



Total Maximum Daily Load (TMDL) Implementation Tracking Needs Assessment

Current Status and Future Needs for States in Regions 5, 6, and 10

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1.0 EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency (EPA) Region 5 Total Maximum Daily Load (TMDL) Program recently performed an analysis of current watershed restoration performance measures and potential hurdles to identifying future restoration goals and priorities. EPA has always recognized the value of tracking and categorizing ongoing TMDL implementation efforts. However, the results of the Region 5 analysis revealed the magnitude of the importance of documenting and tracking implementation efforts for TMDLs and other water quality restoration efforts, and the benefits that would ensue from such efforts.

The Cadmus Group, Inc. (Cadmus), along with team members Camp Dresser & McKee, Inc. (CDM) and Geosyntec Consultants, were retained by EPA to assess the current status of TMDL implementation tracking in nine different states, including each of the Region 5 states (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin), two states in Region 10 (Alaska and Washington), and one state in Region 6 (New Mexico). In addition to assessing the current status of TMDL implementation tracking, TMDL implementation tracking needs were also determined for each of the nine states. In addition to the state interviews, several discussions also took place with EPA headquarters and regional staff in order to obtain their perspectives on the need to track TMDL implementation, including information on what to track (e.g., indicators) and how to track it (e.g., tools).

The level of tracking performed by the nine states interviewed varies from almost no tracking of implementation information to relatively robust dedicated tracking systems with query and reporting functions and spatial tracking capabilities. Most of the states do not have a dedicated TMDL implementation tracking system in place. However, almost all of the states interviewed see value in developing and implementing a tracking system, with potential benefits ranging from establishing a process and indicators for tracking interim implementation steps to reporting progress on restoration to multiple internal and external stakeholders.

The following were identified by the states and EPA as the primary benefits and advantages to having a mechanism in place to track TMDL implementation:

- Provides a method to monitor and track the effectiveness of TMDL implementation.
- Help monitor and track activities of all agencies involved with implementing TMDLs.
- Provides management with a central location to review TMDL implementation progress.
- Allows for the quick generation of reports on implementation progress for EPA, state legislature, and the public.
- Supports cross program coordination (e.g., TMDL, 319, NPDES, etc.)
- Enhances information sharing capabilities among Federal, state, and local agencies.
- Support for watershed based management programs.
- Shows link between funding, implementation activities, and water quality improvements.
- Potentially useful tool to help guide program direction.
- Provides useful information for permit development and monitoring planning.

- National tracking would allow for the comparison of data across state lines. In turn, this could enable EPA to consistently report on key questions, such as “are we implementing our TMDLs” or possibly, “are we cleaning up our watersheds.”
- Tracking system could help states and EPA with national performance measure reporting needs.

Two major challenges to tracking implementation were identified. First, there is no identified source of funding to develop and maintain a tracking system. States that do not currently possess a tracking system have not allocated funding to develop a system. States with tracking systems have limited funding for ongoing development. States are also concerned about the level of resources necessary to maintain data entry and reporting. Most states interviewed indicated that 0.5 to 1.0 additional full time staff equivalents (FTE) would be necessary over current staffing levels for the data entry, maintenance, and reporting they would envision if a system were in place. The second major challenge was identified by states with their own tracking systems in place. States with existing systems capable of tracking implementation information would prefer to continue to develop and utilize their own systems. If a national system were to be created, states with their own tracking systems expressed concern with the need to establish interfaces that would allow for data exchange between the state and national systems.

The following were identified by the states and EPA as the key features or capabilities they would like to see in a TMDL implementation tracking system:

- Ability to track and report on interim milestones for TMDL implementation and not just the single end goal of achieving water quality standards.
- Ability to track EPA-funded and non-EPA funded projects (e.g., Farm Bill projects).
- Ability to easily query and extract data for reporting purposes.
- Include both programmatic progress and environmental progress. For example, a programmatic milestone may be whether or not controls (e.g., permits) have been implemented. An environmental milestone would be the progress of that control toward improving water quality.
- Needs to support ability to report on both qualitative and quantitative measures of success.
- Web-based functionality.

This assessment was undertaken to be proactive as both EPA and states are developing a growing interest in understanding and documenting TMDL implementation as a crucial step on the way to waterbody restoration. It is important to begin thinking about how best to track the implementation of TMDLs in order to ultimately report on the level of waterbody restoration. Most states would use a tracking system if developed by EPA, especially those that have not already developed a state-specific system. Some states would consider the availability of a tracking system as an impetus to begin formal TMDL implementation tracking in their state. The most significant obstacle to tracking TMDL implementation is the limited availability of resources for developing and maintaining a tracking system.

A critical first step in the development of a state, regional, or national tracking system will be the identification of a consistent set of indicators to track implementation. A minimum set of tracking indicators, and other potential indicators, was developed during this assessment and is contained within this document. Further refinement and development will be necessary for a standardized tracking tool. States should work with EPA to develop these indicators, in order to be as consistent as possible.

Minimum implementation indicators would include:

- TMDL adoption, such as: waterbody ID, pollutants addressed, etc.
- Implementation plan development and approval
- Responsible implementation parties
- Allocations incorporated into permits
- Completed projects
- Water quality monitoring triggers
- Restoration evaluation

Before further exploring the architectural framework for a potential regional or national tracking tool or database, the first recommended next step is to develop a workgroup comprised of state and EPA staff to further discuss the many questions and issues about a national or regional tracking database that arose during this assessment; for example, what would be the primary uses of a tracking database? Following these discussions, the workgroup would clearly define the goals and objectives of a tracking system, as well as identify the intended uses.

Once the goals and intended uses of the system are established, the second recommended next step would be to identify the various indicators and benchmarks necessary for tracking the implementation of TMDLs and other water quality restoration efforts. This would be a collaborative process between states and EPA to ensure consistency. A number of potential indicators and benchmarks were identified during the interviews with the states and EPA (and discussed throughout this report). Minimum implementation indicator categories would include:

- TMDL adoption, such as: waterbody ID, pollutants addressed, etc.
- Implementation plan development and approval
- Responsible implementation parties
- Allocations incorporated into permits
- Completed projects
- Water quality monitoring triggers
- Restoration evaluation

The results of the state/EPA workgroup planning process would be documented in a report for EPA and states to refer to should either explore the possibility of developing a state, regional, or national tracking system.

2.0 INTRODUCTION

In a recent report, the Office of Inspector General (OIG) noted the need to report information on TMDL implementation activities and on the water quality improvements associated with total maximum daily loads (TMDLs). In the September, 2007 report¹, OIG recommended that the U.S. Environmental Protection Agency (EPA) Office of Water demonstrate that TMDLs are being implemented by annually reporting on the progress of TMDL implementation activities completed nationwide including the number of TMDLs that have all wasteload allocations incorporated into National Pollutant Discharge Elimination Systems (NPDES) permits and have implemented load allocations through at least one best management practice (BMP) funded through the Clean Water Act (CWA) Section 319 Program. OIG further recommends that the Office of Water demonstrate the results of implemented TMDLs by annually reporting on the progress of water quality improvements resulting from TMDLs nationwide.

Currently, once a TMDL is approved, there is no standardized process for tracking on-the-ground implementation efforts and progress. This severely limits the ability of the EPA and the states to predict recovery and provide follow-up monitoring, assistance, and support. Nationally, EPA is in the process of developing a TMDL program “pipeline” as an organizational framework for developing, assessing, and interpreting results measures. The pipeline identifies key stages along the TMDL process including listing, planning, implementation, and recovery. Region 5, as well as the other regions that participated in this survey, believes that this process can be enhanced by putting in place, a process that captures the necessary information to allow for the classification of each waterbody with a completed TMDL into categories along the TMDL pipeline.

The EPA Region 5 TMDL Program recently performed an analysis of the current watershed restoration performance measures and potential hurdles to identifying future restoration goals and priorities. EPA has always recognized the value of tracking and categorizing ongoing TMDL implementation efforts. However, the results of the Region 5 analysis revealed the magnitude of the importance of documenting and tracking implementation efforts for TMDLs and other water quality restoration efforts, and the benefits that would ensue from such efforts. For example, tracking implementation efforts would allow for TMDL Program results to be more accurately reported and predicted.

The Cadmus Group, Inc. (Cadmus), in conjunction with Camp Dresser & McKee, Inc. (CDM), and Geosyntec Consultants, were retained by EPA to assess the current status of TMDL implementation tracking in nine different states, including each of the Region 5 states (Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin), two states in Region 10 (Alaska and Washington), and one state in Region 6 (New Mexico). In addition to assessing the current status of TMDL implementation tracking, TMDL implementation tracking needs were also determined for each of the nine states. In particular, each state’s needs were evaluated with respect to developing a state-specific or EPA tracking system.

The assessment was completed through a combination of face-to-face meetings with state TMDL, 303(d), and information systems personnel; conference calls with EPA regional and headquarters staff, and web-based research. The purpose of this report is to summarize the results of the assessment and identify recommendations and potential next steps. Information specific to each state interviewed is

¹ *Total Maximum Daily Load Program Needs Better Data and Measures to Demonstrate Environmental Results*. 2007-P-00036.

contained within Section 3 of this report, including examples of existing data tracking systems (for TMDLs or other program information); Section 3 also contains noteworthy information from other states that were not interviewed, but were researched through the internet. Section 4 presents EPA's perspective on TMDL implementation tracking. Sections 5 and 6 present conclusions and recommendations for next steps, respectively.

3.0 INDIVIDUAL STATE ASSESSMENTS

3.1. Alaska

3.1.1. *Current TMDL Implementation Tracking Process*

Most TMDLs in Alaska have a single wasteload allocation, such as to a stormwater permittee, seafood processor, logging or mining operation, etc. The biggest challenge with respect to TMDL implementation in Alaska is that its implementation actions are primarily voluntary. Most of their TMDLs do not have competing wasteload allocations. A major challenge in Alaska is determining natural conditions and natural contributions that are difficult to distinguish from human actions. This will be an increasing challenge with significant changes in climate. Alaska has limited 319 Program funds compared to the size of the state, but may have fewer agricultural impacts than would be expected. Alaska focuses more on protecting waters, rather than restoring waters; this focus guides the state's program activities, data collection, and management.

Alaska's TMDL program staff totals 5 full time equivalents (FTE), with 1.5 to 2 FTE dedicated to TMDL development and tracking. The remainder of the 5 FTEs manage the 319 Program, public outreach, and other program elements. Regarding resources, relatively little data are tracked on the vast number of waters in the state. A relatively small amount of funding is allocated to Alaska for such purposes.

Currently, Alaska does not have a shared tool or application for tracking TMDL implementation. Information on TMDL implementation is limited to filing information in electronic folders or email folders. Alaska uses a variety of Microsoft Excel spreadsheets to track minimal summary information on the current status of TMDL implementation. A few years ago, a Microsoft Access-based application was developed to manage basic information on state waters, including pertinent TMDL implementation information. No predefined categories or indicators for TMDL tracking have been developed or are in use in Alaska. The information that is tracked varies by waterbody and is often based on the issues involved. The current Microsoft Excel and Access databases contain information on various priority waters (TMDL waters or not); and if a TMDL is in place, pertinent information on implementation progress is entered.

Alaska is currently using EPA's Assessment Database (ADB) and Grants Reporting and Tracking System (GRTS). Alaska also recently began the process of developing a web-based module addition to its existing Alaska Clean Water Actions (ACWA) database to track and manage information on Alaska's waters, including impaired waters and TMDL actions. The ACWA database was developed from 2002-2005 to bring together information about funding, grants, and expertise on waters. The database is a web-based application used to identify and prioritize impaired waters. Alaska began the process of

developing a web-based module and waters of concern, but currently has no capability for managing other information. About 400 waters were nominated, 120 of which are high priority. The application contains limited information; therefore, it is seldom used.

3.1.2. Needs with Respect to TMDL Implementation Tracking

For Alaska, the benefits of tracking TMDL implementation include:

- Ability of management to have an organized place to review and evaluate TMDL implementation progress.
- Ability to generate reports on implementation progress for EPA, state legislature, and the public.

The following key features for a tracking tool were identified by Alaska:

- Ability to move waters on or off impairment lists.
- Ability to track long-term, phased approach to resolve issues in some waters.
- Ability to export data in format that can be loaded into GRTS and ADB.
- Standardized performance measures to determine progress relevant to Alaskan conditions.
- Ability to use with Alaska-specific data (GIS projections, etc.).
- Ability to track biological health of waters (e.g., habitat index, macro invertebrate index, etc.)
- Compatible with Microsoft SQL Server.
- Provides flexibility to easily add features specific to Alaska, such as managing information on climatic change impacts on Alaska's waters.
- Tool that uses same field naming structure and organization of information as is used in other EPA databases (such as GRTS, ADB, STORET), where relevant.
- Clear, logical, and consistent hierarchal approach to identifying the scope of a water “unit.” For example, Alaska has found it difficult to prioritize and manage information and approaches on stretches of streams over 40-60 miles in length.

With regards to indicators tracked, Alaska would need flexibility on the type of indicators, as some Alaska TMDLs are very different than others with respect to implementation. Key indicators and tracking measures for Alaska include:

- Completed watershed management plan in place
- Responsible parties identified
- Funding availability/source

Regarding limitations to the use of a tracking system, Alaska has centralized its Information Technology (IT) programs and has restrictions on types of applications it will support. Oracle is not supported. Alaska uses the Microsoft SQL Server backend and DOT NET User interface frontend. Alaska sees little benefit to an ability to directly link to existing EPA databases, but supports the ability to manually import and export data from another system to a TMDL implementation tracking system, like STORET

data, ADB, etc. Alaska does have a data node and is actively pursuing using the node to transfer data systems to EPA, where appropriate.

Alaska feels that an easy to use, low cost to implement TMDL tracking tool would provide sufficient incentive to begin tracking TMDL implementation status in the state. Alaska has no preference regarding a state-specific tool or an EPA tool; however, they did mention that any EPA system would need to be flexible enough to handle Alaska-specific issues (e.g., GIS projection), and they would prefer a tool that would be compatible with the ACWA database, as it is used for information about protecting waters as well as restoring waters. Alaska has a willingness to integrate existing state tracking tools with EPA systems, despite not having had good working experience with current linked databases; for example, EPA's Watershed Assessment, Tracking & Environmental Results (WATERS) is not particularly useful to Alaska. If a national or regional tool were not developed, a development plan for a state-specific tracking tool would be attractive to management for consideration and implementation.

3.2. Illinois

3.2.1. *Current TMDL Implementation Tracking Process*

The Illinois Environmental Protection Agency's (IEPA) current focus is on completing TMDLs primarily in rural watersheds. IEPA uses GRTS to track Section 319 program information, but is not directly tracking TMDL implementation information. IEPA has developed another system to track and report similar program information known as the Resource Management Mapping System (RMMS). RMMS was developed by the University of Illinois in conjunction with IEPA, Illinois Department of Natural Resources, and the Illinois Department of Agriculture to track information related to several programs and initiatives, such as 319 project information, social indicators, 303(d) information, *Conservation 2000* efforts, funding allocations and tracking, and implementation schedules. RMMS is a Geographical Information Systems (GIS) tool built using ArcIMS 9.0, and may be viewed at <http://www.rmms.uiuc.edu/website/rmms/>.

RMMS is accessible to the public, and receives 3-4 visits per day. Some data in RMMS (e.g., land owners) are restricted even for in-house users. It is not currently linked to other information systems, nor is it linked to water quality systems (STORET, which IEPA uses), nor NPDES permit information, but IEPA would like it to be. RMMS was envisioned as a tool for making program information available to the public. It currently contains TMDL tracking fields for "TMDL Started" (year) and "TMDL Completed" (year). Financial support for the development and maintenance of RMMS came from the 319 program; however RMMS has not been maintained for several years due to a lack of funding.

RMMS provides a number of reports via the website. IEPA can enter data into RMMS, but they have no ability to manipulate it within the system. IEPA has some ability to use the system to generate reports, but it does not function fully as intended. RMMS can give load reduction information, but does not calculate data on a watershed level. IEPA has also developed and maintains a web-based interactive mapping tool (<http://maps.epa.state.il.us/website/wqinfo/viewer.htm>) that has good GIS capabilities for representing waterbody assessment and water quality impairment information throughout the state. IEPA would like to integrate RMMS and the interactive mapping tool with tracking capability for TMDL implementation and other water quality restoration information.

3.2.2. Needs with Respect to TMDL Implementation Tracking

IEPA feels an integrated state-specific tool, or EPA-developed application should have functionality for entering and tracking the following implementation information and indicators:

- Implementation or watershed plan approval (date)
- Permits approved (date)
- Implementation started (date)
- Implementation completed (date)
- Monitoring / assessment results
- Water body restored
- Number of acres with best management practices (BMPs) implemented
- Number of acres with conservation tillage / set aside acres
- NPDES permit issuances that include TMDL allocations
- Implementation on a county-wide basis
- NRCS BMP annual report information

IEPA likes the idea of tracking implementation by monitoring, with monitoring triggers being a part of the tracking process. Restoration percentage could be based upon the pounds of pollutant reduced toward the allocation goal. Information on some impairment causes, i.e. septic systems, may need to be tracked, but are outside of IEPA purview.

IEPA feels a tracking system should also be able to be used to report:

- Progress on implementation, to answer local questions, and questions from elected officials
- “Areas of concern”
- EPA requested information
- Effectiveness of implementation efforts between watersheds

IEPA considers key features of a tracking system to include the following:

- Accommodate more than one TMDL per waterbody
- Ability to report out on a statewide, countywide, hydrologic unit code (HUC), and stream basis
- Water quality parameter specific sorting and reporting
- Tracking additional impairment causes that come in after TMDL adoption
- Tracking expected load reductions
- Tracking the success of other watershed BMP implementation efforts / success comparisons
- Adjacent watershed level of interest to gage future TMDL interest

IEPA feels its current systems are not well suited to accommodate TMDL tracking, but could be modified to do so. IEPA would like to link the interactive mapping tool and RMMS, and develop TMDL implementation tracking capabilities from these tools, or with functionality linked to these tools, so that another separate tracking system would not have to be maintained. Any database development and roll-out would be managed by Illinois' IT Department and not directly by IEPA. Coordination with the IT department staff and processes will be required. IEPA dedicates 0.1 FTE to managing data in RMMS, and feels that 0.5 FTE would be a good level for maintaining a dedicated implementation tracking tool.

IEPA wouldn't mind integrating RMMS with another complementary system that allows them to track TMDL implementation. However, they would not like to use an entirely new system for this purpose. RMMS had several funding partners, so funding issues would have to be resolved with any new database. Other agencies have helped develop RMMS, and may want to continue using it.

3.3. Indiana

3.3.1. *Current TMDL Implementation Tracking Process*

The Indiana Department of Environmental Management (IDEM) has developed and is using a database (in both Microsoft Access & Excel) that tracks TMDL development through completion. This information is also in EPA's Assessment Total Maximum Daily Loads Tracking and Implementation System (ATTAINS) database. IDEM uses ATTAINS to track TMDLs that are submitted and/or approved. IDEM also uses GRTS to track 319 program information. IDEM has also developed an Assessment Information Management System (AIMS) database (that has a Microsoft Access front end with an Oracle back end) that tracks water quality data collected by their assessment branch. AIMS was developed by a contractor. IDEM has five watershed specialists that help administer watershed groups, and help set up and maintain the AIMS TMDL development database.

IDEM is not currently maintaining a tracking process or system for TMDL implementation. Implementation data are anecdotal and communicated either verbally or via emails from various groups, then filed in paper form by waterbody. Information on TMDL implementation comes from the watershed specialists, but not in a predictable or consistent way. There is no database or system in place to track this information, or link it to AIMS or ATTAINS.

3.3.2. *Needs with Respect to TMDL Implementation Tracking*

IDEM feels the benefits of a TMDL implementation tracking system would include:

- Helping to guide program direction.
- Providing for cross program coordination.
- Tracking implementation effectiveness; use of funding.
- Easing the ability to inform the public on implementation successes.
- Providing good information for permit development and monitoring requirements.
- Having some groups set up to be self reporting.

IDEM feels that key features of a TMDL implementation tracking tool could include:

- Web based design.
- GIS interface and analytical features.
- Specific to intended purpose, waterbody restoration, not an add-on to another existing tool; something new that pulls from other existing databases.
- Real-time access to information (no manual update of an off-line database).
- User friendly and well documented – a true user manual provided.
- Designed to answer real questions.
- Ability to get at raw data out of the database for use for other purposes.
- Ability to answer unanticipated questions.
- Information on agricultural practices would make implementation tracking more effective.

IDEM feels that key tracking indicators could include:

- An initial indicator or milestone, such as implementation plan completed.
- Percentage of measures that have been implemented.
- After implementation, monitoring to show changes in water quality (a monitoring trigger).

IDEM would like to have a database system to track TMDL implementation information, and would prefer EPA develop a tool for IDEM to transmit data into. There is no strong driving force to develop a state-specific implementation tracking tool at this time. An implementation database would give IDEM the ability to answer likely implementation questions from multiple sources. IDEM would prefer a web-based, GIS capable system specifically for tracking waterbody restoration. Ideally, such a system would allow users to upload and download data from other in-house systems that they may have.

IDEM would prefer to have a tool less cumbersome than GRTS and AIMS to get data for various reporting purposes, and more functional than its existing databases as far as linkage and GIS capabilities. On-going water quality monitoring data needs to stay in the AIMS database for consistency and comparison over time.

IDEM could be limited by the staff resources necessary to maintain a tracking tool and mine data from it. Because IDEM is not specifically tracking TMDL implementation, IDEM does not currently have dedicated staff for this purpose. If a tracking system existed, IDEM estimates 1-1.5 FTE would be needed to manage TMDL implementation data. IDEM does not currently have budget for this, but would be willing to explore using 319 funds for the staff needed for TMDL tracking. IDEM estimates 12 IDEM staff would need to access a tracking system for various data entry, analysis, and reporting purposes. Having a TMDL implementation tracking system in-house could create never ending ways to tweak or query the data, which may be resource intensive. Limitations could also arise as any new tool would be managed by Indiana's State IT department, and not IDEM.

3.4. Michigan

3.4.1. *Current TMDL Implementation Tracking Process*

TMDL implementation in Michigan is accomplished through NPDES permit renewals, Section 319 grants administered through the Michigan Department of Environmental Quality (MDEQ), state nonpoint source pollution control grants funded through the Clean Michigan Initiative (CMI), compliance actions conducted by the MDEQ and local units of government, and technical assistance provided through programs such as the Michigan Agriculture Environmental Assurance Program (MAEAP). However, the State does not yet have a coordinated process to target implementation activities. TMDLs typically identify implementation activities that have occurred, are underway, or are expected to occur; however, the TMDLs do not generally provide specific recommendations for implementation. Nonpoint source control implementation activities are developed through the watershed planning process supported under Section 319 and CMI grants.

MDEQ has begun to focus 319 projects on impaired waters, and the next Section 319 Request for Proposals will seek to further focus projects on impaired waters. MDEQ may also identify priority watersheds for implementation activities in the future.

MDEQ centralizes 319 and CMI grant tracking, but projects can be developed and implemented centrally or in the District Offices. MDEQ tracks the grants in a Microsoft SQL Server database with a Microsoft Access front end to facilitate data entry. The projects are located with latitude and longitude coordinates, and estimated load reductions are tracked. MDEQ manually uploads 319 and some CMI and MAEAP project tracking data to GRTS. The State has chosen not to use GRTS as its principal project tracking system, because they find it difficult to use.

DEQ also maintains the NPDES Management System (NMS), a detailed database to track NPDES permit status. Data from the Michigan system are uploaded to EPA's Permit Compliance System (PCS). DEQ reports \$250,000 to \$500,000 in Discharge Monitoring Report (DMR) savings from use of NMS to upload data to EPA's PCS database.

3.4.2. *Needs with Respect to TMDL Implementation Tracking*

The State would like to develop a data system that tracks the number, location, and types of implementation activities by watershed. The State would also like to track the following:

- Load reductions achieved.
- Watershed grants.
- Watershed groups, watershed meetings, and public involvement.
- Compliance and enforcement activities
- Education and outreach activities

MDEQ sees the value of an implementation tracking system, but the State does not have the resources to develop their own system. As a result, they would like to see a web-based tool developed that could

be accessed by MDEQ, other agencies and organizations conducting implementation activities, and the public. MDEQ is also limited by the staff resources available to support data systems. Data entry is conducted across the Division.

MDEQ would like to see database templates developed that outline the types of implementation activities suitable for different types of TMDLs and causes of impairment. Templates could prompt watershed groups to conduct implementation activities. MDEQ would also like to provide the public with the ability to add data to the system. MDEQ believes that this approach would support public outreach.

MDEQ would also like to see the system developed in a manner that would support current reporting requirements, such as data provided for GRTS. In addition, the state would like to link water quality monitoring data to allow for an assessment of the impact of the implementation activities on water quality improvements. The system should also link to NMS or PCS to allow for wasteload allocation implementation tracking. By also tracking nonpoint source implementation activities and linking to water quality monitoring data, the system should be able to influence future grant targeting and water quality monitoring activities. DEQ made a pitch for support from EPA for XML transfer from existing DEQ databases to existing EPA databases (like GRTS). They would also want this support for any future DEQ databases.

3.5. Minnesota

3.5.1. *Current TMDL Implementation Tracking Process*

The Minnesota Pollution Control Agency (MPCA) is currently implementing TMDLs through the Section 319 grant program and the Clean Watershed Partnership (CWP); however additional resources have recently become available under the Clean Water Legacy Act.

MPCA currently tracks a variety of information regarding the implementation of Clean Water Act watershed programs. The tracked information is documented in the reporting requirements and formats for watershed projects in the following links. The following link is the overall financial assistance page with links to specific topics: <http://www.pca.state.mn.us/water/cwp-319.html>. Links included in this overall page include:

- Semi-annual budgeting and reporting forms - <http://www.pca.state.mn.us/water/cwp-319.html#forms>
- Final report format and requirements - <http://www.pca.state.mn.us/water/cwp-319-finalreport.html>
- Annual reports to EPA synthesized from the projects' semi-annual and final reports and program information - <http://www.pca.state.mn.us/water/cwp-319.html#reports>. MPCA has worked to make the annual reports more “interesting” in recent years. They contain a summary of implementation activities from the LARS and eLink databases.
- Water quality data submittal for STORET - <http://www.pca.state.mn.us/water/storet.html>. Data management staff for STORET have done a real nice job in setting up forms and a process for establishing monitoring sites in STORET, submitting data, and reviewing the data.

- The eLink web page is at <http://www.bwsr.state.mn.us/outreach/eLINK/index.html>. eLink is used to track implementation activities from multiple programs. MPCA requires it for all implementation projects under 319, CWP, and now the Clean Water Legacy Act. The Board of Water and Soil Resources (BWSR) uses it for their state cost-share funds.

Other information sources include the Stream Hydrology Program, which uses a unique database and processing software known as HYDSTRA for storage and management of the data from the network of stream gages (http://www.dnr.state.mn.us/waters/surfacewater_section/stream_hydro/index.html). The HYDSTRA system stores Department of Natural Resource (DNR) Waters stream data, DNR Ecological Resources stream data, and the MPCA stream data. This is the first time the DNR and MNPCA are archiving stream data in the same location. Other DNR divisions and outside cooperators have expressed interest in sharing this data system as well.

HYDSTRA is a collection of database management tools and hydrologic software packages that allows users to store and organize historical data, graphically analyze and edit hydrologic data, store and access digital photos, maps and other documents associated with stream files. HYDSTRA also offers various output formats, both graphical and tabular, to share stream data with others. Flood forecast/warning system gage data are automatically downloaded into HYDSTRA via a satellite link. Stream flow and stage data collected at DNR Waters' special project sites or reported to DNR Waters by hydropower facility operators are also stored in HYDSTRA. DNR flood warning gage data can be accessed at the DNR/MPCA Cooperative Stream Gaging Web page and a National Weather Service Web site.

3.5.2. Needs with Respect to TMDL Implementation Tracking

With the advent of additional implementation funding under the Clean Water Legacy Act, MPCA is looking to update its implementation tracking and reporting processes. They have two main objectives:

1. Adapt Business Object Model (BOM) software to better track watershed restoration activities.
2. Work with the University of Minnesota to determine what reports and indicators can best communicate watershed restoration progress to legislators and the public.

As a first step, MPCA developed a report for the legislature on how to communicate watershed restoration results. MPCA is also working with the University of Minnesota to develop a survey and series of focus groups to determine what effectiveness measures interest different audiences.

MPCA has also developed a nonpoint contract tracking (NCT) database as an interim tool. NCT tracks grants and reports. eLink (described above) is also used to track projects funded under 319 and BWSR.

In its new system, MPCA is planning to track economic data, provide live GIS links to project locations, and include flow analyses linked to HYDSTRA.

MPCA is currently not collecting geographic positioning system (GPS) data on BMP project locations. Instead, the agency is drawing project locations on aerial photos or topographic maps.

MPCA also does not currently track reductions in loads. The agency is forming a workgroup to determine means to track achievement of water quality standards (WQS) and procedures for targeting

monitoring based on assessments of the status of restoration project implementation. MPCA is planning to devote 1.5 to 2 FTEs for BOM development. In terms of current, ongoing data management costs, the agency is devoting the following resource by data system:

Database	FTEs
NCT	1
HYDSTRA	2
STORET	2 – 3
ADB	1

MPCA would like to see database examples from other states. They are interested in what measures and indicators other states are using and how to communicate with stakeholders.

3.6. New Mexico

3.6.1. *Current TMDL Implementation Tracking Process*

The State of New Mexico has been operating under a 1997 consent order to complete its TMDLs for 303(d) listed waters on a timely basis. As a result, most of the Environment Department’s efforts to date have focused on TMDL development, rather than implementation. Implementation tracking to date has primarily focused on wasteload allocation implementation through the NPDES process administered through EPA Region 6. Region 6 also permits MS4s.

EPA Region 6 has looked into modifying GRTS to better track the impacts resulting from Section 319 project implementation. The State and Region are looking at focusing future 319 RFPs on priority watersheds. The State is also developing nutrient criteria that would be implemented through an iterative approach.

The State’s Watershed Protection Section encourages the implementation of certain BMPs by incorporating TMDL recommendations into 319 RFPs. When the grantee is selected, the BMPs are incorporated into the project work plan. The State would also like to see better linking of BMP implementation with water quality monitoring results. They believe trends in water quality are an important measure of program success. WQS may not be achievable in all waterbodies. As a result, achieving some improvement is important to demonstrate. Use Attainability Analyses (UAA) and WQS revisions may be suitable for those waterbodies. The Hamus River Watershed is the first to undergo follow-up monitoring to assess the impact of \$1 million in funded BMPs.

New Mexico is not currently using a data system to track 319 or other nonpoint source projects. Wasteload allocations implemented through NPDES permit revisions are tracked through PCS. Quarterly reports from grantees are tracked on spreadsheets maintained by program staff. Projects are typically 4 to 5 years in duration.

3.6.2. *Needs with Respect to TMDL Implementation Tracking*

New Mexico would like an implementation tracking tool, especially for 319 grants. They would also like to see other programs and agencies use the tool, such as NRCS, USGS, tribes, and municipalities to better capture the range of implementation activities being pursued in the watersheds. New Mexico has adopted ORACLE as the information technology standard. They would be willing to use a web-based tool, as long as it supports their current reporting requirements.

The state is supporting a cooperative, watershed-based approach to water body restoration activities. They want to collaborate with other agencies and tribes to share resources and promote communication. As a result, they would like to see the tool made available to these other groups to better characterize the bigger picture of watershed implementation.

3.7. Ohio

3.7.1. *Current TMDL Implementation Tracking Process*

Like many states, Ohio is just beginning to track TMDL implementation. To date, Ohio EPA has focused primarily on developing TMDLs. Up until now, virtually all TMDL resources have been devoted to TMDL development. Approximately 95% of program resources are devoted to TMDL development, as opposed to restoration. However, the state is increasingly focusing greater attention on TMDL implementation and water quality restoration efforts.

Ohio developed its own water quality tracking system which is not compatible with ADB. Ohio does track and report GRTS data, as well as prepare semi-annual reports for the nonpoint source program. The semi-annual reports are the main means of tracking actual implementation activities. Ohio also has its own NPDES permit compliance tracking system.

Implementation tracking has been driven by individual staff. As a result, Ohio is developing a Microsoft Excel spreadsheet to track implementation progress across the program. Maintaining the spreadsheet will be made part of work plans. The spreadsheet will track accountability for implementing the TMDL. The spreadsheet will not track restoration actions.

Ohio uses biological indicators, so they are interested in using them to track implementation progress. Ohio does not do a lot of reporting outside of the agency, including to the legislature. Section 303(d) and 305(b) reports drive the data tracked by Ohio. Ohio's TMDLs have evolved to focus on watershed restoration goals and to identify projects in programmatic work plans.

3.7.2. *Needs with Respect to TMDL Implementation Tracking*

Ohio has had an ongoing problem with ADB, because the state lists by watersheds and not segments. However, Ohio EPA would be willing to use a national implementation tracking system. A national data system would have to be consistent with Ohio's use of biological indicators. The database should be a web-based application. Ohio would also prefer a system that fits in with and links existing databases. Current state databases have been set up to meet existing reporting requirements. Their databases would

still need to be maintained as implementation tracking systems are developed. Nonetheless, the State supports the development of an implementation tracking database. In ten years, some sort of system will be needed to report on water quality improvement results.

Any tracking system must focus on more than TMDLs and should focus on water restoration in general. Information sources include 319 semi-annual reports, watershed action plans, WRSB and SRF grant tracking. Ohio is interested in a tracking system but has not determined the data set to track to report on implementation progress. The draft spreadsheet is a first step at tracking progress.

Ohio EPA expressed concern over the use of subjective measures to track implementation progress. Ohio uses administrative indicators established by EPA. Administrative indicators include grant issuance, project completion, monitoring, etc. The system should also rely on data gathered by other groups to focus scarce State monitoring resources. The ultimate goal is to de-list waters, but it is hard to come up with progress indicators. Monitoring indicators could also support the ability to de-list waters and focus monitoring resources on other impaired waters.

STORET could be used as an example for an implementation tracking system. STORET was designed to support thousands of interfaces and monthly updates. STORET is now using an XML template as an interface to upload data.

Ten to fifteen FTEs are devoted to database development and management. Existing IT systems need to be updated. Any data system used in the division has to be developed by the IT department. Three to four FTEs are devoted to data entry. The implementation spreadsheet will be maintained by the district offices.

3.8. Washington

3.8.1. *Current TMDL Implementation Tracking Process*

Washington entered into a settlement agreement in 1998 that contains a 15 year schedule for completing 1566 TMDLs. Washington is currently in the 10th year of the 15 year schedule, and has completed over 600 of the TMDLs specified in the settlement schedule. In limited cases, Washington is moving straight into restoration activities, not developing TMDLs in cases where proven restoration techniques (BMPs) apply. Section 319 funds support most implementation efforts, which are tracked using GRTS. Washington has developed a Watershed Attainment Tracking System (WATS), which is similar to ADB, to track 303(d) and 305(b) information. WATS is also used for TMDL prioritization and has been designed to accommodate future connections to monitoring data for all listings.

Washington has developed a computer application called the TMDL Management System that includes basic data on all TMDLs that are in progress or that have been developed, and also includes provisions for some basic data on implementation. The TMDL Management System uses VB.NET. Features of the database include the following:

- State staff responsible for TMDL development and implementation
- Status of report development

- 303(d) listings being addressed
- NPDES permits affected by the TMDL
- Activities (BMPs) being implemented
- Activity location
- Dates, timeframes
- Funding sources
- Lead implementation party / agency
- Estimated activity cost and actual activity cost

WATS and the TMDL Management System are both in Microsoft SQL Server 2000 format. Their permitting system is Oracle based, but is currently being updated, and they are not sure what database platform it will end up on. Their internal development platform is Microsoft's .NET. Any new development work will be done in C#.NET.

Mapping of data is provided by a simple GIS-based query tool, which is also currently available to the public, developed using ArcGIS Server with SDE and SQL Server utilizing a grid system for open waters and lakes. There is also an Environmental Information Management (EIM) database developed by their agency-wide IT group and available to the public: <http://apps.ecy.wa.gov/cimreporting/Search.asp>.

Washington would like to GIS-link the results of TMDL development, implementation, and monitoring. Washington would also like to collect and track information on effectiveness monitoring and monitoring triggers. In addition, Washington's settlement agreement requires 5 year reports (one of which has been completed) on the effectiveness of the TMDL program. The reports must address whether interim targets in the implementation plans have been met, whether BMPs have been put into place, whether wasteload allocations are being put into NPDES permits, and whether additional implementation measures have been instituted where needed.

Washington has 0.5 FTE dedicated to database development and management, and 33 FTE responsible for development and implementation of TMDLs. Reportedly, 8 additional FTE are planned: 4 for the water quality program and 4 for the science and environmental program.

3.8.2. Needs with Respect to TMDL Implementation Tracking

Washington wants to keep using and expanding the functionality of their developed systems, and does not want to link to ADB or ATTAINS. Washington is not interested in a database developed by EPA, but is not opposed to sharing their database designs, or even code, with EPA or other states. However, other states would have to accept everything "as-is" since the state is not in a position to provide technical support. Rather than use an EPA system, Washington would prefer to simply provide data to EPA as required, perhaps even as a web-based upload. If EPA wanted to use a Washington system as a basis for a standard national tool, Washington would work with them.

Washington would like to develop an ad-hoc query tool, and would ultimately like to make all data and features available to the public, including developing custom queries for unanticipated data needs. Washington wants to make sure that any tracking system tracks the information that EPA will hold Washington accountable for, which is not clear at this point.

Washington feels that key tracking indicators include:

- Implementation plan developed (one plan at time of submittal, a second more detailed plan one year later)
- Activity (BMP) implementation status
- Monitoring trigger
 - First screening monitoring trigger
 - Then wide scale monitoring aimed at demonstrating the restoration status of the water
- Overall progress toward restored water

Washington feels that linking a tool too tightly linked to TMDL development could be a limitation, as the state is moving straight into restoration activities with several waters.

3.9. Wisconsin

3.9.1. *Current TMDL Implementation Tracking Process*

The Wisconsin Department of Natural Resources (DNR) is in the early stages of TMDL implementation. The state recently appointed the first TMDL implementation coordinator in the State. Some TMDLs have been developed for specific water segments, but progress is being made on developing TMDLs on a watershed basis.

Implementation is focusing on using existing tools, such as Wisconsin Pollutant Discharge Elimination System (WPDES) permits, and existing regulations, principally NR 151² performance standards. Wisconsin is currently working on revising its runoff control regulations to allow for site-specific performance in TMDL listed waterbodies. Wisconsin is also working on developing reporting criteria to track implementation of the performance standards on a county basis. Wisconsin is also developing a buffer measure to address phosphorus loads.

Wisconsin is currently tracking water quality restoration activities on a basin- and watershed-specific basis. Wisconsin has 23 basins covering the State. Three watersheds within each basin are updated annually. Currently, the updates are tracked centrally, but the function will transfer to the DNR regional offices.

² NR 151: Agricultural performance standards and prohibitions, non-agricultural performance standards, transportation facility performance standards and a process for the development and dissemination of non-agricultural technical standards. (<http://www.dnr.state.wi.us/runoff/rules/nr151.htm>).

Wisconsin DNR has invested heavily in developing an implementation data tracking system. The Water Assessment Tracking and Electronic Reporting System (WATERS) was developed to track the status of waterbodies, pollutant levels, impairments, and watershed planning recommendations. Appendix A contains screen captures of the WATERS database. The database is an ORACLE/GIS-based system, which runs off of the State's 1:24,000 hydrography scale. The WATERS database is internal to DNR, but portions of the system can be viewed externally on the web through the Surface Water Data Viewer.

Development of the WATERS database included external contractor support. Ongoing maintenance requires one full time equivalent (FTE) staff person in the central office and approximately ¼ FTE in each regional office.

Section 319 grants are tracked in the Surface Water Integrated Monitoring System (SWIMS). In 2008, DNR will require grant recipients to provide on-line updates on the status of the grants quarterly. DNR also reports to EPA on grant status through GRTS. DNR recommends the need for XML support to facilitate data transfer. DNR does not track other nonpoint management projects funded through other agencies.

3.9.2. Needs with Respect to TMDL Implementation Tracking

DNR reports several support needs to improve on its tracking system. DNR has lost GIS staff and needs assistance to update land use data. DNR would also like to develop tools to assess the recovery potential for water bodies and approaches for assessing the link between permit revisions and TMDL achievement. Finally, DNR would like to see consistent protocols to model agricultural land use impacts on water quality linked to the Midwest Spatial Decision Support System.

3.10. Other States (*not interviewed*)

Other states' implementation tracking activities were also evaluated to a lesser extent than those described above via website searches and brief telephone conversations. Those states include: California, Idaho, Oregon, and Maryland.

California's TMDL development oversight is largely divided among the state's nine Regional Water Quality Control Boards. Brief conversations with state staff revealed that a statewide tool for tracking implementation has not been developed, and there are no current plans to develop a system. Limited implementation tracking may be occurring at the regional level through informal surveys or other similar means. Staff thought that a tracking tool to monitor the activities of the various regions within California would be useful.

In the State of Idaho, the Idaho Department of Environmental Quality and other state agencies form Watershed Advisory Groups (WAG) to assist and guide the development of TMDLs. A typical WAG is made up of staff from the Idaho Department of Lands, Soil Conservation Commission, Dept. of Transportation, and the Department of Agriculture, and any of these agencies may take the lead on developing a TMDL. Each WAG may differ in how implementation tracking is led and performed, so a national tracking system may have to work with several departments.

The Oregon Department of Environmental Quality published TMDL Implementation Plan Guidance in May 2007. The document provides guidance for agency staff and designated management agencies on the development and implementation of sector- or source-specific TMDL implementation plans. In addition, Oregon prepared an implementation tracking matrix (see Appendix B) as a recommended tool to report on implementation progress as a regular component of grant reporting requirements.

Maryland drafted a TMDL Implementation Guidance for Local Governments in May 2006. The Maryland guidance does not specify how implementation plans are to be developed. Instead, the guidance emphasizes the importance of incorporating planning across existing programs from land use planning on down. The State will work with local government advisors to establish a process for documenting specific TMDL implementation plans. While a process is not yet in place, Maryland envisions tracking implementation plans via the State Water Quality Management (WQM) Plan framework per 40 CFR 130.7. WQM Plans, organized by 6-digit basin codes, will incorporate completed TMDLs, identify the document that constitutes the implementation plan, and identify other appropriate supporting information.

4.0 SUMMARY OF TMDL IMPLEMENTATION TRACKING TOOLS/SYSTEMS

4.1 State Tracking Tools and Systems

Table 1 provides a brief summary of the type of data or information that each of the nine states currently tracks, as well as identifies some of the key indicators or measures that states would like to track through the use of a TMDL implementation tracking system.

Only Minnesota and Washington have dedicated systems for tracking data and information on TMDL implementation. Washington has developed a computer application called the TMDL Management System that includes basic data on all TMDLs that are in progress or that have been developed, and also includes provisions for some basic data on implementation. The following information is tracked:

- State staff responsible for TMDL development and implementation
- Status of report development
- 303(d) listings being addressed
- NPDES permits affected by the TMDL
- Activities (BMPs) being implemented
- Activity location
- Dates, timeframes
- Funding sources
- Lead implementation party / agency
- Estimated activity cost and actual activity cost

Minnesota has developed systems to track implementation activities from multiple programs, including all implementation projects under 319, CWP, and the Clean Water Legacy Act. The Board of Water and

Soil Resources (BWSR) uses it for their state cost-share funds. MPCA has also developed a nonpoint contract tracking (NCT) database as an interim tool. NCT tracks grants and reports.

Wisconsin has also invested heavily in the development of an implementation tracking system. The Water Assessment Tracking and Electronic Reporting System (WATERS) was developed to track the status of waterbodies, pollutant levels, impairments, water quality restoration activities, and watershed planning recommendations on a basin- and watershed-specific basis. Appendix A contains screen captures of the WATERS database. The database is an ORACLE/GIS-based system, which runs off of the State's 1:24,000 hydrography scale. Development of the WATERS database included external contractor support. Ongoing maintenance requires one full time equivalent (FTE) staff person in the central office and approximately ¼ FTE in each regional office. The WATERS database is internal to DNR, but portions of the system can be viewed externally on the web through the Surface Water Data Viewer.

Table 1. States' Current and Desired Implementation Tracking Capabilities

	Implementation Data and Information Currently Tracked	Implementation Data and Information that states Would Like to Track
Alaska	Varies, no pre-defined, standard indicators	Completed watershed management plan in place, Responsible parties identified, Funding availability/source
Illinois	Tracking 319 Program projects	Implementation or watershed plan approval (date), Permits approved (date), Implementation started (date), Implementation completed (date), Monitoring / assessment results, Water body restored, Number of acres with best management practices (BMPs) implemented, Number of acres with conservation tillage / set aside acres, NPDES permit issuances that include TMDL allocations, Implementation on a county-wide basis, NRCS BMP annual report information.
Indiana	Varies, no pre-defined, standard indicators	An initial indicator or milestone, such as implementation plan completed, Percentage of measures that have been implemented. After implementation, monitoring to show changes in water quality (a monitoring trigger)
Michigan	MDEQ tracks nonpoint source grants in a Microsoft SQL Server database with a Microsoft Access front end to facilitate data entry. The projects are located with latitude and longitude coordinates and estimated load reductions are tracked. MDEQ manually uploads project tracking data to GRTS.	Load reductions achieved; watershed grants; watershed groups, watershed meetings, and public involvement; compliance and enforcement activities; and education and outreach activities.
Minnesota	eLink is used to track implementation activities from multiple programs. MPCA requires it for all implementation projects under 319, CWP, and now the Clean Water Legacy Act. The Board of Water and Soil Resources (BWSR) uses it for their state cost-share funds. MPCA has also developed a nonpoint contract tracking (NCT) database as an interim tool. NCT tracks grants and reports.	Economic data, GIS links to project locations, flow analyses linked to HYDSTRA, load reductions, and information to target monitoring activities.
New Mexico	319 program grant tracking data in GRTS.	Data on other program activities, such as projects supported by NRCS, USGS, tribes, and municipalities.
Ohio	319 program grant tracking data in GRTS.	Track accountability for implementing the TMDL. Use of biological indicators to track implementation progress.
Washington	State staff responsible for TMDL development and implementation, Status of report development, 303(d) listings being addressed, NPDES permits affected by the TMDL, Activities (BMPs) being implemented, Activity location, Dates / timeframes, Funding sources, Lead implementation party / agency, Estimated activity cost and actual activity cost	Implementation plan developed (one plan at time of submittal, a second more detailed plan one year later), Activity (BMP) implementation status, Monitoring trigger (First screening monitoring trigger, then wide scale monitoring aimed at demonstrating the restoration status of the water), and progress toward restored waters.
Wisconsin	WATERS data base tracks the status of waterbodies, pollutant levels, impairments, and watershed planning recommendations. Section 319 grants are tracked in the Surface Water Integrated Monitoring System (SWIMS). DNR also reports to EPA on grant status through GRTS.	Reporting criteria to track implementation of performance standards on a county basis. Tools to assess the recovery potential for water bodies and approaches for assessing the link between permit revisions and TMDL achievement. Consistent protocols to model agricultural land use impacts on water quality linked to the Midwest Spatial Decision Support System.

4.2. EPA Tracking Tools and Systems

The following section summarizes existing water quality and TMDL data systems and their potential application for TMDL and water restoration tracking.

4.2.1. ADB

The *Assessment Database* (ADB, <http://www.epa.gov/waters/adb/index.htm>) is a relational database application for tracking water quality assessment data, including use attainment, and causes and sources of impairment. EPA supported the development and distribution of ADB to encourage standardization of reporting among states and to facilitate the generation of the National Assessment Database and the biennial National Water Quality Inventory. The main function of the ADB is to store assessment information in a way that is consistent with EPA's *Guidance for 2006 Assessment, Listing and Reporting requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act*. States need to track this information and many other types of assessment data for thousands of water bodies, and integrate it into meaningful reports. ADB is designed to make this process accurate, straightforward and user-friendly for participating states, territories, tribes and basin commissions. ADB supports three principal functions:

1. Improve the quality and consistency of water quality reporting
2. Reduce the burden of preparing reports under Sections 305(b), 303(d), 314, and 319 of the Clean Water Act
3. Improve water quality data analysis

ADB provides user-friendly data entry forms and automates the production of reports that states submit to EPA.

4.2.2. NTTS

The *National TMDL Tracking System* (NTTS) contains information on waters that are not supporting their designated uses (i.e., waters listed by the state as impaired under Section 303(d) of the Clean Water Act). The NTTS is accessible through the WATERS database (see below) (<http://www.epa.gov/waters/tmdl>). The database tracks the following information relating to individual TMDLs:

- Waterbody name
- Waterbody ID
- State
- Pollutant
- Impairment
- TMDL type (point source, nonpoint source, both)
- Wasteload allocation
- Load allocation
- NPDES Permit ID #
- TMDL approval date

4.2.3. *ATTAINS*

The *Assessment, TMDL Tracking And ImplementatioN System* (ATTAINS) database is being developed as a combination of the ADB and NTTS databases. Regions will use ATTAINS as the basis to record their approved and established TMDLs. Additionally, ATTAINS will hold integrated report information and thereby also record category 4b listings. ATTAINS is planned for release in 2008.

4.2.4. *GRTS*

Grant Reporting and Tracking System (GRTS, <http://www.epa.gov/nps/Section319/grts.html>) was developed to serve as a repository to allow states to report on nonpoint source activities and projects funded under Section 319(h) of the Clean Water Act. GRTS is managed by the Nonpoint Source Control Branch. The branch resides in the Assessment and Watershed Protection Division (AWPD) which is an arm of the Office of Wetlands, Oceans and Watersheds (OWOW). State users are assigned individual user names and passwords and are only allowed to enter or edit data associated with their particular state. The data entered in to GRTS is used by the Agency to respond to various inquires received from Congressional committees, OMB, and various constituent groups. The data is also reviewed for various programmatic and legislative goals.

4.2.5. *STORET*

STORET (short for STOrage and RETrieval, <http://www.epa.gov/storet/dbtop.html>) is a repository for water quality, biological, and physical data and is used by state environmental agencies, EPA and other federal agencies, universities, private citizens, and many others. Data supplied to EPA before 1999 were all placed in Legacy STORET. The Legacy Data Center contains data of undocumented quality. Further, these data are static. The Legacy Data Center does not permit updates, and data in the Legacy system will not change over time. All new data are being entered into Modernized STORET. Both the Legacy and Modernized STORET are web-enabled and available to the public. With a standard web browser, you can browse both systems interactively or create files to be downloaded to your computer. Monitoring organizations who wish to submit data to STORET must operate the STORET System locally. The local STORET System is a data management system with data entry and reporting software modules that operate on personal computers.

4.2.6. *WATERS*

The *Watershed Assessment, Tracking & Environmental Results* (WATERS, <http://www.epa.gov/waters/about/index.html>) database is an integrated information system for the nation's surface waters. The database links together numerous EPA Office of Water program data systems to better integrate applications of the data they contain. Under WATERS, the Water Program databases are connected to a larger framework. This framework is a digital network of surface water features, known as the National Hydrography Dataset (NHD, <http://nhd.usgs.gov/>). By linking to the NHD, one Water Program database can reach another, and information can be shared across programs. Specifically, WATERS links together the Water Quality Standards Data Base (WQSB, <http://www.epa.gov/wqsdatabase>), STORET, the National Assessment Data Base (ADB), NTTS, and GRTS. In addition, WATERS links to EPA's Nutrient Criteria Data Base (NDB,

<http://www.epa.gov/waterscience/criteria/nutrient/database/>), and the Safe Drinking Water Information system (SDWIS, <http://www.epa.gov/safewater/sdwisfed/sdwis.htm>). The WQSDB contains information on the uses that have been designated for waterbodies.

4.3. Systems for Tracking TMDL Implementation

None of the databases described above currently track TMDL implementation, although GRTS does track Section 319 and some other state grants that address nonpoint source load reductions as part of TMDL implementation. Furthermore, the databases do not track many other TMDL implementation activities, such as projects funded under the Farm Bill.

The NTTS currently provides the most detailed information regarding TMDL status. Its usefulness in tracking water quality improvements will be further enhanced with the development of the ATTAINS system. Because NTTS and ATTAINS will serve as the principal systems for tracking TMDLs, it has been suggested that they may serve as the best platform for tracking TMDL implementation. Since they are the main systems for gathering information from State and Federal TMDL programs, NTTS and ATTAINS may also be more readily used by those programs.

5.0 SUMMARY OF STATE'S PERSPECTIVES ON TMDL IMPLEMENTATION TRACKING TOOL/SYSTEM

Resources to develop and administer a tracking database was the highest concern among the states interviewed. States that do not currently possess a tracking system have allocated no funding for developing a system in the near future. States with tracking systems have either no budget allocated, as development of the existing system is complete, or have limited funding planned for ongoing development. States without tracking systems have concerns about the level of resources necessary to develop a system (both internal and external resource needs) and concern over the internal resources necessary to maintain data entry and reporting. Most states interviewed indicated that 0.5 to 1.0 additional full time staff equivalents (FTE) would be necessary over current staffing levels for the data entry, maintenance, and reporting they would envision if a system were in place.

Minnesota and Wisconsin have or are in the process of investing heavily in a tracking database. Those states will proceed with database development regardless of whether a national tracking system is created. If a national system is created, the states are most concerned with establishing interfaces that would allow for data exchange between the state and national systems.

Some states expressed concern over developing and using subjective measures to track implementation progress, and concern over a tool too tightly linked to TMDL development, potentially limiting the ability to move directly into restoration activities without a TMDL.

States without tracking systems felt that a tracking tool could provide sufficient incentive to begin tracking TMDL implementation status.

States mentioned several benefits of being able to track TMDL implementation, with primary benefits including:

- Ability of management to have a central location to review TMDL implementation progress.
- Tracking implementation effectiveness; use of funding.
- Helping to guide program direction.
- Ability to generate reports on implementation progress for EPA, state legislature, and the public.
- Providing for cross program coordination.
- Providing good information for permit development and monitoring requirements.
- Support for watershed based management programs.
- Monitoring the activities of other agencies or parties that are implementing TMDLs.
- Allowing for improved information sharing among Federal, state, and local agencies.

States identified the following key features they would like to see within an implementation tracking tool:

- Web-based design.
- GIS interface and analytical features.
- Ability to track long-term, phased approaches.
- Ability to export data in format that can be loaded into GRTS and ADB.
- Standardized performance measures to determine progress.
- Compatible with Microsoft SQL Server.
- Flexibility to easily add features.
- Uses same field naming structure and organization of information as is used in other EPA databases (such as GRTS, ADB, STORET), where relevant.
- Accommodate more than one TMDL per waterbody.
- Ability to report out on a statewide, countywide, hydrologic unit code (HUC), and stream basis
- Water quality parameter specific sorting and reporting.
- Ability to track additional impairment causes that come in after TMDL adoption.
- Ability to track expected load reductions.
- Ability to track the success of other watershed BMP implementation efforts / success comparisons.
- Specific to intended purpose, waterbody restoration.
- Real-time access to information (no manual update of an off-line database).
- User friendly and well documented – a true user manual provided.
- Ability to get at raw data out of the database for use for other purposes.
- Ability to answer unanticipated questions, flexibility in compiling data and reporting.
- Ability to interface with water quality monitoring data to report on trends in improvements rather than compliance with water quality standards.

Most states would use a tracking system if developed by EPA, especially those that have not already developed a state-specific system. States that have already invested in a tracking system would prefer to continue to use their system solely, or have it work with an EPA developed tool linked to their system. Some states would consider the availability of a tracking system as an impetus to begin formal TMDL implementation tracking in their state. However, the resources necessary to develop a TMDL implementation tracking system is a concern of most states. States with existing systems capable of tracking implementation information would prefer to continue to develop and utilize their own systems and would hope that any potential future regional or national system would be compatible with existing state systems.

The most significant obstacle to tracking TMDL implementation is the limited availability of resources for developing and maintaining a tracking system. Each state interviewed had resource concerns. Future funding requirements for implementation project tracking and reporting could provide the resources needed.

States were also concerned about compatibility and functionality with already existing state tracking systems, and what it would take to develop import / export functions with a range of existing systems/platforms. While there is variation in the development of existing tracking tools, it should be possible to construct import / export routines to make existing systems compatible with an EPA developed regional or national tool. This will require working with each existing system individually to determine the options and necessary effort.

Some states have multiple agencies or groups within the state leading TMDL implementation, with TMDL authority in different regions of a state (e.g., California). A regional or national tracking tool, and in some cases a state specific developed tool, will have to be usable and functional for multiple, and sometimes very different organizations. Web-based functionality could help address this issue.

States typically have centralized information technology (IT) departments that govern IT infrastructure for all state agencies, not managed within the environmental agency or department responsible for TMDL implementation. This sometimes produces restrictions on the types of applications supported. Based on this assessment, it appears that every state's IT department, and in some cases multiple IT departments will have to be coordinated with for tracking tool development. In some cases, IT support was provided by an organization external to the state agency. This arrangement limits the agency's ability to design and manage database systems.

States were interested in developing a consistent set of indicators to track implementation. A minimum set of tracking indicators, and other potential indicators, was developed during this assessment and is contained within this document. Further refinement and development will be necessary for a standardized tracking tool.

6.0 EPA'S INPUT ON A TMDL IMPLEMENTATION TRACKING TOOL/SYSTEM

In addition to the state interviews, several discussions took place with EPA headquarters and regional staff and managers in order to obtain their perspectives on the need to track TMDL implementation, including information on what to track (e.g., indicators) and how to track it (e.g., tools).

In terms of the rationale for tracking TMDL implementation, EPA identified many benefits to having a process and central tool in place to compile information on TMDL implementation. The benefits discussed are provided below:

- National tracking would allow for the comparison of data across state lines. In turn, this could enable EPA to consistently report on key questions, such as “are we implementing our TMDLs” or possibly, “are we cleaning up our watersheds.”
- Regardless of scale, a TMDL implementation tracking tool could help the states to move towards a strategic monitoring approach (instead of a rotating basin approach, for example). For many impaired waterbodies, restoration will take time. For example, it may take five years for a particular waterbody to show significant water quality improvements; therefore, monitoring that waterbody for the first three to five years may not be the best use of monitoring funds. A tracking system could be built to identify implementation milestones and optimal time frames in which monitoring should occur in order to measure and report on improvements.
- A tracking system could help EPA with national performance measure reporting needs for *Measure L (SP-10)* and *Measure W (SP-12)* from EPA’s Strategic Plan. For example, *Measure W* asks EPA regions to report watershed improvement (at the HUC 12 scale) for each of their states based on percent impairment removal. A tracking tool may provide EPA with the necessary information to track such watershed improvements.
- A tracking tool could help illustrate not just how Section 319 funds are being used, but also the quantifiable results of the funding (e.g., the actual waterbody improvements).
- A national tracking tool could allow for reporting on implementation funded by multiple agencies (and not just EPA and the states), including NRCS and USDA. Many agencies are contributing resources toward water quality improvement efforts. There currently isn’t a means to track the individual and combined efforts of multiple agencies, which could be extremely useful.
- A tool could serve as a linkage between different programs (TMDL, permitting, 319, etc.)

EPA staff and managers identified what they felt would be key tracking system features, including:

- Ability to track and report on interim milestones for TMDL implementation and not just the single end goal of achieving water quality standards. Given the length of time it takes for waterbodies to return to full attainment, it is critical to identify and track indicators and benchmarks for incremental progress. A tracking tool should be able to track success in terms of both incremental progress and full recovery.
- Ability to track EPA-funded and non-EPA funded project (e.g., Farm Bill projects).
- Tool should be built similar to WATERS, where data can be queried and extracted out for reporting purposes - for state, legislature, EPA, and public reporting.
- Tracking should include both programmatic progress and environmental progress. For example, one programmatic milestone may be whether or not the recommended / required controls (e.g., permits) have been implemented. The environmental milestone would be the progress of that control toward improving water quality.
- Tracking tool needs to support the ability to report on both subjective measures of success (e.g., “have water quality conditions improved since last monitored”) and detailed quantitative measures of success (e.g., “by how much have pollutant loads decreased over the last three years?”).

While EPA recognizes significant benefits in having a national or regional TMDL implementation tracking tool, they also acknowledge that developing such a tool will require significant thought and planning. Otherwise, they run the risk of developing a tool that states would not use or a tool that does not help with reporting needs because it isn't collecting the right data or information. The following are a few examples of the types of questions and issues that would need to be explored before constructing a national or regional tracking tool:

- Should the tracking tool operate on a national or regional level?
- Would a national/regional database be built for the benefit of the states and their reporting needs, or for the benefit of EPA and its reporting needs? If for both, is it realistic to achieve alignment between EPA needs and state needs such that a system could allow for flexibility to information of importance to both states and EPA?
- At what spatial scale (e.g., individual waterbodies, *Measure W* subwatersheds, etc.) will information need to be reported? At what spatial scale does information need to be collected in order to meet this reporting need?
- What “questions” will be answered by using the database. For example,
 - Have WLAs been incorporated into all permits?
 - What actions/BMPs are planned?
 - What were the resource expenditures for BMPs? Federal, state, county, other?
 - Are BMPs being maintained?
- What type of information will need to be reported to the public, to congress, etc. (e.g., “on how many waterbodies is implementation occurring” or “how many waterbodies have improved by 50%”)? What are the indicators for which data need to be collected in order to meet this reporting need?
- What is the feasibility in being able to interface a national or regional tracking tool with existing state tracking systems? Is there willingness on the part of those states to adapt their systems to link with a national or regional system? Could it be possible for those states to use a linkage identifier (e.g., 303(d) list ID) that would permit linkage between an EPA and a state database?
- How are “success” and “progress” defined with regards to water quality improvements?
- What are the success benchmarks and milestones?
- Do we populate the tracking system with “past” information or just focus on capturing current and future data? If we look at incorporating past information, how far do we go back to illustrate how past resources have been used and what level of water quality improvements have been achieved?

An architectural framework for a tracking system or database platform was not discussed in extensive detail, primarily because staff felt it was more important to talk about the purpose of the tracking system and the type of information to track. However, several framework points were discussed. Based on the discussion, EPA should first examine existing state tracking systems for ideas on the architectural framework for a national or regional database. Important features to consider include: interactive mapping, GIS linkage, web-based application, and public access. EPA databases and tracking tools should first be examined to assess whether they can be modified to also allow for TMDL implementation tracking or whether a new, stand-alone system would be more appropriate.

7.0 CONCLUSION

Several states have already developed a system to track TMDL implementation information, while most are still primarily focused on TMDL development with little to no tracking of TMDL implementation. Since many states are in the early stages of tracking TMDL implementation, this is an ideal time to develop a tracking system to account for practices to improve water quality (either on individual state levels or at the regional or national level). The tracking system development process should acknowledge and complement the data management systems that have been developed by several of the states. In addition, the states would greatly benefit from the ability to learn about other implementation activities, such as those funded under the Farm Bill. Collecting such information will likely require the development of inter-agency coordination at the Federal level. Resources to develop and maintain a tracking system, and the ability of a national or regional system to work with existing or planned systems are the major concerns of states.

8.0 NEXT STEPS & RECOMMENDATIONS

Before further exploring the architectural framework for a potential regional or national tracking tool or database, the first recommended next step is to develop a workgroup comprised of state and EPA staff to further discuss the many questions and issues about a national or regional tracking database that arose during this assessment; for example, what would be the primary uses of a tracking database? Following these discussions, the workgroup would clearly define the goals and objectives of a tracking system, as well as identify the intended uses.

Once the goals and intended uses of the system are established, the second recommended next step would be to identify the various indicators and benchmarks necessary for tracking the implementation of TMDLs and other water quality restoration efforts. This would be a collaborative process between states and EPA to ensure consistency. A number of potential indicators and benchmarks were identified during the interviews with the states and EPA (and discussed throughout this report). Minimum implementation indicator categories would include:

- TMDL adoption, such as: waterbody ID, pollutants addressed, etc.
- Implementation plan development and approval
- Responsible implementation parties
- Allocations incorporated into permits
- Completed projects
- Water quality monitoring triggers
- Restoration evaluation

The results of the state/EPA workgroup planning process would be documented in a report for EPA and states to refer to should either explore the possibility of developing a state, regional, or national tracking system.

APPENDIX A. WISCONSIN'S WATER ASSESSMENT, TRACKING, AND ELECTRONIC REPORTING SYSTEMS (WATERS)

WATERS Home Page

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Wisconsin Department of Natural Resources

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Welcome to WATERS

Browse Reports

- Assessments by Watershed
- Impaired Water Reports**
- CWA Summary Reports
- Outstanding & Exceptional Waters
- Fisheries Trout Waters
- Nonpoint Source Rankings
- Waterbody FAL Classifications
- Goals & Objectives Reports
 - Goals Management Reports
 - List of Success Stories by Year
 - Goals Status Reports
- WADRS Discoverer Workbook Reports

WADRS Featured Reports

 Outstanding & Exceptional Waters	 Waterbody Assessments	 Impaired Waters List	 Goals Status Reports
 Waterbody FAL Classifications	 Waterbody Recommendations	 Nonpoint Source Rankings	 Goals Management Reports
 Fisheries Trout Waters	 Watershed Recommendations	 Monitoring Station Report (Under Construction)	 Success Stories
 Federal Wild & Scenic Rivers	 Clean Water Act Summary Data	 Watershed Plan (Under Construction)	 Lessons Learned

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Watershed Results: Watershed Recommendations

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Total Stream Miles	539
Total Lake Acres	85
Total WetLand Acres	12,197
Percent Wisland Cover	
Agriculture	35.5
Urban	0.05
Sub Urban	0.19
Wetland	6.62
Barren	0.05
Grass Land	19.12
Forest	37.7
Open	0.62
Nonpoint Source Rankings	
Stream Rank	High
Lake Rank	Low
Ground Water Rank	High
Over All Rank	High

REFERENCES 1. Kurz, Joe. Western District Fisheries Manager memo to Beaver Creek, Chippewa County File. May 30, 1989. WDNR. 2. Kurz, Joe. May 5, 1980. Running inventory/Eighteen Mile Creek, Chippewa County. WDNR. Western District Fisheries Management. Apelgren, Bert. Aug. 11, 1978. Running inventory of Trout Creek, Chippewa and Dunn Counties. WDNR. Western District Area Fisheries Management. LaLiberte, Paul. Oct. 1989. Postoperative point source impact study South Fork Lower Pine Creek a...

Watershed Recommendation

ID	Recommendation Text	Goal Date	Status
LC07-12	The nonpoint source priority watershed selection committee should consider the Pine Creek and Red Cedar River Watershed a high priority for selection as a priority watershed project under the Wisconsin Nonpoint Source Water Pollution Abatement Program (Type B)		
LC07-11	WRM should conduct water quality monitoring of Mirror Lake (Type B)....		
LC07-10	WRM should assist the community around the Dallas Flowage in establishing a lake management organization and working to improve and protect water quality (Type B)....		
LC07-9	WRM should encourage participation in the self-help lake monitoring program from the communities around Dallas Flowage and Mirror Lake (Type B)....		
LC07-8	Fisheries Management should pursue officially classifying Beaver Creek as a trout stream (Type B)....		
LC07-7	Fisheries Management should continue to control beaver in the Sand Creek Fishery Area (Type B)....		
LC07-6	Fisheries Management should continue to control purple loosestrife in the headwaters of Sand Creek (Type B)....		
LC07-5	The U.S. Geological Survey should establish long-term phosphorus monitoring stations on the Red Cedar River or the Hay River (LC051 to measure phosphorus loading and year-to-year water quality variability		

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Watershed Results: Watershed Projects & Implementation Actions

View Watershed Detail - Microsoft Internet Explorer provided by Wisconsin DNR

Address: <http://prodoasjava.dnr.wi.gov/wadrs/viewWatershedDetail.do?id=924806>

LC07-4 District WRM should conduct a point source impact study in Upper Pine Creek with regard to the Dallas wastewater treatment plant discharge (Type B)....

LC07-3 District Fisheries Management should institute beaver controls on East Branch Pine Creek and North Branch Pine Creek (Type B)....

LC07-2 The bureaus of Property Management, Fisheries Management, and Water Resources Management should evaluate Upper Pine Creek above Dallas Flowage for possible acquisition under the Stewardship Streambank Protection Program (Type B)....

LC07-1 Fisheries Management staff should conduct a survey of Beaver Creek to formally classify it as a trout stream (Type B)....

Watershed Documents

Document Title	Author Name	Comment
----------------	-------------	---------

Watershed Projects

Project ID	Project Name	Start Date	Project Type	Status	Project Description
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Watershed Implementation Actions

WADRS ID	Waterbody Name	Name	Date	Status	Comment
18791	TAINTER LAKE	Fish consumption advisory	12/31/2002		
18791	TAINTER LAKE	303d validation monitoring (Tier II)	06/01/2007		TMDL priority: medium
15856	RED CEDAR RIVER	Fish consumption advisory	12/31/2002		
15856	RED CEDAR RIVER	303d validation monitoring (Tier II)	06/01/2008		TMDL priority: low

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Impaired Waters Report: TMDL Categories (Status)

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Watershed Report
 Impaired Waters Report

WBIC

Waterbody Type

Geographic Management Unit

Water Management Unit

Watershed LC07 - Pine Creek and Red Cedar River

County

Designated Use

303d Listed? Yes

Trout Class

ORW/ERW

Fed Wild Scenic Flag?

TMDL Priority

TMDL Status

TMDL Pollutant

TMDL Category

TMDL ID

Report Format

Create Report

5b. EAP Project
6. Proposed Delist
4. TMDL Approved
7. Water Delisted
2. TMDL Development
5a. TMDL Implementation
3. TMDL Submitted
1. 303d Listed

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Impaired Waters Report: 303(d) Listed

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Impaired Water Report: Watershed: Pine Creek and Red Cedar River TMDL: Y TMDL Status: VALIDATION_PHASE

Stream Name	WB ID Code	Start Mile	End Mile	TMDL Priority	TMDL Category	Pollutants	TMDL ID	TMDL Status	Current Use	Adoptable Use	Supporting Statute's Use	Designated Use	Supporting Designated Use	Impairments	Source	Assessment	Data Level	DNR Category	County
RED CEDAR RIVER	202500	1.59	49.47	Low Priority	Am. Deposition	Mercury	81	1.303d Listed	SPECIFIC ADVISORY, MNWSP	MNSP	Not Supporting	Default	Present	Contaminated Fish Tissue	Atmospheric Depositors - Toxics	Monitored	SI, P1	Category 5B	Barren, Dunn
TAMBER LAKE	203000	0	137.21	Medium Priority	Am. Deposition, NPS	Mercury, Total Phosphorus	83	1.303d Listed	SPECIFIC ADVISORY, MNWSP	MNSP	Not Supporting	Default	Present	Contaminated Fish Tissue, Excess Algal Growth, pH	Atmospheric Depositors - Toxics, Crop Production (Crop Land or Dry Land), Municipal (Unsanitized High Density Area), Race Point Source, Permitted Runoff from Confined Animal Feeding Operations (CAFOs), Streambank Modification/Restoration	Evaluated	SI, P1	Category 5A	Dunn

APPENDIX B. EXAMPLE OF OREGON'S TMDL IMPLEMENTATION MATRIX TEMPLATE

POLLUTANT: Bacteria		City of Example: TMDL Implementation Tracking Matrix					
SOURCE <i>What sources of this pollutant are under your jurisdiction?</i>	STRATEGY <i>What is being done, or what will you do, to reduce and/or control pollution from this source?</i>	HOW <i>Specifically, how will this be done?</i>	FISCAL ANALYSIS <i>What is the expected resource need? Are there existing resources budgeted? If not, where will the resources come from?</i>	MEASURE <i>How will you quantitatively or qualitatively demonstrate successful implementation or completion of this strategy?</i>	TIMELINE <i>When do you expect it to be completed?</i>	MILESTONE <i>What intermediate goals do you expect to achieve, and by when, to know progress is being made?</i>	STATUS <i>Include summary and date.</i>
1. Failing septic systems	a. Ensure repair of failing systems	i. Respond to reports of failing systems; work with homeowner to set a timeline for repair	Already funded; see specific program budget	Track # of reports, outcome of inspection (failing or not) and date of follow-up that confirmed repairs were made	Ongoing	NA	
	b. Educate homeowners about system maintenance and how to detect failures	i. Mail DEQ info. to X homeowners	\$X	Number of brochures mailed	Once every two years by May 1	NA	
		ii. Provide info at city's booth at community festival	No additional resources needed	Number of contacts	July of each year	NA	
2. Bacteria carried to waterways in storm runoff	a. Address runoff problems from farms via SB 1010 plans (ODA)	i. Contact ODA when problems are identified	No additional resources needed.	Track # of referrals	Ongoing	NA	
	b. Prevent pet waste from reaching waterways	i. Erect signage and provide poop bags in parks	\$X borrowed from park tree planting budget	Check bag supply weekly;	Ongoing thru end of 2008; evaluate effectiveness based upon rate of use	NA	
		ii. Get article in local paper to raise awareness	No additional resources needed; newspaper donating column space	Article in paper	Summer 2008	NA	
		iii. Adopt ordinance requiring owners to clean up after their pets		Adopted ordinance	2008	<ul style="list-style-type: none"> • Convene Advisory Committee by 12/06 • Draft rule by 6/07 • Adoption by 2/08 	