This document contains the National Water Quality Inventory: Report to Congress, 2002 Reporting Cycle: Findings, Bays and Estuaries, and Other Waters

The report can be downloaded from:

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

File 4 of 6

October 2007

Bays and Estuaries

The National Assessment Database summarizes state-reported designated use support information for bays and estuaries by overall use support and by individual categories of uses.

Overall, states assessed 30,446 square miles of bays and estuaries, or 35% of the nation's total estimated 87,370 square miles, for the 2002 reporting cycle (Figure 3). This is 626 fewer square miles than were assessed by the states in the previous reporting cycle. States identified 32% of assessed square miles as impaired, or not supporting one or more of their designated uses (e.g., swimming, fishing, or shellfishing). The remaining 68% of assessed square miles were fully supporting all uses, and of these, 2% were threatened. It should be noted that Alaska alone accounted for 44% of assessed estuarine square miles in the United States and 67% of those square miles rated as fully supported all uses.

Individual use support assessments provide important details about the nature of water quality problems in bays and estuaries. Table 7 shows the top three uses assessed in bays and estuaries. States assessed 29,064 estuarine square miles for support of the Fish, Shellfish, and Wildlife Protection and Propagation use and found that 29% were impaired. (Alaska alone accounted for 13,472 square miles assessed for this use and reported 99% of these square miles fully supported all uses.) The Aquatic Life Harvesting use was assessed in 10,025 square miles and found to be impaired in 29% of assessed

Figure 3. Water quality in assessed bay and estuary square miles.

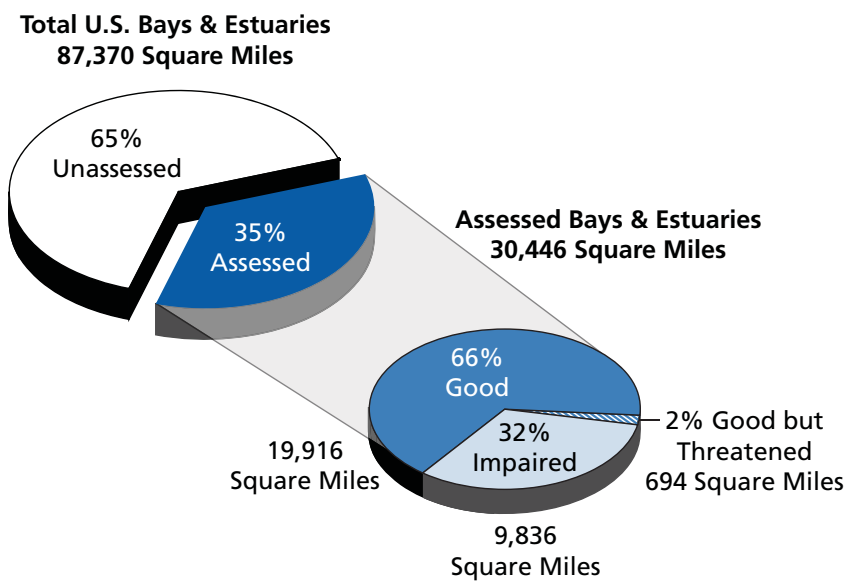


Table 7. Individual Use Support in Assessed Bay and Estuary Square Miles[a].

Designated Use	Square Miles Assessed	Percent of Total U.S. Estuarine Square Miles	Percent of Waters Assessed		
			Good	Threatened	Impaired
Fish, Shellfish, and Wildlife Protection/Propagation	29,064	33%	69%	3%	29%
Aquatic Life Harvesting	10,025	11%	68%	3%	29%
Recreation	9,290	11%	84%	<1%	15%

[a] Waterbodies can have multiple designated uses, resulting in overlap of Square Miles Assessed.

waters; 15% of the 9,290 square miles assessed for Recreation uses (e.g., swimming and boating) were reported as impaired.

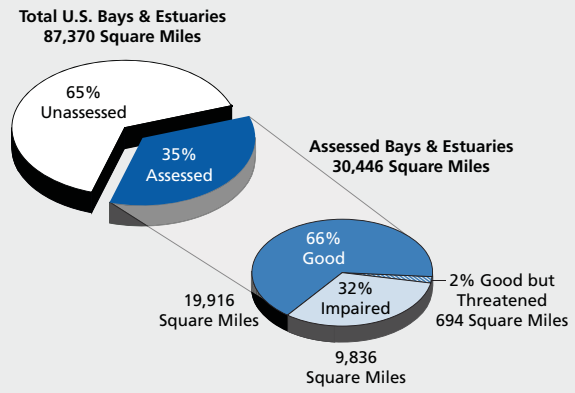
The state-reported information about specific sources and causes of impairment is incomplete. The states do not always report the pollutant or source of pollutants affecting every impaired bay and estuary. In some cases, states may recognize that water quality does not fully support a designated use; however, they may not have adequate data to document the specific pollutant or source responsible for the impairment and report the cause or source as "unknown" or "unspecified." For the first time, this 2002 report includes unknown/unspecified causes and sources in all summary statistics to more clearly represent what states are reporting to EPA.

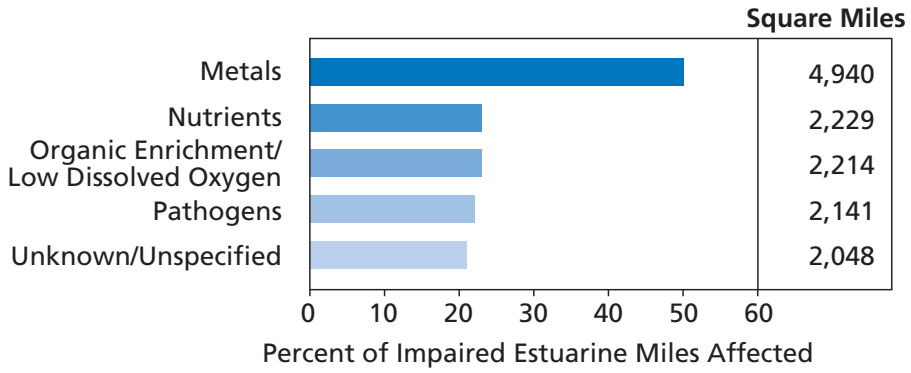
More information on state-reported causes and sources of impairment is available from the National Assessment Database at http://www.epa.gov/waters/305.

Table 8 shows the top reported causes of impairment in assessed bays and estuaries. According to the states, the top causes of estuarine impairment were the following:

- **Metals**, primarily mercury, which has been detected in fish tissue (Alaska alone reported 2,243 estuarine square miles impaired by metals)
- **Nutrients**, such as nitrogen and phosphorus from fertilizers, which can stimulate the excess growth of algae and aquatic weeds
- **Organic enrichment/low dissolved oxygen**, which can adversely affect aquatic life and cause foul odors.

Table 8. Top Causes of Impairment in Assessed Bays and Estuaries*.





*Percents do not add up to 100% because more than one cause or source may impair a waterbody.

Other leading causes of impairment in bays and estuaries included pathogens, unknown or unspecified causes (i.e., causes that could not be identified), impacts to benthic aquatic communities, turbidity, pesticides, and harmful algal blooms.

Table 9 shows the top reported sources of impairment in assessed bays and estuaries. According to the states, the top sources of estuarine impairment included the following:

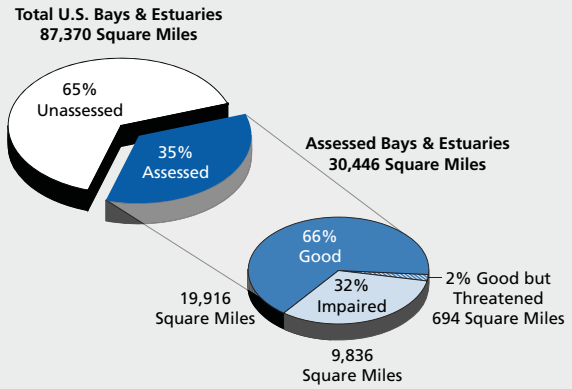
- **Unknown or unspecified sources** (i.e., states could not identify specific sources)
- **Industrial sources** (Alaska alone reported 2,397 square miles impaired by industrial sources)
- **Municipal permitted discharges** (e.g., sewage treatment facilities).

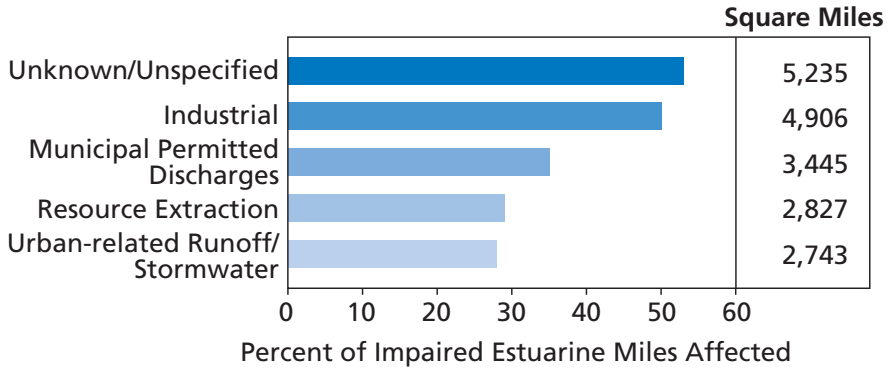
Other leading sources of impairment in bays and estuaries were resource extraction (e.g., mining and runoff of mine tailings), urban runoff/stormwater, and atmospheric deposition.

Other Waters

The 2002 National Assessment Database also contains state-reported information on conditions in coastal shoreline waters, ocean waters, Great Lakes, and wetlands; however, in some cases, only a small percentage of these resources were assessed in the 2002 reporting cycle. These waters are discussed on the following pages.

Table 9. Top Sources of Impairment in Assessed Bays and Estuaries*.





*Percents do not add up to 100% because more than one cause or source may impair a waterbody.

Coastal Resources

Coastal resources are identified in the National Assessment Database in two categories: coastal shorelines (the water immediately offshore, reported in miles) and ocean/near-coastal waters (the area of water extending into the ocean or gulf, range not specified, in square miles). Very few states reported on these important resources; therefore, this information should not be used to draw national conclusions.

Eight of the 27 coastal states assessed 2,571 miles of coastal shorelines, or about 4% of the nation's total 58,618 shoreline miles. The vast majority of assessed shoreline miles (83%) fully supported their designated uses. In the 17% of shoreline miles not fully supporting their uses, pathogens and metals were the leading causes of impairment, and urban-related runoff/stormwater, unknown/unspecified sources, and industrial discharges were listed as top sources of impairment.

EPA works with states, tribes, territories, and local governments to protect coastal swimming beaches, and monitoring of these important resources is increasing. Under the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000, EPA is developing improved tools to measure, identify, and address contaminants in recreational waters and to better understand how these pollutants affect people's health. EPA also awards grants to eligible coastal and Great Lakes states, territories, and tribes to develop and implement beach monitoring and notification programs. For more information on the BEACH program, visit http://www.epa.gov/beaches.

Nearly 5,000 square miles of oceans and near-coastal waters, or 9% of approximately 54,120 square miles in the United States, were assessed by seven states in 2002. Of the assessed square miles, 87% were identified as impaired. Metals (particularly mercury) were by far the most commonly reported

EPA is developing improved tools to measure, identify, and address contaminants in recreational waters (Photo courtesy of John Theilgard).

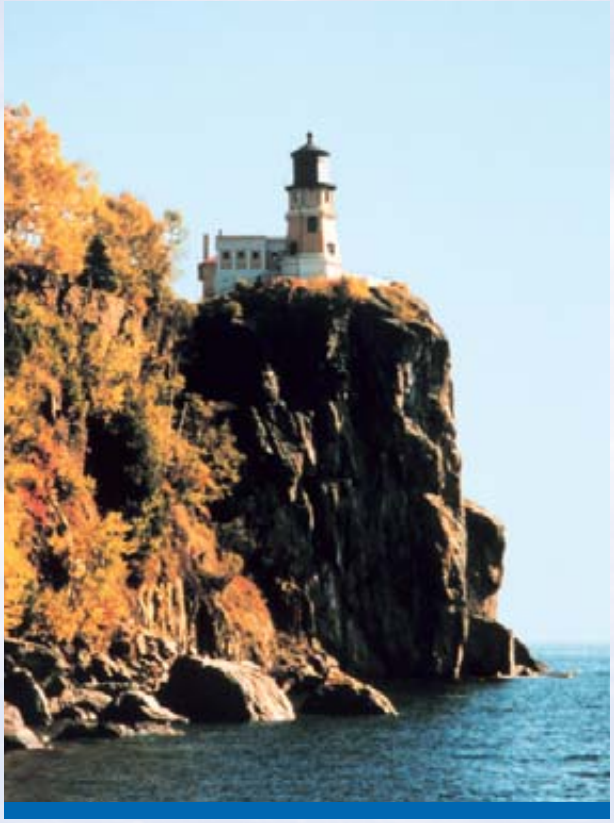
cause of impairment. Atmospheric deposition was the predominant reported source of impairment in oceans and near-coastal waters. (It is important to note that Texas alone assessed nearly 3,879 square miles of ocean and near-coastal waters and reported that 100% of its assessed square miles were impaired due to mercury from atmospheric deposition.)

Detailed information on U.S. coastal condition trends is available in the series of *National Coastal Condition Reports*, which present the findings of a collaborative effort between the states, EPA, and other federal agencies to characterize the condition of 100% of the nation's coastal resources. Section 3 of this report summarizes key findings of the *National Coastal Condition Report II*.

Great Lakes

The Great Lakes—Superior, Michigan, Huron, Erie, and Ontario—are freshwater inland seas of vast importance for water consumption, recreation, fisheries, power, transportation, and many other uses. Of the eight states bordering the Great Lakes, three states (Indiana, Michigan, and New York) reported on the condition of their Great Lakes shoreline miles, and three states (Indiana, Michigan, and Pennsylvania) reported on Great Lakes open waters.

Only about 520 of 5,521 total Great Lakes shoreline miles were assessed in 2002, and of these, 91% were reported as impaired. The leading causes of impairment included pathogens, metals, and toxic organics. Legacy or historical pollution—primarily contaminated sediment—was by far the leading source of shoreline impairment reported by the states.



Lake Superior, MN (Photo courtesy of Richard B. Mierement, National Oceanic and Atmospheric Administration).

The states assessed 50,866 square miles, or 84% of the 60,546 square miles of Great Lakes open waters in the United States. Ninety-nine percent of the assessed square miles of Great Lakes open waters were rated as impaired. Priority organics, metals (primarily mercury), and pesticides were the top three causes of impairment, and atmospheric deposition, industrial sources, legacy or historical pollution, and agriculture were all cited as leading sources of impairment in the open waters of the Great Lakes.

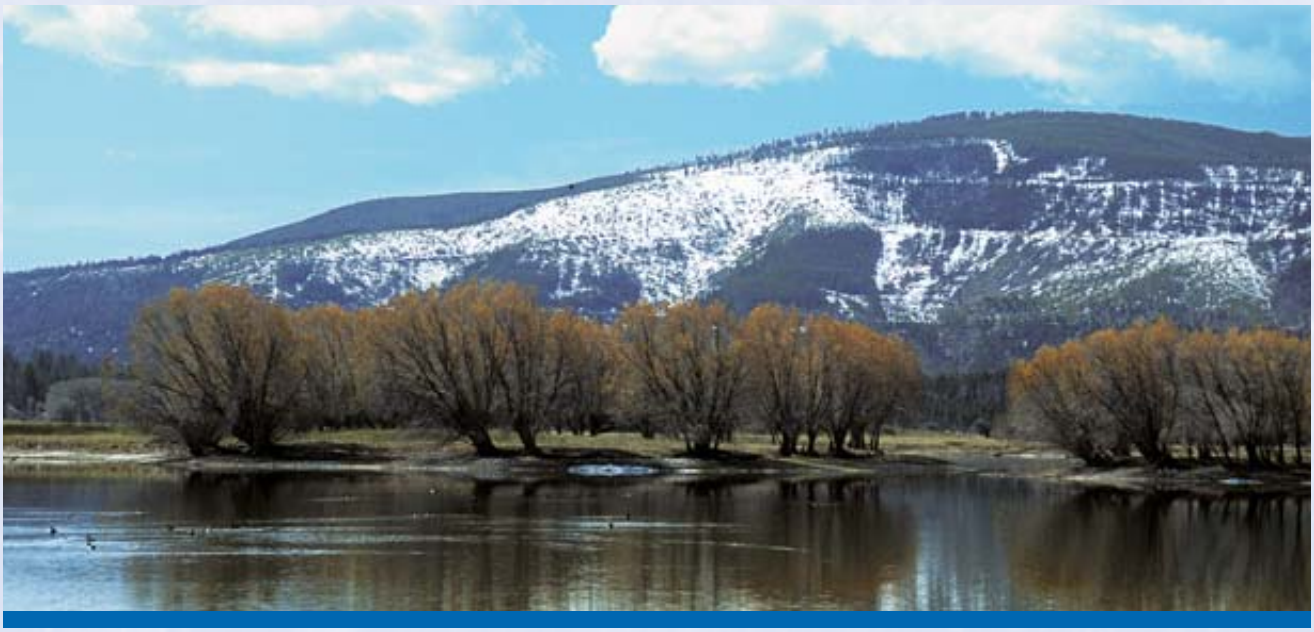
Wetlands

Wetlands occur where water and land come together for a prolonged period of time; saturation of the land with water is the dominant factor determining soil types and the plant and animal communities living in the soil and on the surface. Wetlands vary widely because of regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors, including human disturbance. Included among the many types of U.S. wetlands are marshes, bogs, swamps, wet meadows, vernal pools, playas, pocosins, sloughs, peat lands, prairie potholes, and fens.

Wetlands are a critically important resource due to the many benefits they provide to humans, aquatic life, wildlife, and the environment. Wetlands produce great quantities of food that attract a huge variety of animal species. They serve as nurseries and habitat for many game and commercial fish and wildlife species, and they help improve water quality by intercepting surface runoff and removing, retaining, or filtering out a broad range of substances (e.g., nutrients, sediments, and organic wastes). By storing and slowly releasing water, wetlands help reduce the impacts of floods and erosion, as well as help replenish groundwater and stream flow during dry periods. Wetlands are also of great recreational value to bird watchers, hunters, fishermen, and nature lovers.

Most states lack wetland-specific designated uses, criteria, and monitoring programs, and without these programs, cannot evaluate support of designated uses for wetlands. Only six states provided information on support of designated uses for 1.3 million acres of wetlands in their 2002 reports—a tiny portion of the nation's estimated 105 million acres. States identified 52% percent of these assessed acres as impaired. Metals (primarily mercury), organic enrichment/low dissolved oxygen, and sediment/siltation were the leading causes of wetland degradation in these six states. The sources of these and other pollutants were mostly unspecified. Where sources were identified, atmospheric deposition and agriculture were top contributors to impairment.

Wetlands produce great quantities of food that attract a huge variety of animal species.



Wetlands vary widely because of regional and local differences in soil, topography, climate, hydrology, water chemistry, vegetation, and other factors (Photo courtesy of Gary Kramer, National Resources Conservation Service).

National Studies of Water Quality

Photo courtesy of Paul Fusco, Natural Resources Conseration Service

State 305(b) reports provide insight into the condition of the relatively small number of waters that are assessed, but should not be compared to each other and cannot be used to track trends in water quality over time. Water quality standards and methods vary from state to state, and monitoring and reporting methods also change over time. Most states monitor only a small percentage of their waters for each reporting cycle, and many monitor in different watersheds from one cycle to the next. Thus, as noted earlier in this report, 2002 state 305(b) assessment data exists for only 19% of the nation's stream miles, 37% of lake and reservoir acres, and 35% of bay and estuary square miles. Furthermore, as states improve their abilities to monitor—for example, as they analyze more fish tissue samples or monitor the quality of more beaches—they may discover problems that were previously unidentified.

EPA, other federal agencies, and the states have embarked on a more cost-effective approach to track trends in the quality of the nation's waters: statistically valid, probability-based studies that complement existing monitoring and assessment programs and add to our understanding of national, regional, and local water quality conditions. Probability-based studies select a specific number of sites at random to represent the condition of waters in regions that share similar ecological characteristics. Scientists can then draw inferences for 100% of waters with a known degree of confidence.

Probability-based studies are generally characterized by standard sampling methodologies, a defined set of relevant indicators, and stringent quality assurance (QA) requirements. Three of these studies, and one study that is still in the planning stages, are discussed over the following pages. These study results should not be compared to the 305(b) report findings because they address the entire resource (e.g., all U.S. streams, coastal waters).

National Coastal Assessment

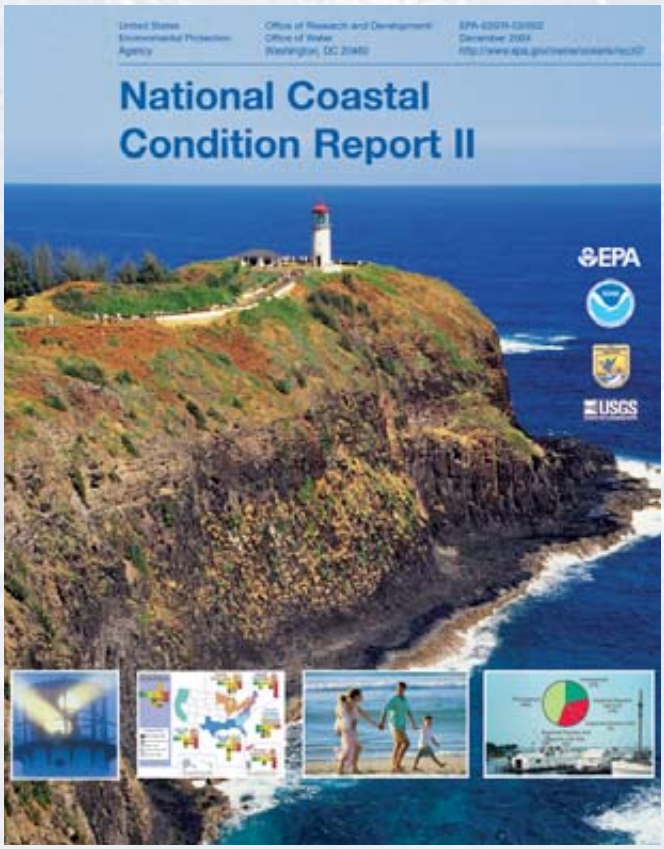
The National Coastal Assessment surveys the condition of the nation's coastal resources, as well as state efforts to protect, manage, and restore coastal ecosystems. The results of these surveys are compiled periodically into a *National Coastal Condition Report*. The states, EPA, and partner agencies—the National Oceanic and Atmospheric Administration (NOAA), USGS, and the U.S. Fish and Wildlife Service (FWS)—issued the *National Coastal Condition Report II* in January 2005 as the second in this series

Understanding the Value of Statistical Surveys and the National 305(b) Report

Although some of the findings of the national 305(b) report appear similar to the findings of the statistically based coastal and streams surveys, there are many differences in the scope of these reports and how they are best used to inform water quality management.

The statistical surveys provide consistent environmental indicators of the condition of the nation's water resources, much as economic indicators report on the health of the nation's economy. Their design ensures that results represent the population of all waters of a certain type across the United States, and their consistent sampling methods ensure that results can be aggregated into regional and national indicators of the health of the resource. The survey results quantify, with documented confidence, how widespread water quality problems are across the country and estimate the extent of waters affected by key stressors. This helps set priorities for water resource protection and restoration. Nationally consistent surveys provide a standardized measure for tracking changes in the condition of the nation's waters over time and for evaluating, at a broad scale, progress in investments to protect and restore water quality.

In contrast to the statistical surveys, the national 305(b) report summarizes information reported by states for only a portion of waters (approximately 19% of U.S. river and stream miles and 35% of bay and estuarine square miles). Although an increasing number of states are adopting statistical survey designs to represent the condition of all state waters, most still select monitoring sites to meet specific needs, such as the evaluating potential downstream impacts of permitted discharges. The national 305(b) report tallies state findings based on data collected using a variety of sampling methods and parameters, water quality standards and interpretation methods, extrapolation methods, and time periods. The 305(b) report provides useful information on the nature of water quality problems identified by state monitoring programs; documents the amount of waters assessed and unassessed; supports the identification of specific waters not meeting water quality standards; and thereby helps states set priorities for these waters.



of environmental surveys of U.S. coastal waters. This report includes evaluations of 100% of the nation's estuaries in the contiguous 48 states and Puerto Rico. Federal, state, and local agencies collected more than 50,000 samples between 1997 and 2000 for the report, using nationally consistent methods and a probability-based design to assess five key indicators of coastal water health. These indicators included water quality, coastal habitat loss, sediment quality, benthic community condition, and fish tissue contaminants.

The *National Coastal Condition Report II* finds that the quality of U.S. coastal waters is generally fair—essentially the same finding as the first *National Coastal Condition Report*, which was published in 2001. Nationally, 35% of coastal resources are in poor condition, 21% are in good condition, and 44% are threatened (fair condition) for aquatic life use or human use. Overall confidence in the accuracy of the data varies by indicator and region and is about 95% nationally. Other key findings of the report include the following:

- A fish tissue contaminants index was used to determine the suitability of waters for fishing. Twenty-two percent of coastal waters are impaired for fishing, based on EPA's guidelines for moderate consumption of recreationally caught fish.

Twenty-two percent of coastal waters are impaired for fishing based on the findings of the *National Coastal Condition Report II* (Photo courtesy of John Theilgard).

- Water quality, sediment quality, habitat loss, and benthic indices were used to determine the suitability of waters for aquatic life use. Twenty-eight percent of coastal waters are impaired for aquatic life use.
- Among the key indicators, coastal habitat condition, sediment quality, and benthic condition ranked the lowest. Individual components of water quality, including dissolved oxygen and dissolved inorganic nitrogen, ranked slightly better.
- From a regional perspective, the coastal condition in the Southeast is rated as good, the Gulf of Mexico and the West are rated as fair, the Great Lakes are rated as fair to poor, and the Northeast and Puerto Rico are rated as poor. Figure 4 summarizes these ratings.

The *National Coastal Condition Report II* presents a broad baseline picture of the condition of estuaries across the United States from 1997–2000 and will serve as a benchmark for analyzing the progress of coastal programs in future years. A third report is expected in 2008 and will assess regional trends for the majority of the United States. To view the *National Coastal Condition Report II*, go to http://www.epa.gov/nccr.

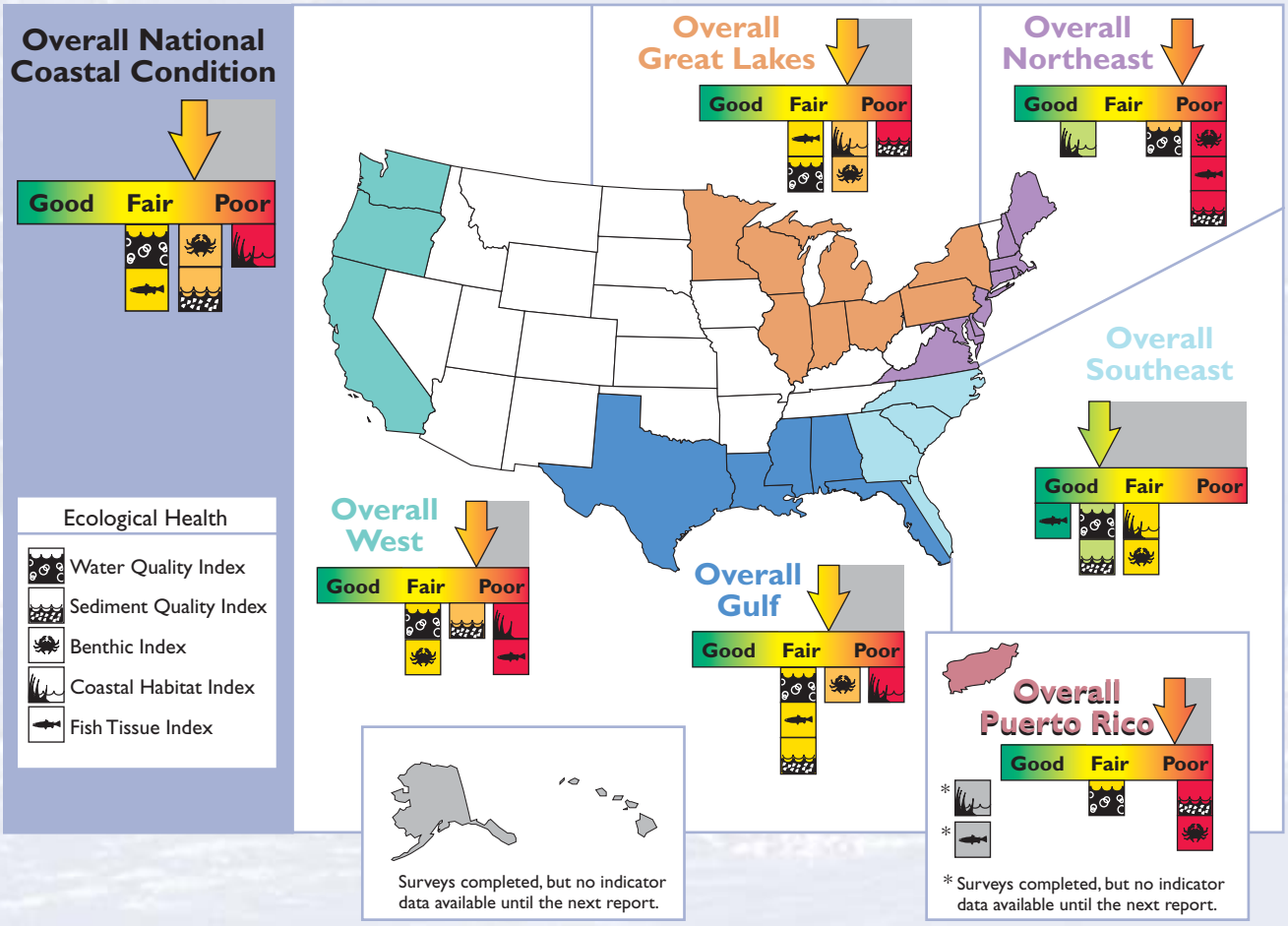


Figure 4. Summary of the overall national coastal condition (U.S. EPA/NCA).