Jeff Cole, Cascade Creek, Grand Teton National Park, WY

Introduction

Section 305(b) of the Clean Water Act requires states and other jurisdictions to assess the health of their waters and the extent to which water quality standards are being met. States are to submit reports describing water quality conditions to the U.S. Environmental Protection Agency (EPA) every 2 years. This report, the thirteenth in a series published since 1975, summarizes state water quality reports submitted in 2000. It is important to note that this report is no longer a Report to Congress, pursuant to Public Law 104-66, the Federal Reports Elimination and Sunset Act of 1995.

This chapter introduces the concept of water quality standards and describes the monitoring data and approaches used by the states to assess their rivers, lakes, estuaries, wetlands, and coastal waters.

Water Quality Standards

In 1972, Congress adopted the Clean Water Act (CWA), which establishes a framework for achieving its national objective "…to restore and maintain the chemical, physical, and biological integrity of the nation's waters." Congress decreed that, where attainable, water quality "…provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water." These goals are referred to as the "fishable and swimmable" goals of the Act.

The CWA called for states to develop water quality standards to guide the restoration and protection of all waters of the United States. Water quality standards became the centerpiece around which most surface water quality programs revolve. For instance, water quality standards are the benchmark against which monitoring data are compared to assess the health of waters and to list impaired waters under CWA Section 303(d). They are the endpoint used to calculate water quality-based discharge limits in permits issued under the National Pollutant Discharge Elimination System (NPDES).

The CWA allows states, tribes, and other jurisdictions to set their own water quality standards but requires that, at a minimum, they include the fishable and swimmable goals of the Act, wherever attainable. States must submit their standards to EPA for approval.

Water quality standards have three elements: designated uses, criteria developed to protect each use, and antidegradation policy.

■ **State designated uses** are the beneficial uses that water quality should support. Where attainable, all waters should support recreation (such as swimming and surfing), aquatic life, and fish consumption. Additional important uses include drinking water supply, agriculture, industry, and navigation. Waste transport or disposal is not an acceptable designated use. States, tribes, and other jurisdictions may designate an individual waterbody for multiple uses. Each designated use has a unique set of water quality criteria that must be met for the use to be realized.

The Clean Water Act of 1972

. . . it is the national goal that, wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water . . .

■ **State water quality criteria** come in two forms, numeric and narrative. Numeric criteria establish thresholds for the physical conditions, chemical concentrations, and biological attributes required to support a beneficial use. Narrative criteria describe, rather than quantify, conditions that must be maintained to support a designated use. For example, a narrative criterion might be "Waters must be free of substances that are toxic to humans, aquatic life, and wildlife."

■ **Antidegradation policies** are narrative statements intended to protect existing uses and prevent waterbodies from deteriorating even if their water quality is better than the fishable and swimmable goals of the Act.

Designated Uses

The states, participating tribes, and other jurisdictions measure attainment of CWA goals by comparing

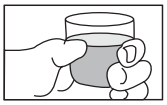
Water quality standards consist of

- *State designated uses*
- *Numeric and narrative criteria for biological, chemical, and physical parameters*
- *Antidegradation policies*

monitoring data to the narrative and numeric criteria they have adopted to ensure support of each use designated for a specific waterbody. These uses include:

Aquatic Life Support

The waterbody provides suitable habitat for protection and propagation of desirable fish, shellfish, and other aquatic organisms.



Drinking Water Supply

The waterbody can supply safe drinking water with conventional treatment.

Fish Consumption

The waterbody supports fish free from contamination that could pose a significant human health risk to consumers.

Shellfish Harvesting

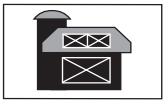
The waterbody supports a population of shellfish free from toxicants and pathogens that could pose a significant human health risk to consumers.

Primary Contact Recreation – Swimming

People can swim in the waterbody without risk of adverse human health effects (such as catching waterborne diseases from raw sewage contamination).

Secondary Contact Recreation

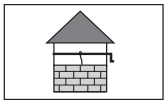
People can perform activities on the water (such as boating) without risk of adverse human health effects from incidental ingestion or contact with the water.



Agriculture

The water quality is suitable for irrigating fields or watering livestock.

States, tribes, and other jurisdictions may also define their own individual uses to address special concerns. For example, many tribes and states designate their waters for the following additional uses:



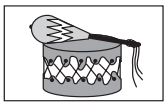
Ground Water Recharge

The surface waterbody plays a significant role in replenishing ground water, and surface water supply and quality are adequate to protect existing or potential uses of ground water.

Wildlife Habitat

Water quality supports the waterbody's role in providing habitat and resources for land-based wildlife as well as aquatic life.

Tribes may designate their waters for special cultural and ceremonial uses.



Culture

Water quality supports the waterbody's role in tribal culture and preserves the waterbody's religious, ceremonial, or subsistence significance.

In their 305(b) reports, states are asked to identify the type of assessment—monitored or evaluated—they used to make each use support determination. **Monitored** assessments are based on recent monitoring data collected during the past 5 years. These data include ambient water chemistry, biological assessments, fish tissue contaminant levels, and sediment chemistry. If monitoring data are not available, states may use qualitative information such as land use data, fish and game surveys, and predictive model results. **Evaluated** assessments are based on qualitative information or monitored information more than 5 years old.

Types of Monitoring Data

Section 305(b) assessments are normally based upon five broad types of monitoring data: biological integrity, chemical, physical, habitat, and toxicity data. Each type of data yields an assessment that must then be integrated with other data types for an overall assessment. Depending on the associated designated use, one data type maybe more informative than others for making the assessment.

■ **Biological integrity data** are objective measurements of aquatic biological communities, usually aquatic insects, fish, or algae, used to evaluate the condition of an aquatic ecosystem with respect to the presence of human impacts. Biological assessment data are best used for making aquatic life use support decisions.

■ **Chemical data** include measurements of key chemical constituents in water, sediments, and fish tissue. Examples of these measurements include nutrients such as nitrogen and phosphorus, metals, oils, and pesticides. Monitoring for specific chemicals helps states identify the specific pollutants causing impairment and helps trace the source of the impairment.

■ **Physical data** include characteristics of water that such as temperature, flow, dissolved oxygen, suspended solids, turbidity, conductivity, and pH. Physical attributes are useful screening indicators of potential problems, often because they can moderate or exaggerate the adverse effect of chemicals.

■ **Habitat assessments** include descriptions of sites and surrounding land uses, status of riparian and aquatic vegetation, and measurement of features such as stream width, depth, flow, and substrate. They are used to supplement and interpret other types of data.

■ **Toxicity testing** is used to determine whether aquatic life use is being attained. Toxicity data are generated by exposing selected organisms such as fathead minnows, daphnia ("water fleas"), or algae to known dilutions of wastewater or ambient water. These tests can help determine whether poor biological integrity is related to toxins or degraded habitat.

Who Collects the Data?

Hundreds of organizations around the country conduct some type of water quality monitoring. These include federal agencies such as the EPA and the U.S. Geological Survey, state water quality agencies, interstate and local agencies, tribes, research organizations such as universities, industry, and citizen volunteer programs. They may collect water quality data for their own purposes or to share with government decision makers. States evaluate and use much of these data when preparing their water quality reports.

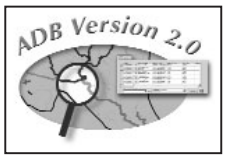
The states, territories, and tribes maintain monitoring programs to support several objectives, including assessing whether water is safe for drinking, swimming, and fishing. States also use monitoring data to review and revise water quality standards, identify impaired and threatened waters under CWA Section 303(d), develop pollutant-specific total maximum daily loads or TMDLs (calculations of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources), determine the effectiveness of control programs, measure progress toward clean water, and respond to citizen complaints or events such as spills and fish kills.

New Developments

In the past, data collection and interpretation efforts under the Clean Water Act (CWA) were not always coordinated. However, EPA is now providing states, territories, and tribes with guidance which recommends they submit a 2002 *Integrated Water Quality Monitoring and Assessment Report* to satisfy CWA requirements for both Section 305(b) water quality reports and Section 303(d) lists. The guidance (published November 19, 2001) is available at *http://www.epa.gov/owow/tmdl/2002wqma.html*. In addition, EPA and its partners are developing new guidance, called the Consolidated Assessment and Listing Methodology (CALM), to provide details on water quality monitoring strategies and designs, data quality and data quantity needs, and data interpretation methods under this streamlined, integrated approach. For more information on CALM, visit *http://www.epa.gov/owow/monitoring/calm.html*.

Various data and information management systems handle the enormous amount of water quality data generated in the United States. These systems have been updated and are generally Web-accessible, allowing the user to retrieve actual raw data or assessment findings for specific waterbodies. Three of these systems particularly relevant to the 305(b) reporting process are EPA's STOrage and RETrieval system (STORET), the Assessment Database (ADB), and WATERS.

STORET is the EPA's central repository of raw monitoring data. STORET includes both a Legacy Data Center for historical data, and recent biological, chemical, and physical data. It requires a specific set of qualifiers—including such information as when and where a given sample was taken, who took it, why it was taken, what methods were used to do so, etc.—to accompany each sampling result. Data in STORET are available on the Web. For more information, visit *http://www.epa.gov/storet/*.



The Assessment Database (ADB) is a relational system for tracking water quality assessment results—whether or not individual water segments meet uses, and what pollutants and sources impair them. The ADB is widely used by the states for 305(b) reporting. Version 2.0 of the ADB, due to be released in 2002, has a new integrated approach that consolidates surface water assessments under Sections 305(b) and 303(d) of the Clean Water Act.

Further information on water quality results, including mapping capabilities, can be obtained from WATERS, a tool that unites information for specific waterbodies (such as their designated uses and impairment status) previously available only on individual state agency homepages and at several EPA Web sites. State and federal water quality managers, as well as interested citizens, can use WATERS to quickly identify the status of individual waterbodies of interest to them. Visit WATERS at *http://www.epa.gov/waters/*.