

US EPA ARCHIVE DOCUMENT

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Lakes, Reservoirs, and Ponds

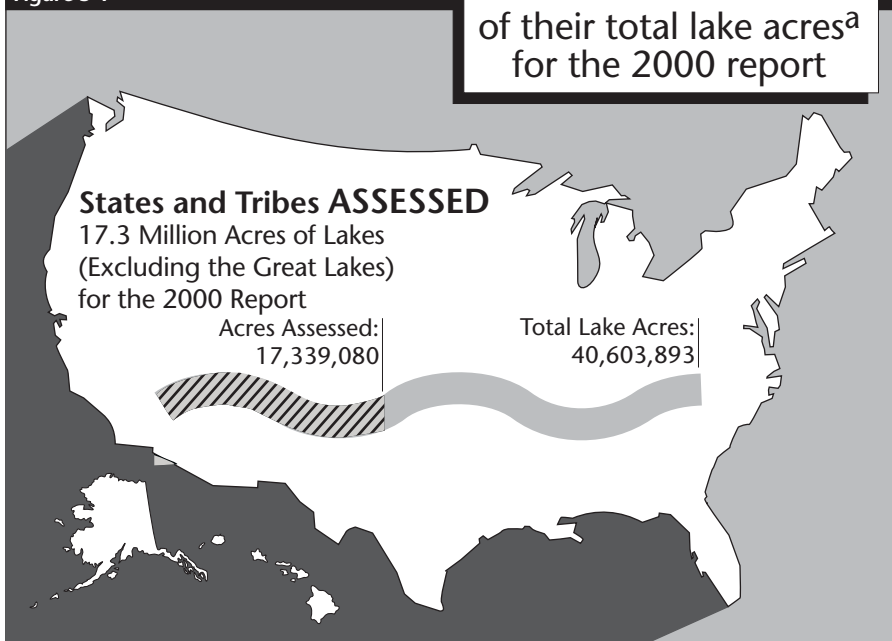
Forty-six states, Puerto Rico, and the District of Columbia (collectively referred to as states in the rest of this chapter) rated lake water quality in their 2000 Section 305(b) reports (see Appendix B, Table B-1, for individual state and jurisdiction data). These states assessed 17.3 million acres of lakes, reservoirs, and ponds, which equals 43% of the 40.6 million acres of lakes in the nation (Figure 3-1). The states based 68% of their assessments on monitored data and evaluated 28% of the assessed lake acres with qualitative information. The states did not specify whether the remaining 4% of assessed lake acres were monitored or evaluated. Compared to the 1998 reporting cycle,

states are using monitoring data for a slightly larger percentage of their assessments. The number of assessed lake acres decreased slightly from 1998 to 2000, from 17.4 million acres to 17.3 million acres.

The summary information presented in this chapter applies strictly to the portion of the nation's lakes assessed by the states and tribes. EPA cannot make generalizations about the health of all of our nation's lakes based on data extracted from the 305(b) reports.

**States and Tribes
ASSESSED
43%
of their total lake acres^a
for the 2000 report**

Figure 3-1

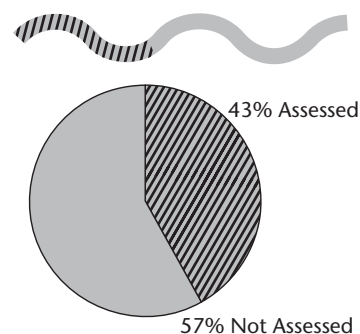


This figure compares the total acres of lakes, reservoirs, and ponds with the subset that were assessed by states for the 2000 water quality report.

Based on data contained in Appendix B, Table B-1.

Lake, Reservoir, and Pond Acres Assessed by the States and Tribes

2000 // 17,339,080 acres = 43% assessed
■ Total acres: 40,603,893^a



1998 // 17,390,370 acres = 42% assessed
■ Total acres: 41,593,748^b



1996 // 16,819,769 acres = 40% assessed
■ Total acres: 41,684,902^c



1994 // 17,134,153 acres = 42% assessed
■ Total acres: 40,826,064^d



1992 // 18,300,000 acres = 46% assessed
■ Total acres: 39,920,000^e



^aSource: 2000 state and tribal Section 305(b) reports.

^bSource: 1998 state and tribal Section 305(b) reports.

^cSource: 1996 state and tribal Section 305(b) reports.

^dSource: 1994 state and tribal Section 305(b) reports.

^eSource: 1992 state and tribal Section 305(b) reports.

Note: Figures may not add to 100% due to the rounding of individual numbers.

Summary of Use Support

Most states and tribes rate how well a lake supports individual uses (such as swimming and aquatic life) and then consolidate individual use ratings into a summary table. This table divides assessed lake acres into those that are

- **Good** – Fully supporting all of their uses or fully supporting all uses but threatened for one or more uses
- **Impaired** – Partially or not supporting one or more uses
- **Not attainable** – Not able to support one or more uses.

Forty-five states, Puerto Rico, and the District of Columbia reported summary use support status for lakes in their 2000 Section 305(b) reports

Assessed Waters^a

Total lakes = 40,603,893 acres
Total assessed = 17,339,080 acres

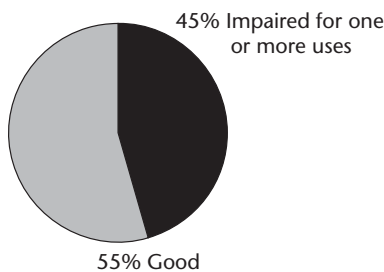
- 43% assessed
- 57% not assessed



Of the assessed acres:

- 68% were monitored
- 28% were evaluated
- 4% were not specified

Assessed Water Quality



^aSource: 2000 state and tribal Section 305(b) reports.

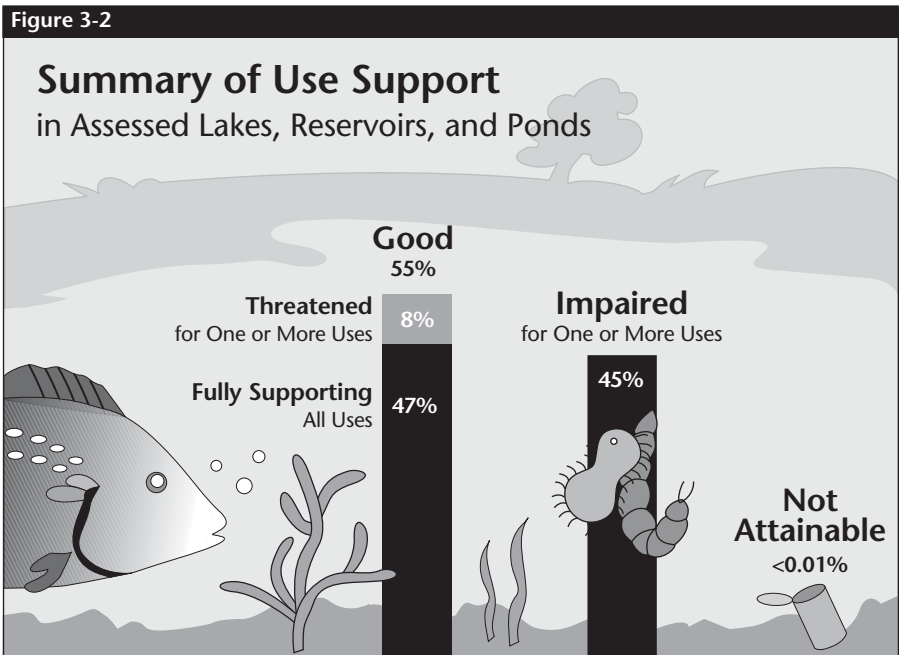
(see Appendix B, Table B-2, for individual state and tribal information). Mississippi, New Jersey, and Ohio did not report on summary of use support for lake acres, so EPA used aquatic life use support status to summarize lake water quality conditions in these states.

The states and tribes reported that 55% of their assessed 17.3 million lake acres have good water quality (Figure 3-2); 47% of the assessed lake acres fully support all uses and 8% of the assessed lake acres fully support all uses but are threatened for one or more uses. Some form of pollution or habitat degradation impairs the remaining 45% of the assessed lake acres included in summary of use support.

It is important to note that 11 states did not include the effects of statewide fish consumption advisories for mercury when calculating their summary use support status in lakes. Connecticut, Kentucky, Maine,

Massachusetts, Minnesota, New Hampshire, New Jersey, North Carolina, Ohio, Vermont, and Wisconsin excluded the impairment associated with statewide mercury advisories in order to convey information that would have been otherwise masked by the fish consumption advisories. If these advisories had been included, all of the states' lakes would have received an impaired rating. Michigan also has a statewide advisory for mercury, and included that impairment in the summary of use support. New York excluded the effects of a statewide PCB/chlordane/mirex/DDT fish consumption advisory for lakes in its summary data.

55% OF ASSESSED lake acres have good water quality.



This figure presents the status of the assessed acres of lakes, reservoirs, and ponds. Of the more than 17 million acres of lakes, reservoirs, and ponds assessed, 54% fully support their designated uses and 44% are impaired for one or more uses. Eight percent of the assessed waters are fully supporting uses but threatened.

Based on data contained in Appendix B, Table B-2.

Note: Figures may not add up to 100% due to rounding.

Individual Use Support

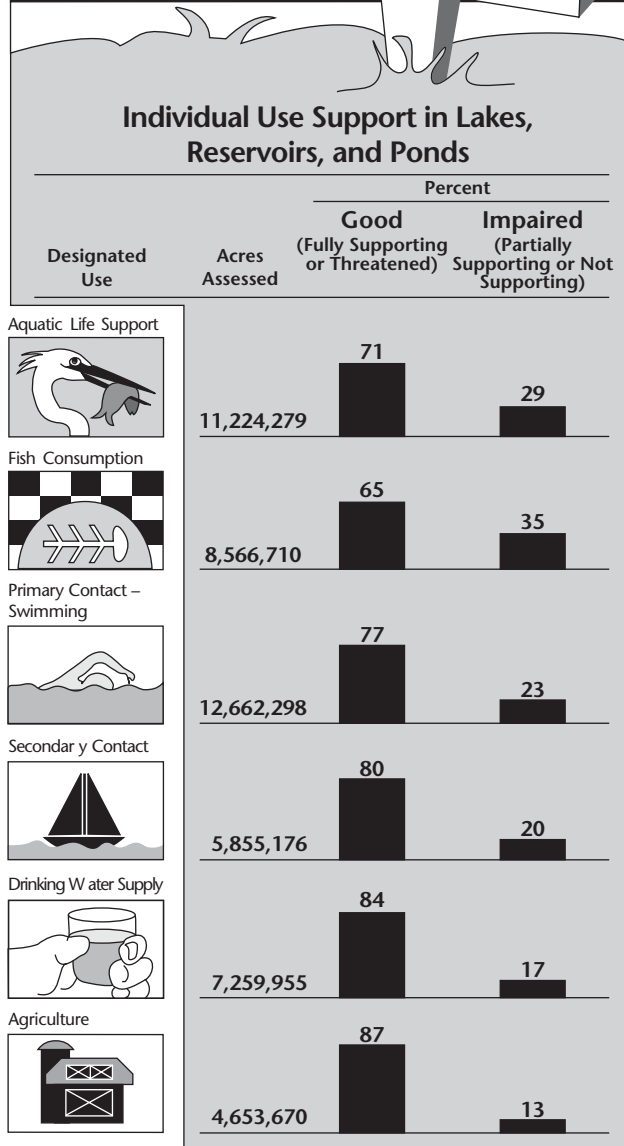
Individual use support assessment provides important details about the nature of water quality problems in our nation's surface waters. The states establish specific designated uses for waterbodies through their water quality standards and, for reporting purposes, consolidate their more detailed uses into six general use categories. The standard uses consist of aquatic life support, fish consumption, primary contact recreation (such as swimming and diving), secondary contact recreation (such as boating), drinking water supply, and agricultural use.

Forty-two states, Puerto Rico, and the District of Columbia reported individual use support status of their lakes, reservoirs, and ponds (see Appendix B, Table B-3, for individual state and tribal information). The reporting states assessed aquatic life use and swimming use most frequently. These states reported that support of aquatic life use is impaired in over 3.2 million lake acres (29% of the 11.2 million acres assessed for aquatic life support), and swimming criteria violations impact almost 3 million lake acres (23% of the 12.7 million acres assessed for swimming use support) (Figure 3-3).

Many states did not rate fish consumption use support because they have not included fish consumption as a use in their standards. However, through separate tracking of state fish consumption advisories (EPA's National Listing of Fish and Wildlife Advisories), EPA estimates that about 23% of the nation's total lake acres were under advisories in 2000. EPA encourages the states to designate fish consumption as a separate use in their waterbodies to promote consistency in future reporting.

Good water quality supports swimming in 77% of the lake acres assessed

Figure 3-3



This figure presents a tally of the acres of lakes, reservoirs, and ponds assessed by states for each category of designated use. For each category, the figure summarizes the proportion of the assessed waters rated according to quality.

Based on data contained in Appendix B, Table B-3.

Note: Figures may not add up to 100% due to rounding.

Water Quality Problems Identified in Lakes, Reservoirs, and Ponds

When states and tribes rate waters as impaired, they also attempt to identify the causes and sources of impairment. Figures 3-4 and 3-5 identify the pollutants and sources of pollutants that impair the most acres of assessed lakes.

The following sections describe the leading pollutants/stressors and sources of impairment identified in lakes. It is important to note that the information about pollutants/stressors and sources is incomplete. The states and tribes do not always report the pollutants/stressors or source of pollutants impacting every impaired lake acre. In some cases, they may recognize that water quality does not fully support a designated use, but may not have adequate data to document the specific pollutant, stressor or source responsible for the impairment.

Pollutants and Stressors Impacting Lakes, Reservoirs, and Ponds

Forty-five states, the District of Columbia, and Puerto Rico identified the pollutants and stressors causing impairments to lake water quality. More lake acres are affected by nutrients than any other pollutant or stressor (Figure 3-4). States reported that excess nutrients pollute 3.8 million

lake acres (which equals 22% of the assessed lake acres and 50% of the impaired lake acres). See Appendix B, Table B-4, for individual state information.

Healthy lake ecosystems contain nutrients in small quantities from natural sources. Extra inputs of nutrients (primarily nitrogen and phosphorus) disrupt the balance of lake ecosystems by stimulating population explosions of undesirable algae and aquatic weeds (Figure 3-6). The algae sink to the lake bottom after they die, where bacteria decompose them. The bacteria consume dissolved oxygen in the water while decomposing the dead algae. Fish kills and foul odors may result if dissolved oxygen is depleted.

The states reported metals as the second most common pollutant in assessed lake acres, impairing 3.2 million lake acres (19% of the assessed lake acres and 42% of impaired lake acres). This is mainly due to the widespread detection of mercury in fish tissue samples. Most states rely on fish tissue samples to indicate mercury contamination, since mercury is difficult to measure in water but bioaccumulates in tissue. States are actively studying the extent of the mercury problem, which originates from atmospheric transport from power-generating facilities, waste incinerators, mining, and other sources.

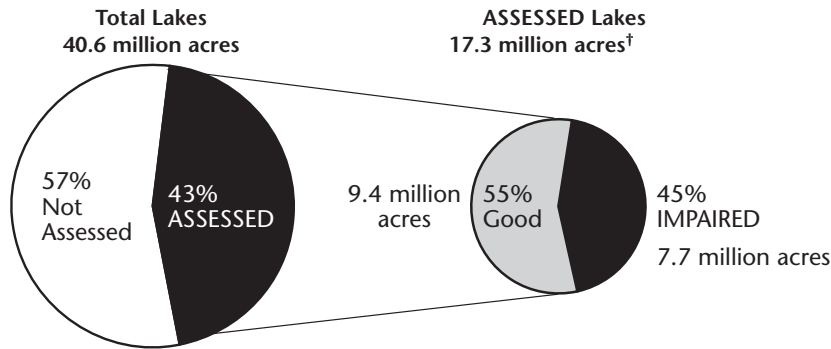
In addition to nutrients and metals, the states report that siltation (sedimentation) pollutes nearly 1.6 million lake acres (9% of the assessed lake acres and 21% of the

impaired lake acres), total dissolved solids affect nearly 1.5 million acres (9% of the assessed lake acres and 19% of the impaired lake acres), and enrichment by organic wastes that deplete dissolved oxygen in lake waters affects over 1.1 million lake acres (7% of the assessed lake acres and 15% of the impaired lake acres).

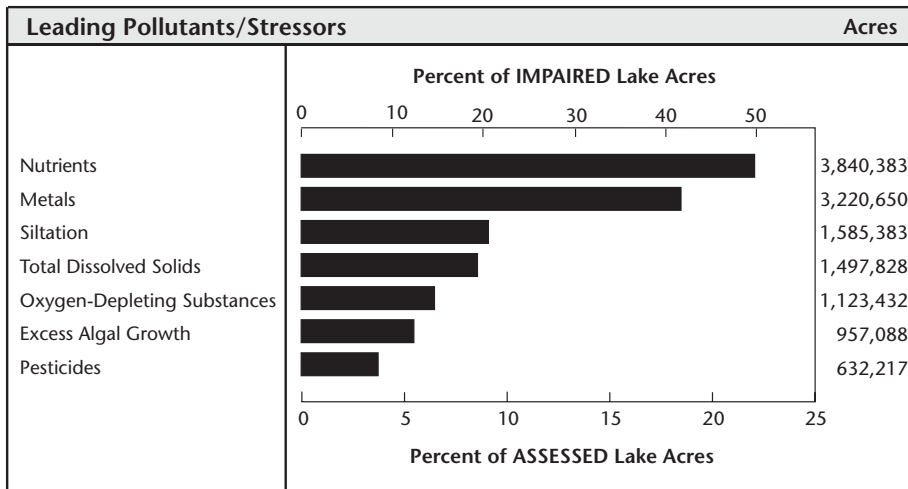
Often, several pollutants and processes impair a single lake. For example, an activity such as removal of shoreline vegetation may accelerate erosion of sediment and nutrients into a lake. In such cases, the states and tribes count a single lake acre under each category that impacts the lake acre. Therefore, the lake acres impaired by each pollutant and process do not add up to 100% in Figures 3-4 and 3-5.

Figure 3-4

Leading POLLUTANTS in Impaired Lakes*



The pollutants/processes and sources shown here may not correspond directly to one another (i.e., the leading pollutant may not originate from the leading source). This may occur because a major pollutant may be released from many minor sources. It also happens when states do not have the information to determine all the sources of a particular pollutant/stressor.



States assessed 43% of the total acres of lakes, reservoirs, and ponds for the 2000 report. The larger pie chart on the left illustrates this proportion. The smaller pie chart on the right shows that, for the subset of assessed waters, 55% are rated as good and 45% as impaired. When states identify waters that are impaired, they describe the pollutants or processes causing or contributing to the impairment. The bar chart presents the leading causes and the number of lake, reservoir, and pond acres impacted. The percent scales on the upper and lower x-axes of the bar chart provide different perspectives on the magnitude of the impact of these pollutants. The lower axis compares the acres impacted by the pollutant to the total ASSESSED acres. The upper axis compares the acres impacted by the pollutant to the total IMPAIRED acres.

Based on data contained in Appendix B, Table B-4.

* Eleven states did not include the effects of statewide fish consumption advisories when reporting the pollutants and sources responsible for impairment. Therefore, certain pollutants and sources, such as metals and atmospheric deposition, may be underrepresented.

† Includes acres assessed as not attainable.

Note: Percentages do not add up to 100% because more than one pollutant or source may impair a lake.

According to the states, **NUTRIENTS** are the most common pollutants affecting assessed lakes. Nutrients

- Are found in 22% of the assessed lakes (see Figure 3-4)
- Contribute to 50% of reported water quality problems in impaired lakes.

Sources of Pollutants Impacting Lakes, Reservoirs, and Ponds

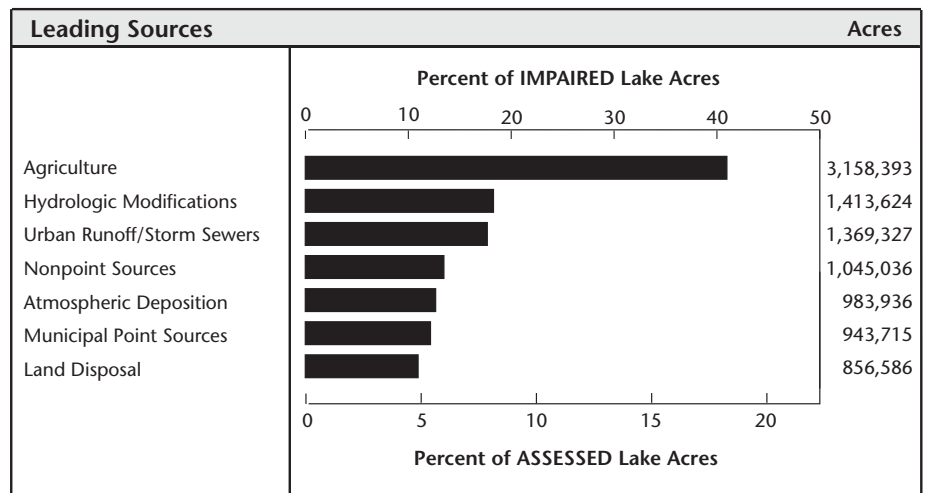
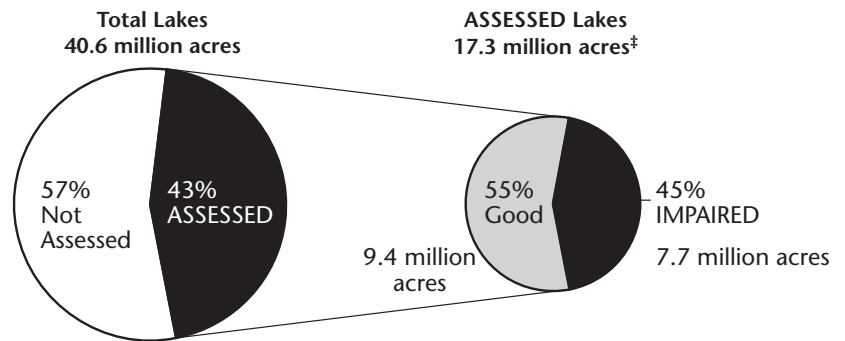
Forty-five states, the District of Columbia, and Puerto Rico reported sources of pollution related to human activities that impair some of their lake, reservoir, and pond acres (see Appendix B, Table B-5, for individual state information). The most commonly reported known sources of impairment in lakes include agriculture, hydrologic modifications, and urban runoff/storm sewers.

Agriculture is the most widespread source of impairment in the nation's assessed lake acres (Figure 3-5). Agriculture generates pollutants that degrade aquatic life or interfere with public use of over 3 million lake acres (18% of the assessed lake acres and 41% of the impaired lake acres). Riparian pasture grazing and irrigated and nonirrigated crop production were the most frequently cited types of agriculture causing impairments to lake water quality.

Hydrologic modifications, the second most commonly reported source of impairment, degrade 1.4 million lake acres (8% of the assessed lake acres and 18% of the impaired lake acres). Hydrologic modifications include flow regulation and modification, dredging, and construction of dams. These activities

Figure 3-5

Leading SOURCES of Lake Impairment*†



States assessed 43% of the total acres of lakes, reservoirs, and ponds for the 2000 report. The larger pie chart on the left illustrates this proportion. The smaller pie chart on the right shows that, for the subset of assessed waters, 55% are rated as good and 45% as impaired. When states identify waters that are impaired, they also describe the sources of pollutants associated with the impairment. The bar chart presents the leading sources and the number of lake, reservoir, and pond acres impacted. The percent scales on the upper and lower x-axes of the bar chart provide different perspectives on the magnitude of the impact of these sources. The lower axis compares the acres impacted by the source to the total ASSESSED acres. The upper axis compares the acres impacted by the source to the total IMPAIRED acres.

Based on data contained in Appendix B, Table B-5.

* Eleven states did not include the effects of statewide fish consumption advisories when reporting the pollutants and sources responsible for impairment. Therefore, certain pollutants and sources, such as metals and atmospheric deposition, may be underrepresented.

† Excluding unknown, natural, and "other" sources.

‡ Includes acres assessed as not attainable.

Note: Percentages do not add up to 100% because more than one pollutant or source may impair a lake.

According to the states, **AGRICULTURE** is the leading source of pollution in assessed lakes. Agricultural pollution problems

- Affect 18% of the assessed lakes
- Contribute to 41% of reported water quality in impaired lakes (see Figure 3-5).

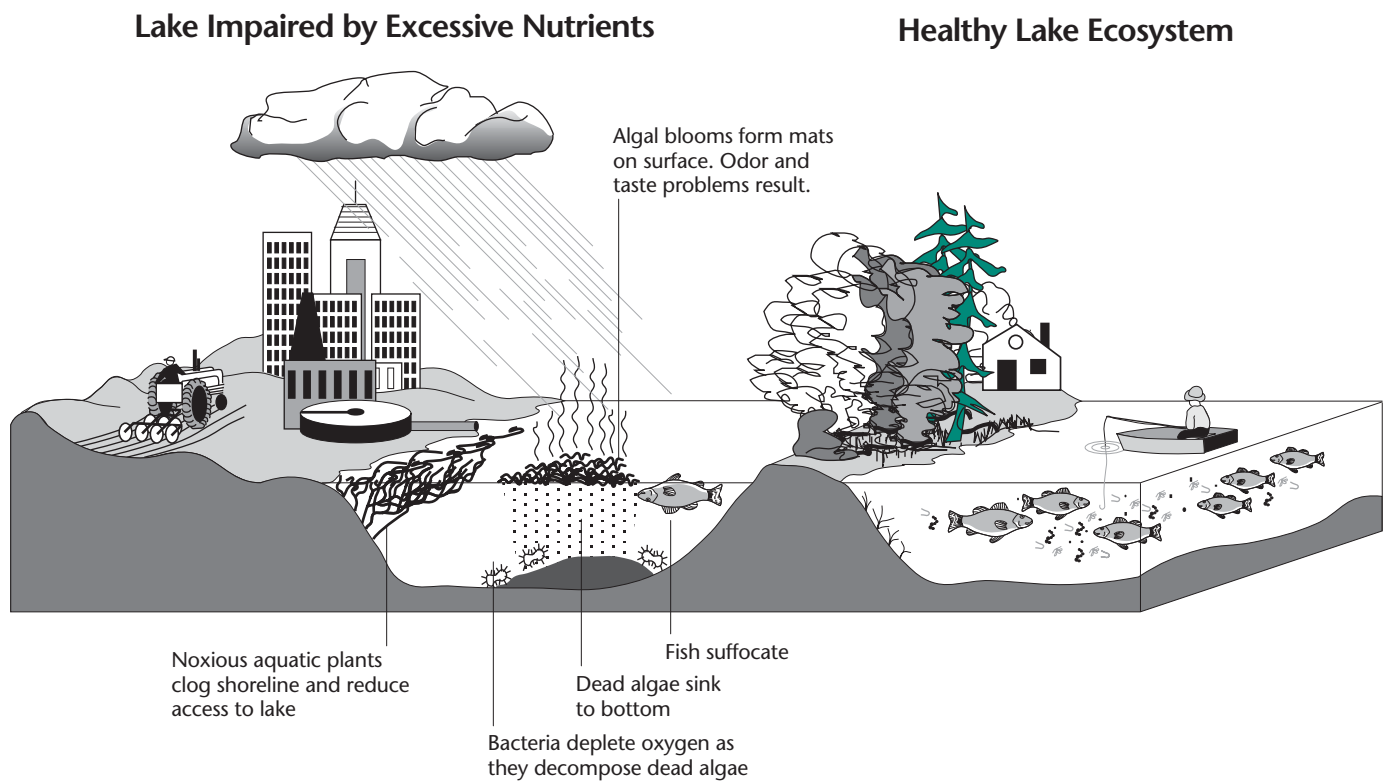
may alter a lake's habitat in such a way that it becomes less suitable for aquatic life.

The states report that pollution from urban runoff and storm sewers degrades nearly 1.4 million lake acres (8% of the assessed lake acres and 18% of the impaired lake acres), generalized nonpoint sources of pollution impair about 1 million lake acres (6% of the assessed lake acres and 14% of the impaired lake acres), atmospheric deposition of pollutants impairs 1 million lake acres (6% of the assessed lake acres and 13% of the impaired lake acres), and municipal sewage treatment plants pollute 943,715 lake acres (5% of the assessed lake acres and 12% of the impaired lake acres).

As in 1998, more states reported lake degradation from atmospheric deposition than in past reporting cycles. This is due, in part, to a growing awareness of the magnitude of the atmospheric deposition problem. Researchers have found significant impacts to ecosystems and human health from atmospherically delivered pollutants.

The states listed additional sources affecting several hundred thousand lake acres, including habitat modifications, land disposal of wastes, flow regulation, resource extraction, contaminated sediments, highway maintenance and runoff, drainage and filling of wetlands, and forestry activities.

Figure 3-6



Nutrients cause nuisance overgrowth of algae as well as noxious aquatic plants, which leads to oxygen depletion via plant respiration and microbial decomposition of plant matter. If not properly managed and controlled, sources such as agriculture, industrial activities, municipal sewage, and atmospheric deposition can contribute to excessive nutrients in lakes.