Overview of Surface Water Quality in Texas:

2004 Water Quality Inventory and 303(d) List

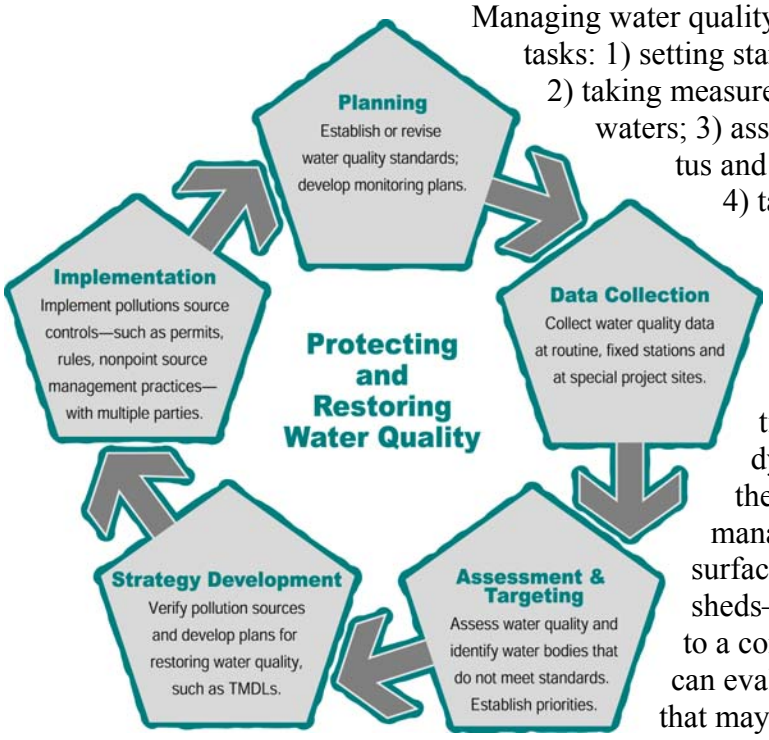
(May 13, 2005)

Introduction

The Texas Commission on Environmental Quality (TCEQ) works to protect the state's natural resources. In keeping with that mission, the TCEQ regularly monitors the condition of the state's surface waters, and assesses the status of water quality every two years. The TCEQ submits this assessment to the U.S. Environmental Protection Agency (EPA). The report is also published on the TCEQ Web site as the *Texas Water Quality Inventory and 303(d) List* (Inventory and List).

Requirements for the Inventory and List are codified in the federal Clean Water Act, Sections 305(b) and 303(d). Further requirements are set out in state law in Title 30 of the Texas Administrative Code (30 TAC), and in rules and guidance established by the TCEQ.

How Water Quality is Measured and Managed



Managing water quality requires an ongoing cycle of tasks: 1) setting standards for surface water quality; 2) taking measurements of the condition of surface waters; 3) assessing the data to determine status and to identify any impairments; 4) taking action to prevent pollution through limits on discharge of wastewater, and to restore water quality when preventive action fails; and 5) evaluation of progress and adjustment or formulation of plans. Figure 1 shows the dynamic nature of this cycle and the major steps in the process of managing the quality of the state's surface waters. By looking at watersheds—the geographic area that drains to a common body of water—the state can evaluate all the sources of pollution that may be affecting water quality.

Figure 1. The Watershed Approach to Water Quality Management

Water Quality Standards

Water quality standards are the foundation for managing surface water quality. A water quality standard is the combination of:

- a designated use and
- the criteria necessary to attain and maintain that use

Standards define the goals for a body of water. The uses prescribe the purposes for which the water should be fit—such as recreation, support of aquatic life, or drinking water supply. The criteria define the instream conditions necessary to support those uses. Criteria are either:

- numeric—a limit on the amount of a certain pollutant that a water body may contain; or
- narrative—a prohibition on a certain condition in the water, such as color, odor, or turbidity.

Water quality standards are the basis for regulatory and nonregulatory control of pollutants when the levels of treatment used by permitted dischargers are inadequate to maintain water quality.

Some standards are applied generally to many different water bodies, while some are site-specific. Any one water body will usually have multiple uses designated for it. For example, a lake or stream may be designated for use as a source of water for a drinking water treatment plant, for recreation like swimming and fishing, and as a healthy environment for fish and other aquatic creatures.

The standards also define an antidegredation policy that protects existing uses and the state's highest quality waters. A complete definition of the standards is published as the *Texas Water Quality Standards* in 30 TAC, Chapter 307.

Classifying Waters by Geographic Area

In order to manage the vast extent of surface waters in Texas, and the ecological diversity of the state, the major rivers, lakes, and estuaries have been subdivided and assigned tracking numbers, called *classified segments*. The classified segments are given numbers that correspond to the major river basin in which they are located.

For example, the Brazos River, one of the state's longest rivers, has been divided into 57 separate segments and designated as Basin 12. Many lakes also lie within the Brazos River basin, and are given segment numbers. All the segment numbers have four digits, the first two of which indicate the basin

number; for example, Segment 1210, Lake Mexia, or Segment 1226, the North Bosque River.

The areas of the classified segments are defined in the Water Quality Standards. Classified segments cover most of the perennial (always flowing) rivers in the state, and lakes and estuaries with large areas. Figure 2 shows the state's major rivers and the numbers assigned to their basins.

Because of the vast extent of waters of the state, not all bodies of water are classified in the Standards. For example, when managing a classified segment of the Brazos River, it may be necessary to examine water quality in the tributaries that flow into that segment. Some of these tributaries may not be part of the classified segment system. When that happens, for management purposes, the tributary is assigned a tracking number, which is referred to as an *unclassified segment*. This unclassified tributary will be designated with the number of the classified segment in whose watershed it resides, along with a letter. For instance, Segments 1806A, 1806B, and so on. The same numbering system applies to unclassified lakes. In the assessment, both classified and unclassified segments are referred to generically as *water bodies*.

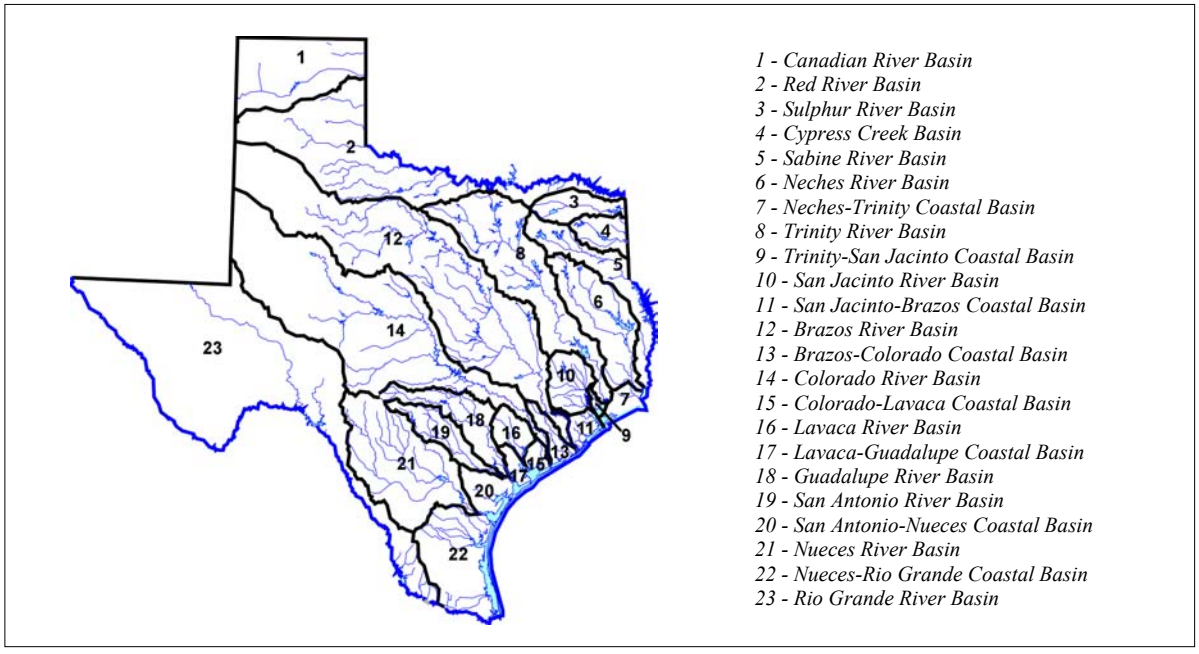


Figure 2. Major River Basins of Texas

Monitoring and Assessment

Every two years, the states must assess the quality of their water and submit a report to the EPA detailing the extent to which each water body in the state meets water quality standards. The TCEQ publishes this assessment as the *Texas Water Quality Inventory and 303(d) List*. In the past, Texas published two different reports, often referred to as the 305(b) Report and 303(d) List, after the sections in the Clean Water Act that describe the requirements of the assessment. Since 2002, both reports have been published as one document,

in accordance with guidance from the EPA. The document still has essentially two main parts: the Inventory, which gives the status of all the waters in the state, and the 303(d) List, which identifies waters that do not meet one or more of the standards established to ensure the beneficial use of the water body (e.g., contact recreation, drinking water source).

The Inventory

The Inventory describes the status of all surface water bodies of the state that were evaluated for the given assessment period. The TCEQ uses data collected during the most recent five-year period in making its assessment. The data are gathered by many different organizations that all operate according to approved quality control guidelines and sample collection procedures. The quality of waters described in the Inventory represents a snapshot of conditions during the limited time period considered in the assessment. Water quality is dynamic and constantly changing.

The assessment guidance is based on a set of methods that apply the surface water quality standards. These methods are developed by the TCEQ with the advice of a diverse group of stakeholders, and are detailed in the *Guidance for Screening and Assessing Texas Surface and Finished Drinking Water Quality Data*.

The 303(d) List

The 303(d) List is an important management tool produced as part of the assessment. It identifies waters for which preventive measures—such as permits that limit discharges of wastewater and the technology used by the dischargers—are not sufficient to achieve water quality standards. The 303(d) List is subject to review and approval by the EPA.

Categories Indicate Water Quality Status

The Inventory assigns each assessed water body to one of five categories to provide information to the public, EPA, and internal agency programs about water quality status and management activities (see Table 1). The categories indicate the status of the water body, and how the state will approach identified water quality problems.

Higher category numbers correspond to higher levels of effort required to manage water quality. For example, water bodies in Category 5 constitute the 303(d) List, and require remedial action by the state to restore water quality. For water bodies in Category 5a, the state must develop a scientific model called a *total maximum daily load* (TMDL) and a plan to implement it. Water bodies in Category 1 are meeting all their uses, and simply require routine monitoring and preventive action.

Further, these categories must be applied to each combination of designated use and criteria (or parameter) for determining support. The combination of the use with the pollutant or condition of concern is called an *impairment*.

For example, the concentration of dissolved oxygen is one of the criteria used to determine the support of the aquatic life use. If dissolved oxygen concentrations are too low, one impairment would exist for the water body under examination.

Since a water body has multiple uses, it may fall into different categories for different uses. In that case, the overall category for the water body is the one with the highest category number.

Table 1. Categories of Use Attainment in the Water Quality Inventory

Category 1	Attaining the water quality standard and no use is threatened.
Category 2	Attaining some of the designated uses; no use is threatened; and insufficient or no data and information are available to determine if the remaining uses are attained or threatened.
Category 3	Insufficient or no data and information to determine if any designated use is attained.
Category 4	Standard is not supported or is threatened for one or more designated uses but does not require the development of a TMDL.
Category 4a	TMDL has been completed and approved by EPA.
Category 4b	Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future.
Category 4c	Nonsupport of the water quality standard is not caused by a pollutant.
Category 5	Category 5 is the 303(d) list. The water body does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants.
Category 5a	A TMDL is underway, scheduled, or will be scheduled.
Category 5b	A review of the water quality standards will be conducted before a TMDL is scheduled.
Category 5c	Additional data and information will be collected before a TMDL or review of the water quality standard is scheduled.

Summary of the Assessment in 2004

For 2004, the TCEQ conducted a targeted water quality assessment of 195 water bodies (out of the 731 assessed in 2002 plus one new water body). The targeted water bodies were primarily those identified as concerns in 2002 because the data set for them was too small to allow for a full assessment, but a number of measurements did not meet the criteria defined in the standards. These 195 targeted water bodies were prioritized for more intense monitoring over the last two years. The 2004 Inventory provides an up-to-date status for them.

In 2004, Texas assessed about 11% of its total river miles, 80% of lake acres, 85% of bay square miles, and 100% of the Gulf square miles within its jurisdiction (see Figure 3). The total area for each type of water body includes both classified and unclassified segments.

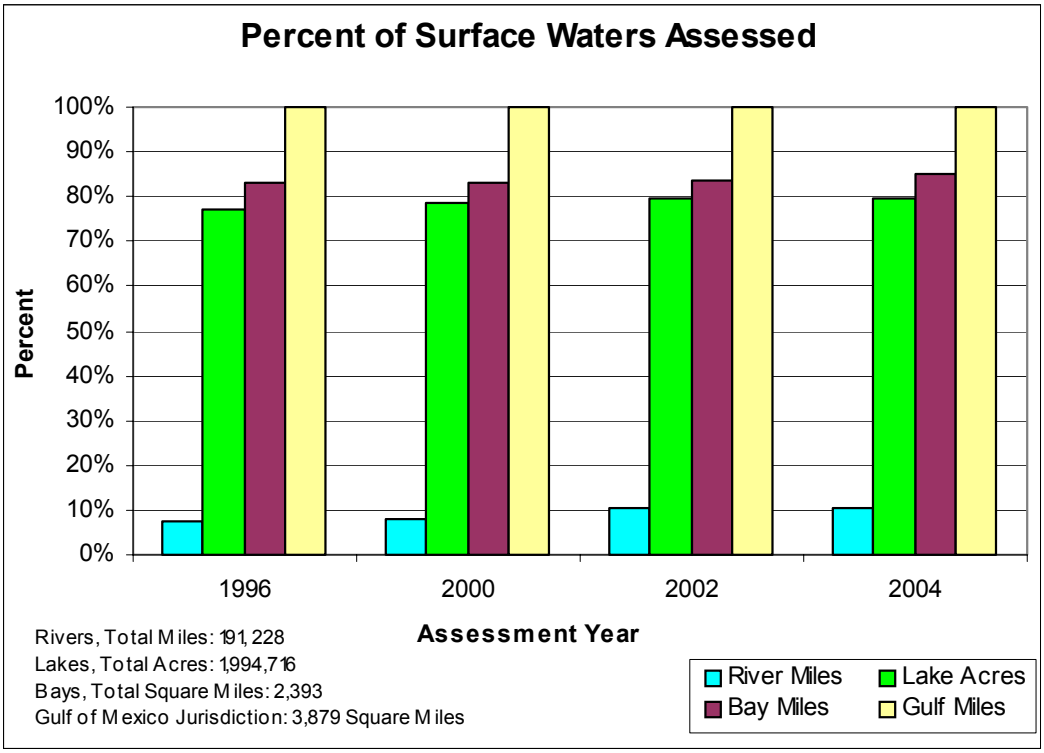


Figure 3. Percent of Surface Waters Assessed Since 1996

Because of the very large number of total river miles in the state (191,288 miles) and limited resources to direct to monitoring, Texas can only assess a small percentage of its rivers in comparison to the number of lakes and estuaries that are assessed. However, all of the classified segments, 38% of the constantly flowing streams, and those thought to be the highest risk for pollution, are included in each assessment year. Staff use a strategy for choosing the segments that is designed to make the coverage as representative of the state as possible. At annual meetings to plan and coordinate monitoring, stakeholders help choose the river segments that will be sampled and assessed.

While the percentage of lakes and estuaries that were assessed for each Inventory has remained fairly constant, rising gradually since 1996, the total number of river miles assessed has increased by 41%. This is due in large part to increased coordination and planning among the state and local organizations that provide data for the assessment.

The increase in the number of water bodies and conditions that are monitored has led to a concurrent rise in the number of water bodies that are identified as impaired, from 147 identified in 1996, to 306 water bodies identified in 2004, with a total of 419 impairments. However, overall water quality re-

mains good, with most water bodies meeting their standards (see Figures 4 and 5.)

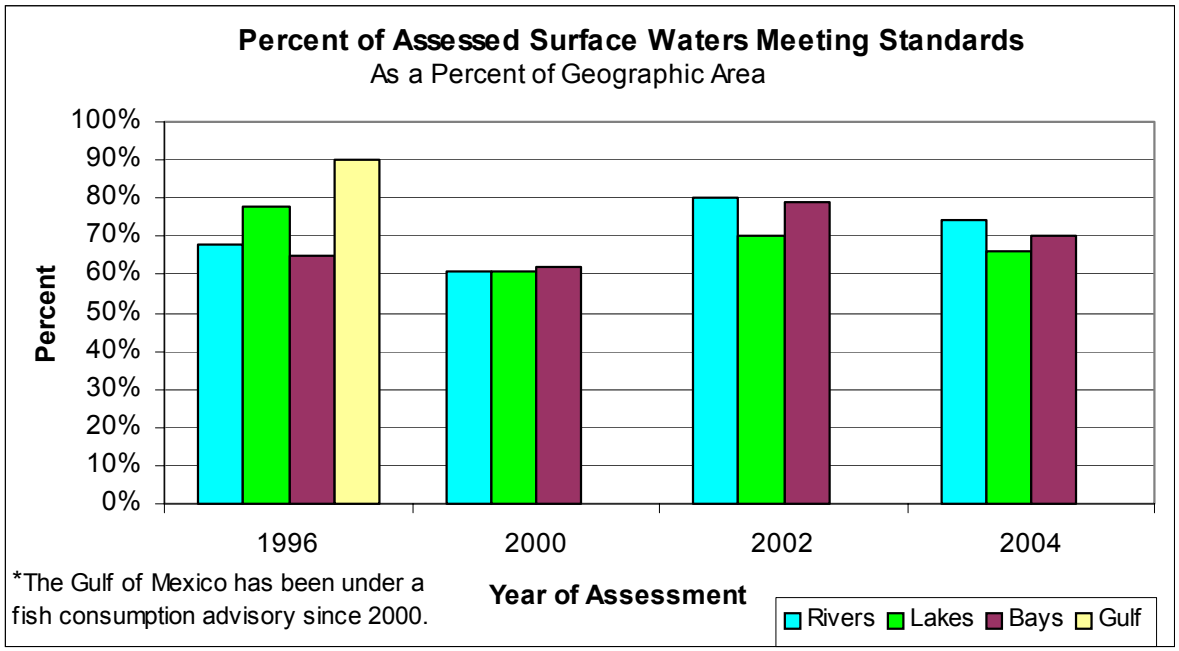


Figure 4. Percent of Surface Waters Meeting Standards, as a Percent of Geographic Area

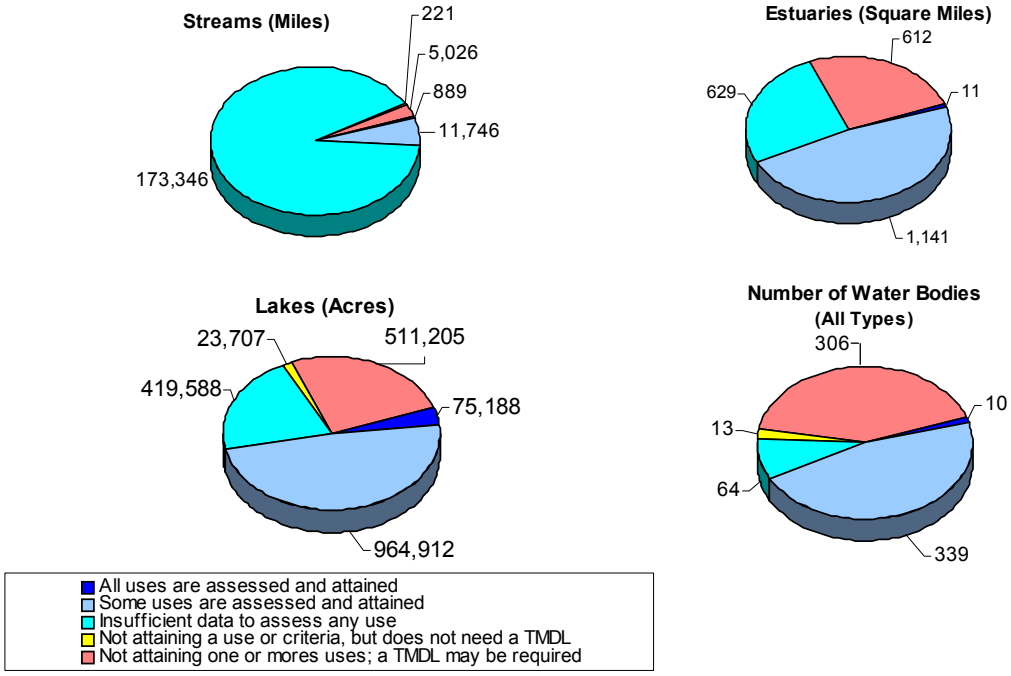


Figure 5. 2004: Status of Waters in Each Category of the Inventory

Protecting and Improving Water Quality

At all times, the TCEQ is protecting water quality through various programs. Just the act of monitoring and assessing water quality is a form of protection, since it informs state officials and the public about the status of Texas rivers, lakes, and estuaries. More water bodies are being assessed each year, leading to more timely identification of problems. But much more is done on a regular basis, like permitting and education activities.

The TCEQ's pace and progress in addressing impairments has risen sharply over the past five years. More TMDLs are being developed, and many of them are now being implemented. The water quality standards were recently revised, and they receive constant scrutiny. More data is being gathered to ensure that we have as sound a basis as possible for establishing existing and new controls. The TCEQ water quality programs strive at all times to provide accurate assessment, and to continually improve the tools and information used to manage water quality.

Actions to Address Waters on the 303(d) List

After a water body is listed in Category 5, the 303(d) list, several different courses may be pursued to bring it into compliance with the standards for its use. Further evaluation may be necessary to determine if the current standard is appropriate, or to determine the cause of the impairment. The TCEQ may begin a project to reduce pollution and restore the impaired use under its Total Maximum Daily Load (TMDL) Program. And certain new requirements may apply for facilities that discharge wastewater into the listed water body. Importantly, the TCEQ may not allow any new or expanded discharges of a listed pollutant into a Category 5 water body if it contributes to the impairment.

The number of impairments addressed by TMDL projects has increased from 67 in 2000 to 199 in 2004. The TCEQ must undertake new projects to restore water quality with each new assessment, while continuing to complete and implement plans for waters listed in previous years.

For water bodies that are impaired due wholly or in part to nonpoint source (NPS) pollution, federal grant funds provided under Section 319 of the Clean Water Act play a key role in implementing restoration projects. These grants provide support for management practices that improve the quality of impaired or threatened waters, and are often used to support development and implementation of TMDLs. NPS grants are also used to implement watershed action plans that are not associated with TMDLs; to conduct special projects that assess impacts due to NPS pollution; and to prevent the degradation of healthy rivers, lakes, and bays.

For most listing years, about half of the water bodies have been subsequently removed from the list as the result of TMDLs, further analysis and monitoring, or changes in assessment methods. TMDLs have been completed or are

in progress for about 25% to 35% of the impairments, depending on the listing year. The remaining water bodies are addressed either through analysis of the standards or targeted monitoring to document the degree and extent of the impairment (see Figure 6).

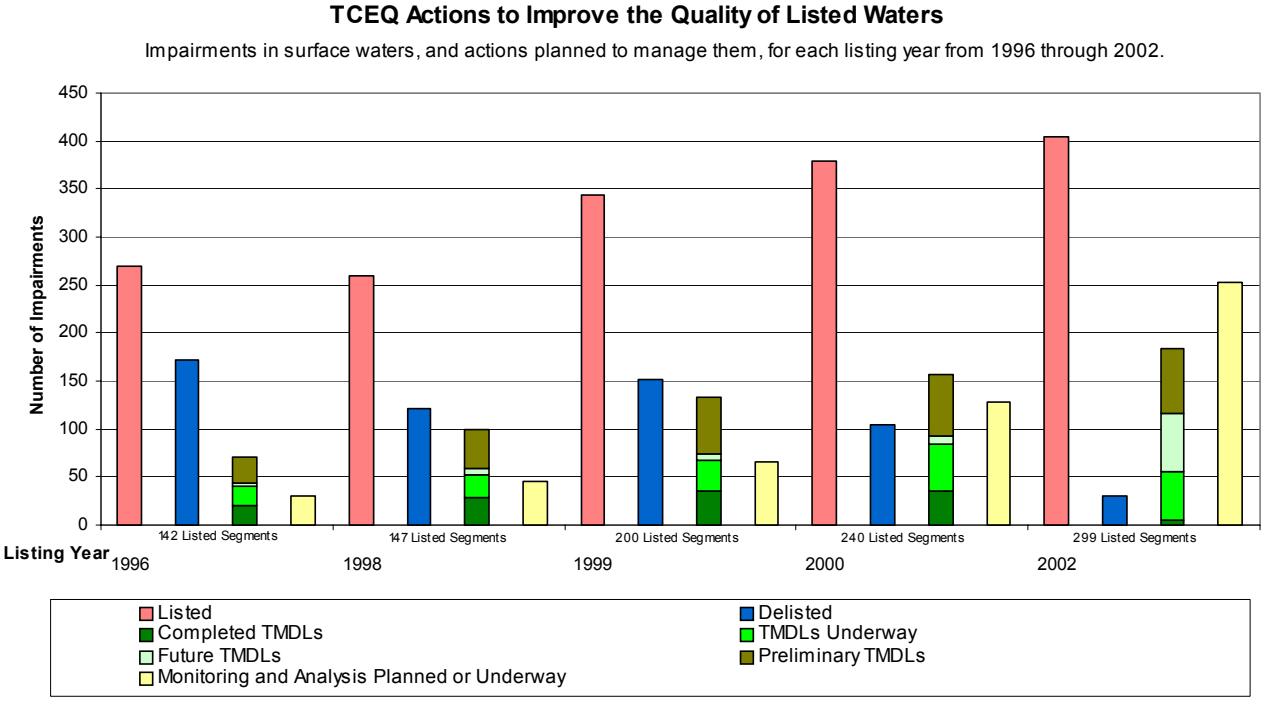


Figure 6. TCEQ Actions to Improve the Quality of Listed Waters

TMDLs and Implementation Plans

TMDLs and their implementation plans are developed to address water body concerns listed in Category 5a. States must establish a TMDL—the total amount of a pollutant that the water body can receive daily and still achieve its water quality standard—for each impairment in each water body in Category 5a. This may mean that several TMDLs are developed for one river or lake. A TMDL must also allocate this load to the various sources of pollution in the watershed. The state must then develop an implementation plan to achieve the loading allocations defined in the TMDL. TMDLs are subject to EPA approval; implementation plans are not.

Since the program began in 1997 until September 2004, TMDL projects have addressed, or are currently working on, 199 impairments in 111 water bodies. These projects may include TMDL development, analysis of standards, or targeted monitoring. For each 303(d) List since 1996, the TMDL Program has already addressed between 25% and 38% of the listed impairments.

As of April 2004, the Commission has adopted final TMDLs for 57 impairments in 33 water bodies. All of the TMDLs have been approved by the EPA. The TCEQ has instituted implementation plans for all of the TMDLs.

Standards Analysis

Water bodies are placed in Category 5b if there is reason to believe that one or more of the assigned standards may be inappropriate because of local conditions that are not due to human impacts. Waters in this category are slated for an analysis of their standards, called a *use attainability analysis*, or UAA.

For example, to determine appropriate aquatic life uses and related criteria, a UAA may consider aspects such as regularity of flow, habitat structure, typical water chemistry, and fish and other aquatic organisms that are characteristic in the area. Some rivers and lakes naturally support an abundant and diverse aquatic community, while other water bodies— such as small streams with intermittent flow—tend to have fewer types and total numbers of aquatic organisms. In addition, some water bodies might support a diverse aquatic community and fishery even though some components of their overall water quality are not superior under natural conditions.

Depending on the results of the UAA, uses and/or supporting criteria may be revised to be more or less stringent. Revisions of the standards are reviewed by the public, adopted by the Commission, and approved by the EPA. When a review and any resulting revisions of the standard are completed, the water body may be moved to another subcategory of the 303(d) List, or to another category of the Inventory.

Targeted Monitoring

Water bodies in Category 5c are targeted for additional monitoring. Water bodies may be placed in this category when a limited data set is available for determining its status. The TCEQ and its monitoring partners schedule intensive monitoring of these waters to determine the degree and geographic extent of nonsupport. Depending on the results of this monitoring, the water body may move to another subcategory of the 303(d) List, or to Category 1 or 2.

For More Information

The Texas Water Quality Inventory and 303(d) List is compiled and published by the Surface Water Quality Monitoring Program (SWQM) of the TCEQ. To contact the SWQM Program, e-mail *303d@tceq.state.tx.us*, or call 512/239-1716.