “excellent” macroinvertebrate communities, although habitat was only rated “fair” to “good.” Sediment is the primary pollutant of concern. Despite extensive historic channelization, the river proper is quite stable. A pilot meander restoration project has been completed.

Galien River

The Galien River is a priority due to the existence of two *E. coli* TMDLs with source areas covering a majority of the watershed. Other major pollutants threatening and impairing the watershed are sediment and nutrients. There is an active watershed group lead by The Conservation Fund. The Conservation Fund is currently implementing a Section 319 NPS grant focusing on septic system awareness efforts, including a social indicators survey. A TMDL work group is exploring additional mechanisms for identifying and resolving *E. coli* inputs to the watershed.

Black River

The Black River watershed has several Section 303(d) listings, as well as a phosphorous TMDL for Great Bear Lake. Sediment and nutrients are the largest pollutant contributions to the watershed. The Two Rivers Coalition, a recently incorporated nonprofit organization, is a strong, proactive watershed group representing both the Paw Paw River and Black River watersheds. 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.

LANSING DISTRICT

Maple River

The Maple River is a typical mid-Michigan watershed. The land use has a significant amount in agriculture with several Concentrated Animal Feeding Operations. Scattered among the many small towns and villages are new homes on five to ten-acre lots and occasional pockets of subdivision carved out of farm fields. There is little, if any, low impact development. Traveling downstream through the watershed, the Maple River can not maintain the current geomorphology and cuts away at the banks, redepositing 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 Maple River on the Section 303(d) list for biota and phosphorus. A phosphorus TMDL was completed for Pine Creek in 2007 and a phosphorus TMDL was completed for portions of the Maple River in 2009. A Section 319 planning grant was awarded, which has encouraged a growing watershed group and expanded public interest. This

watershed is a priority for continued support of the planning and implementation effort, provided it extends throughout the watershed, not just Clinton County, and includes cooperative efforts between the MDEQ, county agencies, and local communities.

Shiawassee River

The Shiawassee River is a good quality warmwater stream. However, the size of the main channel likely buffers sources of pollution, of which on-site septic systems are a general concern. In Livingston County, 80 percent of the homes use on-site wastewater treatment and there is no point-of-sale ordinance to determine the status of the systems. In Shiawassee County, the river flows primarily through rural areas served by septic systems. There are water quality efforts being made to protect the Shiawassee River in Livingston County (as part of the MS4 NPDES permit) and there is a Section 319 implementation grant in Shiawassee County. However, there is no coordination in the watershed among communities or agencies in addressing sources of pollution, priorities, goals, and practices. It is a priority to link environmental protection efforts throughout the watershed and tie them more closely to obtaining water quality improvements.

Looking Glass River

The Looking Glass River is currently meeting state WQS for most of its length. However, development continues to increase. Construction of large commercial developments and subdivisions are taking place with minimal storm water controls that are even more poorly enforced. Homes are being built in crop fields and along the riparian corridor. A strong education program combined with useable storm water controls is needed throughout the entire watershed, not just Clinton County. This watershed is a priority for implementation efforts to address development in historically agricultural areas and consider protection practices.

Flint River

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 back-up 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), wetland (3 percent), and water (1 percent). The loss of wetlands from channelization and tiling has decreased flow stability, increased erosion and sedimentation, and altered stream temperature regimes.

Four subwatersheds, Swartz Creek, Kearsley Creek, Gilkey Creek, and the South Branch of the Flint River have approved watershed management plans and active stakeholder involvement. NPS pollution from septic systems, stream bank erosion, agricultural runoff, fertilizers, pesticides, and increased development are of concern within these watersheds. The South Branch of the Flint River watershed is a high priority for both restoration and protection practices due to its hydrologic stability, in-stream habitat, and biological diversity.

SAGINAW BAY DISTRICT

Kawkawlin River

The Kawkawlin River has been identified as a critical watershed as part of the SBCI program. The Kawkawlin River is a recreational watershed draining to the southwestern portion of Saginaw Bay that has, and continues to experience, WQS exceedences for *E. coli*. 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.

Pinnebog River

The Pinnebog River has also been identified as a critical watershed as part of the SBCI program. The Pinnebog River has been noted as having elevated phosphorus levels, and muck has been an ongoing problem near the mouth for the last several years. The local community is currently finishing a watershed management plan for this water body, and applying for an implementation grant.

Cedar River

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 remains relatively undeveloped and should be a focus for protection efforts. The local community currently has two watershed grants to implement BMPs and permanent conservation easements.

Rifle River

The Rifle River has completed a watershed implementation grant and currently is still implementing practices through the efforts of their Rifle River Restoration Committee. This committee is well supported by the two Resource Conservation and Development Councils that cover this area. The Rifle River is a state designated Natural River and is heavily used for recreation (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 cold water stream.

SOUTHEAST MICHIGAN DISTRICT

Clinton River Watersheds

Stony Creek/Paint Creek

Stony and Paint Creeks are hydrologically separate subwatersheds, but are considered one by the Stony/Paint subwatershed group due to their close proximity and many of the same communities fall within their drainage areas. Both creeks are high quality cold water tributaries of the Clinton River.

Stony Creek continues to retain many high quality characteristics, but is experiencing isolated water quality impairments as a result of increasing development, particularly in the southern end

of the subwatershed. Stony Creek is home to a wealth of unique natural areas that are already 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 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 the Stony Creek/Paint Creek area continues to develop, the potential for negative environmental effects on it will increase. This will include both water *quality* impacts from erosion, sedimentation, and increased inputs of storm water pollutants, as well as water *quantity* impacts resulting 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 Stony Creek/Paint Creek watershed management plan and they continue to meet regularly.

Clinton River North Branch

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. The Clinton River North Branch is a headwaters subwatershed with high quality cold water streams and designated trout streams, creating recreational activities for the entire region. Within the past few years several TMDLs have been developed within the subwatershed, including three pathogen TMDLs and one dissolved oxygen TMDL.

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 is continuing to threaten the remaining wetlands, natural areas, and agricultural land of the subwatershed. Currently, the development pressure is mainly in the southern portion of the subwatershed, but as sprawl continues in southeastern Michigan, the entire Clinton River North Branch will experience development pressure. This development pressure has created an increasing need to take preventive/proactive actions to help preserve the environment and water quality of the Clinton River North Branch.

A watershed management plan has not been developed for the Clinton River North Branch, but an active watershed group has formed and is meeting regularly. The local communities seem to be concerned with the current development pressure and how it will affect the environment and the social fabric of the Clinton River North Branch subwatershed.

With an active watershed group, high quality streams, and development pressure, there is a unique opportunity for NPS program staff to help facilitate and promote a more sustainable development path for the Clinton River North Branch. This opportunity will help to protect and restore the environment, water quality, and valuable resources of the Clinton River North Branch providing benefits for all of southeastern Michigan.

Upper Huron River/Kent Lake

The Kent Lake subwatershed of the Huron River is located in southwestern Oakland County, extending 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.”

In 1998, the MDEQ listed Kent Lake as threatened on the Section 303(d) list of impaired waters requiring TMDL establishment. The reason for the threatened status was cited as excess NPS phosphorus loading in the subwatershed that eventually enters Kent Lake. A TMDL for phosphorus was developed in August 2002.

The MDEQ is currently developing a TMDL for dissolved oxygen and sedimentation for Norton Creek based on the results of water quality studies and biosurveys of that stream. The Norton Creek TMDL is expected to be approved by fall 2009.

Decreased water quality is a concern that encompasses not only nutrient and bacterial loading issues (many beach closings in the area), but also issues of water clarity and toxicity. Additional water quality items of concern include turbidity, conductivity, pesticides, and pollutants such as PCBs and mercury (two lakes have a TMDL for PCBs).

Fourteen communities, one county, and one school district were involved in the development of the Kent Lake/Upper Huron watershed management plan and they continue to meet.

St. Clair River/Lake St. Clair (includes the Pine, Black, and Belle Rivers; and 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. The St. Clair River has been identified as a Great Lakes AOC by the U.S. 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. There are also endangered mussels living there as well. Some of the species found in the Belle River recently were the hickorynut, rayed bean, and snuffbox mussels.

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 provide many recreational opportunities for local residents and tourists. There are nine public beaches

in Michigan's portion of Lake St. Clair and intermittent beach closures due to elevated bacteria levels continue to be a problem.

The St. Clair River RAP identified beach closures as an impaired use in the St. Clair River AOC. St. Clair County's Northeastern Watersheds watershed management plan identifies failing septic systems and sites of unrestricted cattle access as critical areas for corrective actions. TMDLs for bacteria have been established in the Anchor Bay watershed for Crapau Creek and the Salt River. The Anchor Bay watershed management plan also identified failing on-site disposal systems and impacts from cattle crossing and horse-related activities as significant contributors to elevated bacteria levels in the watershed.

Since 2002, 448 illicit discharges (approximately 32,161,680 gallons of sewage per year) have been identified and corrected in these watersheds in St. Clair County alone. Much of this work was accomplished through the assistance of NPS Illicit Discharge Elimination Program (IDEP) grants given to St. Clair County and the majority of the discharges were from failing on-site disposal systems. Despite the significant progress made over the past five years, due to the soils and historical development in this area there are still many issues remaining with failing or inadequate septic systems. Many homes are on small lots with soils that do not support infiltration systems and are often clustered in small cross road unincorporated communities. In these areas there are very few solutions to address the failing systems and the solutions are extremely costly. The prevalent impervious soils in this area result in higher costs, higher failure rates, and shorter system life than in other areas. There are currently 16 known or suspected small communities in St. Clair County that fit this description. It can take several years to find and implement viable solutions in these areas and continuing to address these sources of significant pollution should remain a priority for the NPS program through both enforcement and assistance mechanisms.

Johnson Creek

Johnson Creek is widely recognized as one of the highest quality streams in the Rouge River watershed. Stream characteristics such as cool, clear water; significant groundwater discharge; cobble and gravel substrates; as well as sensitive fish, plant, reptile, amphibian, and macroinvertebrate taxa, make Johnson Creek a valuable ecological and recreational resource to protect and restore. Johnson Creek is the only designated cold water stream in the Rouge River watershed. Its unique recreational use as a brown trout fishery and its ability to support a threatened fish population (the redbside dace) make Johnson Creek deserving of aggressive protection and restoration measures.

Significant numbers of other fish species indicative of high water quality including blacknose dace, redbside dace, mottled sculpin, and rainbow darters also live within the creek. These species prefer cool, clear, flowing streams. While poor in-stream aquatic habitat and biological communities exist throughout much of the Rouge River watershed, MDEQ survey teams found that in-stream habitat and benthic macroinvertebrate communities are acceptable within the Johnson Creek headwaters. Further, annual winter stonefly surveys consistently detect stoneflies, which are indicators of good water quality, throughout the Johnson Creek watershed. Stoneflies are rare throughout the remainder of the Rouge River watershed.

Maintaining cool and clear water will require thoughtful planning of development and storm water management practices as well as the preservation of priority natural areas and the riparian corridor that filter storm water as well as protect and shade the creek. Measures should be taken to reduce the impact of impervious surfaces and to increase native stream bank vegetation and shading along Johnson Creek. In addition to pending land use change in its

watershed, the creek is also at risk due to high storm water flows, high nutrient loads, and high sediment loads that threaten the integrity of the creek. Further, fecal inputs from sanitary seepage, improper septic system maintenance and operation, and other sources must be minimized.

Additionally, annual frog and toad surveys conducted by Friends of the Rouge volunteers consistently indicate that the Johnson Creek watershed has the highest diversity of frogs and toads of all the Rouge River watersheds surveyed. Amphibians are sensitive indicators of environmental quality. In recent years, many observers statewide have been concerned with the apparent rarity, decline, and/or population die-offs of several of these species. This concern was not only for the species themselves, but also for the wetland ecosystems on which they depend. Protection and restoration of wetland, woodland, and riparian natural features within the watershed is critically important to protect not only the stream itself, but also the inland components of the ecosystem.

Sections of Johnson Creek have been placed on the Section 303(d) list for dissolved oxygen levels that drop below the permissible 7 mg/l minimum for cold water streams. Sections of Johnson Creek are also included in the Rouge River watershed-wide Section 303(d) listings for aquatic biota, pathogens, and PCBs. The Rouge River watershed is also a Great Lakes AOC as designated by the U.S. and Canadian federal governments.

Primary local municipalities within the watershed include Washtenaw and Wayne Counties, Plymouth, Lyon, Northville, and Salem Townships, and the city of Northville. Wayne and Washtenaw Counties both have time-of-sale inspection ordinances for septic systems, and storm water ordinances that regulate storm water output from new development and redevelopment. Salem Township has a natural features ordinance. Salem and Northville Townships have watercourse ordinances. Salem Township has a wetlands ordinance. Northville Township has a woodland ordinance. Establishing these types of protection measures within all Johnson Creek communities is a critical key to protection of this watershed.

Johnson Creek is included in the Rouge Middle One watershed management plan. Thirteen communities, three counties, and one school district were involved in the development of the plan. These municipalities continue to meet and work to implement watershed protection goals.

A citizen-based watershed group called the Johnson Creek Protection Group was also recently established. In this organization, residents, businesses, and local officials work together to identify actions to preserve and restore water quality as well as educate the public regarding their role in this ongoing endeavor. The group mobilizes the public to protect Johnson Creek through hosting educational events and supporting volunteer inventory, restoration, and advocacy work.

Finally, Friends of the Rouge is another very active nonprofit organization that works within the Johnson Creek watershed and the greater Rouge River basin to promote restoration and stewardship. Friends of the Rouge programs include volunteer watershed-wide monitoring (frog and toad surveys twice per month at several hundred quarter sections in the watershed; macroinvertebrate surveys three times per year at approximately 30 sites watershed-wide; and chemical, biological, and physical monitoring by students at numerous sites once per year), information and outreach workshops, restoration projects, and Rouge River cleanup events.

UPPER PENINSULA DISTRICT

Menominee River

The Menominee River watershed has a wide variety of issues that are not yet wholly covered under a watershed management plan. There are many active and interested stakeholders who have been holding discussions on the watershed and how to locate funding for potential studies and projects. This watershed is seeing municipal development in many areas, which increases the need for education about urban storm water runoff. The Menominee River also flows through many agricultural areas. Some areas of the watershed are having mercury and PCB issues; yet others require protection of pristine trout habitat. This watershed management plan would therefore include both protective and restorative initiatives.

Huron River (Baraga/Marquette Counties)

The Huron River watershed is a relatively pristine, unimpounded watershed with a high quality cold water biological community. There is a very large, diverse, and active group of stakeholders who have been working together for well over a year on locating resources to protect and restore the watershed. The watershed contains large parcels of corporately owned land that will soon become parceled and sold; therefore exposed to the pressure of private development. This watershed management plan would include both protective and restorative initiatives.