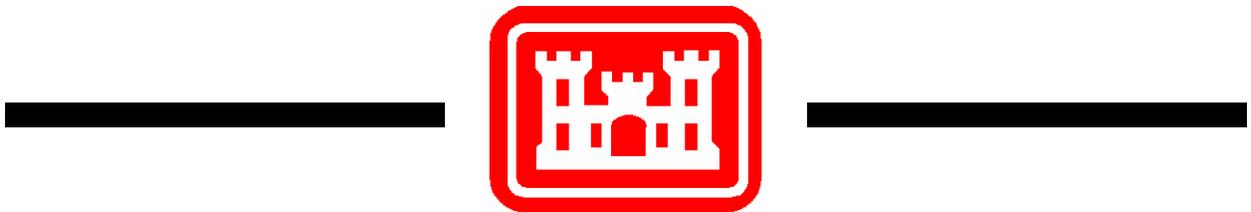


PUBLIC WORKS TECHNICAL BULLETIN 200-1-39
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**GUIDELINES ON THE U.S. ENVIRONMENTAL
PROTECTION AGENCY'S TOTAL MAXIMUM
DAILY LOAD (TMDL) PROGRAM**



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FACILITIES ENGINEERING
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GUIDELINES ON THE U.S. ENVIRONMENTAL
PROTECTION AGENCY'S TOTAL MAXIMUM DAILY
LOAD (TMDL) PROGRAM

1. Purpose. The purpose of this Public Works Technical Bulletin (PWTB) is to inform U.S. Army installation Land Managers on when they must take action to meet the water quality requirements of the U.S. Environmental Protection Agency's (USEPA's) Total Maximum Daily Load (TMDL) Program.
2. Applicability. This PWTB applies to all U.S. Army offices responsible for compliance with the Clean Water Act (CWA) on Army bases.
3. Reference.
 - a. Army Regulation (AR) 200-1, "Environmental Protection and Enhancement," 20 March 2000.

The TMDL program is established under Section 303(d) of the 1972 Clean Water Act. Regulations governing the TMDL program were issued in 1992 and are contained in 40 Code of Federal Regulation (CFR), Part 130.7."

4. Discussion.
 - a. Section 303(d) of the CWA establishes the TMDL (Total Maximum Daily Load) program. A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards (WQS), and an allocation of that amount to the pollutant's sources. WQS are set by states,

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territories, and authorized tribes (referred to hereafter as "states."). These standards identify the desired uses for each waterbody (e.g., drinking water supply and contact recreation) and the water quality criteria describing conditions needed to support those uses. Designated uses have been established for most waters of the United States.

b. The TMDL process benefits from a watershed approach to water quality management. Military land managers, through implementation of the CWA, have the responsibility to protect and restore the quality of public waters under their jurisdiction, as well as to ensure that activities on military installations help maintain downstream water quality. As stakeholders in the TMDL process, military land managers and master planners need to understand what TMDLs are and how the TMDL process will impact military lands and operations.

c. If monitoring and assessment indicate that a waterbody or segment is not meeting WQS, then that water is considered "impaired" and goes on a special list called the "303 (d) list," named after the section of the CWA that calls upon states, approved tribes, and territories to create such lists. States are required to develop their list and submit it to the USEPA for review and approval by 01 April of every even numbered year. The 303(d) list should include not only currently impaired waterbodies, but also waters likely to become impaired (i.e., not meet WQSS) by the time the next 303(d) list is due.

d. Currently USEPA regulations call for 303(d) lists to include only waters impaired by "pollutants", not those impaired by other types of "pollution" (e.g., lack of adequate flow and stream channelization). If it is certain that a waterbody's impairment is not caused by a "pollutant," but is due to another type of "pollution" such as flow, the waterbody does not need to be on the 303(d) list. If, however, biological monitoring indicates there is impairment of aquatic life uses, but it is not clear whether a pollutant is at least one of the reasons for impairment, the water should be on the 303(d) list, and further analysis to identify the causes are needed. Waters impaired by "non-pollutant pollution" should be identified elsewhere in the state's water quality inventory report. After identifying impaired waterbodies, the state is required to develop a strategy that will lead to attainment of WQS.

e. Historically, discharges from point source such as wastewater treatment plants have been closely monitored and addressed in National Pollutant Discharge Elimination System (NPDES) permits. Significant improvements in reducing point

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source pollution have occurred since the early 1970s. Now, water quality management focuses more prominently on nonpoint sources of pollution (e.g., runoff from agriculture and silvaculture operations and wet-weather point sources such as industrial storm water and runoff from some construction sites). Military installations need to be represented at state TMDL stakeholder meetings. Installations need to partner with state, Federal, and local agencies to combine resources to address problems with impaired waters. Installations need to become part of the decisionmaking process, assist with filling in data gaps, and work with the decision makers to develop comprehensive approaches to watershed management once TMDLs are allocated.

f. Appendix A contains Guidelines on the USEPA's Total Maximum Daily Load (TMDL) Program.

g. Appendix B contains lists of references, web sites, and a glossary of technical terms.

5. Points of Contact. HQUSACE is the proponent for this document. The POC at HQUSACE is Mr. Malcolm E. McLeod, CEMP-II, 202-761-0632, or e-mail: malcolm.e.mcleod@usace.Army.mil.

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Directorate of Civil Works

Appendix A

Guidelines on USEPA's Total Maximum Daily Load (TMDL) Program

1. Background

a. *Section 303(d) of the CWA - The TMDL Program.* The principal law governing pollution of the nation's surface waters is the Federal Water Pollution Control Act, or Clean Water Act (CWA). Originally enacted in 1948, it was completely revised by amendments in 1972 that make up much of the Clean Water Act today. Early emphasis of the CWA was on controlling discharges of conventional pollutants (i.e., suspended solids or bacteria). Prior to 1987, programs were primarily directed at pollution discharged from point sources (e.g., pipes, outfalls). However, Congress recognized in the Act that, in many cases, pollution controls implemented by industry and cities were insufficient, due to pollutant contributions from other unregulated sources.

b. Section 303(d) of the CWA requires states, territories and tribes to identify waters affected by pollutants where implementation of the technology-based controls imposed upon point sources by the CWA and USEPA regulations would not result in achievement of water quality standards, (WQS) ["impaired waters"]. WQS are set by states and describe the designated use(s) of a waterbody and include both general, narrative criteria and numerical, pollutant-specific criteria that must be attained to protect the designated use(s). An example of a designated use is public drinking water supply.

c. The 303(d) list of impaired waters must be submitted by States every even-numbered year to the USEPA who, upon review, approves or disapproves the list. To date, over 25,000 waters are determined to be impaired nationally. States must establish a priority ranking for TMDL development for their impaired waters, including waters targeted for TMDL development within the next 2 years.

d. *Definition of a TMDL.* For each waterbody on the 303(d) list, the state is required to set a total maximum daily load (TMDL) of pollutants causing the impairment. As defined by the USEPA, a TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet applicable water quality standards, and an allocation of that amount to the pollutant's sources (point and nonpoint sources).

e. While TMDLs have been required by the CWA since 1972, until recently, states and the USEPA had not developed many.

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Citizen lawsuits brought against the USEPA in the 1990s sought the listing of impaired waters and the development of TMDLs. The pace of TMDL development has increased significantly over the past 5 years. As of 2005, over 18,000 TMDLs have been completed.

f. Figure A-1 shows how TMDL development works in a circular process structured to improve water quality by: (1) identifying water quality-limited waters requiring TMDLs, then (2) Priority ranking and targeting; (3) developing TMDLs, (4) taking control actions, and (5) assessing water quality control actions, finally (back to 1) identifying remaining water quality-limited waters.

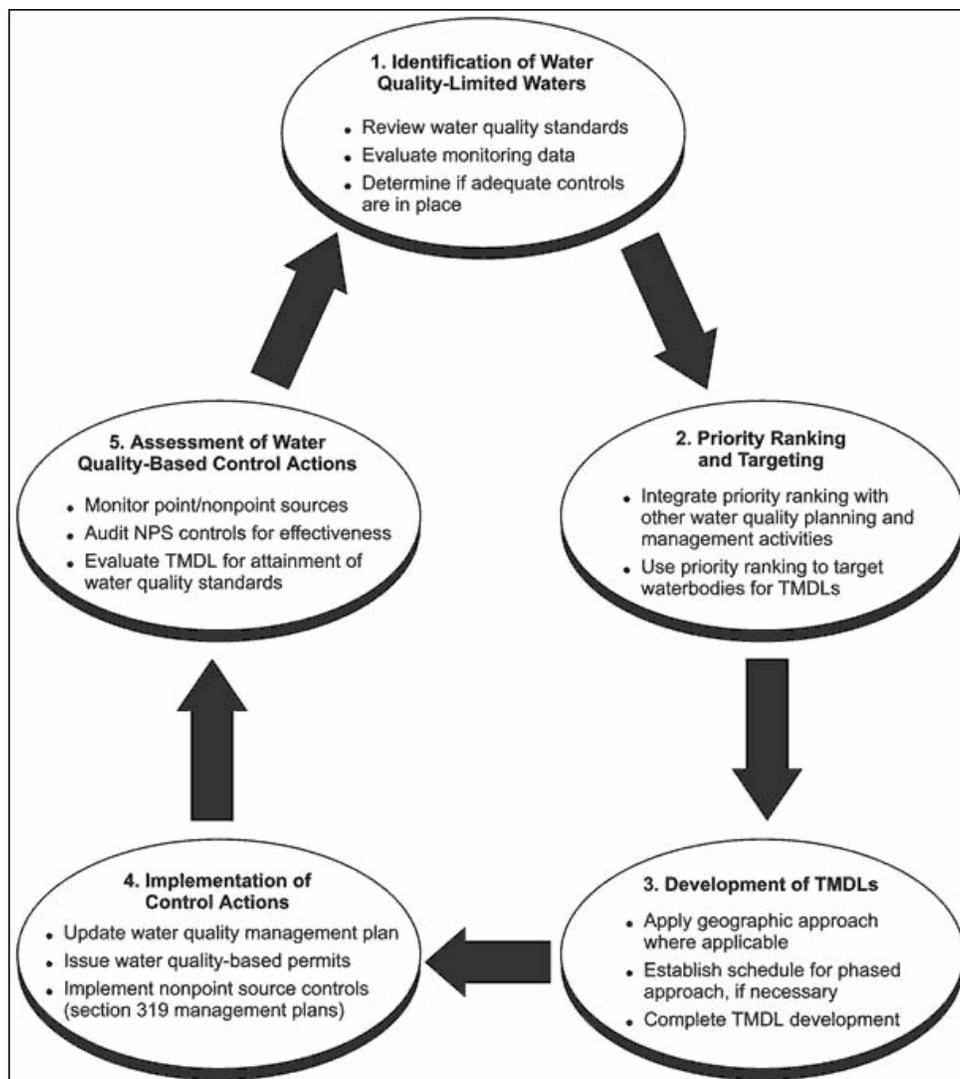


Figure A-1. General elements of the water quality-based approach (adapted from USEPA 1991).

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2. Components of a TMDL.

a. To develop a TMDL, the amount of a pollutant that a waterbody can assimilate without causing failure to support any designated use must be established. Pollutant loads are calculated in mass/unit time entering a waterbody, usually pounds/day. Concentration is measured in units of mass/volume, such as mg/L, and then multiplied by stream flow rates (L/day). A TMDL is expressed mathematically as:

$$\text{TMDL} = \sum \text{WLAS} + \sum \text{LAS} + \text{BL} + \text{MOS}$$

b. A TMDL is the sum of the individual wasteload allocations (WLAs) for point sources, plus load allocations (LAs) for nonpoint sources, plus background loading (BL) for naturally occurring background sources,* plus a margin of safety (MOS). (For example, a TMDL developed in 1990 for Lake Chelan, WA, allocated TMDL included phosphorous load allocations of 0.5 kg/day for future growth, 6.3 kg/day for existing sources, and 44.2 kg/day for background loads [USEPA 1994].) MOS is included to account for uncertainties associated with the development of the TMDL and is added to provide more protection of water quality. If a receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and BL for natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure that relate to a State's water quality standard. If Best Management Practices (BMPs) or other nonpoint source pollution control actions make more stringent load allocations practicable, then WLAs can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs (40 CFR 130.2(i)).

c. *Determination of Pollutant Load Allocations.* The USEPA requires that all sources of the impairing pollutant be considered, and that wasteload allocations be assigned to all relevant point sources and load allocations be assigned to all relevant nonpoint sources. Determining nonpoint source load allocations can be difficult. Load allocations for nonpoint sources are often allocated based on land use types, including urban runoff, agricultural runoff (fertilizer, pesticides), and forestry (soil erosion from logging roads). The runoff is closely related to weather events. Runoff flow from a

* Note: some TMDL calculations sum BLs together with LAs.

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particular portion of the landscape may be difficult to measure. It may not be practical or cost-effective to assign a load to each acre of a farm or a forest. Consequently, water quality managers must look at the whole section of a watershed to consider pollutant sources that may otherwise be overlooked, e.g., leaking underground storage tanks, unconfined aquifers, septic systems, stream channel alterations, damage to riparian areas, etc.

d. *Required Elements of a TMDL.* The minimum elements of a TMDL are:

- Impaired waterbody name and location
- Name of pollutant
- Acceptable load to attain WQS
- Wasteload allocation to point sources
- Load allocation to nonpoint sources
- Margin of safety
- Seasonal variation considerations.

e. *Reasonable Assurance.* EPA guidance calls for reasonable assurance when TMDLs are developed for waters impaired by both point and nonpoint sources. This information is necessary for EPA to determine that the load and wasteload allocations will achieve water quality standards.

i. In a water impaired by both point and nonpoint sources, where a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will happen must be explained.

ii. In a water impaired solely by nonpoint sources, reasonable assurances that load reductions will be achieved are not required for a TMDL to be approved. However, for such nonpoint source-only waters, states are strongly encouraged to provide reasonable assurances regarding achievement of load allocations. Such reasonable assurances may come in the form of incentive-based, non-regulatory, or regulatory approaches.

f. *TMDL Implementation.*

i. Section 303(d) of the Clean Water Act does not require states to develop plans that describe how a TMDL will be implemented. Hence, TMDLs are not "self implementing" under CWA Section 303(d). However, as described below, other regulatory and nonregulatory mechanisms exist for implementing TMDLs.

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ii. Section 402 of the Clean Water Act requires that effluent limits in permits be consistent with WLAs specified in TMDLs. Specifically, The CWA permit issuing authority (the state, except in a few cases, EPA) is required to revise the permits to include water quality-based limits resulting in additional pollution controls. For example, suppose a segment of a river is found to have chromium in excess of the water quality criteria for chromium, and the state identifies chromium in the discharge from a tannery. Even if the tannery is in compliance with the basic treatment requirement, the permit may be revised to include water quality-based limits requiring further reductions in the discharge of chromium needed to attain the water quality standard.

iii. The CWA does not provide a regulatory nonpoint source control program at the Federal level; hence load allocation (LA) established in TMDLs are not Federally enforceable. However, mechanisms to implement nonpoint source controls may include the CWA Section 319 nonpoint source management program coupled with state, local, and Federal land management programs and authorities; public participation processes; and recognition of other watershed management processes and programs such as local source water protection and urban storm water management programs; as well as the state's CWA Section 303(e) continuing planning process.

g. *TMDL Monitoring*. Water quality monitoring is an important part of the TMDL process. To answer the question of what are the sources of major loadings, upstream and downstream monitoring results indicate what segments of a stream contribute the most pollutant. Changes in water quality between two points can be used to determine pollution's point of origin. For lakes, monitoring surface water inputs will indicate which watersheds are contributing most of the pollutants. Further monitoring in the watersheds will indicate which sections of the watershed are responsible for the loadings. Additionally, once point-source controls and BMPs are implemented, monitoring can measure whether the intended improvements in water quality are occurring. If not, additional planning is required to revise or develop additional or improved BMPs.

h. *Example of Information in a State 303(d) List - Illinois*.

i. Illinois' list of impaired waters [303(d) list] for the 2002 reporting cycle reports a total of 803 impaired waters for Illinois in 43 identified watersheds.

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ii. Identified causes of impairments of Illinois waterbodies are:

- Nutrients (e.g., inorganic - N, nitrates, other organics (fluoride), phosphorus, total nitrogen)
- Metals
- Organic Enrichment/Low DO
- Unionized Ammonia
- Other Habitat Alterations
- Sediment/Siltation
- Suspended Solids
- PCBs
- Pathogens
- Algal Growth/Chlorophyll A
- Priority Organics
- pH
- Salinity/TDS/Chlorides
- Flow Alteration
- Noxious Aquatic Plants
- Sulfates
- Pesticides
- Cyanide
- Exotic Species
- Cause Unknown
- Oil and Grease
- Other Inorganics
- Nonpriority Organics
- Thermal Modifications
- Chlorine.

3. Impacts of TMDLs to Military Installations.

a. *TMDL Development.*

i. States are primarily responsible for developing TMDLs. However, TMDL implementation, as discussed below, may have an impact on military operations. Military installations with 303(d) listed waters within, adjacent to, or downstream of the installation's boundaries should contact the state to become involved in the development or review of any applicable TMDLs.

ii. In addition, USEPA regulations recognize that "alternative pollution control requirements" may obviate the need for a TMDL and allow an impaired water to be removed from the state's 303(d) list (40 CFR 130.7(b)(1)). These "Category 4b" reporting requirement apply when "a use impairment caused by a pollutant is being addressed by the state through other pollution control requirements." One should understand that Category 4b waters are a relatively rare classification; as of

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this writing, over 20,000 TMDLs have been completed nationally, while only 130 waters have been classified as Category 4b.

iii. Still, military installations with 303(d) listed waters within or adjacent to the installation's boundaries, may also coordinate with the state EPA or state Office of Environmental Quality to determine whether activities on the installation qualify as alternative pollution control requirements for achieving water quality standards without TMDLs through the "Category 4b alternative" if effluent limitations are stringent enough to implement applicable water quality standards within a reasonable period of time.

iv. Specifically, this rationale should include:

(1) a statement of the problem causing the impairment,

(2) a description of the proposed implementation strategy and supporting pollution controls necessary to achieve water quality standards, including the identification of point and nonpoint source loadings that when implemented assure the attainment of all applicable water quality standards,

(3) an estimate or projection of the time when water quality standards will be met,

(4) a reasonable schedule for implementing the necessary pollution controls,

(5) a description of, and schedule for, monitoring milestones for tracking and reporting progress to EPA on the implementation of the pollution controls, and

(6) a commitment to revise as necessary the implementation strategy and corresponding pollution controls if progress towards meeting water quality standards is not being shown.

v. Two examples of Category 4b waters follow:

(1) Failing local septic systems and animal waste management plans were identified as a source of fecal coliform pollution in Mount Vernon, WA (Washington State's Water Quality Assessment for 2004). A plan was put in place to repair the septic systems, and to develop and implement successful animal waste management plans. Since the implemented plans removed the source of the pollution, there was no need to develop a TMDL.

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(2) Sampling showed elevated levels of PCBs in mussels and English sole in Sinclair Inlet, WA. Since the samples were taken, the Navy conducted remedial dredging to remove the source of the pollution. Since the plan put in place and implemented, these waters were also Category B.

b. *TMDL Implementation.* TMDLs provide information on the relationship of point and nonpoint source pollution to individual impaired waters. TMDLs also provide the information on which implementation actions are based. For example, states may require the incorporation of river corridor protection criteria, buffers, BMPs, operating standards, and other water quality requirements into local operations. USEPA regulations require that NPDES discharge permits be consistent with any approved TMDLs. The CWA permit issuing authority can revise the installation's discharge permits to include water quality-based limits resulting in additional pollution controls. Hence, land managers may need to be involved in TMDL implementation if the WLAs and LAs assigned in a TMDL involve installation activities.

c. The TMDL process presents an opportunity to military installations to integrate planning for land uses across a watershed (or watersheds) within and adjacent to its boundaries. Because of issues like urban encroachment at military installations and the way that encroachment negatively impacts military training and operations, military land managers and master planners have become more engaged with community development practices outside the "fence line."

d. *TMDL Monitoring.* Military land managers may need to develop a water quality monitoring program at each installation in order to demonstrate that certain BMPs and pollution prevention measures are being used and they are effective. Additionally, there may be a need to document management plans and other planning activities. Military installations may be requested to contribute to improve the science and technology to control non-point source pollution and to improve estimates of the magnitude and sources of non-point source pollution.

e. *National Environmental Policy Act (NEPA).* In accordance with NEPA, Army installations complete environmental assessments (EAs) and environmental impact statements (EISs), when necessary, for major Federal actions such as timber harvest, road construction, facility construction, etc. The installation's Directorate of Public Works (DPW) Environmental Branch should address whether the proposed major Federal actions will have an impact on water quality as part of these studies.

APPENDIX B
References, Web Sites, and Glossary

1. References.

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Part 130 of Title 40 of the Code of Federal Regulations (40 CFR 130), section 130.7, "Total Maximum Daily Loads (TMDL) and Individual Water Quality-based Effluent Limitations."

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USEPA, *National Management Measures for the Control of Nonpoint Pollution from Agriculture* (EPA 841-B-03-004, July 2003), available through URL:

<http://www.epa.gov/owow/nps/agmm/>

USEPA, *TMDL Case Study: Lake Chelan, Washington* (EPA 841-F-94-001, January 1994), available through URL:

<http://www.epa.gov/owow/tmdl/cs11/cs11.htm>

USEPA, Total Maximum Daily Loads web site (updated 3 October 2005), available through URL:

<http://www.epa.gov/owow/tmdl/>

Washington State's Water Quality Assessment for 2004, "III. Water Quality Listings by Category, C. Overview of

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Category 4B - Has a Pollution Control Plan," available through URL:

http://www.ecy.wa.gov/programs/wq/303d/2002/2004_documents/cat4b-overview.pdf

and

["2004 Water Quality Assessment \(Final\) - Category 4B Listings," 2 November 2005, available through URL:](http://www.ecy.wa.gov/programs/wq/303d/2002/2004_documents/wria_pdfs-5final/kk-active-4B.pdf)

http://www.ecy.wa.gov/programs/wq/303d/2002/2004_documents/wria_pdfs-5final/kk-active-4B.pdf

2. Recommended Web Sites.

USEPA "Introduction to the Clean Water Act":

<http://www.epa.gov/watertrain/cwa/rightindex.htm>

National Section 303(d) List Fact Sheet (Impaired Waters Listed by State):

http://oaspub.epa.gov/waters/national_rept.control

The Clean Water Network TMDL Toolkit web site:

<http://www.cwn.org/cwn/issues/impairedwaters/iwfocus/index.cfm>

The Water Quality Information Center at the National Agricultural Library Agricultural Research Service, U.S. Department of Agriculture web site. This web site provides question-and-answer fact sheets on the basics of TMDLs, state-specific TMDL Information (not all inclusive), a section on "Tools," recent congressional hearings and other activities, and a good collection of background information:

<http://www.nal.usda.gov/wqic/TMDL.html>

TMDLs.net

This web site was created as a joint effort of America's Clean Water Foundation and the Association of State and Interstate Water Pollution Control Administrators to convey information relating to TMDLs. The goals are to educate stakeholders on challenges and opportunities that TMDLs present; share useful information, tools, and effective approaches being used by the states; foster communication among stakeholders; promote involvement in problem-solving at the local level, and enhance technical skills:

<http://www.tmdls.net/>

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TMDL Innovations

The Environmental Council of States (ECOS)/ Innovative Action Council jointly plans to inventory state TMDL innovations, develop a TMDL innovations scope between the ECOS Cross Media Committee and the USEPA, and demonstrate alternatives to traditional TMDLs through state projects:

<http://www.ecos.org/>

3. Glossary (Source: "Getting Started with TMDLs," pp iv, v), and USEPA Total Maximum Daily Loads website:

<http://www.epa.gov/owow/tmdl/2006IRG/report/2006irg-glossary.pdf>

Assessment

Making a decision, based on all valid (accepted) existing and readily available water quality -related data and information, about the condition of a segment with regard to WQS (i.e., making a WQS attainment status determination).

Attainment

The condition of meeting applicable water quality standards.

Background Loading (BL)

Loads of naturally occurring materials that would have entered the waterbody prior to disturbance of the watershed by human activities. For example, phosphorus derived from the natural rocks in a watershed provides the native vegetation with their nutrient P requirement. Background loads must be taken into consideration in setting TMDLs.

Beneficial Uses

Uses of waterbodies that include drinking water supplies, fishing, swimming, boating, wildlife habitat, and shellfish harvesting. Aesthetic factors may be considered as well, such as appearance and odor. Beneficial uses for waterbodies are determined by state and tribal environmental agencies.

Cause(s) of Impairment

The stressor(s), whose presence in a waterbody is/are, singly or in combination, causing or contributing to failure to meet any applicable WQS. Impairment causes include, but are not limited to, pollutants and other forms of pollution.

Concentration

The amount - usually mass or weight - of a material in a

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given volume of water. Units include milligrams per liter (mg/L, parts per million or ppm); micrograms per liter (mg/L, parts per billion or ppb); sometimes as ounces per gallon (oz/gal). For bacteria, it is frequently expressed as number of cells per 100 cm³.

Designated Uses (DU)

Those uses specified in state or tribal water quality standards regulations for a particular segment, whether or not they are being attained. (40 CFR 131.3.(g)) Uses so designated in *WQS* are not meant to specify those activities or processes that the waterbody is currently able to fully support. Rather, they are the uses/processes that the state or tribe wishes the waterbody to be clean enough to support, whether or not the waterbody can, in its current conditions, fully support them.

Existing and Readily Available Water Quality-Related Data and Information

The definition of this term includes, but is not limited to:

- Information found in watershed plans and other types of water quality management plans; Information contained in reports and databases developed pursuant to the CWA, including: Integrated Reports, separate section 305(b) report, a section 303(d) list, a section 314 lakes assessment, a section 319(a) nonpoint assessment, STORET, the ADB, etc.;
- Information appearing in reports and databases developed pursuant to other Federal statutes and programs, including but not limited to SDWA section 1453 source water assessments, Superfund and Resource Conservation and Recovery Act reports, the Toxic Release Inventory, USDA programs, and USGS programs;
- Restrictions and/or advisories regarding shellfish harvesting and water-based recreation;
- Any observed effect (see definition below);
- Results from site-specific biological, chemical, and physical monitoring and surveys;
- Results of utilization of remote-sensing technology efforts; and
- Results of use of predicative tools/ extrapolative tools (e.g., probabilistic surveys, landscape-models, dilution calculations and models estimating pollutant loadings and ambient water quality).

Impairment

This term includes failure to support a water quality standard, observed effect(s), and direct manifestations of an undesirable effect on waterbody conditions. For example, fish kills, fish lesions, depressed populations of certain aquatic species, and bioassessment scores are observed effects indicating changes in aquatic communities. Major algal blooms, undesirable taste and odor in raw and finished drinking water, and increased incidences of gastroenteritis and other waterborne diseases among swimmers are also observed effects. Depending on a state's water quality standards and specific waterbody conditions, observed effects may form the basis of an impairment decision. For example, depending on the magnitude and cause of a fish kill, this observed effect may or may not result in an assessment of "impaired." Generally speaking, pollutants and pollution are not considered observed effects (e.g., lead, pesticides, phosphorus); rather, they are causes of observed effects.

Impaired Waters

Waterbodies either partially supporting designated uses or not supporting designated uses such as fishing, swimming, recreation, or drinking water.

Load Allocation (LA)

Dividing up and allocating the total quantity of pollutant entering a waterbody daily (originating from nonpoint sources) among all the nonpoint sources.

Margin of Safety (MOS)

In essence, every TMDL implementation is a full-scale experiment in how waterbodies will respond to changes in watershed management. For this reason, an additional allocation based on uncertainty about the response of the waterbody to decrease in the load of a pollutant is set. For example, if a waterbody containing 0.15 parts per million (ppm) total P generates excessive algal growth, the best science and professional judgment may predict that total P levels should be at 0.10 ppm for algal growth not to threaten aquatic life. However, an additional Margin of Safety may be applied because we are unsure of how the waterbody will respond – the Target Load may then be set at 0.08 ppm total P.

Nonpoint Source Pollution

Pollution originating from diffuse sources on the

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landscape, from runoff or groundwater. Examples include runoff from fields receiving manure applications, stormwater runoff from urban landscapes, or roadbed erosion in forestry.

Parameter

A specific pollutant, or other chemical/physical condition, such as phosphorus, copper, E. coli bacteria, BOD, temperature, pH, turbidity, etc.

Parameters

Following is a list of the most typical individual pollutants or water quality conditions addressed by TMDLs or studied during water quality monitoring. A TMDL is written for each individual parameter. An individual stream, stream part, lake, or other waterbody may have one or more TMDLs. Typical TMDL parameters include:

- total phosphorus (TP)
- ammonia/ammonium
- total suspended solids (TSS- total particles suspended in the water)
- total dissolved solids (TDS - salts dissolved in water)
- temperature
- pathogens (fecal coliform and bacteria)
- pesticides
- nitrate
- Habitat Alteration/Modification - turbidity and TSS pollution due to dams, dredging, channelization, ditching, housing developments, highway construction and maintenance, and county operations
- BOD
- low DO
- metals
- pH
- sulfates
- legacy pollutants such as chlordane, mercury, and dieldrin. Some legacy pollutants are deposited via the atmosphere.

Land use and land cover will certainly have an impact on which parameters or pollutants appear in any given waterbody segment or lake; the list of pollutant parameters may also vary from state to state or region to region. For example, naturally occurring arsenic is

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on Nebraska's list, and naturally occurring chloride and selenium, possibly from return irrigation water high in salts, are on Kansas' list.

Point Source Pollution

Pollution originating at a point, such as an industrial plant, wastewater treatment plant, or feedlots. Frequently the waste stream enters the waterbody through a pipe or ditch, making sampling and flow monitoring relatively straightforward.

Target Loads

The quantity of a pollutant that can enter a waterbody per day without degradation of its beneficial uses. For most pollutants this is expressed as mass per day, e.g., pounds of P/day. For heat, it may be in calories per day; for bacteria, number of cells per day.

Threatened Waters

EPA recommends that states consider as threatened those waters that are currently attaining WQSS, but which are expected to exceed WQSS by the next listing cycle (every 2 years). For example, segments should be listed if the analysis demonstrates a declining trend in a specific water quality criteria (WQC), and the projected trend will result in a failure to meet a criterion by the date of the next list (i.e., 2008 for purposes of the 2006 assessment cycle); or, segments should be listed if there are proposed activities that will result in WQSS exceedances.

Total Maximum Daily Load (TMDL)

The maximum quantity of a pollutant that can enter a waterbody without adversely affecting the beneficial uses of the waterbody.

TMDL = sum of all WLA + sum of all LA + BL + MOS.

Unsupported Uses

Those designated uses that are not fully supported by conditions in the waterbody to which those uses are assigned by WQS.

Use (data and information)

Employing data and information to make a characterization determination.

Waste Load Allocation (WLA)

Dividing up and allocating the total quantity of

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pollutant entering a waterbody (originating daily from point sources) among all the point sources.

Water Quality Criteria (WQC)

Elements of state, territorial, or tribal WQS, expressed as parameter (pollutants, etc.) levels or narrative statements, representing a quality of water that supports one or more designated uses. Numeric WQC addressing chemical or physical conditions contain three attributes: (1) magnitude (e.g., concentration), (2) duration (averaging period), and (3) frequency (recovery interval).

Water Quality Standard (WQS)

Provisions of state, tribal, or territorial (or, in some cases, Federal) law which define the water quality goals for a waterbody/segment. WQS consist of: designated uses, water quality criteria (both numeric and narrative), as well as antidegradation policies and implementation procedures.

WQS Attainment

Status Determination Deciding, based on use of all valid existing and readily available data and information, whether WQS, or components thereof, are being met or are not being met.

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