Total Maximum Daily Load

TMDL Team

October 1, 1999

Ohio EPA
Division of Surface Water

This document is the report of the TMDL Team to its chartering authority, the managers of the Division of Surface Water. The purposes of the report are to memorialize the Team's findings and recommendations, to generate discussion on TMDL issues, and to establish a foundation for TMDL decision-making in the Division of Surface Water. The ideas expressed here are not the official position of the Division of Surface Water or the Ohio EPA at this time.

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Several Ohio EPA staff (who were not members of the Team) made excellent presentations and provided important information to the Team during the outreach phase of the project. The presenters and subjects are as follows:

- Anthony Sasson, Kirk Nofzinger, and Jeff Lewis: pollution prevention
- Bob Monsarrat: Integrated Priority System and DEFA
- David White: Unified Watershed Assessments
- Dan Dudley: Continuing Planning Process and Water Quality Management Plans
- Julie Letterhos: Remedial Action Plans (Lake Erie)
- Gail Hesse: DSW's watershed strategy
- Keith Riley: 208 plans.

Various staff experts, either individually or on subteams, provided key information on some of the cross-cutting issues that affect the recommended process. These people include Julianne Kurdila (Legal, has since left Ohio EPA); Susan Willeke and Heidi Greismer (Public Interest Center); and Randy Crowell, David White, Chris Yoder, and Dan Dudley of DSW.

Ten DSW staff and managers served on a "bounce team," from which we solicited comments on our draft recommended process. The bounce team reviewers were:

Peter Killmer, NEDO
Tom Balduf, NWDO
Matt Pitts, NWDO
Dan Dudley, Central Office
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Dave Stroud, NEDO
Lynette Hablitzel, NWDO
Diana Zimmerman, SWDO
Chris Yoder, Central Office
Paul Novak, Central Office

Rico Kmetz-Gonzales came through for us in many ways: creating common work areas, retrieving “lost” work, setting up special access, and performing similar duties of an “evil network administrator” (his preferred appellation). The toughest job may have been accomplished by Ruth Merritt, who typed and made sense of numerous messy flip charts. We truly appreciate her efforts.

Finally, we thank the DSW Senior Management Team for recognizing the importance of the TMDL issue and giving us a chance to participate in finding the solution.

Summary of Recommendations

Recommendations for Listing

- ✓ *Ohio EPA should maintain the close link between 305(b) and 303(d) and funnel all internal and external data related to listing through the 305(b) process.*
- ✓ *DSW should develop a guidance document, focused on external stakeholders, on the use and need of various types of data in the TMDL process in Ohio expanding on concepts outlined in Ohio's monitoring strategy.*
- ✓ *DSW must incorporate other Designated Uses into the TMDL effort; the success of this may depend on the development of appropriate new uses and the development or revision of indicators to assess these uses.*
- ✓ *DSW needs to modify the 305(b) or use or develop some other related database to track waters with TMDL approvals and waters where the installation of technology improvements are expected to result in attainment of impaired waters by the next TMDL cycle.*
- ✓ *Ohio EPA should merge the core of the various water related priority-setting schemes in the Agency (TMDL, 319, DEFA, UWA)*.
- ✓ *DSW should make the TMDL list available in map form, on the web, and as parts of other existing or planned products (e.g., infographics, 305(b) report).*
- ✓ *De-listing and listing should require data of similar rigor and coverage.*

Recommendations for TMDL Projects

- ✓ *DSW should provide training to stakeholders who are interested in collecting data, as resources allow.*
- ✓ *Depending on resources, DSW should hold meetings and solicit input on study plan design from stakeholders and the public.*
- ✓ *DSW should stipulate that external data pertaining to study design must be received by Feb 1 of the year of a planned study in a format considered to be readily available.*
- ✓ *DSW should examine the suitability of certain indicators of designated use attainment (i.e., pathogens as indicators of recreation use impairment) as well as the need to develop new indicators or methods of applying indicators for certain uses (PWS in streams and rivers) as they apply to the TMDL listing process.*
- ✓ *Ohio EPA should maintain the current 5-year definition of threatened waters for Ohio's TMDL listing process*.

- ✓ *DSW should maintain data rigor and enhance our capabilities to distinguish links between impairment and the responsible causes and sources of that impairment.*
- ✓ *We recommend that a public group be contacted or formed early in the TMDL project process.*
- ✓ *We recommend developing a toolbox of calculation methods sufficient to provide tools to develop restoration targets for the various causes and sources encountered in the TMDL process.*
- ✓ *We recommend developing a tool for evaluating of what level of rigor is needed in the calculation method. This tool would greatly assist the allocation of resources among the concurrent TMDL projects.*
- ✓ *Ohio EPA must be very clear with stakeholders about how it will use its authority in TMDL project areas.*
- ✓ *We recommend developing a handbook of BMPs including descriptions and estimated effectiveness in Ohio and related to ecoregions. Such a handbook is necessary for the technical verification of restoration scenarios.*
- ✓ *DSW should establish a mechanism to track TMDL commitments (Agency commitments made to implement and/or validate TMDL projects) and make sure this tracking mechanism is incorporated into annual work plan activities.*
- ✓ *The water quality management plan process should be connected to the TMDL process so that it can be updated efficiently.*
- ✓ *We recommend that annual work plans and specific point and nonpoint source plans in a watershed be adjusted where possible to maximize the probability of success of TMDL implementation. Restoration plans and activities not addressing identified limitations to water quality standards should be reevaluated where possible.*
- ✓ *We recommend that a detailed strategies for working with external parties be developed and institutionalized in annual work plans.*
- ✓ *We recommend that resources be devoted to the development or investigation of bona fide, interim water quality measures by DSW staff.*
- ✓ *We recommend that resources for training and the provision of technical assistance be allocated so that stakeholders can assist DSW in conducting these interim measures.*
- ✓ *We recommend that a quality improvement process be established and that the QIP be recognized as a vital piece of the TMDL process.*

- ✓ *We recommend that, as part of the quality improvement process, the body of data generated by TMDL activities should be statistically and strategically analyzed to more effectively implement TMDLs in the future.*

Recommendations for Accomplishing the Work

- ✓ *We recommend that DSW approach each TMDL as a long-term project and manage it as such, emphasizing the need to maintain continuity within the process and coordination among team members.*
- ✓ *We recommend that DSW use the process outlined in Chapter 3 as a basic template, to be customized into a project plan for each TMDL project.*
- ✓ *We recommend that DSW assign a multi-disciplined staff team to each TMDL project at the beginning of the project and support them as a project team*.
- ✓ *We recommend that DSW establish a staff-level project manager for each TMDL project*.
- ✓ *We recommend that DSW provide each TMDL project team with a management-level "coach" to advise the team, to act as the project's advocate in securing resources and decisions (initially and throughout the project).*
- ✓ *We recommend that DSW establish a "council of coaches" where resource issues are resolved, common problems are discussed, successes are shared, process improvements are recommended.*
- ✓ *We recommend that DSW provide appropriate project management training and tools for TMDL project managers and coaches.*
- ✓ *We recommend that DSW use the 303(d) listing and scheduling process to guide strategic planning of activities to accomplish our mission to "restore and improve the integrity of waters of the state."*
- ✓ *We recommend that DSW prioritize and manage to efficiently address land "development" issues to accomplish our mission "to protect the integrity of waters of the state".*
- ✓ *We advocate that DSW identify organizational infrastructure and allocate resources specifically for complicated or controversial "development" issues*.
- ✓ *We recommend that DSW adopt a resource allocation scheme that focuses on the "restoration" and "protection" aspects of our mission.*
- ✓ *We recommend that in order for the TMDL process to succeed, future additional funding will need to be secured.*
- ✓ *There should be no large scale changes in the 5-Year Basin Approach as emphasis shifts to TMDL projects.*

- ✓ *DSW must recognize that NPDES permits will be critical in achieving TMDL restoration targets in many instances; NPDES permitting must be coordinated with TMDLs where possible.*

- ✓ *To maximize TMDL efforts, the DSW should coordinate with DDAGW the development of an information system architecture that serves multiple programs.*

- ✓ *We recommend that the existence/absence of TMDL restoration plans be considered as a factor in the UWA prioritization process.*

- ✓ *Each unit in DSW should examine its processes and work to eliminate decisions that lead to degradation of water resources.*

- ✓ *We recommend that the TMDL process be introduced to DSW as a way to organize current activities and not as a new or additional burden.*

- ✓ *We recommend that the Environmental Specialist I, intermittent, or temporary classifications be used to reduce the workload and assist staff in repetitive data collection, reduction, and analysis activities.*

- ✓ *A common georeferencing system should be adopted for all sections within DSW.*

- ✓ *A data management process should be developed for sharing data externally as a result of a given TMDL assessment.*

- ✓ *We recommend that the gaps in technical ability and other DSW expertise be recognized and that resources are allocated to address these deficiencies concurrent with the implementation of the TMDL process within DSW.*

- ✓ *We recommend that the QIP be used to continually improve and update DSW's capabilities so that, ultimately, sufficient capacity to complete TMDLs exists*.

Recommendations for Getting Started

- ✓ *We recommend that TMDL projects already in progress be placed into the recommended project process at the appropriate step.*

- ✓ *We recommend that the TMDL Team be actively involved in the implementation of the recommended process over the next several months.*

- ✓ *We recommend that the TMDL Team be involved in the preparation of outreach and educational materials about the recommended process and TMDLs in general.*

Preface: Synopsis of the Workings of the TMDL Team

In 1998, Ohio EPA's Division of Surface Water (DSW) chartered a team to study the "TMDL" (Total Maximum Daily Load) issue and make recommendations for a process to develop TMDLs in Ohio. The team draws on the experience of staff from many program areas of DSW. The following staff have served on the Team:

- Brad Gallant: point source permitting (left Ohio EPA in February 1999)
- Mike Gallaway: enforcement, districts (Central District Office)
- Erin Gaskill: modeling
- Laurel Hodory: watersheds
- Bob Heitzman: water quality standards
- John Morrison: storm water
- Trinka Mount, team leader: modeling
- Ed Rankin: ecological assessment
- Dale White: information management/GIS
- Larry Antosch: nonpoint sources (left Ohio EPA in August 1999)
- Alan Lauver: nonpoint sources (joined the Team in February 1999)

The team sponsor is Maan Osman. Two staff facilitators assisted the Team: Bob Brown of the Hazardous Waste Facilities Board (has since left Ohio EPA) and Kim Reinbold (Division of Hazardous Waste Management, Central District Office). John Yesso, Ohio EPA's Quality Coordinator, worked closely with the Team through the development of its work plan and continues to advise the Team through completion of the project.

The Mission

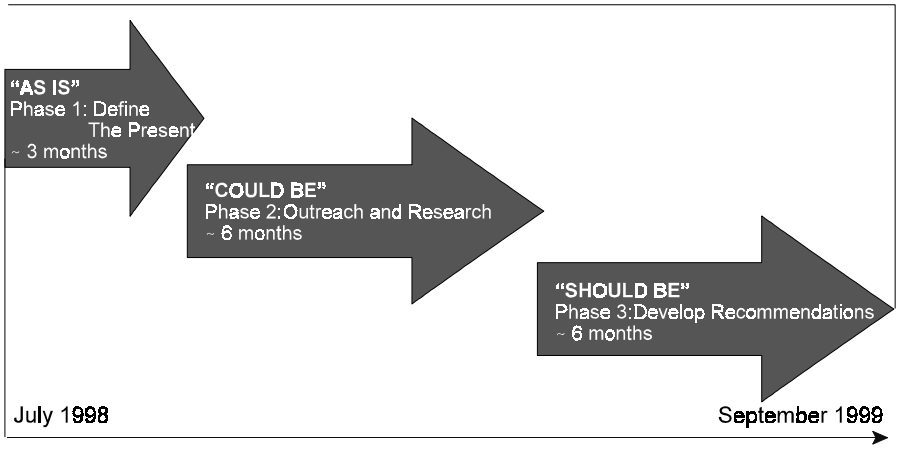
To create a process to establish restoration targets that will result in attainment of water quality standards for Ohio watersheds and strategies to achieve those targets.

Before the Team began its work, a survey of the members revealed ambiguity in the charter and mission. Thus, the first task was to reach a common interpretation of the Team's function and then meet with the chartering group (DSW senior managers) for consensus on the Team's plans. The revised mission is in line with published DSW strategies and goals, specifically the watershed approach and the focus on causes and effects of impairment.

After refining the mission statement, the Team set out to define its work plan. The result was a three-phase plan, shown conceptually at the top of the next page. The work plan identified tasks under each phase and laid out a timeline for completion of the Team's mission. Tasks identified in each phase were completed by subteams of members, occasionally in consultation with various staff experts. Although minor adjustments have been made from time to time, the Team has maintained its work plan.

The TMDL Team used a variety of methods to measure the existing situation and research

possibilities. To define the "as is," subteams researched the legal basis for TMDLs, described the technical and administrative tools the division uses, charted the existing *ad hoc* TMDL process, interviewed DSW managers to find out how they set priorities, and documented the current strategic management process.



The TMDL Team Work Plan Concept

Having defined the current state, the Team set out to investigate possibilities. The primary mode of research was benchmarking with other states and U.S. EPA offices using oral and electronic interviews, the Internet, and documents. Internal brainstorming and benchmarking with other Ohio EPA divisions and staff also produced useful ideas. An External Advisory Group on TMDLs (EAG), made up of interested citizens, environmental groups, other government entities, and regulated dischargers was in its initial stages during this "could be" phase. The EAG recommendations to the Director due June 2000 should expand on the possibilities identified by the internal team.

The Team closed its research efforts with an all-day retreat at which findings and best options were presented and discussed. Since that time the team has been designing a general process to do TMDLs and defining what's needed to make that process work. A 10-member "bounce team" was formed to provide feedback on draft ideas, and two packages of materials were submitted for their review. An all-day DSW senior management and Team retreat to discuss the team's findings is scheduled for October 1999.

Recognizing that widespread cooperation would be needed for implementation of the Team's recommendations, the Team has communicated its progress and findings to DSW senior management throughout the process. The key communication points included the following:

- Meeting with management to outline work plan and revised mission
- Monthly updates of team progress
- Summaries at the end of each phase
- Periodic presentations at division meetings
- A final report of the team's recommendations.

The Team's charter, work plan, and time line are contained in Appendix A. Other information, such as interim work products, progress reports, and presentation materials are available upon request to the Team's leader.

1. General Information

This final draft report of the DSW TMDL Team recommends a process for producing the 303(d) list and TMDL schedule, a process for doing TMDL projects, and specific recommendations not covered in the processes. The report presents basic information about TMDLs, then devotes a chapter to each of the two processes, followed by a chapter on how to accomplish TMDL work in the Division, and finally a chapter recommending how to get the TMDL processes started in DSW. A list of abbreviations and acronyms and a glossary are included, along with several appendixes.

In beginning a discussion of TMDLs, it is important to lay some groundwork about what TMDLs are, how they are supposed to work, and why they are important. This chapter will summarize these points, but volumes of additional information are available from various sources.

1.1 Why TMDLs? Why Now?

In the past few years, Total Maximum Daily Loads (TMDLs) have become a significant issue. Environmental groups have successfully sued U.S. EPA on the TMDL issue for not enforcing the Clean Water Act (CWA) in various states; two notices of intent to sue have been filed regarding Ohio's program. The lawsuits have brought urgency to the issue, but TMDLs deserve attention because they provide a tool to address all sources of pollution to a waterbody. Significant reductions in point source pollutant loadings have unmasked other sources of water quality impairment. Recent Ohio environmental assessments show that the leading causes of surface water impairment are now nonpoint sources (i.e., diffuse pollutant sources such as runoff from agricultural and urban areas) and habitat problems (e.g., stream channelization, sedimentation).

Ohio's 1998 list indicated that 881 of 5,000 waterbody segments are impaired or threatened. Because TMDLs are addressed on a watershed basis, we translate the number of segments to the number of watersheds: of the 326 watersheds in Ohio, 276 contain at least one listed segment. Thus, completing TMDLs for all the currently listed segments by 2013 would require completion of an average of 18 watersheds per year. This assumes that no new watersheds are added in future lists, although this assumption may not be realistic because many of the 5,000 waterbody segments have not been assessed. These statistics are even more alarming when it is pointed out that a TMDL is very unlikely to be completed in a year; thus, there will be 18 TMDLs multiplied by at least 2 or 3 in progress at any given time.

In response to the litigation pressure, U.S. EPA convened a federal advisory committee to examine its TMDL program and recommend changes; the committee's final report was delivered in July 1998. U.S. EPA proposed draft federal rules and guidance on August 23, 1999. After a public comment period and further consideration, the rules are expected to be issued final in early 2000.

In addition to chartering this staff team to recommend a process for dealing with TMDLs, DSW is working with an external advisory group on TMDLs. Their recommendations are due to the Director by June 2000.

1.2 TMDL Basics

In recent draft guidance (1999), U.S. EPA describes the TMDL process as follows:

> The objective of the TMDL process is to systematically identify impaired or threatened waterbodies and the pollutant(s) causing the impairment and ultimately establish a scientifically based strategy – a TMDL – for correcting the impairment or eliminating the threat and restoring the waterbody.

U.S. EPA has redrawn the process to indicate more clearly that TMDLs actually involve two linked processes (see Exhibit 1.1). The DSW TMDL Team created two processes: a listing and scheduling process to be conducted statewide every 2 years (or 4 or 5 years as proposed in the draft rules) that produces the 303(d) list (through the 305(b) report), and a TMDL project process to be used in individual waters or watersheds to address the problems identified in the earlier assessment and listing.

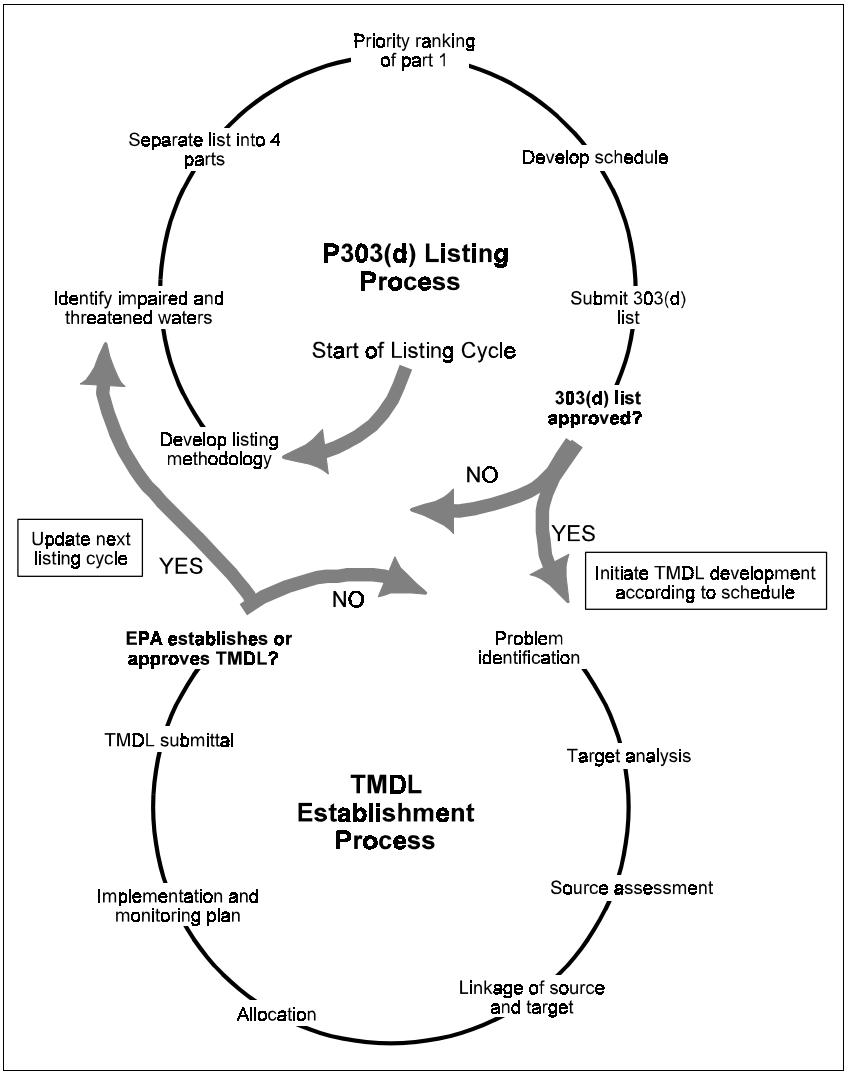


Exhibit 1.1 Components of the §303(d) listing and TMDL establishment process (per recent draft U.S. EPA guidance)

Successful use of the TMDL process requires accurate definition of the problem, characterization of the impaired waterbody and all pollutants contributing to the impairment, and understanding the social, economic, and political constraints that affect implementation and acceptance of the TMDL. TMDLs assume that the total

pollutant load in a waterbody is derived from point, nonpoint, and background sources. Pollutants can be transported to a waterbody either directly, through effluent discharge, bank erosion, recirculation, solar heating, air deposition, and groundwater flows, or indirectly through overland flow (snowmelt or precipitation). The technical approach will vary according to the nature of the problem, pollutant being addressed, type of waterbody, types and number of pollutant sources, and political and economic constraints that affect a specific watershed.

TMDLs consider the effect of processes that contribute pollutants to a waterbody, such as those related to thermal changes, critical flow conditions, sedimentation, and riparian and channel processes. Control measures to implement TMDLs are not limited to NPDES permits, but may also include state and local authorities and actions to reduce nonpoint source pollution.

1.3 TMDLs in the Division of Surface Water and Ohio EPA

1.3.1 History

Until 1992, U.S. EPA certified as TMDLs the wasteload allocations completed in support of NPDES permits by DSW and its predecessors. In the mid 1990s, DSW's modeling and nonpoint source staffs sought and received CWA §104 and §319 funding to develop pilot TMDL-type projects, most notably the Bokes Creek project, but there was little follow-through to implementation of recommendations. Other work proceeding at the same time, such as the work on the ship channel of the Cuyahoga River, although not referred to as a TMDL, is actually a reasonable example of the activities needed to develop a TMDL. The 1997 Great Lakes Initiative rule package included general language outlining the TMDL requirements in Ohio (Ohio Administrative Code 3745-2-12).

TMDLs have traditionally been viewed as a modeling task in DSW. Indeed, modeling is an important component of TMDLs. But we have learned that a modeling analysis, devoid of ties to the local landscape and realistic options for implementation is just another "report gathering dust on a shelf" that does nothing to improve water quality. Integrating all areas of DSW and working with other divisions in Ohio EPA, with other state and federal agencies, and with stakeholders to identify problems and formulate implementable solutions has the best chance of accomplishing the mission of DSW.

1.3.2 DSW Mission

Ohio EPA has the responsibility to establish TMDLs based on federal regulatory requirements. In addition, the Division of Surface Water has a responsibility to the people of Ohio to carry out the Division's mission. The mission can be accomplished through the establishment of TMDLs.

DSW's mission is *to protect, improve, and restore the integrity of all waters in Ohio*. The objective of the TMDL process is, in part, to establish a sound strategy for restoring and protecting a waterbody. Therefore, TMDL projects can be effective means to accomplish the mission but only if a process is established that fully supports all aspects of a TMDL project.

The TMDL process speaks to the improvement and restoration parts of DSW's mission. It is a

long-term process to resolve impairment in Ohio's waters and should serve as a cornerstone for strategic management within the Division.

The TMDL process has strong ties to five of the nine existing goals for DSW, as follows:

- It is based on our program for monitoring and assessing the aquatic environment
- We will be using, refining, and developing scientifically sound methods, policies, and regulations
- The process will aid us in planning and coordinating our resources
- There will be a large public education component to the TMDL process
- It will aid us in developing effective partnerships with local government and other local participants.

The TMDL process provides a road map for the specific implementation of a watershed-based delivery of DSW resources aimed at eliminating impairments to Ohio waters. The 303(d) list serves as a tool for focusing this effort around certain impaired waterbodies, and the process of completing a TMDL for a specific waterbody provides a focal point around which we can prioritize and allocate resources. Chapter 4 discusses these issues in more detail.

1.3.3 Legal Authority

The legal authority under which DSW operates is contained in Ohio Revised Code (ORC) Chapter 6111. This chapter gives the director the authority to issue permits to certain point sources, issue permits approving the construction of wastewater treatment facilities, issue orders to control or abate pollution and develop standards for water quality and to write rules to administer these programs. The TMDL process will be utilized to support this authority by identifying impairments to waters of the state and identifying the activities necessary to restore the waterbody so that it is no longer impaired.

1.4 U.S. EPA Role

1.4.1 Legal Authority Under the Clean Water Act and Current Regulations

Section 303(d) of the Clean Water Act provides that States are to submit their lists and TMDLs to U.S. EPA for approval. If U.S. EPA disapproves a State list and/or TMDL, U.S. EPA must (within 30 days of disapproval and allowing for public comment) establish the list and/or TMDL.

U.S. EPA’s current regulations and guidance elaborate on the statutory requirement for Section 303(d) lists. Generally, Section 303(d) lists are to be submitted to U.S. EPA in April of every even-numbered year and must identify waters not meeting (or not expected to meet) water quality standards after implementation of existing and scheduled controls.

Historically, the listing requirements of 303(d) were not implemented on a regular schedule. Section 303(d) merely provides for States to submit lists to U.S. EPA "from time to time". In the last seven or eight years, however, U.S. EPA and States have increased emphasis on TMDL activities. Regulations that became effective in 1992 required lists to be submitted on a biennial

basis. The increasing emphasis on identifying and targeting impaired waters is consistent with the increased attention to watershed programs that is gradually replacing the water program's historical focus on point source technology-based controls.

U.S. EPA's regulations for implementing Section 303(d) are codified in the Water Quality Planning and Management Regulations at 40 CFR Part 130. The regulations define terms used in Section 303(d) and otherwise interpret and expand upon the statutory requirements.

1.4.2 U.S. EPA's Responsibility Under the Clean Water Act and Current Regulations

Regional Offices are responsible for approving or disapproving State Section 303(d) lists and TMDLs, and for establishing lists and TMDLs in case of disapproval. Public participation is to be provided for by States (or U.S. EPA Regional Offices, in the case of disapproval) when they establish lists or TMDLs.

For any final State Section 303(d) list or any State TMDL submitted for approval, U.S. EPA must either approve or disapprove within 30 days after submittal from the State. If U.S. EPA disapproves a State submission and the State does not agree to correct the problems, then U.S. EPA must, within 30 days, establish the list or TMDLs as necessary to implement water quality standards. U.S. EPA prefers to work cooperatively with States to resolve listing and TMDL issues.

1.4.3 U.S. EPA's Responsibility Under the Proposed Regulations

- Listing and Prioritization Methodology
  The State must develop a methodology that explains how the State will consider and evaluate all existing and readily available data and information to determine which waterbodies the State will include on its list, and to determine priority rankings for those waterbodies. The State must submit the methodology to U.S. EPA by January 31. U.S. EPA is requesting comments on whether the submittals should be required every second, fourth or fifth year, beginning in the year 2000.

  Following submittal, U.S. EPA will review the methodology and may, as appropriate, provide the State with comments in advance of the list submission. U.S. EPA will not approve or disapprove the methodology, but will consider the methodology in its review and approval or disapproval of the list and priority rankings.

- List and Priority Rankings
  Under the proposed TMDL rules the State must submit its list of impaired and threatened waterbodies and the priority rankings to U.S. EPA by October 1. U.S. EPA is requesting comments on whether the submittals should be required every second, fourth or fifth year, beginning in the year 2000. Within 30 days of receipt, U.S. EPA will issue an order approving or disapproving all or a portion of the list and priority ranking. If U.S. EPA disapproves a portion of the list, including identification of particular waterbodies and pollutant/pollution combinations, or the priority rankings, U.S. EPA will, within 30 days, issue an order identifying all waterbodies and pollutant/pollution combinations or priority rankings needed to make the list consistent with the regulations. U.S. EPA will publish this order in

the Federal Register and a general circulation newspaper and request public comment for at least 30 days. If appropriate, U.S. EPA will write an order revising the list after the close of the public comment period. U.S. EPA will send to the State a copy of its order identifying additional waterbodies and priority ranking.

U.S. EPA may establish a list of impaired and threatened waterbodies, including pollutant/pollution combinations and priority rankings if U.S. EPA determines that the State has not or is not likely to establish such list consistent with the schedule specified in the regulations.

- Schedule for Development of TMDLs
  The State must submit its schedule for establishing TMDLs to U.S. EPA with the list of impaired and threatened waterbodies and priority rankings. U.S. EPA will not approve or disapprove the schedule, but will consider the schedule in its review of the list and priority ranking.

- TMDLs
  U.S. EPA will review each TMDL the State submits to determine if it includes all the minimum elements specified in the regulations. A TMDL which does not include all minimum elements will be disapproved. U.S. EPA will issue an order approving or disapproving each TMDL the State submits within 30 days after it is submitted. If U.S. EPA approves a TMDL the State must incorporate the TMDL into its water quality management plan. If U.S. EPA disapproves a TMDL, U.S. EPA will issue an order establishing a new TMDL for that waterbody and pollutant within 30 days of its disapproval. U.S. EPA will publish this order in the Federal Register and a general circulation newspaper and request public comment for at least 30 days. If appropriate, U.S. EPA will issue an order revising the TMDL after the close of the public comment period. U.S. EPA will send to the State the final TMDL it establishes. The State must incorporate the U.S. EPA-established TMDL into its water quality management plan.

  U.S. EPA may establish TMDLs for waterbodies and pollutants identified on Part 1 of the State's TMDL list if U.S. EPA determines that the State has not or is not likely to establish TMDLs consistent with the State's schedule, or if U.S. EPA determines that it should establish TMDLs for interstate or boundary waterbodies.

1.4.4 TMDLs and Section 208 Water Quality Management Plans

The link between §208 Water Quality Management Plans (208 plans) and TMDLs is established in 40 CFR 130.6, which contains the regulations concerning content of 208 plans. Section 130.6(c)(1) makes TMDLs a required element of state 208 plans.

In some instances, Ohio EPA is the lead agency for 208 plan development, in others there is a designated planning agency (e.g., NOACA, NEFCO, TMACOG) that takes the lead role in the development of 208 plans. Once certified by the Governor, and approved by U.S. EPA, 208 plans are binding on Ohio EPA, and our actions must be consistent with the plan, or the plan must be changed. 208 plans, regardless of who is the lead agency, will need to be modified to include approved TMDLs.

1.5 Basic Needs for Doing TMDLs

In recommending a process, it is necessary to define what is needed both to complete successful TMDL projects and, over the longer term, what is needed to build a successful, continuing TMDL program. It is also important to focus on what we will gain by doing TMDLs; the division-level version of "what's in it for me".

1.5.1 For a Successful Project

Successfully completing an individual TMDL project will require the following:

1. Allocation of resources and priority to the project, including adequate staffing
2. Accurate assessment of stream conditions, including identifying causes and sources
3. Local knowledge
4. Communication with local stakeholders
5. Participation of local stakeholders
6. Integrated technical knowledge from many disciplines
7. Internal communication
8. Ability to determine the appropriate calculations
9. Timely decisions on the use of Ohio EPA authority
10. Follow-through on implementation.

1.5.2 For a Successful Program

Building the capacity to do TMDLs in DSW will benefit all programs. The areas needing specific attention can be grouped into three general categories.

1. Commitment
   - Recognition of TMDLs as a priority in DSW, willingness to prioritize resources towards completing TMDLs, making water resource recovery a priority
   - Buy-in from Director's Office and DSW management and staff
   - Long-term commitment to do TMDLs, both in DSW and Ohio EPA
   - Political support: Governor's Office, state legislature
   - Follow through on all projects to build momentum, a track record, credibility

2. Infrastructural support for the TMDL process
   - Data management capabilities
   - Internal communication
   - Adequate funding for implementing solutions (e.g., BMPs)
   - Timely management decisions on projects
   - Adequate tools: make use of available tools and develop those that don't exist today, for instance, data management and GIS tools, effectiveness of BMPs, modeling methods, data collection methods
   - Tie in the water quality management process, which will lend strength to follow-through efforts

3. Continuous process improvement
    - Built-in quality improvement process that doesn't get short-changed
    - Sharing and analysis of best practices and failures
    - Sound technical and regulatory framework

1.5.3 Why We Should Do TMDLs

What is the TMDL process going to achieve? In defining its mission and goals, DSW has decided where it wants to go; TMDLs are the roadmap to get there. Committing to doing TMDLs will benefit DSW in many ways because they:

- Relate directly to the division's mission and goals
- Provide a way to prioritize, including identifying activities to "take off the plate" that are not contributing to goals or not as high a priority
- Provide a way to measure effectiveness, an evaluation tool
- Clarify roles and goals to staff
- Provide a framework, a way for all program elements to contribute in an integrated way and minimize compartmentalization
- Outline a forum to communicate with local stakeholders about their resource, through which we can
    - Build stronger capacity and involvement at local level
    - Build understanding of water quality issues
    - Influence planning and implementation.

2. The Proposed Process for Listing

2.1 General Concepts of Listing

Ohio's 303(d) list springs directly from its ambient monitoring program which has multiple objectives, including TMDL assessments. Ohio uses ambient monitoring data as an integral part of its strategy for its watershed restoration and protection efforts, for both point and nonpoint sources of pollution. The 305(b) report is a summary of these efforts and forms the basis for the state's 303(d) list. The 305(b) assessments are the summarized results of a broad team assessment effort and they will continue to be an important product that emerges out of each TMDL project in Ohio. Unlike some other states lists, Ohio's 303(d) list of impaired and threatened waters is a direct subset of the 305(b) list. This close link will be maintained in future lists and any data collected outside of Ohio EPA's efforts will be funneled through the 305(b) assessment process, at a minimum before being included as part of the 303(d) listing process. More detailed information on ambient assessments are covered in Chapter 3 at the TMDL project level.

✓ *Ohio EPA should maintain the close link between 305(b) and 303(d) and funnel all internal and external data related to listing through the 305(b) process.*

Ambient monitoring is used for both listing waters as impaired (e.g., if they exceed criteria in WQS) or threatened and for determining causes and sources of impairment. All data will need to meet QA/QC requirements required for the specific data quality objectives of each study, and data confidence codes will be part of the 305(b) assessment process. For listing purposes, for example, biological data will have to meet Ohio's QA/QC standards set out in the Ohio's monitoring strategy and elsewhere. Data of lesser quality will be used to drive study designs and in a confirmatory manner during data assessment activities. Ohio EPA will detail how various types and quality of data (e.g., biological data and information, physical-chemical data and information, aquatic and riparian habitat data and information) will be used in a guidance document to be developed.

✓ *DSW should develop a guidance document, focused on external stakeholders, on the use and need of various types of data in the TMDL process in Ohio expanding on concepts outlined in Ohio's monitoring strategy.*

2.2 Listing Procedures

Currently ambient data is assessed yearly as part of Ohio's monitoring program to support a wide range of management objectives. Data is summarized biennially into the 305(b) assessment database (Waterbody System, WBS) that is used to generate both the 305(b) statistics and the basis of the 303(d) list (impaired and threatened waters). Data volume varies by designated use and waterbody type and is summarized in the table below. Previous 303(d) list have focused exclusively on aquatic life uses because they tend to integrate many of the impacts likely to affect all designated uses. However, the recommended approach to TMDL

listing will include consideration of recreation uses and public water supply uses and contaminated tissue. Accurate listing of TMDL waters is dependent on having appropriate use designations. An important component of Ohio EPA's ambient monitoring program is the validation or changing of unverified or undesignated waters. Exhibit 2.1 summarizes the status of designated uses and indicators used to assess these uses in Ohio.

✓ *DSW must incorporate other Designated Uses into the TMDL effort; the success of this may depend on the development of appropriate new uses and the development or revision of indicators to assess these uses.*

Exhibit 2.1 Status of designated uses and indicators used to assess these uses in Ohio (in relation to existence and development of the use, development of indicators that could be used to assess attainment of that use, and current relative amount of indicator data available)

Waterbody Type	Designated Use [A]			Fish Tissue
	Aquatic Life	Recreation	PWS	
Streams/Rivers				
Small Headwaters	I/X/L	X/R/L	na	L-M
Headwaters	X/X/M	X/R/L	X/?/L	
Wadeable	X/X/M	X/R/M	X/?/L	
Boatable	X/X/H	X/R/H	X/?/M	
Lake Erie				
Near Shore	I/I/M-L	X/R/H	X/X/M	M
Estuaries	I/I/M-L	X/R/H	X/X/M	
Ohio River	X/I/M	X/R/H	X/X/H	M-H
Lakes/Ponds	X/R/L-N	X/R/L	X/X/M	M-L
Wetlands	X/I/L	na	na	N

[A] Format: Use Designation/Indicator/Amount of Ambient Data; Optimum: X/X/H.

Codes: **I** - in development; **R** - needs revision; **X** - complete; **?** - status unknown; **L** - low; **M** - moderate; **H** - high

2.3 Listing Methodology

The new TMDL regulations require the development and public noticing of a methodology for TMDL listing and prioritization prior to submittal of the list to U.S. EPA. The current proposed date for having this product to U.S. EPA is January 31 of the year the list is due (this will vary with whether the list is completed on a 2-, 4-, or 5-year cycle). Ohio will take advantage of the close relationship between the 303(d) and 305(b) listing process. Since we recommend that all external data pass through Ohio's 305(b) process with regard to listing decisions, the 305(b) methodology will form the basis for the 303(d) listing methodology. The listing methodology will

deal with how data is used to make decisions (i.e., decision rules), on designated use attainment/non attainment, and threats and how these methods relate to Ohio water quality standards. It will also address how and the amount and rigor of data is factored into these procedures and how we define "readily available" data. It will be based on Ohio's approaches for determining use impairments and U.S. EPA 305(b) guidance that fits within Ohio's approach to ensure that decisions are made on the basis of sound science. As mentioned earlier, Ohio EPA should develop a guidance document explaining how various types of data (internal and external) will be used in the TMDL listing process.

Completion of the 305(b) data assessments is a prerequisite for construction of the TMDL list. This data should be available by April 1 of each year of each TMDL cycle. Currently data is passed from the Waterbody System (FoxPRO format) to the TMDL database (also FoxPRO format). This will eventually change as the WBS moves to an ArcVIEW/Access format. More specific information is dependent of the division's data management plans; recommendations related to data management for the TMDL are discussed in Chapter 4. Without increased data management support the TMDL process will need to be managed in existing databases (e.g., 305(b)).

From the base of information from the 305(b) the proposed regulations require that Ohio's list be divided into four parts:

Part I	Waters that are impaired or threatened by one or more *pollutants*
Part II	Waters that are impaired or threatened by *pollution* only (e.g., habitat impairment only)
Part III	Waters that have had a TMDL established and approved by U.S. EPA, but where standards have not yet been met.
Part IV	Waters that are currently impaired, but where technology improvements are expected to result in attainment of impaired waters by the next TMDL cycle.

2.4 Listing Schedule

Once the database has been obtained from the WBS the list will be split into these four parts by May 1. The cause codes associated with each impairment will be used to split the list into parts I and II. The 305(b) database will need to be modified to track the information that will allow us to split part I and potentially part II into the appropriate part III and IV subparts. Plans for tracking these waters need to be developed. Thus, because of the close link between 305(b) and 303(d) in Ohio, development of the four required parts of the list should be straightforward.

✓ *DSW needs to modify the 305(b) or use or develop some other related database to track waters with TMDL approvals and waters where the installation of technology improvements are expected to result in attainment of impaired waters by the next TMDL cycle.*

2.5 Developing a TMDL Priority System

The new TMDL regulations require a public notice and submittal to U.S. EPA of a process to prioritize TMDL waters. Presently two factors must receive high priority: (1) presence of a PWS and (2) presence of Federally endangered or threatened aquatic species that may be affected by the identified causes of impairment or threats. U.S. EPA discusses primary and secondary factors affecting priority rankings of states with primary factors being those directly related to the sensitivity or characteristics of the waters and secondary factors being things such as resources, etc. The division is expecting substantial input on the prioritization process and scheduling from stakeholders participating in the TMDL External Advisory Group. These stakeholders will provide a valuable perspective on constraints and advantages of various options we are considering.

Ohio EPA plans to incorporate a number of other primary factors into its prioritization process including severity of impact, limitations and practicality of restoration, sensitivity of a waterbody, and waters where the cost of inaction (i.e., delaying action) is high. Secondary factors will include waters with existing watershed groups, projects, or plans and practical and scientific considerations. In addition, this system will be designed to fit within our five-year basin approach and our allocation of effort among Ohio EPA district offices. The result is that the rankings of low, medium and high priorities will have the effect of moving watersheds and waters among the three five-year cycles of our five-year basin approach over the next 15 years. We also need to institutionalize a way to incorporate the public input. Although the priority system will be designed to be dynamic, the importance of long-term planning for work in watersheds also argues for a somewhat conservative approach to changing priorities (and schedules). The current schedule will be the basis or strawman for the new schedule

To improve the overall efficiency and consistency of efforts with our Agency, the TMDL Team recommends that the various priority setting processes related to water be merged at their core (TMDL, 319 Priority Process, DEFA Integrated Priority System, and Unified Watershed Assessment). Exhibit 2.2 compares the major factors among existing prioritization schemes for water in Ohio EPA. Although each of the major priority setting processes has some important differences, all use much of the same information as the basis for their lists. Each of the data elements that go into these lists has a “cost” for compilation that can be spread across these functions. Furthermore, this base system could then be applied to situations such as enforcement and NPDES priority setting. The TMDL list requires Ohio EPA to address each waterbody/pollutant *combination* in setting priorities. The DEFA system has some advantages here by linking project funding to an identified cause of impairment or threat, a function that would prove useful for TMDL efforts, as well as for other prioritization efforts (e.g., 319). Because of the need for more efficient access and manipulation of data, the success of this effort will be dependent on data management improvements (see Chapter 4).

✓ *Ohio EPA should merge the core of the various water related priority-setting schemes in the Agency (TMDL, 319, DEFA, UWA)*.

Once a draft part I list is compiled, the data elements that will be part of the prioritization process can be compiled. Each combination of a waterbody and a cause will have the prioritization factors compiled and printed in a detailed report. Eventually we will develop a

scoring scheme for these factors. In addition, the information will be summarized by watershed to assist in prioritizing by watershed. Thus each waterbody/cause and watershed/cause combination will be prioritized. The prioritization process will be done in essentially two parts, one a “technical” process applying a series of technical and scientific filters and the other a practical process applying a series of resource and efficiency, as well as public/stakeholder filters. Some waters and watersheds will quickly fall out as receiving a high priority rating because of high scores for certain scientific filters (e.g., endangered species) or a high density of co-occurring high scoring factors. Similarly, others will quickly fall out as a low priority (e.g., Limited Resource Waters) where restorability is low. The most difficult will be the medium priority waters and deciding on how to rank factors to rate the risks appropriately and maximize Ohio’s ability to restore waters. As new data is collected and waters are removed or added to the list, it is likely that most of the movement will occur among those listed in this middle category.

Exhibit 2.2 Comparison of major factors among existing Ohio EPA prioritization schemes for water

Factor	TMDL	319	UWA	DEFA
Federally Endangered & Threatened Species	X[1,2]		X[2]	X[2]
Severity of Impairment	X	X	X	X
Aquatic Life Use	X	X	X	X
Antidegradation	X			X
Cause of Impairment	X		X[3]	X
QHEI Restorability	X		X	X
Cost of Inaction	X[4]			
Threats to Public Water Supply	X		X	X
Public Interest, Ongoing Projects	X	X	X	X
Input from Federal Agencies Required	X		X	

1 High priority required if affected by cause of impairment present.
2 Also State Endangered and Threatened Species.
3 By category only: PS, NPS.
4 This indicator not yet developed.

2.6 Devising the Schedule

The current schedule will be the strawman for the new scheduling procedure. A guidance document needs to be created to outline the procedure for creating the schedule from the technical and scientific filters, the resource filters, and the stakeholder filters that are available.

The process will require an internal effort to compile the filters and derive a draft list. We recommend the following review order:

2. Management for Agency priorities and resource related issues related to TMDLs
3. Front line central and district office supervisors and TMDL staff for technical and resource filters
4. The public and other stakeholders.

This order will ensure that the public will receive a product that will be less likely to undergo substantial internal change before becoming final. After the public notice and public meetings on the schedule, a responsive summary will be prepared to respond to any comments made on the schedule. After final review by management and the Directors Office, the TMDL schedule will be submitted to the U.S. EPA.

2.7 Marketing the TMDL List

Once the TMDL "list" is complete, it will be important that Ohio EPA "market" this list if the TMDL process is to be successful. The new regulations require an implementation plan as part of each TMDL. Since many of the actions that will need to be implemented are voluntary in nature, it is essential that we provide the justification for this work to the public in an intuitive, easy to understand, and convincing manner. The proposed U.S. EPA regulations also stress this point and suggest the importance of making this available in maps and other easy-to-understand formats. We recommend that the division investigate multiple ways of presenting the TMDL list to the public in addition to the text and list-based method currently used. This includes maps at multiple scales, a web-based presentation, and incorporation with other Agency products (e.g., infographics).

✓ *DSW should make the TMDL list available in map form, on the web, and as parts of other existing or planned products (e.g., infographics, 305(b) report).*

2.8 De-listing Waters

The decisions required to delist a waterbody will typically occur at the project and waterbody level. The majority of data will likely be collected by Ohio EPA or submitted to Ohio EPA within the 5-year basin approach schedule. All of this information will be handled through the 305(b) process based on procedures detailed in the 305(b) methodology, Ohio EPA's QA/QC manuals and monitoring strategy, and summarized in the planned TMDL data guide. Data must be deemed adequate (i.e., it must meet Agency data quality objectives) by Ohio EPA technical staff to be used for de-listing. For aquatic life uses, for example, data of approximately the same rigor and coverage as that used for listing must be available to delist a segment. A waterbody showing substantial impairment of biocriteria from low pH and sedimentation from mining could <u>not</u> be de-listed based on a small number of "attaining" pH samples, especially since it is known that acid water is often discharged from old mines during rain events. More

detail on the de-listing criteria will be in the listing procedures that are public noticed and submitted to U.S. EPA.

✓ *De-listing and listing should require data of similar rigor and coverage.*

In situations where the data is detailed and rigorous enough, the identified causes and sources could be updated even when the attainment status changes little. Depending on the volume of external data received and the environmental complexity of the waterbodies, the need to respond to such requests for reassessment could be substantial. This would be particularly resource intensive if they fall outside of the five year approach or do not parallel internal studies.

The proposed rules do not allow for de-listing outside of the once per two-, four-, or five-year TMDL cycle. If the cycle moves to five years, as we recommend, there should be an annual process for de-listing waterbodies that have been shown to attain water quality standards. This will maintain a focus on those waters where problems are currently causing impairment. If U.S. EPA rules do not change to reflect this Ohio EPA should create a subset of the TMDL list that includes waters known to be attaining water quality standards and are awaiting “formal” de-listing.

A product of the 305(b) report for each biennial cycle is an assessment of trends in the state. This could be expanded somewhat to report on de-listing and new listing statistics in tabular, graphic, and map form.

2.9 Timeline

Assuming the draft rules are adopted as proposed, the timeline for producing the 303(d) list would be as follows: The methodology for listing, de-listing, and prioritization will be prepared and public noticed from October 1 to November 30. Revisions will be made in this by January 31 when it is submitted to U.S. EPA. As currently specified in the Clean Water Act the 305(b) data will available by April 1. The process to split the list into four segments will be complete by May 1. Data used in the prioritization process and an initial draft schedule will be compiled by June 1 with a 30 day period for internal review complete by July 1. Public comments and public meetings will be held from July to August 30. Final changes and internal reviews will result in a completed schedule and final TMDL list by the October 1 deadline in printed, map, and web forms. Some of these product types will be dependent on available resources. Other products will include this type of information (infographics) as they are completed.

Chapter 2 Recommendations

- ✓ *Ohio EPA should maintain the close link between 305(b) and 303(d) and funnel all internal and external data related to listing through the 305(b) process.*
- ✓ *DSW should develop a guidance document, focused on external stakeholders, on the use and need of various types of data in the TMDL process in Ohio expanding on concepts outlined in Ohio's monitoring strategy.*
- ✓ *DSW must incorporate other Designated Uses into the TMDL effort; the success of this may depend on the development of appropriate new uses and the development or revision of indicators to assess these uses.*
- ✓ *DSW needs to modify the 305(b) or use or develop some other related database to track waters with TMDL approvals and waters where the installation of technology improvements are expected to result in attainment of impaired waters by the next TMDL cycle.*
- ✓ *Ohio EPA should merge the core of the various water related priority-setting schemes in the Agency (TMDL, 319, DEFA, UWA)*.
- ✓ *DSW should make the TMDL list available in map form, on the web, and as parts of other existing or planned products (i.e., infographics, 305(b) report).*
- ✓ *De-listing and listing should require data of similar rigor and coverage.*

3. The Proposed Process for TMDL Projects

The process recommended here is a mix of the TMDL Team's collective program experience, U.S. EPA requirements (still somewhat undefined at this time), Ohio legal requirements, and ideas exposed during the Team's research efforts. The process is flexible and can be scaled up or down depending on the scope of the project.

3.1 General Concept

The objective of a TMDL project is to establish a strategy based on sound science for restoring impaired or threatened waterbodies within a watershed. A TMDL project assesses the selected watershed, develops a strategy to achieve the TMDL objective, implements this strategy, and monitors the progress towards the TMDL goal. This process is a key element of the water quality based approach to watershed management.

Exhibit 3.1 presents an overview of the proposed process for TMDL projects. The illustration progressively details the major steps in a TMDL project (white boxes). Components within each step are included in the grey boxes. The large arrows on top of the page represent the broad phases of a TMDL project and span the steps included in each particular phase. Note that the phases overlap and that the steps do not necessarily belong to one phase only. A general time estimate per phase is included; however each TMDL project may vary from these time estimates due to project-specific characteristics. A parallel quality improvement process is depicted at the bottom of the page. The quality improvement process is a learning tool vital to efficient completion of future TMDLs and is continuous throughout a TMDL project. One aspect not captured in Exhibit 3.1 is the cyclical nature of the TMDL project process, Exhibit 1.1 depicts this cycle and, in conjunction with Exhibit 3.1, completes the picture of the process for a TMDL project. The following descriptions expand on the general concept presented in Exhibit 3.1.

Step 1. Designing a Watershed Survey

A key component underpinning each TMDL is a watershed assessment survey. This assessment will document impaired or threatened waterbodies and characterize the likely causes and sources of the contributing problems. Proper survey designs are critical to a correct assessment of the watershed and are vital to the success of a TMDL project.

<u>Examine Internal and External Information</u>
Typically, existing Ohio EPA data (with all necessary QA/QC checks) will drive the initial study planning efforts. Although rigorous data is required to make a listing decision, less rigorous data or data designed to identify causes and sources of impairment can be quite useful and powerful supplements when designing a survey. Prior to a TMDL-related watershed survey the public and stakeholders will have an opportunity to contribute data that can be incorporated into the study design as part of the public participation process. DSW also must consider how Source Water and Assessment and Protection (SWAP) assessments can be used and the broader question of whether public water supply (PWS) uses should be considered more

specifically in TMDL survey designs. DSW plans to complete a TMDL data guidance document (described in Chapter 2) that will clearly inform the public and stakeholders how various types and quality of data will be used throughout the TMDL process, especially in survey design and listing. Part of the public participation process, for example, may be to decide whether certain types of data can be collected by stakeholders to increase the efficiency and power of the assessment and to reduce unwanted redundancy. Realistic use of external data will rely on the availability of the data in formats that allow ease of use (e.g., with sufficient locational accuracy and ability of the data to be transported via the Internet) and QA/QC checking. For those stakeholders wishing to collect data, training will be provided if resources are available, otherwise the burden of demonstrating that data quality objectives (DQOs) are met will fall on the data owner.

✓ *DSW should provide training to stakeholders who are interested in collecting data, as resources allow.*

Complete Study Plan Design

The actual study plan design will be put together by the TMDL Team assigned to the specific watershed. Team design is discussed in Chapter 4. The study plan will include clear objectives, specify the types and coverage of samples to be collected during a survey, summarize the problems in the watershed to the extent known, and identify potential "hot spots." Public participation will occur during the solicitation of data to create the plan. In addition, a draft of the plan will be placed on Ohio EPA's web site and sent to identified stakeholders. Some of these stakeholders may include other government agencies and institutions whose participation will be key throughout the TMDL process. Meetings with various groups both within and outside of the Agency will be a key feature of study planning.

✓ *Depending on resources, DSW should hold meetings and solicit input on study plan design from stakeholders and the public.*

Step 2. Collect and Compile Ambient Assessment Data

Much of the work detailing the actual collection of data is covered in other guidance documents. Although it is only mentioned briefly here it is a large, often technically complex effort. Data generated outside of Ohio EPA will need to pass through the same QA/QC filters mentioned under study planning to be used in the TMDL listing or assessment process. As mentioned in Chapter 2, a guidance document that summarizes the requirements for external data is planned. This document will also document what attributes data must have to be considered "readily available." Several types of data forums or organizations could facilitate the use and sharing of water resource quality data in Ohio.

✓ *DSW should stipulate that external data pertaining to study design must be received by Feb 1 of the year of a planned study in a format considered to be readily available.*

Step 3. Determining Use Impairment

Depending on the study plan and the data collected, multiple designated uses may need to be assessed when determining use impairment. Criteria for aquatic life uses vary with the size and

Overview of the TMDL Project Process

Numbers on chart correspond to detailed task lists contained in Appendix B

ASSESSMENT PHASE
18 months

DEVELOPMENT PHASE
12 months

IMPLEMENTATION PHASE
18 months

VALIDATION PHASE
Ongoing

1	2	3	4	5	6	7	8	9	10	11	12
Design Watershed Survey	Collect Water Quality Data	Assess Waterbodies	Identify Target Conditions	Develop Restoration Targets	Select Restoration Scenario	Prepare Implement-ation Plan	Submit TMDL Report	Implement TMDL (inside OEPA)	Implement TMDL (outside OEPA)	Annual Validation Activities	Have WQS Been Achieved?
Examine internal information Examine external information Complete study plan design	Collect and compile ambient data (internal) for waterbody assessment Evaluate ambient data (external)	Determine impairments by designated use Determine causes and sources of impairments or threats Complete TMDL support documents	Examine readily available data Gather additional data as needed Analyze data Define goals Select causes of concern Identify and locate sources of causes Determine geographic scope Identify stakeholder involvement	Decide on calculation method Determine existing load Determine desired load Identify needed reduction Generate example restoration scenarios Decide how Ohio EPA authority will be used	Discuss scenarios w/ stakeholders; generate other options Develop decision criteria Screen scenarios to select best option Verify that scenario achieves reduction Finalize allocations	Describe actions Develop schedule Identify legal authorities Develop list of reasonable assurances Estimate time to attain WQS Develop monitoring plan Establish measurable milestones Decide re-open process	Prepare TMDL report Ohio EPA legal and management review Public notice, meeting(s), respond to comments Revise report as needed Ohio EPA management review and signoff Submit report to U.S. EPA	Provide info for WQMP revision Incorporate actions into priorities Identify resources for actions Identify resources for tracking Adjust work plans Do the work Incorporate implementation plans into other agency priorities	Identify implementing parties Verify implementing parties willingness to proceed	Verify monitoring plan Validate control actions implemented Validate stressor reduction	Validate water quality status or re-open TMDL De-list or re-list Input assessment results to 303(d) listing process

Continuously evaluate process

Quality Improvement Process

Evaluate effectiveness of technical decisions made on project

Exhibit 3.1: 11 x 17 foldout (back)

the type of waterbody being examined and with a tiered series of aquatic habitat designations (e.g., EWH, WWH, MWH, LRW). Recreational uses (bathing waters, primary contact, and secondary contact) also need to be considered when determining impairment of use. Exhibit 2.1 summarizes these as they exist now. As with other areas the degree of resources applied to each of these may vary with data availability and quality, priorities and environmental risk. The methodologies for assessing use attainment based on the data collected are addressed elsewhere. However, the incorporation of certain types of data into the TMDL process (e.g., recreation, certain PWS data) may need further examination to understand data limitations (recreation, pathogen data) or how such data will be applied under current water quality standards (surface water PWS assessments). Detailed assessments will be used to drive the specific TMDL project development while summary assessments will be fed through the 305(b) process to form the basis for the next TMDL statewide list.

✓ *DSW should examine the suitability of certain indicators of designated use attainment (i.e., pathogens as indicators of recreation use impairment) as well as the need to develop new indicators or methods of applying indicators for certain uses (PWS in streams and rivers) as they apply to the TMDL listing process.*

The criteria for determining threatened waters is a bit more subjective than for determining use impairment. Threatened waters are waters that are meeting their use, but where there is some information that suggest that the use may be impaired within the next 5 years. Although the TMDL guidance specifies a time period of two years, we propose to maintain the longer time frame because (1) this has been our standard for 305(b) assessments (the basis of the TMDL list for the past 10 years) and (2) our 5-year Basin Approach is such that monitoring will be performed only one every 5 to 10 years making a 5-year time frame more reasonable. Under a 2-year time frame, a water may not be listed even when it is likely to become impaired before we monitor it again. Given the relative cost savings of protection versus restoration it is prudent to protect as many threatened waters as possible.

✓ *Ohio EPA should maintain the current 5-year definition of threatened waters for Ohio's TMDL listing process*

Determining Causes and Sources of Impairment

A major part of the assessment process, in addition to determining use impairments, is associating causes and sources of impairment. The process is similar to a process a doctor may make when diagnosing a patient. Multiple lines of evidence are used to associate stressors present in the environment (e.g., elevated water chemistry parameters, habitat disturbance, toxicity) with the observed impairment. Past associations observed among these various stressors along with longitudinal patterns, patterns observed in reference sites, the results of internal and external research studies, and staff expertise all contribute to the identification of the causes of impairment. Data rigor has been important in creating datasets with sufficiently low variability to identify recurring patterns among stressor data (e.g., water chemistry, habitat) and response data (e.g., IBI, ICI).

✓ *DSW should maintain data rigor and enhance our capabilities to distinguish links between impairment and the responsible causes and sources of that impairment.*

Step 4. Identify Target Condition

This step clarifies and refines the picture formed of the watershed as a result of the assessment, and the context of the TMDL is selected at this point. The progression of this step includes examination and analysis of all readily available data so that project-specific goals can be identified, causes on which the project will focus can be selected, sources can be located, and the geographic scope of the project area can be defined. Many decisions are made in this step and these decisions require input from local stakeholders; therefore, a watershed or stakeholder group would be very helpful to the successful outcome of this step. In addition, internal coordination is needed as this step requires a diverse knowledge base to complete.

✓ *We recommend that a public group be contacted or formed early in the TMDL project process.*

Step 5. Develop Restoration Targets

The relationship between designated uses, numeric measure(s) of success and pollutant loading or some measure (refer to Appendix B, task 5.3) of a stressor not associated with a mass quantity is defined here. Determination of the desired load or state (the classic "TMDL" quantity) is calculated and allocations developed at this point in the process. The calculation method selection depends, in part, on the level of rigor necessary for a particular project. Some considerations in deciding what rigor level is best to use (i.e., simplified methods vs. complex models) are included in Appendix B, step 5.1. Although a process may be similar between various TMDL projects, calculation methods and the amount of resources used in these projects will vary widely depending on the causes and sources of impairment and other project specific factors.

✓ *We recommend developing a toolbox of calculation methods sufficient to provide tools to develop restoration targets for the various causes and sources encountered in the TMDL process.*

✓ *We recommend developing a tool for evaluating of what level of rigor is needed in the calculation method. This tool would greatly assist the allocation of resources among the concurrent TMDL projects.*

A major decision to be made at the end of Step 5 is how Ohio EPA will use its authority to bring the water into attainment. This information should be available to stakeholders as they begin to consider scenarios for restoration.

✓ *Ohio EPA must be very clear with stakeholders about how it will use its authority in TMDL project areas.*

Step 6. Develop Scenarios

Potential restoration scenarios (see the glossary for a definition of this term) that translate the numeric target(s) to treatment options can be developed to highlight the extent implementation methods are needed. These initial scenarios would provide a starting point and guidance tool

for the watershed group to use in deciding on a restoration plan. The local stakeholders could develop additional restoration scenarios. Then an evaluation of all the scenarios would occur and the best restoration scenario (as defined by the stakeholders) would be selected. The selected scenario would be technically verified to ensure the selected actions are predicted to result in WQS attainment.

✓ *We recommend developing a handbook of BMPs including descriptions and estimated effectiveness in Ohio and related to ecoregions. Such a handbook is necessary for the technical verification of restoration scenarios.*

Step 7. Prepare Implementation Plan

An implementation plan will be prepared for the selected, verified restoration scenario. The plan will describe the actions to be implemented, document an implementation schedule, identify legal authorities, list reasonable assurances that the actions will be implemented, estimate the time needed to attain water quality standards, develop and document a monitoring plan, and list measurable milestones. Data from the previous steps will be utilized during the monitoring plan development. After the monitoring plan is developed it will be verified in Step 11 (an annual check to see if the monitoring plan continues to make sense).

Step 8. Finalize TMDL Reporting

Once the implementation plan has been completed, DSW management must approve the plan as a basis for future activities by DSW. The implementation plan, if accepted, would then be finalized, and the TMDL would be sent to U.S. EPA for approval (under the proposed rules).

Step 9. Internal Implementation

Once an approved TMDL implementation plan is available, DSW will incorporate it into our state water quality management plan. The implementation plan would also be incorporated into annual work plans for affected units. Agency commitments could extend over several years, and these commitments must be tracked. For example, the schedule for issuance of NPDES permits included in the implementation plan will need to be incorporated into permit drafting schedules. Nonpoint source program plans may need to be adjusted to make funding available to address identified nonpoint source pollution problems. As action items are implemented, they will be reflected in the annual validation activities (Step 11).

✓ *DSW should establish a mechanism to track TMDL commitments (Agency commitments made to implement and/or validate TMDL projects) and make sure this tracking mechanism is incorporated into annual work plan activities.*

✓ *The water quality management plan process should be connected to the TMDL process so that it can be updated efficiently.*

✓ *We recommend that annual work plans and specific point and nonpoint source plans in a watershed be adjusted where possible to maximize the probability of success of TMDL*

implementation. Restoration plans and activities not addressing identified limitations to water quality standards should be reevaluated where possible.

Step 10. External Implementation

Once an approved TMDL implementation plan is available, DSW will need to confirm that external parties such as local SWCDs, NRCS, health departments, etc., are proceeding with previously agreed upon implementation tasks. Any changes that may have occurred in the approval process will need to be clarified, and local willingness to proceed with implementation will need to be assured. As action items are implemented, they will be reflected in the annual validation activities (Step 11).

✓ *We recommend that a detailed strategies for working with external parties be developed and institutionalized in annual work plans.*

Step 11. Annual Validation Activities

The purpose of validation is to track progress towards attainment of water quality standards so that a waterbody may be de-listed. At the same time, validation may also provide reasonable assurances that phased and nonpoint source TMDLs are on track to achieve water quality standards. Just as important, validation provides an opportunity for assessing the effectiveness of efforts, information which ultimately will reform and direct future efforts while increasing efficiency.

The proposed validation process uses a three-tiered approach to measuring progress based on the environmental indicators continuum, moving from activity-based indicators to environmental indicators. The first tier assesses progress of implementing nonpoint and point source controls; the second tier tracks the instream effects of these source controls; and finally, once an implementation plan has been successfully completed and in place for an appropriate duration, the third tier assesses attainment of water quality standards by the same methods which were used to list the waterbody.

The starting point for conducting validation is completion and implementation of an implementation plan. At that time, validation of completed source control activities (Tier 1) begins and may also be accompanied by initial instream assessment of stressor levels (Tier 2). This can serve as a baseline measure with which to benchmark over time. Validation of instream changes continues until water quality targets, as identified in the monitoring plan (done in the implementation process) are completed. If these improvements do not occur, then the implementation plan must be revisited. At the same time, if improvements do occur, this information needs to be used in the development of future TMDLs. Thus the validation process not only documents and ensures achievement of TMDLs, but provides a mechanism for improving achievement of future TMDLs.

✓ *We recommend that resources be devoted to the development or investigation of bona fide, interim water quality measures by DSW staff.*

✓ *We recommend that resources for training and the provision of technical assistance be allocated so that stakeholders can assist DSW in conducting these interim measures.*

Step 12. Have WQS Been Achieved?

This step completes the "cycle" of the TMDL process. It is essentially both the third tier of validation discussed above and step 2.1 where field monitoring is conducted. This question needs to be answered using the same types of data that listed the waterbody originally. If a waterbody is found to be in attainment, it can be delisted and the strategy used to restore the waterbody documented. If the waterbody remains impaired or is threatened, the effectiveness of source-control activities needs to be evaluated and reasons identified for the impaired or threatened status. This evaluation would then direct where the project should re-enter the TMDL process.

3.2 Task Descriptions

Detailed task descriptions of each of the sub-steps listed in Exhibit 3.1 are included in Appendix B. These task descriptions form a catalogue or guidebook to a TMDL project and are intended to be the nucleus of a TMDL project handbook. These task descriptions represent a large portion of the TMDL Charter Team's effort. Each task description sheet includes the following information as applicable:

- Purpose of the task
- Description of what the task involves
- Inputs the task needs to be accomplished
- Outputs of the task
- Time in regards to the effort it would take to complete the task
- Time in regards to the span of time that would elapse before the task was complete
- Dependencies of the task on another TMDL process step (a project dependency)
- Other dependencies the task relies on before the task can be complete
- Information sources to assist completion of the task
- Recommendations to assist the completion of the task in a process not a project sense

3.3 Outcomes

The outcomes or milestones of each step in the generic TMDL project process are outlined in Exhibit 3.2.

3.4 Quality Improvement Process

Quality improvement should be incorporated on at least two levels in TMDL activities: improving the process itself and improving the technical decisions made on projects, both individually and

collectively. By including the quality improvement process in Exhibit 3.1, the TMDL Team is indicating the level of importance we place on the continuous learning that will be needed as we confront the myriad of situations that will arise in resolving water quality impairments.

Exhibit 3.2 Outcomes of Each Step in the TMDL Project Process, by Step

Step	Step Description	Outcomes
1	Design Watershed Survey	1. Watershed study plans 2. Coordination with other monitoring efforts
2	Collect Water Quality Data	1. Watershed survey data 2. Compilation, QA/QC, analysis of ambient data
3	Determine Impairment Status	1. Location and extent of waterbody impairments 2. Causes and sources of impairment 3. Threats to attaining segments 4. Completion of assessment documents (305(b))
4	Identify/Target Conditions	1. Create a picture of the current situation 2. Collect and organize existing data 3. Form working relationship with public 4. Select causes to target 5. Define the goal of the TMDL 6. Select project geographical boundaries
5	Develop Restoration Targets	1. Establish calculation approach 2. Have measurable endpoints 3. Calculate “TMDL” 4. Determine needed reduction
6	Select Restoration Scenario	1. Selected restoration scenario to achieve target
7	Prepare Implementation Plan	1. Final implementation plan
8	Submit TMDL Report	1. Submittal of TMDL Report to U.S. EPA
9	Implement TMDL (inside Ohio EPA)	1. Identify activities/products Ohio EPA is responsible for 2. Prepare/modify annual work plan to reflect activities 3. Track implementation plan
10	Implement TMDL (outside Ohio EPA)	1. Identify parties responsible for selected actions
11	Annual Validation Activities	1. Annual documentation of source milestones, and water quality targets
12	Have WQS been achieved?	1. Documentation of attainment of WQS or re-opening TMDL

3.4.1 Improving the TMDL Process

Given the lack of experience nationally with TMDLs, and some of the issues that must be resolved for successful TMDLs, there will be room for improvement in the TMDL process. Steps can be embedded at key places in the TMDL project process to reflect on the project's progress, thus capturing information that will help future projects proceed more smoothly. Information leading to better resource estimates can also be collected in this way.

✓ *We recommend that a quality improvement process be established and that the QIP be recognized as a vital piece of the TMDL process.*

3.4.2 Improving Technical Decisions

A quality improvement process (QIP) is needed to evaluate and analyze the results of TMDL development and implementation to ensure continued achievement of TMDLs and de-listing of waterbodies. Without such a "check" (QIP), it will be difficult to impossible to provide "reasonable assurances" to U.S. EPA that TMDLs in fact will be achieved, since many of the initial implementation approaches for nonpoint TMDLs will be based upon anecdotal and qualitative experience. In addition to providing a "check" on TMDL implementation, the QIP would also serve to ensure those implementing TMDL activities that their efforts and dollars are being spent wisely, and that they will indeed produce the predicted results. Thus, the QIP is a method for analyzing the body of evidence produced by the TMDL implementation process and applying the findings to improving the process. In the business world, the QIP is akin to a consumer satisfaction survey that is then used to improve the product or service. Ultimately, the QIP will better define the relationship between certain source control activities and water quality outcomes so that these can be predicted with greater and greater confidence.

Currently, this relationship is better understood for point sources than nonpoint sources. In the initial stages of TMDL implementation, it is likely that there will be a significant amount of modification of nonpoint source control activities before an outcome is achieved. As TMDLs are implemented, the gathering and analysis of this information will be imperative to continually improving the TMDL process and ensuring its survival. Conversely, without such an approach, the proposed TMDL process will age and fail.

✓ *We recommend that, as part of the quality improvement process, the body of data generated by TMDL activities should be statistically and strategically analyzed to more effectively implement TMDLs in the future.*

It will also be important to identify what additional, new data would be helpful in better understanding the relationship between various nonpoint source controls and water quality improvements. The data generated can be used to create a strategic process for finding grants and funding that will improve the TMDL process (i.e., grants that are not considered "position funders" but that are focused on process improvement).

3.5 Timeline

The assessment phase will actually begin somewhat before what is illustrated in Exhibit 3.1 due to external groups compilation of information activities. This external data will need to be submitted to Ohio EPA by February 1 of the year of the study in order to be useful in watershed survey planning. Study plans will be compiled by the TMDL project team from April to May of the year of the survey. Most data collection for assessment will proceed from June-October although some parameters may be collected sooner or later (e.g., sediment chemistry, wetland bioassessments). Assessment of use attainment and causes and sources of impairment occur from April to November of the following year. These assessments will be made within the framework of the TMDL project team and certain components have the possibility of being accelerated or delayed slightly depending on the assessments the TMDL project team will need to proceed with development.

Currently 305(b) assessment summaries, derived from the “TSD” process occur biennially by January of the year the 305(b) report is due. Final reporting timelines will vary with product complexity but will be designed to make information available to the TMDL Team as needed. For example, certain assessments (waters impaired by nutrients) could be completed early to allow spring sampling to begin for the TMDL development process. Infographics would likely come later to communicate TMDL progress, identify areas of concern, etc., to the public and stakeholders.

The other phases are not as defined as to the time of year activities need to occur. Development may need to cover various seasons so this phase could easily take longer then the estimated year depicted in Exhibit 3.1. Validation of a TMDL is a continuous cycle that has a wide variability of time associated with it; time needed for validation will depend on the cause and sources targeted and the control actions selected to achieve the restoration target. Validation will be highly project-specific. It is important to note that the projected time allotments per phase in Exhibit 3.1 are estimates only, and that actual time needed for a particular project may vary widely from these estimates and from other TMDL projects.

3.6 Documentation of TMDLs

Up to this point, U.S. EPA has provided little information about what TMDLs must contain: the reports should relatively short (20 to 30 pages, not counting appendixes, which will contain the details) and contain the required elements as outlined in regulations. Exhibit 3.3 highlights the vast differences between the existing and the proposed rules as far as what is and what may be required in a TMDL report. Fortunately, DSW already produces the technical support document which provides supporting information for many of the proposed requirements. As the final federal rules are developed, documentation for future TMDLs can be firmed up. It will be important to remember that U.S. EPA is only one audience for these documents; the public and stakeholders involved in the development and implementation of the TMDL also must be considered.

Exhibit 3.3 Required TMDL Elements Under Existing and Proposed Rules

Existing Rules	Proposed Rules
Quantification of the pollutant load that may be present and still meet WQS	Name and geographic location of waterbody
Wasteload allocations	Waterbodies upstream that contribute significant amounts of the pollutant
Load allocations	Identification of the pollutant for which the TMDL is being established
A margin of safety	Quantification of the pollutant load that may be present and still meet WQS
Consideration of seasonal variations	Identification of the amount or degree by which the current pollutant load in the waterbody deviates from the pollutant load needed to attain or maintain WQS
	Identification of the source categories, source subcategories, or individual sources of the pollutant for which the wasteload allocations and load allocations are being established.
	Wasteload allocations and supporting technical details
	Load allocations for nonpoint sources
	A margin of safety
	Consideration of seasonal variations and environmental factors such that the WQS is met.
	An allowance for future growth
	An implementation plan that includes the following:
	A description of the control actions and/or management measures which will be implemented to achieve the wasteload allocations and load allocations
	A demonstration that the control actions and/or management measures are expected to achieve the required pollutant loads
	A timeline, including interim milestones, for implementing the control actions and/or management measures
	A discussion of reasonable assurances that wasteload allocations and load allocations will be implemented
	A description of the legal authority under which the control actions will be carried out

Existing Rules	Proposed Rules
	An estimate of the time required to attain and maintain water quality standards and discussion for the basis for that estimate
	A monitoring and/or modeling plan designed to determine the effectiveness of the control actions and/or management measures and whether allocations are being met.
	A description of measurable, incremental milestones for the pollutant for which the TMDL is being established for determining whether the control actions and/or management measures are being implemented and whether WQS are attained.
	A description of the process for revising TMDLs if the milestones are not being met and projected progress toward attaining water quality is not being demonstrated.

Chapter 3 Recommendations

✓ *DSW should provide training to stakeholders who are interested in collecting data, as resources allow.*

✓ *Depending on resources, DSW should hold meetings and solicit input on study plan design from stakeholders and the public.*

✓ *DSW should stipulate that external data pertaining to study design must be received by Feb 1 of the year of a planned study in a format considered to be readily available.*

✓ *DSW should examine the suitability of certain indicators of designated use attainment (i.e., pathogens as indicators of recreation use impairment) as well as the need to need to develop new indicators or methods of applying indicators for certain uses (PWS in streams and rivers) as they apply to the TMDL listing process.*

✓ *Ohio EPA should maintain the current 5-year definition of threatened waters for Ohio's TMDL listing process*.

✓ *DSW should maintain data rigor and enhance our capabilities to distinguish links between impairment and the responsible causes and sources of that impairment.*

✓ *We recommend that a public group be contacted or formed early in the TMDL project process.*

- ✓ *We recommend developing a toolbox of calculation methods sufficient to provide tools to develop restoration targets for the various causes and sources encountered in the TMDL process.*

- ✓ *We recommend developing a tool for evaluating of what level of rigor is needed in the calculation method. This tool would greatly assist the allocation of resources among the concurrent TMDL projects.*

- ✓ *Ohio EPA must be very clear with stakeholders about how it will use its authority in TMDL project areas.*

- ✓ *We recommend developing a handbook of BMPs including descriptions and estimated effectiveness in Ohio and related to ecoregions. Such a handbook is necessary for the technical verification of restoration scenarios.*

- ✓ *DSW should establish a mechanism to track TMDL commitments (Agency commitments made to implement and/or validate TMDL projects) and make sure this tracking mechanism is incorporated into annual work plan activities.*

- ✓ *The water quality management plan process should be connected to the TMDL process so that it can be updated efficiently.*

- ✓ *We recommend that annual work plans and specific point and nonpoint source plans in a watershed be adjusted where possible to maximize the probability of success of TMDL implementation. Restoration plans and activities not addressing identified limitations to water quality standards should be reevaluated where possible.*

- ✓ *We recommend that a detailed strategies for working with external parties be developed and institutionalized in annual work plans.*

- ✓ *We recommend that resources be devoted to the development or investigation of bona fide, interim water quality measures by DSW staff.*

- ✓ *We recommend that resources for training and the provision of technical assistance be allocated so that stakeholders can assist DSW in conducting these interim measures.*

- ✓ *We recommend that a quality improvement process be established and that the QIP be recognized as a vital piece of the TMDL process.*

- ✓ *We recommend that, as part of the quality improvement process, the body of data generated by TMDL activities should be statistically and strategically analyzed to more effectively implement TMDLs in the future.*

4. Integrating TMDLs into How DSW Accomplishes Its Work

Outlining a TMDL process was only one part of the charter of the TMDL Team. Recommending how TMDLs can be integrated into the Division's existing work is a big challenge. In this chapter, we recommend how the TMDL work can be accomplished, how it can be planned into the future, and how it relates to other Division work and priorities.

4.1 Building on What We Already Do

Doing TMDL-type work is not new in the Division of Surface Water (DSW). The Five-Year Basin Approach employs an interdisciplinary team approach analogous to that envisioned for TMDL projects. In the spring of every year, biologists, modelers, nonpoint source staff, and permit writers from central and district offices meet to plan field surveys for the summer. At the initial planning meetings information is shared about the local landscape, land use, dischargers, known water quality impacts, past surveys and experiences, even the best places to access the stream by boat. A field plan is developed, and survey data are collected. Typically, the group meets one, or two, or more times after the field season to discuss results and coordinate data analysis and reporting. Generally a Technical Support Document, which contains all analyses, conclusions, and recommendations, is produced. At the very least, information for the statewide 305(b) report is prepared. Occasionally the team completes follow-through work for certain priority issues on an as needed basis (e.g., permitting, enforcement), but eventually the group disbands. However, the resulting assessments and recommendations filter through to influence the division's work over the next several months, and to years in some cases. Modeling is done as needed to support permits, and permits are issued. The whole process typically lasts about two years, with a new set of watersheds entering the process every year. This process, procedurally at least, is similar to what must happen in completing TMDLs.

Continuity in effort, teamwork, and the sequence and flow of the various component work products are essential to the timely completion of technical support documents (TSDs) and the varied "spin-off" products such as the 305b report, 303d listing, permit support documents (PSDs), and WQS use designation revisions. This continuity is not always maintained and interruptions to the process have been especially apparent in the past 3 to 4 years. Staff are pulled off a project to work on an "emergency" just when they are needed most; the next piece of the puzzle doesn't arrive on schedule because a higher priority popped up unexpectedly; one unit or another loses staff and the process either gets off schedule or grinds to a halt. The intentions are good, the technical work is excellent, but too often the process ends in frustration.

✓ *We recommend that DSW approach each TMDL as a long-term project and manage it as such, emphasizing the need to maintain continuity within the process and coordination among team members.*

For many years, loosely arranged groups of staff have accomplished watershed and point source work in DSW. We are proposing to formalize and build upon these *ad hoc* work teams to accomplish TMDLs, taking advantage of the skills and experience of the staff and adding structure to make sure the work gets done on time and on budget. Over the next several pages, we will explain how project teams will work and how they can be supported by the organization. A similar project team approach can be used to produce the 303(d) list and schedule.

✓ *We recommend that DSW use the process outlined in Chapter 3 as a basic template, to be customized into a project plan for each TMDL project.*

By their very nature, TMDLs will require continuous innovation. Nationwide and in Ohio, the TMDL process and its tools, experiences, and protocols are in their infancy. Each project will be different from the last because every set of problems will require unique solution and working with a unique group of stakeholders. This is not to say that we will not become more efficient, but there can never be a "TMDL assembly line" operation. We will build on the knowledge gained as we do projects, just as we have done in building other expertise in the Division.

4.1.1 Team Structure and Operations

A team is a number of people with different backgrounds, skills, and knowledge, and drawn from various areas of an organization (their "home"), who work together on a specific and defined project. The mission of the team is a specific task. A team leader is appointed for the duration of the project. The team remains intact throughout the project, but individual members may scatter between tasks and belong to a number of teams at one time. The team needs a clear and sharply defined objective. It must be possible to feed back from the objectives to the work and performance of the whole team and of each member. The team as a whole is responsible for the successful completion of the project.

Like other work of the Division, TMDLs will require a wide range of skills on each project, and no two projects will be alike. The knowledge and expertise for formulating solutions for impaired and threatened waters and following up on projects lies throughout the Division.

✓ *We recommend that DSW assign a multi-disciplined staff team to each TMDL project at the beginning of the project and support them as a project team*.

Exhibit 4.1 presents our recommendation for a TMDL project team as a conceptual model. Membership on project teams would be customized for each TMDL project, depending on project needs. It is reasonably certain that all projects, at least in the foreseeable future, will require biology, water quality, geographical information systems (GIS), and modeling support. Depending on the characteristics of the watershed, the causes and sources of impairment, and potential remedies, any or all of the following could also be needed: nonpoint sources, permits, wetlands, watersheds, agriculture, enforcement, compliance assistance, and standards.

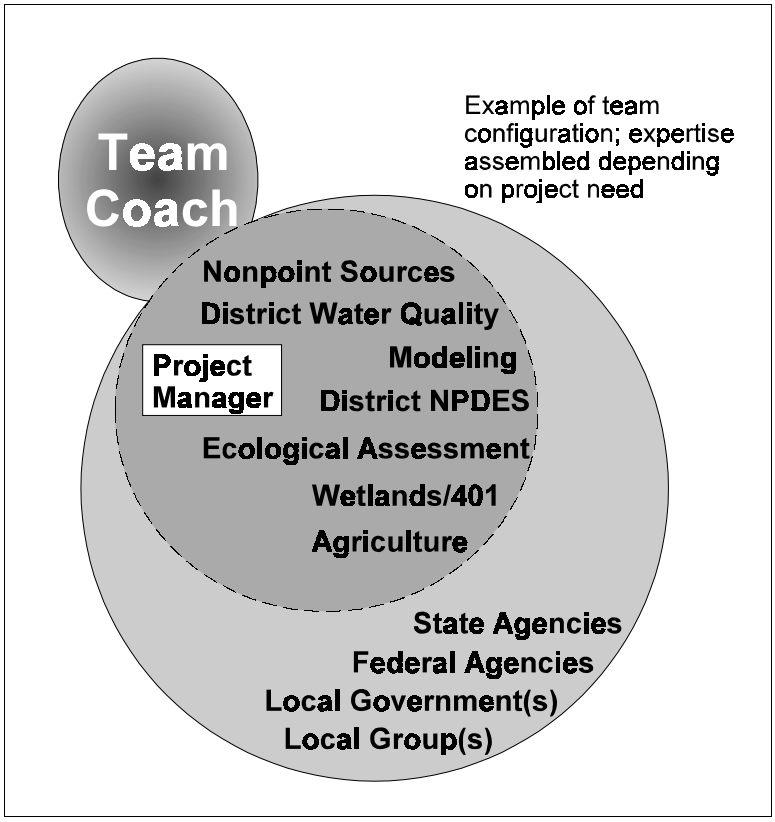


Exhibit 4.1 Conceptual Model of a TMDL Project Team

Having 5 or 7 or 10 or 12 people on a team does not imply that an equivalent number of full-time equivalents (FTEs) will be used for the project. It does mean that all people on the project should have adequate time set aside to accomplish the work assigned to them and that they will know what is happening with the team and the project.

To maintain continuity and to ensure that adequate expertise is available throughout a project, team membership must remain intact throughout the project, even if a member's major task is complete. The process involves several feedback loops, and any decision can be revisited through the public participation requirements.

Exhibit 4.2 provides an example of the level of involvement that various expertise areas may have throughout the process for a hypothetical TMDL

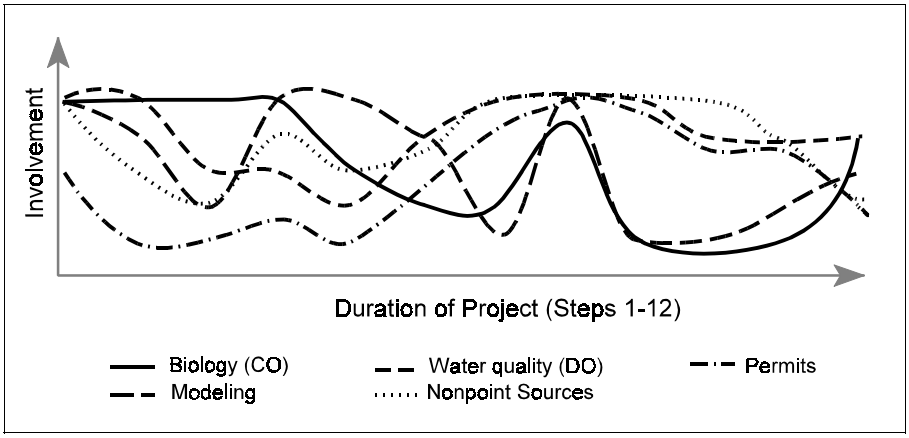


Exhibit 4.2 Example of TMDL Project Involvement of Various Expertise Areas

project. Note that no member ever stops being involved; at the lowest activity level, the member would still keep abreast of team progress and remain in communication with team members. The level of involvement of some expertise areas will be such that a staff member may function on more than one TMDL project team. For other areas, the project team activities may be the primary assignment of some staff.

External interests are also represented in the model (Exhibit 4.1). The participation of stakeholders in the TMDL process will be a key to successful implementation. However, such participation can also consume many staff resources. It will be important to develop a plan for stakeholder involvement early in each project so that the roles and expectations of all parties are clear with respect to public participation.

✓ *We recommend that DSW establish a staff-level project manager for each TMDL project*.

One member of the project team will function as the project manager (or project leader) for the duration of the project. In addition to the technical duties assigned, the project manager will oversee the project: maintaining the schedule, assessing and reporting progress, facilitating communication among team members. The project manager should possess the leadership skills necessary to control a project of the size and importance of a TMDL. An important aspect of the project manager's job is to establish clarity: clarity of objectives and of every member's role including his/her own.

✓ *We recommend that DSW provide each TMDL project team with a management-level "coach" to advise the team, to act as the project's advocate in securing resources and decisions (initially and throughout the project).*

Management is integrated into the TMDL process through the use of team coaches. A coach ensures that the projects are adequately staffed and prioritized. At various steps in the process, management decisions are needed. The team coach would work to ensure those decisions are made when needed, without undue delay.

✓ *We recommend that DSW establish a "council of coaches" where resource issues are resolved, common problems are discussed, successes are shared, process improvements are recommended.*

Exhibit 4.3 illustrates the concept of a "council of coaches." The management coaches, working as a self-managing group, would allocate resources among the TMDL projects. The council would be a forum for sharing best practices and solving problems. Perhaps the most important function of the council would be ensuring the process undergoes continuous improvement. Having managers involved in TMDLs as team coaches provides an opportunity to be involved in a very tangible way. Each coach will gain perspective on the process by working through team problems with the team's project manager and with his or her fellow coaches on the council.

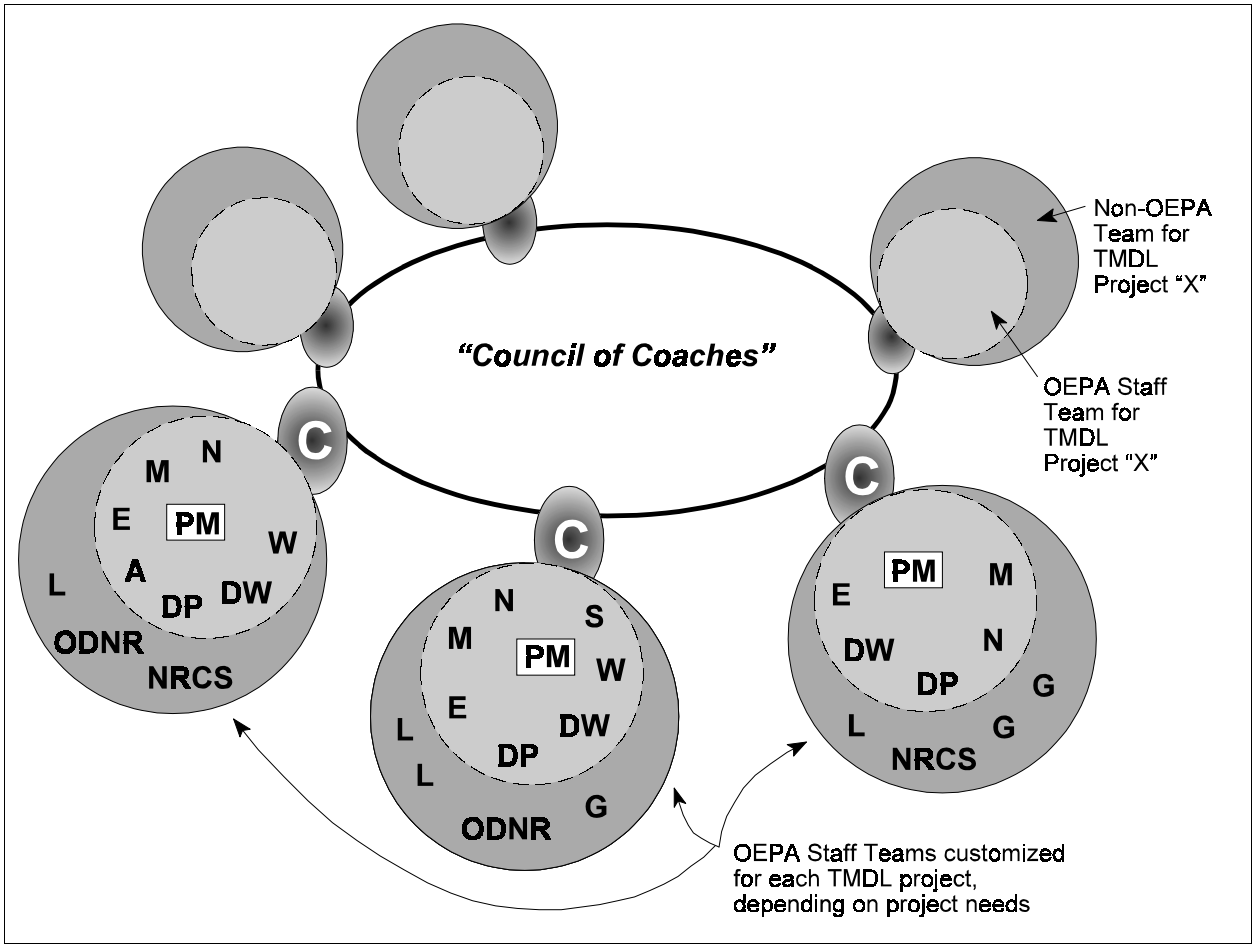


Exhibit 4.3 TMDL Project Teams and Council of Coaches (refer to Exhibit 4.1 for key to lettering)

The TMDL Team realizes that some of these concepts are new and that a learning curve must be overcome. Project managers and coaches should receive training in the concepts of project management. The division should invest in project management software to aid in controlling and communicating progress on the TMDL projects. Training in team building and team player skills for management and staff, respectively, would also be a wise investment.

✓ *We recommend that DSW provide appropriate project management training and tools for TMDL project managers and coaches.*

The establishment of long-term, focused project teams to complete individual TMDL projects will bring more structure to the division. We believe that having more definite project planning mechanisms to control projects, schedules, and resources should enable the division to forecast its resource needs and communicate its priorities, goals, and accomplishments to parties outside the division (e.g., the Director's Office, the Governor's Office, the Legislature). Being able to communicate this vital information should make it easier for the division to acquire the resources it needs to do TMDLs.

4.1.2 Defining Roles

Everyone in DSW will play a part in the successful completion of TMDLs in DSW. Exhibit 4.4 summarizes the roles of staff and management that we envision as necessary in implementing the TMDL process.

Exhibit 4.4 Defining Roles in the TMDL Process

Position in DSW	Role in the TMDL Process
Chief	• Pass through information • Allocate resources • Enforce Division commitment to TMDLs through strategic management process
Assistant Chiefs	• Pass through information • Participate in resource allocation discussions • Enforce Division commitment to TMDLs through strategic management process • Ensure that sections and unit eliminate or minimize decisions that lead to impaired waters • Balance TMDL needs with other Division priorities
CO/DO Managers (non-coaching role)	• Enforce Division commitment to TMDLs through strategic management process • Ensure completion of non-TMDL program priorities • Ensure completion of TMDL program priorities • Participate in resource allocation discussions • Review and approve work outputs (e.g., reports and recommendations) • Intervene in crisis management situations
CO/DO Managers (coaching role)	• Enforce division commitment to water resource recovery through strategic management process • Ensure completion of TMDL program priorities • Ensure completion of non-TMDL program priorities • Participate in resource allocation discussions • Work with TMDL project manager to identify resource needs • Share information with the project team • Secure the participation of other Ohio EPA divisions as needed
Council of Coaches	• Balance resources among TMDL projects • Ensure TMDL projects priority among other division priorities • Secure timely management decisions at necessary points in TMDL projects • Ensure that process improvement occurs • Share best practices • Resolution of common problems

Position in DSW	Role in the TMDL Process
CO/DO Supervisors	• Enforce division commitment to water resource recovery through strategic management process • Ensure that technical work of their TMDL staff is adequate for TMDL needs • Provide or recommend training to prepare staff for their TMDL project responsibilities • Ensure work plan commitments are carried out
CO/DO TMDL Project Manager	• Manage the project • Inform team coach of progress of project • Clarify objectives and roles • Maintain regular communication with and among TMDL project team members • Prepare progress reports • Identify resource needs • Work with team coach to identify resource needs • Identify to coach obstacles to completing TMDL
CO/DO Technical Staff	<u>TMDL Role</u> • Enforce division commitment to water resource recovery through strategic management process • Meet deadlines established for TMDL projects • Communicate needs and results with other TMDL project team members • Establish and maintain technical skills <u>Non-TMDL Role</u> • Provide technical support to TMDL project teams on substantive issues • Prevent crises from disrupting necessary TMDL tasks • Establish technical precedents for use in TMDL projects • Develop rules and establish guidance

Other Ohio EPA staff will also play a key role in the TMDL process. Legal reviews and public meetings will be needed in every TMDL project. Pollution prevention and the revolving loan fund will likely provide assistance with implementation. Other divisions could be involved in any given TMDL project depending on the impairment. Connections to Legal, the Public Interest Center, Pollution Prevention, and the Division of Environmental Financial Assistance can be outlined after management endorsement of the process. Connections to other divisions could be established, at least in the beginning, on a project-by-project basis.

4.2 Implications to DSW Organizational Structure

Recognizing the potential dangers of the topic, the Team is side-stepping the issue of what constitutes an appropriate organizational structure for the Division of Surface Water. However,

how TMDLs are done in the division is influenced by the organizational structure, so a discussion of the impact of various options is warranted.

4.2.1 The Possibilities

A wide spectrum of organizational possibilities exist, as portrayed in Exhibit 4.5. The primary pros and cons of the structures are summarized in Exhibit 4.6.

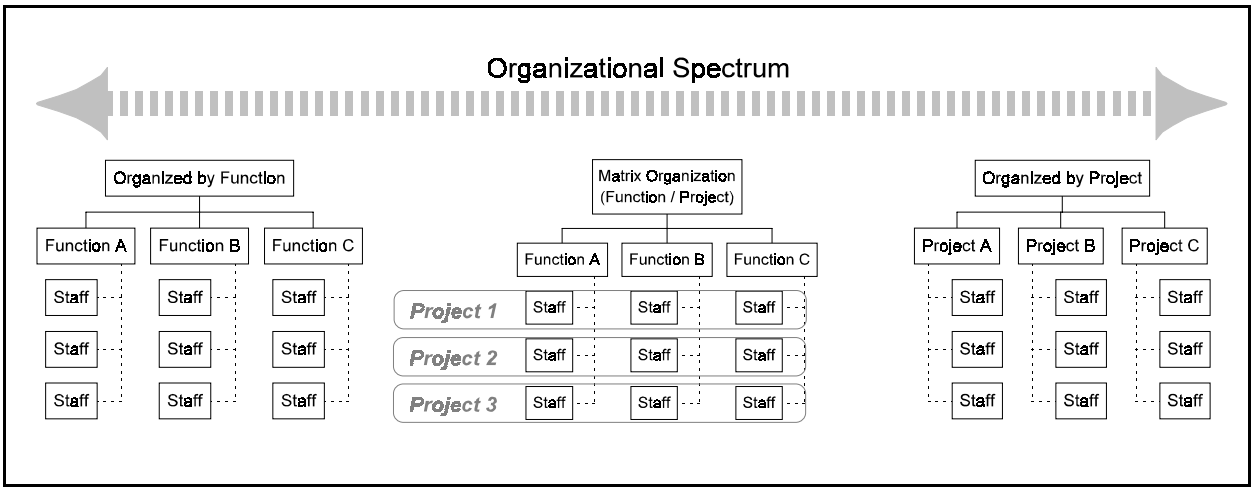


Exhibit 4.5 Spectrum of Organizational Possibilities

4.2.2 The Existing Structure of DSW

The existing organizational structure of DSW and its predecessors (and all of Ohio EPA) is and has been essentially function-based, especially in central office. DSW exhibits a number of the traditional advantages and disadvantages of a function-based organization (see Exhibit 4.6), particularly the development of excellent staff technical skills and the difficult communication among staff of different functions (a silo effect).

In DSW today, work that is produced by multiple functional areas is often produced with little communication among staff doing the work. Essentially, a work unit completes its assigned task, then passes the product to the next unit, etc., until the work product is complete. While the Team did not collect specific data on how well this system works (and did not conduct a survey of staff for their opinion), our years of experience in doing the work tells us that this system deprives staff of "ownership" in the final product and the associated investment in process efficiency and product quality. Ownership leads to job satisfaction which feeds improvements in quality and quantity of work completed.

Several years ago, a QStP team designed a table of organization for the newly formed DSW. The final recommendation of that team was to adopt a matrix-type structure by maintaining functional areas overlain by geography (watersheds). Today's DSW is organized for the most part along the QStP team's recommendations, but the overlying "watershed" portion of the recommendations was never implemented. Some districts have adopted variations of the

Exhibit 4.6 Advantages and Disadvantages of Various Organizational Structures

Type	Advantages	Disadvantages
By Function	• Development of excellent technical skills • Proficiency in performing repetitive tasks • Clarity; everybody understands his own task • High stability • More focused management of QA/QC and QMP issues for specific areas of work	• Presents barriers to communication • Proficiency only in narrow area • Planning is function-based, rather than global • Difficult to understand the task of the whole organization and to relate it to the individual's own work • Rigidity; resists adaptation; not receptive to new ideas • Does not develop, train, or test people • No incentive to do things better • Demands little responsibility for the success of the whole organization • Units subordinate the welfare of other units and the whole organization in favor of their unit • Decisions can be made only at the top; may be misunderstood and/or poorly implemented
By Project	• Flexibility: as projects are completed, staff are available for other projects • Broader knowledge base developed • Focus on the goal, not on the function • Invites innovation	• May not develop in-depth expertise • Minor projects may get lost • Easy to lose historical knowledge • Could be confusing if projects and processes are not well defined
Matrix-Type	• Build and maintain technical strength • Develop global vision • Projects of many different types can fit model; global application • Focus on the goal, not on the function • Broader knowledge base developed • Invites innovation	• Could be confusing if projects and processes are not well defined

recommended structure and could provide useful laboratories for experimentation through the TMDL process.

4.2.3 An Organization to Support the TMDL Process

While we believe sound arguments can be made for adjusting the organizational structure of the division to support TMDLs, we believe that completing successful TMDLs is possible within the existing organizational structure. Our objective as a team is to recommend a TMDL process that can work successfully within the framework that exists today.

Of the factors listed in Section 1.5 as necessary for completing TMDLs, the organizational structure of the Division most directly affects local interaction and internal communication. Both of these issues can be overcome by special attention in structuring the TMDL process.

Establishing watershed teams in DSW would be an investment of scarce resources, but the teams could facilitate TMDL projects if they provided the following :

- Knowledge of and/or established relationships with interested local stakeholders
- Knowledge about how the water resource is valued locally, which may indicate how successfully a TMDL could be implemented
- Knowledge of long-standing local issues: political, social, etc.
- Knowledge of available data or data sources, GIS coverages, etc.

However, the absence of established staff watershed teams can be overcome to a large extent with additional effort at the beginning of TMDL projects. Where watershed teams do not exist, we believe that the best strategy is a long-term commitment to maintain watershed teams, at least in the district offices, once they are established as a result of TMDL projects.

Internal communication issues can be addressed by having a definite project plan with clearly defined responsibilities for each TMDL project. Periodic updates among team members would be expected. Electronic options beyond simply setting aside common work spaces on the network and using email group lists should be fully explored.

4.3 TMDLs and the Strategic Management Process

Ohio EPA has adopted a six-phase Strategic Planning Process that is designed to allow divisions within Ohio EPA to plan their present and future activities. The TMDL process has the potential to have a great impact on what we include in our strategic planning process and its outcomes.

4.3.1 How TMDLs Can Influence the Strategic Management Process

Strategic management of the TMDL process is critical due to the phased TMDL schedule adopted by DSW. The current schedule envisions 3 cycles of 5 years each, with 20% of the listed streams covered in the first cycle, and 40% in each of the two subsequent cycles. A few years into this 15-year period, we will be faced with a tsunami of work. As we ramp up activities and move into the 40% cycle, the early TMDLs will be ready for re-evaluation. This number is amplified by continuing TMDLs that may take 5 to 10 years to achieve water quality standards, such as may be true for those with heavy nonpoint source contributions. The strategic management process provides a framework for addressing these future resource needs and ensuring that the TMDL process is effective and efficient.

The listing process provides us with a list of waters that must be addressed, and the TMDL project process will allow us to allocate resources to deal with the observed water quality impairment. Thus, the TMDL process provides a mechanism for DSW to allocate resources in

order to directly address water quality impairment, a goal we have been trying to attain since the early 90s. As discussed later in this section, these mechanisms will allow us to link directly with DSW's mission.

✓ *We recommend that DSW use the 303(d) listing and scheduling process to guide strategic planning of activities to accomplish our mission to "restore and improve the integrity of waters of the state."*

Below, each of the six phases of the strategic management process are discussed in the context of TMDLs.

4.3.1.1 Phase 1, Situation Assessment

Situation assessment, Phase 1 of the Strategic Planning Process, will be greatly affected by TMDLs, now and in the future. Phase 1 is described as an effort to collect, monitor, analyze, summarize and disseminate information on trends that could have an impact on the Agency's future direction.

For DSW, the TMDL listing process provides detailed information of our current attainment status and includes such information as trends in water quality impairment that will require allocation of resources to address. The 303(d) list of impaired waters will set a long-term direction; and the schedule that must be included with the 303(d) list will dictate our future actions. U.S. EPA's proposed TMDL rules indicate a future direction which must be accounted for in our strategic planning, along with other issues such as permit backlogs, "development" issues, etc. Section 4.3.2. discusses this at greater length.

4.3.1.2 Phase 2, Strategic Direction

In this phase, Ohio EPA's strategic direction is established and communicated through vision, mission, and goals. DSW's mission to "protect, improve and restore the integrity of all waters of the state" is fundamentally sound and supports the Agency mission. The 303(d) listing process is one of the primary tools that DSW can use to establish goals to achieve our mission of restoring the integrity of waters of the state since it identifies the specific areas that will need to be addressed. Once the list has been completed and approved, goal setting centered around the TMDL project process will identify the means by which our mission may be achieved.

4.3.1.3 Phase 3, Strategy Development

This phase of the Strategic Planning Process produces strategies and plans that will be used to support long-term goals and strategic direction established in phase 2. Research conducted by the TMDL Team during Phase 1 of our work uncovered a disconnect between the Division's long-term goals and strategies and the annual planning of activities by each unit or section. There did not appear to be a mechanism that would allow the bridging between day-to-day activities and the Division's mission and strategic goals.

The TMDL process provides a framework around which we can ultimately allocate resources to achieve our mission of "restoring the integrity of waters of the state", and bridge the gap between our annual planning processes and our mission. The interplay of the 303(d) list and

the waterbody-specific TMDL process will provide us with an identifiable long-term schedule of activities which should provide measurable environmental results over a specified time frame.

4.3.1.4 Phase 4, Resource Acquisition and Allocation

The purpose of this phase is to identify the resources necessary to implement the strategies and develop the means to obtain them, primarily through the biennium budget. In the absence of adequate resources, priorities should be established to bring work products in line with available resources. In the past DSW has not been successful in prioritizing at this stage in the planning process because an accepted mechanism for removing items from annual plan “to do” lists did not exist. However, it is important to acknowledge that DSW has been developing or has developed the tools (annual work plans, TAS coding) that should enable us to succeed in the future.

The TMDL process will provide a mechanism for directing a multi-disciplinary segment of DSW's available resources towards our mission of “improving and restoring the integrity of waters of the state”. The Division will then need to prioritize and allocate our remaining resources to accomplish other programmatic goals (please see section 4.3.2 for more details). In this way we can ensure a measurable environmental benefit that will derive from our activities in any given year.

By using the 303(d) list and the TMDL project process, we will be able to project anticipated activity levels into draft annual work plans. For example, as we move through the 303(d) list, the total number of TMDLs underway in any given year will naturally increase, ranging from a low of nine in the first year and up to more than 100 in the tenth year (based on the 15-year 20/40/40% model) depending on how long it actually takes to complete a TMDL. This information will be useful in budget planning and resource acquisition.

As we move through the 303(d) list, experience with the process will also feed back into this phase, allowing us to fine tune projected resource needs into the future. For example, we may discover that it takes more effort to do the public participation than we anticipated, or we may be able to monitor TMDL effectiveness with less effort than anticipated. We will also identify areas where we will have a need to develop or improve technical tools to make the process more accurate and/or efficient. These resource estimates will need to be considered in our total resource projections for TMDL activities.

By having an ability to predict our resource needs comparatively far into the future, DSW will be in a position to lay the groundwork for leveraging the resources that are necessary to accomplish the “restoration” component of our mission.

4.3.1.5 Phase 5, Annual Plans

This phase includes the development of annual work plans that will embody the resource allocation decisions made in phase 4, and will result in achievement of goals established in phase 3. The TMDL process should be used to populate annual work plans for the current planning year, as well as future annual work plans so that they reflect the activities necessary to accomplish TMDLs. This will provide individual work units with the specific activities that they must accomplish to start, continue, or complete a TMDL for a scheduled waterbody.

4.3.1.6 Phase 6, Work Schedules

This phase is conducted at the work unit level, and results in the specific staff assignments necessary to carry out the tasks identified in the annual work plans. This is where the work that will ultimately lead to restoration of impaired waterbodies will actually occur. As DSW gains experience with the TMDL process, feedback into the strategic planning process can be used to improve program effectiveness and thus our ability to guage and acquire resources.

4.3.2 Interaction Between TMDLs and Other DSW Work Priorities

In the previous section, we discussed how TMDLs fit into DSW's strategic planning process, and how they can be used to address the "improve and restore" component of our mission. The questions remain, how do we address the "protection" component of our mission and how do we prioritize the rest of our work?

✓ *We recommend that DSW prioritize and manage to efficiently address land "development" issues to accomplish our mission "to protect the integrity of waters of the state".*

While TMDLs appear to be a good fit with our strategic management process, we must remember that there is a significant portion of our work that occurs on a random basis. These activities are driven by our customer's needs; DSW will be unaware that it must work on a project until we receive a permit application. A common thread of this type of work is that it is related to land "development" within the state. For the purposes of this discussion, "development" is broadly defined as the conversion of an existing land use type from one of lesser intensity to one of greater intensity. A typical example is the conversion of agricultural cropland to commercial mall/retail or single family subdivisions. The ramifications of "development" to DSW may range from the need to do a simple Permit to Install (PTI) review to a complex evaluation of potential effluent limitations and an antidegradation review.

On most PTIs and some NPDES permits, we will not be able to predict that we will need to work on a specific facility in any given fiscal year. We will, however, be able to predict the relative frequency with which our review work will occur. For example, in a given fiscal year, we should be able to predict through past experience that we will receive a relative number of requests for effluent limitations and plant expansions that are driven by "development" pressure. These requests may call for involvement from multiple programs (biology, modeling, district water quality and permits, Central Office permits, 401/404)

Ironically, even though "development" issues can be problematic for us to deal with, due to conflicts between customer expectations for product turn-around and regulatory requirements for public participation, it is here that we have the greatest potential to fulfill our mission of "protection". From the initial customer need to develop, through permit acquisition, and through the construction phases, DSW has a role in protecting the waters of the state. We currently do not consciously focus on the relationship between "development" and our role of protection. Yet this becomes a way to strategically manage another significant portion of our total resources. While we will not be able to manage on a project-specific basis such as with TMDLs, but we will be able to manage them on a relative frequency basis.

✓ *We advocate that DSW identify organizational infrastructure and allocate resources specifically for complicated or controversial "development" issues* .

Currently, DSW addresses complicated or controversial "development" related issues on an *ad hoc* basis. Since the exact timing of these "emergencies" is difficult to predict, we have not allocated staff time for dealing with these high priority issues. DSW should identify specific procedures and personnel with experience in dealing with these situations that will maximize coordination and communication between Central Office and the District Offices and to ensure that the issue is addressed in a timely fashion. The staff reserved for dealing with these "emergencies" should also be tasked with other, lower priority work, so that it can be dropped or delayed if the situation demands. By establishing up front our ability efficiently respond to "development" related issues in a timely manner, we can ensure that "development" happens in such a manner that our water resources are protected.

Thus, in as much as we need to strategically manage multi-programmatic resource allocation to accomplish TMDLs, in order to address the "improve and restore" part of our mission, we will need to do the same for "development" issues, in order to accomplish the "protection" part of our mission and to prevent "emergency" issues from distracting us from the long-term TMDL process.

4.3.3 Current and Future Resource Allocation Schemes

As DSW struggles with resource issues, we force ourselves to choose internally among various programs. The TMDL Team thinks it is important to note that the current situation is a very self-destructive prioritization method, in which we pit our own programs against each other in order to obtain resources. The programs within DSW have been established for a reason, usually a legal mandate or a *bona fide* business need. In order to complete TMDLs, we will need all of our established programs to work in harmony. Likewise, to effectively deal with "development" issues, we will need *all* of our programs.

✓ *We recommend that DSW adopt a resource allocation scheme that focuses on the "restoration" and "protection" aspects of our mission.*

Future resource allocation schemes should be directed around supplying DSW resources to restore waters of the state (TMDLs) and supplying DSW resources to protect waters of the state ("development" issues). Once these resource allocation issues have been resolved, any remaining resources can be directed towards maintenance of our administrative infrastructure (see Section 4.3.4 for a discussion of the NPDES permit backlog).

Given acceptance of this rationale by DSW management, our strategic planning process would change the most in phase 4 of the strategic planning. Phases 1 through 3 would remain largely unchanged, since they do not really deal with resource allocation issues.

In phase 4, the Resource Acquisition and Allocation Phase, DSW must make determinations as to the amount of resources it will allocate to "restoration", and the amount of resources to be dedicated to "protection." To accomplish this, the schedule submitted with the 303(d) list (once approved) can be used in conjunction with the proposed TMDL project process to populate

several years of draft annual work plans (perhaps 5?). At that time, knowledge of relative frequency of "development" related issues can be used to further populate the draft work plans. This will place senior management in the position of being able to make long-term decisions concerning resource allocation to obtain the desired levels of "restoration" and "protection". In this manner, future biennium budgets could be assembled, and we will know if serious resource shortfalls will prevent the accomplishment of these fundamental parts of our mission. This will place us in the position of being able to identify to the legislature what we intend to accomplish, and the ramifications of various resource levels, which ultimately should put us in a better position to leverage adequate resources. Because our current TMDL schedule is "back-loaded" over the 15-year period (three 5 year cycles weighted 20%, 40%, 40% for the first, second, and third cycles respectively), this can be a crucial issue.

The resource allocation (and hopefully acquisition) that has occurred in phase 4 will then drive the completion of annual work plans and unit plans in phases 5 and 6. The work plans that are agreed to in these phases should not exceed the resources available at the end of phase 4.

4.3.4 TMDLs and the NPDES Permit Backlog

When the TMDL Team was chartered, one of the boundaries established was that "the process must be applicable using existing DSW staff and resources; however, the process can include reallocation of staff responsibilities and resources towards TMDLs". By using the process of managing resource allocation for "restoration" through the TMDL process, and "protection" through dealing with "development" issues, the TMDL Team is proposing a way to balance our existing resources to accomplish our mission.

Subsequent to the chartering of the TMDL Team, U.S. EPA raised the issue of NPDES Permit backlogs as a major issue. Director Jones has indicated that the NPDES Permit backlog is a high priority issue and DSW senior management proposes to address this issue. One of the "hot button" aspects of this issue with the Director and the Legislature is that Ohio facilities pay fees to receive these permits. Thus, there is an expectation that fee payment results in timely permit issuance.

While the TMDL Team believes that it is possible to make significant progress towards performing TMDL projects within the confines of existing resources, the addition of NPDES backlog elimination into the resource mix means that there will be resources that are simply unavailable for "reallocation" as mentioned in our charter. When one considers that it will be difficult to ignore the needs of "development" within the state, it is likely that we will be left with choosing between the NPDES permit backlog and the TMDL process, at least in the near future. Given the expectations revolving around fee payment and permit issuance, DSW must acknowledge that to complete TMDLs successfully, significant new resources will need to be obtained.

✓ *We recommend that future additional funding will need to be secured for the TMDL process to succeed.*

The significance of the NPDES permit backlog is not whether DSW actually has a permit backlog or not, it is the near certainty that over the 15-year TMDL horizon, U.S. EPA will come

up with an unfunded initiative to which DSW must respond. However, by adopting the strategic management principles recommended above, and including NPDES Permit backlog elimination into the strategic mix along with TMDLs and "development", we will be in a position to predict our resource shortfalls, show what can and can't be done with various levels of funding, and be in a position to leverage additional resources for future budget bienniums. In this way, the TMDL process can serve as a powerful tool in the justification of the necessary resources to perform our mission.

4.4 How the Proposed Process Fits with Other DSW Systems

4.4.1 5-Year Basin Plan

The 5-Year Basin Approach plays a key support role in the TMDL process. The cyclical monitoring of Ohio's surface waters has provided information into the 305(b) report, which directly supports the 303(d) listing process. Because of our past and continuing investment in an adequate monitoring program, DSW is better able to predict our resource needs with regard to the TMDL process.

While the 5-Year Basin Approach plays a key role in the listing phase of the TMDL process, it also plays a key role in the TMDL project phase. Accurate assessment of listed waters means that DSW can take the actions that are necessary to gain water quality standards goal attainment. The actual study areas in the 5-Year Basin Approach may change somewhat to respond to waters that are listed on the 303(d) list, but there should be no large scale changes as emphasis shifts to TMDL projects. It will be essential to maintain and continually update via the 5-year Basin Approach the core database on which 305(b) statistics have been developed over the past twenty years.

An additional role that the 5-Year Basin Approach will serve in the future is TMDL validation. The 5-year Basin Approach provide the basic framework for determining whether the actions taken to implement a TMDL resulted in water quality standards goal attainment. The same information will also be used to list and delist waterbodies in the 303(d) listing process.

✓ *There should be no large scale changes in the 5-Year Basin Approach as emphasis shifts to TMDL projects.*

4.4.2 Watershed Strategy

The watershed approach is a philosophy and process for protecting and restoring watersheds, with the ultimate goal of bringing all waters into attainment of water quality standards. To fully integrate the watershed approach into the work of DSW, the Division needs a process not only for protecting streams, but for restoring them. The TMDL framework provides such a process for restoring streams. By collating and organizing much needed information about causes and sources of impairment, by supporting and providing guidance on developing stakeholder-driven restoration plans, and by providing mechanisms for tracking progress, the proposed TMDL process promotes and supports the Division's Watershed Strategy as well as local watershed

action planning efforts. In fact, the process so closely parallels a watershed approach that one state has used TMDL as the basis for its statewide watershed strategy (Texas Natural Resources Conservation Commission, March 1997: *The Statewide Watershed Management Approach for Texas: The TNRCC's Framework for Implementing Water Quality Management*).

The Division's Watershed Strategy (1998) recommends a variety of steps to implement the watershed approach (see box). The proposed TMDL process provides a structure for accomplishing each of these recommendations. To a greater or lesser extent, the Division is already doing some of these things; however, to meet a fifteen year schedule, these efforts will need to be accelerated and bolstered. The follow sections highlight how the TMDL process supports and integrates with the Watershed Strategy.

Key Recommendations for Implementing the Watershed Approach*

1. Form basin teams to conduct and support the work of watershed planning and implementation activities.
2. Link the work of the Division to changes in water quality.
3. Develop administrative and environmental indicators to incrementally track these changes.
4. Develop a reporting framework and schedule to document changes based on the 5-year basin cycle.
5. Invest in GIS / IMS infrastructure development and training.

*From Ohio EPA Division of Surface Water Watershed Strategy, 1998.

- Form Basin Teams to Conduct and Support the Work of Watershed Efforts
  The TMDL process provides a framework for organizing the work of the Division on a watershed basis that is closely tied to a benchmark - the TMDL restoration target. While the watershed strategy calls for basin teams, TMDLs require teams associated with smaller geographic units, however, conceptually these units support and fit within the Watershed Strategy framework and its recommendation for watershed teams. Section 4.1 of this report explains more clearly how these teams might function and interact.

- Link the Work of the Division to Changes in Water Quality
  The TMDL restoration target provides a measurable benchmark against which the Division can measure its work and progress towards attainment of water quality standards. When combined with project teams organized on a TMDL watershed basis (see Section 4.1), the link between the work of the Division and water quality improvement becomes even clearer. Throughout the development, implementation, and validation of TMDL projects, a comprehensive and holistic examination of water quality issues ensures the development of restoration plans that will tend to maximize the effect of restoration activities. Ultimately, this translates into the Division's work program priorities, improving the efficiency and connection of our work to water quality improvement.

- Develop Administrative and Environmental Indicators to Track Progress
  The watershed strategy calls for development of new indicators to supplement those which already exists as a means of measuring incremental water quality improvement. Similarly,

the proposed TMDL process calls for the development of new indicators, or interim measures of progress - particularly those that capture changes in water quality, short of intensive biological monitoring. Federal guidelines require that TMDL implementation plans include source control milestones and water quality targets to be collected and documented as a means of "reasonable assurances" that TMDLs will indeed be achieved. This data can also be used to fine tune implementation restoration plans. It also provides a feedback loop to continually improve the efficiency of the Division's work and tighten the connection to water quality improvement. Furthermore, the proposed TMDL process calls for the development of methods to measure interim water quality which can be easily used by stakeholder groups. Adequate training in the application of these methods is also recommended to improve quality control and consistency of monitoring (see Appendix D, Public Participation Report).

- Develop a Reporting Framework and Schedule to Document Changes
  Tracking and documenting indicators, milestones, and targets are inherent in the watershed approach as well as the proposed TMDL process. A sample of a TMDL monitoring reporting form is located in Appendix F. In implementing TMDLs, the difficulty of tracking implementation of restoration activities is complicated by the fact that local stakeholders may not necessarily report this information to Ohio EPA, thereby making it difficult for the Division to track progress towards TMDL progress.

- Invest in GIS/IMS Infrastructure and Training
  As with the watershed strategy, the proposed TMDL process requires investment in geographic information system (GIS) and information management system (IMS) infrastructure and training if it is to be successful (see Appendix E, Exploration of Shortcomings in Data Management and Infrastructure). IMS infrastructure can increase the Division's efficiency in all aspects of the TMDL process, particularly in gathering data whether it be for listing or validation purposes. In particular, an improved IMS infrastructure could facilitate the capture of local implementation activities via the Internet as well as collate, organize and transfer a variety of data among our own internal customers.

4.4.3 NPDES Permitting

NPDES permitting will continue to be DSW's primary regulatory instrument for authorizing and monitoring point source (regulated) discharges. Based on proposed federal rules, NPDES permits may be used for monitoring nonpoint source (non-regulated) discharges in combination with pollutant trading (offsets). NPDES permitting will be a critical tool in TMDL watersheds with point source discharges.

The Division has long envisioned a method for prioritizing permitting that would maximize water quality benefits – the "biggest bang for the buck" – but has been unable to take actions to support this philosophy for a variety of reasons, as DSW managers expressed to the TMDL Team. In addition, direction from U.S. EPA has been unclear as to the acceptability of foregoing "bean counting" on behalf of watershed decision-making. For example, implementation of TMDLs in watersheds where impairment is the result of both point source and nonpoint source impacts, creative ways of using the permitting process may need to be used. Pollutant trading may provide new options that not only improve water quality, but

encourage stakeholders to find solutions. Examples of successful pollutant trading efforts exist in Tar Pamlico Sound, North Carolina; Cherry Creek, Colorado; and the Chesapeake Bay. Michigan has developed state rules for pollutant trading, and the issue is covered in the proposed federal rules currently open for comment.

It would be most effective to re-issue NPDES permits in accordance and concurrently with TMDL implementation plans. It will be necessary to issue permits to new sources or modify/reissue permits (due to significant increases in loadings) outside of the TMDL process. Also, major and minor NPDES permits will need to be addressed during basin work. Since the TMDL schedule runs over the next 15 years, and there is a large backlog of expired NPDES permits, with pressure at the state and federal level to reduce the backlog, permits will need to be renewed outside of the TMDL process.

✓ *DSW must recognize that NPDES permits will be critical in achieving TMDL restoration targets in many instances; NPDES permitting must be coordinated with TMDLs where possible.*

4.4.4 Ohio Nonpoint Source Management Program

The Ohio Nonpoint Source Management Program outlines the recommendations and strategies needed to protect and improve Ohio's water resources. One of the important features of Ohio's program is the networked responsibility for management of nonpoint source control between the Ohio Department of Natural Resources and the Ohio Environmental Protection Agency. In addition to these primary agencies, Ohio's nonpoint program relies on the cooperation and involvement of other federal, state and local agencies as well as the vital involvement of local water resource organizations. This network allows Ohio to address nonpoint pollution control planning, assessment and implementation in a comprehensive and effective manner.

This working relationship among the named agencies will be beneficial in addressing the nonpoint source portion of the TMDL process. TMDL efforts will require active participation and implementation at the local level as well as significant interagency cooperation to ensure progress in restoring impaired waters. Without such stakeholder involvement, implementation of many TMDLs may be limited.

A watershed management plan is a critical component of a successful TMDL. The Ohio Nonpoint Source Program already relies heavily on watershed management plans to address water quality problems. These plans emphasize identification of the nature, extent, and cause of water quality problems; development of an implementation plan; implementation of BMPs; education and evaluation. The watershed management plans are developed locally with input and support from Ohio EPA, Ohio Department of Natural Resources (ODNR), Natural Resources Conservation Service (NRCS) and other agencies.

4.4.5 Other Programs

4.4.5.1 Source Water Assessment and Protection Program

Ohio's recently approved Source Water Assessment and Protection (SWAP) Program provides opportunities for bolstering and supporting the TMDL process. While the SWAP Program is

aimed at protecting the state's drinking water sources from contamination and is a product of the 1996 Safe Drinking Water Act Amendments, it may provide data useful in conducting TMDLs.

Under the program, the Division will delineate and assess approximately 160 surface water systems - that is, public drinking water systems that draw on surface water sources - by the year 2003. The delineations will be based on a combination of the 11- and 14-digit hydrologic cataloging units developed by NRCS. The assessments will include information on causes and sources of impairment as well as an inventory of all known potential sources of contamination located within the protection area.

This information will be captured and made available via a Geographic Information System Spatial Database Engine. (Design and purchase of such a system is currently being explored by the Division of Drinking and Ground Waters (DDAGW) and is anticipated to be operational within the next year.) While the immediate purpose of such a system is to meet the requirements of SWAP, the long-term applications are much broader. Such a system could feasiblely provide dynamic interactive mapping and access to related attribute data for all Ohio watersheds, not only to Ohio EPA staff but to external stakeholders via an Internet Map Server. Thus it could not only assist in listing and prioritizing TMDLs, but also facilitate development of TMDL restoration plans by filling information gaps and depicting the information in an easily understandable, graphic format. Furthermore, an Internet Map Server could potentially provide a mechanism for capturing locally collected verification and validation data. Thus, to maximize TMDL listing, implementation, and validation, the Division should coordinate with DDAGW the development of an information system architecture that serves multiple programs. In the absence of an Internet Map Server, the SWAP program will still provide valuable data that can be used by Ohio EPA staff, but it will be less useful in supporting external stakeholder implementation and validation efforts.

Printed reports that include maps, tables, and other information will be generated and distributed to all public water systems and made available to all interested parties. These reports effectively collate and organize an extensive amount of water quality, land use, point source and hydrologic information about a number of Ohio's watersheds which will be a valuable tool in developing TMDL restoration plans in any of the 160 source watersheds. However, under this scenario (without the Map Server), consideration will need to be given to the differences in watershed networks since the scale used in generating the source water assessments (11/14 digit HUCs) and that used in TMDLs may differ.

✓ *To maximize TMDL efforts, the DSW should coordinate with DDAGW the development of an information system architecture that serves multiple programs.*

4.4.5.2 Unified Watershed Assessment

The Unified Watershed Assessment (UWA) is an initiative designed to coordinate and prioritize goals of various resource agencies in the interest of restoring water quality to nonpoint source impaired watersheds. For example, a watershed that is nonpoint source impaired as well as the home to an endangered animal or plant species, would rank higher in priority than another nonpoint source impaired watershed without any endangered species. Similar to the Source Water Assessment and Protection Program, the Unified Watershed Assessment collates and

integrates a variety of data based on the 11-digit hydrologic cataloging unit. The prioritization can then be used in allocating and awarding funding for restoration efforts.

Under the criteria used in developing the 1998 UWA, watersheds that have at least 10 percent of their waters assessed and have impaired water quality rank the highest and are designated as category 1 watersheds. (Category 2 watersheds are those which are in need of protection; category 3 watersheds are those which are state/federal resource waters; and category 4 watersheds are those which insufficient water quality data exists to make a determination.) Special supplemental 319 funding was made available in 1999 to support the development and implementation of watershed restoration strategies (WRS) in category 1 watersheds. These WRS closely mirror the TMDL restoration/implementation plans as described in this report and proposed in draft federal TMDL regulations. Thus, to maximize the availability of UWA funding to TMDL watersheds, it will be important to incorporate the existence/absence of TMDL restoration plans as a factor in the UWA prioritization process.

✓ *We recommend that the existence/absence of TMDL restoration plans be considered as a factor in the UWA prioritization process.*

4.4.6 Relationship to Other Divisions and Offices of Ohio EPA

Recognizing the project-specific nature of TMDLs, we did not make an extensive effort to identify ties to every division and office of Ohio EPA. Over time, every division and office will become involved in TMDLs through one project or another. At this early stage, however, exactly how involvement will come about cannot be determined. As projects are identified and start, the involvement of others should be determined as early as possible to ensure adequate resources are set aside. The quality improvement process and sharing of best practices will provide examples and bring the involvement of other divisions and offices into sharper focus.

We already know that the contribution from certain divisions and offices will be important in doing TMDLs, as discussed here.

- <u>Division of Environmental and Financial Assistance</u>
  The Division of Environmental and Financial Assistance (DEFA) has loan money available for a variety of point source and nonpoint source needs. DEFA has a project prioritization process that considers impacts to human health and the environment. In the future, DEFA may be able to use implementation plans from approved TMDLs as an input to their project prioritization mechanism in order to help improve water quality. DEFA's experience may help in defining implementation accountability.

- <u>Division of Hazardous Waste Management</u>
  The Division of Hazardous Waste Management (DHWM) oversees the RCRA (Resource Conservation and Recovery Act) corrective actions program. This program is designed to ensure rehabilitation of waste management units at current or former holders of hazardous waste handling permits. Former waste management units may be closed under a risk based assessment that may result in loadings of various materials to waters of the state. These loadings will need to be accounted for in any TMDLs done in the affected basins.

- Division of Drinking and Ground Waters
  The Division of Drinking and Ground Water (DDAGW) is discussed in association with the SWAP program elsewhere in this report.

- Division of Environmental Services
  The Division of Environmental Services' (DES) information management system (LIMS) should streamline data availability which should speed up data analysis. As we develop new sampling methods or possibly sample for new parameters, DES could become involved in TMDL program development.

- Division of Air Pollution Control
  Air deposition has been emphasized in the proposed TMDL rules, and DAPC has been participating in the TMDL External Advisory Group air deposition/mercury subgroup.

- Office of Pollution Prevention
  Pollution prevention alternatives should be used as a strategy in implementation plans. Also, each of DSW's program areas should examine its decision criteria to eliminate requirements that may lead to impairment (e.g., PTI decisions that encourage paving (impervious surfaces)). DSW's new P2 team could focus on identifying these types of issues.

✓ *Each unit in DSW should examine its processes and work to eliminate decisions that lead to degradation of water resources.*

4.5 Challenges in Implementing the Process in DSW

4.5.1 Infrastructure Limitations: Staff Resources

One of the main requirements to successfully completing both an individual TMDL project and the 15-year schedule includes allocation of resources and adequate staffing. The division currently has a large workload and a depleted workforce both in numbers and, in general, efficiency. The TMDL requirement highlights the need for a strong prioritization and organization method (see section 4.3) and increased staff and staff efficiency with which to process the workload.

The prospect of additional burdens (as represented by TMDLs) to an already strained load and the perception that TMDLs represent a change to the status quo are views shared by many in the division. This outlook and the potential reduction in efficiency such views can generate could be improved if the program is presented not as a new, additional burden but instead, as a way to organize current activities so that progress towards the division's mission is increased. Staff attitudes and efficiency could also improve if the watershed team approach is implemented. As parts of teams, staff would be involved with the entire process and product not just with pieces as is currently done. They would have the opportunity to more directly see how their work fits into the bigger picture and how they have contributed to real environmental gains.

✓ *We recommend that the TMDL process be introduced to DSW as a way to organize current activities and not as a new or additional burden.*

The use of the Environmental Specialist I, intermittent, and/or temporary classifications could increase the workforce and reduce the workload in a cost effective manner. Many tasks performed by staff are repetitive and time consuming and require only a basic scientific knowledge to perform. These tasks are well-suited to an entry level or temporary position. The traditional summer field season intern worked well when the only condition needing assessment occurred during summer conditions; however, the advent of TMDLs (seasonal and alternate flow conditions must be considered) requires that such workers are available throughout the year, on a longer term basis. Many data collection, reduction, and analysis activities could be assigned this classification under more senior staff oversight. This would utilize the abilities of staff more fully, nurture future workforce candidates, increase job satisfaction and provide a level in a potential technical promotional track.

✓ *We recommend that the Environmental Specialist I, intermittent, or temporary classifications be used to reduce the workload and assist staff in repetitive data collection, reduction, and analysis activities.*

4.5.2 Infrastructure Limitations: Data Management

A successful process for conducting TMDLs depends on effective data management and data infrastructure. Maintaining high quality data (storage format, metadata, information flow) improves Agency and DSW credibility. Further, ease in retrieval of information is critical because it focuses time and energy on addressing the substantive matters of the TMDL process. It is cost effective and devotes resources to improvement and maintenance of existing data infrastructures. Not paying attention to data management could result in duplication of data collection and management efforts, followed by an absence of meaningful data analyses and interpretations. An investment (through resources and strategic planning) in data management and information flow at the beginning of the TMDL assessment era within the Agency will provide dividends of efficiency and competent analyses over the next fifteen years. In essence, data management is a key component in the quality improvement process because it provides the required parameter(s) to assess improvement over time. Specific conclusions were derived from a TMDL subteam that met over a brief interim on this topic and are included below (see Appendix E for a more extensive description):

- A common georeferencing system needs to be adopted for all sections within DSW to match the team approach needed for effective TMDL assessments (this is also mentioned as a requirement in the proposed TMDL regulations).
- Voids in data collection efforts to support Ohio water quality standards exist.
- The assessment of nonpoint sources and causes of water resource degradation does not have a traditional data infrastructure within DSW. It will also require extensive use of geographic information systems and spatial analyses to develop indicators of stress and relationships to sources of pollution.
- Characterization of nonpoint source pollution often utilizes remotely sensed information of land cover and demographics.
- Collection and organization of external data is cumbersome given the existence of resource

limits and vertical barriers.

- Scheduling of TMDLs for waterbodies on the §303(d) list involves significant data management and interpretation and is always geographical in nature.
- There currently exist significant hardware and software limitations for DSW to provide effective data management.

- *A common georeferencing system should be adopted for all sections within DSW.*

- *A data management process should be developed for sharing data externally as a result of a given TMDL assessment.*

4.5.3 Technology/Knowledge/Expertise Gaps

Nationally there is a clear recognition that water resource problems can be complex. Even though, for example, the large role of nonpoint source impacts are known, there is much to be done to improve the predictability of these relationships. Ohio EPA needs to improve program development efforts targeted at knowledge gaps in the TMDL process. Much of this is outlined in the Quality Improvement Process. This process should not be overlooked in resource allocation. Investments in filling these knowledge gaps early in the TMDL process will pay large dividends in the long run. Proceeding where information is poor can lead to inappropriate restoration strategies that may be costly and result in a loss of confidence in the TMDL process. Given the voluntary nature of many restoration actions such a loss would be deadly to the program.

TMDLs address many different types of impairments, waters, flow conditions and sources and involve a high degree of team work, communication, and public involvement. DSW does not have experience with many of these different conditions and will need to develop the capacity to carry out TMDL responsibilities. Gaps in technical capacity can be generalized into the following categories which are currently underpowered in regards to the TMDL process:

- Data management (see Section 4.5.2)
- Calculation methods and knowledge
- Software and hardware to support increased data management and calculation needs
- Knowledge about the effectiveness of control actions on impacting a cause
- Data collection methods and tools both for the development and validation phases.

In addition, the Agency does not have a great deal of experience with writing NPDES permit language in special situations where permit limits depend on voluntary actions. The flexibility of SWIMS may add another dimension to this problem. Expertise will need to be developed on how to construct such special and flexible permit language while still satisfying other regulatory requirements (such as antidegradation and antibacksliding).

Although all TMDL projects will be different, we must be able to learn from each project. One idea the TMDL Team considered is developing a “cookbook” of technical and administrative tools that would be a reference manual for staff involved in TMDL work. Examples of such

reference manuals are available in the Agency. A synopsis of one model, the DHWM closure plan reference, is included in Appendix C.

✓ *We recommend that the gaps in technical ability and other DSW expertise be recognized and that resources are allocated to address these deficiencies concurrent with the implementation of the TMDL process within DSW.*

✓ *We recommend that the QIP be used to continually improve and update DSW's capabilities so that, ultimately, sufficient capacity to complete TMDLs exists*.

4.5.4 Regulatory Limitations

In October, 1997, The Environmental Law Institute (ELI) published a research report titled "Enforceable State Mechanisms for the Control of Nonpoint Source Pollution". A review of this document was conducted to identify some *potential* tools that may be useful in dealing with nonpoint sources of pollution. Most of these would require some legislative change, so they clearly represent the "could be" component of our TMDL research.

One promising concept discussed in the report is the "bad actor" laws that have been implemented in some states. The following is the ELI report's description of a "bad actor" type of law:

> Rather than impose a statewide enforceable standard for forest practices, or even a watershed based set of standards, a number of states have enacted authorities that enable state regulatory agencies to respond to pollution-causing events by directing forest operators to implement specific practices. These laws are often referred to in the nonpoint source context as "bad actor" laws, because they impose obligations only on those operators who have already committed - or are in the process of committing - bad acts. (The use of the term "bad actor" should not be confused with the more common use of the term in environmental law to refer to laws that require agencies to deny new permits to entities with histories of noncompliance).

This type of change to Ohio's law could have important ramifications to the TMDL process, if a mechanism exists to go after those who are causing problems. If legislative opportunities arise as a result of the TMDL process, consideration to some of the methods outlined in the ELI report should be given.

4.5.5 Accountability

Effective implementation of Total Maximum Daily Load projects will require the Division to work cooperatively with local stakeholder groups particularly when dealing with nonpoint source TMDLs. Recommendations on how the Division might initiate and sustain such participation by local stakeholder are highlighted in Appendix D. Given that these stakeholder efforts can be initiated and sustained, the challenge then is to identify mechanisms for establishing accountability with these groups. But this is complicated by the reality that while Ohio EPA is ultimately responsible for implementing TMDLs, it also is significantly restricted in its capability to do so. In many cases, the capability or authority to implement controls that would achieve

TMDLs is held locally. Thus local commitment to implement prescribed actions must be documented to provide "reasonable assurances" that TMDLs will be achieved. A variety of such mechanisms will need to be further explored and developed.

Chapter 4 Recommendations

✓ *We recommend that DSW approach each TMDL as a long-term project and manage it as such, emphasizing the need to maintain continuity within the process and coordination among team members.*

✓ *We recommend that DSW use the process outlined in Chapter 3 as a basic template, to be customized into a project plan for each TMDL project.*

✓ *We recommend that DSW assign a multi-disciplined staff team to each TMDL project at the beginning of the project and support them as a project team*.

✓ *We recommend that DSW establish a staff-level project manager for each TMDL project*.

✓ *We recommend that DSW provide each TMDL project team with a management-level "coach" to advise the team, to act as the project's advocate in securing resources and decisions (initially and throughout the project).*

✓ *We recommend that DSW establish a "council of coaches" where resource issues are resolved, common problems are discussed, successes are shared, process improvements are recommended.*

✓ *We recommend that DSW provide appropriate project management training and tools for TMDL project managers and coaches.*

✓ *We recommend that DSW use the 303(d) listing and scheduling process to guide strategic planning of activities to accomplish our mission to "restore and improve the integrity of waters of the state."*

✓ *We recommend that DSW prioritize and manage to efficiently address land "development" issues to accomplish our mission "to protect the integrity of waters of the state".*

✓ *We advocate that DSW identify organizational infrastructure and allocate resources specifically for complicated or controversial "development" issues* .

✓ *We recommend that DSW adopt a resource allocation scheme that focuses on the "restoration" and "protection" aspects of our mission.*

✓ *We recommend that in order for the TMDL process to succeed, future additional funding will need to be secured.*

- ✓ *There should be no large scale changes in the 5-Year Basin Approach as emphasis shifts to TMDL projects.*
- ✓ *DSW must recognize that NPDES permits will be critical in achieving TMDL restoration targets in many instances; NPDES permitting must be coordinated with TMDL where possible.*
- ✓ *To maximize TMDL efforts, the DSW should coordinate with DDAGW the development of an information system architecture that serves multiple programs.*
- ✓ *We recommend that the existence/absence of TMDL restoration plans be considered as a factor in the UWA prioritization process.*
- ✓ *Each unit in DSW should examine its processes and work to eliminate decisions that lead to degradation of water resources.*
- ✓ *We recommend that the TMDL process be introduced to DSW as a way to organize current activities and not as a new or additional burden.*
- ✓ *We recommend that the Environmental Specialist I, intermittent, or temporary classifications be used to reduce the workload and assist staff in repetitive data collection, reduction, and analysis activities.*
- ✓ *A common georeferencing system should be adopted for all sections within DSW.*
- ✓ *A data management process should be developed for sharing data externally as a result of a given TMDL assessment.*
- ✓ *We recommend that the gaps in technical ability and other DSW expertise be recognized and that resources are allocated to address these deficiencies concurrent with the implementation of the TMDL process within DSW.*
- ✓ *We recommend that the QIP be used to continually improve and update DSW's capabilities so that, ultimately, sufficient capacity to complete TMDLs exists*.

5. Getting Started

With a 303(d) list due in 2000 (using new regulations) and many, many TMDL projects to do, it is imperative that DSW decide how it will proceed as soon as possible. This chapter proposes some ways to move forward immediately.

5.1 Generating the 2000 303(d) List

This topic is also addressed in Chapter 2. The most immediate needs are as follows:

- Determine commonalities among prioritization schemes
- Assign staff to a project team
- Select project manager
- Fill out project team, including legal, PIC, and a management coach
- Use the TMDL External Advisory Group to help determine scheduling/listing priorities.

5.2 TMDL Projects in Progress

Nine TMDL projects are currently underway in DSW, as listed in Exhibit 5.1.

✓ *We recommend that TMDL projects already in progress be placed into the recommended project process at the appropriate step.*

This approach will allow immediate "road testing" of the process; the quality improvement process will provide a feedback loop so that we can learn from these projects (e.g., improve resource estimates) and strengthen our planning capability.

Launching the nine projects into the process should proceed immediately, as follows (for each project):

1. The recommended process (translated into generic project management tools) is adapted to the specifics of the project. No steps are added or dropped without full consideration.
2. Resources available for the project are determined.
3. Staff are assigned to the TMDL project teams.
4. A project manager is selected.
5. A project coach is selected.
6. A determination is made of exactly where the project is in the process.
7. Assignments are made to team members, including “remedial” tasks to bring the project up to speed.
8. Any stakeholders already involved in the process are made aware of the activity on the project.

Central and district office managers should work to figure out resource availability under the current agreements.

Exhibit 5.1 TMDL Projects Currently in Progress in DSW

Project	Due to U.S. EPA	At Which Step in Recommended Process?	Ohio EPA District
Middle Cuyahoga	September 1999 (draft) November 1999 (final)	9, 10	NEDO
Rocky River	September 2000	4 or 5	NEDO
Mill Creek (Cincinnati)	September 2000	4 or 5	SWDO
Upper Little Miami River	September 2000	4 or 5	SWDO
Sugar Creek	September 2000	4 or 5	NEDO\SEDO
Stillwater River	September 2001	2	SWDO
Mill Creek (Marysville)	September 2001	4	CDO
Raccoon Creek	September 2001	2	SEDO
Bokes Creek	September 2001	2	CDO

The proposed rules include a provision for “transitional” TMDLs, defined as those that are submitted to U.S. EPA for approval within 12 months of the final rule adoption. If the rules are adopted in early 2000 as expected, the first five of the TMDLs listed in Exhibit 5.1 can be approved under existing rules. This would mean the TMDL report could be submitted without the high degree of reasonable assurances for implementation that is addressed in the proposed rules. Although completing an implementation plan is important for the ultimate success of a TMDL, being able to submit the reports without the full plan should help keep these on schedule for submittal to U.S. EPA. After all, when the commitments were made, implementation plans were not required to be submitted as part of the TMDL report.

5.3 Next Steps for the TMDL Team

We believe that we have accomplished our Team’s mission and fulfilled our charter. However, there are some important details that we think could benefit from some extra attention from this Team. After all of our work, we are understandably quite interested in the successful implementation of the TMDL process. We propose two types of activities for further work by this team.

✓ *We recommend that the TMDL Team be actively involved in the implementation of the recommended process over the next several months.*

This will allow those most familiar with the process to evaluate progress and make any necessary adjustments. We are particularly concerned about maintaining the integrity of the process and making better resource estimates. This activity would also include developing the quality improvement process more fully, especially the part related to improvements to the process itself. Updating the CPP documentation of the TMDL process must also be completed

after management consensus on the recommended process is achieved.

✓ *We recommend that the TMDL Team be involved in the preparation of outreach and educational materials about the recommended process and TMDLs in general.*

A number of items will be needed to present and explain the process to staff in DSW, to other divisions and offices in Ohio EPA, and to the public. We foresee a need for fact sheets, presentation materials, etc. We must also establish a TMDL presence on the DSW web site. It is very important that as we discuss the subject of TMDLs, we speak with one voice, relaying a consistent message on this complicated subject.

Throughout this report, topics needing attention are identified. Team members have knowledge of these subjects, but the whole Team does not necessarily need to be involved in addressing all the issues. Among the topics are

- Documentation/work products (TSD, PSD, TMDL)
- Data management & GIS
- 201/208 and TMDL integration
- Improving Ohio EPA's "toolbox" for data management, project management, calculation methods, data collection methods
- More definition of the ties of the TMDL effort to DEFA and the IPS
- More definition of the ties of the TMDL effort to DDAGW and SWAP
- Connections to the ongoing DSW work on data management issues
- Work with legal staff to identify and find answers to several legal questions (e.g., what are the best ways to ensure commitments to implement solutions are carried out, how to involve interested citizens without incurring liability).

Some of these are short-term issues, some are long-term. Staff or teams of staff should be tasked with recommending solutions or strategies for moving towards solutions.

Chapter 5 Recommendations

✓ *We recommend that TMDL projects already in progress be placed into the recommended project process at the appropriate step.*

✓ *We recommend that the TMDL Team be actively involved in the implementation of the recommended process over the next several months.*

✓ *We recommend that the TMDL Team be involved in the preparation of outreach and educational materials about the recommended process and TMDLs in general.*

Acronyms and Abbreviations

BMP	best management practice
BPJ	Best Professional Judgement
CFR	Code of Federal Regulations
CPP	continuing planning process
CRP	conservation reserve program
CSO	Combined sewer overflow
CWA	Clean Water Act
CZARA	Coastal Zone Act Reauthorization Amendments
DAPC	Division of Air Pollution Control
DDAGW	Division of Drinking and Ground Waters
DES	Division of Environmental Services
DEFA	Division of Environmental and Financial Assistance
DFFO	Director's Final Findings and Orders
DHWM	Division of Hazardous Waste Management
DSW	Division of Surface Water
EAG	external advisory group
ELI	Environmental Law Institute
EPA	environmental protection agency
EQIP	Evnironmental Quality Incentives Program
EWH	Exceptional Warmwater Habitat
FTE	full-time equivalent
GIS	geographic information system
HUC	hydrologic cataloging units
IBI	Index of Biotic Integrity
ICI	Invertebrate Community Index
IMS	information management system
Iwb	Index of Well-Being
LaMP	lakewide management plan
LIMS	Laboratory Information Management System
LRW	Limited Resource Water
MGD	million gallons per day
MIwb	Modified Index of Well-Being
MOA	memorandum of agreement
MOU	memorandum of understanding
MWH-A	Modified Warmwater Habitat (Mine Affected)
MWH-C	Modified Warmwater Habitat (Channelized)
MWH-I	Modified Warmwater Habitat (Impounded)
NEDO	Northeast District Office
NEFCO	Northeast Ohio Four County Regional Planning and Development Organization
NOACA	Northeast Ohio Areawide Coordinating Agency
NPDES	national pollutant discharge elimination system
NPS	nonpoint source
NRCS	Natural Resources Conservation Service

NWDO	Northwest District Office
OAC	Ohio Administrative Code
ODH	Ohio Department of Health
ODNR	Ohio Department of Natural Resources
ODOT	Ohio Department of Transportation
ONRW	outstanding natural resource water
ORC	Ohio Revised Code
ORSANCO	Ohio River Sanitation Commission
OST	Office of Science and Technology
PDP	professional development plan
PIC	Public Interest Center
POTW	publicly owned treatment works
PTI	permit to install
PS	point source
PSD	permit support document
PWS	Public Water Supply
QA/QC	Quality Assurance/Quality Control
QHEI	Qualitative Habitat Evaluation Index
QMP	quality management plan
QStP	Quality Service through Partnership
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
SEDO	Southeast District Office
SSO	sanitary sewer overflow
STORET	Storage and retrieval system (U.S. EPA ambient data database)
SWIMS	Surface Water Information Management System
SWAP	source water assessment and protection
SWCD	Soil and Water Conservation District
SWDO	Southwest District Office
TMACOG	Toledo Metropolitan Area Council of Governments
TMDL	total maximum daily load
TNRCC	Texas Natural Resources Conservation Commission
TSD	technical support document
USGS	United States Geological Survey
UWA	unified watershed assessment
VAP	voluntary action plan
WBID	waterbody identification
WLA	wasteload allocation
WQBEL	water quality based effluent limit
WQMP	water quality management plan
WQS	water quality standards
WRS	watershed restoration strategies
WWH	Warmwater Habitat
µg/l	micrograms per liter
WWW	world wide web

Glossary of Terms

Underlining indicates that the term is also defined here.

A **geographic information system** (**GIS**) is an information system that is designed to work with data referenced by spatial or geographic coordinates. A **GIS** is both a database system with specific capabilities for spatially-referenced data, as well as a set of operations for analyzing and/or manipulating the data to create higher-level information.

An **implementation plan** consists of the final restoration scenario, the timeline and milestones for implementing the restoration scenario, a discussion of the reasonable assurances, a description of applicable legal authority, a justified estimate of the time required to attain the goal of the TMDL, a monitoring plan to track that the control actions are being implemented, the actions are effective, the allocations are being met and the water quality standards are being attained, and a description of how to revise the TMDL if necessary.

In general, a **model** is an interpretation, often simplified, of a more complicated system. Specifically, a water quality **model** is a representation or an abstraction of an aquatic system that can be used to evaluate how changes to a component in the system affect the overall performance of the system. For example, a common use of a water quality **model** is predicting how pollutants -- that either run off land or that are directly discharged into a waterbody --affect water quality.

Reasonable assurance means that you demonstrate that each wasteload allocation and load allocation in a TMDL will be implemented. NPDES permit language would be a **reasonable assurance** of wasteload allocations. Examples of **reasonable assurances** for load allocations include regulations, local ordinances, contracts, cost-sharing agreements, memorandums of understanding, site- or watershed-specific voluntary actions and compliance audits of best management practices.

A **stakeholder group** consists of individuals that have an interest in the TMDL project area. A **watershed group** consists of individuals that have an interest in the watershed that a TMDL project area resides. A **stakeholder group** may be the same as a **watershed group** (and vice versa); however, many TMDL projects will be conducted on sub-basins of watersheds that have large watershed groups already established. Many members of a **watershed group** may not be interested in actively participating in a **stakeholder group** if the area of their interest is not included in the TMDL project area. In addition, current **watershed groups** may not include all parties interested in a TMDL project. The term '**stakeholder group**' allows for the possibility that a subset of a **watershed group** may be formed to assist the TMDL project.

A **restoration scenario** is a set of specified control actions and/or management measures which, if implemented, may meet the restoration target or goal of the TMDL project. For example, a **restoration scenario** for ammonia could be: all POTWs have average permit values of 1 mg/l ammonia nitrogen, 25% of agricultural land in the watershed will be converted to conservation tillage and conservation easements will be required of 75% of the existing

riparian corridor via local ordinances. The final **restoration scenario** will need to be technically verified to confirm that the actions, if implemented, will meet the restoration target or other TMDL goal. This final **restoration scenario** forms the basis of the implementation plan.

A **restoration target** is a quantitative or qualitative determination of the stressor modification necessary for a waterbody to meet and/or maintain water quality standards. Some examples of individual **restoration targets** include: reduction of x pounds of copper; increase of stream flow by 2 MGD; decrease of sedimentation by 30%; and increase in riparian zone by x acres. **Restoration targets** are the "numbers" the restoration scenario is designed to achieve.

Tools are items used to accomplish an action and can be classed as administrative, legal, or technical. Some examples of administrative **tools** are grants, permits, procedures and reporting protocols. Legal **tools** include but are not limited to legally binding rules. Technical **tools** can encompass models, databases, and geographical information systems.

Water quality standards means the rules set forth in Chapter 3745-1 of the Ohio Administrative Code establishing stream use designations and water quality criteria protective of such uses for the surface waters of the state. For example, Springwater Run has an aquatic life habitat use designation of warmwater habitat. Attainment of the warmwater habitat use designation is directly assessed using the biological criteria in Chapter 3745-1 (for example, an index of biotic integrity of 40) and indirectly assessed using chemical criteria in Chapter 3745-1 (for example, a cyanide level of 12 µg/l). The warmwater habitat use, the biological criteria and the cyanide water quality criterion are all water quality standards of Springwater Run.

Tiers are used to indicate progression on the environmental indicators continuum. For example Tier 1 is an administrative or programmatic measure, whereas Tier 3 is an environmental indicator. The process of validating TMDLs uses three tiers: source control milestones, water quality targets (to measure stressor effects), and water quality standards attainment.

Appendix A: TMDL Team Documents

Redlining and strikeouts in text indicate changes recommended by TMDL Team in July 1998.

DSW TMDL Team Charter - February 9, 1998

PROJECT MISSION:
~~*The team mission is to create a strategy and process to develop and implement Total Maximum Daily Loads (TMDLs) for Ohio watersheds.*~~ *The team mission is to create a process to establish restoration targets[1] that will result in attainment of water quality standards for Ohio watersheds and strategies to achieve those targets.* The strategy and process must allow for public participation and consider technical and administrative issues as well as the interests of both the environmental and regulated communities. In addition, the team will:

- Clearly define applicable regulations and requirements;
- Interpret and make recommendations in response to U.S. EPA proposed TMDL requirements;
- Identify and evaluate existing processes in DSW and Ohio EPA that could be used to develop TMDLs (e.g. TSDs, PSDs, 208 plans, CSO/SSO strategies);
- Incorporate the environmental indicators hierarchy to evaluate the effectiveness of the TMDL process;
- Identify legislative and/or rule changes needed to develop TMDLs and TMDL implementation plans in Ohio; and
- ~~Establish~~ Interact with an external advisory group, representing the full range of Ohio TMDL stakeholders, to provide public input and guidance on the strategy and process.

BACKGROUND:
DSW's traditional focus on point sources has resulted in great improvements in Ohio's waters. However, according to the 305(b) report, point source dischargers are no longer the leading sources of water quality impairment. There is widespread recognition that more emphasis must be placed on developing TMDLs that address pollution problems caused by nonpoint sources and the adverse effects of wet weather conditions and on finding ways to involve local citizens, governments and organizations.

Pressure to develop and implement TMDLs is steadily increasing. Environmental groups have initiated law suits against U.S. EPA in 28 states regarding slow or insufficient development of TMDLs. In response, U.S. EPA has proposed changes requiring development of TMDLs for all impaired waters within the next 13 years.

TMDLs may require greater resource commitments and more complex water quality analyses, and will certainly require the integrated use of all the tools that DSW has developed through the years. DSW must be proactive in identifying its available resources and investigating the most cost-effective ways to use those resources to meet the demand for TMDLs. Successful adoption of a TMDL process will support the 75% water quality goal and is in accordance with the major themes of DSW's Strategic Plan.

[1] Team definition: A *restoration target* is a quantitative or qualitative determination of the stressor modification necessary for a waterbody to meet and/or maintain water quality standards. Some examples of restoration targets include: reduction of x pounds of copper; increase of stream flow by 2 MGD; decrease of sedimentation by 30%; and increase in riparian zone by x acres.

The TMDL process for a watershed can be divided into the following four steps:

1. **Development** - Data collection, assessment, modeling, load allocation, and recommendation of potential abatement measures.
2. **Implementation Plan** - Select an abatement measure and develop a plan to apply it.
3. **Implementation** - The final application of the selected abatement measure.
4. **Validation** - Assessment to determine if the abatement measures were effective.

BOUNDARIES:

- The team may consider all four TMDL steps in creating the TMDL strategy.
- The team will not create a process for step 3, implementation of TMDLs. Processes will be created only for steps 1, 2, and 4.
- The strategy and process must be consistent with U.S. EPA requirements and laws, and must be consistent with all state laws and rules, except where changes in state laws or rules are determined to be necessary and included in the team recommendations.
- The process must be applicable using existing DSW staff and resources; however, the process can include reallocation of staff responsibilities and resources toward TMDLs.
- The team will report progress to the Team Mentor monthly, and to Advisory Team quarterly or as requested or required for the milestones.
- The team will report progress to external advisory group on a regular basis.
- All work must be completed prior to development of the next 303(d) list (October 1999).

WHAT THE TEAM HAS AUTHORITY TO DO:

- Establish the team work plan, to include tasks and estimated time frames.
- Consult with Ohio EPA staff, U.S. EPA, external stakeholder groups, and other states on TMDL or similar processes.
- Each member may spend 10% to 25% of his/her time on the work of this team.

TEAM MEMBERS:

- Members should embody the following: a broad and thorough knowledge of his/her program area and how that area fits into the overall DSW mission; be able to formulate and consider new uses for existing information; and familiar with data uses and limitations. Prefer familiarity with the objectives of TMDLs and with national developments.
- Recommend up to 10 members, with at least one member from each of the following areas:
  modeling: extensive knowledge of water quality models, statistical techniques, research experience
  ecological assessment: extensive knowledge of biological information, statistical techniques, 5-year basin approach study design, research experience, environmental indicators
  NPDES permits: knowledge of “nonpoint” aspects of point sources: wet weather, CSOs, stormwater
  GIS: extensive knowledge of innovative GIS tools and available data, research experience
  nonpoint source: extensive knowledge of NPS pollution in Ohio, research experience
  district: experience working with water quality problems on a watershed basis
  watershed coordination: familiar with assessment and implementation of watershed action plans and/or other management/action plans.

ADVISORY TEAM: DSW Chief and Assistant Chiefs
FACILITATOR: To be determined
ESTIMATED TIME FOR COMPLETION: 18 to 20 months. Complete by September 30, 1999.
MEETING FREQUENCY AND DURATION: To be decided by team
TEAM MENTOR: Maan Osman
TEAM LEADER: Trinka Mount
TIMEKEEPER: To be determined
SCRIBE: To be determined

TASK/ACTIVITY	DESIRED PRODUCT [LINK TO DELIVERABLE]	DUE DATE	PEOPLE RESPONSIBLE
PHASE 1: DEFINITION OF PRESENT ("AS IS" PHASE)			
1. Identify and collect applicable statutes/ regulations/ guidance a. U.S. EPA b. Ohio EPA c. Other Federal departments/agencies d. Other Ohio departments/agencies	summary of authority, summary of statutes/ regulations/ guidance, library of copies [1]	8/31/98	Heitzman, Gallaway, Morrison, Gallant [Kurdila]
2. Identify available tools by these types, including technical, legal, and administrative a. Assessment of stream segments b. Development of restoration target c. Implementation strategy to achieve target d. Validation that target was achieved	list of tools: description of tool, who uses it, how it works [2]	10/15/98	Rankin, White Gaskill, Antosch, Hodory, Gallant
3. Document the current Ohio TMDL process, including listing, priority, development	flowchart [3]	8/31/98	Gaskill, Rankin, White, [Crowell]
4. Document current DSW strategic management process to establish goals and objectives	description of linkages currently established [4]	9/15/98	Antosch, White, Hodory, Gallaway
5. Define current goals and existing prioritization processes within each DSW program area.	description of processes and linkages [4]	9/30/98	Hodory, Antosch, Heitzman, Gallaway, Morrison
PHASE 2: OUTREACH/RESEARCH ("COULD BE" PHASE)			
1. Benchmark (at general level) with other states regarding TMDL processes and how effective they are, including number developed, time spent, number implemented, how implemented, type of impairment addressed, and 303(d) list development processes. Classes for review include: a. States within Region 5. b. States who have final court judgements. c. States, outside of Region 5, who have not been sued or who have pending litigation.	written summary of a given State's TMDL activity [background for 2, 3, 4] *product altered, incorporated into other phase 2 topics*	NA	Antosch, Gallaway, Rankin, Hodory, Gaskill, Heitzman [Kurdila]

TASK/ACTIVITY	DESIRED PRODUCT [LINK TO DELIVERABLE]	DUE DATE	PEOPLE RESPONSIBLE
2. Develop and coordinate comments on the FACA report.	written summary of Ohio EPA reaction to FACA report [background for 2, 3, 4] *product altered, ireport as written used as resource for other phase 2 topics*	9/30/98	Mount, Heitzman, Gallaway
3. Interact with external advisory group (EAG). We need to coordinate with SMT on timetable for formation of EAG. We should begin forming a list of issues that we would request EAG feedback from.	- list of issues - document summarizing EAG responses [all]	delayed	to be determined
4. Explore, identify, and define potential tools for *listing/prioritization* of water bodies. Avenues for exploration include, but are not limited to, benchmarking (see Task 1), team brainstorm and/or brainstorm with technical experts, federal guidance documents, reviews of models, and journal literature reviews.	written summary of listing/ prioritization tools including their description, application, and valuation [2]	3/31/99	Antosch, Rankin, White, Mount
5. Explore, identify, and define potential tools for *development* of restoration targets (step 1 in Charter).	written summary of development tools including their description, application, and valuation [2]	3/31/99	Gaskill, Antosch, Heitzman
6. Explore, identify, and define potential tools for *implementation* to achieve restoration targets (step 2 in Charter).	written summary of implementation tools including their description, application, and valuation [2]	3/31/99	Morrison, Hodory, Antosch, Gallaway, Gaskill
7. Explore, identify, and define potential tools for *validation* that Water Quality Standards are attained (step 4 in Charter).	written summary of validation tools including their description, application, and valuation [2, 4]	3/31/99	Hodory, Rankin, White
8. If a lawsuit is filed against USEPA alleging that Ohio has failed to fully implement TMDLs, analyze and then summarize the actions of external party(ies). The summary may include how OEPA could address (or not address) each issue in the lawsuit.	to be determined based upon direction from senior management [all]	NA	to be determined

TASK/ACTIVITY	DESIRED PRODUCT [LINK TO DELIVERABLE]	DUE DATE	PEOPLE RESPONSIBLE
PHASE 3: DEVELOPMENT OF RECOMMENDATIONS ("SHOULD BE" PHASE)			
1. Develop a proposed "TMDL" process utilizing the products of the Phase 1 and 2 activities.	proposed "TMDL" process. [2, 3, 4]		all
2. *Evaluate strengths and weaknesses of available tools for listing/prioritization for* their utility in the proposed "TMDL" process and recommend future course of action.	*summary of strengths and weaknesses* of each available tool, an evaluation of their utility in the proposed process and recommendation for future action. [2]		Antosch, Rankin, White
3. Evaluate strengths and weaknesses of available tools for *development* of restoration target (step 1 in Charter) for their utility in the proposed "TMDL" process and recommend future course of action.	summary of strengths and weaknesses of each available tool, an evaluation of their utility in the proposed process and recommendation for future action. [2]		Gaskill, Antosch, Heitzman
4. Evaluate strengths and weaknesses of available tools for *implementation* of strategy to achieve restoration target (step 2 in Charter), evaluate their utility in the proposed "TMDL" process and recommend future course of action.	summary of strengths and weaknesses of each available tool, an evaluation of their utility in the proposed process and recommendation for future action. [2]		Morrison, Lauver, Hodory, Antosch, Gallaway, Gaskill
5. Evaluate strengths and weaknesses of available tools for *validation* of strategy to achieve restoration target (step 4 in Charter), evaluate their utility in the proposed "TMDL" process and recommend future course of action.	summary of strengths and weaknesses of each available tool, an evaluation of their utility in the proposed process and recommendation for future action. [2]		Hodory, Rankin, White
6. Evaluate the proposed "TMDL" process, revise proposed process as necessary and finalize.	evaluation of proposed process, rationale for modifications (if any) and final recommended "TMDL" process. [4]		all
7. Recommend how to integrate the final, developed "TMDL" process into the DSW Strategic Management Process and DSW Goal Statement.	modified DSW Goal Statement and Annual Plan that reflects the implementation of the developed "TMDL" process [3, 4]		all

DSW TMDL TEAM WORK PLAN TIMELINE

6/30/99

TASK/ACTIVITY	1998						1999											
	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
PHASE 1: DEFINITION OF PRESENT ("AS IS" PHASE)																		
1. Identify applicable statutes/ regulations/ guidance	%%%	%%%																
2. Identify available tools	%%%	%%%	%%%	%%														
3. Document the current Ohio TMDL process	%%%	%																
4. Document current DSW strategic management process	%%%	%%%	%															
5. Define current goal/priority processes in each program area.	%%%	%%%	%%%															
PHASE 2: OUTREACH/RESEARCH ("COULD BE" PHASE)																		
1. Benchmark TMDL processes with other states		%%%	%%%	%%%														
2. Develop and coordinate comments on the FACA report	%%%	%%%	%%%															
3. Interact with external advisory group (EAG)	O	N	G	O	I	N	G	→	→	→	→	→	→	→	→			
4. Explore/identify/define potential tools for listing/prioritization				%%%	%%%	%%%	%%%	%%%										
5. Explore/identify/define potential tools for target development				%%%	%%%	%%%	%%%	%%%										
6. Explore/identify/define potential tools for implementation				%%%	%%%	%%%	%%%	%%%										
7. Explore/identify/define potential tools for validation				%%%	%%%	%%%	%%%	%%%										
8. Analyze any litigation aimed at Ohio's TMDL activities	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?			
PHASE 3: DEVELOPMENT OF RECOMMENDATIONS ("SHOULD BE" PHASE)																		
1. Develop a proposed "TMDL" process using Phase 1&2									%%%									
2. Evaluate listing/prioritization tools in the proposed process										%%%	%%%	%%%						
3. Evaluate development tools in the proposed process										%%%	%%%	%%%						
4. Evaluate implementation tools in the proposed process										%%%	%%%	%%%						
5. Evaluate validation tools in the proposed process										%%%	%%%	%%%						
6. Evaluate the proposed "TMDL" process, revise and finalize.													%%%	%%				
7. Recommend how to integrate the final process into the SMP													%%%	%%%	%%%			
Project management; assembly of deliverables (team leader)	O	N	G	O	I	N	G	→	→	→	→	→	→	→	→			

Appendix B: Task Descriptions for the Generic TMDL Project Process

1 Watershed Survey Design

1.1 Examine Available Internal Information

Purpose: To compile internal information on past surveys (TSDs, PSDs, reference site data, other data, existing TMDL monitoring plans generated stressor/exposure data) to act as the baseline for a new survey to examine trends in impairment and causes/sources, identify gaps in previous surveys, etc. (See Ohio EPA 1999a) For waters that have had previous TMDLs developed and implemented, this process will ensure they are re-sampled for trend analyses and listing/de-listing.

Description: This activity is one of searching/reading though databases, documents, and files and compiling the data in ways (e.g., maps, tables) to make it useful for designing the new survey. This process includes QA/QC checks on the data. Information is typically summarized as part of a study plan document. EAU staff have traditionally taken the lead in developing the study plan, with the involvement of modelers, permitting staff, NPS, district staff and other agencies.

Inputs: Electronic or paper databases, files, reports.

Output: This is part of the process to produce a study plan document.

Time (Effort): 10-24 hours

Time (Span): 2-3 days; One to Two Weeks (mid April to late May)

Dependencies:
Project: None.

Recommendations: Improved data and information management for monitoring efforts; accurate geo-referencing standards for all data

Information Sources:
Ohio EPA. 1999a, Draft. Ohio EPA five-year surface water monitoring strategy, 2000-2004. Ohio EPA Technical Bulletin MAS/1999-7-2. Ohio EPA, Division of Surface Water, Front Street, Columbus, Ohio.

1.2 Examine Available External Information

Purpose: To compile external information on past surveys (e.g., other agencies, volunteer data) to add to a baseline of data for a new survey.

Description: This activity is one of searching/reading though databases, documents, and files and compiling the data in ways (e.g., maps, tables) to make it useful for designing the new survey. A time consuming part of this procedure could be finding the data,

documentation, and performing QA/QC checks on the data. Information is typically summarized as part of a study plan document. Guidelines for data acceptance (Ohio EPA 1999b) and development of Internet databases may improve this. For other government stakeholders (federal and state agencies) data sharing needs to be institutionalized at the staff level. Perhaps consideration of a mechanism like that which exists in Maryland (Maryland Water Monitoring Commission) should be considered as a permanent, independent entity to facilitate information sharing.

The new TMDL process will also incorporate feedback (including data) from stakeholders identified in the initial announcement of activity (e.g., monitoring, TMDL development) in the watershed. This will likely require one or more meetings and monitoring and assessment workshops. This will be discussed in more detail under a general plan for public participation. The proposed federal TMDL guidelines require consideration of "monitored" and "evaluated" (e.g., volunteer monitoring data) in constructing the TMDL list, however, this data would have to meet Ohio EPA QA/QC standards to be used in listing decisions [this supported in proposed regulations] . Evaluated data such as volunteer monitoring not rigorous for listing can help target the intensive monitoring that will be used to make attainment decisions, see Ohio EPA 1999b).

Inputs: Electronic or paper databases, files, reports.

Output: This is part of the process to produce a study plan document.

Time (Effort): 8-40 hours

Time (Span): 1 to 2 weeks (mid April to late May)

Dependencies:

Project: Public participation process in operation; availability of data in electronic and paper form (includes documentation of this data, and communication and participation of data "owners" to gain understanding of data " nuances").

Other: Development of public participation, completion of ambient monitoring guidance, development of training program and materials.

Recommendations: Future data and information management efforts should work to improve capture (e.g., via Internet) of external data and "metadata" (e.g., QA/QC information) to increase use/usefulness of information. At a minimum Ohio government agencies should not so parochial when dealing with these types of data.

Information Sources:

Ohio EPA. 1999a, Draft. Ohio EPA five-year surface water monitoring strategy, 2000-2004. Ohio EPA Technical Bulletin MAS/1999-7-2. Ohio EPA, Division of Surface Water, Front Street, Columbus, Ohio.

Ohio EPA. 1999b, Draft. Guide to the uses of ambient monitoring data for surface waters in the TMDL process. Ohio EPA Fact Sheet MAS/1999-????. Ohio EPA, Division of Surface Water, Front Street, Columbus, Ohio.

1.3. Complete Study Plan Design

Purpose: To write and produce a plan of study for a watershed.

Description: This activity meshes Agency study objectives (TMDL needs, other water quality management needs, such as unsampled area, permit support, WQS support, etc., see Ohio EPA 1999a, b) with knowledge of previous assessment and data to create a monitoring plan of study for a watershed. Important issues will include sample design and coverage based on environmental complexity. Meetings with stakeholders and those with interest/expertise outside of Ohio EPA will be an important form of public input.

Inputs: Electronic or paper databases, files, reports, complaints, BPJ, meeting notes.

Output: A study plan document in printed and electronic form (web).

Time (Effort): 16-40 hours

Time (Span): 5-10 days with review; 1 to 2 weeks (mid April to late May)

Dependencies:
Project: 1.1, 1.2

Information Sources:
Previous Study Plans, TSDs, TMDL Reports, etc.,

Ohio EPA. 1999a, Draft. Ohio EPA five-year surface water monitoring strategy, 2000-2004. Ohio EPA Technical Bulletin MAS/1999-7-2. Ohio EPA, Division of Surface Water, Front Street, Columbus, Ohio.

Ohio EPA. 1999b, Draft. Guide to the uses of ambient monitoring data for surface waters in the TMDL process. Ohio EPA Fact Sheet MAS/1999-????. Ohio EPA, Division of Surface Water, Front Street, Columbus, Ohio.

2 Collect Water Quality Data

2.1 Collect and Compile Ambient Assessment Data (Internal Efforts)

Purpose: To collect and compile data that will be used to assess attainment of designated uses and to identify sources and causes that are limiting achievement of these uses.

Description: This activity is the "nitty-gritty" of going out into the environment to collect data and turn it into information on whether various designated uses (aquatic life, recreation) are meeting these uses (i.e., goals). It is the collection of various categories of appropriate indicators including aquatic life, bacteria, ambient water column and sediment chemistry, habitat data, toxicity data, etc. based on the plans of study devised in step 1. For aquatic life, for example, the process includes data collection, processing of samples, entering and proofing data (e.g., taxonomic, geographic) and calculating indices or other measures. The Ohio EPA monitoring strategy covers many of the important considerations related to monitoring not mentioned here (Ohio EPA 1999a).

Inputs: Plan of study (1.3)

Output: Data that meets all data quality objectives (QA/QC) for its intended use in an electronic form useful for part 3.1 and 3.2.

Time (Effort): 4-8 work years per watershed

Time (Span): 9- 15 months

Dependencies:
Project: Step 1.3. Complete study plans, equipment and resources (e.g., interns, supplies) for field work, data management resources for data entry or access, QA/QC, etc.

Information Needs:
Study plans

Ohio EPA. 1999a, Draft. Ohio EPA five-year surface water monitoring strategy, 2000-2004. Ohio EPA Technical Bulletin MAS/1999-7-2. Ohio EPA, Division of Surface Water, Front Street, Columbus, Ohio.

Ohio Environmental Protection Agency. 1987a. Biological criteria for the protection of aquatic life: Volume I. The role of biological data in water quality assessment. Div. Water Qual. Monit. & Assess., Surface Water Section, Columbus, Ohio.

Ohio Environmental Protection Agency. 1987b. Biological criteria for the protection of aquatic life: Volume II. Users manual for biological field assessment of Ohio surface waters. Div. Water Qual. Monit. & Assess., Surface Water Section, Columbus, Ohio.

Ohio Environmental Protection Agency. 1989c. Biological criteria for the protection of aquatic life: Volume III. Standardized biological field sampling and laboratory methods for assessing fish and macroinvertebrate communities. Div. Water Quality Plan. & Assess., Ecol. Assess. Sect., Columbus, Ohio.

Rankin, E.T. 1989. The qualitative habitat evaluation index (QHEI): rationale, methods, and application.

Div. Water Qual. Plan. & Assess., Ecol. Assess. Sect., Columbus, Ohio.

Since the publication of the preceding guidance documents new publications by Ohio EPA have become available. The following publications should also be consulted as they represent the latest information and analyses used by Ohio EPA to implement the biological criteria.

DeShon, J.D. 1995. Development and application of the invertebrate community index (ICI), pp. 217-243. in W.S. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Risk-based Planning and Decision Making. Lewis Publishers, Boca Raton, FL.

Rankin, E. T. 1995. The use of habitat assessments in water resource management programs, pp. 181-208. in W. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. Lewis Publishers, Boca Raton, FL.

Yoder, C.O. and E.T. Rankin. 1995. Biological criteria program development and implementation in Ohio, pp. 109-144. in W. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. Lewis Publishers, Boca Raton, FL.

Yoder, C.O. and E.T. Rankin. 1995. Biological response signatures and the area of degradation value: new tools for interpreting multimetric data, pp. 263-286. in W. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. Lewis Publishers, Boca Raton, FL.

2.2 Collect and compile and QA/QC readily available external information

Purpose: To use data collected by groups external to Ohio EPA to supplement and strengthen (e.g., geographically) assessments or to focus more intensive monitoring efforts.

Description: This activity will vary greatly with the source of the information and documentation (e.g., .purpose, QA/QC) available for each data source. Other data has been integrated into various reports (TSDs) and the 305(b) process in the past. Some can be straightforward to use. For example we used USGS and other Agency pH data to identify mine affected streams in southeast Ohio. For other datasets that are less well documented the use of the information can be difficult. Part of the plan to improve the usefulness of such data will be to create a clear process for accepting and using data (Ohio EPA 1999b). Certain types of data, for example, may be useful in identifying area for intensive monitoring or aid in associating cause and sources back to impairment. Data that is too difficult to use (e.g., poor documentation) or not rigorous enough may be excluded.

Inputs: Electronic data with well documented QA/QC (sufficient “metadata”)

Output: Data that can meet various needs for the TMDL process depending on QA/QA and documentation (e.g., cause/source determination) in electronic form.

Time (Effort): 1-10 days

Time (Span): 1 month (April-May)

Dependencies:

Project: Cooperation of stakeholders, data “owners”.

Other: Establishment of a process for involving the public and stakeholders including meetings, training, technical assistance. One possibility is a body similar to the Maryland Water Monitoring Council (see 1.2). Establishment of processes and procedures for capturing data (e.g., Internet).

Recommendations: Consider these source of data and information when improving the Division’s monitoring data and information systems (i.e., SWIMS II/Jr).

Information Sources:

Ohio EPA. 1999b, Draft. Guide to the uses of ambient monitoring data for surface waters in the TMDL process. Ohio EPA Fact Sheet MAS/1999-????. Ohio EPA, Division of Surface Water, Front Street, Columbus, Ohio.

3 Assess Waterbodies

3.1 Determine impairments by designated use

Purpose: To determine attainment of water quality goals (standards) for Ohio waters.

Description: This activity is one of comparing results of ambient monitoring of streams, rivers, ponds, lakes, reservoirs, Lake Erie, and wetlands to the appropriate criteria listed in the Ohio WQS for these waters (it is the basis of listing/de-listing decisions). Those waters that have measures that exceed (e.g., typically stressors such as chemicals, bacteria levels) or deviate (e.g., response variables such as biocriteria) from the criteria are considered "impaired." Waters without such "exceedances" or deviations from criteria may be considered unimpaired or attaining the appropriate designated uses if data is deemed sufficient (e.g., biocriteria) to make such a call. Attaining waters may be classified as threatened if there is evidence that the use may not meet criteria in the future because of trends in or near these waters. In a few situations where some indicators conflict in their assessments of attainment a "weight of evidence" approach is used. The previous activity included the collection and much of the "grunt" work to QA/QC the data (includes proofing, voucher identification, database entry, etc.); this activity assumes the information is available in final form.

Inputs: Electronic databases (proofed, QA/QC'd) of ambient assessment data (biological, chemical), other supporting data for weight of evidence analysis.

Output: Multiple outputs will be produced with varying level of detail supporting these analyses. The most complex treatment will be reported in Technical Support Documents (TSDs). For TMDL watersheds, a summary of the attainment status will be produced for the TMDL report. For waters with biological criteria (aquatic life uses) attainment tables summarize the attainment status for each site and tables of chemical data summarize impairment of chemical water quality criteria. Some very simple assessments have an attainment table and are reported though the 305(b) report. Sizes of all Waterbodies impaired (i.e., miles for streams/rivers, acres for lakes) are reported in summary form in the 305(b) report and electronically in the Waterbody System (WBS)

Time (Effort): 2-5 days per watershed (simple to complex).

Time (Span): 5 months (Feb - June)

Dependencies:

Project: 2.1, 2.2.

Other: This process is dependent on the availability of data in electronic form. It is also dependent on the completion of a "Use Attainability Analysis" where appropriate. For example, Ohio EPA has a tiered system of aquatic life uses and recent survey results are use to confirm that the current use is appropriate or to recommend a use change. The criteria used to determine the attainment status vary with use, therefore determining the correct attainment status is dependent on the correct use designation. Some waters and waterbody types have use designation under development (e.g., wetlands, Lake Erie near shore area and estuaries

(Lacusturaries), and headwater streams.

Recent proposed guidelines indicate that any water quality decline in a tier 3 water (i.e., ONRW, Ohio currently has none) will be considered impaired for 303(d) purposes. Similarly any stream whose *existing* use, as of 1975 has been affected is also considered impaired if no use attainability has been performed. Because Ohio regularly designates or redesignates streams that we monitor that have no or have inappropriate designated uses, this problem should be minimal in Ohio.

Out of Cycle Assessments: It is not clear whether the proposed TMDL regulations will limit listing and de-listing between the 2, 4, or 5 year cycles being proposed. Ohio EPA assesses designated use attainment each year based on data collected during a previous summer period. We will likely need to consider how we handle data submitted to us off cycle intended for either a de-listing decision or a change in cause/source identification. All such data will need to meet QA/QC specifications and will be processed through the 305(b) process at a minimum.

Recommendations: For some designated uses, the current criteria or assessment methods likely need to be examined more closely (e.g., recreation, public water supply), thus determining the appropriate attainment status of these uses will be dependent on an in-depth assessment of the indicators used for these designated uses (e.g., U.S. EPA 1999).

Information Needs:

Ohio Environmental Protection Agency. 1987b. Biological criteria for the protection of aquatic life: Volume II. Users manual for biological field assessment of Ohio surface waters. Div. Water Qual. Monit. & Assess., Surface Water Section, Columbus, Ohio.

Ohio Environmental Protection Agency. 1989b. Addendum to Biological criteria for the protection of aquatic life: Volume II. Users manual for biological field

U.S. EPA. 1999. Action plan for beaches and recreational waters. Office of Research and Development/Office of Water, U.S. EPA-EPA/600/R-98/079

3.2 Determine causes/sources of impairments or threats

Purpose: For impaired or threatened waters determine reasons for impairment and sources of the stressor that is causing or may cause impairment

Description: “Multiple lines of evidence” are used to associate stressors present in the environment (e.g., elevated water chemistry values, sedimentation, habitat disturbance, nutrient enrichment and low dissolved oxygen, toxicity) with the observed impairment. The approach is analogous to a medical diagnosis on a patient (waterbody) by a doctor (biologist or scientist). The multiple lines of evidence may include whole effluent toxicity, ambient exceedances of water quality parameters, histories of spills or other episodic “events,” biological response signatures in the aquatic community, elevated concentrations of nutrients compared to reference levels, etc. Long-term databases integrating biological, chemical, and habitat data have allowed us to describe predictive responses of some components of aquatic life to a gradient of environmental conditions. For example, a decrease in the substrate score of the QHEI is associated with lower IBI scores, number of

sensitive species, etc. This data, in essence, lets us diagnose many causes of impairment with a high degree of confidence. A similar process will be done for each use (e.g., recreation).

Inputs: Electronic databases of ambient assessment data (biological, chemical), other supporting data for weight of evidence analysis (permit violations, spills, effluent toxicity, land use changes, etc.).

Output: Assessments of causes and sources of impairment will generally be integrated with the assessment of the attainment status. Multiple outputs will be produced with varying level of detail supporting these analyses. The most complex treatment will be reported in Technical Support Documents (TSDs). For TMDL watersheds, a concise assessment of the associated causes and sources will be part of the TMDL report. Causes and source will also be reported in summary form in the 305(b) report, electronically in the Waterbody System (WBS), and as part of the 303(d) list.

Time (Effort): 2-4 weeks

Time (Span): January to June

Dependencies:

Project: 2.1; 2.2; 3.1.

Other: This process is dependent on the availability of sound data (response, stressor, and exposure indicators) in electronic form. For more detailed and robust assessment of watershed level effects, better land use and GIS information will be needed. Clearly some of these assessment are more straightforward than others and a more robust predictive capability of some of these associations is dependent on a functional "Quality Improvement Process" that will reexamine the relationships (models) between response variables (aquatic life, bacteria) and environmental stressors and exposure indicators as we gather new (e.g., pebble counts, improved bacteria indicators) and more spatially and technically sound information.

Recommendations: Although we have been recognized for having a broad and rigorous monitoring program, we need to develop more indicators that will improve our accuracy and precision in identifying NPS causes/sources. These include various substrate measures (e.g., pebble counts), measures of streambank stability (Pfankuch 199?), geomorphological measures (Rosgen 1995) as well as more accessible GIS coverages (e.g., land use, glacial features, soils, etc.).

Information needs:
Previous reports (TSDs, etc.)

Ohio EPA. 1999c, Draft. The process for assessing the causes and sources of impairment of aquatic life in Ohio streams and rivers. Ohio EPA Fact Sheet MAS/1999-????. Ohio EPA, Division of Surface Water, Front Street, Columbus, Ohio

DeShon, J.D. 1995. Development and application of the invertebrate community index (ICI), pp. 217-243. in W.S. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Risk-based Planning and Decision Making. Lewis Publishers, Boca Raton, FL.

Rankin, E. T. 1995. The use of habitat assessments in water resource management programs, pp. 181-208. in W. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. Lewis Publishers, Boca Raton, FL.

Yoder, C.O. and E.T. Rankin. 1995. Biological criteria program development and implementation in Ohio, pp. 109-144. in W. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. Lewis Publishers, Boca Raton, FL.

Yoder, C.O. and E.T. Rankin. 1995. Biological response signatures and the area of degradation value: new tools for interpreting multimetric data, pp. 263-286. in W. Davis and T. Simon (eds.). Biological Assessment and Criteria: Tools for Water Resource Planning and Decision Making. Lewis Publishers, Boca Raton, FL.

3.3 Complete TMDL support documents

3.3.1 Watershed TMDL support documents

Purpose: To provide a detailed and sound basis for calculating a TMDL

Description: These reports will be developed to provide an environmental characterization that will for the basis for completing a TMDL. This analysis will define the impaired water or waters (e.g., subwatershed), the associated stressor(s) thought to be limiting to the attainment of water quality standards, and the source or sources of these stressors. For aquatic life, any ecological impediment or constraints will be identified. Where multiple stressors are present, those most limiting to the designated use will be identified. Where appropriate, the most ecologically desirable alternatives for restoration may be initially identified.

Inputs: The same data and analytical capabilities need to complete a TSD: electronic data in raw and summarized form and GIS and statistical data and analyses.

Output: Concise and timely reports (perhaps delivered in database or some other electronic form) identifying limitations to designated uses and an assessment of causes and sources of impairment. These assessment may be grouped regionally (e.g., watersheds) and/or by categories of stressor (e.g., toxic vs. NPS/habitat)

Time (Effort): Unknown because this would be a new product; effort somewhere between a PSD and a TSD and dependent on form (electronic vs document). Likely 20-160 hours.

Time (Span): February to September (9 months)

Dependencies:

Project: 3.1; 3.2.

Other: This process is dependent on the availability of sound data (response, stressor, and exposure indicators) in electronic form (i.e., need to assess use attainment and cause/sources of impairment) and many of the same resources needed to complete a TSD but in a shorter or different (e.g., electronic) form.

For more detailed and robust assessment of watershed level effects, better land use

and GIS information will be needed. The TSD process needs to be examined to determine the most efficient effort and format for delivering this information while maintaining the integrity of the assessment process

3.3 Complete TMDL support documents

3.3.2 305(b) Report

Purpose: To provide a summary report with site specific and larger scale summaries of water resource quality status and trends

Description: The 305(b) report (Ohio Water Resource Inventory) is a biennial report required by section 305(b) of the Clean Water Act and is intended to be the main vehicle by which states report to Congress on the status and trends in their water resource quality. For Ohio it is a summary of the data collected to support various Agency assessment functions. We do not monitor "because of 305(b)" as some states do, rather it is a tool for providing feedback on the success of our water quality management strategies and forms a basis for our strategic plan. The report contains both waterbody-specific summaries of status and causes and sources of threats or impairments and larger scale summaries of status and trends (from watershed scale to statewide scale). Because it is designed as a summary process, the 305(b) data is typically not detailed enough to form the basis of a TMDL. More detailed TMDL support documents will provide this function (see 3.3a).

Currently a biennial effort for National reporting, we should change the waterbody assessment component to an annual effort. All data used for listing waters on the TMDL list will be funneled through the 305(b) process. The proposed TMDL regulations call for a closer link between the 305(b) report and the TMDL list which we already have in Ohio.

Inputs: These summaries are completed during the final process of putting together a TSD or some similar level of assessment (where a TSD is not completed). Therefore the inputs are the various data types (indicators) needed for the TSD process. The more complex the environmental setting the greater the need for a broad array of indicators. The data needs will vary by designated use (e.g., aquatic life vs recreation).

Output: Waterbody assessments of attainment/non attainment of designated uses and causes and sources of threats and impairments in electronic form (WBS) and in paper reports (Ohio Water Resource Inventory).

Time (Effort): Approximately 5% of a EAU biologist's time is spent summarizing the data for the WBS (100 hours for all waters sampled by that biologist) and 50-75% of a FTE (1500 hours) is spent creating and editing the biennial reports and fact sheets, entering and proofing data, etc. The 100 hour estimate is roughly 1-2 hours per waterbody where a TSD or other analysis has been completed (e.g., PSD), more otherwise. Both of these estimates would increase with the need to distribute this information (which is the basis for 303(d)) more broadly and more efficiently outside of the Agency though "infographics" and the web. Better ways of communicate 303(d) information to the public and stakeholders are encouraged in the new TMDL

regulations.

Time (Span): 1 - 9 months; January to August

Dependencies:

Project: 3.2, 3.3a,

Other: This process is dependent on the availability of sound data (response, stressor, and exposure indicators) in electronic form and many of the same resources needed to complete a TSD.

If more outside data were to be used and funneled directly through the 305(b) process, significant staff time would be needed to compile, research (i.e., determine purpose, QA/QC limitations, etc.), and analyze this information.

Information Needs:
U.S. EPA. 1997 Draft, Guidelines for preparation of the 5-year state water quality assessments (305(b) reports) and annual electronic updates. Office of Water, U.S. EPA DRAFT EPA-841-B-002.

4 Identify Target Conditions

4.1 Examine readily available data

Purpose: Begin to create a picture of the watershed by examining readily available information.

Description: Locating, searching and retrieving database information, documents and files located in the Agency including the information gathered in the listing process. Compiling this information into a useable format and checking for QA/QC as needed for documents located in-house but compiled by external entities such as consultants, the regulated community and environmental groups and that were not included in the listing process.

Inputs: Electronic or hard-copy databases, files, reports, maps and documents. Verbal descriptions from staff familiar with the watershed also included. (e.g., waterbody sheets, TSDs, PSDs, existing Agency files (permits, modeling), consultant reports, CSO studies, etc.)

Outputs: Collection and organization of information.

Time (Effort): 40 to 80 hours depending on availability and format (hard copy) of data

Time (Span): 2 to 4 weeks depending on staff availability and time to retrieve electronic data

Dependencies

Project: This process is dependent on the 303(d) list and TMDL schedule being finalized.

Other: The watershed has been approved for TMDL development and a project manager and/or team has been assigned the TMDL project. Availability of staff to supply needed information.

Recommendations: Recommendations in the data management workgroup final report would be applicable here. In addition, the formation of a 'stream team' as discussed in the TMDL charter team's final report would facilitate location of internal information.

Information Sources:
The 303(d) List; current cycle, the Water Resources Inventory/305(b) Report, and the Nonpoint Source Assessment; Ohio EPA, DSW
Technical Support Document (specific to watershed); Ohio EPA, DSW
BASINS: Target/Assess/Data Mining modules; U.S. EPA, OST
Files on entities and watersheds; Ohio EPA, DSW Files
Archived reports and data; State of Ohio Archive
River mile maps of area; Ohio EPA, DSW Library
Verbal discussions with Ohio EPA district and central office staff
Chemical data: STORET, LIMS, LEAPS, datasonde databases

4.2. Gather additional data as appropriate and available

Purpose: Continue to create a picture of the watershed by gathering available, additional data

not necessarily available during the listing process.

Description: Issue a 'call for data' public notice to generate stakeholder involvement and gain watershed data. Call likely sources of information such as local universities, industries and watershed groups. Locate, search, and retrieve database information, documents, files and other data from external sources. Compile this information into a useable format and filter information using QA/QC protocols. Data meeting sufficient QA/QC requirements can be used directly; data not meeting these requirements can be used in a qualitative sense only.

Inputs: Electronic or hard-copy databases, files, reports, maps, measurements and documents. Verbal descriptions from stakeholders familiar with the watershed can be valuable qualitatively. Can be assisted with input from a stakeholder group; see 4.8.

Outputs: Collection and organization of information.

Time (Effort): 20 to 120 hours depending on availability and format (hard-copy) of data

Time (Span): 1 to 3 months depending on the level of the response; the response time of the public, and on the format data provided is in.

Dependencies

Project: This process is dependent on the 303(d) list and TMDL schedule being final. 4.8 would facilitate this; however, the steps are not interdependent.

Other: The watershed has been approved for TMDL development and a project manager and/or team has been assigned the TMDL project. Availability of staff to locate/request needed information. Availability of external data and willingness to give data to Ohio EPA. This is also dependent on communication with the various data "owners" to understand the procedures used to collect the provided data.

Recommendations: This step could be greatly facilitated by issuing a "call for data" by: issuing news releases; sending letters and/or placing phone calls to key stakeholders and watershed groups; including information request on the DSW web page. Potential coordination with the listing call for data but this needs to be more focused on a watershed level, not a state level. A QA/QC protocol is also needed.

Information Sources:
ODNR, USGS, U.S. EPA, NRCS, city/county water and health departments, colleges and universities; local and statewide. Do a literature search to locate studies for watershed of interest. Existing watershed groups, 208 planning agencies, regulated entities, Greenway programs; Internet keyword search.

4.3. Analyze all available data

Purpose: Create a picture and an understanding of the watershed by analyzing compiled internal and external information. This differs from the listing process in that it is a watershed-specific focus and may include additional data not included in listing. In addition, other questions other than impairment are being assessed here such as

identification of major causes of concern including public perception issues (not only aquatic life and human health indicators that are included on the 303d list), resolution of an acceptable geographic scope, exact locations of sources and where what impairments are due to what causes. The listing process is more a summary of overall watershed conditions; this step is to breakdown from the general to the specific details needed in calculating the TMDL.

Description: Synthesize and analyze collected data; look for trends and red flags in the data.

Inputs: Collected data from 4.1 and 4.2

Outputs: Summary of available data; description of findings based on data and a useable database for development purposes.

Time (Effort): 10 to 120 hours depending on availability and format of data

Time (Span): 1 to 6 weeks depending on staff availability

Dependencies

Project: This process is dependent on 4.1 and 4.2.

Other: This process is dependent on the availability of existing data and availability of tools to merge data from the various sources.

Recommendations: This step could be greatly facilitated by the recommendations highlighted in the data management workgroup final report. In general, data should be easily referenced and useable, preferably in electronic format, using similar formats and a common georeferencing system. A QA/QC program needs to be instigated and used. Guidelines for use of external data should be developed. Database and/or other software tools and training should be secured. A position dedicated to this type of data management could be useful.

Information Sources:
Not applicable.

4.4. Define goal(s)

Purpose: Define goal or goals of the TMDL project. For example, is the primary concern of a particular TMDL to address biological impairments, human health concerns, a public concern, or some other focus or combination. Selection of causes of concern to focus on will be developed in the next step.

Description: Based on collected data and preferably using a team approach involving Ohio EPA and stakeholders, identify goal or goals of the TMDL project. Management input may be needed to determine available resources and Agency position of goal setting.

Inputs: Description and analysis from 4.3 and product from 3.3a.

Outputs: Defined goal or goals for the TMDL project

Time (Effort): 5 to 20 hours depending on available information and if availability of resources is an issue

Time (Span): 1 day to 3 weeks depending on staff and management availability.

Dependencies

Project: This process is dependent on completion of 4.3 and 3.3a.

Other: This process is dependent on the availability of staff to devote time to this process, and on management input and support. External input valuable but not required if staff are knowledgeable about public perception and concerns with the watershed. The selection of goal(s) will depend on availability of resources to perform the work, the results of 4.3, and potentially, public perception of the watershed.

Recommendations: This step could be greatly facilitated by having both a 'stream team' of staff and a stakeholder group to interact with at this point in the process. The TMDL charter final report describes the makeup of a stream team and the public participation workgroup final report lists recommendations to form a stakeholder group. In addition, this step is a potential management checkpoint. The strategic plan should be coordinated with this. A priority setting procedure similar to the listing method should be developed here.

Information Sources:
Ohio EPA staff, external stakeholders, the results of 4.3 and the TSD if available.

4.5. Select causes of concern

Purpose: Select which (or all) of the causes of concern that will be focused on in the TMDL project.

Description: Using the output of 4.3 and the watershed team approach list the causes of concern. Selection of causes may need managerial input and a description of the availability of resources.

Inputs: Output of 4.3, 3.3a and watershed team participation

Outputs: Ranked list of causes of concern and a description of causes selected for TMDL development

Time (Effort): 5 to 20 hours depending on amount of data to review, how familiar staff are with the watershed, and how much discussion is generated.

Time (Span): 1 to 3 weeks depending on staff and managerial availability

Dependencies

Project: This process is dependent on completion of 4.4.

Other: Participation of a watershed team, managerial input, and an idea of availability of future resources. In addition, the results of the most current watershed assessment are necessary to the successful identification of the appropriate causes of concern.

The strategic plan could be coordinated with this. A priority setting procedure similar to the listing method should be developed here.

Information Sources:
Ohio EPA staff and management, external stakeholders, the results of 4.3 and 4.4 and the TSD if available.

4.6. Identify and locate sources of selected causes

Purpose: Identify sources of the identified causes of concern in the watershed.

Description: Using the output of 4.3 and the watershed team approach determine the sources of concern.

Inputs: Output of 4.3 and watershed team participation

Outputs: List and description of sources of concern

Time (Effort): 1 to 5 hours depending on number of sources identified

Time (Span): 1 to 2 weeks depending on staff availability

Dependencies

Project: This process is dependent on completion of 4.3 and 4.5.

Other: No other dependencies exist; however, participation of a wide knowledge base would facilitate process; see recommendations.

Recommendations: This step could be greatly facilitated by having both a 'stream team' of staff and a stakeholder group to interact with at this point in the process. The TMDL charter final report describes the makeup of a stream team and the public participation workgroup final report lists recommendations to form a stakeholder group.

Information Sources:
Ohio EPA staff, external stakeholders, the results of 4.3 and the TSD if available.

4.7. Determine geographic scope

Purpose: Define the geographic scope of the TMDL project

Description: Using the output of 4.3 - 4.6 and the watershed team approach determine the geographic boundaries. Selection of boundaries will be based on availability of resources, stakeholder input, the identified goal and selected causes to be focused on and physical or other hydrologic features of the watershed.

Inputs: Output of 4.6 and watershed team participation

Outputs: Description of the geographic scope of the TMDL project

Time (Effort): 1 to 5 hours

Time (Span): 1 to 2 weeks depending on staff and managerial availability

Dependencies

Project: This process is dependent on completion of 4.6

Other: Participation of a watershed team, managerial input, and estimate of availability of future resources.

Recommendations: Availability of resources is an important input to the decision of geographic scope. This is a management checkpoint; managerial guidance needed.

Information Sources:
Ohio EPA staff and management, external stakeholders, and the results of 4.3 through 4.6.

4.8. Identify stakeholder group

Purpose: Contact and/or form a stakeholder group interested in selected TMDL project conditions. Develop a plan or agreement for how the stakeholder group will be involved in the process. Assign roles, identify work products and a timeline. The purpose of this group is to assist in the TMDL development and can serve a wide range of roles including as a public participation 'bounce' group and as a source of watershed data.

Description: Contact existing watershed groups, the external providers of data and people or organizations likely to have an interest in the TMDL project. The public participation workgroup recommendations provide guidance for this step.

Inputs: Stakeholder interest and list of people to contact

Outputs: Engagement and/or formation of stakeholder group and a plan for how to proceed.

Time (Effort): 20 to 80 hours depending on interest and availability of people to contact as well as if a group already exists.

Time (Span): 1 to 2 months depending on responses from public.

Dependencies

Project: This process is dependent on the 303(d) list and TMDL schedule being finalized.

Other: The watershed has been approved for TMDL development and a project manager and/or team has been assigned the TMDL project. Availability of staff to supply needed time and information. Availability, interest, and commitment from stakeholders and other interested parties.

Recommendations: This step can be initiated as soon as the watershed is selected for TMDL development and staff are assigned to the project. Some knowledge of the watershed would be important to have before meeting with the public, so completion of 4.1 is recommended before a meeting with the stakeholders.

Information Sources:

Ohio EPA staff, and Internet search; see public participation workgroup final report for more details.

5 Develop Restoration Targets

5.1 Decide on calculation method

Purpose: Select the most appropriate method to calculate the TMDL

Description: Evaluate the suite of calculation methods based on their applicability to the causes and sources of concern, their required inputs, their accuracy and efficiency. This could be a simple calculation that multiplies the appropriate water quality criterion with a critical flow condition to a fully calibrated and verified data-intensive model.

Inputs: A library of calculation methods, completed rigor evaluation (Figure B.1), and completion of 4.5 and 4.6

Outputs: A selected calculation approach and justification for selection

Time (Effort): 10 to 80 hours depending on if a successful precedent exists or not and on a library of available options

Time (Span): 1 week to 2 months depending on staff and management availability and pre-existing knowledge of calculation methods for the identified causes and sources of concern.

Dependencies

Project: This process is dependent on completion of 4.1 through 4.7.

Other: Availability of a reference library and a rigor evaluation tool (however, projects must proceed even if not available). Management guidance on resource availability.

Recommendations: A reference library would assist this process as would a method to determine what rigor is needed (see Figure B.1) and what resources are available for a particular TMDL project. A valuable document would be a catalogue of calculation methods, organized by impairment cause which could be referenced. This document should be continuously updated with information of what methods were successful and with other information learned from previous projects. A document such as this one would contribute to quality improvement and increase project efficiency. In addition, innovative methods to calculate TMDLs would be useful to explore. Innovative methods could include the use of surrogate measures to address a cause of concern not easily modeled, the use of models or calculation methods not previously used by Ohio EPA, or other approaches not presently identified.

Information Sources:
Ohio EPA staff, Internet search, reference library including U.S. EPA technical guidance and protocols and the U.S. EPA document *Compendium of Tools for Watershed Assessment and TMDL Development* (May 1997)

Figure B.1. Decision Tool for Estimating Required Rigor	
Criteria	**Description**
Ramifications	
Socio-economic	Does the development of a restoration target have high social and economic ramifications (positive or negative)? Ramifications consider a local economy, numbers of direct and indirect jobs, state and local tax revenue, and other factors as appropriate.
Legal	Does the development of a restoration target have high legal ramifications? For example, will omission of a restoration target will result in a legal suit against the Agency by U.S. EPA or other party?
Physical Complexity	
Homogeneity of Sources and Causes (Stressors)	Is the watershed predominantly occupied with nonpointSsource or pointSsource activity? If the watershed is dominated with nonpoint-source activity, can the nonpoint-source load be quantified?
Capability of Model / Approach / Method	Can the adopted model, approach, or method connect cause with restoration target?
Estimation of Sources and/or Causes (Stressors)	Are sources and/or causes of pollution known with confidence? If not, are they estimable? What is the level of uncertainty in identifying the source and/or cause?
Available Resources	
Data – Existing	Does information on sources, causes (stressors), and endpoints exist or be generated with minimal effort?
Data – Type	Does information collected directly from field sampling exist? Does indirect (indicator) information exist?
Personnel	Do sufficient personnel (person-hours) with corresponding technical expertise exist?
Monetary	Do sufficient financial resources exist to complete field monitoring, laboratory analysis, equipment and additional data purchases, etc.?
Listing/Standards	
Source/Impairment Relationship	Is impairment known to be caused by exceedence of a numeric criterion?
Water Quality Criteria/Impairment Relationship	Were numeric criteria used to list [303(d)] the waterbody segment?

5.2 Determine existing load

Purpose: Quantify the existing load or other existing stressor condition(s)

Description: Collection and analysis of data as necessary for the calculation approach. Input data into the calculation method under existing conditions to determine existing load.

Inputs: Outcome of 5.1 and 4.3

Outputs: Existing load defined

Time (Effort): 80 to 2000 hours depending on calculation method selected, required rigor, and availability of existing data.

Time (Span): 1 month to 1 year

Dependencies

Project: This process is dependent on completion of 5.1 or at least on an idea of the required rigor and availability of resources. Many calculation methods require similar kinds of data so data collection could start before final calculation method is selected; however, data collection should not be performed blind.

Other: Availability of resources, requirements of calculation method and results of a rigor decision process to determine needed rigor. Capacity and ability of the Department of Environmental Services (DES, the Ohio EPA analytical laboratory) to analyze samples for parameter of concern.

Information Sources:
Calculation method documentation, field sampling guidance and Ohio EPA staff.

5.3 Determine desired load

Purpose: Quantify the desired load or other desired stressor condition(s)

Description: Input data into the calculation method under desired conditions to determine desired load.

Inputs: Calculation method. This could be a simple calculation that multiplies the appropriate water quality criterion with a critical flow condition to a fully calibrated and verified data-intensive model. One other method to target biological criteria yet quantify the desired stressor condition is statistical (see Figure B.2).

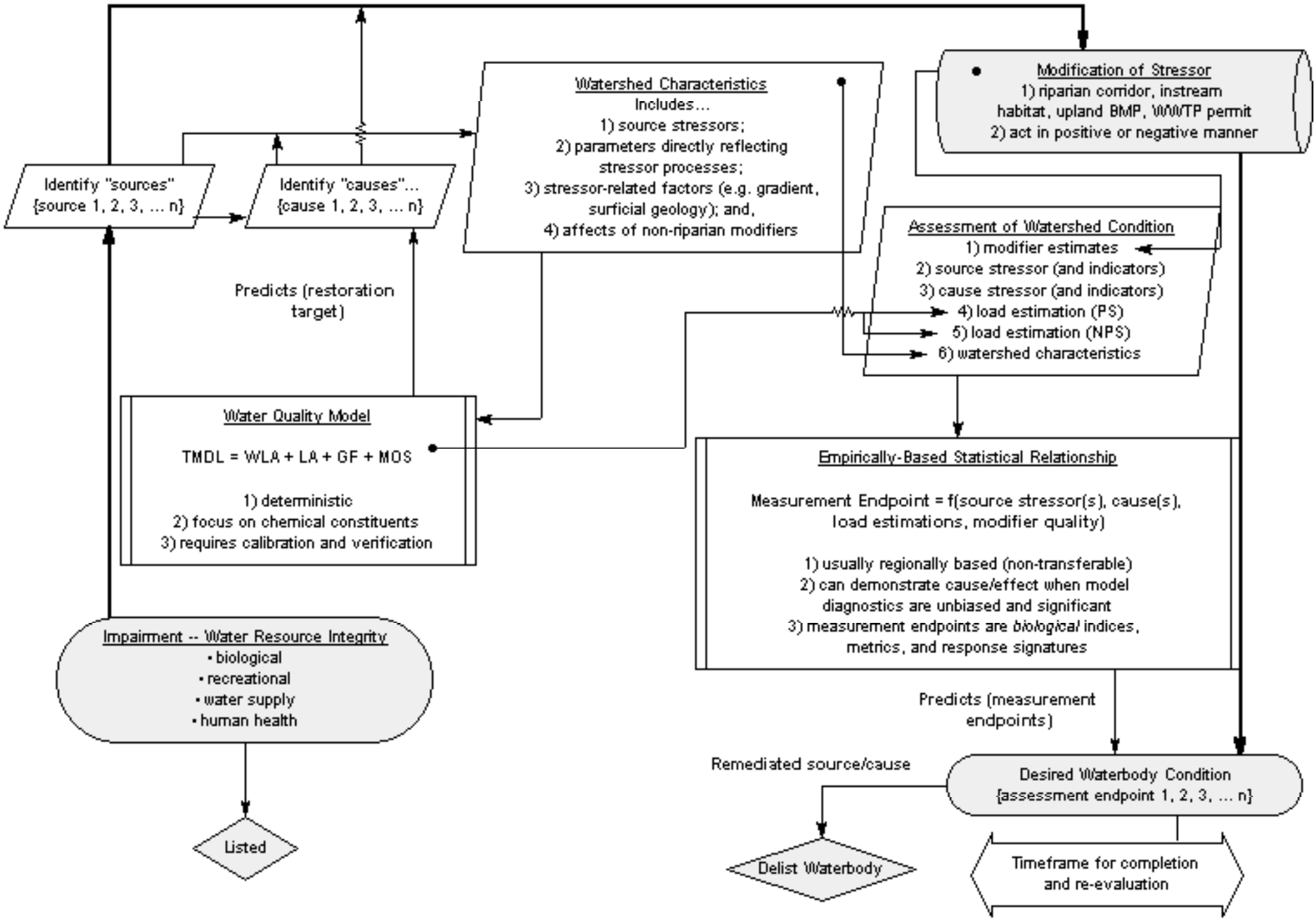
Outputs: Desired load defined

Time (Effort): 1 hour to 200 hours depending on calculation method selected and required rigor.

Time (Span): 1 day to 6 months

Dependencies

Figure B.2. Connection between Impairment and Desired State.



Project: Depending on the calculation method used and the parameters of concern, this step may only be dependent on completion through 4.7. If a more complex modeling method is used, the model would need to be set up under existing conditions (calibration and verification) before being able to predicting future conditions; therefore, it could be dependent through 5.2. In addition, a calculation of the TMDL or the assimilative capacity can be dependent on what restoration actions are selected for implementation especially if such actions impact the physical characteristics of the stream (such as dam removal) therefore, the finalization of this step could be dependent on 6.4.

Other: None.

Information Sources:
Research may be needed to quantify the flow conditions that should be used to determine the desired load.

5.4 Identify needed reduction

Purpose: Quantify the amount an existing watershed condition needs to change in order to meet the TMDL goal. For example, a needed reduction could be 50% reduction in phosphorus loading in the watershed or riparian cover needs to increase by 75 river corridor acres.

Description: Generally, this would be the difference between the existing and desired conditions. Some instances, the needed reduction would be best represented by restoration scenarios which incorporate many actions that combine to identify the needed reduction. This could be true for a stressor that is effected by many different factors, for example, dissolved oxygen which is impacted by physical stream characteristics and by nutrient and biochemical oxygen demand (BOD) loadings.

Inputs: The outcomes of 5.2 and 5.3.

Outputs: Needed reduction identified

Time (Effort): 1 hour to 120 hours depending on cause and calculation method selected

Time (Span): 1 day to 6 months

Dependencies

Project: This process is dependent on completion of 5.2 and 5.3.

Other: None.

Information Sources:
Not applicable.

5.5 Generate example restoration scenarios

Purpose: Translate desired load or required reduction into potential restoration scenarios.

Determine some restoration scenarios that would meet the goals of the TMDL and which would educate the stakeholder group on the extent and type of implementation options needed in the watershed.

Description: It is difficult to understand the extent to which restoration actions are needed unless some strategies or scenarios are presented. This step would use the calculation method or other tool to determine a few restoration scenarios able to achieve WQS if implemented. The scenarios could define the boundaries, i.e., if only nonpoint sources were reduced or if only point sources were reduced (what Ohio EPA can do with its authority). An additional strategy incorporating both voluntary and regulatory actions could also be presented. These strategies would be for educational purposes only and would serve as a starting point for the stakeholder group to use when determining an implementation plan.

Inputs: The outcomes of 5.2 and 5.3, technical knowledge of the cause of concern, effectiveness of implementation options, and a general knowledge of what may or may not be acceptable to the stakeholders.

Output: A set of potential restoration scenarios. For example, scenarios to achieve the TMDL goal through only point source reduction or only nonpoint source reductions and then some scenario incorporating both point and nonpoint source controls.

Time (Effort): 8 to 80 hours depending on cause and calculation method selected

Time (Span): 1 to 4 weeks

Dependencies

Project: This process is dependent on completion through 5.3 (not necessarily on finalization of 5.3 in the case of allocation-based approaches).

Other: This process is dependent on knowledge of effectiveness of treatment measures per cause (i.e., conservation tillage is expected to reduce 1 lb of phosphorus per acre per year) and a general feeling of what some acceptable implementation options may be. Before presenting this scenarios to a stakeholder group, the Agency position should be clear as to what it is willing to do with its authority; therefore, this is dependent on managerial input as well (Step 5.6).

Recommendations: A reference document detailing effectiveness of BMPs and other control measures.

Information Sources:
Internet search and reference library detailing effectiveness of BMPs.

5.6 Decide how Ohio EPA authority will be used to achieve needed reductions

Purpose: This is an important management and legal checkpoint at which it will be decided how Ohio EPA can use its authority to achieve the needed reductions. It will be important that stakeholders understand the ramifications of various scenarios, including this one.

Description: To make it clear to all involved how Ohio EPA will use its authority to bring the impaired water into compliance

Inputs: The outcomes of 5.2 and 5.3, technical knowledge of the cause of concern, effectiveness of implementation options.

Output: A decision on how to use Ohio EPA's authority

Time (Effort): 8 to 80 hours depending on cause and calculation method selected

Time (Span): 1 to 4 weeks

Dependencies
Project: This process is dependent on completion through 5.3 (not necessarily on finalization of 5.3 in the case of allocation-based approaches).

Recommendations: A reference document detailing effectiveness of BMPs and other control measures.

Information Sources:
Internet search and reference library detailing effectiveness of BMPs.

6 Select Restoration Scenario

6.1 Discuss scenarios with stakeholders and generation additional options

6.1.1 Review list of technically sound restoration scenarios developed as an outcome of the development process.

Purpose: Stakeholders become familiar with what types of actions and options for achieving water quality goals/restoration targets.

Description: Publicize availability of restoration scenarios. Interface with stakeholders; provide and discuss options for achieving water quality targets. Develop common understanding of water quality problems and potential solutions. Gather local information about the watershed/segment and sociopolitical issues that might affect implementation approaches. Educate stakeholders on treatment options that may exist.

Inputs: Restoration scenarios from Development Team (Step 5.5).

Outputs: Fertile ground for brainstorming or consensus. Provide background necessary to obtain local input on acceptable restoration strategies. Obtain information regarding local conditions that may enhance or hinder implementation of potential solutions to water quality problems.

Time (effort): 6-18 hours; includes preparation time and post meeting activities (1-3 meetings)

Time (span): 1-4 months (this may depend on the frequency of local watershed group meetings)

Dependencies:

Project: Completed scenarios from Step 5.5., stakeholder group (Step 4.8)

Other: Stakeholders willingness/availability to come to table.

Information Sources:
List of restoration scenarios from Step 5.5, stakeholders group from Step 4.8.

6.1.2 Expand the list of technically sound restoration scenarios to add other possible restoration scenarios developed through the public participation process.

Purpose: To ensure potential restoration scenarios are not overlooked and to provide local stakeholder input into potential restoration scenarios.

Description: Hold meetings with stakeholders and discuss/brainstorm potential alternative restoration scenarios in addition to those provided from the development process.

Inputs: Restoration scenarios from Development Team (Step 5.5). Local stakeholder feedback on additional potential restoration scenarios (if available).

Output: Additional restoration scenarios acceptable and feasible to stakeholders (if available).

Time (effort): 6-18 hours; includes preparation time and post meeting activities (1-3 meetings)

Time (span): 1-2 months

Dependencies:

Project: Completed scenarios from Development Team.(Step 5.5), stakeholder group (Step 4.8)

Other: stakeholders willingness/availability to come to table and their understanding water quality problems and solutions.

Information Sources:
local laws and regulations from stakeholders, local knowledge from stakeholder group

6.2 Develop list of criteria for evaluating list of acceptable restoration scenarios

Purpose: Develop list of criteria for evaluating list of restoration scenarios.

Description: Gathering information from various stakeholders and experts and determining the criteria to be used to evaluate the list of potential restoration scenarios. Criteria should include:

- Feasibility - The likelihood that the scenario will achieve the restoration target
- Acceptability - The likelihood that the action will take place, and
- Sustainability - The likelihood that the action(s) will stay in place.

Inputs: Stakeholders' and Ohio EPA experience regarding actions, time, legal authority, resources and programs necessary to achieve restoration scenarios, as well as identification of potential obstacles that should be considered in the evaluation process.

Outputs: List of watershed specific criteria for screening the list of potential restoration scenarios.

Time (effort): 8-40 hours

Time (span): 1 month - 3 months

Dependencies:

Project: Stakeholder group established (Step 4.8).

Other: Stakeholder involvement/participation in establishing criteria. In the absence of stakeholder interest or participation, Ohio EPA will establish the criteria.

Information Sources:
Local stakeholder groups, Ohio EPA, other state/local agencies (e.g., SWCD, LED, NRCS).

Note: Hours are expressed for a unit or group of people involved (e.g. basin team/watershed group) for Ohio EPA effort only.

6.3 Screen the list of acceptable restoration scenarios using the SELECTED criteria to identify the actions to be used to achieve the TMDL restoration target

Purpose: To select the most acceptable (based on the consensus derived criteria list) restoration scenario that when fully implemented will achieve the restoration target.

Description: The stakeholders use the criteria list from step 6.2 to rate/rank (filter) each restoration action. Upon filtering all the restoration actions, the stakeholders AND Ohio EPA will select the best combination of restoration actions or restoration scenario that will achieve the restoration target (contingent on technical validation, see Step 6.4). This selection process may need to be completed on an iterative basis is selected restoration scenarios cannot be technically verified in Step 6.4, in which case there would be repeated loops through this Step (6.3) and Step 6.4. If consensus cannot be reached on the restoration scenario, Ohio EPA will become responsible for selection and implementation of a restoration scenario.

Input: The criteria list from step 6.2 stakeholder input, and the combined list of restoration scenarios from Steps 5.5 and 6.1 .

Output: The selected restoration scenario for technical verification.

Time(effort): 6-40 hours, 1-3 meetings

Time(span): 1 week to 3 months

Dependencies:

Project: The completion of the criteria list (Step 6.2), and the combined list of restoration scenarios from Steps 5.5 and 6.1 .

Other: Ability of the stakeholders to meet and come to consensus on a “best” restoration scenario.

Information Sources:
local stakeholders group, Ohio EPA, previous TMDLS, other local agencies (SWCD, LED, NRCS).

6.4 Technical Verification of Selected Restoration Scenario

Purpose: Verify that the restoration scenario developed through the implementation process results in attainment of water quality standards or otherwise meets the goal(s) of the TMDL project.

Description: This step ensures that the selected restoration scenario is technically valid and will result in the attainment of water quality standards if it is carried out as indicated. This step may be repeated in an iterative fashion if selected restoration scenarios cannot be technically verified.

Inputs: The selected restoration scenario from 6.3 and a calculation method from 5.2 or calibrated and verified model from 5.3.

Outputs: Verification of plan or description of where the plan fails to meet the goals of the TMDL project.

Time (Effort): 8 to 40 hours depending on calculation approach used and intensity of restoration plan

Time (Span): 1 - 4 weeks

Dependencies

Project: This process is dependent on completion through step 5.5 and on step 6.3.

Other: This process may be dependent on knowledge of effectiveness of treatment measures per cause (i.e., conservation tillage is expected to reduce 1 lb of phosphorus per acre per year).

Recommendations: A reference document detailing effectiveness of BMPs and other control measures.

Information Sources:
Internet search and reference library detailing effectiveness of BMPs.

6.5 Finalize allocations

Purpose: Finalize the allocations and the TMDL calculation if necessary based on the verified restoration plan

Description: Re-allocate the loads based on the technically verified restoration scenario and finalize the TMDL calculation if necessary. For example, the TMDL may be calculated by adding up the allocations for point sources, nonpoint sources, background conditions and including a margin of safety and a future growth factor. If allocations change then the TMDL calculated number can also change. This step is to finalize the allocations and the TMDL calculated value.

Inputs: Final restoration plan from 6.4 including a specified future growth factor.

Outputs: Final allocations and TMDL calculation.

Time (Effort): 2 to 10 hours depending on calculation approach used and intensity of restoration plan

Time (Span): 1 day - 1 week

Dependencies

Project: This process is dependent on completion through 6.4.

Other: None.

Information Sources:
Not applicable.

7 Prepare Implementation Plan

7.1 Describe actions that will be implemented

Purpose: To document the actions of the selected restoration scenario that will be implemented to achieve the TMDL restoration target.

Description: As part of an implementation plan, the stakeholders will document the actions of the selected restoration scenario that will be implemented to achieve the TMDL restoration target. The description may vary depending upon the complexity of the problem and selected actions, but at a minimum the description must include:

<u>For point sources</u>

- wasteload allocations for point source dischargers;
- a list of NPDES permits and the schedule for revision/issuance of these permits, if necessary, to incorporate the TMDL allocations

<u>For nonpoint sources</u>

- load allocation(s);
- a description of management practices or measures/control actions necessary to attain the load allocation, including:
  - ✓ who must undertake the management practices/measures or control actions. Identified parties could include either individual sources or logical groupings of sources (i.e. landowners and funding agencies), as the State determines is most appropriate to guide implementation of the particular TMDL;
  - ✓ what actions identified sources must take to meet their allocations, including an assessment of the anticipated effectiveness of the actions, how the actions would be expected to achieve the TMDL allocations, and what additional actions may be needed;
  - ✓ when those actions must be implemented, including any seasonal variations; and
  - ✓ where the actions apply (the geographic boundaries for sources and control actions/management measures).

Input: The actions of the selected restoration scenario from step 6.4, related information from step 6.1, 6.2, and the stakeholder input.

Output: Documentation of the selected actions section of the implementation plan.

Time(effort): 10-40 hours

Time(span): 3-6 months

Dependencies:

Project: The selected actions or restoration scenario (step 6.4).

Other: The ability of stakeholders to meet.

Information Sources:

7.2. Develop schedule for implementing actions

Purpose: Determine how long it will take for all source control activities to be implemented.

Description: This will vary greatly depending upon whether the actions are for point sources or nonpoint sources. In either case, the stakeholders implementing the actions will need to be consulted to find out realistically how long it takes to implement certain activities (e.g., farmers, industries, POTWs). Similarly, resource experts and locals familiar with social, cultural or political issues that will affect progress will be important to consult (as in 6.2). It is likely that the schedule development will be iterative as new stakeholders participate in voluntary actions and others already committed alter their plans.

Inputs: Output from Step 6.4, knowledge of program implementation procedures (e.g. 319 grants, NPDES permitting procedures, EQUIP funding procedures, NRCS/SWCD program priority setting procedures).

Outputs: A schedule of actions.

Time (effort): 8 hours - 120 hours

Time (span): 1 - 8 months

Dependencies:

Project: information from Step 6.4.

Other: (1) the number of stakeholders involved; (2) stakeholder willingness to participate and cooperate; and (3) availability and receipt of financial resources.

Information Sources:
program priorities from NPDES permit program, 319 grant program, and state and federal nonpoint source management programs.

7.3 Identify legal authorities under which the implementation of selected actions will be carried out

Purpose: To identify and document legal authorities under which the implementation of selected actions will be carried out.

Description: The stakeholders will identify and document the legal authorities under which the selected actions will be carried out (e.g. Clean Water Act, NPDES permitting requirements, Clean Water Act sec. 401Certification, CZARA, State forest practices acts, State water laws, State nonpoint source management programs, local laws and/or watershed management plans) and whether those actions are enforceable. The plan should also include information on how the specified authorities will be used and enforced, and by whom. For actions that will be performed on a voluntary basis, a method should be identified and documented by which parties responsible for implementation can make commitments to perform actions described in the

implementation plan (e.g. memorandums of agreement (MOA)).

Input: The output from step 7.1 and the stakeholders, knowledge of legal authorities for water quality program implementation.

Output: A documented list of enforceable or voluntary actions and corresponding legal authority.

Time(effort): 8-16 hours

Time(span): 1 week to 3 months

Dependencies:

Project: The completion of step 7.1.

Other: The ability of the stakeholders to meet.

Information Sources:

7.4. Develop list of reasonable assurances that the actions will be implemented.

Purpose: To develop and document a list of reasonable assurances that the selected actions will be implemented and result in attainment of the restoration targets identified by the TMDL.

Description: The stakeholders will develop and document a list that differentiates the enforceable and non-enforceable selected actions necessary to achieve the restoration targets identified by the TMDL. The reasonable assurance for planned point source controls (e.g. planned POTW upgrades, changes to NPDES permits) will be a schedule for implementation of planned NPDES permit actions. The minimum requirement to demonstrate that non-enforceable actions (for certain nonpoint source activities) will result in attainment of the load allocation for nonpoint sources required by the TMDL, include:

- demonstration of the availability of funds to implement the non-enforceable actions;
- description of the process for entering into any necessary agreements with/among various federal, Tribal, State, and local agencies/entities, private landowners, or others to carry out such non-enforceable actions and the probability of success in achieving such agreements.
- an assessment of the likelihood of continuation of government programs (e.g. Conservation Reserve Program) that are planned to assist in implementation; and
- an analysis of the anticipated effectiveness of the management measures (a demonstration of how, if implemented, they will actually lead to desired reductions; an evaluation of the success of existing/prior programs calling for similar controls in the watershed or a similar watershed may be used in this analysis).

Input: The description of the actions from step 7.1 and stakeholder input/consensus.

Output: The documentation of reasonable assurances that the selected actions will be implemented and result in attainment of the restoration targets identified by the TMDL.

Time(effort): 2- 20 hours

Time(span): 1 week to 6 months (to develop list of reasonable assurances, not to implement those actions).

Dependencies:

Project: The completion of step 7.1.

Other: The ability of the stakeholders to meet.

Information Sources:
Information from steps 7.1, 7.2, 7.3.

7.5 Estimate time needed to attain water quality standards

Purpose: To estimate the time required to attain applicable water quality standards and demonstrate that the standards will be met as expeditiously as practicable.

Description: The stakeholders need to estimate the time from starting implementation of selected actions until attainment of applicable water quality standards. (Assume that actions called for to implement the TMDL would begin immediately after approval of the TMDL submittal)

Input: The output from steps 7.2-4 the stakeholders, opinions from experts on anticipated biological recovery periods.

Output: A documented time estimate for attainment of applicable water quality standards.

Time(effort): 2-10 hours

Time(span): 1 week to 3 months

Dependencies:

Project: The completion of steps 7.2-4

Other: The ability of the stakeholders to meet, resources necessary to devote time to making recovery time predictions.

Information Sources:
EAU, scientific literature

7.6 Develop monitoring plan to determine the effectiveness of the implementation of selected actions

Purpose: Develop monitoring plan to determine the effectiveness of the implementation of selected actions.

Description: To develop a monitoring plan, consideration must be given to the lag between source control actions and in-stream effects, especially for nonpoint sources. Thus it will be important to consult with water resource specialists to determine appropriate monitoring methods based on the actions being monitored. In addition, interim or surrogate measures that document progress in water quality improvement will need to be developed and tailored to the needs and skills of the stakeholder group conducting the monitoring. Some examples include secci disk depth, stream bank rods, and pebble counts. Consideration should also be given to where the measurements of progress will be taken with respect to each source control activity and the cause of impairment to the watershed. The monitoring plan should reflect incremental source milestones and water quality targets that ultimately meet water quality goals over a time span approximating that developed in Step 7.5. The monitoring plan should also accommodate the tracking of administrative activities necessary to support activities identified in Step 7.4. (Reasonable assurances).

Inputs: Selected actions and schedule of activities, information from steps 7.1, 7.2, 7.3,7.4, 7.5.

Outputs: A written monitoring plan and form that can be used to document monitoring results and completion of tasks identified in the implementation plan.

Time (effort): 8 - 24 hours

Time (span): 2 to 4 months

Dependencies:

Project: Completion of 7.1 - identification of actions, the parties responsible for completing them, and where they will take place.

Other: completion of tasks assigned in the implementation plan by both Ohio EPA and outside stakeholders, completion of assigned monitoring activities, knowledge of monitoring methods necessary to measure progress for various implementation activities.

Information Sources:
EAU, nonpoint source monitoring methods

7.7 Establish measurable milestones to determine if the implementation plan is being properly executed

Purpose: Develop the milestones that will be measured to ensure that reasonable progress is being made towards attainment of the restoration targets.

Description: The milestones that are measured should reflect the results that are expected from the monitoring plan (Step 7.6). The monitoring plan provides the data which is subsequently assessed against the milestones, which helps to determine whether or

not progress toward attainment of the restoration target is being observed.

Inputs: The monitoring plan, Step 7.6, Selected actions and the schedule of activities from Steps 7.1, 7.2, 7.3, 7.4, and 7.5.

Outputs: Measurable milestones against which to measure data provided by the monitoring plan.

Time (effort): 8-24 hours

Time (span): 2-4 months

Dependencies:

Project: Completion of Steps 7.1-6.

Other: Establishment of a tracking system for tracking progress against established milestones, identify resources to carry out this follow-up step.

7.8 Develop process to re-open TMDL if necessary

Purpose: To establish the process that will determine that the implementation plan is not achieving the stated objectives, and that the TMDL must be reopened.

Description: This part of the implementation plan establishes the process by which the data from the monitoring plan in Step 7.6 and the milestones from Step 7.7. will be evaluated to determine if activities outlined in the implementation plan are being accomplished, and if those activities are accomplishing the anticipated progress towards the water quality targets. This process should provide for the evaluation of:

- whether the activities outlined in the implementation plan have been accomplished,
- whether the activities have resulted in the anticipated water quality improvements, and
- whether the water quality improvements have resulted in attainment of the water quality targets.

Inputs: Data from Step 7.6, milestones from Step 7.7, validation processes from Step 11.3

Outputs: A process by which data will be evaluated to determine the success of the implementation plan, and a stated course of action in the event that data shows that the restoration targets are not being attained.

Time (effort): 8-40 hours.

Time (span): 1-2 months

Dependencies:

Project: Output from Steps 7.6 and 7.7

Other: Experience from other TMDL validation processes.

8 Submit TMDL Report

(The placement of this step assumes that the proposal to include the implementation in the TMDL report contained in the proposed rules is adopted in the final rules.)

8.1 Prepare TMDL report

Purpose: Document the TMDL development process for the TMDL report. Currently, this is the minimum requirement for the TMDL report for approval purposes. The proposed rules would also require an implementation plan in the final submittal.

Description: This step may be either preparation of the development section of a TMDL report (proposed new rules) or may be the preparation of the TMDL report (existing rules). The minimum requirements needed in the report change depending on which set of rules is governing at the time of the TMDL project.

Inputs: Assessment of watershed, documentation of development process and description of implementation activities to date if this step is to submit TMDL report to U.S. EPA.

Outputs: The TMDL report or the development section of the TMDL report.

Time (Effort): 40 to 200 hours depending on intensity of process and needed presentation formats

Time (Span): 1 week to 3 months depending on staff availability and degree of documentation needed.

Dependancies: This process is dependent on the existence of a final, verified restoration scenario and completion of the development process.

Dependencies

Project: This process is dependent on completion through 6.4 if this step is just to address the development phase although documentation should occur throughout the development process. If this step is to produce the final report then it is also dependent on 3.3a.

Other: None.

Information Sources:
Previous approved TMDLs for format.

(Descriptions of the remaining tasks in this step will be made available later.)

9 Implement Actions Identified in Implementation Plan (Within Ohio EPA)

9.1 Provide information for WQMP revision

Purpose: To ensure the TMDL is included in the applicable (preferably sub-basin) Water Quality Management Plans (WQMP).

Description: Each TMDL will be included in the WQMP. Ohio EPA will need to develop a schedule for updating the WQMP to include the TMDL. It may be possible to combine several TMDLs in a WQMP revision, which may be done annually or on some other regular schedule. A public noticing process is required as part of the WQMP update process.

Input: Ohio's CPP, Steps 7.1, 7.2.,and 7.4.

Output: A schedule for revising the WQMP to include the TMDL.

Time(effort): 2-8 hours

Time(span): 2 weeks

Dependencies:

Project: Output from Steps 7.1, 7.2, 7. 4, 7. 5

Other: U.S. EPA approval of TMDL.

Information Sources:
The Ohio CPP, public comments received during TMDL development and implementation plan development.

9.2 Incorporate the completed TMDL implementation plan into program priorities

Purpose: To incorporate the completed TMDL implementation plan into DSW program priorities.

Description: Identify activities and work products to be produced by Ohio EPA in order to achieve restoration targets identified in the TMDL implementation plan.

Input: Final implementation plan (Output of Step 7.).

Output: Lists of activities and products, including schedules for completion, from Ohio EPA required to achieve restoration targets identified in the TMDL implementation plan.

Time (effort): 30-50 hours

Time (span): 1-3 months

Dependencies: Complete implementation and ability of appropriate internal people meeting.

9.3 Identify resources necessary to perform activities and develop work products

Purpose: Identify resources as a prelude to obtaining and/or allocating said resources.

Description: Determine the amount of resources that will be required to perform activities identified as being Ohio EPA'S responsibility.

Input: Output from 9.1, DSW work load model.

Output: A list of the required resources and a plan/strategy to obtain and/or allocate them.

Time (effort): 8-20 hours

Time (span): 1-3 months

Dependencies:

Project: Output from 9.1.

Other: Appropriate division people meeting and actively working on this.

Information Sources:
DSW workload model, past and future annual work plans

9.4 Identify and provide resources for oversight and tracking the implementation plan

Purpose: To insure implementation is on track.

Description: Identify and provide resources for oversight and tracking the implementation plan; the annual validation tasks.

Input: Implementation Plan, outputs 9.1 - 9.4

Output: List of resources, said list being provided, and a mechanism/process for tracking implementation plan.

Dependencies:

Project: Implementation Plan, outputs from 9.1 - 9.4.

Other: A mechanism for tracking the implementation plan being established.

9.5 Prepare/modify Annual Work Plan to reflect activities and work products to be produced.

Purpose: Incorporate TMDL implementation plan related activities into Division and unit annual work plans.

Description: Revise/prepare annual work plans (accountability agreements) to incorporate activities required by the TMDL implementation plan. This may include revision of current annual work plans as necessary, as well as population of future annual work

plans to account for commitments of the TMDL implementation plan.

Input: Output from Steps 9.1 AND 9.2, Annual Work Plans

Output: Revised work plans (if necessary), future work plans populated with commitments.

Time (span): 30-50 hours

Time (effort): 1-3 months

Dependencies:

Project: 9.2 output

Other: Appropriate division people meeting and working together to populate annual planning documents.

9.6 Perform activities and produce work products in accordance with implementation plan schedule

Purpose: To perform the activities identified in the implementation plan as being necessary to achieve the restoration targets identified in the TMDL.

Description: Accomplish the activities identified in the annual work plans in order to implement the TMDL. Examples of these activities are: issuance of point source control actions (NPDES, DFFO), preparation and execution of grant projects, negotiation and tracking of MOAs (memorandum of agreement), outreach to local government, modification of 208 Water Quality Management Plans.

Inputs: 9.1 and 6.4 outputs and 9.3 outputs.

Outputs: Activities and work products (9.2 output).

Time (effort): 120-480 hours

Time (span): 1-18 months

Dependencies:

Project: Output from Steps 9.1 - 9.3

Other: Resource availability.

9.7 Encourage the incorporation of the TMDL Implementation Plans into other Agency priorities (i.e., Unified Watershed Assessment)

Purpose: To influence grant awards, cost-share and other Agency's funding assistance programs so that higher priority is given to (1) TMDL-listed watersheds; and (2) those listed which also have completed implementation plans.

Description: This step will vary depending upon the programs which are targeted. For example, for the UWA, the effort will largely be one of coordination with NRCS, Ohio EPA's major partner in developing the UWA. For other programs which go through statewide committee reviews and selection, such as 319 and EQIP, a mechanism for ensuring that watersheds that are listed or that have completed implementation plans are weighted more favorably needs to be developed. In other instances and where appropriate, it may make sense to encourage other agencies to voluntarily weight TMDL watershed applicant more favorably, such as in awarding of NatureWorks grant. A systematic inventory and appraisal of Agency financial assistance programs would be helpful in determining where it is appropriate and possible to weight TMDL watersheds more favorably in competitive review processes.

Inputs: Inventory of possible programs and their applicant review/selection process.

Outputs: A set of recommendations for incorporating a favorably weighted value for TMDL watersheds based on their priority ranking and whether or not an implementation plan has been completed for each Agency financial assistance program that could facilitate implementation of TMDLs.

Time (effort): 8 hours - 80 hours per program

Time (span): 1 month - 1 year per program

Dependencies:

Project: TMDL list and completed implementation plans for specific watersheds.

Other: none identified

10 Implementation of TMDL (outside Ohio EPA)

10.1 Identify parties responsible for the implementation of selected action(s)

Purpose: To ensure that the external parties responsible for actions under the implementation plan are identified.

Description: To confirm parties identified in the TMDL implementation plan, and to make sure that lines of communication between DSW and the external implementing party are established.

Input: TMDL Implementation Plan, output from Step 7.1.

Output: A list of external parties responsible for implementing actions under the TMDL implementation plan, with current contacts, phone numbers, addresses, emails, etc.

Dependencies:

Project: TMDL Implementation Plan, output from Step 7.1.

Other:

10.2 Verify responsible party's willingness to voluntarily implement the selected action(s) identified in the implementation plan

Purpose: Verify responsible party's willingness to voluntarily implement the selected action(s) identified in the implementation plan.

Description: To verify the willingness of parties responsible for implementation of specific actions under the implementation plan are aware of their responsibility and intend to fulfill their agreements. This may include meetings to discuss anticipated course of action, etc.

Input: TMDL Implementation Plan, output from Step 7.1., and Step 10.1.

Output: Confirmation of plans to move forward on TMDL implementation tasks by external parties.

Dependencies:

Project: TMDL Implementation Plan, output from Step 10.1.

Other: Willingness of external parties to fulfill agreements under the TMDL implementation plan.

11 Annual Validation Activities

11.1 Verify monitoring plan

11.1.1 Check milestones and targets
11.1.2 Adjust monitoring plan (re-open TMDL)

Purpose: Assure a technically sound monitoring plan and adjust if necessary.

Description: While the monitoring plan may initially be created by those involved in writing the implementation plan, it will be important for this step to include input from others who may have expertise in monitoring and water quality evaluation. The identification of a checkpoint in the validation process should not be construed as a distant or later step to the initial development of the plan, but rather as an iterative process that not only acknowledges feasibility, acceptability but also scientific rigor at once. This step is singled out to emphasize the importance of reviewing proposed protocol for methods of measuring milestones/targets adopted in the monitoring plan to see if they are appropriate to the unique circumstances and conditions of a particular watershed and water quality conditions.

Inputs: A written monitoring plan including tables (produced in Implementation 7.6). Descriptions/handbook of protocols for methods to measure in-stream effects (especially Tier 2).

Outputs: Stamp of approval plus comments or specific recommended changes and where to re-enter the TMDL process (7.1).

Time (effort): 5 - 20 hours

Time (span): 1 week - 3 months (Depends on whether problems are predominantly NPS or PS)

Dependencies

Project: Verification of monitoring plan needs to occur concurrently with stakeholder involvement in developing the plan (7.6).

Other: Requires bonafide monitoring measures. When these don't exist, QIP needs to develop them.

Recommendations: Research and development of surrogate measures of water quality and methods which can me used to assess them which are easily implemented. A team of staff familiar with Rosgen's stream morphology and knowledgeable of the scientific rigor of various sampling designs would be essential in developing such tools.

Information Sources:

11.2 Verification of source control actions

11.2.1 Assess implementation of source control actions.

11.2.2 Annually document source control actions using the monitoring plan reporting form.

Purpose: Verification that activities have occurred and that implementation plan is proceeding as predicted. Provides opportunity to adjust implementation plan activities.

Description: For point sources, verification will largely be done via inspections and verification that compliance plans are being implemented. For nonpoint sources assessment may occur at a variety of different levels. Land use controls implemented via government-funded programs such as CRP, 319, EQIP and Natureworks can be tracked by collecting data from the agencies that run the programs. These agencies usually report on an annual basis and assess implementation either through field visits or self-reporting. A second level of assessment must occur at the local level for non-government funded land use controls such as zoning and ordinances. Tracking these activities will be much more difficult and will rely upon a strong liaison between Ohio EPA and local watershed groups.

Inputs: Data collected from other resource agencies and from local watershed stakeholders. Written monitoring plan (7.6)

Outputs: A periodic written report using the monitoring plan format as its basis.
A statewide summary of monitoring reports for all ongoing TMDLs.

Time (effort): 40-80 hours per watershed one or more times per year or as identified in monitoring plan. This time frame is dependent on the development of some type of data management support and infrastructure.

Time (span): 1 week - 1 month per TMDL assessment (Depends on whether problems are predominantly NPS or PS).

Dependencies: Completion of a monitoring plan (7.6). Designated DSW staff to collect data from other agencies. Volunteers at the local level to collect and report data for non-government funded programs. If volunteers are not available at the local level, then DSW staff will need to assume these responsibilities. Thus, for this step to be successful, buy-in and support by management is critical.

11.2.3 Compare completed activities with milestones
11.2.4 Submit periodic progress reports to U.S. EPA if required for phased TMDLs or as part of reasonable assurances.

Purpose: Reasonable assurances that implementation is occurring and that source control targets will be met according to schedule.

Description: Evaluating the monitoring results by comparing them with the projected milestones and targets is the first step in addressing the effectiveness or appropriateness of the TMDL/implementation plan. If milestones are not being met, implementers should attempt to assess why a particular milestone has not been met and adjust future milestone to reflect a new time frame, or, they may also wish to consider re-opening the TMDL.

Inputs: Data collected from other resource agencies and from local watershed stakeholders. Written monitoring plan (7.6). Electronic capture and data management and support will ensure and expedite this process.

Outputs: A periodic written report using the monitoring plan format as its basis.
A statewide summary of monitoring reports for all ongoing TMDLs which can be used in prioritizing various program activities e.g., 319 selection, DEFA loans, etc. This information can also be used to report back to U.S. EPA regarding phased NPS TMDLs.

Time (effort): 20-40 hours per watershed one or more times per year or as identified in monitoring plan.

Time (span): 1 week - 1 month per assessment (Depends on whether problems are predominantly NPS or PS)

Dependencies: Completion of a monitoring plan (7.6) . A mechanism must be in place to verify implementation activities are occurring and being tracked (11.2).

11.3 Validation of stressors reduction

11.3.1 Assess stressors
11.3.2. Annually document stressor values using monitoring plan reporting form.

Purpose: To sample and collect in-stream water quality data and document this information in the monitoring plan.

Description: Assessment of stressors will vary greatly from point sources to nonpoint sources. For point sources, assessment will largely be done by the facility via self-monitoring. For nonpoint sources, however, assessment will occur at the local level whenever possible. Technically sound methods which do not require extensive training, equipment or financial resources will usually be preferred. Some of these methods exist, while others will need to be developed. At the same time, these methods must adequately assess changes in stressors and be capable of predicting water quality outcomes. Methods for tier 2 validation may need to be conducted at timed intervals that do not necessarily coincide with statewide tracking/reporting.

Inputs: Written monitoring plan including tables that identify water quality targets and methods for measuring them.

Outputs: A periodic written report using the monitoring plan format as its basis.
A statewide summary of monitoring reports for all ongoing TMDLs.

Time (effort): 20-40 hours per watershed one or more times per year or as identified in monitoring plan. This will depend on whether data is received electronically and already QA/QC'd or on paper.

Time (span): 1 week - 1 month per assessment (Depends on whether problems are predominantly NPS or PS)

Dependencies: Development of adequate methods to assess stressors (dependent upon QIP) such as secci disc depth and pebble counts. Local stakeholders interest and willingness to conduct monitoring activities. Implementation tasks must be implemented.

11.3.3 Compare stressor values with water quality targets.
11.3.4 Evaluate the effectiveness of source control activities implemented.
11.3.5 Submit periodic progress reports to U.S. EPA if required for phased TMDLs or as part of reasonable assurances.

Purpose: To determine if water quality targets as specified in monitoring plan are appropriate Provides reasonable assurances that restoration target will be met.

Description: This step is an exercise in comparing the data collected in step 11.3 with water quality targets established in the implementation plan (monitoring reporting form with identified milestones and targets).

Inputs: A completed, written monitoring plan including tables with established water quality targets and methods for measuring them.

Outputs: A periodic written report using the monitoring plan format as its basis.
A statewide summary of monitoring reports for all ongoing TMDLs that can be used by various DSW programs in setting priorities e.g., 319 awards, DEFA loans, field work and study plans, etc.

Time (effort): 20-40 hours per watershed one or more times per year or as identified in monitoring plan

Time (span): 1 week - 1 month per TMDL assessment (Depends on whether problems are predominantly NPS or PS and degree of local assistance.)

Dependencies: Identification and financial support for a dedicated set of staff to conduct quality improvement assessments of a single TMDL and the overall statewide TMDL process. Since the relationship between best management practices and water quality improvement is not well document and currently not well understood, it will be imperative to the success of Ohio's TMDL program that this experiential data is evaluated as it is collected. It can then be used to improve the efficiency and future outcome of TMDL development, implementation and validation efforts.

12 Have WQS Been Achieved in the Waterbody?

12.1 Documentation of attainment of water quality targets

12.1.1 Assess attainment of water quality standards
12.1.2 Document water quality findings (every 5-10 years?) Using the monitoring plan reporting form.

12.2 De-list or re-list waterbody

Purpose: Ensure that water quality targets are met (as measured by aquatic life use attainment or other indicators used in the Listing Process [e.g., chemical exceedance]) for the specific watershed so that a decision to de-list or re-enlist can be made; infer reasons for non-attainment.

Description: This step is essentially the same step in Listing where field monitoring is conducted (2.1). Conduct field monitoring for calculation of aquatic life-use attainment (i.e., determine all metrics for IBI, ICI, and MIwb) and/or other indicators. Document results using the "monitoring plan reporting form." If waterbody is in attainment, delist and document successful strategy used to restore waterbody. If not in attainment, evaluate the effectiveness of source-control activities (step 11.2) and identify reasons for non-attainment using biological response signatures (aquatic life use attainment only).

Inputs: Updated literature on biological response signatures (as output from step12.4. on Quality Improvement Process); monitoring equipment, resources, and staff.

Outputs: Monitoring and assessment results; documentation of strategy and reasons for de-listing or re-listing.

Time (effort): For each year (season) involving determination of aquatic life use attainment, one pass will require 1-5 days (including study plan finalization and travel). Ideally, two passes per season should be conducted or a total time effort of 2-7 days for each TMDL watershed. Additional time will be required to document and evaluate data collected.

Time (span): 1-2 years for point-source dominated stressors; 5-10 years for nonpoint-source dominated stressors.

Dependencies: Indication from tier 2 validation result that water quality standards are likely to be met if sampling is conducted. Flow regime of waterbody within climatic normal; availability of staff and monitoring resources for determination of aquatic life use attainment; whether or not additional stressors are imposed on watershed and waterbody.

Appendix C: Example of a "Cookbook," from DHWM

Synopsis: "Closure Plan Review Guidance for RCRA Facilities"
Division of Hazardous Waste Management (DHWM)

Introduction:

One of DHWM's functions is oversight of the closure/cleanup of regulated hazardous waste management units at hazardous waste treatment, storage, and disposal (TSD) facilities once these units are taken out of service. Ohio's hazardous waste rules (specifically OAC Rule 3745-66-12) require that these facilities submit closure plans for these units. The closure plan must detail all of the investigation/sampling procedures to be used to determine if contamination exists, the cleanup or decontamination procedures to be employed to remove all hazardous waste and residues, and the confirmation sampling that will be conducted to ensure that the unit and any affected soil and groundwater have been cleaned up to the performance standard outlined in OAC Rule 3745-66-11. The standard outlined in this rule is rather generic, and requires closures to be performed in a manner that minimizes the need for further maintenance and ensures that releases from the unit that may be dangerous to human health or the environment are controlled, minimized, or eliminated.

Because these requirements are not well defined in the rule and there are no actual cleanup standards identified, each closure plan must be evaluated by a district DHWM inspector to determine if the performance standard is being met for each individual facility/unit undergoing closure. OAC Rule 3745-66-12 details the content requirements for closure plans, but this information generally varies significantly from facility to facility. To assist inspectors in reviewing these plans consistently around the state, DHWM drafted the "Closure Plan Review Guidance for RCRA Facilities", a guidance document that was first issued to DHWM staff in May of 1991. In September of 1993, the guidance was public noticed as a draft final document, but it was not until March of 1999, after the original guidance document was significantly revised, that the document was issued as an official DHWM policy. The guidance is intended not only for use by DHWM inspectors, but also by companies and consultants preparing closure plans for submittal to Ohio EPA.

Revision and updating of the current (3/99) Closure Plan Review Guidance was a lengthy process, with the bulk of the major revisions being completed within approximately one year prior to draft issuance (in ~9/98). Although one person was in charge of revising the document before 7/98, when that person left the Agency the task was delegated to several individuals in Central Office DHWM, including those with closure administrative experience, closure technical experience, risk assessment experience, and experience with sampling, analytical, and statistical techniques. Development of generic risk-based clean standards (see description below) was perhaps the most labor-intensive task, requiring the evaluation of large quantities of data (environmental and toxicological) and calculation of target clean up values for ~50

chemicals.

During the public notice period, DHWM staff were given the opportunity to comment, and many revisions were made prior to finalizing the guidance. DHWM recognizes that the closure guidance is dynamic, and that future updates in response to changing technology and procedures will be necessary. To ensure that necessary updates occur in a timely manner, a workgroup comprised of central and district office closure coordinators was formed and tasked with maintenance of the Closure Plan Review Guidance. This workgroup currently meets monthly to discuss a variety of closure issues.

Summary of Guidance:

The final guidance consists of two parts: Part I which deals with administrative processing of closure plans and basic plan content requirements, and Part II which deals with risk assessment procedures.

Part I of the guidance covers the regulatory requirements for closures, the different types of units that may be subject to closure requirements, administrative processing of closure plans (including boilerplate approval letters and notices of deficiency and plan review checklists), and plan content considerations. A large portion of this part of the guidance provides detailed instructions on the sampling, statistical analysis, and data evaluation procedures acceptable to DHWM for determining if structures, equipment, soil, and groundwater contain levels of hazardous constituents that may be harmful to human health and the environment. There are extensive examples provided throughout this guidance to illustrate the concepts detailed in the narrative, especially in the areas of sampling plans and statistical analysis of data.

Part II of the guidance is dedicated to coverage of risk assessment procedures. It first describes the scenarios under which a risk assessment may be conducted in an effort to demonstrate that the unit no longer poses a threat to human health and the environment, then goes on to detail the calculation methods (formulas) and standard inputs to the calculations that must be used when performing unit risk assessments. The four components of risk assessment (data collection/evaluation, exposure assessment, toxicity assessment, and risk characterization) are presented, as are the Division's position on several issues ancillary to risk assessment such as natural attenuation, use of maximum contaminant levels vs. risk-based standards, and appropriate uses of ground water fate and transport modeling. Many of the sections also contain U.S.EPA guidance documents that have been incorporated rather than just being referenced. The guidance also contains sections on ecological risk assessment and risk management decisions, but these sections appear as headings only as they are still under development by DHWM; these sections will be included in future revisions to this guidance document. The newest and perhaps most important component of Part II of the guidance is inclusion of Appendix D, Generic Risk-Based Cleanup Standards, that provides cleanup target numbers (and a methodology for using these numbers) for facilities that prefer to avoid the expense and time involved in conducting a site-specific risk assessment for its closing units.

Applicability to TMDL Process:

In January of 1999, the TMDL workgroup discussed concepts for the team's final product. One of the final products identified was a TMDL "cookbook" that would cover all aspects of the TMDL process and include a catalog of tools for various parts of the process. It was identified that the cookbook would be used by staff as a reference and would include templates for deliverables such as implementation plans.

It appears that the cookbook concept could make use of some of the content ideas and organizational concepts from DHWM's closure plan review guidance (e.g., inclusion of U.S. EPA TMDL rules and guidance on various subjects). Since much of the concern revolves around data and appropriate techniques for gathering and analyzing data, it would seem logical to include the "how to" for these techniques in a format that would be useable to both Ohio EPA staff and other groups that may be working on a TMDL. It is also conceivable that once the guidance manual is compiled and reviewed internally, the final version could be public noticed as a DSW policy which would, when finalized, "set the standard" for all TMDL projects, regardless of whether they are managed by Ohio EPA or other groups (e.g., watershed protection groups).

Appendix D: Recommendations for Developing Public Participation in TMDLs

Final Report **Version: 13 Sep99**	***TMDL: Public Participation***
Participants: Alan Lauver, Bob Heitzman, Heidi Greismer, Susan Willeke, Laurel Hodory	

Introduction

A successful process for conducting Total Maximum Daily Load (TMDL) projects for Ohio watersheds requires public participation. Without such participation, Ohio EPA resources are inadequate to accomplish the hundreds of TMDLs across the state. Furthermore, many of the activities necessary to accomplish TMDLs are outside the realm of existing regulatory authority and incentive programs administered by Ohio EPA.

Since the advent of the 319 program, the federal initiative promoting the watershed approach, and in the midst of an increasingly environmentally-minded populace, stakeholder interest in water quality has grown. Currently, there are about 100 stakeholder-led watershed groups in Ohio (see attachment). These groups exist in various forms such as coalitions, advisory councils, partnerships, and corporations, to name a few. Since these groups are locally driven, they often evolve in response to local demands, issues, and resources, and for this reason, can be difficult to track and follow. The success of these groups in accomplishing their goals varies depending upon the skills and knowledge they bring to the table such as technical expertise, political savvy, or organization administration. As these groups continue to learn and gain expertise about water quality, their needs for information and support also change. Therefore, a public participation strategy for TMDLs must capitalize upon existing stakeholder organizations as well as initiate the formation of new ones.

In developing a public participation strategy, the work group identified the following guiding principles:

(1) Public participation as required by the proposed federal regulations is insufficient to adequately build capacity for TMDL implementation at the local level. Therefore, these requirements should be minimally fulfilled as efficiently as possible.

(2) Other areas in the proposed Ohio EPA TMDL process provide better opportunities for initiating and maximizing supporting public participation. Therefore, Ohio EPA should focus its efforts and resources in these areas to the greatest extent possible.

(3) Sustaining public participation throughout the entire TMDL process will require various types of support.

The following are the findings and recommendations of the workgroup:

Public Participation Required to Fulfill Federal Regulations

The proposed federal TMDL regulations require public participation in the following areas:

1. Methodology for determining acceptable data and priority rankings of impaired or threatened waters;
2. List of impaired or threatened waterbodies;
3. Priority rankings of impaired or threatened waterbodies;
4. Schedule for completing TMDLs; and
5. TMDLs.

Under the proposed federal regulations, fulfillment of these minimum requirements will require several public comment periods. The deadline for the data and prioritization methodology precedes that of the list, rankings and schedule deadline. Therefore, separate public comment periods will be required. The list of waterbodies, priority rankings and TMDL schedule could presumably be public noticed together. Each individual TMDL will require a separate opportunity for public input.

Public Participation Needed to Successfully Implement TMDLs in Ohio

Key Opportunities in the Proposed Ohio EPA TMDL Process for Maximizing Public Participation

Paragraph references in parentheses refer to those in the organizational charts created in Phase 3. Items marked with an * are needed to meet federal requirements.

Listing Process

1. Call for external waterbody information by:
   - issuing news releases;
   - sending letters and/or placing phone calls to key stakeholders and stakeholder groups; and
   - including information on the DSW Web page.

2. Allow public comment and review of draft TMDL listing and priority setting methodology* by:
   - public noticing availability in newspapers;
   - issuing news releases and stakeholder letters;
   - including information on the DSW Web page;
   - allowing a minimum of a 60-day comment period; and
   - holding public information session(s) and public hearing(s) in districts.

3. Allow public comment and review of draft TMDL list and schedule* by:
   - public noticing availability in newspapers;
   - issuing news releases and stakeholder letters;
   - including information on the DSW web page;
   - allowing a minimum of a 30-day comment period; and

- holding public information session and public hearing.

4. Incorporate TMDL list and priority rankings into the state water quality management plan.*

Development Process

1. Call for data and interest in participating on a roundtable stakeholder group in each of the TMDL watersheds (4.8, 4.2) by:
   - issuing news releases and stakeholder letters;
   - contacting local / weekly newspapers;
   - sending letters and/or placing phone calls to key stakeholders and stakeholder groups;
   - including information on the DSW Web page; and
   - sending out a survey to all stakeholders in watershed with SASE asking for commitment and interest in participating in a roundtable group.

2. Hold meetings to:
   - inform and educate local stakeholders about TMDLs and the status of their watershed;
   - identify public concerns about the waterbodies (4.4);
   - estimate needed rigor for developing restoration targets (5.1);
   - determine data needed for determining existing load (5.2);
   - determine desired “load”(5.3);
   - select 3-5 restoration scenarios (5.5); and
   - assist in preparation of draft TMDL (8.1).

3. Allow public comment and review of each draft TMDL and Implementation Plan (Step 7)* by:
   - public noticing availability in newspapers;
   - issuing news releases and stakeholder letters;
   - contacting local/weekly newspapers;
   - including information on the DSW Web page;
   - allowing a minimum of a 30-day comment period;
   - holding public information session and public hearing; and
   - using the roundtable stakeholder group to review comments and finalize the TMDL.

4. Incorporate each TMDL into the state water quality management plan.*

Implementation Process

1. Hold meetings to:
   - review list of technically sound restoration scenarios developed as an outcome of the development process (6.1);
   - expand the list to add other possible restoration scenarios developed through the public participation process (6.1);
   - develop list of criteria for evaluating the list of acceptable restoration scenarios (6.2);
   - screen the list of acceptable restoration scenarios using the stakeholder developed criteria to identify the actions to be used to achieve the restoration target (6.3); and

- prepare the TMDL Implementation Plan (7.1)
  - ★ describe the actions that will be implemented (7.1)
  - ★ develop schedule for implementing actions (7.2)
  - ★ identify legal authorities under which the implementation of selected actions will be carried out (7.3)
  - ★ develop list of reasonable assurances that the actions will be implemented (7.4)
  - ★ estimate time needed to attain water quality standards (7.5)
  - ★ develop monitoring plan to determine the effectiveness of the implementation of selected actions (7.6)
  - ★ establish measurable milestones to determine if the implementation plan is being properly executed (7.7)

2. Allow public comment and review of selected and technically verified restoration scenario by:
   - public noticing availability in newspapers;
   - issuing news releases and stakeholder letters;
   - contacting local/weekly newspapers;
   - allowing a minimum of a 30-day comment period;
   - holding public information session and public hearing; and
   - using the roundtable stakeholder group to review comments and finalize the selected scenario.

3. Allow public comment and review of draft TMDL Implementation Plan* (8.3)

<u>Validation</u>

1. Hold public meetings to:
   - verify the monitoring plan (11.1);
   - check milestones and targets (11.1); and
   - adjust monitoring plan (re-open TMDL) (11.1).

2. Provide training to:
   - assist stakeholders in assessing implementation of nonpoint source control actions (11.2);
   - encourage stakeholders to document source control actions (11.2);
   - assist stakeholders conducting baseline stressor assessment (11.3.);
   - assist stakeholders conducting periodic stressor assessment (11.3);
   - encourage stakeholders to document stressor values with water quality targets (11.3); and
   - evaluate the effectiveness of source control activities implemented (11.3).

3. Create an easily accessible data capture mechanism to:
   - document source control actions (11.2);
   - document stressor values with water quality targets (11.2);
   - evaluate the effectiveness of source control activities implemented (11.3);
   - examine body of data via Quality Improvement Process (11.3);

- submit periodic progress reports to U.S. EPA (as required) (11.3);
- develop quality improvement research questions (QIP);
- analyze comprehensive validation data (QIP); and
- summarize findings (QIP).

Recommendations

The resource commitment and effort of Ohio EPA in developing and maximizing public participation in the TMDL process will vary greatly from one TMDL to another based upon the existing level of local stakeholder interest. For some TMDLs, a watershed group may already exist, whereas for others there may be no watershed group or, even worse, no local interest. Thus, Ohio EPA must carefully define its role and scope in the formation, development and sustainment of stakeholder groups. Finally, the needs of stakeholder groups may vary depending on:

- the sophistication of the local group;
- the complexity of the water quality problems and degree to which nonpoint and point source problems exist; and
- the local factors such as history and socioeconomic and political environments that enhance or hinder progress.

The following is a partial list of recommendations for maximizing stakeholder involvement and effectiveness in conducting TMDLs.

1. **Create and distribute education and outreach materials**. Ohio EPA will need to invest resources in outreach and education to the general public in order to build interest. Below are a few suggestions.

    - development of general education materials about TMDLs;

    - use of innovative outreach approaches that identify key stakeholders whose involvement is critical to successful TMDL implementation such as news releases, citizen advisories, Web announcements and personal contacts. A media event could be scheduled once a final TMDL process is approved by U.S. EPA to kickoff the new process; and

    - development of guidance in the form of some type of “How to” manual. A supplement, addendum or modification to the existing watershed guide (*A Guide to Developing Local Watershed Action Plans in Ohio*) could be developed to this end.

2. **Initiate and develop stakeholder involvement in TMDLs.** Ohio EPA should consider holding stakeholder roundtables in all TMDL watersheds according to the proposed schedule. These roundtables could be used to kickoff new stakeholder groups or bolster those which already exist by:

- educating, informing and outreaching to local stakeholders in a relaxed and familiar environment. Evening meetings held at local churches or meeting halls are suggested for better turnout;

- providing a history and summary of water quality problems and the specifics related to the TMDL;

- defining Ohio EPA's purpose and expectations of such groups;

- explaining Ohio EPA's roles and boundaries - what it can and can't do in terms of implementing TMDL action plans;

- exploring and defining the stakeholder group's commitment to TMDL development, implementation and validation activities;

- providing an overview of the TMDL process and general time frames for various steps in the process;

- establishing or suggesting establishment of a regular meeting schedule; and

- clarifying how Ohio EPA will endorse and prioritize funding to endorsed implementation plans.

3. **Catalog existing and develop new support programs to assist stakeholder groups with organizational processes such as facilitation, conflict resolution, meeting/organization administration, outreach, etc.** The life and health of stakeholder organizations varies, and any support that can be provided to this end also will further TMDL implementation by such groups. While some of these programs may already exist, others do not. Ohio EPA should identify where these gaps are and make recommendations for the development of such services and programs. It is incumbent on Ohio EPA to identify existing programs, coordinate with the organizations administering the programs, and communicate this information to stakeholder groups in the context of TMDLs.

4. **Establish guidelines for how and when Ohio EPA will be involved with local stakeholders**. Ohio EPA's resource commitment will vary depending on the TMDL schedule. To get a better idea of the resource commitment, Ohio EPA should compare the list of existing watershed groups with the TMDL list and identify and target implementation of TMDLs where there are existing, active watershed groups. As we move into the TMDL process the total number of TMDLs underway in any given year will naturally increase, ranging from a low of 11 in the first year and up to more than 100 in the tenth year (according to the 20/40/40% model over 15 years, depending on the number of years it takes to complete each TMDL). Thus, it will be important to distribute TMDLs evenly across districts so as not to overburden one district more than another. Similarly, it will be imperative to be strategic about how and when staff are involved with such groups. Guidelines that spell out the details would assist in managing resources to this end. For example, Ohio EPA involvement may be greatest during the development and

implementation steps of the TMDL, but less as local stakeholders move into implementation and validation activities. In addition, as much as possible, Ohio EPA can maximize use of other agencies and institutions that provide organizational support to start-up groups, thereby limiting the role of Ohio EPA to providing technical expertise and verification at strategic points in the process. For example, rather than relying upon an Ohio EPA staff person to act as a facilitator or conflict resolution arbitrator in selecting a restoration scenario, these services could be provided through another organizations such as a university graduate program.

5. **Develop tools that expedite tracking of stakeholder implementation activities.** A key developmental area for supporting and augmenting public participation, which also provides the secondary benefit of meeting federal "reasonable assurance" requirements, is tracking implementation progress. Tracking of progress also will be needed so Ohio EPA can maximize its water quality assessment resources in collecting the monitoring data necessary for de-listing waterbodies. If stakeholder implementation activities are well tracked and documented, the information can be used as a barometer in predicting when and if a waterbody should be re-assessed. Furthermore, providing a tracking mechanism provides benefits to stakeholder groups as they implement and continually refine their activities. Experience indicates that watershed groups want their data to be used. Furthermore, if groups see that their data is used, it will reinforce and encourage their continued involvement in TMDL activities.

   To minimize the administrative burden in tracking progress, especially where stakeholders groups are actively involved, Ohio EPA needs to develop a dynamic, interactive Internet reporting tool that will allow stakeholder groups to:

   - submit implementation and monitoring plans;
   - document monitoring results; and
   - retrieve such information about all ongoing TMDL implementation activities at any moment in time.

   This can be dove-tailed with other information management infrastructure development (See Data Management section).

6. **Provide training to stakeholder groups.** To ensure that stakeholder groups have the tools to conduct validation activities and that such data is accurate, reliable and consistent from one group to the next, Ohio EPA will need to provide guidance and training. In particular, user-friendly methods of measuring water quality surrogates will need to be developed and QA/QC. (See Data Management recommendations for further details. Some of these needs could be simultaneously addressed with QA/QC protocols for external data used in the listing process.) The importance of this cannot be overemphasized.

7. **Develop mechanisms for brokering accountability agreements with stakeholder groups.** While Ohio EPA has the ultimate responsibility for TMDL implementation, its

authority is limited, particularly in implementation of nonpoint source TMDLs. This effectively shifts the onus of capacity out of the hands of Ohio EPA and into those of local stakeholders. Ironically, however, no mechanism for establishing accountability with such groups currently exists. Ohio EPA will need to explore opportunities and mechanisms for formalizing voluntary accountability agreements with stakeholder groups responsible for implementing TMDL activities.

Follow-up for Developing a Public Participation Strategy

Many of the recommendations in this report require further development and research before they can be implemented. Follow up on specific recommendation could occur through a variety of efforts:

- QSTP-like work teams
- contracting out to consultants
- co-oping with university graduate students where possible
- coordinating with the future adopt-a-watershed program

Appendix E: Exploration of Shortcomings in Data Management and Infrastructure

Summary of Issues **Version: 28Sep99**	***TMDL : Data Management and Infrastructure***
Participants: Randy Crowell, Rich McClay, Ed Rankin, Dave White, and Dale White	

Introduction

A successful process for conducting Total Maximum Daily Load (TMDL) projects for Ohio watersheds depends on effective data management and data infrastructure. The objective of this report is to identify current or potential weaknesses in the DSW/Agency data management infrastructure as they pertain to TMDL-based watershed assessments. The workgroup identified the following general characteristics about data management for water resources:

1) The need to distinguish between *internal* and *external* data users. These descriptors are relative such that internal could imply TMDL Staff Team, DSW, or Agency.
2) Differentiate data export in *raw*, *value-added*, and *summary* form. To define, value-added data contains additional processing (statistical, aggregations, human-interpreted) to generate more meaning or information.
3) Water resource information is organized by *point*, *line*, and *polygon* feature classes, or as objects. Each of these features can be characterized within a geographic information system (GIS). When information is organized as polygon features, a minimum spatial scale needs to be identified. For example, a common question asked in DSW data discussions is if the minimum scale should be set at the 11-digit hydrologic unit code (HUC-11) or HUC-14 watershed unit? To define, the number of digits expressed in a hydrologic unit code indicates the relative size of watershed partitioning. For example, there are 44 watershed partitions using the HUC-8 convention and there are approximately 340 partitions using the HUC-11 convention.
4) Differentiate *short-term* versus *long-term* additions and modifications to existing DSW data management and infrastructure. Short-term functions occur within the next 6-18 months while long-term functions occur within the next 2-5 years.
5) Differentiate *critical (or core)* versus *non-critical* data and/or information flow needs. To define, non-critical data may be that which does not directly contribute to the DSW Mission (see Strategic Management Plan) but is used in an auxiliary fashion to aid in interpretation of critical data or it may serve a role in a future analysis unknown at present.

Recently, a workgroup was formed to evaluate how DSW generates, evaluates, receives, and manages (GERM) data. Our TMDL workgroup concurs with their conclusions on data generation and management deficiencies. In particular, you will find that Conclusion Nos. 1, 2, and 4-6 of the GERM report are also identified below. Mention of the STORET workgroup is necessary as their recommended process may address a portion of the shortcomings identified below. The STORET workgroup is tasked to identify if the new Oracle® based data base will be used by DSW, and if it will, how will it be used and implemented.

Major Themes

•A common *georeferencing system* should be held by all DSW sections. The georeferencing system is a representation of spatial attributes in either a planimetric or spherical (i.e., latitude and longitude) coordinate system.

1) The georeferencing system should adhere to a standard for coordinate precision and accuracy; the map base (i.e., map projection system) should be the same source for all measurements.
2) Accuracy of the coordinate system will depend on data lineage (i.e., it may not be economical to upgrade the coordinate accuracy of historical features).
3) Features of interest have a unique nature in that they exist as points (sites), lines (segments), or polygons (watersheds or regions). They may also exist as objects when their character is discrete. Spatial queries of these features should be independent of their unique nature. Polygon features are often nested (e.g., watershed sub-units) such that data storage models should contain this information and permit referencing across spatial scales.
4) There is a need to portray DSW data across an array of mapping units (e.g., HUC-8 vs. HUC-11 vs. HUC-14). Hence, standards for georeferencing at a minimum mapping unit (or Representative Elemental Area) need to be adopted.
5) The Ohio Waterbody Identification (WBID) number has been serving as our primary reference number for stream and river segments. Significant data sharing problems have occurred when one or more WBIDS have been changed. A new, permanent, non-editable reference number needs to be developed for use in internal data sharing. The BIDS can still be used for reporting and representing hydrologic order.

•Ease in *retrieval* of information is critical because it focuses time and energy on addressing the substantive matters of DSW and the Agency; it is cost effective and devotes resources to improvement and maintenance of existing data infrastructures.

1) Many of the current data documents for Ohio water quality standards are not digital or are not retrievable by numerical fields.
2) Technical Support Documents (TSD) contain a high level of value-added information. Efforts should be made to link this value-added information to geographical features of interest. TSD format should be modified to allow easier electronic retrieval.
3) Stream and river segments should be spatially explicit. Segments can be indexed as a reach (a segment length defined by either a confluence or recognizable change in quality/structure) in order to reference water quality use-attainment. Nodes on segments may or may not coincide with use-designations and/or use-attainment measures. In these instances, segmentation can be dynamic (treated “on the fly”).
4) Historical data within DSW should be upgraded depending on need or critical nature. Both spatial (see section on georeferencing system above) and non-spatial attributes (e.g., biographical) may need to be upgraded to maintain consistency in data integrity.
5) Nearly all of DSW data is time-dependent (i.e., repeated observations of the same location). Storage of time-dependent data is challenging because disk volume increases and ongoing maintenance is required. For example, there is a need to conform to data standards which may change, albeit infrequently, over time.

•Maintaining high quality data (storage format, metadata, information flow) improves Agency/DSW credibility. Existence of high quality data improves Agency/DSW accountability to regulated/non-regulated community and their accountability towards the Agency.

1) The §303(d) report lists causes/sources of non-attainment with historical (and often obsolete) information. Without anonymity constraints, consequences of poor data quality can potentially degrade the public image of a regulated entity. Data quality checks need to be instituted.

2) Data lineage should be maintained by documenting the source of production and the processing steps employed. Lineage is a component of a larger record-keeping system known as metadata. Both lineage and metadata standards should be developed, adopted, and required by DSW data collection and development efforts.

3) Our experience shows that Federal regulations seem to have dual standards on data quality issues. For example, even within the same Federal requirement, TMDL regulations suggest both use of high quality data and "to use whatever data is available."

•Specific concerns related to Ohio water quality standards.

1) Standards have been expanded to include criteria for wetlands; hence, the overall format may need to be revised.

2) Current and future §303(d) reports must include fish advisory information. Fish advisory information currently is either non-digital or not easily retrievable because of the lack of georeferencing. Further, bacteriological information is not currently part of Ohio's §303(d) report even though most states include it. Ohio DNR and ODH generates bacteriological data for Ohio's lakes but this information is collected in a diverse manner. DERR spills exist but they are incomplete. Approximately 25 percent of spills have coordinates and most of those are suspect. Only reports on the number of spills per county per year can be made. Ohio DNR generates information on fish kills but they exist as hard copy maps and their georeference is in need of improvement.

3) DSW fish tissue information lacks staff resources to manage and update it. This data source has strong potential to exist as value-added information and currently only exists in raw form.

•Assessment of nonpoint sources and causes of water resource degradation.

1) At the present state, few resources (staff or monetary) are devoted to the collection of nonpoint pollution sources and stressors. This is compounded by the difficulty in collecting such information, whether by existing or new methodology, because of its inherent nature.

2) Attributes associated with agricultural activities have either very poor or non-existent georeferencing information. High protection of anonymity by USDA also exists. Is this right-to-privacy guaranteed with exceptions to the Freedom of Information Act?

3) Characterization of nonpoint source pollution often utilizes remotely sensed information of land cover and demographics (e.g., US Census of Population). The benefit of remotely sensed information is that it covers large geographical areas and is repetitive. Land cover and use is often derived from the interpretation of satellite imagery. Agricultural practices (e.g., tillage management) can also be derived from this source. DSW should consider the provision of resources such as for purchasing raw satellite data. It is relatively inexpensive through the Ohio View program. Further, staff expertise in this area should be promoted. In

a related effort, DSW should increase its interaction with the Ohio DNR remote sensing program.

4) Other databases that either do not exist or not exist in digital format need to be developed.

a) Two of these databases are information on the morphological and substrate characteristics of Ohio rivers and streams. Further, hydrological and hydraulic regimes vary over time (e.g., flood plain structure and sediment load), even when watershed landscape characteristics are invariant. Data methods to capture these changes need to be considered.

b) In-stream assessments for chlorophyll and phytoplankton need to be developed.

c) Data on erosion rates (as an output of sediment load modeling) and delivery ratios need to be maintained. Currently, DSW obtains delivery ratio information from the USGS.

d) Estimates on soil erosion from NRCS are too coarse geographically to connect to river and stream impacts. For example, soil loss from upland erosion does not imply deposition in the same or near locale.

•Collection and organization of external data given the existence of resource limits and vertical barriers (resistance to integration).

1) Often there exists hidden costs to convert external data into an internally usable form. Some of these costs originate from the absence of corresponding QA/QC and locational information, the presence of sampling bias, and inconsistent data formatting.

2) Completeness (e.g., geographical extent, appropriate time intervals, and metadata) is inconsistent between agencies/entities or even within the same agency/entity.

3) Conflicts of interest may occur as a private entity may not recognize public goods (i.e., clean water as a resource to be available to all citizens). In contrast, if private citizens and town-communities are providing data, the loyalty of these groups to maintaining public goods may be beneficial to data integrity. Related to this is that data provision by public groups will enhance ownership of water resources in Ohio.

4) If data is provided by external groups on a regular basis, then educational/training programs need to be developed, and perhaps offered on a regular basis, by DSW to ensure data quality and integrity. Current programs like these include training of the Northeast Ohio Regional Sewer District for biological assessment and the DERR Voluntary Action Program (VAP).

5) In the special case of data sharing among other public agencies, we identify the following concerns/issues:

a) MOUs need to be developed to ensure longstanding integration.

b) Deployment of “data Sharing” staff are not promoted within public agencies, in terms of managing responsibilities for both acquiring external and distributing internal data.

c) STORET as a data resource is not exhaustive in that every constituent for every observation is included.

6) The following agencies/entities (outside Ohio EPA) currently provide data to DSW: Ohio DNR (DOW, REALM, and NAP), ODOT, USGS, and universities/consultants. Further, data is provided sporadically to DSW by the LaMP and RAP communities and ORSANCO (for interpretation of conditions in the Ohio River in the §305(b) report).

7) Capturing information collected during the implementation phase of TMDL offers the most concern for managing external data. These collection efforts will be transient and highly variable, given the range of technical ability between stakeholder groups, so that a tracking system will need to be developed to support the subsequent validation phase. If tracking systems exist at present, then a method to include TMDL-based information needs to developed.

•Considerations for DSW in sharing data externally as a result of the TMDL process.

1) Formats vary and exist as written documents, tables, WWW pages, and data files, among others.

2) The question arises whether to supply all information collected or should a reasonable subset be supplied to the external community? Generating a subset is valid from a cost-effective viewpoint in that resources are devoted to supplying the most commonly used data sets to the external community.

3) Existing tools such as STORET can be utilized. TMDL tracking with U.S. EPA can be provided to the public through the “Surf Your Watershed” WWW site.

4) Provisions for “data sharing” staff need to be made. For example, a “help desk” scenario would clarify data requests from external entities. For example, the Maryland Water Resources Council promotes data sharing and provides continuity over time for this service. Can the Ohio (Governor’s) Water Resource Council act in a similar capacity (see DSW Annual Work plan)?

5) A genuine “marketing strategy” for DSW data needs to be developed in order encourage public (external) consumption of our data collection and interpretation. That is, the value of our data increases with greater and widespread, albeit valid, usage.

6) A strategy for data acquisition (both internal and external data) should be developed. For example, should information requests be static (a one-time large volume download) or dynamic (query-based requests of individual data sets)?

•Economic aspects of data management.

1) Differentiation of core versus non-core data is important for prioritization of data management activities (and their associated costs). Information flow should be prioritized within DSW. For example, *core* data elements might involve those data elements affecting water quality standards and aquatic life use attainment.

2) Duplication of effort needs to be reduced to improve our economic efficiency.

3) A cost/benefit analysis of data collection should be completed. Often data is collected and stored but never are interpretations made. If data becomes obsolete, the collection effort was potentially wasteful.

• Scheduling of TMDLs for waterbodies on the §303(d) list involves significant data management and interpretation.

1) Hence, attention to high value versus low value waterbodies should be made (note that the designation for State Resource Waters is being phased out).

2) High value waters are important resources to the public because of their proximity to and/or inclusion in natural landscape areas (such as parklands) or as a source for public water supplies or presence of threatened and endangered species (both aquatic and terrestrial).

3) In general, the reliance on GIS analysis and mapping tools to designate high value waters is critical. GIS technology can be included at three levels:

a) basic mapping without attribute interpretation (descriptive);
b) basic mapping with attribute interpretation and query (descriptive and analytical); and
c) spatial analysis to generate higher-level information from raw geographic data layers.

•Technological limitations of data management.

1) Is DSW prepared to invest in upgrading hardware/software resources? The state of disrepair in the EAU network and hardware resources is one item. Other items include processor speed, memory levels, and monitor size. Each component reduces the efficacy of handling geographical and diverse data will often be part of TMDL problem-solving efforts.

2) LAN network speed is below optimum and appears unresolvable. Sub-optimum network speed encourages a high decentralization of data storage which subsequently results in data redundancy and inconsistency.

3) Related to the provision of hardware and software is the availability of technical training. Information processing technology changes rapidly and it would be a wise investment for DSW to promote staff efficiency with data management software. Results of the QStP team to identify training needs for new DSW employees are to be implemented in 10/99; hopefully this should provide a much needed opportunity. In addition, training requests are done on an individual basis through individual staff' Professional Development Plan (PDP). The intent of PDPs are not followed whole-heartedly and they merely exist today as an administrative routine. Management should generate a staff-training typology. For example, staff involved with higher-level components of SWIMS should have training in entity-relationship modeling, SQL, etc.

4) A critical resource for the external community is their ability to access and employ digital communications technology (e.g., Internet , WWW browsers and communicators). They will need to upload information regarding implementation activities and possibly make modifications to these data uploads. Questions on use of DSW hardware resources and disk access privileges need to be resolved.

5) In general, DSW has failed to recognize the scale of the problem of data management. Data management is a wise investment and "data" only then becomes "information" when human interpretation occurs. Realistically, only 3-4 staff out of 211 are devoted full-time to data management issues in DSW (or 2 percent of total).

Appendix F: Sample Monitoring Plan

Example: **Nutrient TMDL**

Activity	Tier	Indicator	Targets / Milestones					Actual (reported)				
			YR1	YR2	YR3	YR4	YR5	YR1	YR2	YR3	YR4	YR5
100 miles of livestock fencing	1	cumulative no. of fenced miles	50	75	100	100	100					
bank stability assessment	2	median rating (1-5 scale) using visual observation	2	3	3	4	4					
2500 acres conservation tillage	1	cumulative no. of acres in CT	1500	1500	1500	2500	2500					
5 miles conservation easements	1	cumulative no. of miles as easements	1	2	3	3	5					
pebble count	2	median pebble size	10mm	10mm	15mm	15mm	20mm					
update maintenance of 75 septic system	1	cumulative no. of septic systems in compliance	25	50	75	75	75					
bacteria sampling	2	bacteria count	200,000	75,000	2,000	2,000	2,000					
nutrient sampling	2	?????										
aquatic use attainment	3	IBI										
aquatic use attainment	3	ICI										
aquatic use attainment	3	IWB										

Activity	Tier	Indicator	Targets / Milestones					Actual (reported)				
aquatic use attainment	3	QHEI										
recreation use attainment	3	Bacteria count										