
ENVIRONMENTAL Fact Sheet



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DES's Lake Survey Program

What is the Lake Survey Program?

The lake survey program, conducted by DES since 1975, is a lake sampling program designed to determine the current physical, chemical and biological condition of a lake or pond. The condition of the lake or pond is determined based on lake quality data collected on one day in mid to late summer, and on one day in mid winter, along with available and calculated morphometric data.

Why are Lakes Surveyed?

Lakes are surveyed to measure the trophic status (biological productivity) of a lake, to evaluate impacts from [acid rain](#), to determine the presence or absence of [exotic aquatic weeds](#), and to ensure compliance with state water quality standards. The collected information is also used to establish baseline conditions for future comparisons, and to evaluate long-term trends by comparing current conditions with historical data. The trend analysis is useful for determining general trends in a large number of lakes.

However, because of the limited frequency of sampling, only major changes can be detected in any particular lake. More frequently collected data is necessary to detect subtle changes in a given lake.

Acid Rain Status of New Hampshire Lakes

Sensitivity Category	Alkalinity (mg/L CaCO ₃)	Percent of Lakes
Acidified	0	3%
Critical	>0-2	18%
Endangered	>2-5	32%
Highly Sensitive	>5-10	32%
Sensitive	>10-20	12%
Not Sensitive	>20	3%

Trophic Status of New Hampshire Lakes

Trophic Category	Number	Area of Lakes
Low Productivity (oligotrophic)	31%	70%
Medium Productivity (mesotrophic)	44%	24%
High Productivity	25%	6%

(eutrophic)

Which Lakes are Surveyed?

All publicly-owned recreational lakes (natural lakes of 10 or more acres) and all man-made recreational lakes that are open to the general public are potential survey lakes. There are approximately 750 such lakes in the state, and most of the reasonably accessible lakes in this group have been surveyed at least once since the program's inception in 1975. Public water supplies that restrict recreation, as well as private ponds, wetlands, and run-of-the-river impoundments are not surveyed.

How Frequently are Lakes Surveyed?

In many cases the most recent water quality data for a lake, prior to this lake survey program, was data collected by the N.H. Fish and Game Department in the late 1930's. The initial goal of the survey program was to update this data, and, for some lakes, the data may not be updated again for another 50 years. However, the goal now is to survey the larger, more populated lakes approximately once every 10 to 15 years. Any qualified lake that has not been surveyed, and is accessible, will be surveyed upon request; and any surveyed lake that has data over 10 years old will be re-surveyed upon request, if possible.

Ten Largest Lakes In New Hampshire

Lake Name & Town	Surface Area (acres)
Lake Winnepesaukee, Gilford	44,586
Lake Umbagog, Errol	7,850
Squam Lake, Holderness	6,764
Lake Winnisquam, Laconia	4,264
Newfound Lake, Bristol	4,105
Lake Sunapee, Sunapee	4,085
Moore Reservoir, Littleton	3,480
Ossipee Lake, Ossipee	3,092
Lake Wentworth, Wolfeboro	3,018
Lake Massabesic, Auburn	2,900

What Type of Information is Collected During a Lake Survey?

During the summer the first information to be collected is the water depths in the lake. This is accomplished by conducting numerous transects across the lake by boat, while recording the depth readings on an attached fathometer. The readings are used later to construct a bathymetric map of the lake showing depth contours. The rooted plants growing along the shoreline of the lake and around the major islands are inventoried next, and later a map is constructed depicting the location, type, and abundance of plants. A few bacteria samples are taken at selected locations along the shore during the plant inspection.

The deep spot of the lake is then sampled. First, the temperature and dissolved oxygen are measured at meter intervals from top to bottom, using a probe. Based on the temperature profile, water samples are collected at the mid-epilimnion, mid-metalimnion, and mid-hypolimnion depths (the 3 distinct layers in a thermally stratified lake), or at 1/3 and 2/3 the water depth for unstratified lakes. These samples are analyzed for pH, alkalinity, color, conductivity, phosphorus, nitrogen, and selected cations and anions. A composite sample of the upper waters is collected to determine algae biomass (chlorophyll-a) and identification and counts. Net

phytoplankton and zooplankton identification and counts are measured from vertical plankton net hauls from the mid-metalimnion. Water clarity is also measured.

In the winter, water samples are collected at 1/3 and 2/3 the water depth, and analyzed for similar constituents as in the summer. A sample of the bottom water is collected to be analyzed for dissolved oxygen, and net phytoplankton and zooplankton are collected from the water column for identification and counts. This information is used to evaluate the lake's condition during a time of low biological productivity.

What Happens to the Lake Data?

Each year a report is prepared, presenting the data collected on the lakes surveyed in a given year. The information includes a listing of the morphological, biological and chemical data, a bathymetric map, a listing of the temperature and dissolved oxygen profile data, and a map and listing of the type, location and abundance of aquatic plants present. Twenty-five copies of the reports are forwarded to the State Library for distribution to area libraries.

Entire reports are generally not sent to individuals, but the data on a particular lake is sent upon request. The data is also put in a computer. A data summary for a particular lake, along with explanatory information, is available upon request.

Summary data for all the lakes surveyed in the program is available from DES's Public Information Office at 271-2975. The document title is *Quality of New Hampshire Lakes and Ponds: A Layman's Guide*, and the cost is \$4.00.