16. NON-POINT SOURCE PERFORMANCE STANDARDS & PROHIBITIONS

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Status: Various Projects in Place

Runoff management addresses polluted runoff from both agricultural and non-agricultural land uses, including some sources covered by WPDES permits. Compliance inspections are conducted for stormwater control from municipal separate storm sewer systems, certain industries and construction sites of an acre or more. Compliance inspections are planned for concentrated animal feeding operations and compliance tracking of performance standards and prohibitions is in the pilot stage. In addition, several special projects are underway to evaluate urban and agricultural Best Management Practices (BMPs). Some runoff management projects are conducted to assist in the development and implementation of Total Maximum Daily Loads (TMDLs) that are described in the Tier 2 section of this strategy. Monitoring to evaluate the effectiveness of NPS-related TMDL implementation is a desired future activity.

Monitoring Objectives

The monitoring objectives listed below include both permit-related activities and non-permitted activities. Emphasis is placed on performance standards for agricultural activities, construction erosion control, stormwater management and manure management prohibitions which have been in effect since Oct. 1, 2002. These objectives are closely tied to the state's Nonpoint Source Evaluation Framework. Data on compliance with performance standards along with data on stormwater and CAFO compliance will be used as environmental indicators cited in the framework. Several objectives are intended to increase information related to TMDL development and implementation. These objectives move along a continuum from administrative tracking to long-term water quality outcomes.

Clean Water Act Objectives

- Identifying causes and sources of water quality impairments
- Supporting the implementation of water management programs
- Supporting the evaluation of program effectiveness

Specific Objectives

- Track compliance with runoff management programs with emphasis on agricultural and non-agricultural performance standards and prohibitions.
  - Document preparation of erosion control and stormwater plans for new development.
  - Collect information on the location and types of stormwater control practices for both new development and retrofits in developed urban areas funded by DNR runoff management grant programs.
  - Consider developing a regular, consistent inspection process that uses both regional and central office staff expertise and a site visit approach.
  - Generally track landowner compliance with and local governmental support for the performance standards and prohibitions.
  - Track compliance levels with performance standards and prohibitions where appropriate.
  - Track and report CAFO permit monitoring activities. Track costs of urban and rural control practices to meet performance standards.
- Improve our ability to select and design nonpoint source control practices.
  - Test the effectiveness of selected urban BMPs and work with the UW on agricultural control practices

  - Establish an assessment protocol for urban BMPs to determine how well BMPs are working and to evaluate the design and maintenance requirements for future modifications.
  - Improve our information on the cost of installing and maintaining all types of control practices
  - Develop sizing criteria for selected stormwater control practices
  - Work with model developers to enhance both agricultural and urban runoff models to include the ability to design most commonly used practices
  - Develop technical standards to help implement both agricultural and non-agricultural control practices
- Determine the critical sources of nonpoint source pollutants.
  - Complete source area monitoring for urban areas.
  - Consider using the Wisconsin Buffer Initiative for impaired waters identification and TMDL development.
  - Work with SLOH to determine proper tests to identify sources of groundwater contamination (strategic plan)
- Improve our knowledge of the pollutants or factors impairing the beneficial uses of Wisconsin surface waters and set new levels of performance standards to facilitate TMDL development and implementation.
- Determine the ability of the performance standards and prohibitions to achieve the beneficial uses of our rivers, lakes and streams.
  - Assist in determining whether current Best Management Practices are effective at achieving improvements.
  - Assist with calibration and verification of models used in planning and implementation of performance standards
  - Assist in determining what changes to our management measures, programs, projects and tools need to be made or which tools need to be developed

Monitoring Design

Most runoff management evaluations are developed for individual situations, thereby making each project unique in its design. Researchers might coordinate with existing monitoring schedules for fixed station, targeted, and baseline or ambient monitoring for lakes and streams, or might pursue separate monitoring schedules that best fit project needs. Before-and-after designs often use the same monitoring methods as were used in previous Tier 2 TMDL monitoring to provide results that can be directly compared. Addition of nutrient and bacteria parameters to baseline monitoring would help support nonpoint management research.

Whole stream monitoring (before and after BMP monitoring) is being conducted in selected priority watersheds where BMPs have been installed on a widespread scale. Monitoring is done before, during, and after practices are implemented, for a total of 10-15 years. For biological indicators, a Before-After Control Indicator (BACI) experimental design is used, which compares test sites with control sites where BMPs were not installed (control sites were not used for chemical parameters). Completion of the whole stream monitoring project is expected in 2009.

Agricultural

The designs for measuring status/participation/compliance will vary depending on the activity, and will likely be a combination of judgmental design and model output to establish baseline measurements and rate of compliance. Examples of agricultural non-point Tier 3 projects that are underway include the following:

- The status of the cropland erosion performance standard at the field level will be a measure of the number of acres of cropland that meet the tolerable rate of soil loss (T) as calculated using the Revised Universal Soil Loss Equation (RUSLE 2). The status of livestock-related performance standards and prohibitions, including nutrient management, will be measured through status reviews of conservation plans and nutrient management plans, followed by site inspections. Compliance checks will be done by county land conservation departments.

- UW Madison is conducting monitoring on several Discovery Farms to determine the effects of certain agricultural BMPs. Projects will be undertaken to investigate the water quality effects and cost-benefits of BMPs implemented under various management scenarios. Two participating farms have trained local samplers to collect high-quality data: one does traditional monthly stream sampling, another monitors tile line outflows (same parameters as stream monitoring). A third farm is monitored periodically as part of a school program. These data will provide a good baseline on which to build with more intensive monitoring at each farm in future years.
- Building on the research the resulted in the Wisconsin Buffer Initiative, the University of Wisconsin, with Department support, is moving to the implementation stage by conducting monitoring to attempt to correlate farm phosphorus losses with stream phosphorus concentrations in a series of Wisconsin watersheds. Phosphorus losses will be calculated using the Phosphorus Index (PI), and detailed producer surveys. Stream phosphorus content will be measured by USGS gauging stations, already set up in many watersheds. This monitoring will dovetail with the implementation of TMDLs across the state.
- Water quality monitoring is also a requirement of both rural and urban runoff management grants.

Urban

When opportunity arises, two primary methods are used to study urban BMP effectiveness: source area loading and single-source monitoring of specific BMPs. Monitoring of source area loading measures the levels of pollutants delivered from untreated individual source areas (driveways, roofs, lawns, etc.) where no BMPs are applied. The BMP-specific monitoring and source area loading monitoring are part of an overall plan to identify the sources of pollution and the effectiveness of corrective measures. This type of monitoring is usually conducted above and below an installed BMP. BMPs that the WDNR has tested (or is in the process of testing) include street sweepers, rain gardens, low impact development techniques, infiltration devices, detention ponds, and proprietary devices (such as Stormceptor and Vortechnics). Proprietary devices are monitored using EPA's Environmental Technology Verification (ETV) protocol. Information gathered is used to calibrate models such as SLAMM and P8, pollutant loading and reduction models for urban areas.

Core and Supplemental Water Quality Indicators

For long-term impact analysis, biological parameters are the least expensive means to address the effects of nonpoint pollution on the water resources. Baseline monitoring covers in-stream monitoring of biological parameters such as fish, macro-invertebrates and habitat and is conducted by regional biologists. Supplemental parameters such as sediment, nutrients, bacteria or toxics may also be measured during baseline sampling to support specific nonpoint projects.

Agricultural Core Indicators

- Total suspended sediments
- Total phosphorus
- Dissolved phosphorus
- Bacteria (E. coli)
- Temperature
- Flow
- Dissolved oxygen
- BOD
- Biological list (fish, macroinvertebrates, habitat)

Agricultural Supplemental Indicators

- Nitrite
- Nitrate
- TKN
- In-stream habitat

Urban Core Indicators

- Flow/Volume
- Total suspended solids loads
- Suspended solids concentration
- Sediments
- Dissolved phosphorus
- Total phosphorus
- Biological list (fish, macroinvertebrates, habitat)

Urban Supplemental Indicators

- Toxics (PAH, pesticides, etc.)

Quality Assurance

The WDNR has a quality management plan (QMP) and an Evaluation System manual code (MC 9314.1) in place that establishes processes and protocols that the state's monitoring program must meet. While there are several Quality Assurance Project Plans (QAPPs) developed for ongoing projects and several more are currently being developed, the QMP does not provide specific guidance for runoff management monitoring activities. As nonpoint source elements are developed or further refined for the water monitoring strategy, additional quality assurance processes and protocols may need to be developed if the QMP does not adequately address them.

Data Management

Data from projects funded with runoff management grants, including BMPs installed and monitoring results, are migrated into SWIMS on a daily basis. Water quality field data in SWIMS; assessment and field comments, indicated sources, impairments and pollutants can be held in WATERS. As the WATERS project evolves, WDNR will explore the options for building modules for nonpoint source data. Additional staff and funding will be needed for this effort. Other databases, such as the Fisheries Management database, are used as applicable. The whole stream monitoring and site specific monitoring results are published in USGS publications, since much of the work is contracted with USGS. These are available to the public through USGS or the department. Department staff is tracking both the issuance and satisfaction of notices of non-compliance under NR 151 and the performance standards and prohibitions notices of discharge under NR 243.

Agricultural

Department staff is developing a database to track manure runoff events and spills which are often a violation of the manure management performance standards. The goal is to store the data in SWIMS and WATERS to associate it with resource and assessment data. Permit tracking data for Concentrated Animal Feeding Operations (CAFOs) is housed in SWAMP and is maintained by Runoff Management Section staff. Staff from various agencies is trying to address the challenge of collecting relevant geo-spatial data in the face of varying county computer capabilities and staff shortages. If the Watershed Bureau decides to collect pollutant load data, data management procedures will need to be identified and developed.

Urban

Information about the stormwater permit program and the construction, industrial and municipal facilities covered by general or individual permits is stored in Oracle tables and available via the Stormwater interface. This interface is currently being merged into the SWAMP database system in order to bring uniformity for people interacting with both systems and to simplify maintenance. The Oracle tables store detailed information about facility locations, contacts, and compliance with permit conditions. A project is underway to allow construction site applicants to apply for a permit via the internet. Data submitted as a requirement of the permit could be migrated to the SWAMP database providing up-to-date information more efficiently.

Non-agricultural performance standards have been incorporated into the stormwater permits but the current database doesn't have specific fields to track compliance with performance standards. Regional and central office staff in the stormwater program has access to and input data into the SWAMP system. This database is not available to the public directly, but data from it is available online, in real time. This system is used for daily administration of the stormwater program and for billing purposes. This system can track compliance with the permitting program, but will not track pollutant load reductions or in-stream water quality data. This data can be held in SWIMS in the future.

Data Analysis/Assessment

Data on the status of runoff management projects, including the performance standards and prohibitions, will be collected and analyzed annually. Data collected as part of the whole stream monitoring or single source monitoring are used to calibrate models and set goals. The performance standards were developed and promulgated into administrative rules as a direct result of past monitoring efforts. These data are analyzed and reported in publications as informational pieces for the state and the public. This information is needed to assess whether a practice alone or in a treatment train with other practices can achieve the performance standards. Source area monitoring is necessary to predict end-of-pipe pollutant loads. These data are eventually included in model upgrades, a tool available to the public for estimating pollutant load reductions.

Reporting

Information about runoff management monitoring activities is reported as part of the joint WDNR/DATCP annual report to the Land and Water Conservation Board. Research results may also be used for the integrated 303(d)/305(b) Report, S. 319 Reports to EPA, and for listing/delisting waters under 303(d).

USGS publications report pollutant loading and reduction as a geometric mean concentration over a series of storm events for source area monitoring and measurement of BMP effectiveness. One to two seasons of data are included in the studies, which cover 15 or more storms. Specialized monitoring equipment was needed to collect surface runoff from source areas such as lawns, roads and roofs. These techniques are reported in trade journals and in publications within the state. Their availability is advertised on the USGS website.

Programmatic Evaluation

Data to measure progress toward meeting program goals will be collected annually to summarize compliance statewide. Much of the data tracking will be done by counties and permitted municipalities, and reported to WDNR for evaluation. A process and timeline to evaluate the data has not yet been determined.

The public has a need to know which practices can achieve the performance standards. To this end, the state is providing technical standards for BMPs and monitoring results for proprietary devices and making them available on the WDNR website. Feedback from the public provides direction to the department on which BMPs to evaluate and which technical standards to develop. The technical standard development process is an opportunity to provide the detail that may be needed to implement a performance standard. The general language of the performance standard allows maximum flexibility, but minimum direction. The technical standards provide direction if the public chooses to use them. The technical standards, by their nature, can be adapted as needed to changing situations and public feedback.

General Support and Infrastructure Planning

Staff and training – WDNR FTE and some LTE in Integrated Science Services spend significant time on nonpoint monitoring projects. USGS staff and students also contribute time to these projects, and WDNR usually supports University of Wisconsin Madison students as well. Nonpoint monitoring could provide excellent opportunities for citizen monitoring, and volunteers will be considered for specific projects on a case-by-case basis.
Laboratory resources – Approximately $120,000 annually is used toward laboratory analysis at the State Lab of Hygiene.
Funding – Approximately $560,000 is allocated to fund nonpoint source monitoring annually. About $405,000 of this amount comes from EPA grants, and $155,000 in state nonpoint source segregated funds. Outside sources such as municipalities and counties provide matching monetary and staff resources. Some additional funding needs are listed under *Program Gaps* below.

Program Gaps

- Baseline monitoring is provided across the state in locations determined by the regional biologists. For this information to be beneficial to the nonpoint program, collection of land use information including practice installation in the basins tested would enhance the predictive nature of this information.

Baseline monitoring could be conducted in a watershed where no practices have been implemented as a background condition and then conducted later in watersheds where implementation of the performance standards has been broadly successful. Data from the monitoring under these conditions will provide answers and direction for the program in setting future goals. County and municipal staff has information on land use and could provide this information in same cases as a GIS layer. To meet this goal, the department would need to set as a priority the availability of land use data and BMP installation when identifying sites to monitor.

- A second area of concern is collecting information on source areas. Many source areas have been monitored, but to provide a thorough mass balance of a watershed, many more source areas need to be evaluated. A strategy of monitoring six different types of source areas per year for three years (18 total source area types) would provide the state with a relatively complete array of sources and predicted pollutant loads. This information will be used to improve the existing urban models. The cost of this effort would be $30,000 per source area, with USGS providing the staff under contract to the department.

- A third limitation has been the closure of existing stream gauging stations. Flow measurement is necessary to determine whether the infiltration performance standard has resulted in volume reduction. Stream gauging stations have been taken out of service recently to save the $4,000 annual maintenance fee. These stations are clearly needed to provide long term tracking of the hydrology of the watershed. Implementation of BMPs, without the flow data, limits the state's ability to predict the effectiveness of the current infiltration performance standard and whether the goal should be modified. The performance standards are applied statewide, but there is an interest in providing targeted performance standards where additional control is needed. Restoring stream gauging stations in critical ecosystems would be the first step to providing the information needed to set site specific "targeted" performance standards.

- A fourth concern is the challenge of coordinating monitoring among various federal and state agencies that have multiple monitoring objectives, including ability to share data collected under different systems. WDNR has limited ability to influence how data are tracked and reported if it is collected by other agencies.

- A fifth concern is the need to continue monitoring to evaluate the effectiveness of different types of BMPs in urban areas. Monitoring must include all the types of unit processes that are available for urban BMPs (e.g., sedimentation, filtration, floculation). It would also be useful to evaluate how well the urban practice assessment protocol is working.

- A sixth concern is the lack of information on which pollutants in urban streams are toxic to the biota and what levels of these pollutants can be tolerated by the biota. Extensive studies by the WDNR have identified high levels of mortality and dramatic changes in sexual behavior in test organism when exposed to water from urban streams. A higher level of effort is needed to associate specific chemicals with the observed impacts.