

# Nonpoint Sources of Nutrients

STATE OF MICHIGAN, DEPARTMENT OF ENVIRONMENTAL QUALITY

## *Nutrient Framework to Reduce Phosphorus and Nitrogen Pollution*

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 group of substances ranging from natural compounds, such as sediment, to commercially produced chemical pesticides. The NPS Pollution Control Program (NPS Program) is unique compared to many programs managed by the Michigan Department of Environmental Quality (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 sources; and the lack of the MDEQ control over many decisions that impact water quality. Given this lack of regulatory control, many of the actions taken to reduce NPS pollution are best coordinated and implemented at the local level; some actions can only be implemented at the local level (e.g., land use planning or ordinance development). Actions of local, state and federal stakeholders must be coordinated to make certain the limited resources are used efficiently and effectively to ensure that protection and restoration of water resources is achieved. The NPS Program relies heavily on watershed management plans to achieve the necessary coordination.



Fig 1. Unrestricted farm animal access to surface water.

One of the key strategies that Michigan’s NPS Program employs to restore and protect water quality is to help stakeholders develop and implement watershed management plans. Therefore, many of the specific activities conducted by NPS Program staff are geared toward the development of watershed management plans that are approved by the MDEQ or implementation of priority activities from approved watershed management plans. Examples include:

**Technical Assistance:** The NPS Program staff provide technical assistance to stakeholders to develop ([Developing an Approvable Watershed Management Plan](#)) and implement watershed management plans. This includes providing available water quality data and helping to design monitoring studies to obtain additional information; helping stakeholders identify NPS pollutants and causes of impairment; and assisting in the identification of best management practice (BMP), land use planning activities, and model ordinances.

**Information and Education Outreach:** The NPS Program produces, funds and distributes a variety of materials to inform people about pollutant sources and impacts as well as activities that individuals can do to reduce pollutant loads. Materials are available on the [NPS Program Webpage](#) under the “Information/Education” heading. In addition, NPS Program staff help stakeholders design and implement social monitoring studies to assess the effectiveness of information and education outreach activities; quantify changes in knowledge regarding NPS pollutants; and measure changes in behavior to reduce NPS pollutants.



Fig 2. Sediment-laden storm water

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**Grants:** The NPS Program provides Federal Section 319 grants and matching State Clean Michigan Initiative grants to watershed groups and other eligible entities to implement MDEQ approved watershed management plans. Additional information regarding grant priorities, eligible entities, application process and schedule are available on the [NPS Program Webpage](#) under the “Grant Applicant Information” heading.

**Compliance and Enforcement:** The NPS Program staff provide technical support to stakeholders working to achieve compliance with applicable laws and rules. In addition, staff provide assistance with complaint response and investigation, and occasionally participates in escalated enforcement actions.

**Monitoring and Field Investigations:** The NPS Program staff assist with monitoring to identify NPS related problems and causes of impairment as well as prioritize sites for BMP implementation. Also, monitoring is conducted to assess the effectiveness of BMPs, determine whether planning and implementation efforts are protecting or improving water quality and determine the overall effectiveness of the NPS Program. Additional information regarding NPS monitoring is available on the [NPS Program Webpage](#) under the “Monitoring and Field Investigations.”



Fig 3. Severe erosion caused by ephemeral storm water flows

Michigan’s NPS Program targets activities to reduce nutrients in numerous watersheds statewide given that nutrients (primarily phosphorus and nitrogen) are major causes of NPS related water quality impairments and threats to healthy waters in Michigan. Also, the NPS program promotes sediment load reduction activities given that soil erosion is a major source of phosphorus inputs in addition to the water quality impacts associated with sedimentation. The NPS Program targets BMPs to reduce nutrient and sediment loads from a variety of sources. Some examples include:

**Agricultural:** The NPS program promotes a variety of BMPs such as comprehensive nutrient management plans, cover crops and tillage practices; livestock management strategies; drainage water management strategies; and buffers and filter strips (Fig 1). For example, the [Cass River and Saginaw Bay Watershed Livestock Exclusion Project](#) used CMI funding to implement multiple BMPs resulting in phosphorus load reductions of 22,000 pounds/year, nitrogen load reductions of 68,000 pounds/year and sediment load reductions of 11,000 tons/year.

**Urban:** Hydrologic instability (stream flashiness) is a major cause of soil erosion and nutrient loading from urban watersheds with large areas of impervious surfaces (Figs 2 and 3). Impervious surfaces deliver storm water to watersheds more quickly than natural land uses resulting in larger peak flows during precipitation events. In addition, impervious surfaces prevent infiltration of rainfall resulting in less groundwater recharge and lower stream flows during dry periods. The NPS Program works to encourage BMPs to address storm water inputs and improve stream stability by improving storm water infiltration and retaining or detaining storm water on site. For example, stakeholders in the [Portage/Arcadia Creek watershed](#) installed a number of storm water best management practices resulting in reduced stream flashiness and a measured annual reduction of phosphorus loads of about 800 pounds/year.

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**Forestry:** The NPS Program worked with the Michigan Department of Natural Resources Forestry Division to develop [Sustainable Soil and Water Quality Practices on Forest Land](#) to promote BMPs to reduce nutrient and sediment loads from forestry practices. Also, the NPS Program staff provide grants, technical assistance and compliance assistance to help stakeholders reduce loads. For example, staff provided compliance assistance to foresters working near [Bruno Creek](#) in Michigan's Upper Peninsula. NPS Program staff discovered excessive soil erosion at a logging road crossing. Staff worked with the land owner to install BMPs to limit nutrient and sediment inputs.

**Failing On-site Wastewater Treatment Systems:** The NPS Program promotes efforts to find and fix failing on-site septic systems. For example, the [Huron River Watershed-Detection and Rectification of Failing Septics](#) project partners used aerial imagery to help identify households in high probability failure areas and then targeted information and education outreach activities to those areas. In addition, project partners enforced existing county regulations in locations where severe problems were identified. The [Lake Charlevoix Watershed Protection through Action Project](#) partners worked to develop an onsite-septic ordinance. The [Mid-Shiawassee River Watershed Restoration Project](#) used bacteria "sniffer" dogs to identify areas with elevated *E. coli* levels and then targeted information and education efforts as well as inspection programs to these areas. In a few cases, the Mid-Shiawassee project partners used grant funds to provide cost-share opportunities to eligible homeowners for septic system replacement.

Finally, the [NPS Program Webpage](#) is a good source for additional information about NPS Program staff, technical assistance, grant applications, monitoring guidance, and education outreach.



Fig 4. Canine being used to search for sources of sewage contamination. Image from <http://blog.theanimalrescuesite.com/cs-sewage-sniffing-dogs/>