continued Endnotes

15 40 C.F.R. 130.2(i).

16 All TMDLs are effectively phased in that they should be iterative. Ideally, a phased TMDL is an approach where the TMDL is designed and implemented to meet water quality standards even if there are uncertainties. The TMDL should thus contain plenty of Margin of Safety ((MOS), see discussion on page 15) and requires monitoring to see if it is working to restore the water body. If the TMDL is not working, the "second phase" of the TMDL allows for "fine-tuning" to improve the TMDL and gradually reduce the MOS as more accuracy is established.

17 Concentrated Animal Feeding Operations (CAFOs) are defined as livestock feedlots with more than 1,000 "animal units." This translates into confinement operations with more than 2,500 hogs or 700 dairy cows or 1,000 beef cattle or 30,000 or 100,000 chickens and turkeys (depending on the type of watering system the birds use).

18 The National Pollutant Discharge Elimination System (NPDES) is the Clean Water Act's primary point source control program. Under this program, all point source discharges of pollutants to a waterbody require a permit that imposes dicharge limits. See River Network, *The Clean Water Act: An Owner's Manual*, 1998, Chapter 3.

19 U.S.EPA NPDES Permit Writers' Manual, December 1996. (EPA-833-B-96-003).

20 40 C.F.R 130.2 (g).

21 *New Policies for Establishing and Implementing Total Maximum Daily Loads*, Bob Perciasepe (former U.S. EPA Assistant Administrator, Office of Water) memo to the EPA Regions dated August 8, 1997.

22 40 CFR 130.2(g).

23 Construction sites greater than five acres are considered point sources. Once Phase II of the Stormwater Program is in effect (December 2002), this category will be broadened to include sites greater than one acre.

24 Funding sources to address nonpoint source pollution include CWA Section 319, managed by state agencies and Farm Bill conservation programs, managed by the U.S. Department of Agriculture's Natural Resource Conservation Service, Farm Services Agency, and state Departments of Agriculture.

25 For more information on trading, refer to Dolan, Kari and Sproule Love. *A New Tool for Water Quality: Making Watershed-Based Trading Work for You.* National Wildlife Federation, June 1999, available at NWF's webpage: http://www.nwf.org/watersheds/newtool.html.

26 Perciasepe, New Policies.

27 Environmental Law Institute, 1998. *Almanac of Enforceable State Laws to Control Nonpoint Source Water Pollution.* www.eli.org.

28 For more information on modeling, refer to Frey, Merritt and Evan Hansen. *Modeling and Total Maximum Daily Loads.* Clean Water Network and Downstream Strategies, Spring 2002.

29 Order Granting Motion to Intervene, Pronsolino v. Marcus, U.S. District Court, Northern District of California, No. C99-1828 FMS, filed July 14, 1999.

Tracking TMDLs

a field guide for evaluating proposed watershed restoration plans

by
Kari Dolan | National Wildlife Federation
and Gayle Killam |River Network

May 2002

Acknowledgments

National Wildlife Federation

NWF's mission is to educate, inspire and assist individuals and organizations of diverse cultures to conserve wildlife and other natural resources and to protect the earth's environment in order to achieve a peaceful, equitable and sustainable future. NWF produced *Saving Our Watersheds: A Field Guide to Watershed Restoration Using TMDLs*.

58 State Street
Montpelier, VT 05602
tel: (802) 229-0650
fax: (802) 229-4532
www.nwf.org

River Network

is the nation's leader in supporting grassroots river and watershed conservation groups. In 1999, River Network published *The Clean Water Act: An Owner's Manual*. The mission of River Network is to help people understand, protect and restore rivers and their watersheds.

520 SW Sixth Avenue, Suite 1130
Portland, OR
97204-1511
tel: (503) 241-3506
fax: (503) 241-9256
www.rivernetwork.org

Project Staff

Design & Layout

Tanyia Johnson

Production Coordinator

Gabriela Stocks

Front Cover Photo

John Marshall

Printing

Rhino Digital, Portland, OR

Printed on processed chlorine free, 100% recycled paper (cover printed on 50% recycled paper).

Foundations

Ward M. and Mariam C. Canady Educational and Charitable Trust

The Turner Foundation

Charles Stewart Mott Foundation

The Moriah Fund

Tortuga Foundation

Richard and Rhoda Goldman Fund

Individuals

We wish to thank Merritt Frey (Clean Water Network) and Barry Sulkin for their substantial contribution to this publication.

ISBN 1-930407-07-6

Endnotes

1 "Polluted" or "impaired waters" is a term to describe those waters that fail to meet water quality standards. See discussion of water quality standards below in endnote 11. 33 U.S.C.A. Section 1313.

2 33 U.S.C.A. § 1251-1376.

3 33 U.S.C.A. § 1313 [CWA Section 303(d)].

4 A third component of water quality standards is the antidegradation policy, which is targeted at keeping clean waters clean. For more information, refer to: River Network, *The Clean Water Act: An Owner's Manual*, March 1999. [page 66]

5 U.S. Environmental Protection Agency. *National Picture of Impaired Waters Highlights of the 1998 303(d) lists*. Washington, D.C. http://www.epa.gov/owow/tmdl/states/national.html.

6 U.S. Environmental Protection Agency. June 2000. *National Water Quality Inventory 1998 Report to Congress, Summary*. EPA-841-F-00-006. Washington, D.C. http://www.epa.gov/305b/98report.

7 U.S. Environmental Protection Agency, Office of Water. May 2000. *Atlas of America's Polluted Waters*. EPA-840-B-00-002. Washington, D.C.

8 40 CFR 130.7(d).

9 For an introduction to the TMDL process, see Dolan, Kari and Cameron Davis. *Saving Our Watersheds: A Field Guide to Watershed Restoration Using TMDLs*, National Wildlife Federation, January 1998, http://www.nwf.org/watersheds/fieldguide/.

10 33 U.S.C.A. §1313 [CWA Section 303(d)].

11 The standards consist of designated uses, water quality criteria and the antidegradation policy. Designated uses are the uses for waterways, such as water supply and fishing that have been officially designated by the state or tribe. Water quality criteria are numeric or narrative water quality conditions, such as temperature ranges or dissolved oxygen concentrations, established to protect designated uses. The antidegradation policy must be established for the state to prevent water quality deterioration and protect high quality waters. See River Network, *The Clean Water Act: An Owner's Manual*, 1998, Chapter 4.

12 The Clean Water Act requires each state to develop water quality standards that support existing and designated uses. Existing uses are "those uses actually attained in the water body on or after November 28,1975, whether or not they are included in the water quality standards." Designated uses are "those uses specified in water quality standards for each water body or segment whether or not they are being attained." (40 CFR 131.3(e-f)).

13 40 CFR 130.7(b)(5)(iii). "[e]ach state shall assemble and evaluate all existing and readily available water quality data and information to develop the list."

14 The Maine and Massachusetts water quality agencies have quality assurance programs and will use the data. Maryland and Kentucky train volunteers but do not condone use of the data in any regulatory context.

end notes continued on next page

Resources

TMDL

Dolan, Kari and Cameron Davis. “Saving Our Watersheds: A Field Guide to Watershed Restoration Using TMDLs”, National Wildlife Federation, January 1998. http://www.nwf.org/watersheds/fieldguide/about.html

Frey, Merritt. “The Ripple Effect: How to Make Waves in the Turbulent World of Watershed Cleanup Plans”, Clean Water Network, 2001. 208-345-7776 or www.cwn.org.

Clean Water Act

Elder, Don, Gayle Killam, and Paul Koberstein. “The Clean Water Act, An Owner’s Manual”, River Network, March 1999. 503-241-3506 or www.rivernetwork.org.

NPDES Permit Review

Forthcoming:
Moore, Robert, Merritt Frey, and Gayle Killam. “Permitting an End to Pollution: How to Scrutinize and Strengthen Water Pollution Permits in Your State”, Prairie Rivers Network, Clean Water Network, and River Network, May 2002.

Preface

The National Wildlife Federation (NWF) and River Network have worked for years to restore polluted waterways nationwide — and we’ve succeeded in a big way. Industrial and municipal discharge pipes that once spewed, unchecked, countless gallons of poisons into our waters have now largely been identified and limited. *But the job remains unfinished.*

Having worked so hard to protect our waters and the people and wildlife that depend on them from the harm caused by a direct flow of pollution, we must now tackle diffuse sources of pollution like run-off to complete the job. Our nation’s waters are becoming degraded by dangerous pollutants from runoff, habitat destruction from structures that alter flow, and contamination from airborne sources. This guide describes how people can take advantage of real opportunities to protect the stream or lake in their own regions.

Through this guide, NWF and River Network are working hard to inform people about the problem of water pollution, and giving them the tools to do something about it. The goal of our work is simple: to make all our water clean enough for people and wildlife. Achieving it will mean working for new or stronger laws, helping states and localities to safeguard their own watersheds and, most importantly, helping people everywhere to understand what’s at stake and what they can do to help.

A powerful watershed restoration tool that combats all sources of pollution, including these diffuse sources, is called the Total Maximum Daily Load (TMDL) provision, found in Section 303(d) of the Clean Water Act.

The journey to a healthier world for humans and wildlife begins with knowledge and understanding, followed by the actions of people who care. With this field guide, the National Wildlife Federation and River Network hope to empower people to make positive conservation changes in their own neighborhoods.

Mark Van Putten
President & CEO
National Wildlife Federation

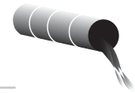
Kenneth R. Margolis
President
River Network

Checklist of "Taking Action" Ideas in this Guide

What's the problem?

- Find out how the segments in your waterbody are defined by the state.
- Document the uses in each segment.
- Ask if the segment size makes sense.
- Find out what the state requires for monitoring and assessment data.
- Ask whether one TMDL plan can address all of the problem pollutants in a given segment.

How much pollution can the waterbody handle?



- Require a daily maximum in acceptable pollutant loadings.
- Find the water quality criteria for the problem pollutants in your state's water quality standards.
- Request documentation for the agency's pollutant load allocation. Compare it to your knowledge of the pollutant sources.
- Insist that the TMDL prohibit any load of persistent or bioaccumulative pollutants.
- Ask when the TMDL is designed to achieve water quality standards.

What are the pollution sources and their clean up responsibilities?

- Examine the wasteload allocation to ensure that all necessary point sources are included.
- Examine the load allocation to ensure that all relevant nonpoint sources are included.
- Ask whether pollution trading will lead to unwanted consequences, such as hot spots of poor water quality.
- Look for the margin of safety. Is it explicitly described?
- Examine whether the flow estimate used in the calculation of the TMDL reflects all conditions, including the worst case condition.
- Insist that the TMDL explicitly accounts for expected growth.

What changes will be required and when?

- Require a TMDL implementation plan that includes a monitoring plan, milestones for improvement, and a timeline for revisions.
- Examine whether all point source permits are being adjusted expeditiously according to the TMDL.
- Demand "reasonable assurances" that reductions in nonpoint contributions will occur.

Keep in Mind! {continued from previous page}

Uncertainty

The margin of safety in TMDLs is frequently assumed to be incorporated in conservative assumptions or water quality standards. Ask for the margin of safety to be explicitly addressed. If the agency staff will not do that, request that all the assumptions and uncertainties such as in the models, data and best management practices be discussed and justified in the TMDL.

Future Growth

Many TMDLs are being developed without reserving any part of the "pie" for planned or likely future development. It may be unpopular with the current sources to reserve some portion of the allowable pollution for future sources, but without it, the TMDL will not result in a healthy waterway.

Models Are Not Perfect

Even if you are not technically inclined, you are capable of asking good questions about the models that are being used. Ask about the assumptions of the model, what data have been used to develop the pollution reduction targets, whether the data being used are current, and whether the model has been verified in the field. If the model is designed for a river but it is being used on a lake system, it may not predict pollution loads accurately. [28]

Legal Challenges to the TMDL Process

Many agricultural and forestry interests are seeking exemptions from the TMDL process. In many cases, these nonpoint sources are the primary contributors of pollutants such as sediment, pesticides, or high temperature. It is important to keep all contributors to problems in your watershed actively engaged in the TMDL process. [29]

You Are On Your Way...

to improving the health of your watershed through the development and implementation of strong TMDLs. Cleaning up our waters will take time, but it will be well worth your hard work. Every time you fish in your local creek or watch your children swim, you will know that you did your part in making our waterways clean and safe for people and wildlife!

Contents

Tracking TMDLs
a field guide for evaluating proposed watershed restoration plans

Keep in Mind!

Here are several things to watch out for as you review TMDLs.

Weakening Water Quality Standards

States are finding it difficult to complete all the TMDLs required to address the problems in their threatened and impaired waters. One unfortunate result is that some states are trying to weaken their water quality standards. If the standards are less protective, there will be fewer waters considered threatened or impaired and fewer TMDLs required. If your waterbody is removed from the impaired waters list (or if the TMDL is weakened over time), check to see whether the standards were weakened. Weakening is not allowed without substantial documentation and justification. Request this documentation and challenge any changes that remove protection of uses that you care about.

Business as Usual

Some states are claiming that all of the pollution is either part of the background conditions and/or caused by nonpoint sources. The TMDL may then claim that either: (a) nothing can be done; or (b) best management practices are the solution to restore the watershed. Often, these TMDLs do not offer "reasonable assurances" that the proposed changes will be implemented or will even work to restore the waterway. Some TMDLs do not even address the pollutant reductions from nonpoint sources at all. Challenge these TMDLs that don't specifically call for reductions in pollutant loadings.

© Thompson River Project

© Tim Palmer

Pollution Trading

Some TMDLs are being developed with built-in pollution trading strategies. Pollution trading poses challenges to restoration, including difficulty in monitoring progress and the potential loss in accountability when nonpoint sources are involved. In addition, isolated "hot spots" of poor water quality can develop. Ask for specific details about how the water quality standards will be met.

Reduced or Eliminated Monitoring

With state and federal budgets getting much tighter, cuts are being made at the expense of natural resource protection. In particular, the already limited funding for state and federal water quality monitoring is at risk. State support of volunteer monitoring programs may also be subject to cuts. Defend existing monitoring levels, and, if cuts are made, argue for a minimum monitoring plan that is sure to catch the worst case levels of the problem pollutants about which you are concerned.

Keep in Mind! {continued on next page}

How can the Sique River Become Healthy?

The implementation plan for the Sique River TMDL is the key to ensuring that real restoration activities will occur.

Sources	Restoration Tasks
Municipalities and Industries	The water quality agency needs to revise wastewater NPDES permits on the river to limit the discharge of bacteria and sediment based on the TMDL waste load allocations (WLA). Waste load allocations may also require changes to stormwater permits. They could require or improve best management practices to deal with bacteria and sediment in runoff from roofs, roads, and parking lots. Construction stormwater permits could be developed or adjusted to include specific erosion control measures and numeric sediment limits.
Feedlots	Feedlot permits in the agricultural area need to be reopened or written to require more stringent best management practices to limit bacteria and sediment (see endnote 18).
Farms	The TMDL is required to provide “reasonable assurance” that the farm will reduce load to the river. Identifying funding to improve management practices is an example of how the implementation plan can address nonpoint source pollution.
Future	There needs to be a process for allocating the pollutant allotment that was reserved for future development. As new subdivisions are planned downstream and likely additional feedlots are sited upstream, the regulatory agency should follow a process to account for the new pollutant loads.
Monitoring and Revisions	The implementation plan should establish a monitoring plan with a timeline for achieving water quality standards such as swimming, fishing, and boating goals. If goals are not met, a deadline for revisions to the TMDL should be set.

Presenting the TMDLs Watershed Cleanup Program

Many states and tribes are making progress toward cleaning up their polluted lakes, rivers, streams, and estuaries. One important tool under the Clean Water Act (CWA or the Act) is to develop watershed restoration plans, called Total Maximum Daily Loads (TMDLs), for these waters. What should be in these plans? Will these plans really restore polluted waters?[1] How can I help?

What is the Role of the Clean Water Act's TMDL Program?

The Clean Water Act, enacted nearly 30 years ago, sets forth a comprehensive program to control water pollution.[2] The Act targets pollution reductions from all sources – "point sources" such as municipal wastewater treatment, industrial facilities and construction sites that discharge into waterways via a pipe or a ditch, and "nonpoint sources," which are diffuse. Nonpoint sources include urban and agricultural runoff, contaminated groundwater from the leaching of pollutants, and airborne toxics such as mercury.

The drafters of the CWA created a safety net for rivers, lakes, and coastal waters whose water quality did not improve despite the Act's new protections. If those measures are not enough, the states and EPA are supposed to rely on the Total Maximum Daily Load (TMDL) program.[3]

The TMDL program requires that states and EPA identify rivers, lakes and coastal waters that are threatened or polluted. A management or clean up plan (the TMDL) is required for each waterbody that can not be improved by simply enforcing the minimum required point source treatment.

A TMDL sets a pollution cap or ceiling. The cap is a formula that represents the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. The sum of the allowable contributions of a single problem pollutant from all contributing point and nonpoint sources must not exceed that cap.

Water quality standards, established by states, territories, and tribes are the backbone of the TMDL program. Water quality standards identify the uses for each waterbody – for example, drinking water supply, swimming, aquatic life support, or fishing – and the scientific criteria to support that use. Water quality criteria describe the conditions necessary to ensure that the water is safe for those identified uses.[4]

How Healthy Are Our Waters?

What is the magnitude of our water pollution problem? Over 20,000 individual river segments (of varying sizes), lakes, and estuaries across America are too polluted to meet water quality standards designed to protect people and aquatic life.[5] Of the total amount of assessed waters, the nation's polluted waters include approximately 300,000 miles of rivers, nearly 8 million acres of lakes, about 12,000 square miles of estuaries, and close to 400 miles of shoreline.[6] Polluted mostly by sedimentation, nutrients, and pathogens, these waters may not be safe for aquatic life, fishing, swimming, boating, drinking water, or other basic uses.

Federal, state, and local governments have made tremendous progress in reducing pollution from point sources. However, thousands of streams and lakes remain polluted. The principal problem is nonpoint source pollution, but many point sources need additional treatment, especially where discharges into waters that already have identified water quality problems are increasing. According to the EPA, the overwhelming majority of the population – 218 million Americans – lives within 10 miles of a polluted river, lake, or coastal water.[7] Cleaning up polluted waterways will have a profound impact on the environment, health, and economy of communities across the country. EPA estimates that about 40,000 TMDL watershed cleanup plans need to be developed in the near future.

Taking Action

Ask Questions

Is there a TMDL implementation plan?

Some states include a plan with the TMDL, and some don't. Insist that a plan containing a timeline, benchmarks, monitoring schedules, and revision opportunities is necessary to protect or restore the waterbody.

Are all point source permits being adjusted expeditiously?

There are cases where pollutant loadings from industries and sewage plants have been left at existing levels, even though the TMDL showed that the stream does not have the capacity to handle those loadings. Permits should be adjusted at least upon renewal (theoretically every five years), but hopefully sooner if a TMDL shows the need for revisions. State regulators may be reluctant to revise the permits ahead of schedule because most states have a backlog of permits that need to be renewed. Push for adequate, timely adjustments to NPDES permits that are consistent with the limits imposed by the TMDL.

Are there reasonable assurances that reductions in nonpoint source contributions will occur?

Some states have laws or mechanisms that require the nonpoint sources to reduce their pollution to waterways. Most states will need to depend on voluntary programs and federal and state financial incentives to drive the unregulated source reduction.[27]

Examples of ways a TMDL could incorporate reasonable assurance that its load allocations will be met include: (a) funding for voluntary projects specifically tied to pollution reduction on the waterbody (e.g., buffer strips, wetlands restoration) or (b) implementation of state-based regulations on nonpoint source pollution.

© Tim Palmer

Build Support

Talk with entities who will need to make changes. During the development of the TMDL, the responsible agency often does not communicate with the sources responsible for contributing pollutant load to the water. Sometimes the sources are not adequately informed of the changes required by the TMDL. If you have relationships with any sources (local governments, businesses, farmers) try to engage them in the TMDL process. Implementation will take that much longer and be that much harder if they are not included early.

Identify Resources

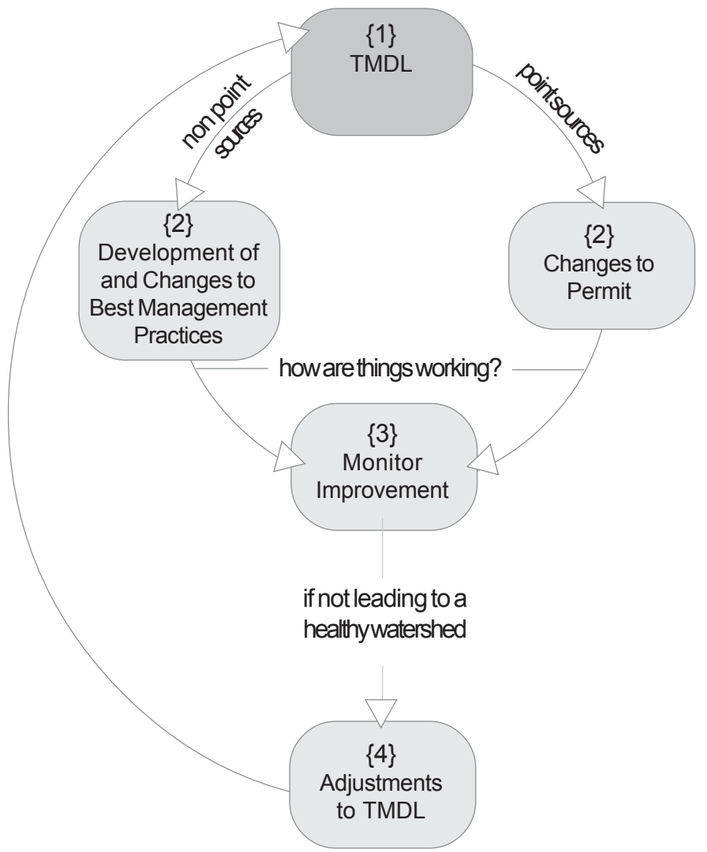
Call experts to ask about implementation practices and technologies. Local agricultural universities, extension services, and Natural Resources Conservation Service should have information about the most recent developments in best management practices. Businesses and municipalities similar to those in your watershed may be willing to talk about the cutting edge technology for pollution control. Find an engineering firm that works on pollution control and ask questions. Bring your new-found knowledge to the table when discussing the TMDL with your agency.

Current EPA guidance calls on states to develop implementation plans to go with TMDL calculations when they involve nonpoint sources of pollution.[26] The TMDL should have a schedule for timely revisions to the point source permits as well.

The implementation plan should describe:

- what actions will be taken;
- when they will be taken;
- what legal or regulatory authorities are in place (federal, state, or local);
- the monitoring plan; and
- milestones for improvement, and provisions for revising the TMDL if needed.

TMDL Implementation



How This Guide Can Help You Get Involved

Currently, state agencies must identify all impaired and threatened waters every two years.[8] Once these waters are identified, they must be prioritized for clean up, and a watershed cleanup plan must be developed.

This guide builds upon the introductory information on the CWA TMDL program contained in National Wildlife Federation's *Saving Our Watersheds: A Field Guide to Watershed Restoration Using TMDLs* and River Network's *The Clean Water Act: An Owner's Manual*. Its purpose is to give you the information you need to review and comment on TMDL watershed cleanup plans that are being proposed for nearby waterways.[9] The guide will also help you understand how to assist your state agency or the U.S. Environmental Protection Agency in actually developing and implementing TMDLs. Your help will make those TMDLs work to clean up the waterways you care about.

This guide covers the following steps:

- Determine the amount of the pollutant that the river or lake can safely absorb (the cap).
- Identify all contributing sources.
- Divide up the allowable pollutant "load" among all point and nonpoint sources.
- Take into account background sources, seasonal variations, future growth, and a margin of safety to account for uncertainty.
- Develop an implementation plan to go along with the TMDL.

© Alliance of Partnerships for Parks

Development of the plan is only the beginning of the road to recovery and protection for impaired and threatened waters. Community support of the plan is critical to its success. Ask for a public hearing on the draft plan and encourage neighbors, businesses, landowners, elected officials, and interested community members to attend and offer information or comments. You can be the eyes in the watershed – monitoring the recommended changes and monitoring the progress toward the goal of watershed health. Find a local citizen monitoring group or start one yourself. Most importantly, request a schedule for revisions to the TMDL in the event that the proposed changes aren't showing adequate progress toward achieving water quality standards.

The sections below can help you review proposed TMDLs. Each section has a component called "Taking Action" that provides topics to explore with your water quality agency and ideas about how to take action on a TMDL. We will follow a hypothetical river, the Sique River, through the process to try to make the pieces of the TMDL clearer. Good luck! Your involvement is crucial for making the TMDL program work to clean up local rivers, lakes, estuaries, and wetlands.

Understanding
the Nuts and Bolts
of a TMDL

What changes will be required and when?

Some TMDLs are more complicated than others and will take more time to return the waterbody to health. Other TMDLs are focused on protection – keeping the waters from getting into trouble. How can you know what the plan of action is and how long it might take? The TMDL must provide “reasonable assurance” with specific actions to achieve the goal; otherwise, it is simply a paper exercise (and EPA should not approve it).

Sique River | Allocating Responsibility

The sources in each segment have been allocated the following portions of the total allowed pollutant loads during critical high flow.

Allowable Pollutants by Source

Segment	Pollutant	Uses Affected	Source	Example	What Can theRiver Handle? (Change Required)
Upper	bacteria	swimming supported	wildlife	deer, fox, rabbits	current level *(e.g., 0% reduction)*
	sediment	cold water fishery supported	natural erosion	avalanche, scouring	current level *(e.g., 0% reduction)*
Middle	bacteria	swimming partially supported	agriculture rural communities	feedlots, livestock treatment plants, septic failures	less than current loads *(e.g., 10% reduction)*
	sediment	warm water fishery not supported	agriculture rural communities	feedlots, row crops new development- houses & roads	less than current loads *(e.g., 20% reduction)*
Lower	bacteria	swimming not supported	municipality urban runoff	treatment plant pets and waterfowl	less than current loads *(e.g., 10% reduction)*
	sediment	warm water fishery not supported	municipality urban runoff	treatment plant new development- houses & roads scouring due to flashier rivers	less than current loads *(e.g., 10% reduction)*

In the middle segment, the margin of safety needs to be higher because more voluntary nonpoint source reductions are necessary. In the lower segment, municipalities must address the loads coming from urban runoff (through stormwater permits) and their wastewater discharge.

Sample Questions

- Are the background levels (coming from the upper segment) accurate?
- Have the pollutants been fairly allocated? Is any one source responsible for the whole reduction?
- Is there sufficient load reserved for likely future development? (not shown in chart)
- Does the margin of safety adequately account for all uncertainty?

What's the problem?

The state's list of impaired and threatened waters (also called the 303(d) list) describes the waterbodies that do not meet or are not likely to meet water quality standards within the next listing cycle (currently two years).[10] In order to set the stage for cleaning up the waters, the TMDL must address the water quality standards that are being or may be violated.[11]

The TMDL needs to identify the pollutant or problem causing harm or likely to cause harm to a river, lake, or other water body. TMDLs are designed to address one or more chemicals or pollutants causing problems, such as high loadings of phosphorus, low concentrations of dissolved oxygen, or high concentrations of bacteria. For a water body that has more than one pollution problem, there can be multiple individual TMDLs, but frequently, they are combined into one plan. For pollutants that interact, such as sediments and metals, the TMDLs should be written together to account for the combined effects.

TMDLs can also address a problem that is not exactly a pollutant, such as habitat degradation or the lack of flow. Such TMDLs should at least provide a clear problem description, quantifiable restoration goals, and plan of action for recovery.

How Do I Get My Community Involved?

Whether you are an interested person, a member of a civic organization, a volunteer at a watershed association, or a local official, your involvement is critical in keeping the intent of a proposed TMDL on track. Our greatest strength as citizens is when we collectively communicate our concerns. Here are some tips for gaining the power to change policies, regulations, laws, or practices that may be damaging your waters.

- Talk to your neighbors about your concerns.
- Take pictures of the problems, if you can.
- Collect stories or signatures from neighbors who are also concerned.
- Bring issues to community meetings – church, school, and town government.
- Use pictures and/or petitions to get people involved.
- Meet with your local state and federal elected officials. Bring other affected constituents (or their signatures, stories, or pictures) with you.
- Talk with your local or regional media (print, radio, and television).

Taking Action | Ask Questions

Is the margin of safety explicit?

Insist on a reasonable margin of safety (MOS) in your TMDL. This reflects uncertainty in: (a) the quality of data being used; (b) the model employed; (c) the effectiveness of practices used to reduce pollutants; and (d) the implementation of these proposed practices. As future monitoring and refinements reduce the uncertainty, the MOS can be revised. Urge the state agency to define an explicit margin of safety. If the TMDL does not show an explicit MOS, request that the agency quantify the factors in their "implicit" margin of safety.

Did the flow estimate used in the calculation of the TMDL reflect all conditions?

Stream flow is an important part of the TMDL. It is crucial that your agency chooses the river's worst-case flow - when the river is most vulnerable to pollution problems - when developing the TMDL.

The worst-case flow will usually be a low flow for point source-dominated problems and a higher flow for nonpoint source-dominated problems (see chart below). This is because point source discharge limits must be set to meet water quality standards at the "worst case," usually when flows are so low that they can hardly provide any dilution.

Limits for point source stormwater pollution are the exception, however. Stormwater discharge limits and nonpoint source pollution controls must account for the runoff from storm events and, therefore, need to be designed with higher flows in mind. Many TMDLs use the low flow calculation that represents the lowest seven consecutive day average likely to occur over a ten-year period, known as the 7Q10 flow. This flow assumption may not result in a TMDL that is protective in the wetter, high flow periods.

Ask your agency how they chose the flow used to set the cap. Let the agency know when the TMDL does not account for seasonal variations in flow in ways that will adequately protect the river. Push for acute and chronic toxicity testing in the receiving water body downstream from the sources. It is important that the loading does not pose a problem for any of the uses in the waterway at any flow level.

Does the TMDL account for expected growth?

If it doesn't, any growth could quickly overwhelm the pollutant cap and prevent achievement of water quality standards. Failure to meet water quality standards, technically, could cause a prohibition of all future pollutant loads would be prohibited. Therefore, it is in the best interest of the state agency to account for anticipated growth.

Worst Case Flow Scenarios

Pollutant Category	Likely Source	Pollutant	Worst Case Flow
Wastewater	Municipal	BOD	Low Flow
	Industrial	Temperature	Low Flow
	CAFO (Concentrated Animal Feeding Operation)	Bacteria	High Flow
	Mining	Metals	High Flow
Stormwater	Construction	Sediment	High Flow
	Municipal	Petroleum by-products	High Flow
Nonpoint Source	Agricultural Fields	Pesticides	High Flow
	Urban Runoff	Petroleum by-products	High Flow

Taking Action

Ask Questions

Are all point sources included in the waste load allocation?

The TMDL can allocate the pollutant "pie" several ways. For point sources, the situation is more straightforward. In most cases, each permittee will be allocated a certain amount of the pollutant load. Some TMDLs may group smaller point sources together for a gross allocation approach. This can make it difficult to track individual permittee's compliance with the TMDL, and it can result in "hot spots" if the sources are in the same location.

Submit any information you may have about point sources in the water body. Often regulators neglect to account for pollutants such as sediment that come largely from construction sites. Construction sites are almost always considered point sources[23] and therefore should be covered by NPDES stormwater permits. Regulators need to address all point sources as a part of the WLA with specific loads that can be translated into numeric, enforceable permit limits.

Are all nonpoint sources included in the load allocation?

For nonpoint sources, the TMDL can make a gross allocation to broad classes of activity. For example, load allocations can be divided into agriculture and silviculture sources.

Urge your state to specifically identify nonpoint sources and set specific allocations and/or reductions for them. Since nonpoint sources of pollution are typically unregulated, more specifics may provide that opportunity to secure pollutant controls at nonpoint sources. Point out the funding sources and policy programs that can help implement nonpoint source reductions.[24]

© Tim Palmer

Is pollution trading planned?

Load allocation can be based on land area (e.g., each tributary of a polluted stream might be allocated a load limit) or by specific land parcel (e.g., Farmer Jones needs to reduce runoff by 10%). U.S. EPA is involved in discussions around the country regarding the use of pollution trading in developing TMDLs. Pollution trading refers to one source reducing their load beyond what is required and then "trading" that extra reduction to another source for which it is more expensive or more difficult to achieve. If a trading strategy is being proposed, make sure that the sources participating in the trade are held accountable for their expected reductions in pollutant loads.[25] Note that a trading program may lead to unwanted consequences, such as: (a) "hot spots" or very high local concentrations of problem pollutants; (b) a weakening of enforcement provisions; or (c) inequities from allowing trading across watersheds or within large watersheds. Ask for specific details about how the water quality standards will be met.

Taking Action

Ask Questions

Is the segment size realistic?

State or tribal agencies divide waterbodies into segments for the purposes of setting water quality standards. These segments may be delineated by natural formations and must make some sense. Is one segment a whitewater canyon and the next a slower moving pool with a floodplain? A reasonably sized segment does not include too many issues and pollutant sources in one segment, and lends itself to monitoring and field verification. Some TMDLs have attempted to include 100 river miles as one segment, or an entire lake including some of its tributaries! On the other extreme, the segment should not be too small. This can be inefficient, and it may prevent a more holistic evaluation of impacts and appropriate selection of cleanup strategies. For example, in Alaska, a TMDL was proposed that looked at the upper layers of water in Ward Cove and overlooked the bottom portion where all the contaminated sediments presented a major part of problem.

How should I document the uses in each segment?

The uses of the segment dictate the extent of the protection or clean-up necessary. Therefore, it can be helpful to define segments by their different uses such as cold water fishery and navigation. Find out what documentation is acceptable to your state agency (pictures, fishing license, etc.). Include those uses that existed at one time, but will require restoration of the waterway to reestablish them.[12]

Can one TMDL plan address all of the problem pollutants in a given segment?

States are trying to combine TMDLs for different pollutants and segments into fewer plans. Evaluate the approach to determine whether such combinations make sense. Make sure there is an explicitly stated cap for each pollutant.

How will the state use our volunteer monitoring data?

Many states use citizen monitoring data to identify problems for their attention. The TMDL regulations offer state agencies the opportunity to use citizen data in their TMDL program.[13] Some states rely on volunteers to help collect water quality data by funding training programs and/or central management of the data collected.[14] The state agency should have a quality assurance/quality control protocol that defines how samples must be taken, tested, and documented. If you follow that protocol, the state agency should accept your data.

Build Support

- Communicate with groups that are involved in boating, sailing, fishing, running or walking, or other recreational sporting groups.
- Communicate with businesses and residents along the river.
- Engage the media in the TMDL process (print, radio, television).
- Communicate with elected officials whose jurisdiction includes the waterbody.

Identify Resources

- Talk to the nearest university. There are often graduate students and professors willing to focus their research on real-world problems.
- Identify any nearby consulting firms or law offices that might volunteer time to the project.

Sique River | Background

To help explain the TMDL process, we will use the invented Sique River restoration as our working example. The Sique River headwaters are in the mountains. The river flows through a rural agricultural valley and past a few towns and one large city before it converges with a larger river. For the purposes of state regulation, it is divided into three segments: headwaters, agricultural floodplain, and residential/urban. The agricultural and urban segments are on the threatened and impaired waters list (otherwise known as the 303(d) list) for bacteria (E coli) and sediment (measured as total suspended solids (TSS)). Swimming and boating occur in all segments. The upper segment supports a cold water fishery and the middle and lower segments are designated for, but currently are not supporting, warm water species.

KEY *cold water fishery* *warm water fishery*

Suburban/Rural Residential

Headwaters

Supporting Cold Water Fishery

Agricultural Flood Plain

City

Identified Problems with Bacteria & Sediment

The water quality agency may write different TMDLs for each problem in each segment. In the case of the Sique River, the water quality agency is developing one TMDL to address sediment problems in the middle and lower segments and one TMDL to address bacteria problems in the middle and lower segments. The bacteria and sediment coming into the Sique River must be reduced in order to meet the water quality standards that have been set to protect swimming and aquatic life in the middle and lower segments.

Sample Questions

- Is the river broken into appropriate segments?
- Are all the uses for each segment identified in the TMDL?
- Have all the problems been identified in the 303(d) list?

Dealing With Uncertainty: Margin of Safety (MOS)

© Tim Palmer

TMDLs must include a Margin of Safety (MOS) to account for (a) uncertainty about the relationship between pollutant limits and water quality; (b) error in establishing the limit; or (c) lack of available data. The MOS is intended to provide leeway in the TMDL because it is difficult, if not impossible, to calculate all the pieces needed for restoring or protecting the waterbody on the first try.

A MOS can be accounted for either as an explicit, set-aside part of the total allowable load, or implicitly addressed by conservative assumptions used in determining the TMDL. The implicit approach is commonly taken by agencies, but is less desirable by the public. An explicit MOS will more clearly inform the public of all of the uncertainties in assumptions behind the establishment of the pollutant cap and the strategy for allocating pollutant loads among sources.

Addressing Known, Expected, and Worst Case Conditions

© Tim Palmer

As previously stated, the Clean Water Act regulations specify that natural conditions should be explicitly described in the TMDL.[22] Background conditions would include pollution that is not caused by a human-related activity, such as naturally high arsenic levels, natural erosion and sedimentation, or naturally high water temperatures.

The TMDL must be developed so that it is protective at all times, including all worst-case situations. Seasonal factors, such as temperature or flow can affect pollutant concentrations. When developing a TMDL, the Clean Water Act requires that the impact of such seasonal factors on aquatic life and other uses must be taken into account. For example, during low-flow summer months, the TMDL will need to account for the fact that the lower flow means less dilution of pollution. In other cases, contamination from nonpoint source runoff may spike during storm events when flows are high.

TMDLs should also account for future growth. Some TMDLs allocate a portion of the loading capacity specifically for the pollutants that will come from both point and nonpoint sources associated with future growth. When the time comes, the pollutants can be allocated by the regulatory agency to a particular source.

Point Sources: Waste Load Allocation (WLA)


© Tim Palmer

The waste load allocation is the pollutant discharge assigned to point sources that can be safely released to the waterbody. Point sources include sewage treatment plants, industrial operations, sites covered by stormwater permits, concentrated animal feeding operations,[17] and mining permits. Where there are multiple discharges of the same pollutant along the same degraded water body segment, the total allowable pollutant discharge needs to be divided up or "allocated" among the sources. If there is reason to expect additional future discharges, some portion of the total WLA should be reserved. Otherwise, the TMDL should clearly state that no future loads will be allowed.

Allowable point source loads might not be presented in the TMDL in the same manner as discharge limits in National Pollutant Discharge Elimination System (NPDES) permits.[18] Since the changes to permits can be a crucial part of achieving the TMDL, WLAs need to be developed in a way that can be translated into permit limits.[19]

Nonpoint Sources: Load Allocation (LA)


© Tim Palmer

The load allocation is the amount of a pollutant that nonpoint sources can safely release to a waterbody. This allocation should place a cap on all the nonpoint source pollution that does not fall under NPDES permits, such as roads, forestry operations, or farmland. For some pollutants, naturally occurring loads need to be accounted for in the total. This background pollution is sometimes included in the load allocation. Regulations specify that, whenever possible, natural conditions and nonpoint source loads should be distinguished from each other.[20] This will allow for a clearer understanding on how load reductions will be implemented.

For waters impaired partially or solely by nonpoint sources, EPA guidance says that states are supposed to provide "reasonable assurances" that the pollution reduction obligations from these sources will be achieved. Such reasonable assurances may be: "non-regulatory, regulatory or incentive-based, consistent with applicable laws and programs" and should be included in TMDL implementation plans. [21]

Understanding the Nuts and Bolts of a TMDL

How much pollution can the waterbody handle?

After identifying the problem pollutant(s) causing degradation and the water quality standard(s) that are violated, the TMDL must determine the total amount of the problem pollutant(s) that the water body can safely handle in order to meet water quality standards.

The TMDL should be stated in terms of a cap – a "total maximum daily load," of that pollutant. The TMDL is typically expressed in mass-per-unit time, such as pounds per day, which is an effective way of quantifying pollutants from point sources.[15]

While calculating loads from point sources may be easy because the amount of discharge can usually be measured directly, determining loadings from nonpoint source runoff can be much more difficult. Why? Nonpoint source runoff may be measurable, but usually you must either depend on modeling or make assumptions about specific loads based on stream monitoring above and below a source. Moreover, loadings from nonpoint sources depend upon a number of variables, such as amount and timing of rainfall, the health of the riparian buffer, land uses, and stormwater management practices on the land.

The TMDL Formula

Simply put, the TMDL is comprised of a pollutant cap and a restoration plan. The cap is a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards. To clean up the water so it is safe for people and wildlife, the plan describes how the contribution from every source of the pollutant (plus an allowance for a margin of safety) must be limited or reduced in order to meet or be less than the pollutant cap. A more detailed description of these components begins on page 15.

Limits on Point Source of Pollution
(Waste Load Allocation)

Limits on Nonpoint Sources of Pollution
(Load Allocation)

Margin of Safety
(Accounting for Uncertainty in the Proposed Reductions)

+

Healthy Water
(Total Maximum Daily Load Pollution Cap)

The TMDL must account for background conditions (which may sometimes be found in the load allocation) and seasonal variation of pollutant loads. It is also important to consider the contributions from likely future development and to allocate a portion of the pollutant load in the TMDL if necessary.

Understanding the Nuts and Bolts of a TMDL

What are the pollution sources and their clean up responsibilities?

The TMDL must identify all the sources of pollution, both point and nonpoint, as well as background levels of the pollutant, seasonal variation, and all uncertainty associated with the calculation. It also should account for additional future sources of pollution.

Components include:

- Point Sources: Waste Load Allocation (WLA)
- Nonpoint Sources: Load Allocation (LA)
- Dealing With Uncertainty: Margin of Safety (MOS)
- Addressing Known, Expected, and Worst Case Conditions

Taking Action

Ask Questions

Does the TMDL consider "daily" pollutant loads?

One of the problems encountered when evaluating TMDLs is that the cap in the Total Maximum Daily Load is often not specified as a maximum daily amount. The TMDLs are required to account for daily loads to assure that standards are met at all times, despite changes in conditions due to daily seasonal variations. It could be possible to meet a monthly or an annual load cap even if critically poor water quality conditions occurred during part of that month. Realistically, however, it is difficult to express habitat or flow problems as a daily pollutant load. Therefore, if you see something other than a daily load, point out that the agency must be accountable for meeting the criteria and protecting uses every day throughout the year.

Does the TMDL address all appropriate measures of the problem pollutant?

Find the water quality criterion for the problem pollutant in your state's water quality standards. Some pollutants, like metals and bacteria, have both acute (maximum) and chronic (average) criteria. The TMDL should assure that all applicable criteria are met at all times. To find your state's water quality standards, visit River Network's web site at: http://www.rivernetwork.org/library/librivcwastate_intro.cfm for the appropriate contact and the standards' online location, if available. U.S. EPA's new water quality standards website at: http://www.epa.gov/ost/wqs has copies of *approved* standards online, including tribal standards.

What are the "allowable" pollutant loads based on?

Agencies depend on existing research, data collected, models, and/or "best professional judgement" to determine the allowable load for each pollutant. These allowable loads should be protective of all uses of the waterbody. Question the agency's overall loads and request documentation for the decisions. Seek out local technical resources, such as a univeristy, to review the state's decision.

Does the TMDL allow any load of persistant or bioaccumulative pollutants?

Some pollutants accumulate as they move through the food chain, becoming more concentrated and dangerous as they reach higher organisms including humans. Oppose any load of persistent or biaccumulative pollutants, such as mercury or dioxin.

When does the TMDL propose to meet water quality standards?

The whole point of this exercise is to end up with a plan to meet water quality standards and restore each water body. Believe it or not, some proposed TMDLs have stated that even if everything works as described in the TMDL documentation, the water body will remain polluted. This undesirable outcome may be due to the size of the problem or lack of understanding of the sources or the problem. There have been some attempts to label such TMDLs incorrectly as "phased TMDLs," expecting that there will be another round of analysis and load reductions that will eventually lead to water quality standards being met.[16] Ask for specifics about how the TMDL will meet designated and existing uses, numeric and/or narrative water quality criteria, and the antidegradation policy.

Build Support

Offer monitoring data wherever it is available. Look to universities, think tanks, and law firms for low cost technical support.

Sique River | Identifying the Limits

The first step after identifying the problems in the Sique River is to identify what the river can handle or its "assimilative capacity." In the middle and lower segments, our goals are to "support" warm water fish (and the food and habitat they need) and to be able to swim safely in the river.

Each state can establish its own criteria for supporting these uses. A use is considered to be supported when water quality criteria are met most of the time. Some states have determined that up to 10% of the monitoring samples can show violation, and the use will still be considered supported. A use is not supported when some percentage of samples (often over 25%) do not meet water quality criteria. In this example, partial support of a use is when water quality violations occur in 10%-25% of the samples.

How much sediment and bacteria can be in the river and still meet those goals? In this case, it looks like a significant reduction in sediment and bacteria loads needs to occur in the rural and agricultural segment because there appears to be significant inputs of these pollutants. In the lower segment, other sources of these pollutants worsen the problem, but there may be fewer opportunities to make substantial reductions.

Allowable Pollutants

Segment	Pollutant	Uses Affected	What Can the River Handle? (Change Required)
Upper	bacteria	swimming supported	More Bacteria* *(e.g., 0% reduction)*
	sediment	cold water fishery supported	More Sediment* *(e.g., 0% reduction)*
Middle	bacteria	swimming partially supported	Less Bacteria *(e.g., 10% reduction)*
	sediment	warm water fishery not supported	Less Sediment *(e.g., 20% reduction)*
Lower	bacteria	swimming not supported	Less Bacteria *(e.g., 10% reduction)*
	sediment	warm water fishery not supported	Less Sediment *(e.g., 10% reduction)*

*Although the river can likely handle more of each pollutant, the agency is not allowed to permit such degradation. The antidegradation policy of the Clean Water Act protects against degradation of waters that have higher quality than is required by the minimum standards.

Sample Questions

- How did the agency determine what the river can handle?
- Will the required changes result in swimming and aquatic life being supported?