This document contains the National Water Quality Inventory: Report to Congress, 2004 Reporting Cycle: Background

The report can be downloaded from:

http://www.epa.gov/305b/

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January 2009

Background

Under section 305(b)(1)(A) of the Clean Water Act, the states, territories, and other jurisdictions of the United States are required to submit reports on the quality of their waters to the U.S. Environmental Protection Agency (EPA) every 2 years. Historically, the states submitted these reports in hardcopy format, and EPA prepared a national hardcopy report that summarized these findings (see *http://www.epa.gov/305b*). Under section 303(d) of the Clean Water Act, the states also biennially provide a separate prioritized list of those waters that are impaired and require the development of pollution controls. (To learn more about section 303(d) reporting, visit *http://www.epa.gov/owow/tmdl*.)

Beginning with the 2002 reporting cycle, EPA urged the states to combine the reporting requirements for sections 305(b) and 303(d) into one integrated report and to submit these reports electronically. EPA encouraged the states to combine these reports because the integration merges environmental data from a variety of water quality programs, thereby increasing the consistency of the information. In addition, integrated reporting presents the public with a more informed summary of the quality of assessed state waters; provides decision makers with better information on the actions necessary to protect and restore these waterbodies; and streamlines state reporting burdens by eliminating the need for two separate reports.

Sixteen of the 44 water quality reports submitted by the states were fully integrated for the 2004 reporting cycle, and progress toward full integration by all the states is expected in the coming years. Data for both the integrated and non-integrated state reports are available on EPA's new Water Quality Assessment and Total Maximum Daily Load (TMDL) Information database and website, ATTAINS (**A**ssessment **T**MDL **T**racking and **I**mplementatio**N** **S**ystem). To facilitate the states' efforts to improve integrated reporting, EPA published reporting guidance in 2005 (U.S. EPA, 2005) and a series of clarifying memoranda in subsequent years. For more information on integrated reporting, visit *http://www.epa.gov/owow/tmdl/guidance.html#tmdl*.

About the Water Quality Assessment and TMDL Information Database (ATTAINS)

The ATTAINS Water Quality Assessment and TMDL Information database (henceforth referred to as the ATTAINS database) presents electronic water quality information submitted since 2002 by the states, territories, and District of Columbia. The ATTAINS database allows the user to view, via the Internet, dynamic tables and charts that summarize state-reported data for the nation as a whole, for individual states, for individual waters, and for the 10 EPA regions. The database shows which waters have

been assessed, which are impaired, and which waters have plans (e.g., TMDLs) completed to help restore water quality. By displaying data in one location, the ATTAINS database allows for a more informed summary of the quality of state waters that have been assessed and provides decision makers with better information on the actions necessary to protect and restore assessed waters of the United States.

To view the ATTAINS database, users can go to *http://www.epa.gov/waters/ir* and click on the map to find summary information and assessment results for specific states, EPA regions, watersheds, and waterbodies of interest. Users can then select information for a specific biennial reporting cycle (e.g., 2002, 2004) or select the most recent available information across multiple cycles. A series of tables and charts also summarizes the status of assessed waters across the nation.

Comparability of Water Quality Data

Although the data in the ATTAINS database provide a picture of state assessment results, this information should not be used to compare water quality conditions between states, identify trends in statewide or national water quality, or compare the impacts of specific causes or sources of impairment over time. The following are reasons for this lack of comparability:

- The methods states use to monitor and assess their waters, including what and how they monitor and how they report their findings to EPA, vary from state to state and within individual states over time. Many states target their limited monitoring resources to waters they suspect are impaired, or to address local priorities and concerns; therefore, the small percentage of waters assessed may not reflect statewide conditions. States may monitor a different set of waters from one reporting cycle to another, or may monitor fewer waters when state budgets are limited. It is also important to note that six states did not provide electronic data for the 2004 reporting cycle, and that the lack of data from these states affects the overall summary statistics.
- The science of monitoring and assessment varies over time, and many states are better able to identify problems as their monitoring and analytical methods improve. For example, states are conducting more fish tissue sampling than in previous years. The use of improved assessment methods to collect better information may result in more extensive and protective fish consumption advisories, even though water quality conditions themselves may not have changed.
- For the 2004 reporting cycle, EPA re-evaluated how it grouped sources and causes reported by the states into larger overall categories (such as Municipal Discharges/Sewage or Metals) for national reporting purposes. The purpose of this re-evaluation was to more accurately categorize the source and cause information reported by the states. Some overall source and cause categories were renamed, and some state-reported sub-categories were moved into different overall categories compared to the 2002 reporting cycle. (See the section *Sources of Impairment* in this report for more information.)
- Under the Clean Water Act, each state has the authority to set its own water quality standards; therefore, a state's definition of its designated uses (for example, Warm Water Fishery or Livestock Watering) may differ from definitions used by other states, along with the criteria against which states determine impairments. (See the section *Assessing Water Quality*, below, for more information.)

For this report, EPA has included ATTAINS data from 44 states, the District of Columbia, the U.S. Virgin Islands, and Puerto Rico. Pennsylvania, Maryland, Florida, Oregon, Idaho, Hawaii, the tribal nations, and the island territories of the Pacific did not provide data electronically that could be used for the 2004 reporting cycle. Although Pennsylvania, Florida, and Oregon did publish hardcopy section 305(b) water quality reports, EPA relies on the states' electronic submittal of assessment information as the source of the water quality findings in this report. Maryland and Hawaii submitted only 303(d) impaired waters lists in 2004 and did not provide information on assessed waters that were not impaired. Idaho is submitting a combined 2004/2006/2008 integrated report in 2008. Although only data from the 2004 reporting cycle were used for this report, it is important to note that the ATTAINS database contains all available waterbody-specific data reported by the states and territories since 2002.

About half the states conduct their own probability-based surveys (based on statistical random sampling design) to complement this information and to draw statewide conclusions about their water resources. EPA fully supports these state efforts to provide more complete assessments of their waters and to increase the percentage of assessed waters. Because state-level probabilistic monitoring efforts are in their initial stages in many states, the results of these state-scale probability surveys, for the most part, are not included in the 2004 ATTAINS database. EPA expects that the 2008 version of the database will begin to include these results, and that the Agency will be able to move toward water quality reports that assess all state waters in the coming years. Such reporting will provide a valuable complement to current knowledge on the subset of waters with targeted monitoring.

Assessing Water Quality

The states assess the quality of their waters based on water quality standards they develop in accordance with the Clean Water Act; therefore, water quality standards may differ from state to state, but must meet minimum requirements. EPA must approve these standards before they become effective under the Clean Water Act.

Water quality standards consist of three elements: the **designated uses** assigned to waters (e.g., Recreation, Public Water Supply, the Protection and Propagation of Aquatic Life); the **criteria** or thresholds that are necessary to protect the designated uses (these criteria are expressed as numeric pollutant concentrations or narrative requirements); and the **anti-degradation** policy intended to prevent waters from deteriorating from their current condition. Waters may be designated for more than one use. To learn more about water quality standards, visit *http://www.epa.gov/waterscience/standards*.

Designated Use Categories in this Report

The states have different names for the various uses they have designated for their waters. For example, one state might designate as Class A those waters that are capable of supporting fish species of commercial and recreational value (e.g., salmon, trout), whereas another state might classify similar waters as Cold Water Fishery waters. The ATTAINS database groups state-reported uses according to the following overall categories:

- **Fish, Shellfish, and Wildlife Protection and Propagation**—Is water quality good enough to support a healthy, balanced community of aquatic organisms?
- **Recreation**—Can people safely swim or enjoy other recreational activities in and on the waterbody?
- **Public Water Supply**—Does the waterbody safely supply water for drinking after standard treatment?
- **Aquatic Life Harvesting**—Can people safely eat fish caught in the waterbody?
- **Agricultural**—Can the waterbody be used for irrigating fields and watering livestock?
- **Industrial**—Can the water be used for industrial processes?
- **Aesthetic Value**—Is the waterbody aesthetically appealing?
- **Exceptional Recreational or Ecological Significance**—Does the waterbody qualify as an outstanding natural resource or support rare or endangered species?

Information on which state classifications fit under each of these categories can be found by clicking on the individual use category name in the ATTAINS database.

After setting water quality standards, the states assess their waters to determine the degree to which the standards are being met. State water quality assessments are normally based on six broad types of monitoring data: biological integrity, chemical, physical, microbiological, habitat, and toxicity. (Examples of the different types of data used to determine a state's water quality are shown in the following box.) Each type of monitoring data yields an assessment that must be integrated with other data types for an overall assessment. Depending on the designated use, one data type may be more informative than others for making the final assessment.

States tribes and other jurisdictions monitor for a variety of pollutants, or causes of impairment. Table 1 provides a list of major causes of impairment cited in this report.

Table 1. Major Impairment Cause Categories Used in this Report	
Category	**Examples**
Cause Unknown—Impaired Biota	Impairment or degradation of the biological community (e.g., fish, macroinvertebrates) due to an unknown/unidentified cause
Dioxins	Highly toxic, carcinogenic, petroleum-derived chemicals that are persistent in the environment and may be found in fish tissue, the water column, or sediments
Flow Alterations	Changes in stream flow due to human activity; includes water diversions for purposes such as irrigation
Habitat Alterations	Modifications to substrate, streambanks, fish habitat; barriers
Metals	Substances identified only as "metals"; also, selenium, lead, copper, arsenic, manganese, others (in some cases, may include mercury)
Mercury	A toxic metal with neurological and developmental impacts; found in fish tissue, the water column, or sediments
Nuisance Exotic Species	Non-native fish, animals, or plants (e.g., Eurasian milfoil, *Hydrilla*, zebra mussels) that choke out native species and alter the ecological balance of waters
Nutrients	Primarily nitrogen and phosphorus; in excess amounts, these nutrients overstimulate the growth of weeds and algae and can lead to oxygen depletion
Organic Enrichment/ Oxygen Depletion	Low levels of dissolved oxygen; high levels of biochemical oxygen-demanding substances (e.g., organic materials such as plant matter, food processing waste, sewage) that use up dissolved oxygen in water when they degrade
Pathogens	Bacteria and pathogen indicators, *E.coli*, total coliforms, fecal coliforms, *Enterococci*; used as indicators of possible contamination by sewage, livestock runoff, and septic tanks
Polychlorinated biphenyls (PCBs)	A toxic mixture of chlorinated chemicals that are no longer used, but are persistent in the environment; used originally in industry and electrical equipment; primarily found in fish tissue or sediments
Pesticides	Substances identified only as "pesticides"; also, chlordane, atrazine, carbofuran, and others; many older pesticides are persistent in the environment
Sediment	Excess sediments, siltation; affects aquatic communities by altering and suffocating habitat and clogging fish gills
Toxic Organics	Chemicals identified only as "toxic organics"; also, priority organic compounds, non-priority organic compounds, polycyclic aromatic hydrocarbons (PAHs), and others; often persistent in the environment

Types of Monitoring Data

- **Biological integrity data.** Objective measurements of aquatic biological communities (usually aquatic insects, fish, or algae) used to evaluate the condition of an aquatic ecosystem. Biological data are best used when deciding whether waters support aquatic life uses.
- **Chemical data.** Measurements of key chemical constituents in water, sediments, and fish tissue. Examples of these constituents include metals, oils, pesticides, and nutrients such as nitrogen and phosphorus. Monitoring for specific chemicals helps states assess waters against numerical criteria, as well as identify and trace the source of the impairment.
- **Physical data.** Characteristics of water, such as temperature, flow, suspended solids, sediment, dissolved oxygen, and pH. These physical attributes are often useful indicators of potential problems and can have an effect on the impacts of pollution.
- **Microbiological data.** Measurements of pathogen indicators, such as fecal and total coliform bacteria, *E. coli*, and *Enterococci.* Monitoring of these indicators helps determine possible contamination by such things as untreated sewage, septic systems, and livestock or pet wastes, and is often used to determine if waters are safe for recreation and shellfish harvesting.
- **Habitat assessments.** Assessments used to supplement and interpret other kinds of data; includes descriptions of the sites and surrounding land uses, assessment of the condition of streamside vegetation, and measurements of features such as stream width, depth, flow, and substrate.
- **Toxicity testing.** Measurements of mortality of a test population of selected organisms, such as fathead minnows or *Daphnia* (water fleas). These organisms are exposed to known dilutions of water taken from the sampling location. The resulting toxicity data indicate whether an aquatic life use is being attained. These tests can help determine whether poor water quality results from toxins or from habitat degradation.

Where possible, the states, tribes, and other jurisdictions identify the sources of those pollutants associated with water quality impairment. **Point sources** are sources that discharge pollutants directly into surface waters from a conveyance (e.g., a pipe). These sources include industrial facilities, municipal sewage treatment plants, combined sewer overflows, and storm sewers. **Nonpoint sources** are sources that deliver pollutants to surface waters from diffuse origins (e.g., fields and streets). These sources include urban runoff that is not captured in a storm sewer; agricultural runoff from cropland and grazing areas; leaking septic tanks; and atmospheric deposition of contaminants from air pollution. Habitat alterations, dams, channelization, dredging, and stream bank destabilization are also significant sources of water quality degradation. See Table 2 for more information on source categories used in this report.

Table 2. Major Pollutant Source Categories Used in this Report

Category	Examples
Agriculture	Crop production, feedlots (including concentrated animal feeding operations), grazing, manure runoff
Atmospheric Deposition	The settling of airborne pollution from many diverse sources (e.g., factory and automobile emissions, pesticide applications) onto land or water
Construction	Residential development, bridge and road construction, land development
Habitat Alterations (Not Directly Related to Hydromodification)	Riparian and in-stream habitat modification and loss; filling and draining of wetlands; removal of riparian vegetation; streambank erosion
Hydromodification	Pond construction; channelization; dam construction; dredging; flow alterations from water diversions; flow regulation; hydropower generation; streambank destabilization and modification; upstream impoundments
Industrial	Factories, industrial and commercial areas, cooling water intake structures, mill tailings
Land Application/Waste Sites/Tanks	Salt storage piles; land application of biosolids; land disposal; landfills; leaking underground storage tanks
Legacy/Historical Pollutants	Brownfield sites, contaminated sediments, in-place contaminants
Municipal Discharges/Sewage	Septic systems, sewage treatment plants, domestic sewage lagoons, sanitary sewer overflows, municipal dry and wet weather discharges, unpermitted discharges of domestic wastes, combined sewer overflows, sewage disposal
Natural/Wildlife	Flooding, drought-related impacts, waterfowl
Recreation and Tourism	Golf courses, marinas, turf management, boat maintenance
Resource Extraction	Abandoned mining, acid mine drainage, coal mining, dredge mining, mountaintop mining, petroleum/natural gas activities, surface mining
Silviculture (Forestry)	Forest management, forest fire suppression, forest roads, reforestation, woodlot site clearance
Spills/Dumping	Accidental releases/spills, pipeline breaks
Unknown/Unspecified	Source of impairment is unknown or cannot be specified
Unspecified Nonpoint Source	Source of impairment is identified as nonpoint, but no further information available
Urban-Related Runoff/Stormwater	Discharges from municipal separate storm sewers, parking lot and impervious surfaces runoff, highway and road runoff, storm sewers, urban runoff, permitted stormwater discharges

For the 2004 reporting cycle, EPA reorganized many source categories compared to previous reporting cycles; therefore, apparent significant increases or decreases in individual categories (e.g., Municipal Discharges/Sewage) may be attributable to this reorganization rather than to actual changes in the impact of an individual source category.

Hundreds of organizations in the United States conduct water quality monitoring, including state, interstate, tribal, and local water quality agencies; research organizations such as universities; industries and sewage and water treatment plants; and citizen volunteer programs. EPA, the U.S. Geological Survey (USGS), the National Park Service (NPS), and the National Oceanic and Atmospheric Administration (NOAA) are among the many federal agencies that collect water quality monitoring data. These monitoring organizations collect water quality data for their specific purposes, and many share their data with other users, including government decision makers. The 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. The states also use monitoring data to review and revise water quality standards, identify impaired and threatened waters under Clean Water Act section 303(d), develop pollutant-specific TMDLs, determine the effectiveness of control programs, adjust drinking water treatment requirements, measure progress toward clean-water goals, and respond to citizen complaints or events such as spills and fish kills.

To learn more about the water quality monitoring, assessment, and reporting practices of a specific state, visit the state's water quality Internet site and read the explanatory and programmatic information included in most reports.

Nationally consistent probability surveys are an efficient way to get a good understanding of national water quality conditions and trends. Probability surveys are scientifically based studies designed to sample water quality conditions at randomly selected sites that are statistically representative of the population of waters across the United States. EPA and its monitoring partners have used this methodology to develop a series of *National Coastal Condition Reports* (*http://www.epa.gov/nccr*), which summarize the findings of the National Coastal Assessment, a probability-based study. Another probability-based project currently underway is the National Study of Chemical Residues in Lake Fish Tissue (*http://www.epa.gov/waterscience/fishstudy*), which is the first national freshwater fish contamination survey to have statistically selected sampling sites. EPA also partnered with the states to conduct the probability-based Wadeable Streams Assessment (*http://www.epa.gov/owow/streamsurvey*) to determine the biological condition of small streams in the United States. The Wadeable Streams Assessment was completed in 2006.