

# **Clean Water Act and the TMDL Program**

**An Introduction and Basic Desk  
Reference for Corn Growers**



*The National Corn Growers Association thanks the Assessment and Watershed Protection Division of the U.S. Environmental Protection Agency for contributing to this Desk Reference. The opinions in this publication are those of the authors, and do not necessarily reflect the views of the EPA or National Corn Growers Association. The information in this desk reference does not substitute for existing regulations such as those of the Clean Water Act.*

# Clean Water Act and the TMDL Program

## An Introduction and Basic Desk Reference for Corn Growers

A Message from the President:

Corn growers are committed to leaving our environment in better shape than we found it. We are mindful of the need to balance environmental stewardship with the maintenance of a long-term, dependable food supply. As good stewards, we rely on the adoption of new technologies, practices and policies that benefit the environment.

The National Corn Growers Association (NCGA) promotes stewardship by encouraging growers to become informed about their local watershed, including Total Maximum Daily Loads (TMDLs). TMDLs will likely affect agricultural practices, and as good stewards, producers should learn more about the TMDL process in the watersheds where they live.

What is a TMDL and how will it affect your farming operation? That is the question NCGA will help answer for its members through this informative desk reference guide. This guide offers you a chance to “walk through” the TMDL process as it has been actually applied and to learn more about successful watershed partnerships.

With this guide, NCGA aims to educate grower members on water quality issues and encourage grower participation in the clean water process. TMDL implementation will be a locally driven process, and growers must get involved in local watershed activities to ensure best management practices (BMPs) to reduce pollutants targeted by TMDLs are workable.

Restoration of impaired stream segments cannot be successfully achieved without cooperation from those who live in the watershed. U.S. farmers are the best qualified to offer workable approaches to solving water quality problems involving agriculture.

Armed with the information contained in this guide, well-informed growers can better connect with their local community-based watershed coalitions to identify successful, accepted agricultural practices that could be promoted to help meet pollutant reduction goals set by TMDLs.

We hope this informative guide helps assist corn growers seeking an interactive strategy to address water quality issues in their states.

Sincerely,



Ken McCauley  
President

# Clean Water Act and the TMDL Program

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## I. Executive Summary

Despite the technical and unfamiliar terms, phrases and acronyms often used about the Clean Water Act, the Act's underlying logic and working concepts are relatively straightforward. A Total Maximum Daily Load, or TMDL, is one of the many provisions in the Clean Water Act that actually is simple in concept. The Clean Water Act requires a TMDL when a particular waterbody is identified as having so much of one or more pollutants in it that additional measures need to be taken to clean it up. In order to understand a TMDL it is important to understand something of how the Clean Water Act programs seek to protect water quality before these TMDL measures must be taken.

The primary goal of the Clean Water Act is to protect water quality by keeping things out of streams, rivers, lakes, or bays that in the best of circumstances should not be there. Such things include excessive *sediment and soil* from erosion; *nutrients* from sewage treatment plants, city streets, home lawns and gardens, and agriculture; *pesticides* from industrial processes, home lawns and gardens, and agriculture; *metals and chemicals* from mining and industrial facilities; and *pathogens* like fecal coliform. The Clean Water Act refers to these things as “pollutants.”

The first question is, how do we want to use a particular waterbody? It is reasonable to protect water quality by keeping things out of water that do not belong there, but Congress knew that it was neither possible nor practical to keep everything out of water everywhere. So the Clean Water Act says that we protect water quality in a waterbody to the level needed to ensure we can use that particular waterbody in a way that makes sense. Swimming, fishing, drinking water, irrigation or industrial processes are all examples of ways waterbodies can be used. The state regulatory authority establishes, with public input, this “designated use” for each of the waterbodies. These are the uses the state wishes each river, lake, wetland, or other waterbody to be able to support, regardless of whether they are able to do so at the time of their designation.

How much of a pollutant is too much? Even though we know a waterbody's designated use, and we know that certain things going into that waterbody will prevent us from being able to attain that designated use, the practical question is “how much of that thing or pollutant is too much?” For each pollutant in question for a particular waterbody, or category of waterbodies, the Clean Water Act expects the state to try and answer this question. The answer to this question is called “water quality criteria.”

Permits are the key tool used to limit the release of pollutants. The Clean Water Act makes it illegal for a factory, processing plant, municipal facility, construction site, concentrated animal feeding operation, and other similar sources to dispose of pollutants in waterbodies through things like pipes or ditches. The only time it is legal for these entities to do this is when they have a Clean Water Act permit under the National Pollution Discharge Elimination System, or NPDES, where this permit specifies exactly how much of the pollutant can be released to water.

An NPDES permit holder has to limit its discharge of a pollutant to predetermined, low levels that are economically achievable. Environmental Protection Agency, or EPA, goes through a comprehensive process to assess what is the best technology available that is economically achievable, and then establishes what levels of pollutant discharge that technology achieves. Permit holders do not have to use this technology – they just have to achieve the same levels of discharge. This technology-based performance standard is determined through EPA-developed “effluent limitations guidelines.”

Agricultural runoff is exempt from these mandatory permitting requirements – voluntary measures are called for by the Act. Some activities can contribute pollutants to water but are exempted from the Clean Water Act permit requirements. Most prominent in this category are row and specialty crop agriculture, manure properly applied by a concentrated animal feeding operation (CAFO) to land the CAFO owns or controls, forestry, and septic tanks. Essentially all of corn farmers’ crop production activities fall into this exempt category. The Clean Water Act provides for a voluntary program for these activities as a way to reduce runoff of pollutants.

What happens if a waterbody remains polluted, even after technology-based permits are imposed? As required by the Clean Water Act, states survey waterbodies every two years to determine water quality. These findings are reported to EPA on a list, often called a “303(d) list.” Sometimes these surveys find that a waterbody is too polluted to be able to be used according to its “designated use” even when all the factories, processing plants, and/or sewage treatment plants, and other point sources discharge in accordance with their Clean Water Act permits. A waterbody reaching this condition is what triggers a TMDL.

A TMDL sets a limit on the total amount of pollutant for a waterbody and divides that total up among all parties releasing that pollutant to water. When a waterbody gets too polluted, or “impaired,” the Clean Water Act requires states to identify the maximum amount of a pollutant the waterbody can receive in a given period of time and still meet water quality standards. This amount is set low enough so that over a reasonable period of time the water quality of the impaired waterbody will recover to the desired levels (i.e., meet state water quality standards). This total maximum loading rate of pollutant is divided up among all of the permit holders and the other contributors who are exempt from permitting so that water quality comes back to acceptable levels.

A hypothetical TMDL for an agricultural watershed, is used to illustrate a real TMDL action. The “Poplar River” is part of a major river system that flows to the Mississippi River. It is an agricultural watershed, but with 750,000 residents and one large city (Poplar City) of 200,000 people. Over 75 percent of the land is farmed for row crops, primarily corn and soybeans. Alfalfa is also widely planted. The city and the other urbanized areas get their drinking water from the Poplar River and all of the small cities and towns treat their sewage. A large number of small towns do this by using treatment lagoons, which have Clean Water Act permits and discharge intermittently. Poplar City discharges effluent continuously from its sewage treatment plant into the river, as do ten other smaller cities. All have discharge permits under the Clean Water Act.



Based on monitoring data the Poplar River regularly exceeds the federal standard for nitrate in drinking water. The Poplar River is designated under the Clean Water Act as a drinking water supply. Because the state determined that there was too much nitrate in the Poplar River, the state identified a 15-mile stretch near Poplar City as “impaired” due to nitrate. As a result, the state is required by the Clean Water Act to put the River on the state 303(d) list and develop a TMDL for nitrates for this stretch of the river that accounts for every source of nitrate that is feeding into this stretch of the river.

As the first step in the TMDL analytic process, the state estimated the current loading rate for nitrates into the impaired stretch of river, before a TMDL is calculated. Of an estimated current total loading rate of 250 lbs. of nitrates per 24-hour period, the state estimated that commercial fertilizer constituted 122 lbs (45 percent). Other nonpoint sources – septic systems, pasturing operations, and air deposition accounted for an additional 46 percent, with municipal point sources contributing the remaining 9 percent.

The state then calculated that the maximum load of nitrates consistent with meeting the nitrate water quality criteria would be only 137 lbs. every day, corresponding to an overall reduction of about 45 percent from current levels. Its initial proposal for allocation of this load called for a 73 percent reduction in loads of nitrogen coming from row crop agriculture. However, after representatives of the farm community became involved in the TMDL development process, the desired reduction from row crop operations was reduced to 51 percent.

Though implementation plans are not federally-required components of TMDLs, the state decided to develop an implementation plan anyway. Working with farmers, U.S. Department of Agriculture (USDA), EPA, and others, the state led the development of a detailed implementation plan specifying which particular sets of BMPs would be applied to which particular acres of land. In addition, the implementation plan included estimates of cost-share needs and identified likely sources of funding.

According to the TMDL implementation plan, it will take five to eight years to achieve the reductions called for in the TMDL, and then for levels of nitrates in the impaired stretch of river to drop down below those specified in the state’s applicable water quality criterion.

## II. Introduction

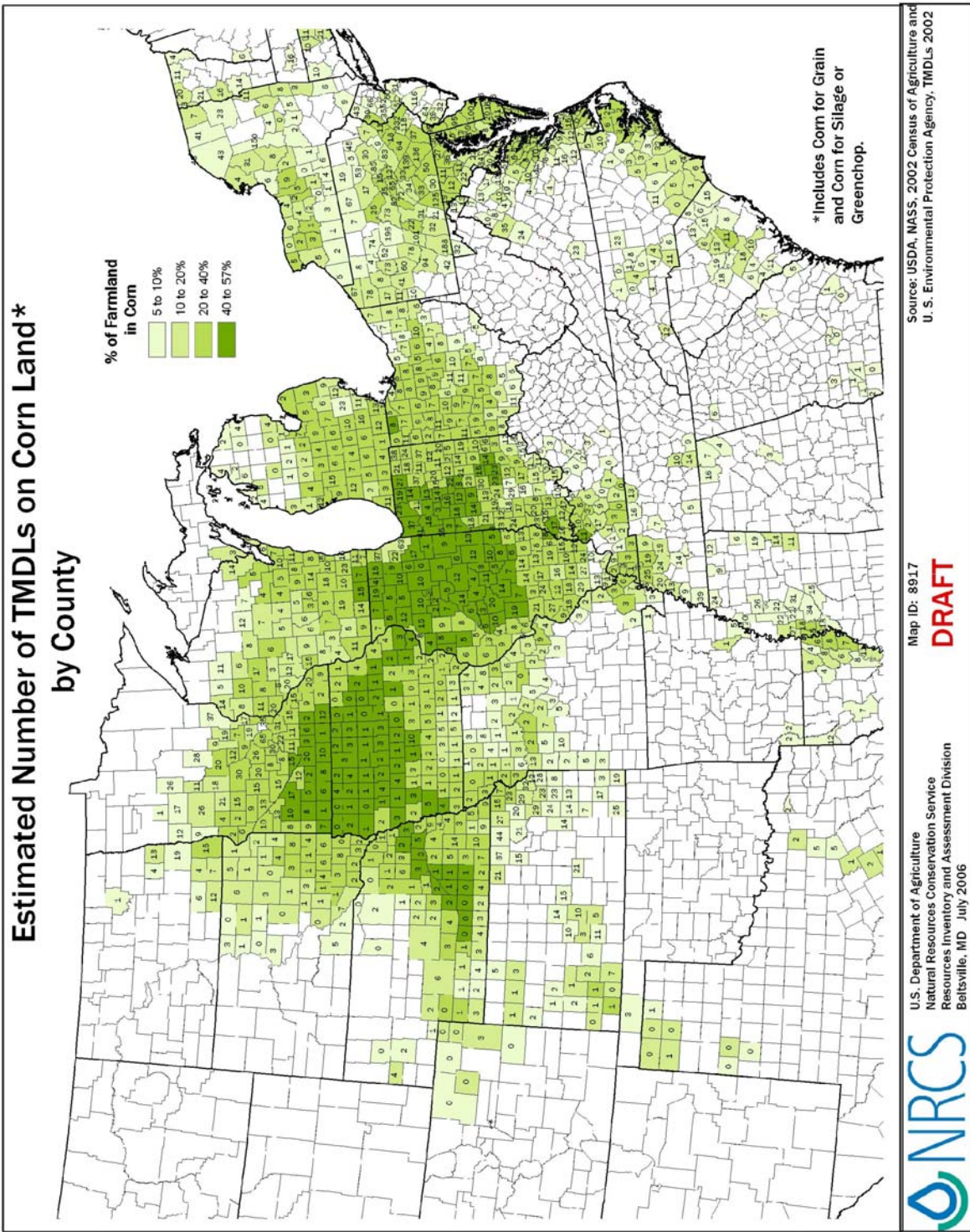
The Clean Water Act was established in 1972 to restore America's waterways. By the 1990's many sources of pollution were reduced, but overall United States water quality still had not achieved the standards required by the Act. In an effort to reach this goal and as a result of several lawsuits brought against EPA and state regulatory agencies, states have begun to rely more on a process called the Total Maximum Daily Load (TMDL) program.

Corn growers farming in a watershed that feeds a stream, river, or lake that is too polluted to support the use designated by their state could find themselves in the middle of a TMDL. What this might mean for a corn producer and how a producer might handle this is the subject of this desk reference.

The Clean Water Act has several elements or aspects that are designed to protect or restore water quality. It is only after these program elements have failed to succeed that the Clean Water Act requires states to take their efforts to the next level through a TMDL process. The first step of a TMDL is to identify the maximum amount of a pollutant the waterbody can receive. Nutrients, sediment and pesticides are potential pollutants that could be in rain or snowmelt that runs off of corn lands. This total amount is set low enough so that over a reasonable period of time the water quality of the impaired waterbody will recover to the desired levels specified by state water quality criteria. The second major part of a TMDL is the allocation of that pollutant load among the parties that are putting the pollutant into the waterbody in question.

In the 1990s, environmental advocates brought 38 lawsuits against EPA and 40 lawsuits against states to force them to implement the TMDL program. As a result, 60,000 TMDLs have been identified by states and EPA as needing to be completed and 23,000 of these have been completed to date. The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) has mapped, as shown in Figure 1, the number of TMDLs of all types that existed in 2002 in corn producing counties. (The number in each county represents the number of TMDLs, and the color of the county represents the percentage of the county in corn land.)

But what does that mean? It is improbable that corn producers ever will be **required** to adopt pollution controls such as Best Management Practices (BMPs). Such a regulatory requirement could come only from a state or local government as the Clean Water Act does not provide regulatory authority over nonpoint source pollution. However, it is very possible that the producers in a watershed as well as producers throughout an entire state, will be subjected to considerable public, media and agency pressures to adopt BMPs. Their reputation as stewards of the land and its resources would be publicly and prominently called into question if they did not. The good news is that corn producers facing a TMDL in their watershed often will find state agencies and USDA willing to provide producers with financial assistance to adopt these BMPs, and in general to assist them in ways acceptable to farmers with their stewardship activities. TMDLs have the potential to be a serious management issue for farmers, but also are potentially a real opportunity.



**FIGURE 1. Map of Estimated Number of TMDLs in Counties with Corn Land, 2002**

### III. A Synopsis of the Clean Water Act

The underlying logic and working concepts of the Clean Water Act are straightforward and easily understood if properly explained. A Total Maximum Daily Load, or TMDL, is one of the many concepts in the Clean Water Act that actually is simple in concept but may be complicated in practice.

The Clean Water Act requires a TMDL when a particular waterbody is identified as having so much of one or more pollutants in it that additional clean-up measures need to be taken. A TMDL represents the Clean Water Act's backup when the Act's primary tools have failed to protect water quality at acceptable levels. The TMDL is designed to help clean up a waterbody by establishing the maximum rate of loading of a pollutant so the waterbody can, over time, recover and achieve water quality standards. A TMDL also divides this total up among different municipalities, businesses or people that are releasing that pollutant into the waterbody, or will do so in the future. Science is involved in these decisions, but the application of TMDL science always requires assumptions and judgments that can change depending on the people involved and the circumstances. In addition to the scientific decisions, there are numerous more subjective decisions and invariably a great deal of politics and social dynamics involved.

The Clean Water Act can be broken into eight major elements. Each element is a simple concept and is logically related to the next. These eight elements are briefly discussed below and summarized in Chart 1 at the end of this section.

#### **Element 1     Protect water quality by keeping things out of water that don't belong there.**

The primary goal of the Clean Water Act is to protect water quality by keeping things out of streams, rivers, lakes, or bays that in the best of circumstances should not be there. Such things include excessive *sediment and soil* from erosion; *nutrients* from sewage treatment plants, city streets, home lawns and gardens, and agriculture; *pesticides* from industrial processes, home lawns and gardens, and agriculture; *metals and chemicals* from mining and industrial facilities; and *pathogens* like fecal coliform. The Clean Water Act refers to these things it seeks to keep out of water as "pollutants."

#### **Element 2     What uses should a waterbody be able to support?**

It is reasonable to protect water quality by keeping things out of water that do not belong there, yet Congress knew that it was neither possible nor practical to keep everything out of water. The Clean Water Act says that we protect water quality in a waterbody to the level needed to ensure we can use that particular waterbody in a way that makes sense. People have to know what uses society wants a particular stream, river, lake or bay to be able to support before they can decide what pollutants or how much of a pollutant must be kept out of the water. Swimming, fishing, drinking water, irrigation or industrial uses are all examples of ways waterbodies can be designated. The Clean Water Act establishes a national goal, wherever attainable, of having all waters clean enough to provide "for the



protection and propagation of fish, shellfish, and wildlife" and "for recreation in and on the water". EPA interprets this "fishable/swimmable goal" to include keeping levels of pollutants in harvestable fish and shellfish below levels that would pose undue risk to consumers.

The state regulatory authority establishes, with public input, this "designated use" for each of the waterbodies. This designated use step is the first of two major parts of the Clean Water Act's "water quality standards" program. After more than 30 years since passage of the Clean Water Act, all waterbodies should have been assigned a set of designated uses. Although it is hard to change a designated use it is certainly possible. Some states have done so on a number of occasions. Designated uses can only be removed by conducting a "use attainability analysis," which demonstrates such uses are not reasonably attainable.

### **Element 3 How much of a pollutant in a waterbody is too much?**

Even though we know a waterbody's designated use, and we know that certain things going into that waterbody will prevent us from being able to attain that designated use, the practical question is "how much of that pollutant is too much?" How much of a pollutant disposed into a waterbody will hurt water quality so much that the waterbody cannot achieve its designated use? For each pollutant in question for a particular waterbody or category of waters (e.g., rivers, lakes), the Clean Water Act expects the state to try and answer this question.

"Water quality criteria" are specific numbers for specific pollutants which the state decides are needed to protect a waterbody's designated use. These criteria are formally adopted by the state and are the second major part of the Clean Water Act's "water quality standards" program.

### **Element 4 A Clean Water Act permit is needed to dispose of pollutants into water through pipes or ditches, or similar means.**

Under the Clean Water Act, it is illegal for a factory, processing plant, municipal facility, construction sites, large feedlots and other types of operations to dispose of pollutants into waterbodies through pipes, ditches or other discrete means of conveying waste. Only when an entity has a permit issued under the Clean Water Act National Pollution Discharge Elimination System, or NPDES, is this permissible. The NPDES permit sets how much of a particular pollutant a facility will be allowed to dispose of or discharge into a waterbody. Row crop agriculture is not subject to this aspect of the law. It is exempted from NPDES permitting requirements.

A facility disposing of pollutants into a waterbody through pipes, ditches or other discrete means of conveyance are called "point sources" under the Clean Water Act. The act of disposing pollutants into water like this is called "discharging." Farmers, ranchers and other land users like them are considered "nonpoint sources" of pollutants where runoff into a waterbody is a result of rain or snowmelt. Nonpoint sources do *not* need NPDES permits.

**Element 5 Permit holders can discharge only at lowest level possible using best technology that is economically achievable.**

NPDES permits require the permit holder to achieve what the regulatory system believes is the lowest possible level of pollutant discharge that is economically achievable for the industrial sector to which it belongs through use of “best available technology economically achievable.” EPA goes through a comprehensive process to assess what is the best technology available that is economically achievable and then establishes what level of pollutant discharge that technology achieves. Permit holders do not have to use this EPA-identified technology. They just have to achieve the specified level of discharge. How the permit holder does that is their own business. However, the EPA “model technology” for a particular pollutant and a particular industrial category is what the permit holder in that category commonly will use.

The process to establish the best available technology that is economically achievable is part of the Clean Water Act and is called the “effluent guidelines” program. Livestock producers just went through a 3 year process to revise the effluent guideline Concentrated Animal Feeding Operations (CAFO) and the end result was included in the 2003 CAFO rule. Mandatory CAFO nutrient management plans for permitted CAFOs are one of the most prominent changes that came with the new rules for CAFOs.

**Element 6 Runoff from agricultural and other lands is exempt from the Clean Water Act’s mandatory permitting requirements.**

Some activities can contribute pollutants to water but are exempted from the Clean Water Act permit requirement. Most prominent in this category are row and specialty crop agriculture, forestry and septic tanks. Essentially all of corn farmers’ crop production activities fall into this category. The Clean Water Act provides for voluntary, state-level programs for these activities as a way to reduce runoff of pollutants.

The Clean Water Act calls runoff from farming, ranching and similar other land use activities “nonpoint source pollution.” Nonpoint sources do *not* need NPDES permits. The Clean Water Act’s voluntary program for nonpoint source pollution was established by amendments adopted in 1987 in Section 319. The program is conveniently called the “Section 319” program. Federal funds are provided to the states through this program to help them develop and implement nonpoint source management programs.

**Element 7 Sometimes a waterbody is still too polluted, even after technology-based permit limits for point sources have been implemented and, perhaps, some BMPs are being used by nonpoint sources.**

States survey and report on what is known about the quality of their waters every two years. These findings are reported to EPA. Sometimes these reports find that a waterbody is too polluted based on its designated use even when all the point sources are in accordance with their Clean Water Act permits. That is, such waterbodies fail to meet one or more water

quality criteria for one or more pollutants; hence, they are “impaired” for the designated uses to which these criteria apply. The list of such waterbodies that each state is supposed to submit to EPA every two years is called the “impaired waters list” or the Clean Water Act section “303(d) list.” Once a waterbody becomes “impaired” the Clean Water Act requires a state to prepare a TMDL for every waterbody/pollutant combination that appears on its 303(d) list. Typically, it is several years after a waterbody first appears on a 303(d) list before one or more TMDLs for it are developed.

**Element 8     A TMDL sets the total amount of a pollutant that is supposed to go into an “impaired” waterbody, and for everyone in that watershed the same TMDL sets their share of this total.**

When a waterbody gets too polluted, or “impaired,” the Clean Water Act requires states to identify the maximum amount of a pollutant the waterbody can receive and still meet applicable state water quality standards. This amount is set low enough so that over a reasonable period of time the water quality of the impaired waterbody will recover to the desired levels.

A TMDL is two things: 1) the setting of the total maximum load the waterbody can accept (the “loading cap”); and 2) the allocation of that pollutant load among the parties that are putting the pollutant into the waterbody. Monitoring data and models of water quality are used in a TMDL process to understand the waterbody and how the pollutants are entering it. The data and models also are used to decide how much of the problem pollutant is coming from point sources like factories and sewage treatment plants versus how much is coming from nonpoint sources like farming and urban lawn care. The “TMDL cap” is divided up among all of the permit holders and nonpoint source contributors. The portion of the TMDL loading cap assigned to point sources is called the Wasteload Allocation (WLA). The portion assigned to the nonpoint sources is the Load Allocation (LA).

Background sources of the pollutant, such as those that occur naturally also are taken into account. The Clean Water Act requires that a “margin of safety” (MOS) be added as well to ensure that the loading called for in the TMDL will be low enough to meet applicable water quality standards. A basic rule applicable to all TMDLs is that the sum of the WLA, LA, natural background load and MOS must be no greater than the overall loading cap established by the TMDL.

TMDLs do not establish new implementation authorities. Instead, they are implemented through existing requirements such as NPDES permits for point sources and voluntary BMP programs for nonpoint sources like agriculture.

**CHART 1. Eight Key Elements of the Clean Water Act**

<b>Element</b>	<b>Clean Water Act Concept</b>	<b>Clean Water Act Terms</b>
Element 1	Protect water quality by keeping things out of water that don't belong there.	Pollutants such as sediment, pesticide and nutrient run off
Element 2	How would we like a waterbody to be used?	Designated Use
Element 3	How much of a pollutant in a waterbody is too much for support of a given designated use?	Water Quality Criteria
Element 4	Clean Water Act permit needed to dispose of pollutants into water through pipes or ditches, or similar means.	Point Sources, Discharge and NPDES Permits
Element 5	Permit holders can discharge only at lowest level possible using best technology that is economically achievable	Technology-based Effluent Limitation Guideline
Element 6	Runoff from row and specialty crop agriculture, forestry and septic tanks are exempt from Clean Water Act permitting requirements	Nonpoint Source Section 319 Program
Element 7	Sometimes a waterbody is still too polluted even when point source permit requirements are met and some BMPs are being used for nonpoint sources	Impaired Water/Section 303(d) List
Element 8	Calculating the maximum amount of a pollutant a waterbody can receive and dividing that up among all of the point sources and nonpoint sources	Total Maximum Daily Load



## **IV. Case Study: A Total Maximum Daily Load for the Poplar River Watershed**

*The following case study is an illustration presented for educational purposes. It is a fictional TMDL based on a real TMDLs being developed for waters in the Corn Belt.*

### **The Watershed and the People In It**

The Poplar River flows for 135 miles before it joins a major Midwestern river that, in turn, joins the Mississippi River. The Poplar River is formed when three upstream rivers join: the Pine River, the Cottonwood River, and Branch Creek.

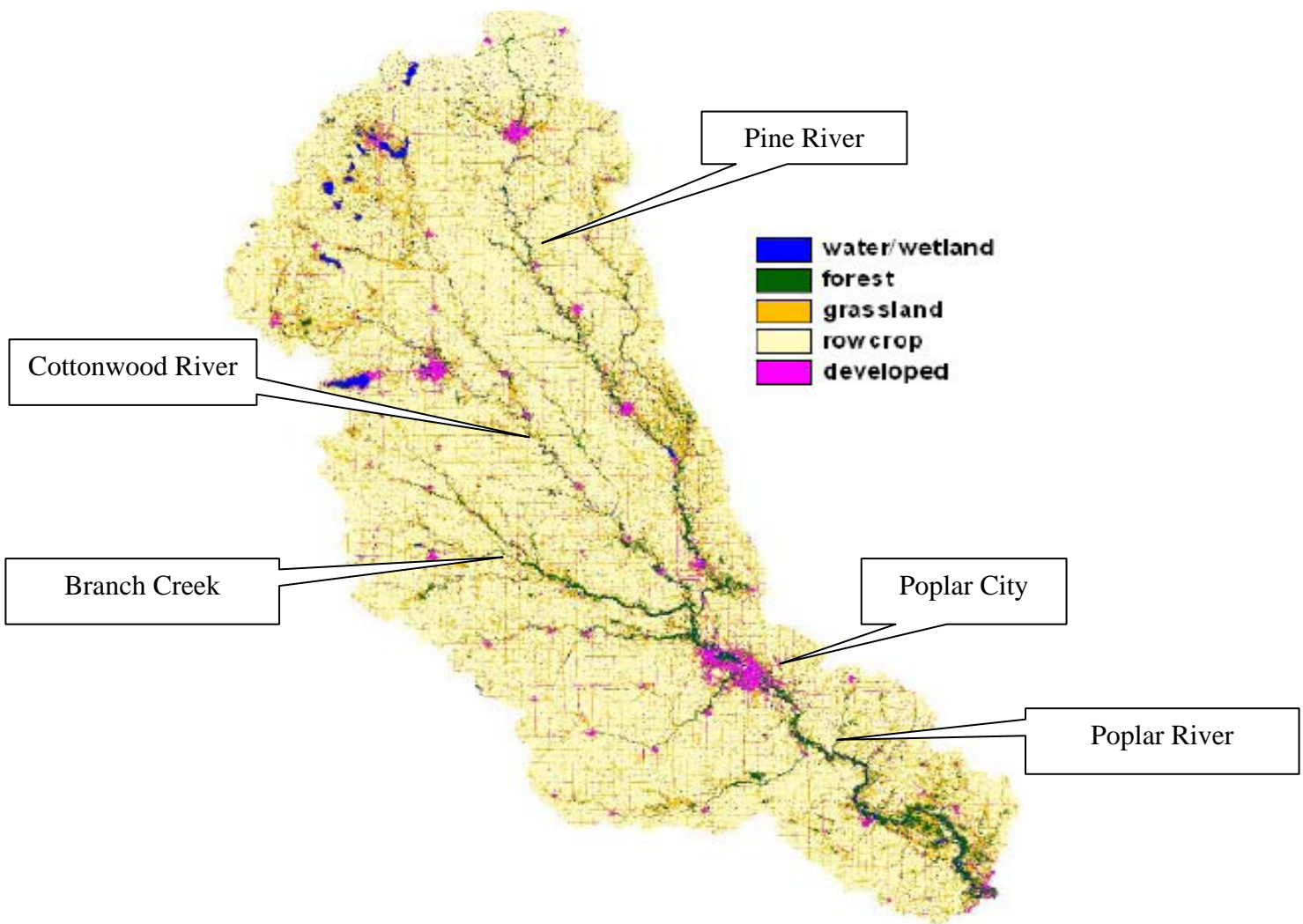
Nearly 8,000 square miles of land (5.1 million acres) are drained by the Poplar River and its three main tributaries. Nearly 750,000 people live there, most of whom are in several small cities and over 125 small towns. Poplar City is the largest city in the area and home to about 200,000 people. Poplar City and the other urbanized areas get their drinking water from the Poplar River.

All of the small cities and towns treat their sewage. Poplar City discharges effluent from its sewage treatment plant into the river as well as 10 other smaller cities. All have discharge permits under the Clean Water Act. In addition, eight of the urbanized areas (including Poplar City) are large enough that their stormwater runoff discharges are point sources regulated by federal Clean Water Act (NPDES) permits.

The watershed is mostly agricultural. Over 75 percent of the land is farmed for row crops, primarily corn and soybeans. Alfalfa is also widely planted. Figure 2 (next page) shows the Poplar River drainage and the use of its land. On the map, Poplar City is the large urbanized area just below the center. The map also shows extensive forest buffer strips along all of the major watercourses installed through USDA's Conservation Reserve Program to protect water quality.

Two large CAFOs are located in the Poplar River drainage area, both of which occasionally discharge and both of which have NPDES permits. Numerous small industrial operations also are present throughout the watershed, including a fertilizer plant and several makers of small appliances. Many of these facilities discharge effluent into the Poplar River or one of its upstream stems. About 25 NPDES permits have been issued to various industrial enterprises and municipalities in the drainage area.

**FIGURE 2. The Poplar River, fed by the Pine River, the Cottonwood River, and Branch Creek**



### **The Rivers and the Water Quality Problems**

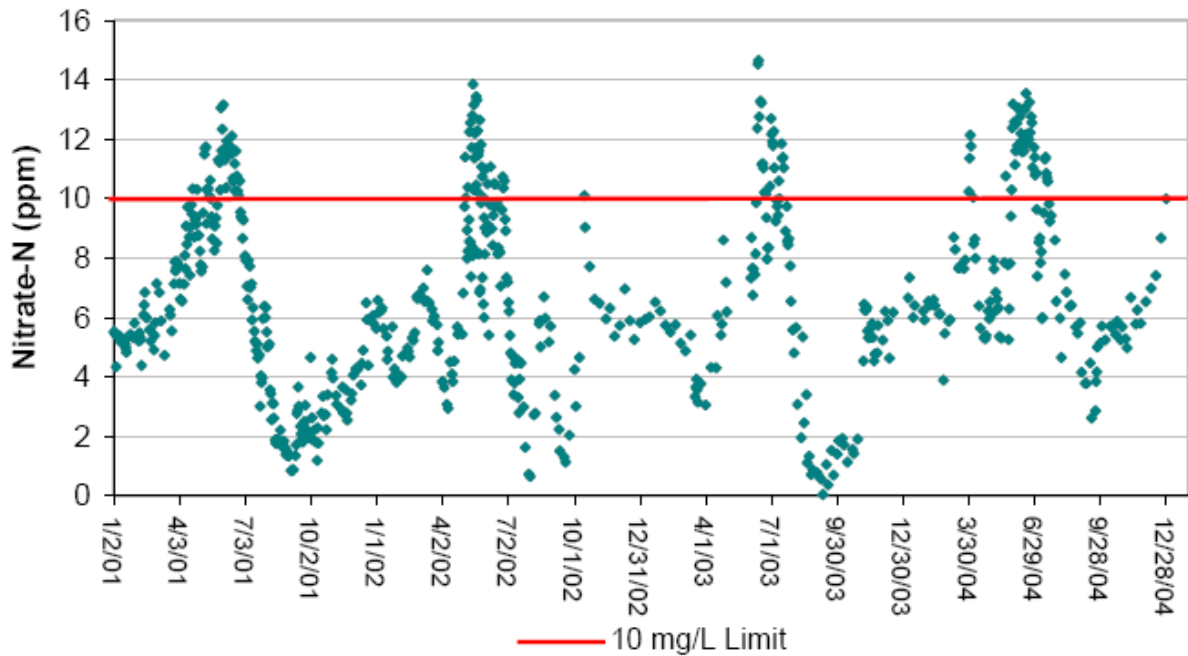
The Poplar River is a wide and winding river, too shallow for boating except near the very end where it drains into a major Midwestern river. It is warm but shady, thanks to extensive forest buffers. Catfish and other local sport fish can be found. As a result, it is a popular destination for picnickers and fishermen in certain locations. Because the river is so shallow, few people swim in it but they could if they wanted to. This same generalized picture is also true for the Pine and Cottonwood Rivers and Branch Creek, although the further upstream the less shady the rivers become.

The state regulatory agency, together with EPA and the U.S. Geological Survey, has measured pollutants extensively in the Poplar River and the three main rivers that feed it. Concentrations of pesticides, metals, and fecal coliform (associated with sewage and livestock) are all within acceptable levels to protect health as well as fish and other aquatic life. However, Poplar City has regularly exceeded the federal drinking water standard for

nitrate in its drinking water supply, which it obtains from the Poplar River. Under the Federal Safe Drinking Water Act, Poplar City faces the prospect of substantial fines and may be required to install treatment at its drinking water plant to remove nitrates, at a cost of \$10 million.

In 1975, the state “designated” the Poplar River’s use under the Clean Water Act as a drinking water supply. The state established numeric water quality criteria for a number of parameters, including a nitrate criterion of 10 milligrams per liter (mg/l), as a 24-hour average never to be surpassed. Subsequently, the state determined that 24-hour average concentrations of nitrate in the Poplar River often were around 40 mg/l. Hence, the state identified a 15-mile stretch near Poplar City as “impaired” for its drinking water designated use due to excessive levels of nitrate. As a result, the state is required by the Clean Water Act to develop a TMDL for nitrates for this stretch of the river.

**FIGURE 3. Nitrate-N measured at Poplar City from 2001-2004.**



## **A TMDL Is Needed – How to Proceed**

There are two regulatory agencies that worked on this TMDL: the state water agency and the Regional Office of the EPA. The state water agency is responsible for developing the TMDL. Under the Clean Water Act, EPA must approve the TMDL or, if it disapproves the TMDL, EPA must establish its own. EPA frequently gets sued by environmental groups over TMDLs such as this one. So, EPA took an active role in working with the state to help make sure this TMDL was done in a way that it can be approved and defeat any legal challenge.

The perspectives of these two regulatory agencies were similar although there were some important differences. The state and EPA agreed that a TMDL for nitrates was needed. They both agreed that the TMDL needed to be based on extensive data and the best available computer models. Most importantly, they agreed that the TMDL should be one that would be implemented so that the water quality standards for the Poplar River would be achieved in a reasonable time. Hence, the state agreed to work with EPA, other agencies and key stakeholders to develop an implementation plan for the TMDL.

## **Estimating Pre-TMDL Loading Rates**

Though EPA regulations do not require inclusion of estimates of existing pollutant loadings in TMDLs, most states have chosen to do so.

To begin the process of developing a TMDL, the state compiled extensive data on the levels of nitrate up and down the Poplar River, the Pine River, the Cottonwood River, and Branch Creek. In addition, the state assembled several years of information on the total quantity of water that passed various points along the rivers.

This information was then combined using computer models to yield the total load of nitrate that the Poplar River carries at many points along its course, including the impaired section of the river near Poplar City. During critical conditions of precipitation, stream flow and point source discharge, the nitrate load to the impaired reach was estimated to be 250 lbs. per day.

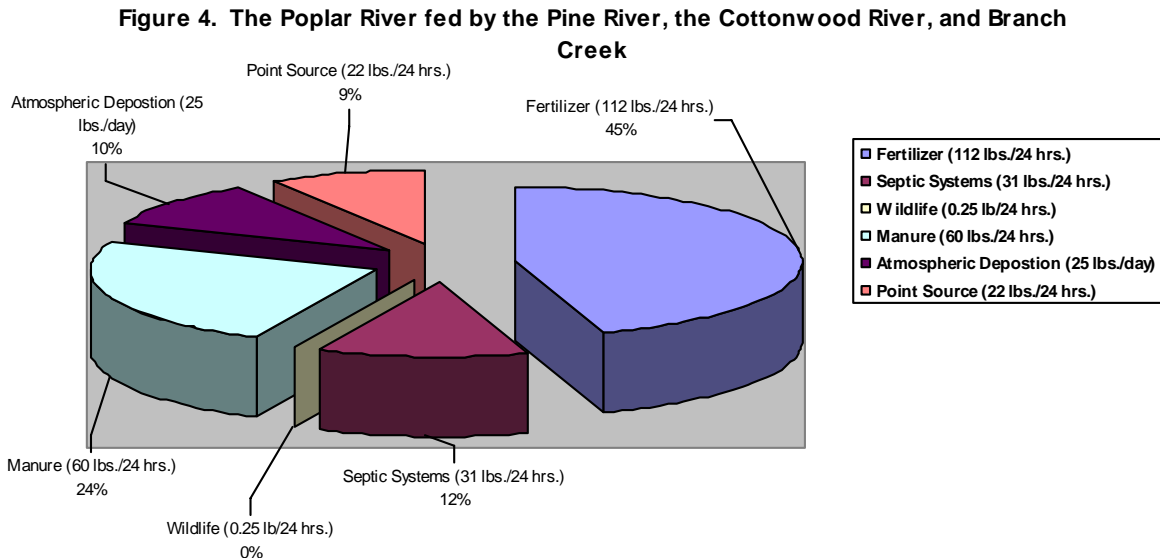
The state then cataloged all point sources in the 8,000 square-mile area of the Poplar River watershed that are regulated by NPDES discharge permits. A point source is a municipal, industrial or any other facility that disposes of a pollutant or pollutants into waters of the United States through a discrete pipe, ditch or other means of conveyance. The state calculated the total loads of nitrate contributed by these sources using monitoring data and computer models. The estimate was 22 lbs. per day (9 percent of the total load of 250 lbs. per day).

The state then examined background sources, meaning those sources of nitrate which either naturally occur or for which no practicable control methods are available. Nitrate found in

water can come from wildlife, especially deer and Canadian geese. In this case, wildlife were estimated to contribute an insignificant amount – just 0.1 percent of the total. Additionally, nitrate found in water coming from the atmosphere, for example via acid rain, was identified as a source. Air deposition of nitrates was found to be a significant source to the Poplar River during the spring, about as large as the contribution from regulated point sources. Its contribution during critical conditions was 25 lbs. per day (10 percent of the total).

Lastly, the state examined three other possible sources of nitrate loadings to the Poplar River and its feeder rivers: septic systems, runoff of excess animal manure, and runoff of excess fertilizer. Using census data, USDA data, and information from the state department of agriculture, the state estimated contributions of nitrate to the Poplar River coming from each of these categories of sources.

Figure 4 illustrates the result of the state’s calculations on the sizes of the estimated current loading contributions from the different sources of nitrates to the Poplar River: septic systems – 30 lbs./day (12 percent of total); excess animal manure – 60 lbs./day (24 percent); and excess fertilizer – 112 lbs./day (45 percent).



### Calculating The Loading Cap

The state calculated, based on the flow of the Poplar River and other factors, that in order to meet the water quality criteria of 10 mg/l, the total maximum load of nitrates would be 137 lbs. every day. This corresponds to an overall reduction of about 45 percent from current levels.

## **Selecting a Proposed Allocation of the Loading Cap**

First, the state decided that achieving reductions in air deposition of nitrogen, though technically feasible, would be very unlikely. The state proposed that the load allocation from air deposition would be equal to current loads (25 lbs./day.).

Then, the state turned to the regulated point sources and proposed a total wasteload allocation for them of 17 lbs./day, corresponding to a 23 percent reduction from their current loading rate.

Next, the state turned to agriculture and septic systems, both nonpoint sources. For septic systems, the proposed load allocation was set at 25 lbs./day, which equals a 20 percent reduction from pre-TMDL levels. The load allocation for sources of manure was proposed at 40 lbs./day (33 percent reduction). Since the total allocation for point sources, air deposition, septic tanks, and manure runoff totaled 107 lbs./day, the remaining 30 lbs./day of the overall loading cap of 137 lbs./day was available for assignment to sources of chemical fertilizer. Therefore, in order for the impaired stretch of Poplar Creek to achieve water quality standards, maximum 24-hour loads of nitrates from fertilizer would have to be cut from 112 lbs./day to 30, a 73 percent reduction.

## **Stakeholder Involvement in the TMDL Process**

Row crop agriculture, including the state corn growers association and other important farm groups, received a form letter from the state inviting them to participate in the process of developing a proposed TMDL but were not contacted again before the process got underway. The public hearings were in Poplar City and the state capitol so many farmers could not attend; public notice documents were poorly written and hard to understand. No one articulated very well to farmers in the Poplar River drainage basin what the risks and opportunities might be for them.

In contrast, point sources, especially Poplar City, were very active from the beginning in working with the state to develop a proposed TMDL. All of the municipalities were very afraid that they would be required to install expensive treatment systems in their sewage treatment plants to remove additional amounts of nitrates from their discharges. They pointed out that they had already been subject to regulation under the Clean Water Act whereas nonpoint sources like farmers had not been required to reduce their loadings of pollutants. They further argued that it would be unfair to ask municipal sewage plants to fulfill a high level of reduction from their current levels. They suggested that the TMDL call for minor reductions from point sources with higher cuts coming from nonpoint sources.

As noted above, the first proposed allocation of the loading cap called for a 23 percent reduction in loads from point sources, while loadings of nitrogen from commercial fertilizer use would need to be reduced by 73 percent in order to meet water quality standards.



To its credit, the state realized that it had missed a very important opportunity in developing its proposed TMDL by not working closely enough with farmers and producer groups. There was little chance for the final TMDL to be implemented successfully without farmer support and full participation. The two public hearings on the proposed TMDL were dominated by speaker after speaker blaming nonpoint sources for pollution problems and yet farmer groups were noticeably absent. The director of the state agency realized that something was wrong and intervened personally. The NRCS state conservationist was called in for help and advice.

Together, the water agency director and the state conservationist met with the directors of the major state farm groups. They talked about the failure of the state to work closely with the agricultural community on this particular TMDL, and talked about ways to get a dialog established in a more collaborative way.

The major state farm groups felt they had been asked to achieve a disproportionate degree of reduction in the 24-hour load of nitrogen from their operations, compared to the point sources, and so they decided to get involved. The main problem was time: the state had developed its proposed TMDL without adequate involvement of the farming community and, under pressure from EPA, was rushing to finish it. The farm groups pointed out that additional time was needed to collect more information about the role of farm operations in current loadings and possible alternative allocation schemes.

The state director agreed that more time was needed and convinced EPA that this buy-in was crucial to actually implementing the TMDL. EPA agreed to a substantial extension of the schedule for developing the TMDL.

### **Final Allocation of Loads**

The state decided to revise the allocation of the loading cap among all the sources after numerous meetings with representatives of the farm community and further discussion with the affected point sources. The reductions expected from row crop agriculture would be more commensurate with those to be required of point sources as well as from other nonpoint sources such as pasturing of livestock and septic systems. The consensus allocation was:

Air deposition:	25 lbs. per day
Septic systems:	15 lbs. per day
Point sources:	10 lbs. per day
Manure:	30 lbs. per day
Fertilizer:	57 lbs. per day

Thus, by getting involved, though belatedly, sources of chemical fertilizer were able to nearly double the original nitrogen allocation assigned to them from 30 lbs. per day to 57 lbs. per day. Rather than aiming for a 73 percent reduction in nitrogen runoff from their farms, row crop agriculture would be striving to achieve a significantly lower reduction of 51 percent.

## **TMDL Implementation Plan**

Implementation plans are not required elements of TMDLs under federal law, and therefore, are not subject to EPA approval/disapproval. However, the state agreed not only to send the draft implementation plan to EPA for informal comment but asked EPA for help in developing certain aspects of the plan. Work on the implementation plan began during the development of the TMDL itself and was scheduled for completion six months after formal EPA approval of the TMDL.

The state water agency had developed good relationships with agriculture, including the state corn growers association, and trusted that agricultural producers would install the needed BMPs with the support of NRCS. Likewise, EPA worked with the state to help farmers obtain dedicated funding from USDA to support the installation of needed BMPs.

The NRCS state conservationist identified a broad set of nutrient management and related land-use BMPs that would be suitable for the land and farming practices used in the watershed. The three main USDA financial assistance programs that could be of assistance in the adoption of these BMPs were the Environmental Quality Incentives Program, the Conservation Security Program, and the Conservation Reserve Program. The Farm Services Agency (FSA) state executive director and the FSA state committee chair were brought into the discussion and they indicated interest in working with farmers, the state and NRCS to see if a Conservation Reserve Enhancement Program (CREP) could be initiated in the watershed to speed up the adoption of conservation buffers (the process to create the CREP is moving forward, but not yet completed). Lastly, the NRCS state conservationist also committed to helping ensure that NRCS staff or NRCS funded private technical service providers would be available in the watershed to give farmers the help they need to adopt all of these practices.

For the next six months, the state conservationist, the water agency director and their staffs successfully worked with representatives of the major farm groups to identify specific BMPs that could be installed as well as specific changes to nutrient management that could be adopted by corn and soybean growers in an attempt to achieve their reduction target of 51 percent. These included the following:

- Consistent use of more aggressive nutrient management planning techniques, including such practices as:
  - Examining yield expectations to determine if they need to be reduced given realistic estimates of potential yields and then making an associated adjustment in recommended nitrogen fertilization rates;
  - More consistent and thorough use of soil testing, fully crediting for soil nutrient content when setting nutrient application rates;
  - Greater use of spring versus fall applied nitrogen, banding of nitrogen and use of nitrification inhibitors;
- Drainage water management systems that:
  - Retain water and nitrogen in the field
  - Do not inhibit spring field work but reduce the amount of water and nitrogen leaving the field; and



- Provide greater soil moisture available for crop growth during the growing season;
- Aggressive adoption of ditch, stream and riverside vegetated buffer strips.

The state also spent time working with the NRCS state conservationist and farm groups on trying to pinpoint exactly where in the Poplar River watershed improved BMPs could yield the best water quality improvements downriver. Most importantly, NRCS, the state and farm groups agreed on a very specific strategy for increasing education for growers about needed BMPs in critical locations. NRCS also agreed to increase financial assistance to help accelerate the installation of needed BMPs in the most important areas.

This specific BMP strategy, with the backing of major state farm groups, became the centerpiece for the nonpoint source components of the state's final TMDL implementation plan. Similar detailed strategies were developed for the other key types of nonpoint source pollutants, including manure from grazing operations and septic tanks. For point sources, the implementation plan consisted of more stringent NPDES permit limits based on the WLAs assigned to them in the TMDL.

The support of the farm groups and the financial backing of NRCS proved key to addressing one of the fundamental concerns raised by local and state environmental groups—did the plan provide reasonable assurances that the measures called for on agricultural lands would in fact be adopted? The farm groups' willingness to work on these measures with the technical and financial support from NRCS provided to the state's satisfaction such assurances and all the parties were able to point to these measures in the final plan. EPA approved the state's final TMDL and no environmental group challenged it.

The TMDL will take five to eight years to accomplish its goal as point and nonpoint sources all do their share. The water quality standards for nitrates are still being exceeded but they are expected to be met when the TMDL is fully implemented. While drinking water standards for nitrates are still being exceeded in the Poplar City municipal water supply, the utility company has already initiated some interim changes in the chemical treatment of its drinking water that have dramatically reduced the frequency of the exceedances, though at significant cost. EPA, the state and Poplar City agreed that a new drinking water treatment system is not needed for nitrates since the nitrate TMDL for the intake water will likely be successful in bringing the level of nitrate in the city's raw water supply down to the levels for finished drinking water set in the Safe Drinking Water Act (SDWA).

## V. Lessons Learned And Opportunities

The Poplar River TMDL case study just presented reflects hypothetical views, perspectives and needs of stakeholders but they are very similar to those in real TMDLs happening today. Sometimes the pollution problem is different. Instead of nitrates, the problem might be high levels of herbicides, pesticides or excessive sedimentation. Sometimes the interplay of interests and personalities are different, too – state representatives may be less engaged or sometimes much more forward-thinking. Sometimes differing, passionate stakeholder perspectives and litigation can make solving a pollutant problem seem very challenging. The Poplar River case study gives an example of various groups’ collaboration; ultimately, the farm community was pleased that it was able to nearly double the nitrogen allocation assigned to it.

Often farmers are very reluctant to get involved early in a process like this – the jargon is unfamiliar, the regulatory atmosphere appears risky and sometimes it is hard to see how the time and effort required will benefit an individual farmer. Unfortunately, declining to participate in a TMDL in your watershed could lead to some real and serious consequences. Corn growers enjoy a reputation of being excellent neighbors and best stewards of land and water. However, this reputation can be lost in a particular watershed if the TMDL is prepared and the growers in the area do not participate.

The experience with finished TMDLs highlights that it is better to get involved early and take advantage of every opportunity to affect the course of discussions and decisions.

There are some particular strategic and practical approaches that corn growers can take that can help increase the chances that, if one must be prepared, the TMDL will turn out well. The eight major elements of the Clean Water Act were explained in the Introduction. Four of these elements constitute key places and ways that growers could get involved to have the greatest affect and to be the most successful. These are:

Element	Clean Water Act Concept	Opportunity
Element 2	Use of a waterbody	Change the “designated use” for a waterbody so that the level of water quality needed accurately affects how the water is used and the level of quality that is really attainable.
Element 3	How much of a pollutant is too much?	The answer to this question is not always scientifically obvious and different scientific conclusions are possible. Farmers can weigh in during this process on behalf of the science that makes the most sense.
Element 7	Waterbody is too polluted	The answer to this question also is not always scientifically obvious and different scientific conclusions are possible. Assumptions involving judgment calls and the applications of different types of water quality models are examples of this. Farmers can weigh in during this process on behalf of the science that makes the most sense.
Element 8	Calculate the maximum amount of a pollutant a waterbody can receive and divide that up.	How to divide up the pollutant load “pie” is rarely scientifically obvious. Farmers can weigh in and have an effect.

## **Making Sure Regulators Have Given Waterbodies the Right “Use”**

TMDLs are prepared for waterbodies that have been found to be too polluted to support the use that the state has designated as appropriate for the waterbody. It takes less pollution to trigger this finding in a waterbody that is given a more pristine use than it is for a waterbody that is recognized as having other uses more traditionally associated with human activities and communities. Getting this designated use right is the first step in ensuring that the regulatory water quality goals are not being set too high.

Every waterbody in the country has a designated use, with only an extremely small number of exceptions. Most are built on some variation of “fishable and swimmable,” although other more detailed uses are very often found in state water quality standards. In some cases, though, these designated uses were set universally for every waterbody in an entire state. While these broad uses might make sense in some or most waterbodies across a state, it often happens that for a particular waterbody a designated use can be impossible to ever meet.

The Clean Water Act requires all states every three years to update its water quality standards, including the designated uses for its waterbodies. This creates an opportunity for groups like agriculture to become involved with state water agencies in making sure that the designated uses are appropriate. Designated uses can be changed where the state has demonstrated – through a “use attainability analysis” – that the current designated use is infeasible. The state must publish the use change for public comment and show that the newly proposed use is the highest attainable use. In some farm states, notably Oklahoma and Kansas, substantial changes to water quality standards have occurred in farm country due, in large part, to the direct involvement of agricultural groups.

## **How Much of a Pollutant is Too Much**

Even though we know a waterbody’s designated use, and we know that certain things going into that waterbody will prevent us from being able to attain that designated use, the practical question is “how much of that thing or pollutant is too much?” How much of a pollutant disposed into a waterbody will hurt water quality so much that the waterbody cannot achieve its designated use? For each pollutant in question for a particular waterbody, the Clean Water Act expects the state to try and answer that question.

Criteria for pollutants are always expressed as quantities of a pollutant that can be present in the environment while still protecting fish, other aquatic life or human health. These numbers are then based on scientific guidance that EPA produces but states have great leeway on the exact numbers they choose. For many pollutants, especially metals and pesticides, these numbers are well established and are difficult to change. For others, though, numbers have never been set.

The biggest opportunity for corn growers is setting criteria for nutrients in state water quality standards to protect aquatic life. Most states do not have any concrete measure of how many nutrients in water are too much, especially to keep too much algae and slime from forming. Nonetheless, many states still list waterbodies as “impaired” for nutrients, saying that they do not meet water quality standards. All states and EPA are aware of this difficulty and are now working to develop new “numeric” criteria for nutrients in state water quality standards.

EPA has published a methodology on how to go about setting these numbers and has issued extensive guidance on the appropriate numbers and data the state should consider. Most states are working with the U.S. Geological Survey and other agencies to gather extensive data on nutrients as a first step towards actually adopting numbers into their water quality standards. Since the adoption of these numbers will potentially cause the listing (or perhaps delisting) of waters as impaired, it is important for state corn grower associations to stay abreast of state water quality standards for nutrients. It may also be very important for the producer associations to weigh in early on the science and assumptions that states are making about possible numbers for nutrients in waterbodies. Early involvement will payoff later, by helping to make sure that the state makes sensible decisions and that the standards can actually be attained.

### **Making Correct Decisions About Whether a Waterbody Really Is “Impaired”**

No matter what the designated use of a waterbody, and the standard that the state regulatory agency sets for how much of a pollutant is too much, state water agencies can have a difficult time determining whether or not a waterbody is actually so polluted that it can’t properly be used per its designated use. Is one incident a year where there is too much of a pollutant too many? What about extreme weather conditions and floods?

The process that every state uses to determine whether an impairment exists is very similar to that presented in the Poplar River TMDL case study. state agencies collect large amounts of monitoring information from many sources, use several different computer models and apply “professional judgment.”

Nearly all states have adopted a methodology for determining whether an impairment exists on any given waterbody, most of which are available on the Internet. They are usually called “assessment methodologies.” Although they are technical documents, these methodologies are open to improvement and are often revised.

So, two good opportunities exist to affect the decision about whether a waterbody really is impaired. First, the state association can weigh in on the techniques used by the state water agency in its assessment methodology, meaning the general approach the state will use in deciding whether or not water quality standards are met. Second, and most importantly, local growers as well as state associations can weigh in with the state agency on its particular determination that a particular waterbody is impaired.

In both cases, early involvement is helpful to help speed the learning curve and to build good, trusting relationships with key people at the state water agency.

## **Making Correct Decisions on Allocating the Pollutant Load**

The creation of a TMDL that will actually be implemented always depends on the support of all the people and organizations who will be asked to implement it. The allocation of needed load reductions among the respective sources is neither set in stone nor does it have to be done by any set formula. It is a matter for the state to decide. There may be stakeholders at the table that only want to look to row crop agriculture for pollutant reductions. Agriculture needs to be involved in water quality decisions that affect it, especially when it comes to the allocation of load reductions among all the sources in a watershed.

Often, computer models and assumptions are used by the state as they draft a TMDL. By learning more about the models and assumptions that the state uses, agricultural interests can improve their outcomes in the TMDL. What kinds of BMPs are needed and used? Where are they used? How effective are they? Are funding and financial assistance in place? Sometimes the answers to these questions are critical in getting a sensible TMDL that can actually be implemented. Agricultural organizations, including corn growers, are best positioned to help answer these questions and to make sure that agriculture is well represented among stakeholders.

### **Affect the Way You Get Informed and Can Participate**

A very important first step is to pay attention to the letters and phone calls the state water agency usually sends regarding TMDLs that might affect corn growers. Are they timely? Are they understandable? Or do you get them at all? If the answer to any one of these three questions is *no*, then this is an opportunity for the state association to call the state water agency and find the key person in charge. Firmly insist that you get proper and understandable notice. It's your right. If you are lucky, you might also make a friend at the state agency that may be able to help you later.

The second step is to make sure that your participation is welcome. Any sign that low-level staffers at the state agency are avoiding you or are otherwise putting you off? Direct calls from a director of a state association to the director of the state water agency or chief lieutenant may be necessary. On occasion, help from a key state legislator or a key ally in the Governor's office may be needed. A number of states have developed specific mechanisms for key people to participate in the TMDL process. They have names like WAG (watershed advisory group) or BAG (basin advisory group) or many others. These are usually advisory in nature and can be more or less effective in finding solutions that everyone can support. Other participation mechanisms exist, including facilitated dialogs sponsored by the state or others. Sometimes no participation mechanism exists for developing a TMDL, other than the normal process of legal notice and comment. This rarely works well and may signal a need for more intensive involvement by the state association.

It is important that each state association take stock of its members and experiences to determine whether or not the state participation mechanism is working, especially regarding the way in which the state decides how to allocate loads among point and nonpoint sources. Sometimes, as the Example showed, the NRCS state conservationist and state agriculture groups can have a very positive impact when state processes are not working well.

# Appendix A: Advanced Information on Total Maximum Daily Loads

## Introduction

As noted throughout this desk reference, a Total Maximum Daily Load (TMDL) is the total amount of a pollutant that can be received by a stream, river, lake or bay without exceeding the water quality standards that apply to that waterbody. TMDLs do not establish new implementation authorities but are implemented through existing requirements (such as NPDES permits for point sources) and voluntary programs (for nonpoint sources, including row crop agriculture).

TMDLs are established only for those waterbodies that do not meet their standards. A TMDL specifies the amount of pollution reduction necessary to achieve the water quality standard, and allocates this needed reduction among the various sources of the pollutant to the waterbody.

A water quality standard is the minimum goal set or affirmed through a process established by the Clean Water Act for ambient water in every waterbody in the country. They are highly customized and vary from place to place. Under the Clean Water Act and EPA's regulations, water quality standards must designate specific desired uses for each waterbody, such as swimming, drinking, warm-water fishery and aquatic life. Standards also include specific numbers for specific pollutants which are necessary to protect the desired uses of that waterbody. It is common for states to include numeric values in their standards for a long list of pollutants.

Water quality standards are set by states and submitted to EPA for approval or disapproval. They must be reviewed by states every three years and all revisions must be submitted to EPA. Where EPA disapproves a state water quality standard, then EPA establishes the standard in place of the state. Since state and EPA water quality standards are almost always established via regulations, though, they are often difficult to change if the standard is incorrect or if it is not attainable.

The following sections provide more detailed information about how the Clean Water Act views and defines point and nonpoint sources, the water quality standards program and the TMDL program itself. It covers some of the most commonly asked questions about the process such as what is a TMDL, how they are developed and implemented and why it matters. It concludes with a review of the key questions anyone should be asking about their TMDL once they get involved in order to ensure that the TMDL is correct, credible and workable.

## Point Sources and Nonpoint Sources

The Clean Water Act defines a point source as "any discernible, defined and discrete conveyance" and provides numerous examples, including pipes. Mostly, these point sources are factories, sewage treatment plants, city storm sewers and concentrated animal feeding



operations that discharge pollutants. Regulatory NPDES permits are required for discharges of pollutants from point sources. These regulatory permits are usually issued by states, although in a few states EPA issues them.

In contrast, nonpoint sources are not defined by the Clean Water Act. In practice, they are everything else. Row crop agriculture is clearly a nonpoint source.

No regulatory program is prescribed for nonpoint sources at the federal level. Instead, the Federal Clean Water Act recognizes that numerous other programs and incentives exist for these nonpoint sources, including voluntary action by growers. State governors are required to develop a “nonpoint source management plan” which identifies the Best Management Practices and funding sources for reducing pollutants which might come from nonpoint sources.

EPA provides grants to states for implementing these state nonpoint source management programs. In FY 2006, for example, EPA’s authorized grant funding to states was \$204 million. This funding is tiny in comparison to other federal programs to provide technical and financial assistance to growers, especially those administered by NRCS and the Cooperative State Research, Education, and Extension Service. Most importantly, total federal funding, including funding from USDA, falls far short of the need for implementing Best Management Practices that might be called for in a TMDL.

## **Water Quality Standards: What They Are and Why They Matter**

### **Setting Specific Goals for Specific Water bodies**

Water quality standards adopted by states pre-date the Clean Water Act. All states had water quality standards adopted under state laws to protect public health, some dating back to the late 1800s. When the Clean Water Act was adopted in 1972, it did not require states to throw out all they had done and start afresh; rather, states continued their primacy. Instead, the Clean Water Act established three new elements: new federal minimum requirements, new federal guidance on the science and a new federal oversight role for EPA.

Under the Clean Water Act, state water quality standards must include designated uses, such as public water supply, propagation of fish, recreation, etc. State standards must also include specific numerical water quality criteria, based on EPA science guidance, which will protect the designated use. There are other requirements as well. All state standards must be reviewed by states every three years and revised to take into account new science or changing uses. Any changes are submitted to EPA for approval or disapproval. EPA promulgates its own standards for a state in the event of a disapproval.

These water quality standards are the measure that states and EPA use to determine whether a waterbody is impaired, and therefore must be listed as such and have a TMDL. Accordingly, what standard is in the first place is important to the TMDL process.

All states have designated uses and, for many pollutants, numeric criteria. All states also have general “narrative” criteria which provide a catch-all prohibition on excessive amounts of pollutants for which numeric criteria have not been developed.

## Underlying Science

In contrast to other parts of the Clean Water Act, EPA’s primary role is not to regulate but to oversee state water quality standards programs. A main way it does so is to provide the science to support the states as they adopt standards. EPA provides this science by periodically issuing and updating information about the levels of pollutants that will protect aquatic life and human health. These documents are guidance, not regulation, and may be used or rejected by states as local studies might indicate. However, since EPA approves and disapproves state standards, EPA’s guidance normally carries great weight. EPA also normally uses its own guidance documents as the basis for any replacement standards it might promulgate for a state following a disapproval.

The bulk of EPA’s science documents for water quality standards are for pollutants that are not associated with row crop agriculture. However, three important sets of numbers are important in corn-growing areas: pesticides/herbicides, excessive nutrients and excessive sedimentation.

EPA has guidance numbers for state water quality standards for a number of pesticides and herbicides. Most importantly, EPA has draft numerical values for concentrations of atrazine in rivers, streams and lakes which EPA says would protect aquatic life. Even though they are not final, some states use these numbers as benchmarks to indicate whether a waterbody is impaired and needs a TMDL. This is especially true in watersheds upstream of drinking water supply intakes where atrazine is found at levels which those drinking water utilities believe is a problem.

EPA also has final guidance numbers for excessive levels of nutrients in waterbodies which, EPA says, lead to losses of aquatic life and algal blooms. These numbers (that apply in the ambient water of rivers, streams, etc.) are derived using statistics. Because they were derived statistically and not from local measurements, EPA’s numbers may or may not represent levels which really are a problem in any given waterbody. Because of the scientific uncertainty (which EPA acknowledges) and because of the potential consequences for nonpoint and point sources alike, states have been slow to adopt EPA’s numerical criteria for nutrients in their state water quality standards.

EPA has not yet adopted any numbers, either draft or final, concerning excessive sedimentation concentrations despite the fact that excessive sedimentation is the reason most frequently cited by states that their waterbodies do not meet water quality standards. The science is still very rough and unformed concerning what, exactly, is “excessive.” EPA is now working on a scientific approach and methodology that it will use for developing numbers, but firm scientific guidance on sedimentation will not be available for many years. Therefore, states and EPA will continue to use their *best professional judgment*.



## Changing a Standard

The Clean Water Act includes the notion of “attainability” of water quality standards in one of its goal statements, which EPA translated in the 1970s into “use attainability” determinations in its regulations for the standards program. Where the designated use is not attainable for a variety of reasons, it can be changed to a use that is attainable. Hurdles are high, but changing an unattainable standard is important for agriculture where broad areas of the landscape can be affected by a single unattainable water quality standard.

Some states, notably Kansas and Oklahoma, have successfully negotiated “templates” with EPA as a way to speed up the process of changing an unattainable water quality standard in agricultural areas. In a template, EPA and states agree ahead of time what data is needed and what public participation process will be undertaken. Then, when the state gets that data and goes through the process, EPA’s approval of the changed standard becomes routine. Hundreds of waterbodies have had their uses and criteria changed in this way. Other states, though, are fearful of public backlash and have been slow to make needed changes. EPA, too, has been uneven in its treatment of state demonstrations that water quality standards are unattainable.

## **Total Maximum Daily Loads: How They are Developed and Implemented**

### **Monitoring, Modeling, and Other Assessment Information**

The first step in the TMDL process is to decide whether or not a stream meets the particular water quality standards that apply to that waterbody. Numerous sources of information are used, beginning with monitoring. Direct measurements of the quality of rivers and streams are taken by many governmental agencies, including the U.S. Geological Survey, EPA, state water agencies, fish and game agencies. Most commonly, measurements are taken of water levels (such as stream flow), dissolved oxygen, relative acidity and certain basic elements such as metals. Biological evaluations are also made of the kinds and quantities of fish and larvae living in a particular waterbody as a gauge of health, often termed “biomonitoring.”

However, the extent of surface water in this country is vast and conditions in waterbodies change seasonally, weekly, and even hourly. That means that the chemical and biological monitoring information that states and EPA rely upon is almost always incomplete. To help fill in the gaps, EPA and states have invested heavily in developing computerized models. Numerous models are available which are designed for certain kinds of waterbodies and which are calibrated to local flow and chemical information in streams or lakes. These models predict water quality and are used by states to supplement the actual monitoring information they get. However, they rarely provide predictions accurate enough to definitely determine that a water quality standard is exceeded, any more than the models used by weather forecasters accurately predict the weather at your farm.

### **Impaired Waterbodies: The Integrated Report and Approval of Lists and TMDLs**

The second step in the TMDL process is for the state to decide which of the waterbodies in the state do not meet water quality standards. These are assembled every two years on its list of impaired waterbodies and submitted to EPA for approval or disapproval. Where EPA disapproves, EPA can and does add waters to the list. A TMDL may then be developed for each waterbody on the list.

EPA asks states to assemble all kinds of information about the quality of streams, rivers, lakes and bays (e.g., landscape analysis, complaints and comments from the public)<sup>1</sup> and to solicit a very long list of possible sources of information. The state then must review this information, compare it to the water quality standards and decide whether individual waterbodies meet the standards.

Through its guidance, EPA asks states to develop an “assessment methodology” which explains how the state will make its decisions consistently about attainment of standards. The methodologies include which data will be used, how standards will be interpreted, and how uncertainties and data gaps will be treated. These assessment methodologies are negotiated between EPA and each state so that lists, when they are submitted, are more likely

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<sup>1</sup> *Guidance for 2006 Assessment, Listing, and Reporting Requirements Pursuant to Sections 303(d), 305(b), and 314 of the Clean Water Act* (page 30) available at <http://www.epa.gov/owow/tmdl/2006IRG>.

to be approved. State assessment methodologies are public information and can be very useful in challenging the listing of a waterbody improperly called impaired.

Every two years, states must submit to EPA their lists of impaired waterbodies, i.e. those that do not meet their water quality standards, together with a schedule for completing a TMDL, as needed, for each listed waterbody. TMDLs must then be submitted to EPA when they are completed. EPA must approve or disapprove the state lists and TMDLs and, if EPA disapproves, it must establish those lists and TMDLs in place of the state.

EPA's approvals and disapprovals are decisions that can be challenged in court if they do not meet statutory minimums or if there is no administrative "due process." The same is also true of any waterbodies EPA adds to a state list or a TMDL establishes following a disapproved state submission. As a result, there is always public notice of EPA's decisions, (typically through *Federal Register* notice or on the EPA Regional Office Web site). Usually, these decisions are best tracked at the state-level by staying closely in touch with the key state person working on a TMDL.

The listing requirement of the TMDL section of the Clean Water Act is just one of several overlapping requirements for listing and reporting that the Act establishes for other things. As just one example, each state must also submit separate reports on lakes and on the overall quality of water in the state, commonly called the "305(b) Report." EPA and states collaborated on a way to collapse all of these lists and reports into a single report called the "Integrated Report." While not required, most states are now using this mechanism to give their lists to EPA.

States are asked to classify each waterbody into one (and sometimes more) of the following five categories:

- 1: All standards are met
- 2: Some, but not all designated uses are met
- 3: Insufficient data
- 4: One or more designated uses are not met but a TMDL is not needed
- 5: One or more designated uses are not met but a TMDL is needed.

Most attention is placed on Category 5. This Category may be called the Impaired Waters List or the Clean Water Act section [303\(d\) List](#). Why is this important? If a waterbody near you is listed under Category 5, then a TMDL is being or will be done that could affect you.

Note that Category 4 recognizes that TMDLs do not always have to be done. The easiest example is where a TMDL has already been done and approved, but implementation is not complete so water quality standards are not yet met. EPA also gives very limited exceptions if enforceable requirements have been established for nonpoint sources that will attain the standards. Row crop agriculture does not normally fall into any of these exceptions.

The Clean Water Act also requires that "threatened" waters be listed and get a TMDL, in addition to those determined to already exceed water quality standards. This has historically

meant that a state or EPA needs to predict how a downward trend will result in non-attainment of standards at sometime in the future, even though standards are met now.

### **Priority Ranking and Schedule for TMDLs**

States and EPA have listed about 40,000 waterbodies that need a TMDL but have finished TMDLs for about half that number since the Clean Water Act was passed in 1972. Given the workload, the Clean Water Act requires states to assign a “priority ranking” to the waterbodies and then to establish the TMDLs in accordance with that priority ranking. EPA requires states to establish schedules for doing so. In a number of states where lawsuits compelled EPA to produce TMDLs, firm and enforceable schedules for EPA are established in “consent decrees.”

State and EPA schedules are public information. If a listed waterbody near you has not yet gotten a TMDL, then you can find out when it is scheduled to do so by contacting the state water pollution agency. Some state pollution agencies post their schedules for developing TMDLs on their Web sites.

### **Developing a TMDL: Slicing Up the Pie**

As a consequence of the law and EPA’s regulations, a TMDL for an impaired waterbody consists of these four parts:

- The sum of all the waste load allocations for all the point sources;
- The sum of all the load allocations for all categories of nonpoint sources;
- Background loadings, meaning the contribution of uncontrollable natural sources;
- A margin of safety to account for lack of certainty regarding how water will respond to changes in loadings.

The sum of these four parts must be equal to or less than the loadings necessary to achieve the water quality standards.

There is no prescribed way that the rules or EPA say how the pie must be sliced up, other than NPDES permits for point sources must include limits needed to meet water quality standards. States have freedom to find the most practical approach, within certain constraints. Clearly, everyone has a stake. Just as clearly, these are decisions that are best made at local and state levels, not at an EPA office.

The very best TMDLs are those in which collaboration and discussion occurs among the sources or groups of sources in a watershed. Most commonly, standards cannot be met without dialog and discussion with the agricultural, ranching or forestry community. In these cases, widespread application of Best Management Practices is the goal of the people developing the TMDLs. Experience has taught them that dialog and conversation with agricultural producers is the best way to advance wider application of BMPs; EPA strongly encourages this nonconfrontational approach.

## Implementation

EPA uses a test of reasonable assurance when approving TMDLs submitted by states that include reductions of a pollutant from categories of nonpoint sources. (Reductions from point sources are expected to actually occur because wasteload allocations for each of them must be incorporated into an enforceable NPDES permit.) But since most Best Management Practices are voluntary, EPA and states sometimes have a hard time distinguishing between *wishes* and *promises* when it comes to actual implementation.

States and EPA give credit for the reduced loadings that Best Management Practices can achieve when they believe there are reasonable assurances that the BMPs will actually be implemented. The best way, which is to the advantage of the producer, is for cost-share to be applied. NRCS state conservationists are aware of this need and usually support increased cost-share assistance to farmers where additional Best Management Practices are needed to achieve water quality standards.

## Court Action and Consent Decrees

State decisions can be challenged under state laws in state courts, and EPA actions can be challenged under federal laws in federal courts. As a result of the specific phrasing of the Clean Water Act, particularly the deadlines for action, EPA became a hotbed of litigation on TMDLs beginning in the late 1980s. Virtually all of this litigation was brought by environmentalists seeking to speed up the program. The “mandatory duty” of states to produce lists and TMDLs, and the “mandatory duty” of EPA to act if states failed to do so, was affirmed by federal courts in case after case. As a result of EPA’s losses in court, a substantial number of consent decrees were entered before federal judges which lay out precise schedules for producing lists of impaired waters and TMDLs. Many of these court orders are still in force.

Even though your state may be covered by one of EPA’s consent decrees with an environmental group, it is important to understand that in every case these pertain to schedules for producing lists of impaired waterbodies and TMDLs. They do not pertain to the content of the lists or the TMDLs. The court tells EPA and the state when to do something, but it is still up to the state and EPA to decide what to do with each action. From the perspective of corn growers, these consent decrees do not impose new mandatory requirements on agriculture. Rather, the concern of growers is that the consent decrees add urgency and speed to the process. This haste can lead to ill-supported decisions and undercut the value of collaboration and volunteerism.

## The Watershed Approach

In the 1990s, federal and state officials responsible for reducing pollution jointly articulated for the first time the notion of a watershed approach for improving water quality. The basic tenet was that partnership and collaboration among all landholders in a watershed was the best way to deal with water quality problems. The partnership would be in the best position to find economic and mutually beneficial ways of reducing pollution problems. Numerous

examples of local successes exist, mostly in connection with changes in land use. “Trading” of pollution rights among point and nonpoint sources has also been accomplished in a few places, using the watershed approach.

Most significantly, though, the watershed approach enables states and EPA to adopt a less confrontational and more accommodating posture with agriculture than the traditional command-and-control approach they historically used. In the context of TMDLs, it provides a conceptual framework for states or EPA to conduct discussions with various possible sources of a pollutant causing an impairment in a watershed to find the most beneficial way of developing a TMDL.

### **TMDLs in Perspective**

TMDLs are not developed everywhere. They are only developed for streams, rivers, lakes, and bays for which a problem exists, meaning those waterbodies which do not meet state water quality standards. The TMDL basically says what reductions in a pollutant are needed from which sources in order to meet water quality standards.

TMDLs are not directly enforceable against anyone. Load allocation numbers for nonpoint sources, including row crop agriculture, are never enforceable under the Federal Clean Water Act. Although, many states and localities establish regulations under their authorities for certain kinds of nonpoint sources such as septic tanks or forestry. Wasteload allocation numbers for point sources are normally translated into NPDES permit requirements which then become enforceable for those point sources.

TMDLs have been and continue to be a tremendous workload for states and EPA. To produce all 40,000 TMDLs ideally, with complete data and with good communication and buy-in from all potentially affected people, is impossible. That means that mistakes will be made and that people will be left out of the process. The challenges to everyone are large.

States and EPA increasingly rely on stakeholder-driven processes in complex watersheds and upon the involvement of potentially affected groups everywhere. They are almost always willing to take whatever help they can get. Engagement by potentially affected nonpoint source communities is often missing; states especially are usually hungry for help and support.

### **What is the Process and How Can Farmers Get Involved?**

All states have public participation processes for developing their lists of impaired waters and for developing TMDLs. Likewise, EPA has public participation processes for establishing lists and TMDLs when it disapproves what a state has submitted. Comment times vary, from about 30 to 90 days. Notices are typically found in the *Federal Register* or on the EPA Regional Office Web site.

A few states and a few EPA regional offices have developed effective networks and connections with the agricultural community. In most cases, though, it is difficult to get

specific information about TMDLs that might affect your own farm. The most practical approach is to first find out whether your state has listed a waterbody near your land on its impaired waters list. EPA maintains a reasonably accessible and interactive Website (including maps) of all the listed waterbodies for which TMDLs are needed. See [http://oaspub.epa.gov/waters/national\\_rept.control](http://oaspub.epa.gov/waters/national_rept.control)

If a waterbody near your land is listed, then a TMDL that could affect you may have been or will be developed. You might contact your state corn growers association for support and advice. Other growers in your area might likely be affected as well, so a collaborative approach involving many growers is likely to be more effective than each farmer working singly.

### **Getting it Right -- Important Questions to Ask**

#### **Is the Water Quality Standard Right?**

Many TMDL problems begin with a standards problem. If the water quality standard is wrong or unattainable, then the TMDL will be wrong or unattainable.

In many cases, the state knows that the standard is wrong but has not yet fixed it. Because of the structure of the law, states must list waterbodies as impaired right up until the time that the standard is actually changed. This is a pressure that corn growers can use to their advantage, to try to speed up the state in its process of actually changing a wrong standard.

In some cases, the state may not have focused on the issue of a wrong standard because of staffing cutbacks or other administrative barriers. In these cases, growers should also push to get standards changed if needed. In Kansas, state legislators proved very helpful to that process.

#### **Is a Waterbody Really Impaired?**

Whether or not a water quality standard is actually exceeded for a waterbody is always a matter of judgment. This judgment is rarely straightforward. States collect all kinds of data and information, much of it anecdotal (like citizen complaints), compare it to an often-fuzzy water quality standard, and make their best professional judgment. These judgments can often be debatable.

To solve a problem, people need to understand and agree that there really is a problem. If there is doubt, states should be asked to explain convincingly why standards really are exceeded. If standards are not exceeded, of course, the waterbody does not need to be listed and a TMDL does not need to be done.



## How Do Best Management Practices Get Credit in a TMDL?

When working out the components of a TMDL, states need to calculate the loadings reductions that will occur if and when additional Best Management Practices are put into place for categories of nonpoint sources, either voluntarily or through cost-share. This is how states determine the load allocations that will be assigned to nonpoint sources in a TMDL.

No one has good tools to accurately assess the effects of Best Management Practices on the quality of streams, rivers, lakes and bays; only gross estimates can be derived. By their nature, Best Management Practices, based on experience, are adapt over time. Rain cannot be accurately predicted, farm roads wash out unexpectedly, and millions of other factors make water pollution predictions very rough, at best.

Nonetheless, states and EPA all publicly agree that Best Management Practices are the best state-of-the-art techniques for reducing runoff of excess nutrients, silt and pesticides from nonpoint sources. As a result, all are eager to find a way to broaden the use of Best Management Practices in impaired watersheds, and to give broad credit for them in calculating a TMDL. Corn growers are rightfully proud of the state-of-the-art practices that farmers used every day and should work to get them recognized in any TMDL for a watershed involving corn producers.

## What Does “Daily” Mean?

This is a new and evolving issue which might affect the agricultural community. Historically, states and EPA developed TMDLs with simple numbers to express pollutant loads as annual or seasonal loads because the nature of the pollution or other factors make “daily” numbers inappropriate. All weather-related pollution, including row crop agriculture, has always been treated in TMDLs with long-term loading numbers, not daily ones. It is not possible to calculate daily loads in any meaningful way when it comes to rainfall and snowmelt.

Nonetheless, an environmental group (Friends of the Earth) recently achieved a court victory against EPA by securing a decision from the District of Columbia Circuit Court of Appeals that TMDLs must be expressed in daily terms because that is the term used in the Clean Water Act.

On November 15, 2006, EPA issued a memorandum<sup>2</sup> recommending that all TMDLs include daily load and waste load allocations, but also continue to include weekly, monthly, or seasonal loads as appropriate to facilitate implementation.

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<sup>2</sup> Establishing TMDL "Daily" Loads in Light of the Decision by the U.S. Court of Appeals for the D. C. Circuit in *Friends of the Earth, Inc. v. EPA, et al.*, No. 05-5015, (April 25, 2006) and Implications for NPDES Permits memorandum available at <http://www.epa.gov/owow/tmdl/dailyloadsguidance.html>.



## Appendix B. Common Terms and Acronyms

**303(d) List:** The list of specific waterways in a state that do not meet the water quality standards that the state set for them. This list is revised every two years and submitted to EPA for approval. It is the list of waterways that need TMDLs in each state. This list is also sometimes called the “impaired waters list” or Clean Water Act section “303(d) list.”

**305(b) Report:** A report prepared every two years by each state that describes the overall health of the streams, rivers, lakes and bays of the state. It is based on monitoring information. Section 305(b) of the Clean Water Act requires it.

**Agricultural Pollution:** Farming wastes, including runoff and leaching of excess pesticides and fertilizers; runoff of excess silt; improper disposal of animal manure, crop residues, or debris.

**Assessment Methodology:** An explanation by a state on how it makes its decisions about whether or not water quality standards are met. For example, they discuss which data will be used, how water quality standards will be interpreted, and how uncertainties and data gaps will be treated.

**Attainable or Attainability:** A judgment by the state about whether an existing “designated use” can be achieved. For example, high concentrations of a pollutant can occur naturally in violation of a designated use. Another example occurs when dams (including small check dams) change a stream into a lake. Yet another example is when water quality standards cannot be achieved except with exorbitant cost. When a “designated use” of a waterbody cannot be achieved, the use can be changed.

**Background Level:** In calculating a TMDL, “background level” is the amount of a pollutant that is human-caused, coming from upstream, or is already present and naturally occurring (not human-caused).

**Best Management Practices (BMPs):** Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from nonpoint sources.

**Biomonitoring:** A technique for measuring the health of a river, stream, or lake. States and EPA measure numbers of living organisms in a waterway and then compare the numbers to populations found in clean and healthy conditions.

**Clean Water Act (CWA):** Federal law which is the basis for setting goals for streams, rivers, lakes and bays; for regulating discharges of pollution from point sources; for providing loan funding to municipalities for constructing sewage treatment plants; and for managing the overall health of waterbodies. This law provides for state nonpoint source management plans and for grant funding to help implement them. It also includes requirements for TMDLs.

**Consent Decree:** A formal legal agreement between a plaintiff and a defendant in a court proceeding, which settles the case. A consent decree is entered as a judgment of the court and is legally binding. In TMDLs, numerous consent decrees exist between EPA and environmental groups, entered as settlements to litigation. Mostly, those consent decrees establish schedules for production of TMDLs.

**Conservation:** Preserving and renewing, when possible, human and natural resources. The use, protection and improvement of natural resources according to principles that will ensure their highest economic or social benefits.

**Daily:** In the context of “Total Maximum Daily Loads,” EPA and states have historically established load numbers as seasonal or even yearly loads. In a recent court case brought by an environmental group, the District of Columbia Circuit Court of Appeals ruled that TMDLs need to include (but are not limited to) numbers which are expressed as daily loads. On November 15, 2006, EPA issued a memorandum (<http://www.epa.gov/owow/tmdl/dailyloadsguidance.html>) recommending that all TMDLs include daily load and waste load allocations, but also continue to include weekly, monthly, or seasonal loads as appropriate to facilitate implementation.

**Designated Use:** A specific desired use for a waterbody, such as swimming, fishing, or public water supply. Designated uses are set by states for every waterway in the state as an important part of their water quality standards. Many stretches of water may have multiple designated uses since water is often used for many purposes.

**Discharge:** A term that has specific meaning under the Clean Water Act. It means the release of a pollutant into a waterway by a point source. It is illegal for any point source to discharge pollutants without an NPDES discharge permit.

**Dissolved Oxygen (DO):** It is the oxygen freely available in water. DO is vital to fish and other aquatic life and for the prevention of odors. DO levels are considered a most important indicator of a waterbody’s ability to support desirable aquatic life. Secondary and advanced waste treatments are generally designed to ensure adequate DO in waste-receiving waters.

**Due Process:** The opportunities for people and organizations to participate as government makes important decisions, including water quality standards and TMDLs. “Due process” is formally established by the laws that apply, and almost always include formal public notice and a formal opportunity to present testimony or submit comments. It also includes the formal opportunities that people and organizations have for appealing or challenging decisions that they disagree with.

**Effluent Guidelines:** Formal regulations established by EPA that set standards of performance for industrial dischargers, for example, power plants, chemical plants and paper mills. They include the lowest levels of pollution that can be met by using the best available technologies that can be achieved economically. These levels become enforceable when they are put into NPDES permits for the industrial dischargers.

**Exceed or Exceedance:** The term used by states and EPA to refer to a level of pollution in water that is greater than the level in the state water quality standards.

**Impaired Water:** A waterway that does not meet the water quality standards the state set.

**Impaired Waters List:** The list of specific waterways in a state that do not meet the water quality standards that the state set for them. This list is revised every two years and submitted to EPA for approval. It is the list of waterways that need TMDLs in each state. This list is also sometimes called the “303(d) list” or “TMDL list.”

**Integrated Report:** The impaired waters list is just one of several overlapping requirements the Clean Water Act has for states to list and report on the status of waterways in the state. As just one example, states must report on the overall quality of its waterways in its “305(b) Reports.” EPA and states have agreed on an efficient way for states to satisfy all these reporting requirements at once, using an “Integrated Report.”

**Load:** The amount of a pollutant carried by a waterway. It is usually found by multiplying the concentration of the pollutant in the waterway by the flow of the waterway, to yield a mass of the pollutant in a day, week, season, or year.

**Loading Cap:** The total amount of a pollutant that can be discharged by all point and nonpoint sources combined, and still meet water quality standards. The loading cap is simply another term for a TMDL.

**Load Allocation (LA):** The part of the TMDL where the nonpoint sources and background levels are considered. The “load allocation” includes a load for a broad category of nonpoint source (such as row crop agriculture or forestry), but does not include specific load numbers for specific farms or people.

**Margin Of Safety:** An allowance in a TMDL that provides for uncertainty. Since there are many assumptions and errors that are implicit in TMDLs, the Clean Water Act requires that every TMDL include a “margin of safety” to account for lack of certainty regarding how the water will respond to changes in loadings.

**Mandatory Duty:** A specific obligation that EPA has under the Clean Water Act that can be enforced through citizen suits. One example is the requirement of the Clean Water Act for EPA to approve or disapprove state TMDLs in certain time frames and, if it disapproves, to establish the TMDL itself. If EPA fails to do any of these things, it can be sued by citizens under the Clean Water Act for failing to do a “mandatory duty.”

**Narrative:** A component of all state water quality standards which sets very broad restrictions on the quality of streams, rivers, lakes and bays. For example, all states have an narrative provision in their standards which says that waterways must be “free from toxic pollutants in toxic amounts,” without specifying what that means.

**National Pollutant Discharge Elimination System (NPDES):** A provision of the Clean Water Act which prohibits discharge of pollutants into waters of the U.S. unless a special permit is issued by EPA, a state, or, where delegated, a tribal government on an Indian reservation.

**Nonpoint Sources:** Diffuse pollution sources (i.e. without a single point of origin or not introduced into a receiving stream from a specific outlet). The pollutants are generally carried off the land by stormwater. Common nonpoint sources are agriculture, forestry, mining lands, dams, groundwater recharge, land disposal, saltwater intrusion and city streets.

**Nonpoint Source Management Plan:** A plan that the Clean Water Act requires each to develop for managing runoff from nonpoint sources. States implement these plans in part by grant funding that EPA provides. These nonpoint source management plans primarily rely on voluntary and incentive-based approaches for managing nonpoint source runoff, although sometimes states and localities develop state laws or ordinances for managing pollution that might come from septic tanks, city streets, etc.

**Nutrient:** Any substance assimilated by living things that promotes growth. This term is generally applied to nitrogen and phosphorus in wastewater, but is also applied to other essential and trace elements.

**Point Source:** Any “discernible, defined and discrete conveyance” such as a pipe or sewer. Mostly, these point sources are factories, sewage treatment plants, city storm sewers and concentrated animal feeding operations that discharge pollutants.

**Pollution:** Generally, the presence of a substance in the environment that because of its chemical composition or quantity prevents the function of natural processes and produces undesirable environmental and health effects. Under the Clean Water Act, for example, the term has been defined as the man-made or man-induced alteration of the physical, biological, chemical and radiological integrity of water and other media.

**Pre-TMDL Loadings:** A calculation of the amounts of a pollutant currently being discharged by all point and nonpoint sources to an impaired waterbody before a TMDL is calculated or additional measures are taken to reduce pollutants.

**Priority Ranking:** The Clean Water Act requires that every state set priorities for completing all TMDLs on all the impaired waters in its 303(d) list. Some states satisfy this by simply labeling each waterway as “high,” “medium,” or “low” priority, and some states simply indicate the priority ranking as the schedule for completing TMDLs. States have very broad discretion on how to set their priorities.

**Reasonable Assurances:** The reasons that state water agencies can use to agree that needed nonpoint source best management practices will actually be implemented. In many states these reasons include a history of successful implementation and firm agreements (such as easements or long-term funding agreements) that indicate that the BMPs are unlikely to be removed or reversed.

**Runoff:** That part of precipitation, snowmelt, or irrigation water that runs off the land into streams or other surface water. It can carry pollutants from the air and land into receiving waters.

**Section 319:** The section of the Clean Water Act that authorizes states to develop a plan for managing runoff from nonpoint sources and that provides grant funding to states to help them implement their plans. These plans primarily rely on voluntary and incentive-based approaches for managing nonpoint source runoff, although sometimes states and localities develop state laws or ordinances for managing pollution that might come from septic tanks, city streets, etc.

**Silt:** Sedimentary materials composed of fine or intermediate-sized mineral particles.

**Stakeholder:** Any organization, governmental entity, or individual that has a stake in or may be impacted by a given approach to environmental regulation, pollution prevention, energy conservation, etc.

**Technology-based Approach:** One of the two major strategies of the Clean Water Act for improving water quality nation-wide (the other strategy is the water quality-based approach). Every point source is required to meet pollution limits set by EPA that reflect what can be achieved by certain levels of pollution control technologies. For industry, this is usually the best available technology economically achievable set by EPA in its effluent limitations guidelines. For municipal sewage treatment plants, this is usually secondary treatment technologies.

**Template:** An agreement between a state and EPA about what data and findings are needed to show that a designated use is not attainable, and that the standards need to be changed. “Templates” are especially useful where large numbers of similar waterways are improperly classified in a state so many standards need to be changed. This is a recent innovation pioneered by Oklahoma, Kansas, and Ohio, and has resulted in a dramatic increase in the numbers of water quality standards changes in those states.

**Threatened:** A waterway which currently meets the water quality standards that apply but that is expected to exceed those standards in the next two years. This is a relatively infrequent occurrence, normally associated with large-scale urban development. The Clean Water Act requires “threatened” waterways to be listed and to receive a TMDL in addition to those that currently exceed their standards.

**Total Maximum Daily Load:** The total amount of a pollutant that can be received by a stream, river, lake, or bay without exceeding the water quality standards that apply to that waterbody.

**Trading:** Trading is a voluntary approach encouraged by EPA and states in which nonpoint sources and point sources agree on cost-effective ways to meet Clean Water Act requirements. For example, if city sewage treatment plant faces expensive upgrades to remove discharges of nitrogen, it might be possible for that plant to pay cost-share directly to farmers for Best Management Practices for nitrogen instead. In this case, it might be possible to achieve greater overall reduction of nitrogen in the watershed at a lower overall cost to the city. There are many legal and bureaucratic barriers to this approach, however, and it has not often been used for water.

**Use Attainability Analysis:** This is a demonstration by the state that a designated use cannot be attained. EPA's regulations set specific requirements about what is necessary in this demonstration. Templates have proven helpful in several states.

**Water Quality Criteria:** In state water quality standards, "water quality criteria" are specific numbers for a pollutant that will achieve a designated use. They are considered to be a part of the state standards. (Note: this term can be confusing, since it is sometimes also used to describe general scientific guidance that EPA publishes. When talking about TMDLs, however, it normally refers to the numbers for individual pollutants in state water quality standards.)

**Water Load Allocation (WLA):** The maximum load of a pollutant each point source discharger is allowed to release into a particular waterway. Each "wasteload allocation" is then turned into an enforceable discharge limitation for the pollutant in the NPDES permit for the point source.

**Waste Water Treatment Plant:** A facility containing a series of tanks, screens, filters and other processes by which pollutants are removed from water.

**Water Quality-based Approach:** One of the two major strategies of the Clean Water Act for improving water quality nation-wide (the other strategy is the technology-based approach). Specific water quality standards are set for all waterways, total maximum daily loads are developed for those waterways that do not meet their standards, and point sources meet more stringent limits in their permits that are necessary to meet the standards.

**Water Quality Standards:** State-adopted and EPA-approved ambient standards for streams, rivers, lakes and bays. The standards are highly customized. They prescribe the uses of the waterbodies (such as swimming, fishing and drinking water) and establish the specific numerical water quality criteria that protect designated uses.

**Watershed:** The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common point.



## Appendix C. Clean Water Act TMDL Requirements

(d) Identification of areas with insufficient controls; maximum daily load; certain effluent limitations revision

(1)(A) Each state shall identify those waters within its boundaries for which the effluent limitations required by section 1311(b)(1)(A) and section 1311(b)(1)(B) of this title are not stringent enough to implement any water quality standard applicable to such waters. The state shall establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters.

(B) Each state shall identify those waters or parts thereof within its boundaries for which controls on thermal discharges under section 1311 of this title are not stringent enough to assure protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife.

(C) Each state shall establish for the waters identified in paragraph (1)(A) of this subsection, and in accordance with the priority ranking, the total maximum daily load, for those pollutants which the Administrator identifies under section 1314(a)(2) of this title as suitable for such calculation. Such load shall be established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality.

(D) Each state shall estimate for the waters identified in paragraph (1)(B) of this subsection the total maximum daily thermal load required to assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife. Such estimates shall take into account the normal water temperatures, flow rates, seasonal variations, existing sources of heat input, and the dissipative capacity of the identified waters or parts thereof. Such estimates shall include a calculation of the maximum heat input that can be made into each such part and shall include a margin of safety which takes into account any lack of knowledge concerning the development of thermal water quality criteria for such protection and propagation in the identified waters or parts thereof.

(2) Each state shall submit to the Administrator from time to time, with the first such submission not later than one hundred and eighty days after the date of publication of the first identification of pollutants under section 1314(a)(2)(D) of this title, for his approval the waters identified and the loads established under paragraphs (1)(A), (1)(B), (1)(C), and (1)(D) of this subsection. The Administrator shall either approve or disapprove such identification and load not later than

thirty days after the date of submission. If the Administrator approves such identification and load, such state shall incorporate them into its current plan under subsection (e) of this section. If the Administrator disapproves such identification and load, he shall not later than thirty days after the date of such disapproval identify such waters in such state and establish such loads for such waters as he determines necessary to implement the water quality standards applicable to such waters and upon such identification and establishment the state shall incorporate them into its current plan under subsection (e) of this section.

(3) For the specific purpose of developing information, each state shall identify all waters within its boundaries which it has not identified under paragraph (1)(A) and (1)(B) of this subsection and estimate for such waters the total maximum daily load with seasonal variations and margins of safety, for those pollutants which the Administrator identifies under section 1314(a)(2) of this title as suitable for such calculation and for thermal discharges, at a level that would assure protection and propagation of a balanced indigenous population of fish, shellfish, and wildlife.

(4) Limitations on revision of certain effluent limitations. --

(A) Standard not attained. --For waters identified under paragraph (1)(A) where the applicable water quality standard has not yet been attained, any effluent limitation based on a total maximum daily load or other waste load allocation established under this section may be revised only if (i) the cumulative effect of all such revised effluent limitations based on such total maximum daily load or waste load allocation will assure the attainment of such water quality standard, or (ii) the designated use which is not being attained is removed in accordance with regulations established under this section.

(B) Standard attained. --For waters identified under paragraph (1)(A) where the quality of such waters equals or exceeds levels necessary to protect the designated use for such waters or otherwise required by applicable water quality standards, any effluent limitation based on a total maximum daily load or other waste load allocation established under this section, or any water quality standard established under this section, or any other permitting standard may be revised only if such revision is subject to and consistent with the antidegradation policy established under this section.

## Appendix D. Web Sites and Sources of Information

EPA's main TMDL Web Site	<a href="http://www.epa.gov/owow/tmdl/">http://www.epa.gov/owow/tmdl/</a>
EPA's interactive Web Site on TMDL lists	<a href="http://oaspub.epa.gov/waters/national_rept.control">http://oaspub.epa.gov/waters/national_rept.control</a>
EPA's introduction to TMDLs	<a href="http://www.epa.gov/owow/tmdl/intro.html">http://www.epa.gov/owow/tmdl/intro.html</a>
EPA's guide to watershed information	<a href="http://www.epa.gov/win/">http://www.epa.gov/win/</a>
EPA's Integrated Report Guidance	<a href="http://www.epa.gov/owow/tmdl/2006IRG">http://www.epa.gov/owow/tmdl/2006IRG</a>
EPA's Daily Loads Guidance	<a href="http://www.epa.gov/owow/tmdl/dailyloadsguidance.html">http://www.epa.gov/owow/tmdl/dailyloadsguidance.html</a>
All state water agency Web sites	<a href="http://www.asiwpca.org/links/links.htm">http://www.asiwpca.org/links/links.htm</a>
State TMDL information Web Site	<a href="http://www.tmdls.net/">http://www.tmdls.net/</a>