

---

# ENVIRONMENTAL Fact Sheet

---



29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • [www.des.nh.gov](http://www.des.nh.gov)

---

WD-BB-16

2017

## NHDES's Lake Trophic Survey Program

### What is the Lake Trophic Survey Program?

The lake trophic survey program, conducted by NHDES, was initiated in 1975 to determine current condition of a lake or pond, as required by the federal Clean Water Act. By collecting physical, chemical, and biological measurements, approximately 780 New Hampshire lakes and ponds have received trophic class ratings and tens of thousands of data points have been gathered. The program was discontinued in 2008 and revamped in 2013, allowing NHDES to continue to make informed decisions concerning changes in trophic status, provide the public with recent water quality information on specific waterbodies, monitor regional environmental influences, and facilitate water quality stewardship of New Hampshire's waterbodies.

### Why are Lakes Surveyed?

Lakes are surveyed to determine the [trophic status](#) <http://des.nh.gov/organization/commissioner/pip/factsheets/bb/documents/bb-27.pdf> of a lake, to evaluate impacts from [acid rain](#), <http://des.nh.gov/organization/commissioner/pip/factsheets/bb/documents/bb-8.pdf> to determine the presence or absence of [exotic aquatic plants](#) <http://des.nh.gov/organization/divisions/water/wmb/exoticspecies/index.htm>, to ensure compliance with state [water quality standards](#) <http://des.nh.gov/organization/divisions/water/wmb/wqs/index.htm>, and to supplement data used to assess designated use support for federal [water quality reporting](#). <http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm>

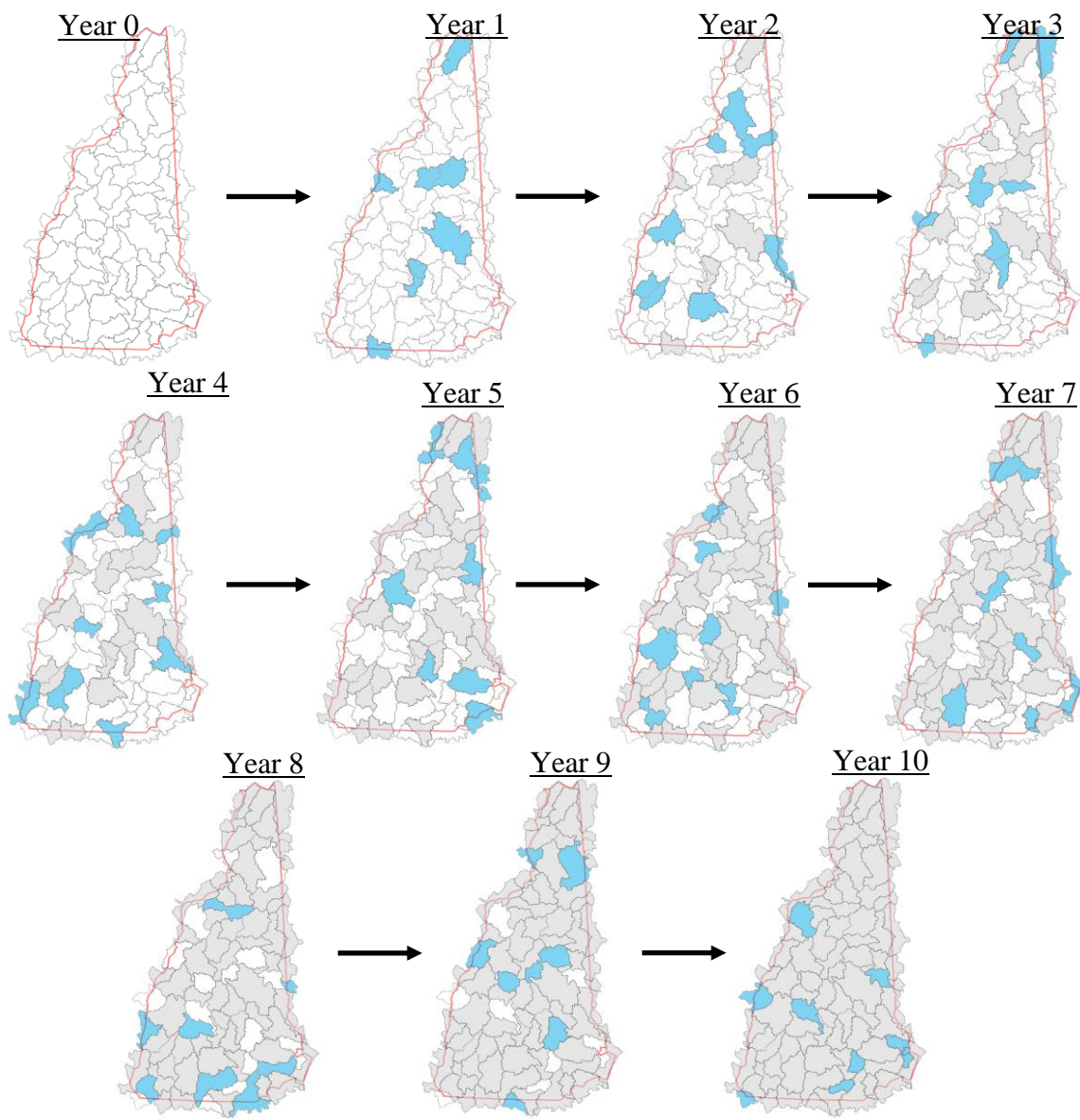
The collected information is also used to establish baseline conditions, evaluate long-term trends, and provide the public with water quality data, plant species and distribution maps, and lake depth contour maps. When the lake trophic survey program was discontinued in 2008, it left the [Volunteer Lake Assessment Program \(VLAP\)](#) (<http://www.des.nh.gov/organization/divisions/water/wmb/vlap/index.htm>) as the only regular NHDES-coordinated monitoring effort on New Hampshire's lakes and ponds. Although the VLAP program is a highly successful program that generates data from 175 waterbodies annually, greater than 80% of the lakes and ponds in New Hampshire were excluded from monitoring. As a result, NHDES was limited in its ability to update the trophic status of individual lakes, complete water quality assessments, and provide the public with water quality information on lakes and ponds outside of the VLAP program. Due to these concerns, the lake trophic survey program was modified and reinstated in 2013.

### Which Lakes are Surveyed?

Publicly accessible natural and man-made waterbodies that are 10 acres or greater in size may potentially be selected for a trophic survey. There are approximately 750 such waterbodies in the state, and most have been surveyed at least once since the program's inception in 1975. Waterbodies less than 10 acres in size, private ponds, wetlands, and riverine impoundments are generally not surveyed.

Since the program was reinstated in 2013, eight to 10 new waterbodies are selected for a trophic survey each year. Waterbodies are selected based on the following criteria:

1. Select lakes and ponds that have not been surveyed in at least 15 years;
2. Select lakes and ponds that are not in the University of New Hampshire's Lakes Lay Monitoring Program or in NHDES VLAP;
3. Select lakes and ponds that have development pressure or are subject to public use;
4. Select lakes and ponds by watershed rotation (see picture below).



## **How Frequently are Lakes Surveyed?**

Historically, waterbodies were surveyed once in the summer and once in the winter. When the program was reinstated in 2013, winter sampling was dropped and two additional summer sampling events were added, so that each lake has three consecutive years of summer water quality data.

While eight to 10 new waterbodies are selected annually, every year 24 to 30 lakes are surveyed. Waterbodies are surveyed in August or early September their first year, in July their second year, and in June their final year. After the three years of sampling is completed, the data are summarized in a lake trophic survey report.

## **What Type of Information is Collected During a Lake Survey?**

During the first year's sample event, an aquatic plant survey is conducted, bathymetry is collected, and 10 habitat sites are assessed. The aquatic plant survey is completed by slowly boating around the perimeter of the lake while a biologist records plant species and density. Simultaneously, a Lowrance GPS fathometer collects depth and plant volume information, which will be turned into a bathymetry map and a plant volume map. The 10 habitat sites are randomly selected and quantify human influences and habitat type. After the entire perimeter has been boated around, the biologist will complete transects across the waterbody to collect additional depth and plant data.

Afterward, the deep spot of the lake is sampled. First, a one-meter profile of the temperature and dissolved oxygen is measured from top to bottom, using a probe. Based on the temperature profile, water samples are either collected at the mid-epilimnion (top water layer), mid-metalimnion (middle water layer), and mid-hypolimnion (bottom water layer) in stratified lakes, or at one-third and two-thirds the water depth for unstratified lakes. From the mid-epilimnion sample, the water is analyzed for pH, alkalinity, apparent color, conductivity, chloride, turbidity, total phosphorus, total Kjeldahl nitrogen, nitrate + nitrite nitrogen, sulfate, and selected cations and anions. From the mid-metalimnion, a composite sample to determine algal biomass (chlorophyll-*a*) and a plankton sample to determine phytoplankton and zooplankton densities are collected. If dissolved oxygen is low at the bottom of a waterbody, an additional water sample will be collected at the mid-hypolimnion to measure total phosphorus. Water clarity (transparency) is also measured.

In the second and third years, biologists proceed directly to the deep spot location. The same deep spot information is collected and the water samples are analyzed for the same parameters, with the exception of select cations and anions in the mid-epilimnion water sample.

## **Where is the Lake Data?**

After three consecutive years of sampling, a report is prepared that summarizes morphological, biological, and chemical data, assesses trophic status, and provides maps of bathymetry, plant volume, and nearby land use. Reports are available at <http://tinyurl.com/NH-LakeMapper>. Additionally, all data are in electronic format and raw data can be obtained from the NHDES OneStop database at <http://www.des.nh.gov/onestop/index.htm>.