

**Vermont Inland Lakes  
Lay Monitoring Program Report  
2012**



**State of Vermont  
Agency of Natural Resources  
Department of Environmental Conservation**

**Watershed Management Division  
Montpelier, Vermont**

**2012**

**VERMONT LAY MONITORING REPORT**

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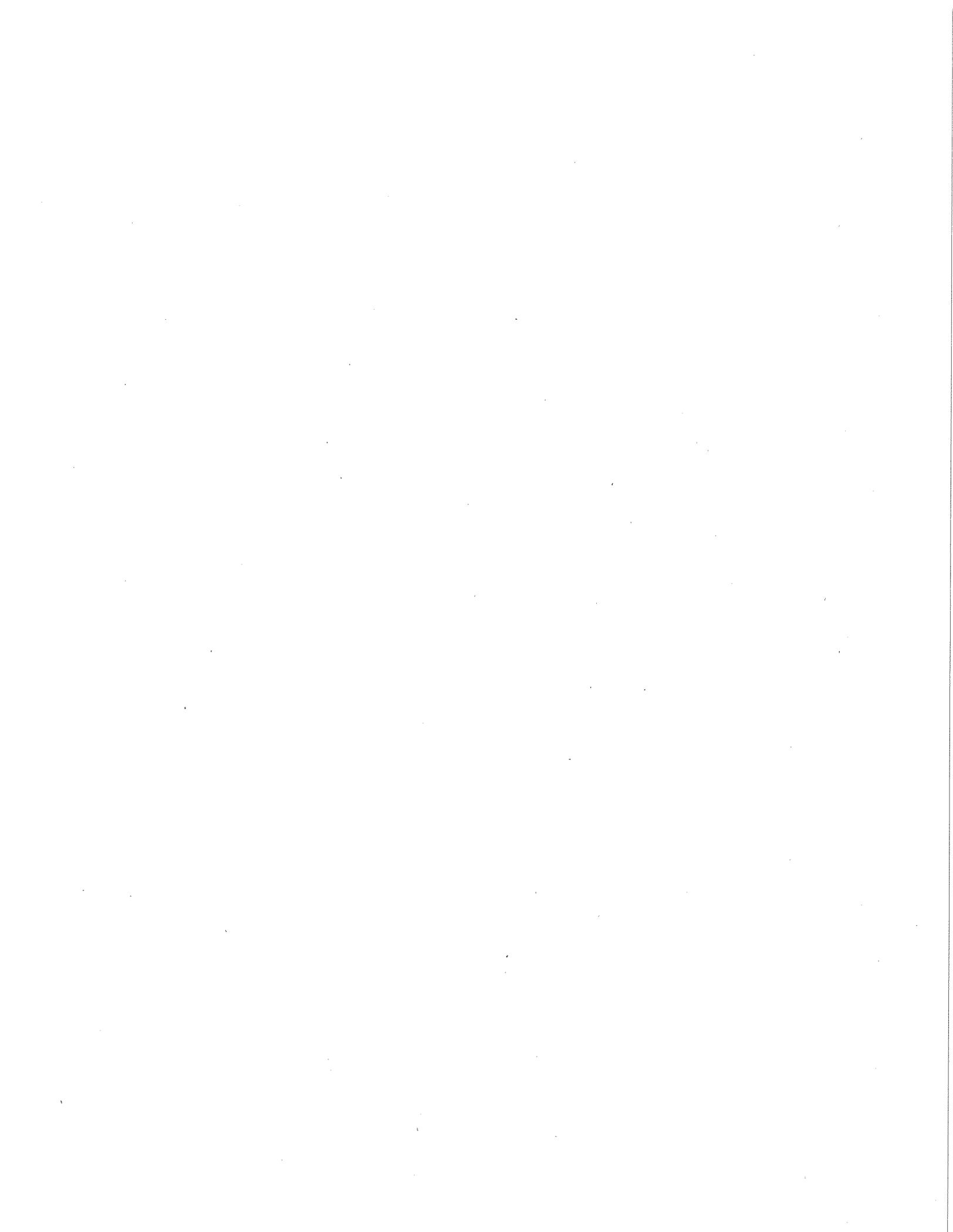
## ACKNOWLEDGMENTS

Without the dedicated cadre of volunteers who demonstrate their interest in and commitment to the health of their lake through weekly summer sampling, the Lay Monitoring Program would simply not have been possible. The long-standing success of this public-private partnership is evident in the more than 30 years of nutrient enrichment data that track the health of Vermont's lakes and ponds. In 2012 Lay Monitors donated nearly 900 hours of their time to make 685 sampling trips – thank you for your efforts which allow the story of our lakes to continue to be told.

The success of this program is also a direct result of the efforts of Amy Picotte, who served as the Lay Monitoring Coordinator for 20 years before handing over the reins in 2012. Her shoes are large ones to fill, and it is with great respect and gratitude that this responsibility is assumed.

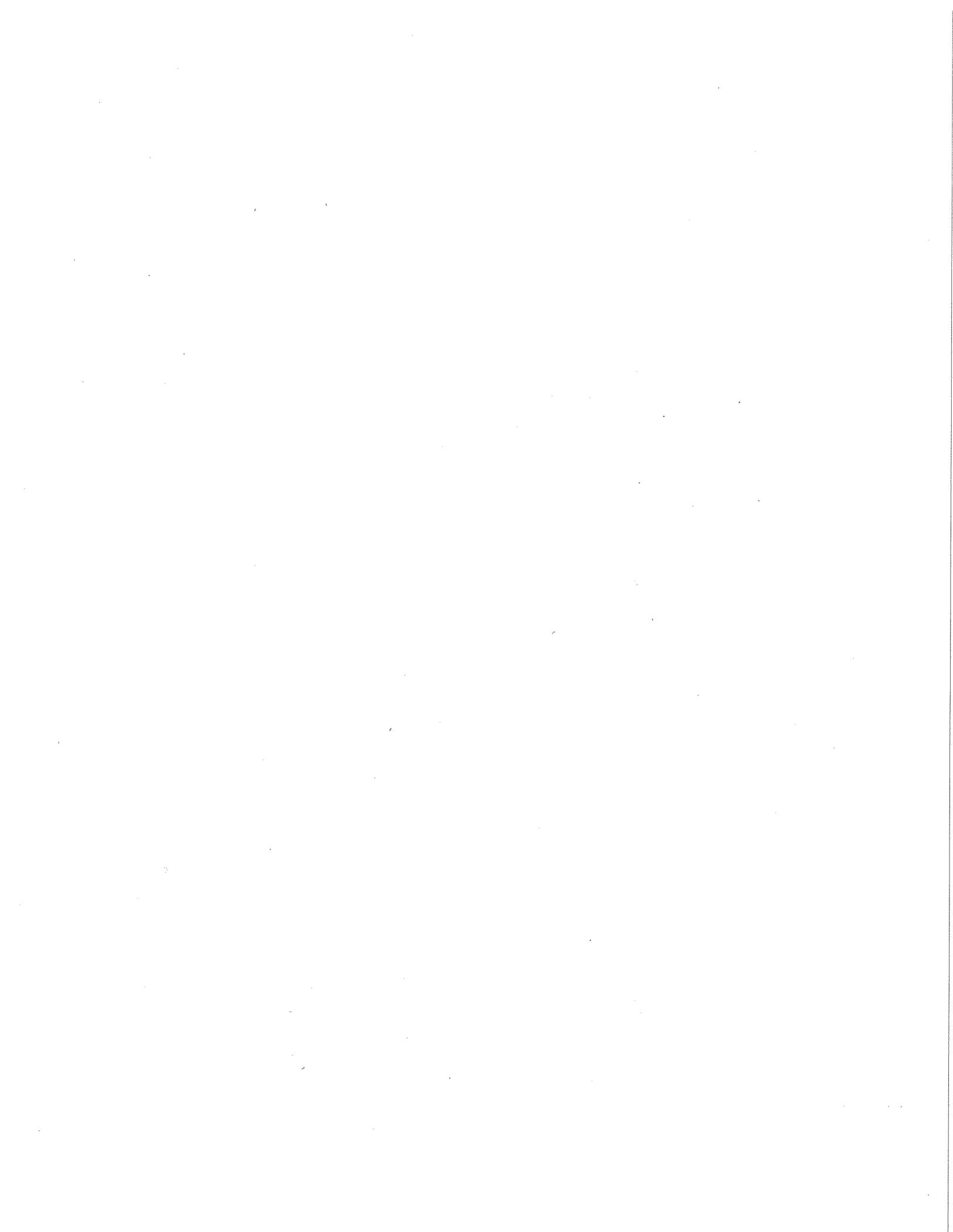
Also, thank you to Amanda Northrop, the Lay Monitoring Program Assistant who logged many miles, always with good humor and a sense of adventure, retrieving samples and meeting with volunteers, statewide.

And finally, thank you to Dan McAvinney and Dan Needham, the Department of Environmental Conservation Laboratory chemists, and their staff, who processed hundreds of chlorophyll-a and phosphorus samples through the summer.

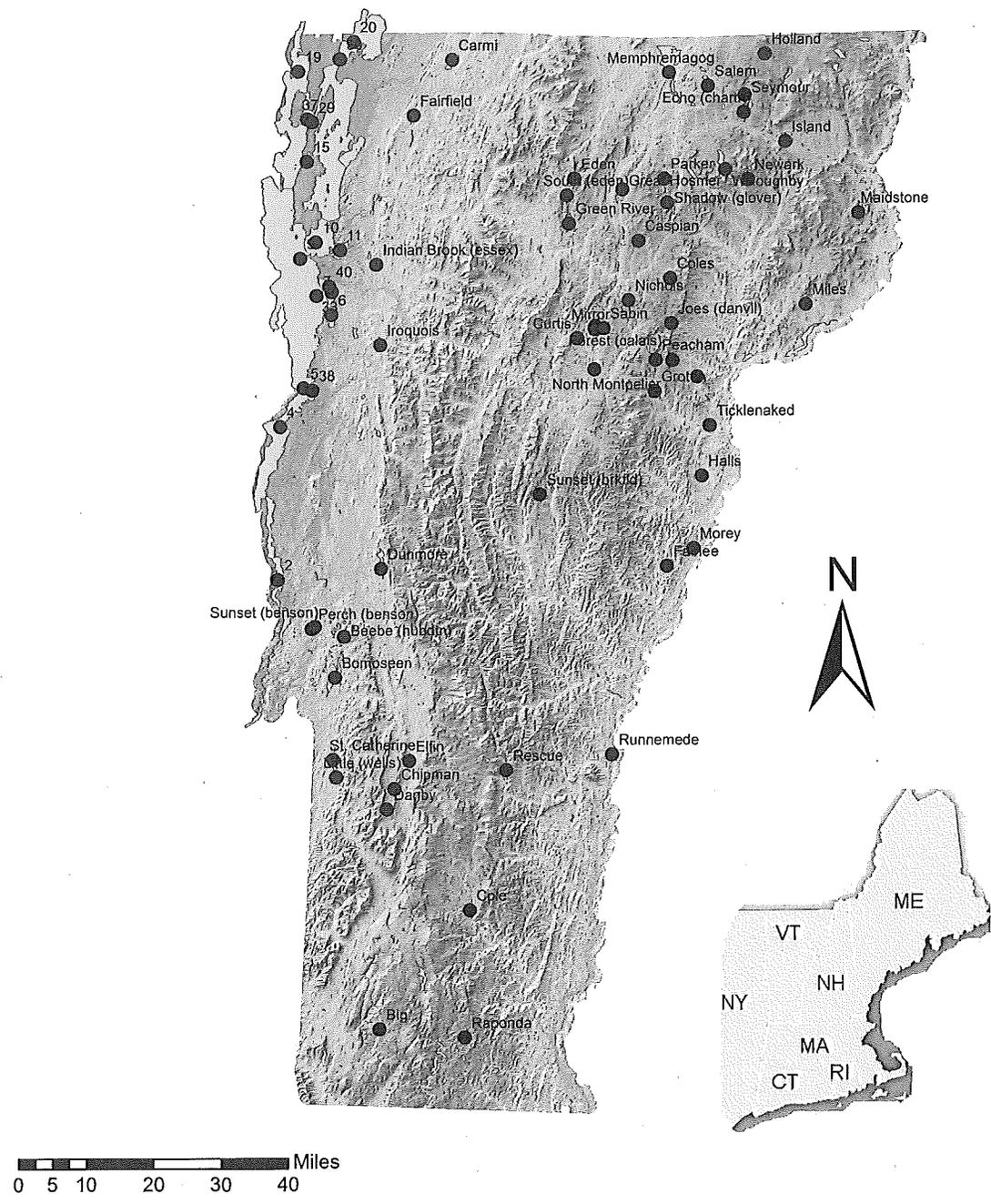


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# 2012 Vermont Lay Monitoring Program Lake Sampling Sites



## INTRODUCTION

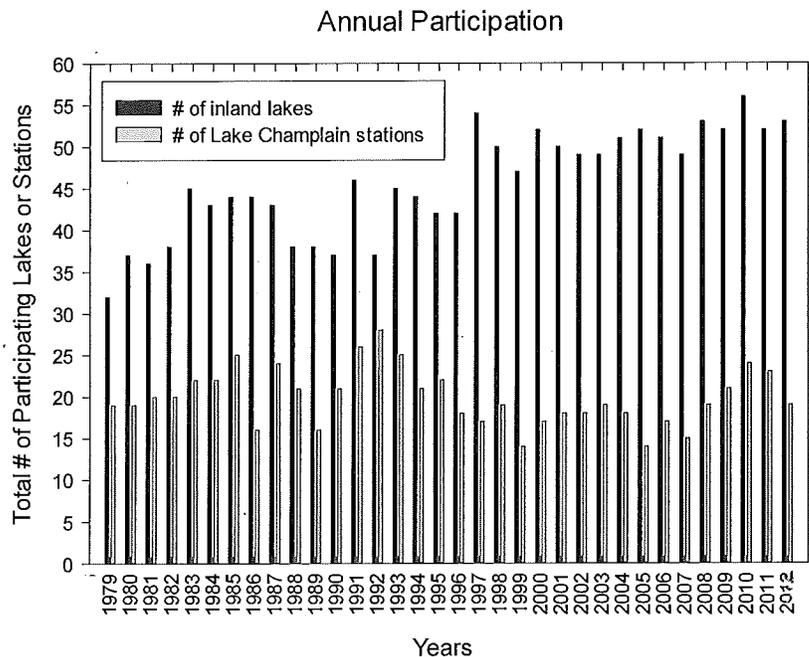
The Vermont Lay Monitoring Program (LMP) is a citizen participation program in which volunteers are trained and equipped to conduct periodic water quality sampling on lakes. Since the initiation of the program in 1979, the principal objectives of the program have been to accumulate an accurate water quality database on lakes in terms of nutrient enrichment, and to inform lake residents about lake protection and biology. In detail, the goals of the program are:

1. to provide a perspective on the range of water quality conditions on Vermont lakes;
2. to describe water quality conditions on each lake participating in the program;
3. to provide data useful in developing statistical eutrophication models for Vermont lakes;
4. to establish a database on each lake useful for documenting future changes in water quality;
5. to educate and involve lake residents in lake protection.

The Lay Monitoring Program was started by the Vermont Department of Environmental Conservation (DEC), with an initial participation of 32 lakes and 19 Lake Champlain stations. Since then, participation has increased to include a total of 91 lakes and 40 Lake Champlain stations.

Figure 1 shows the total number of inland lakes and Lake Champlain stations sampled under the LMP each year since 1979.

**Figure 1.**  
**Annual Total Number**  
**of Participating LMP Lakes**  
**or Stations.**



## Lake Monitoring Program Annual Update

Vermont's more than 800 lakes and ponds are natural jewels left by glacial activity more than 10,000 years ago. Over time, they have provided waterways for human settlement, exploration, battles, and trade and commerce. Today, Vermont residents and visitors use lakes primarily for recreation, including fishing, boating, camping, and vacationing, and many Vermonters own homes or camps on the lakeshore.

For lakes to be resilient to human impacts on the land, their first line of defense is a well vegetated shore. Unfortunately, data show that developed sites have 96 percent fewer trees along the shores than undeveloped sites in Vermont, and that cleared shores pose the greatest threat to Vermont lakes. Naturally vegetated shores protect lake water quality, ecology, and bank stability. And healthy lakes benefit people, property values, and the tourism economy.

However, shoreland development and lake health need not be mutually exclusive. There are ways to develop a lakefront property, or to manage a lot with an existing house or camp, without detriment to the services naturally vegetated shorelands provide. A statewide shoreland regulation that outlines standards for lake friendly development would ensure new development doesn't degrade our treasured lakes and ponds. In addition, the new outreach and technical assistance program Lake Wise, described below, will give lakeshore property owners the tools and resources needed to improve their own footprint on the lake.

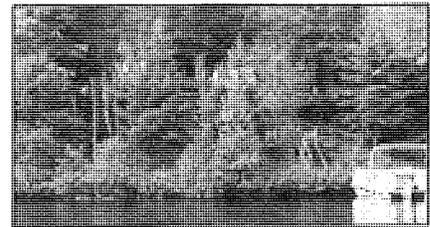
### Lake Wise

The Lake Wise Program is offered through the Vermont Lakes and Ponds Management and Protection Section to provide trainings in lake friendly shoreland management to Lake Associations and shoreland property owners. Through Lake Wise, participants receive technical assistance for fixing erosion and dirty runoff problems, which will protect lake quality and wildlife habitat.

Lake Wise participants managing their shores with good practices in the four categories of (1) *Driveway*; (2) *Structures and Septic Systems*; (3) *Recreation Areas*; and (4) *Shorefront* will receive the *Lake Wise Award and Beautiful Sign*. This sign can be proudly displayed on model lake



**Common lakeshore development** consists of clearing native vegetation and planting a lawn. Suburbanized shorelands diminish lake health.



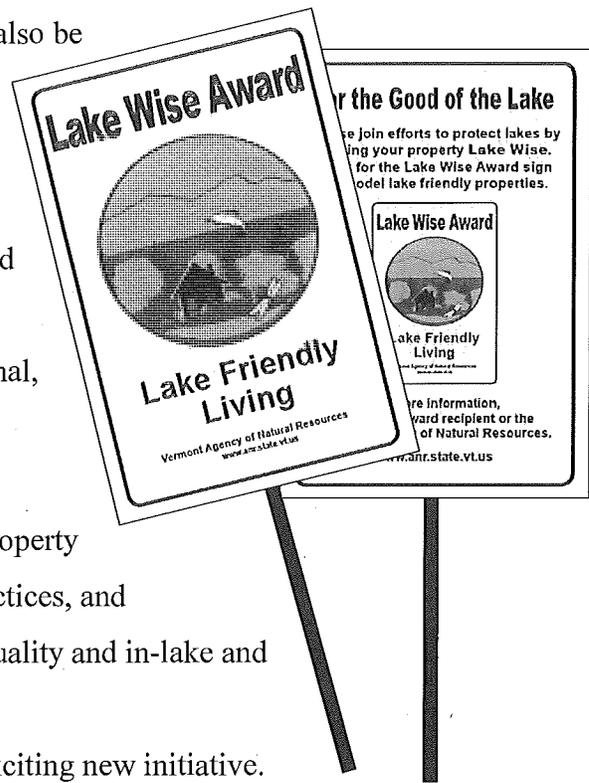
**Lake-friendly shoreland development** includes: setting a lawn back from the lake; allowing native trees to stabilize the bank, while pruning lower branches for a view; leaving woodlands (duff layer, shrubs, and mature trees) in place to filter runoff and provide healthy habitat for fish and other wildlife.

friendly properties. Informational Lake Wise signs can also be posted at public areas around the lake to alert others to look for the Lake Wise Award sign on well managed properties. Lake Associations are also awarded the “*Gold Award*,” depending on the percentage of shoreland owners participating in Lake Wise.

The goal of Lake Wise is to establish a new normal, a new culture of lakeshore landscaping. A property that earns the Lake Wise Award will represent a “model” shoreland property. The Lake Wise Award certifies a property is well managed, using shoreland Best Management Practices, and is protecting the lake, improving or maintaining water quality and in-lake and onshore wildlife habitat.

There are many ways to get involved with this exciting new initiative.

Have your property evaluated, or serve as a *Lake Wise Evaluator* or a *Lake Wise Scout* (see below). For more information, contact Amy Picotte at the Vermont Agency of Natural Resources at [Amy.Picotte@state.vt.us](mailto:Amy.Picotte@state.vt.us) or (802) 490-6128.



### ***Lake Wise Evaluators***

Lake Wise Evaluators have a background in natural resources management, including managing stormwater runoff and protecting wildlife habitat. All Evaluators use the same methods and impartiality for each assessment.

Evaluators spend a maximum of 1 ½ hours assessing and providing technical advice on each property. Properties are evaluated according to the Lake Wise criteria for shore; recreation area; driveway; and structure and septic. If all the appropriate Best Management Practices are in place, then the property earns the Lake Wise Award, otherwise, the Evaluator gives the landowner a copy of recommendations for how to become Lake Wise certified in the future. Landowners have up to three years to make the improvements and to be assessed a second time for earning the Lake Wise Award, after which time, a whole new evaluation would need to be done.

### ***Lake Wise Scouts***

Lake Wise Scouts are the local, volunteer Lake Wise screener and motivator. The Scout’s job is to encourage shoreland owners to follow the Lake Wise BMPs and ultimately earn the Lake Wise Award. Lake Wise Scouts conduct preliminary assessments of anyone’s shoreland property to advise them on what needs to be done, if anything, before the official Lake Wise Evaluator is called out to assess the property.

## SECTION 1.

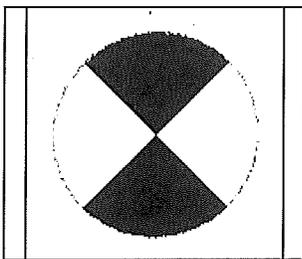
### THE PARAMETERS THE LMP USES TO MEASURE WATER QUALITY

The Lay Monitoring Program is concerned with measuring water quality as it relates to increased nutrient enrichment of lakes. Nutrient enrichment caused by human activities is the primary threat to Vermont lake water quality.

A variety of conditions may occur in a lake which is experiencing declining water quality due to excessive cultural nutrient enrichment. Nutrients in the water stimulate algae and rooted plant growth and the lake's "productivity" increases. As a result, the algae growth decreases water clarity and in some cases causes foul odors. Excessive rooted plant growth can interfere with boating, swimming, fishing, and other recreational uses. As these plants and algae die each year, they fall to the bottom, adding to the lake sediments. When the natural environment of a lake is altered, the types of fish and other wildlife the lake supports may also change.

In order to determine a lake's water quality, or productivity, the LMP measures the Secchi water clarity and the chlorophyll-a and total phosphorus concentration.

#### Water Clarity: Secchi Disk Transparency

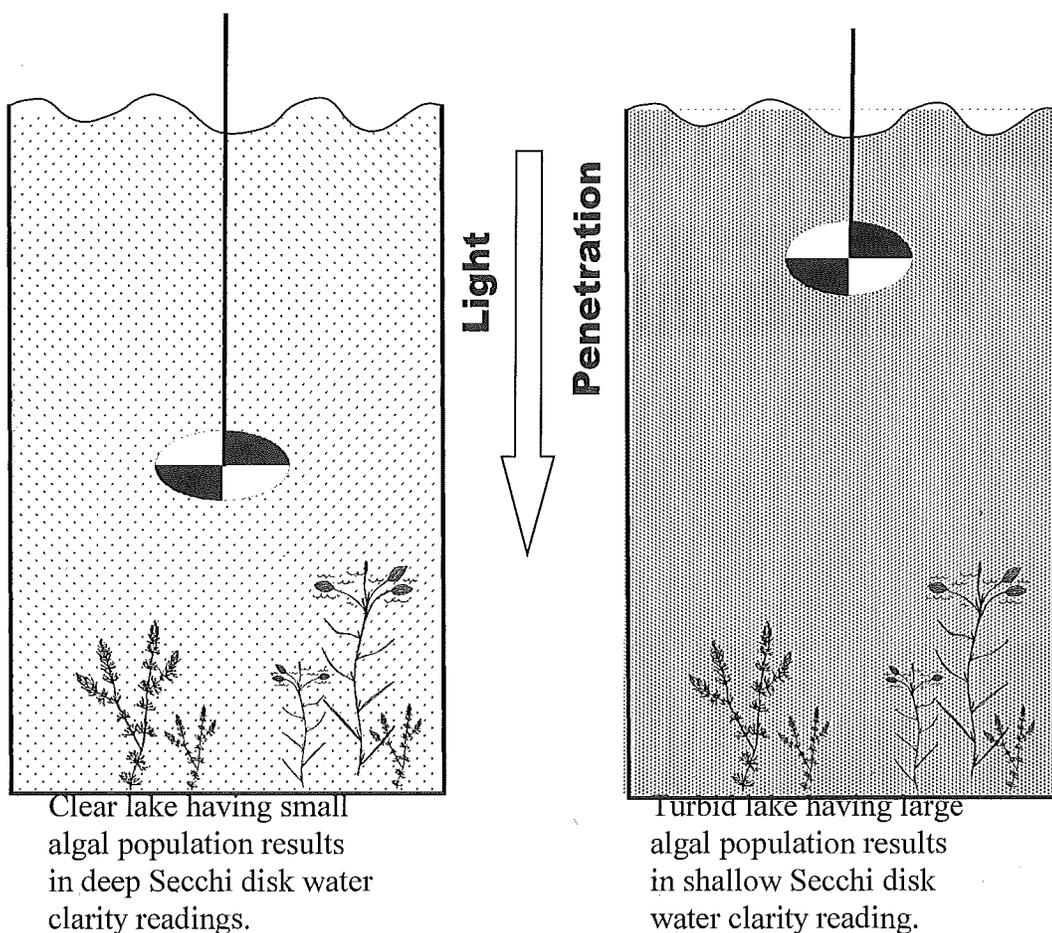


The Secchi disk reading is a measure of the clarity of lake water. The transparency of a lake's water is directly related to the amount of materials suspended in the water. Particulate matter, such as algae or silt, limits light penetration and reduces the water's clarity (Figure 2). Therefore, a Secchi disk transparency reading is a rough indication of a lake's water quality in terms of nutrient enrichment.

Some Vermont lakes have naturally "tea" colored water. This is very common in beaver ponds and in acidic lakes in some areas of the state. The color is due to the presence of dissolved organic acids, and can reduce the water's clarity. However, water color is not a major factor in most Lay Monitoring lakes. Other variables unrelated to nutrient enrichment can also influence the Secchi disk transparency reading, such as wave action and light reflection. These two variables can be minimized by sampling on calm days and taking the Secchi disk reading off the shaded side of the boat.

On a few of the Lay Monitoring inland lakes and Lake Champlain stations, the Secchi disk is often still visible at the bottom of the lake. If on a particular lake the Secchi disk is viewed to the bottom at 5 meters, this should be interpreted to mean the Secchi disk transparency is at least 5 meters. Such measurements are not an actual measure of water clarity (since the real reading would be deeper), and useful summer averages cannot be calculated.

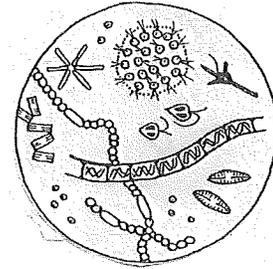
The Secchi disk is widely used as a basic water quality indicator, and a Secchi disk transparency reading can often be related to the trophic state of a lake. An oligotrophic (deep, coldwater) lake usually has very clear water and therefore a deep Secchi disk reading. In contrary, a eutrophic (shallow, warmwater) lake usually supports large populations of algae and therefore has a shallow Secchi disk transparency reading. (The relationship between Secchi water clarity and chlorophyll-a, and Secchi water clarity and total phosphorus is shown in Figures 4 and 5.)



**Figure 2. How Secchi Disk Measures Water Clarity**

## Chlorophyll-a Concentration

Algal populations in a lake can be quantified by measuring the amount of chlorophyll-a in a water sample. Chlorophyll-a is the photosynthetic green pigment contained in all types of algae and other green plants. The amount of chlorophyll-a present in a water sample is directly proportional to the amount of algae living in the water. In the course of a year, algal populations normally follow a classic successional pattern from a peak population of diatoms (a group of algae which use silica to form glass shells for support and protection) in early spring to a variable summer algal population to a peak population of blue-green algae in the fall. The magnitude of the populations and the diversity of the species composition depend on factors such as the degree of nutrient enrichment in the lake and prevailing weather conditions.



algae under microscope

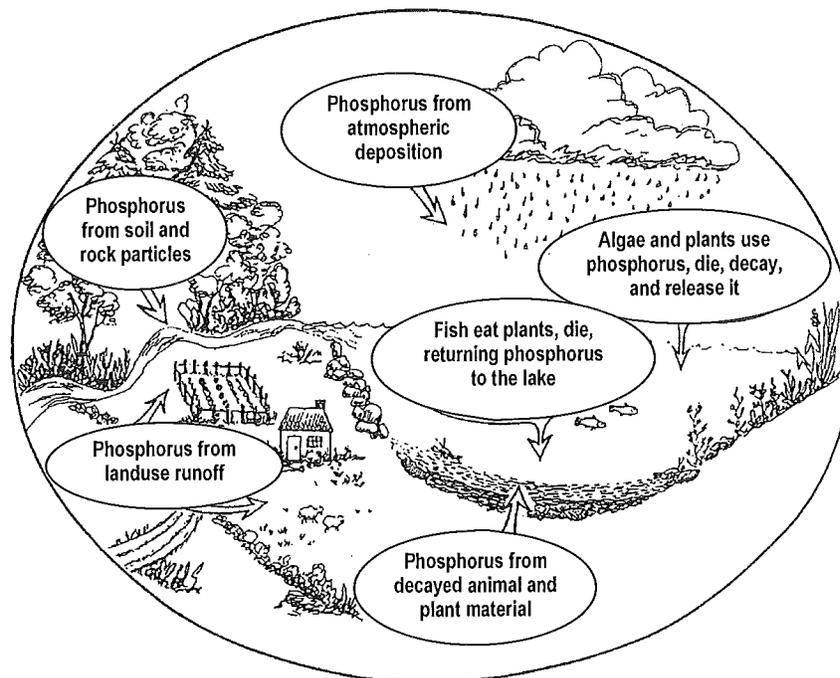
Theoretically, if the Secchi disk transparency is related to the amount of particulate matter suspended in the water, it should also be related to the chlorophyll-a concentration of the water. If all other factors are constant, as algal populations and chlorophyll-a concentrations increase, the Secchi disk transparency should decrease. However, this relationship does not always hold true because Secchi disk transparency is influenced by several factors and because algal populations often inhabit water levels below the Secchi disk depth, thereby causing higher chlorophyll-a concentrations without affecting Secchi disk transparency.

The chlorophyll-a concentration can often be related to the trophic state of a lake. An oligotrophic lake usually supports a small algal population and therefore has a low chlorophyll-a concentration. Conversely, a eutrophic lake usually supports large populations of algae and therefore has a high chlorophyll-a concentration. (The relationship between chlorophyll-a and Secchi water clarity, and chlorophyll-a and total phosphorus is shown and explained in Figures 4 and 6.)

## Total Phosphorus Concentration

By measuring the amount of nutrients in the water, the LMP measures the variable which most directly influences water quality. Phosphorus is the nutrient in shortest supply in Vermont lakes, therefore it is the one most likely to stimulate productivity, and the best nutrient to measure to track changes in productivity. Total phosphorus includes all the different chemical forms of phosphorus and measuring total phosphorus is an indication of the amount of phosphorus which is potentially available for algal growth.

Phosphorus enters a lake from a variety of sources such as rainfall, incoming streams, land runoff, ground water, and direct discharges. Within a lake, phosphorus that has accumulated in the bottom sediments may become re-suspended in the water under anaerobic (no oxygen) conditions. The phosphorus entering a lake can be derived from both natural and cultural sources. Phosphorus is contributed naturally to aquatic environments by the decomposition of organic matter and the erosion of phosphorus-containing soils. Culturally, phosphorus is contributed to a lake system by people's activities in the drainage basin (Figure 3).



**Figure 3.**  
**Sources of Phosphorus**

Under natural conditions, the majority of phosphorus contributed to a lake system enters the lake during the spring when the flow of inlet streams is high due to snowmelt and spring rains. Cultural nutrient inputs, on the other hand, may occur at any time of the year. While the lake is in spring overturn, just after ice-out, the incoming phosphorus is distributed evenly throughout the lake.

At this time, the total phosphorus concentration in a lake can be used to predict the amount of algal growth that will occur in the lake during the summer. Total phosphorus concentrations measured during the summer, on the other hand, reflect the amount of phosphorus contained in algae in the water, as well as the amount of phosphorus which is still available to the algae. Thus, spring total phosphorus concentration is related to the potential algal growth which will occur in a given season, while summer total phosphorus concentration is related to the algal growth occurring on a given sampling day, as well as the potential for future algal growth.

Theoretically, total phosphorus concentration should be directly related to chlorophyll-a concentration and indirectly related to Secchi disk transparency. Hence, total phosphorus concentration is related to the trophic state of a lake. An oligotrophic lake usually receives small amounts of total phosphorus in the spring and exhibits low total phosphorus concentrations throughout the summer. In turn, a eutrophic lake usually receives large quantities of total phosphorus in the spring and exhibits high total phosphorus concentrations throughout the summer. (The relationship between total phosphorus and Secchi water clarity, and total phosphorus and chlorophyll-a is shown in Figures 5 and 6.)

Although spring total phosphorus is sampled on many Lay Monitoring lakes, it is not collected from Lake Champlain. Summer total phosphorus is measured on Lake Champlain, as the phosphorus distribution in such a large lake is a dynamic system, which cannot be measured by sampling only during spring overturn. The dynamic system in Lake Champlain results from the constant redistribution of phosphorus via currents and mixing patterns in the lake, and from continual phosphorus inputs via the lake's tributaries and point source discharges such as sewage treatment plants.

## SAMPLING OVERVIEW

Each Lake Champlain monitor samples one station, while "inland" lake (lakes other than Lake Champlain) monitors typically sample two stations per lake. The Lay Monitoring Program is divided into two sampling programs. **Basic** monitors measure Secchi disk transparency on a weekly basis. **Supplemental** monitors, as well as all Lake Champlain monitors, sample Secchi disk water clarity and chlorophyll-a and total phosphorus concentrations.

SAMPLING PROGRAM	Station #1			Station #2
	Secchi	Chlorophyll-a	Phosphorus	Secchi
<b>Basic</b>	<b>X</b>			<b>X</b>
<b>Supplemental</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Champlain</b>	<b>X</b>	<b>X</b>	<b>X</b>	

Basic monitoring of water clarity provides a good indication of water quality conditions. Supplemental monitoring is generally performed on inland lakes which have one or more of the following characteristics:

- 1) the lake is relatively new to the program and chlorophyll-a and total phosphorus base line information is desired,
- 2) the lake has a history of water quality problems, or
- 3) a diagnostic study has been performed on the lake and restoration measures have been implemented.

## SAMPLING PROCEDURES

### Water Clarity (Secchi disk transparency)

Water clarity is measured using a Secchi disk, a metal disk painted with two black and two white quadrants. The Secchi disk is lowered slowly into the water and the lowest depth at which it is still visible is the Secchi disk transparency reading. Measurements are read in meters (1 meter = 3.3 feet) from a marked line attached to the center of the disk.

## **Algal Population Density (chlorophyll-a concentration) and Nutrient Enrichment (total phosphorus concentration)**

Supplemental monitors, in addition to taking Secchi disk readings, also collect water samples to be analyzed for chlorophyll-a and total phosphorus concentrations. Water samples are collected (in duplicate) by using a weighted garden hose, measured along its length in meters. The hose is lowered straight down into the water to a depth twice the Secchi disk reading. In this way a composite sample of the water column from the water's surface to the depth of the hose is contained in the hose. The hose is crimped shut at the water's surface and pulled up by reeling in a rope attached to the lower weighted end. When the weighted end is brought into the boat, the crimp is released and the water is emptied into a bucket. The appropriate bottle is filled with the water, and the hose is lowered once again in order to collect the duplicate sample.

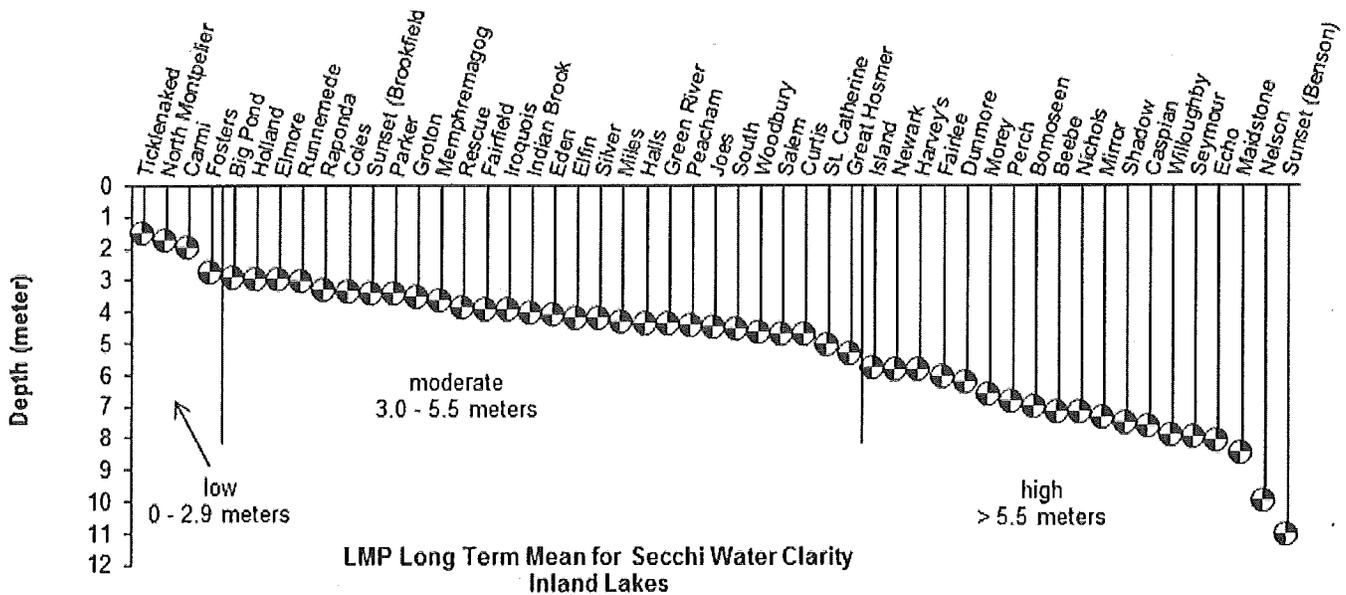
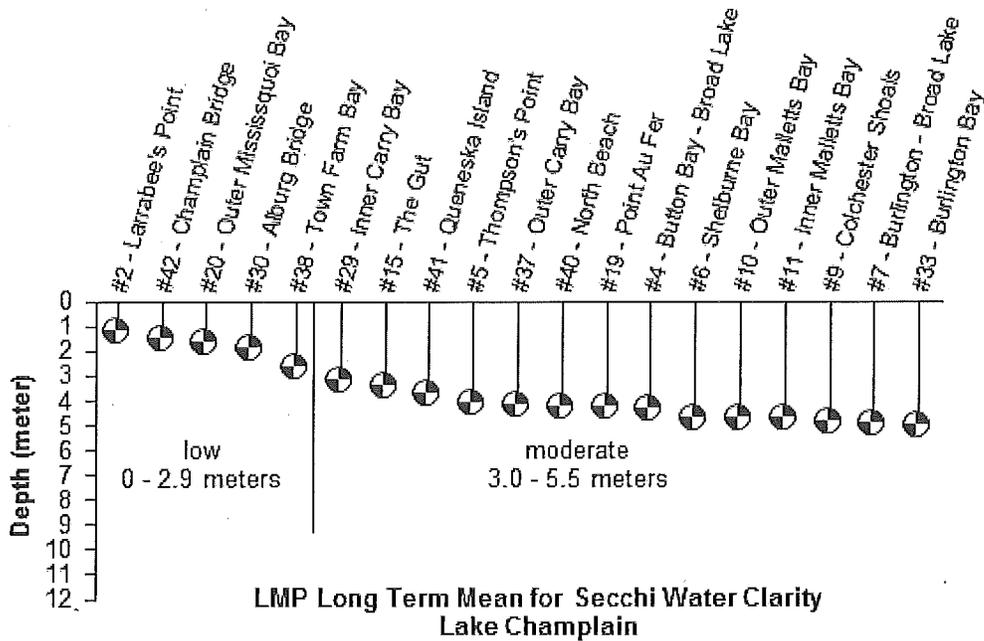
Upon returning to shore, the monitor sets up a "home laboratory." The chlorophyll-a water samples are filtered through a simple filtration unit. The algae, and therefore the chlorophyll-a contained in the algae, are retained on the filter. The filter is folded, labeled, and frozen. The phosphorus sample collected in a test tube is stored on a shelf away from bright light. Chlorophyll-a samples are taken in duplicate, total phosphorus samples are not. Every two weeks the chlorophyll-a filters and phosphorus test tubes are picked up by LMP staff and transported to the Vermont DEC Laboratory in Burlington for analysis.

Chlorophyll-a concentration is analyzed using fluorometric determination. Total phosphorus is analyzed by the colorimetric, automated ascorbic acid method.

During the spring turnover period, staff members of the DEC sample a number of lakes throughout the state for total phosphorus concentration using the hose technique described in this section. Spring total phosphorus concentrations presented in this report represent the mean of six to nine samples collected on a lake for one sampling date. Spring total phosphorus concentrations provide an estimate of the amount of phosphorus which will be available to plants and algae during the summer.

## Secchi Water Clarity Long-Term Means

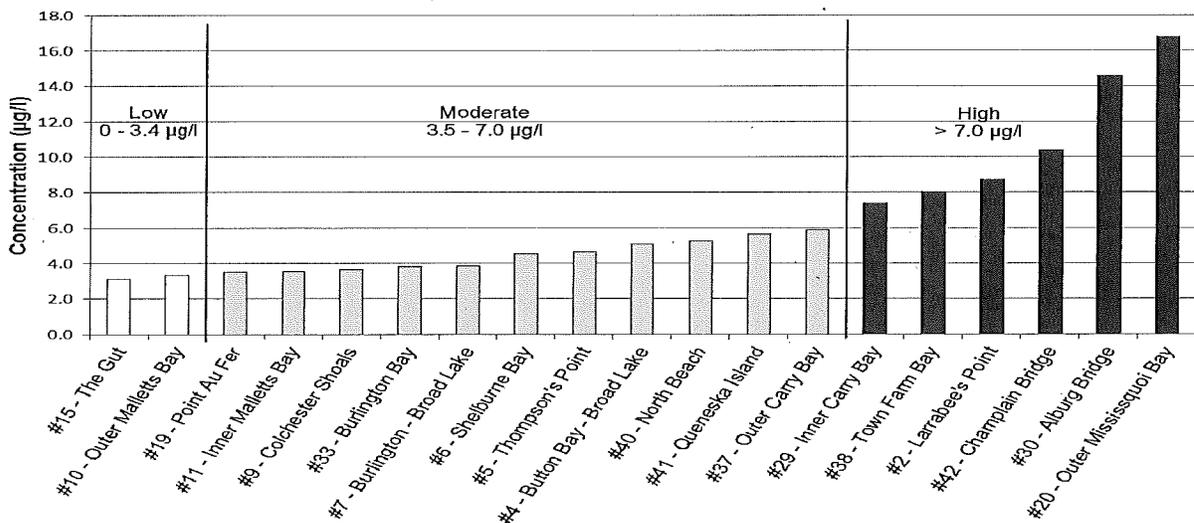
These graphs show the long-term mean for the inland lakes and Lake Champlain stations that participated in the LMP during 2012. Annual summer means are calculated from at least eight samples. **Long-Term Means** are based on averaging all the annual summer means. Some lakes or stations have been sampled since 1979 when the Lay Monitoring Program first started. The lakes (or stations) are ranked in order of increasing Secchi disk transparency with the lakes (or stations) with the lowest clarity on the left side of the graph and those with the greatest clarity at the right side of the graph. The groupings of “low,” “moderate,” and “high” are based on the range of clarity readings recorded in Vermont over the last 30 years.



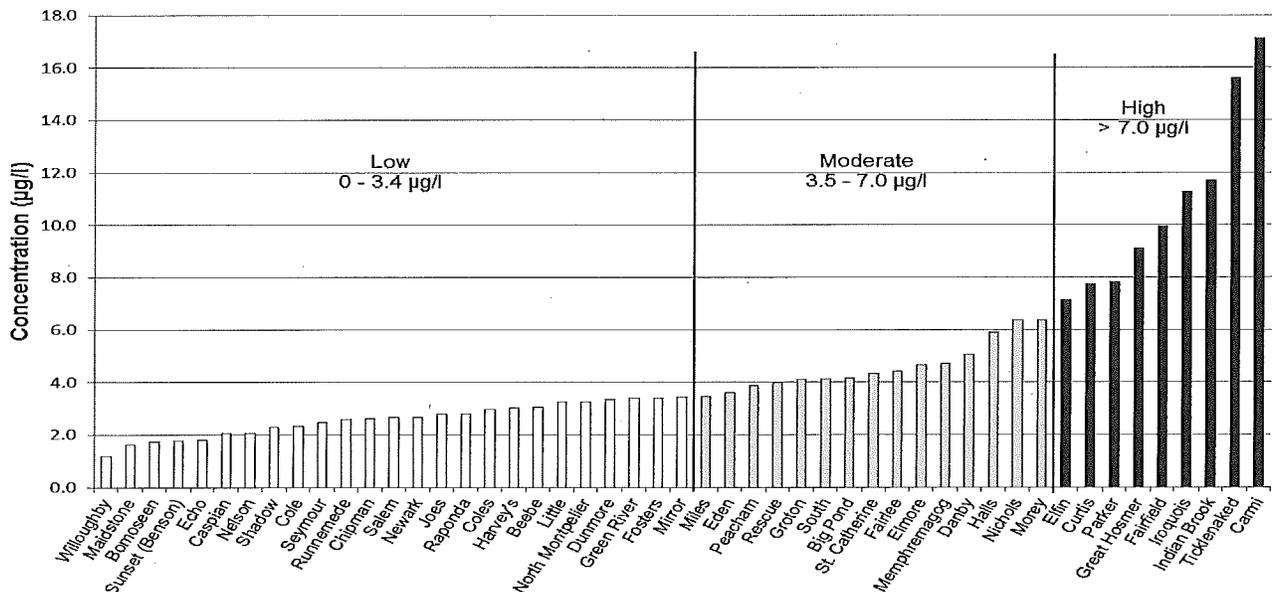
## Chlorophyll-a Long-Term Means

These graphs show the long-term mean for the inland lakes and Lake Champlain stations that participated in the LMP during 2012. Annual summer means are calculated from at least eight samples. **Long-Term Means** are based on averaging all the annual summer means. Some lakes or stations have been sampled since 1979 when the Lay Monitoring Program first started. The lakes or stations are ranked in order of increasing chlorophyll-a concentrations with the lakes or stations with the lowest chlorophyll-a levels on the left side of the graph and those with the greatest chlorophyll-a levels on the right side of the graph. The groupings of “low,” “moderate” and “high” are based on the range of chlorophyll-a concentrations sampled in Vermont over the last 30 years.

**LMP Long-Term Mean for Chlorophyll-a Concentration  
Lake Champlain**



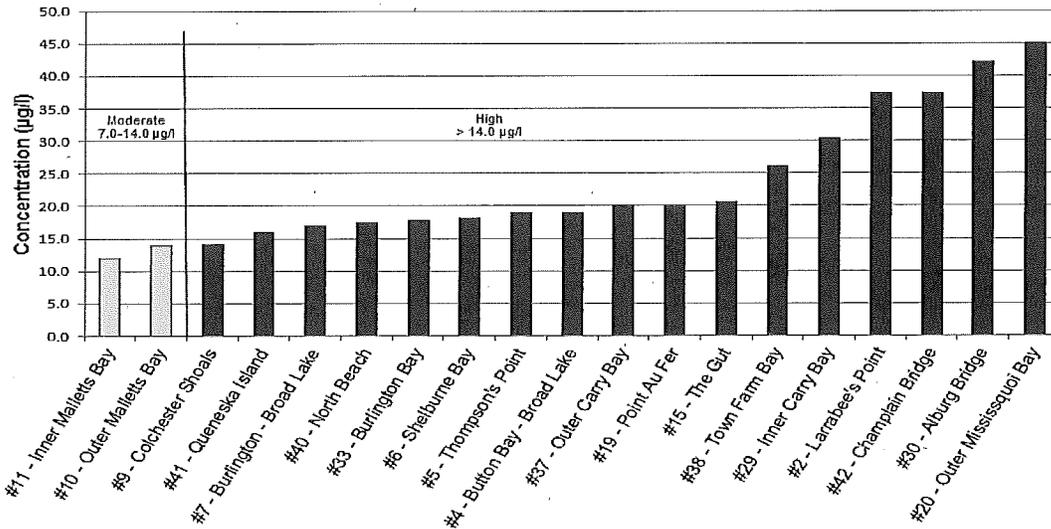
**LMP Long-Term Mean for Chlorophyll-a Concentration  
Inland Lakes**



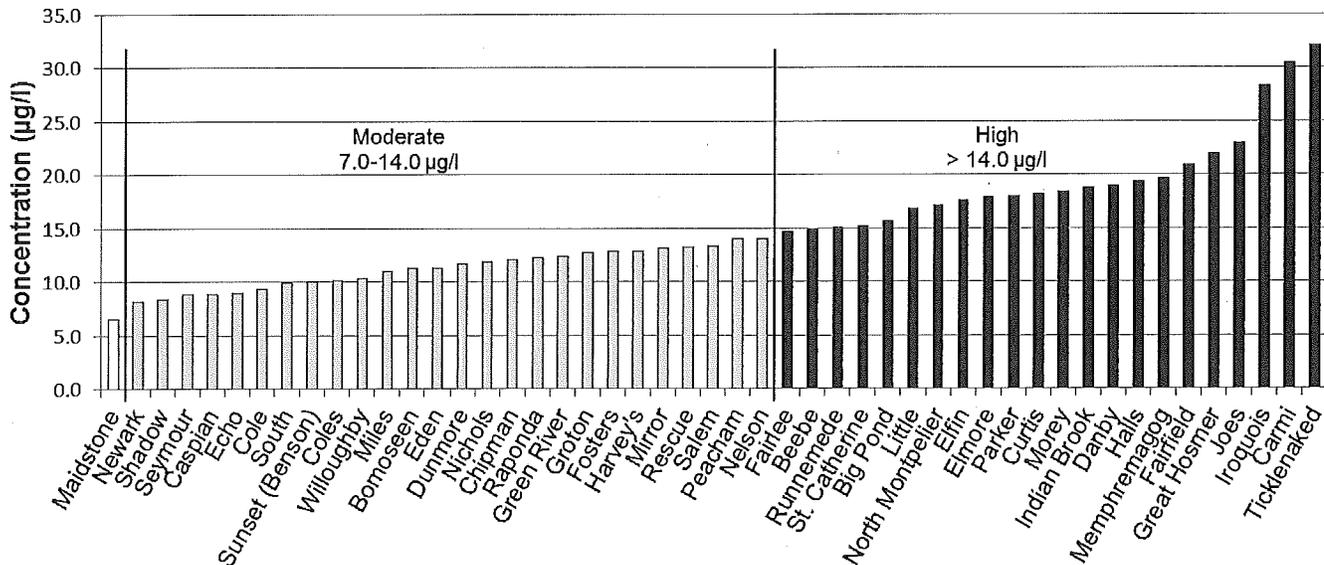
## Total Phosphorus Long-Term Means

These graphs show the long-term mean for the inland lakes and Lake Champlain stations that participated in the LMP during 2012. Annual summer means are calculated from at least eight samples. **Long-Term Means** are based on averaging all the annual summer means. Some lakes or stations have been sampled since 1979 when the Lay Monitoring Program first started. The lakes or stations are ranked in order of increasing total phosphorus concentrations with the lakes or stations with the lowest phosphorus levels on the left side of the graph and those with the greatest phosphorus levels on the right side of the graph. The groupings of “low,” “moderate,” and “high” are based on the range of total phosphorus concentrations sampled in Vermont over the last 30 years.

**LMP Long-Term Mean for Total Phosphorus Concentration  
Lake Champlain**



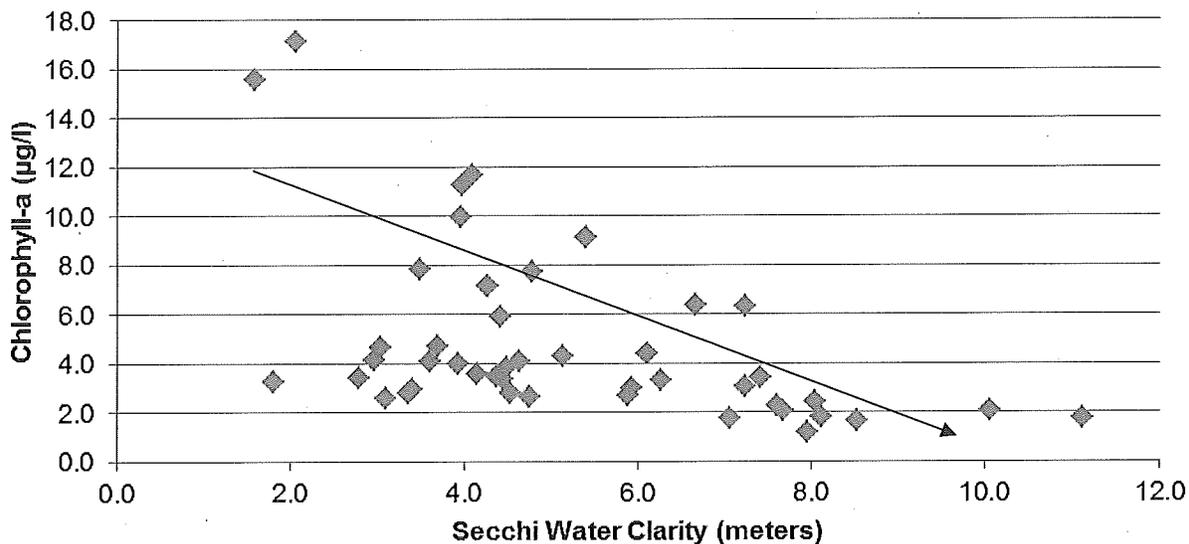
**LMP Long-Term Mean for Total Phosphorus Concentration  
Inland Lakes**



## THE RELATIONSHIP OF LMP WATER QUALITY PARAMETERS

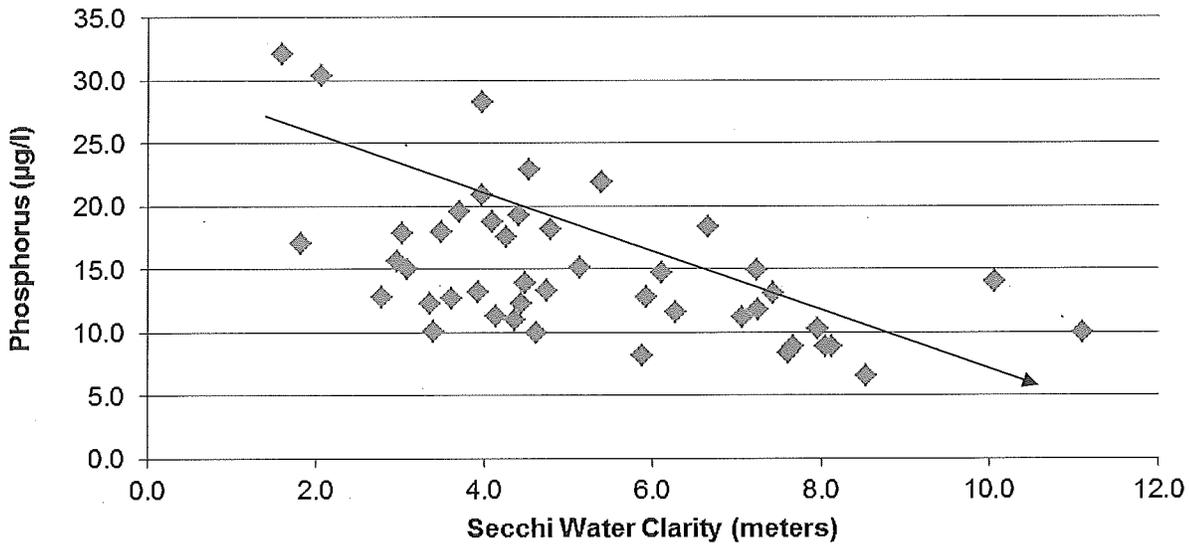
Figures 4-6 present the relationship of the Lake Champlain long-term data. The parameters sampled, Secchi disk transparency, chlorophyll-a, and total phosphorus are graphed against each other in order to observe how they are related to, and affected by, each other. Using the lake station data, three graphs were created: Secchi water clarity versus chlorophyll-a concentration; Secchi water clarity versus total phosphorus; and chlorophyll-a concentration versus total phosphorus.

Figure 4 below shows the relationship between Secchi water clarity and chlorophyll-a concentration, as mapped from the long-term inland lake means. Each data point represents the Secchi/chlorophyll-a relationship for one lake. In general this graph shows that when the secchi water clarity increases, there is a decrease in chlorophyll-a, as would be expected.



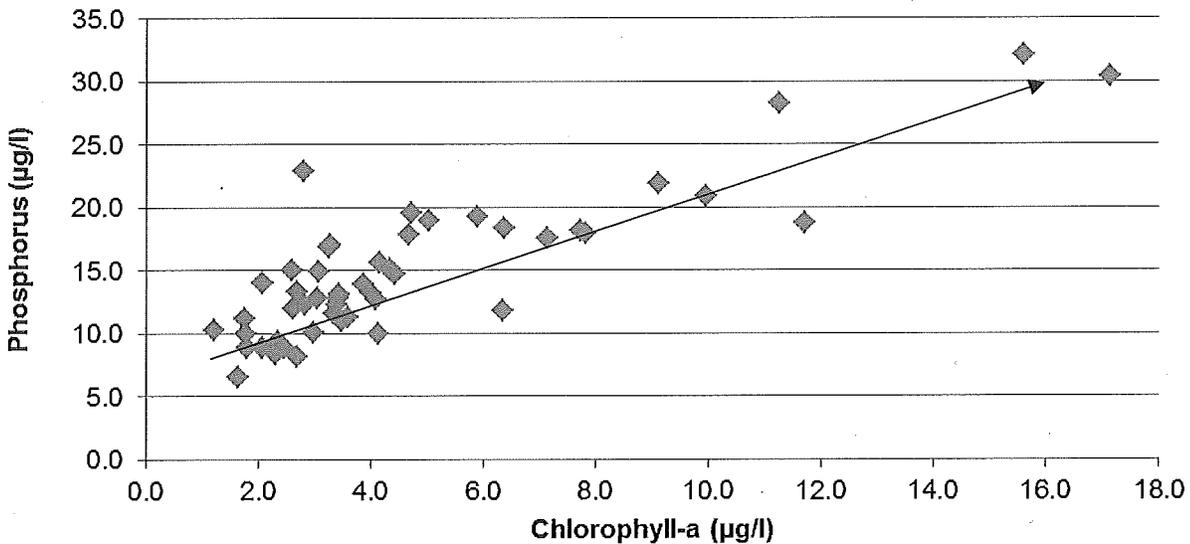
→ Indicates trend

Figure 5 portrays the relationship between Secchi water clarity and total phosphorus, using the Long-Term LMP Means. Each data point represents the Secchi/total phosphorus relationship for one LMP lake. As would be expected, the graph shows that as Secchi water clarity increases, the total phosphorus concentration decreases.



→ Indicates trend

Figure 6 shows the relationship between chlorophyll-a and total phosphorus, as graphed using the Long-Term LMP Means. Each data point represents the chlorophyll-a/total phosphorus relationship for one LMP lake. In general, as the total phosphorus concentration increases, the chlorophyll-a concentration also increases.



→ Indicates trend

## LAY MONITORING DATA ANALYSIS

A data analysis is conducted on all of the Lay Monitoring lakes and Lake Champlain stations. This analysis consists of:

1. calculating the summer annual means for each parameter sampled;
2. showing and comparing the long-term means for the inland lakes and Lake Champlain stations;
3. designating the trophic state (eutrophic, mesotrophic, and oligotrophic) of each lake based on the long-term means for each parameter sampled; and
4. determining trends from water quality databases. A database should describe water quality conditions with enough accuracy to be useful in statistical analyses.

### 1. Summer Annual Means

The reliability of summer annual means for each water quality parameter depends on the sampling technique of the monitors and the frequency of the sampling. A summer average calculated from many samples will be more reliable and representative of the lake than an average determined from just a few samples. Summer averages based on sparse, inconsistent, or scattered sampling are considered weak and are not truly comparable with other lakes or with other years. If a lake was sampled seven weeks or less during the summer its summer average Secchi disk transparency, chlorophyll-a concentration, and total phosphorus concentration are not calculated and will not appear in the individual lake Annual Means Tables as such. Since partial data sets may contain useful information, a record of which years each lake or station was sampled is included in Appendix 2.

### 2. Comparison of Long-Term Means Among Lakes

The comparison between lakes or stations based on the long-term water quality means is presented on pages 12-14. The graphs show the Lay Monitoring lakes and the Lake Champlain stations according to long-term means for each of the parameters sampled. The stations and lakes are grouped, for purposes of comparison among themselves, into three general divisions: high, moderate, and low. The stations or lakes falling within the same division may be considered to have a similar degree of nutrient enrichment.

### 3. Trophic Status

The evaluation of trophic state for each Lay Monitoring lake is discussed beginning on page 19.

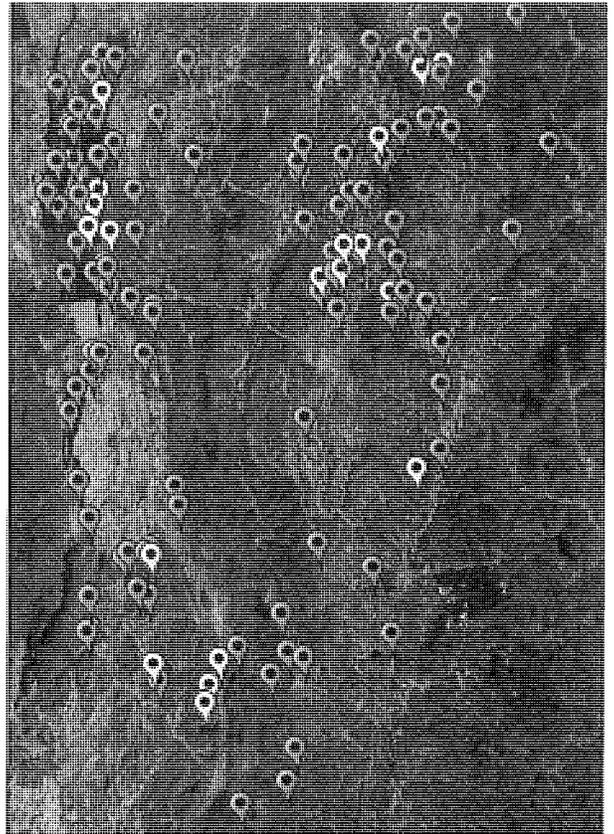
#### 4. Determining Trends from Water Quality Databases

In addition to describing current water quality conditions on lakes, the Lay Monitoring data is useful for detecting future changes in water quality. Results from the first several years of a study are generally described as "base line" data and serve as a reference point for future studies. After base line conditions have been established, a change in water quality may be documented by demonstrating that a statistically significant difference is present between the recent data and the established base line conditions. In this way, if there is a water quality decline, it may be detected and lake residents can be alerted to take corrective action.

Data analysis is also useful for detecting long-term trends in water quality (see Figure 7.). Trends can show whether or not a lake's water quality is changing or maintaining stable conditions. All lakes exhibit natural variability from year to year, some more than others. The less variable the data on a particular lake, the faster it is to detect a trend. Likewise, the more variable a lake is, the longer it takes to see a trend. There are lakes in the program whose water quality is so variable that even 10 years of data is difficult to conclude much other than the water is highly variable from year to year.

The summer averages of Secchi water clarity, total phosphorus and chlorophyll-a are examined for their variability from year to year. In addition, spring total phosphorus is analyzed by the same method. The variability between years helps determine how many years of monitoring is necessary in order to establish a base line water quality database that among many uses can be used for trend analysis.

The Lay Monitoring data reveal that, overall, Secchi disk transparency exhibits the least variability from year to year and thus is the best parameter for creating a database. The other parameters, chlorophyll-a and phosphorus concentrations, are often more variable and require more years of sampling to establish good reference points. However, the Lay Monitoring data on these lakes are still useful for describing current water quality conditions and for developing statewide eutrophication models.



**Figure 7.**

-  **Stable or good long-term trends**
-  **Increased nutrient enrichment trends**
-  **Statistically degraded water quality trends**

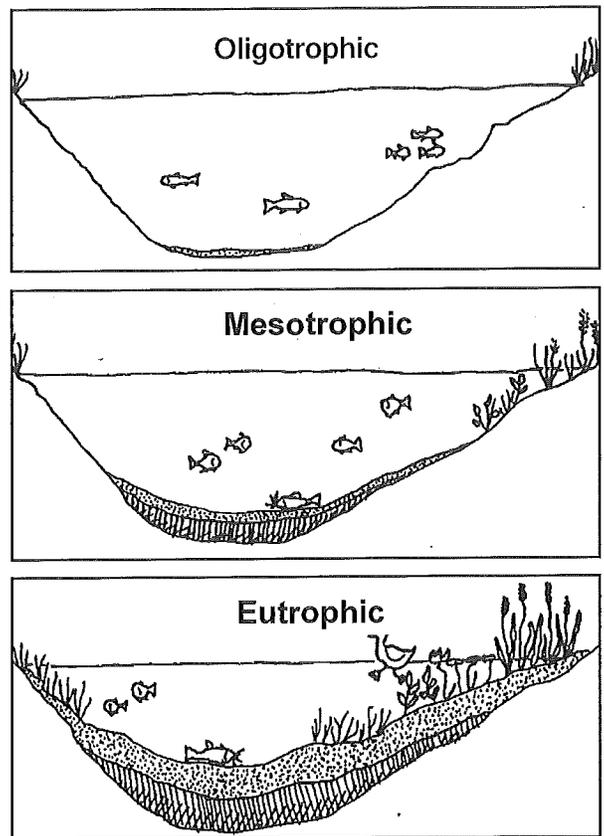
## EUTROPHICATION AND TROPHIC STATE

Eutrophication is a temporal phenomenon which occurs over a span of thousands of years. Limnologists have divided the gradual process of eutrophication into various stages of nutrient enrichment called trophic states. Generally, eutrophication is divided into three broad states - - oligotrophic, mesotrophic, and eutrophic. It is normal for all lakes to pass through these three states - from oligotrophy through mesotrophy to eutrophy. The rate at which a lake eutrophies depends on the size and shape of the lake and the characteristics of its drainage basin.

Vermont lakes are at many different stages in the process of eutrophication. Some are still deep, cold, and relatively unproductive (oligotrophic), while others have filled in with sediment over the years to the point where they are now shallow and warm, and support substantial growths of rooted aquatic plants and/or algae (eutrophic). Vermont is fortunate to have a diversity of lake types within its state boundaries with lakes that vary widely in terms of their individual progression in the eutrophication process, as each stage of eutrophication plays an important role in the natural environment.

To place a value judgment on a trophic state, for instance to call an oligotrophic lake "desirable" or a eutrophic lake "undesirable," is not scientifically sound. The eutrophication process occurs naturally, and therefore should not suggest a value judgment. However, when people accelerate the eutrophication process through their activities in a lake's drainage basin, they are altering the course of nature. When people alter the natural scheme of things, their impact may be considered detrimental. Thus, culturally accelerated eutrophication may be considered "undesirable."

All lakes experience natural eutrophication and many lakes are exposed to cultural eutrophication. The extent of cultural eutrophication in a lake will depend on the variety and the management of land uses in the drainage basin and along the shoreline. The effect of cultural eutrophication is a rapid increase in the nutrient enrichment of a lake and an acceleration of the eutrophication process. Cultural eutrophication can be identified by conducting a study to determine the sources of nutrient loading to a



lake (nutrients contributed by people cause cultural eutrophication), or by monitoring the rate of eutrophication of a lake (a rapid rate implies culturally accelerated eutrophication).

The water quality parameters commonly measured to determine the trophic state of a lake are Secchi disk transparency, chlorophyll-a concentration, and total phosphorus concentration. By examining the summer average for these parameters, the trophic state or degree of nutrient enrichment can be assessed. A rapid rate of nutrient enrichment may be indicative of cultural eutrophication, as opposed to the slow rate of natural eutrophication.

## Trophic State

Each Lay Monitoring inland lake is evaluated to determine its trophic state based on the water quality data collected since the lake entered the Lay Monitoring Program. Five trophic categories are used: eutrophic; mesotrophic; oligotrophic; transitional between eutrophic and mesotrophic; and transitional between mesotrophic and oligotrophic. To determine the trophic state, the available yearly averages since 1979 were averaged together for each parameter on a lake and the resulting values were compared with the table below. For instance, if a lake was sampled for three years under the Supplemental program, the three summer average Secchi disk transparencies, and chlorophyll-a and total phosphorus concentrations obtained during that time are averaged together. These average values define the trophic state according to the following Secchi disk transparency, chlorophyll-a concentration, and phosphorus concentration groupings:

<u>Trophic State</u>	<u>Average Secchi disk transparency</u>	<u>Average chlorophyll-a concentration</u>	<u>Average total phosphorus concentration</u>
Eutrophic	less than 3.0 meters	more than 7.0 ug/l	more than 14 ug/l
Mesotrophic	3.0-5.5	3.5-7.0	7.0-14
Oligotrophic	more than 5.5	less than 3.5	less than 7.0

Due to the variability encountered within lakes, the average values of different parameters on a lake often do not fall neatly into the same trophic state. In these cases, to determine trophic state, the average spring phosphorus concentration is weighted most heavily, then chlorophyll-a concentration, and finally Secchi disk transparency. Some subjectivity is necessarily involved here, although an attempt is made to keep the evaluations of trophic state as objective as possible.

The Lay Monitoring lakes are mapped on the following page according to trophic state (Figure 8). Lakes which are intermediate between trophic states are termed "transitional." It is interesting to note that many of the oligotrophic lakes occur in northeastern Vermont, while most of the eutrophic lakes occur in lower elevation areas such as the Lake Champlain valley and the Connecticut River valley. Associated factors that might have influenced the trophic state of these lakes are naturally more productive soils in the valley areas and a longer history of human settlement and cleared land in these regions.

The trophic state of each lake is included in the individual lake evaluations in SECTION 2 of this report.

# Vermont Lay Monitoring Program Trophic Status

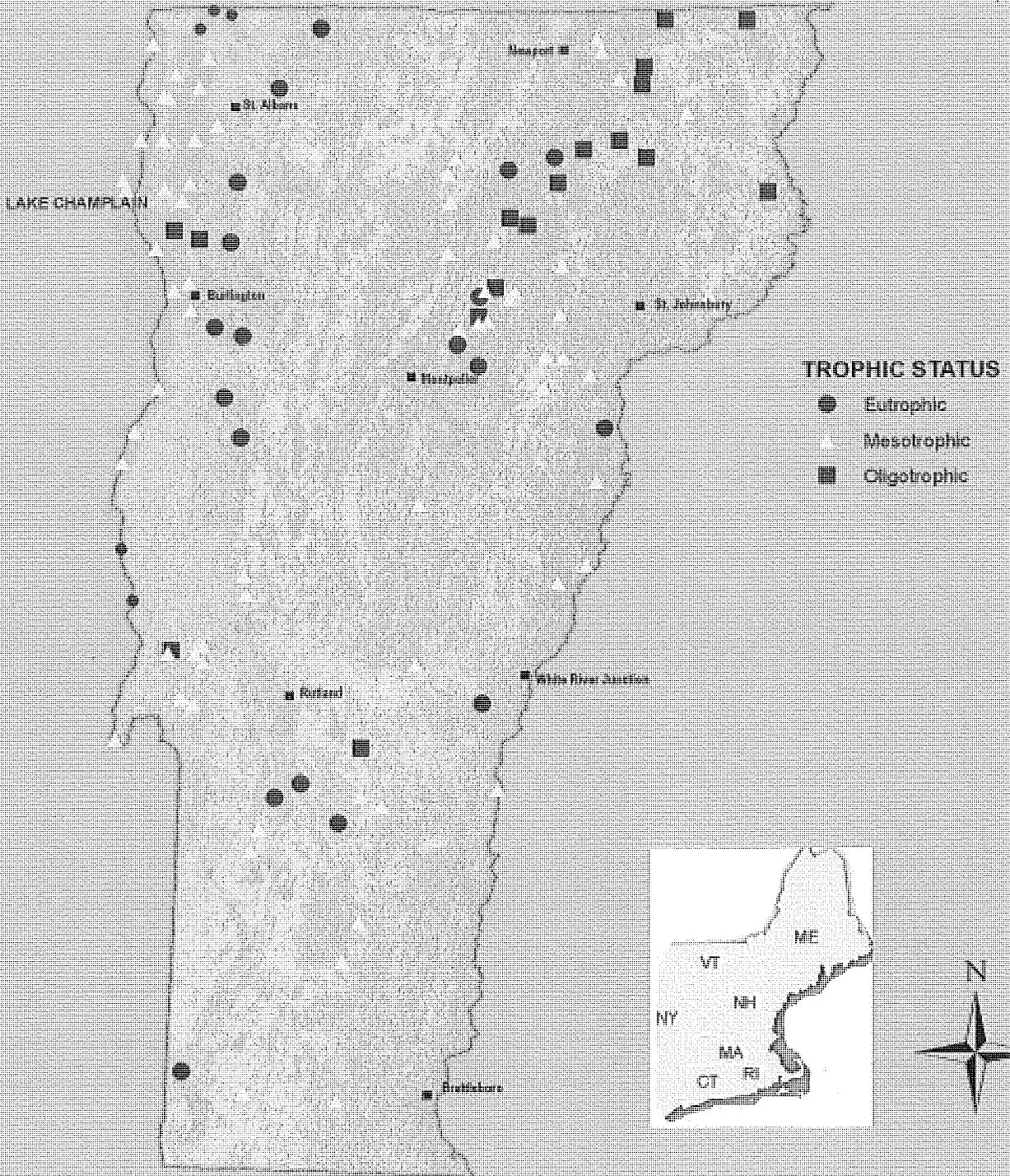
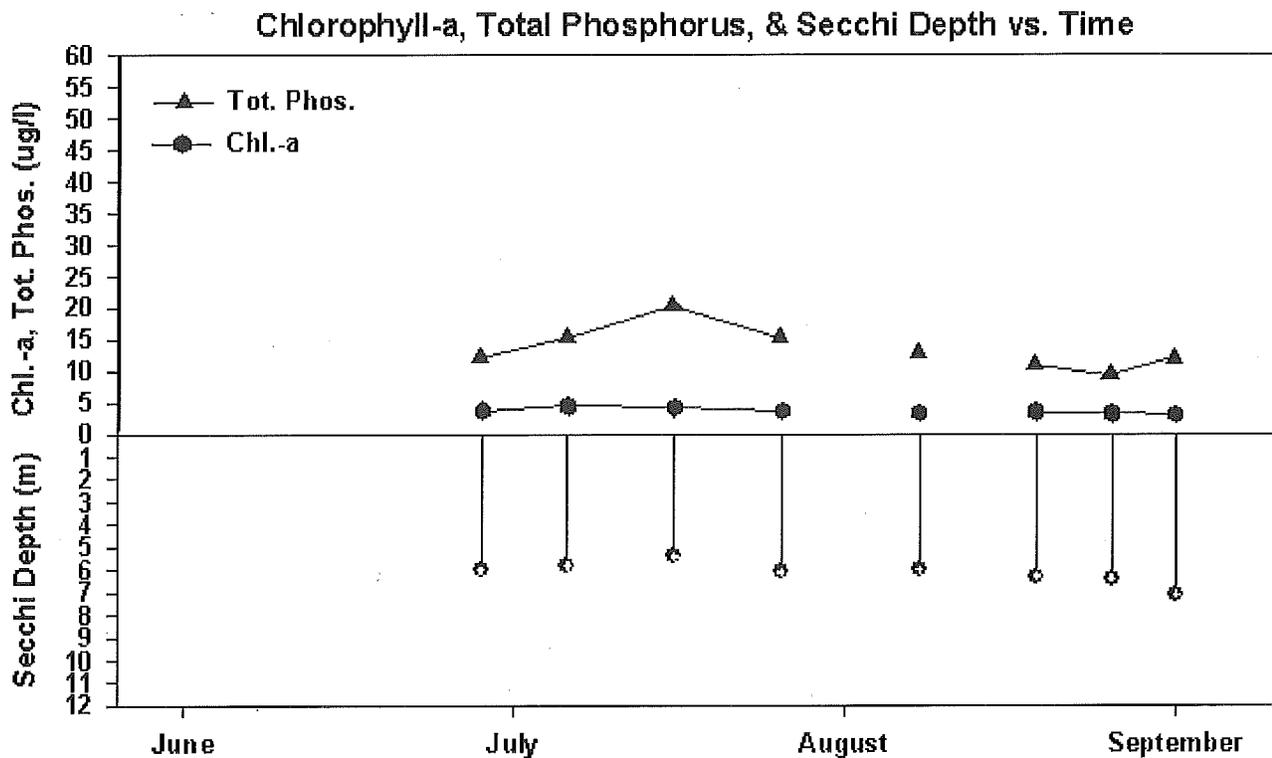


Figure 8.



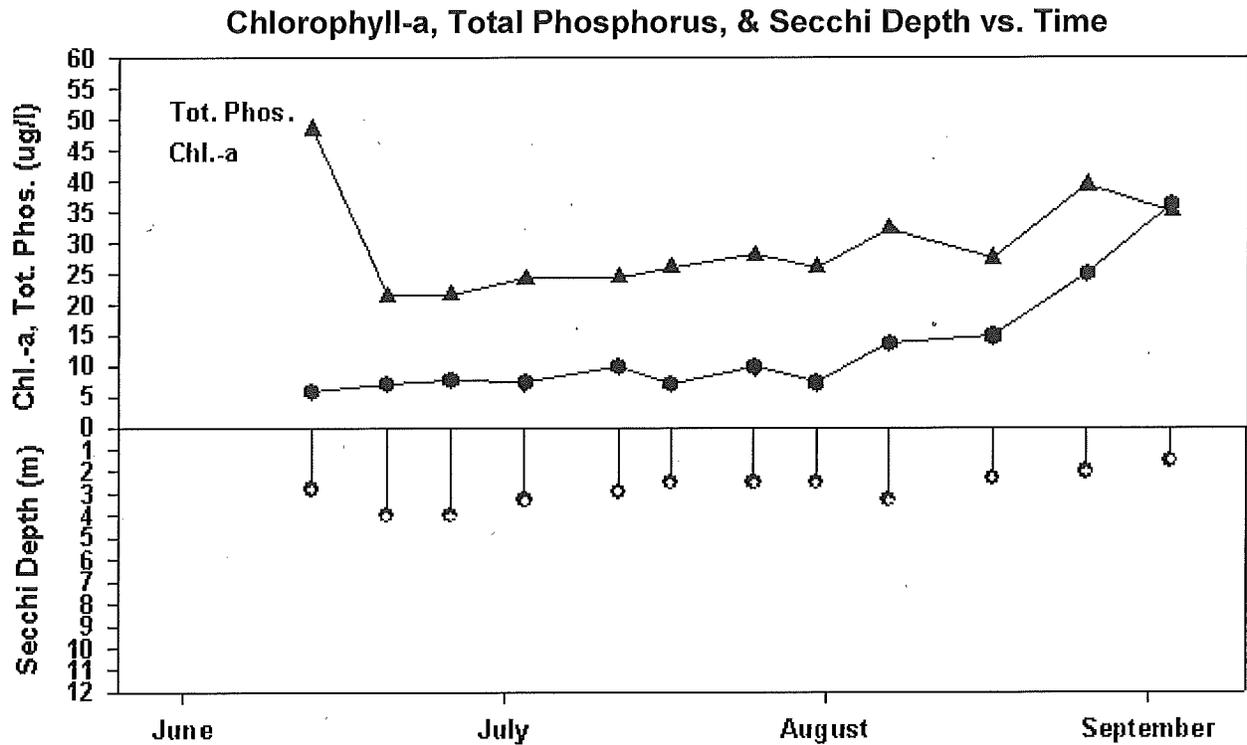
## A Mesotrophic Lake:

Graphed below is a typical mesotrophic lake. Mesotrophic lakes are characterized by moderate algal populations and relatively clear water. Water clarity generally decreases during the summer as seen by the slow drop in Secchi disk transparency. Readings can vary anywhere from 3.0 to 5.5 meters. The algal population increases slowly during the summer as the water warms up and conditions become more favorable for growth. Chlorophyll-a concentrations usually vary between 3.5 and 7.0 ug/l. Note that the shallowest Secchi disk reading corresponds to the greatest chlorophyll-a concentration. However, due primarily to variations in sampling conditions, this is not always the case. Variations in Secchi disk readings on mesotrophic lakes are due to changes in the algal population density, the amount of sediment suspended in the water, and sampling day weather conditions.



## A Eutrophic Lake:

Graphed below is a typical eutrophic lake. Eutrophic lakes are characterized by shallow Secchi disk readings and large algal populations during most of the summer. By early June the lake already supports an abundant algal population. Water clarity is often between 2.0 and 3.5 meters during the summer, although it may drop below this during an algae "bloom." When water and weather conditions become optimum for algae growth, one species population growth can increase dramatically. An algae bloom is not uncommon for a eutrophic lake during either July or August. Chlorophyll-a concentrations during blooms may be anywhere from 10 to 100 ug/l. Notice that the Secchi disk reading drops considerably during an algae bloom. Many lakes are naturally eutrophic; this does not mean these lakes have "poor" water quality.



## SUMMARY OF HOW THE DATA ARE USED

Data from the Lay Monitoring Program show that lakes exhibit natural fluctuations in nutrient concentration from year to year. However, monitoring results can be used to detect significant, rapid, or smaller long-term increases in nutrient loading, which would most likely indicate cultural eutrophication. Lay Monitoring information helps to identify the changes in nutrient loading and alerts communities and lake residents to take corrective actions to prevent problems with their lake water quality.

### Summary List of Data Uses:

#### ● **Determining Water Quality Trends**

Lay Monitoring data is used to establish the baseline conditions of a waterbody. These data can also be used to identify water quality improvement or degradation over time.

#### ● **Water Quality Assessments**

Lay Monitoring data have been used to develop water quality assessments for Vermont's biennial "305(b) Report" to the U.S. Congress, named after the section of the Clean Water Act that requires the report. Data used for this purpose are evaluated in accordance with Vermont's Water Quality Assessment and Listing Methodology.

#### ● **Impaired and Priority Waters Listings**

Following the development of water quality assessments, certain waters are "listed" based on the available data, which can include Lay Monitoring data. The federal Clean Water Act requires states to prepare a biennial list of waters that do not meet Water Quality Standards due to pollutants. This list of impaired (polluted) waters is called the "303(d) list," after the section of the Clean Water Act that requires the list. Vermont also prepares a list of waters that are state priorities for further study or remediation that do not fall within the limited scope of the 303(d) list. The state priority waters list includes, among others, waters in need of further assessment and waters altered by exotic species, flow regulation, or channel alteration. Data used for listing purposes are evaluated in accordance with Vermont's Water Quality Assessment and Listing Methodology.

#### ● **Legislative Process**

Lay Monitoring data have been used in the legislative process and for the development of water quality standards. Data used for this purpose must be documented as quality-assured and based on reliable and reproducible field and analytical methods.

#### ● **TMDL (Total Maximum Daily Load)**

Lay Monitoring data have been used for developing pollution control plans (so-called TMDL analyses) required for all impaired waters on Vermont's 303(d) list.

#### ● **Federal Funding for Remediation**

Lay Monitoring data have been used to obtain federal funding for remediation projects. Funds go towards projects that cleanup waters with documented water quality problems. The highest quality data will carry the greatest weight when such data are used to direct remediation funds.

#### ● **Red Flag**

Lay Monitoring data has been used to identify waters where water quality is questionable and requires more in-depth study. Once these waters have been brought to the attention of state and academic parties, professionals can conduct more rigorous research and monitoring.

**SECTION 2.**  
**LAY MONITORING LAKES**

In 2012, the following lakes participated in the Lay Monitoring Program:

<b>Lake</b>	<b>Page</b>	<b>Lake</b>	<b>Page</b>
Beebe.....	30	Maidstone .....	86
Big Pond.....	32	Memphremagog.....	88
Bomoseen.....	34	Miles.....	90
Carmi.....	36	Mirror .....	92
Caspian.....	38	Morey .....	94
Chipman.....	40	Nelson.....	96
Cole.....	42	Newark .....	98
Coles .....	44	Nichols.....	100
Curtis.....	46	North Montpelier .....	102
Danby .....	48	Parker.....	104
Dunmore .....	50	Peacham .....	106
Echo .....	52	Perch .....	108
Eden .....	54	Raponda.....	110
Elfin.....	56	Rescue .....	112
Elmore.....	58	Runnemedede.....	114
Fairfield.....	60	Salem .....	116
Fairlee .....	62	St. Catherine .....	118
Fosters.....	64	St. Catherine – Little Lake.....	120
Great Hosmer .....	66	Seymour.....	122
Green River.....	68	Shadow .....	124
Groton .....	70	Silver .....	126
Halls .....	72	South (Eden) .....	128
Harvey's.....	74	Sunset (Benson).....	130
Holland.....	76	Sunset (Brookfield) .....	132
Indian Brook .....	78	Ticklenaked .....	134
Iroquois .....	80	Willoughby .....	136
Island.....	82	Woodbury.....	138
Joes .....	84		

## HOW LAY MONITORING DATA ARE DISPLAYED

The data of each lake are presented in alphabetical order beginning on page 30. Each data page is organized according to the following sections.

### **Lake Name:**

Lakes are listed by the State name found in the "Vermont Lakes and Ponds: an Inventory by County." When a lake is known by more than one name, other names are listed in the brief description of the lake following the monitor names.

### **Lay Monitor(s):**

People who sampled or assisted with sampling at least three weeks during the summer are included on this list. The principal monitor is listed first.

### **Physical Lake Characteristics:**

Lakes referred to as a size, such as "small," or "moderately-sized" are named by the following LMP criteria: <100acres = small; 100-200acres = moderate size; 200-350acres = relatively large, and >350acres = large.

### **Compared to Other lakes, the Trophic State is:**

Trophic state describes the degree to which a lake has become enriched with nutrients and aquatic life. The Lay Monitoring lakes have been divided into five trophic state categories: eutrophic, mesotrophic, oligotrophic, transitional between eutrophic and mesotrophic, and transitional between mesotrophic and oligotrophic.

**Table of 2012 Summary:**

This table presents the maximum, minimum and mean values, as well as the number of observations for each parameter measured during the summer. If Spring Total Phosphorus was measured by the DEC, the result is listed at the bottom of the table.

**Table of Annual Data:**

This table includes the annual summer means for each sampling parameter for however long the lake has participated in the program. The Lay Monitor weekly results for Secchi disk transparency, chlorophyll-a concentration, and total phosphorus are used to calculate summer means. Spring total phosphorus is collected by the DEC on a single sampling date in the spring. If the Secchi disk was observed to the lake bottom during the summer, then no numerical value was entered under that year, or if less than eight samples were collected, no annual mean would be calculated.

**Graph of 2012 Data:**

The two-part graph presents the summer sampling results for Secchi disk transparency, chlorophyll-a concentration, and total phosphorus. Time is measured along the horizontal axis.

Secchi disk transparency, presented in the lower graph, is measured in meters along the left vertical axis. The vertical axis is descending for Secchi disk transparency, with 0 meter depth, or lake surface, located at the top of the graph.

Chlorophyll-a concentration and total phosphorus are presented in the top graph and measured in micrograms per liter (ug/l) along the left vertical axis.

# BEEBE POND

**Hubbardton, VT**

**Lay Monitors:** Barbara Cooley  
Jody Zeoli

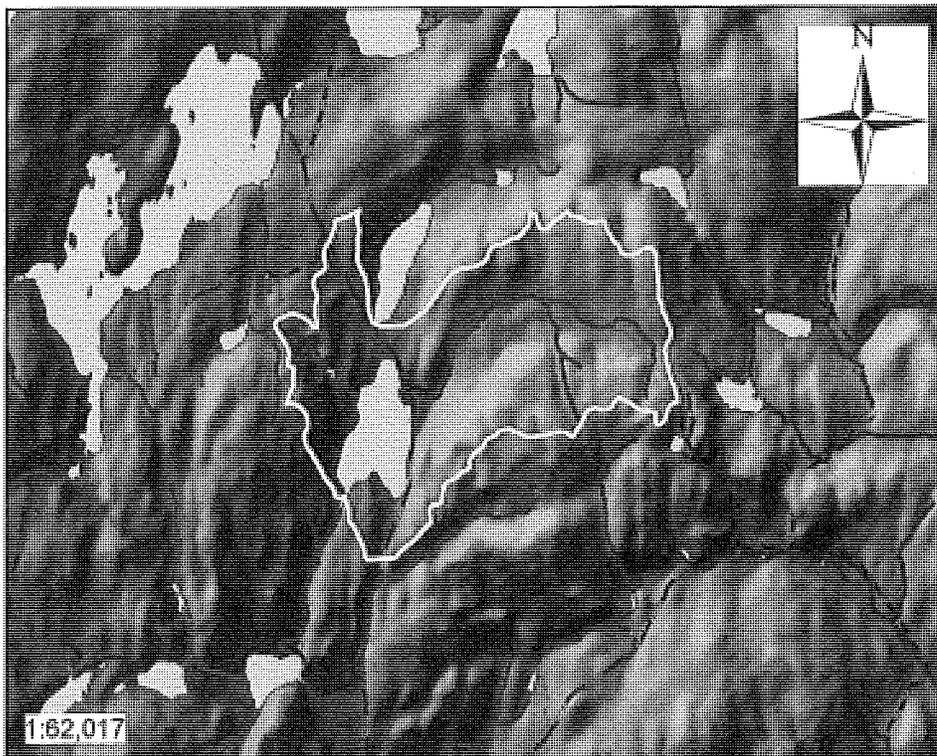
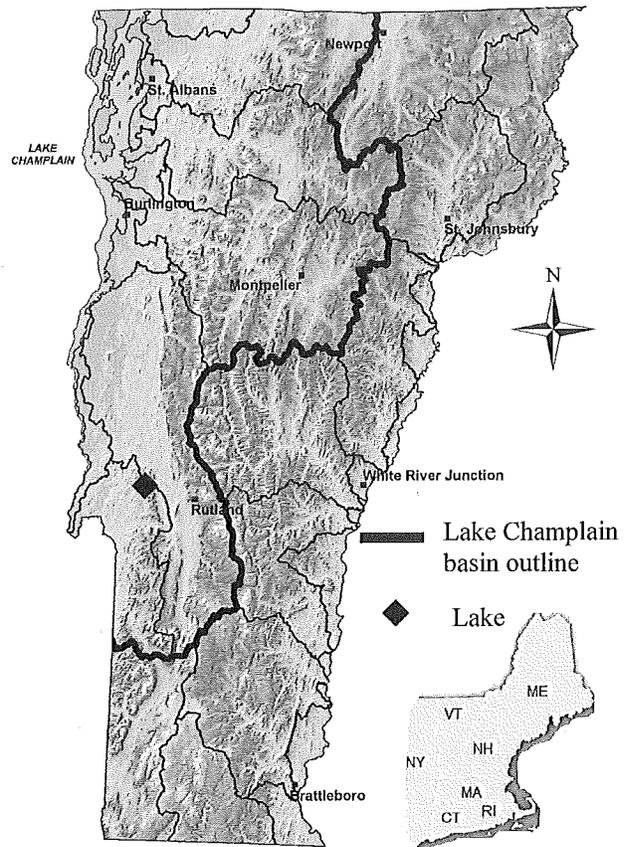
**Former Monitors:** Mary Sondergeld  
Marilyn and Keith Brostek

Beebe Pond is a small, warmwater lake.

Lake Surface Area: 111 acres  
 Drainage Basin Area 1,843 acres  
 Maximum depth: 43 ft. (13.0 m)  
 Average depth: 26 ft. (7.9 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g}/\text{l}$	< 7.0 $\mu\text{g}/\text{l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Beebe Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	16	6.7	3.0		15
1980	13	7.0	3.4		16
1981	9	7.3	3.8		14
1982	8	7.6	3.5		21
1983	8	8.0	2.1		12
1984	9	8.3	3.3		10
1985	10	7.1			12
1986	8	9.0			25
1987	4				16
1988	8	8.3			
1989	7				
1990	7				
1991	7				
1992	10	7.4			
1993	8	6.7			
1994	12	7.0	3.1	11	16
1995	9	7.4			
1996	8	6.9			
1997	9	7.3			
1998	6				12
1999	9	7.6			

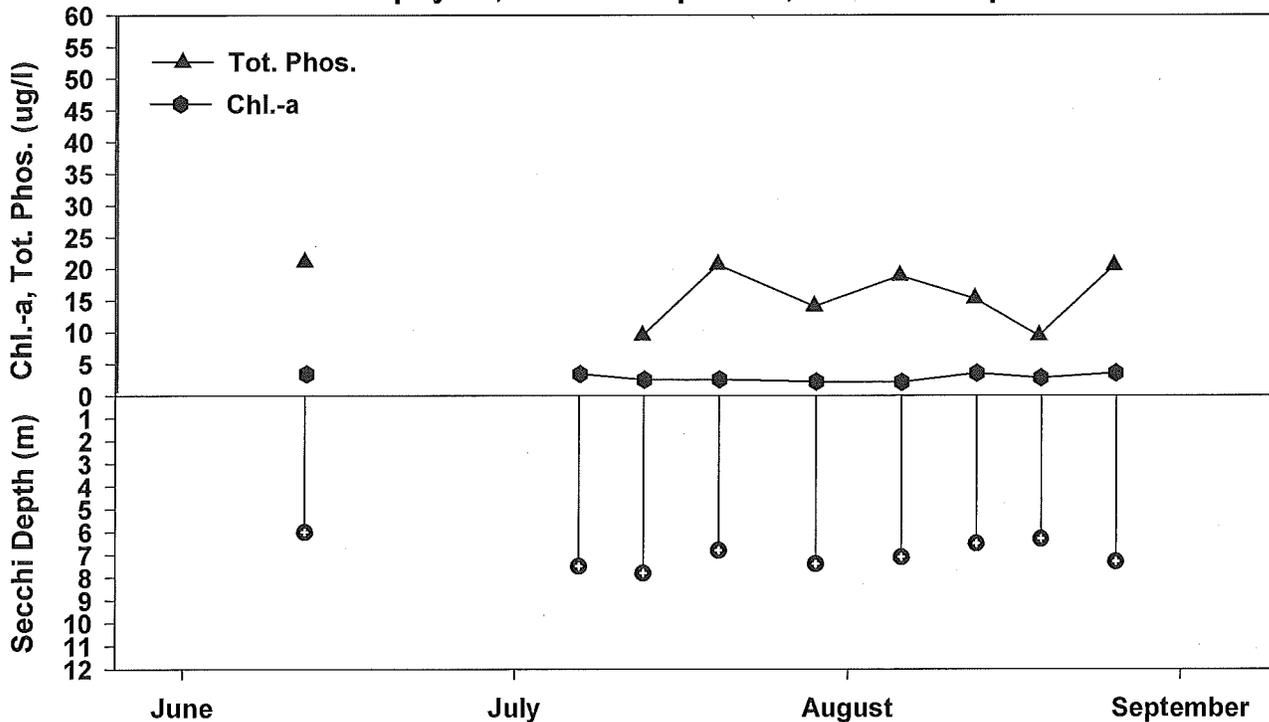
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	9	7.3			
2001	8	6.9			
2002	8	8.1			
2003	12	6.9			22
2004	8	6.3			21
2005	8	7.2			16
2006	9	6.2			15
2007	10	5.9			14
2008	7				
2009	11	6.8			
2010	12	7.1			
2011	9	7.2			
2012	9	7.0	2.3	16	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	9	6.0	7.0	7.8
Chl-a (ug/l)	9	1.5	2.3	2.9
Summer TP (ug/l)	8	9.5	16	21

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# BIG POND (WOODFORD LAKE)

Woodford, VT

**Lay Monitor:** Maureen O'Neil  
Tiffany Tobin

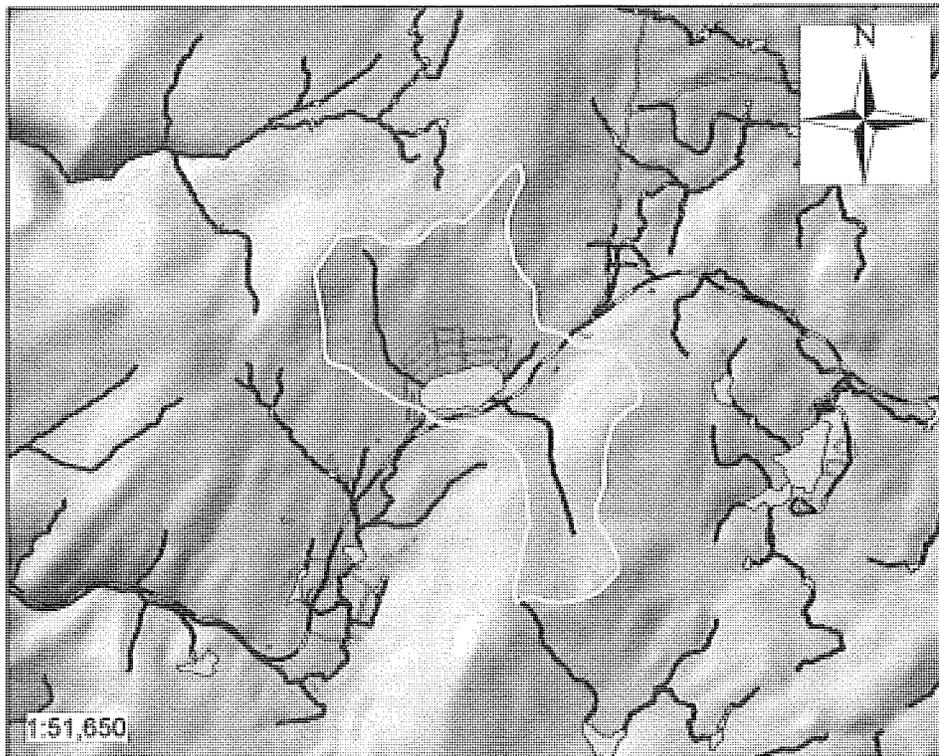
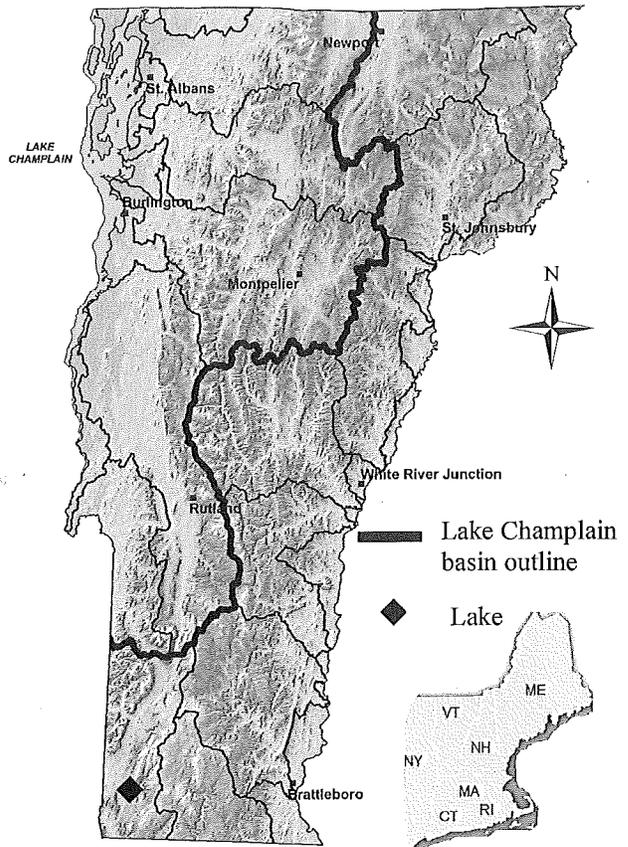
**Former Lay Monitors:** Anita Capella  
Dorothea Scott

Big Pond is a small, warmwater lake.

Lake Surface Area: 31 acres  
 Drainage Basin Area 715 acres  
 Maximum depth: 28 ft. (8.5 m)  
 Average depth: 13 ft. (4.0 m)

**Compared to other lakes, the trophic state is: Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
<b>Mesotrophic</b>	<b>3.0 - 5.5</b>	<b>3.5 - 7.0</b>	<b>7.0 - 14</b>
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Big Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1981	13	3.8	3.8		
1982	13	3.8	3.2		7.0
1983	10	3.9	5.6		8.5
1986	10	2.7	2.2		
1993	8	3.2	4.0	10	
1994	7				
1995	10	2.8	3.4	9.5	
1996	7				
1997	8	2.7			

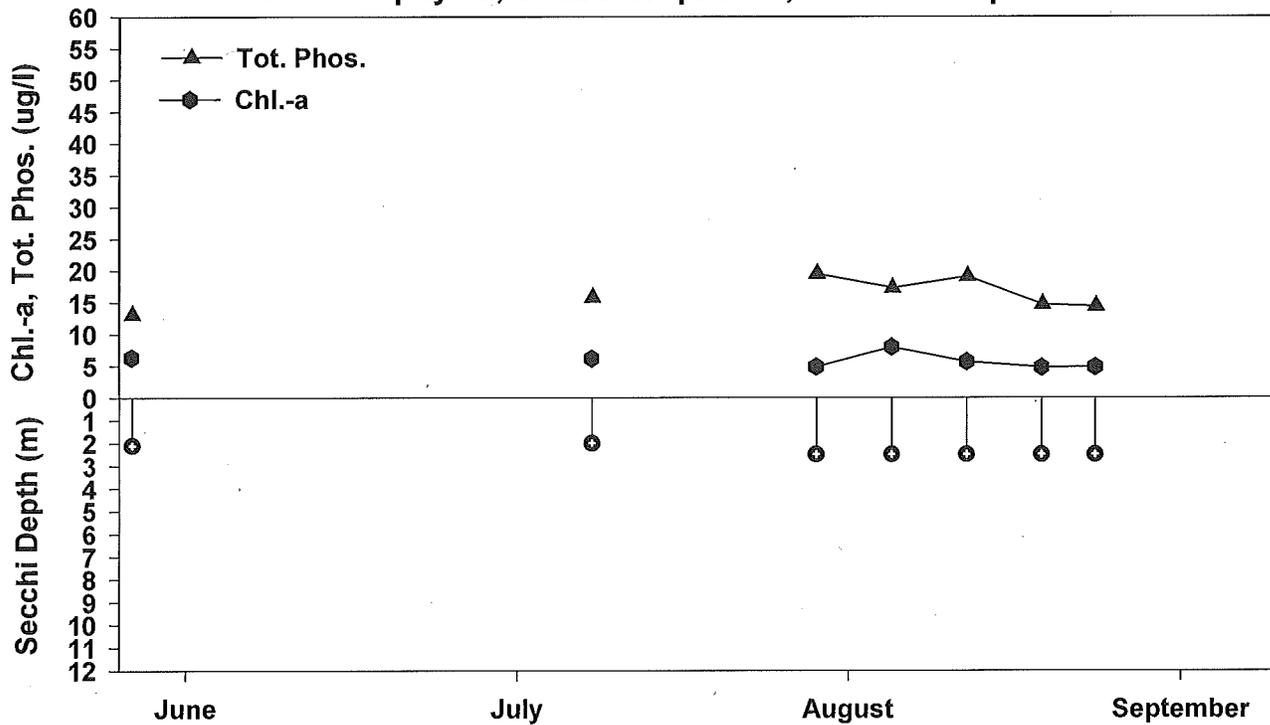
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2008	8	1.8	6.2	23	9.2
2009	1				11
2010	12	2.4	5.4	18	
2011	10	2.6	3.4	18	
2012	7				

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	7	2.0	2.4	2.5
Chl-a (ug/l)	7	4.1	5.2	7.4
Summer TP (ug/l)	7	13	16	20

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LAKE BOMOSEEN

## Castleton and Hubbardton, VT

**Lay Monitor:** Frank Giannini

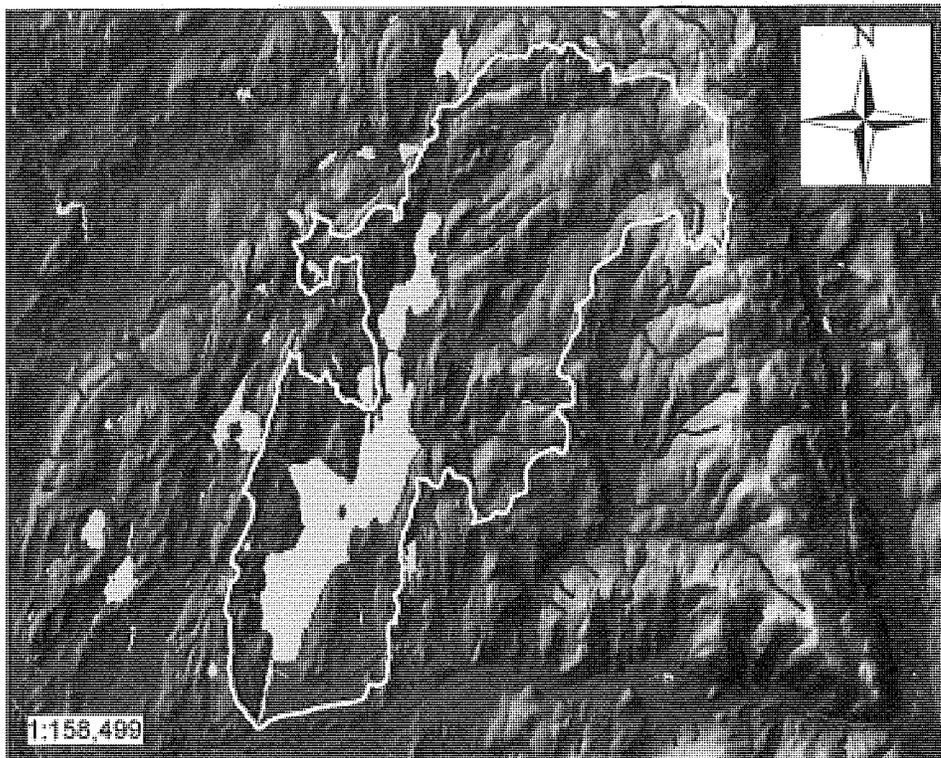
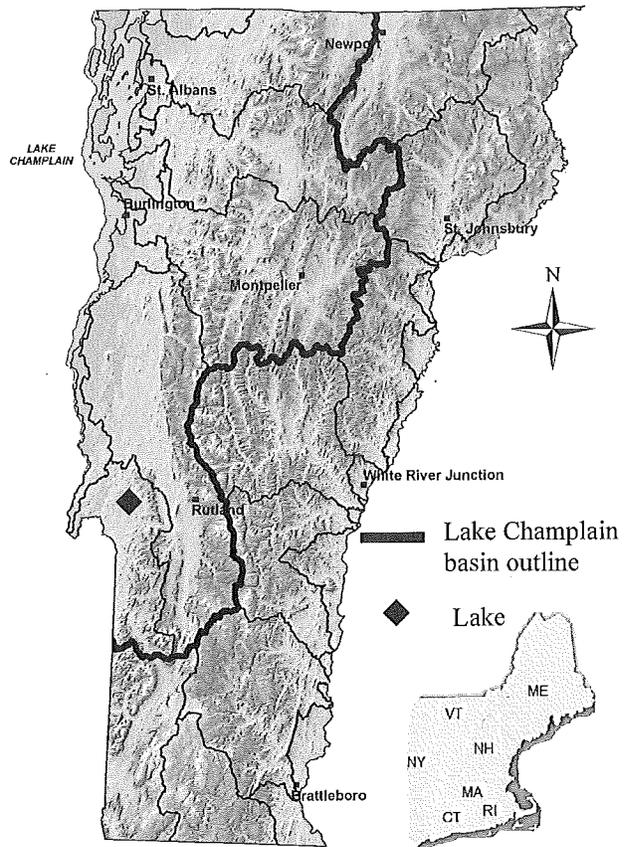
**Former Lay Monitors:** Alfred S. Kosloffsky  
Jim Leamy

Lake Bomoseen is a large, warmwater lake.

Lake Surface Area: 2,360 acres  
 Drainage Basin Area: 23,630 acres  
 Maximum depth: 65 ft. (19.7 m)  
 Average depth: 27 ft. (8.2 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Lake Bomoseen

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1992	11	7.1			
1993	12	6.4			
1994	11	6.5			
1995	11	5.6			11
1996	11	5.2			14
1997	13	6.2			
1998	13	4.6			14
1999	13	6.8			

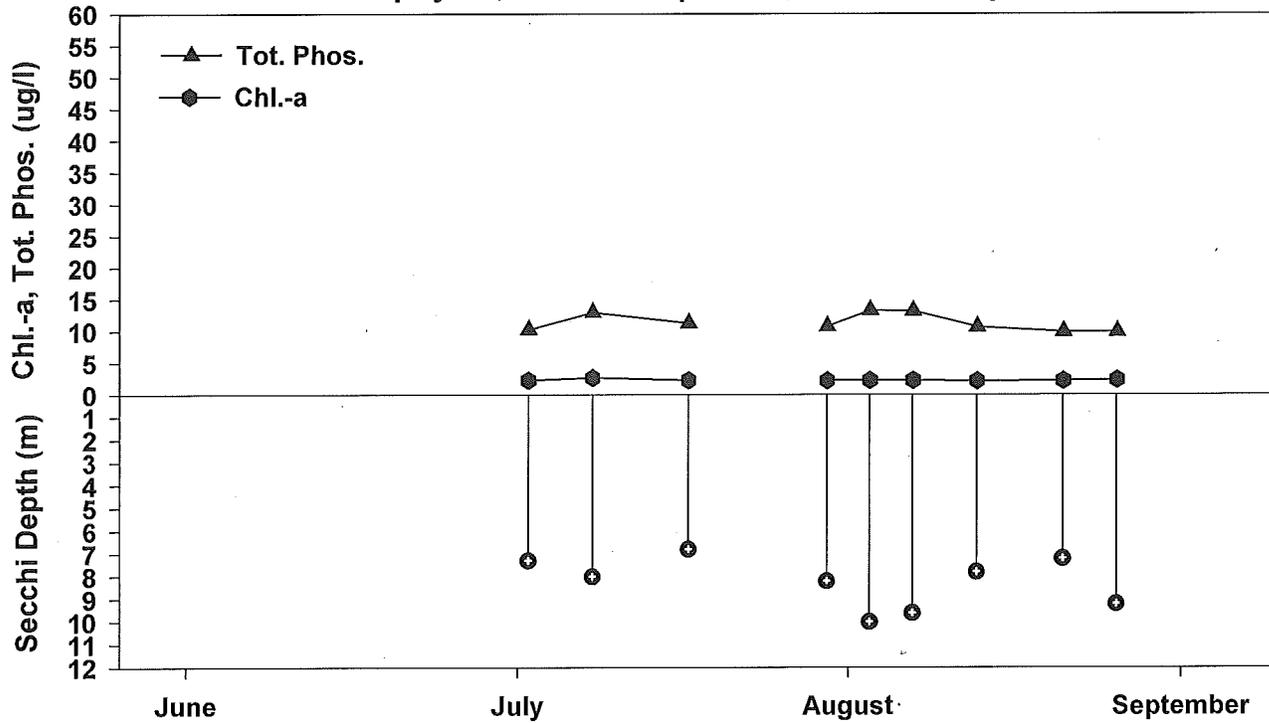
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	12	6.0			
2001	9	7.2			
2002	11	7.9			
2003	13	8.3			
2004	12	7.9			12
2005	14	7.7			
2006	13	8.2			
2007	10	8.6			8.0
2008	11	7.3			9.9
2009	9	7.6			
2010	10	7.2	1.6	11	
2011	11	8.1	2.0	11	10
2012	9	8.2	1.6	11	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	9	6.8	8.2	10
Chl-a (ug/l)	9	1.5	1.6	2.0
Summer TP (ug/l)	9	9.9	11	13

## 2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LAKE CARMi

Franklin, VT

**Lay Monitor:** Peter Benevento

**Former Lay Monitors:** Bob Rennie

Dave Jones

Richard Davis

Lake Carmi is a large, shallow, warmwater lake.

Lake Surface Area: 1,402 acres

Drainage Basin Area 7,710 acres

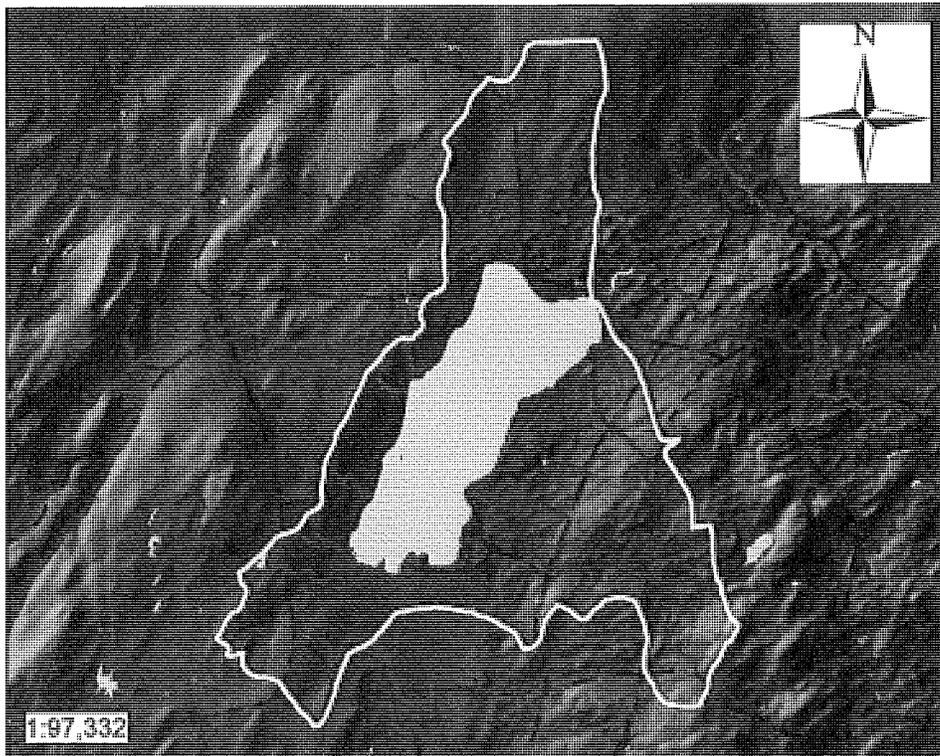
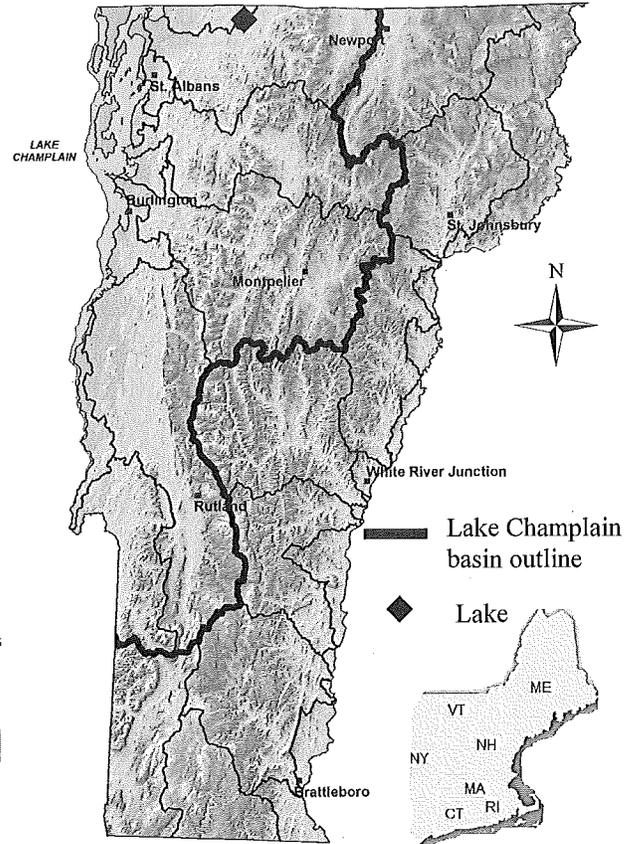
Maximum depth: 33 ft. (10.0 m)

Average depth: 13ft. (3.9 m)

**Compared to other lakes, the trophic state is**

Eutrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Lake Carmi

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	17	1.5	16		18
1980	16	1.7	24		18
1981	12	1.9	19		23
1982	7				30
1983	11	1.9	26	30	30
1984	12	1.5	30	35	25
1985	13	1.5	31	39	25
1986	13	1.3	27	37	22
1987	10	1.8	15	30	27
1988	13	2.0	14	28	
1989	13	2.4	13	29	
1990	14	1.7	40	28	
1991	12	2.1	13	27	
1992	13	2.2	14	29	
1993	14	1.8	15	27	
1994	14	2.2	10	24	27
1995	10	2.1	15	26	23
1996	10	2.1	10	27	29
1997	9	2.5	8.4	24	28
1998	9	2.2	7.6	23	24
1999	9	2.1	20	27	27

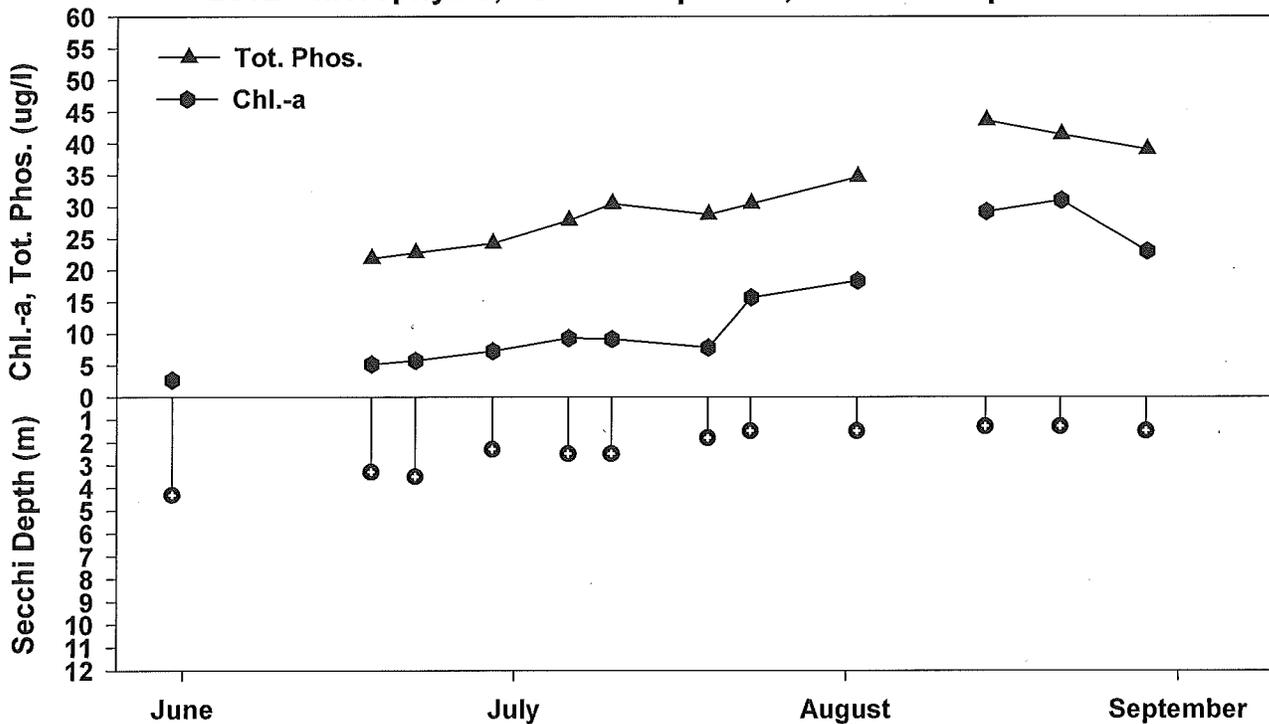
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	8	2.5	12	26	25
2001	14	2.9	11	25	27
2002	9	2.7	8.0	24	25
2003	8	2.2	16	32	
2004	11	2.3	13	30	29
2005	11	2.2	16	29	
2006	10	1.2	36	47	
2007	12	2.8	12	29	23
2008	12	1.9	16	38	
2009	13	1.9	16	41	33
2010	13	2.4	15	36	
2011	12	2.1	12	34	
2012	12	2.3	13	31	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	12	1.3	2.3	4.3
Chl-a (ug/l)	12	2.0	13	31
Summer TP (ug/l)	11	22	31	44

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# CASPIAN LAKE

## Greensboro, VT

**Lay Monitor:** Andy Dales

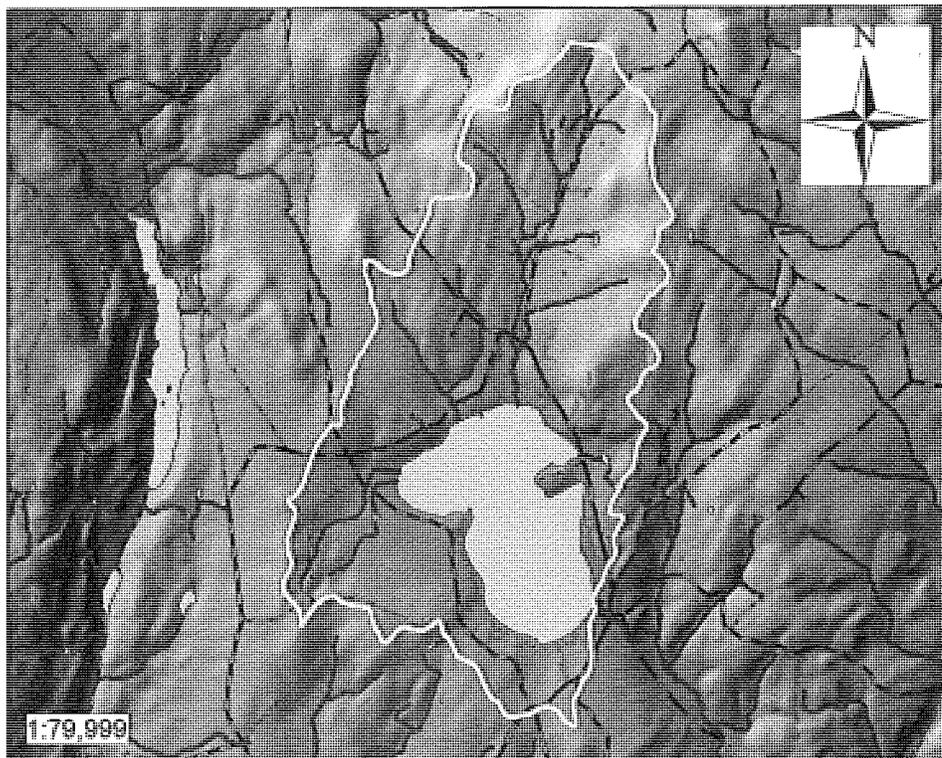
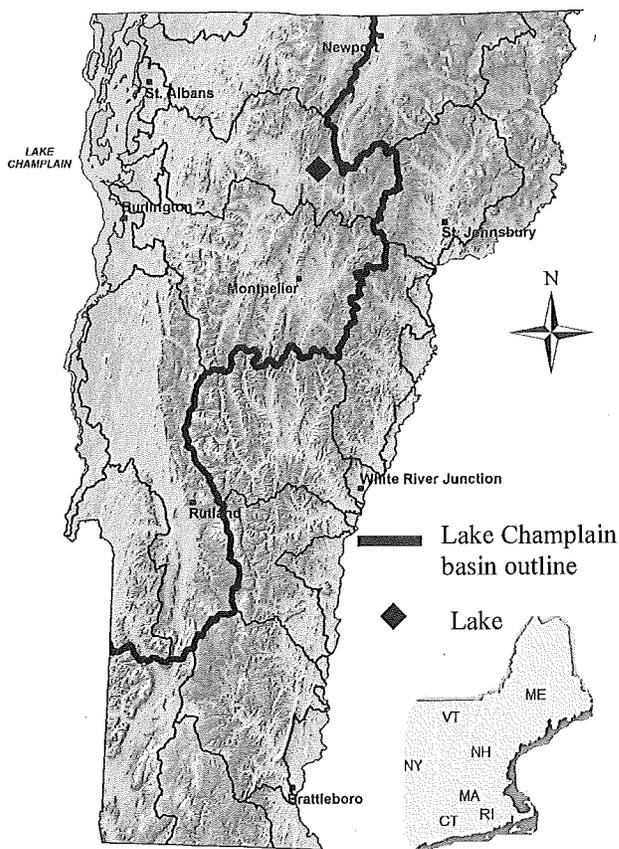
**Former Lay Monitors:** George Hasen  
Scott Irwin

Caspian Lake is a large, deep, coldwater lake.

Lake Surface Area: 789 acres  
 Drainage Basin Area: 4,510 acres  
 Maximum depth: 142 ft. (43.0 m)  
 Average depth: 57 ft. (17.3 m)

**Compared to other lakes, the trophic state is Oligotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Caspian Lake

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	7				4.3
1980	9	8.5			5.3
1981	13	7.3	2.8		5.3
1982	12	7.0	1.5		7.3
1983	11	6.6	2.4		8.7
1984	12	7.9	1.6		6.0
1985	13	7.9	3.1		7.3
1986	12	7.3	1.2		8.0
1991	12	7.2			
1992	13	8.9			
1993	11	9.3			
1994	13	8.6	1.5	5.1	5.1
1995	12	8.4	2.0	7.9	
1996	12	7.0	2.5	7.1	4.6
1997	10	7.5	1.3	7.1	5.5
1998	10	5.3	1.9	7.8	
1999	10	7.0	2.9	6.5	6.9

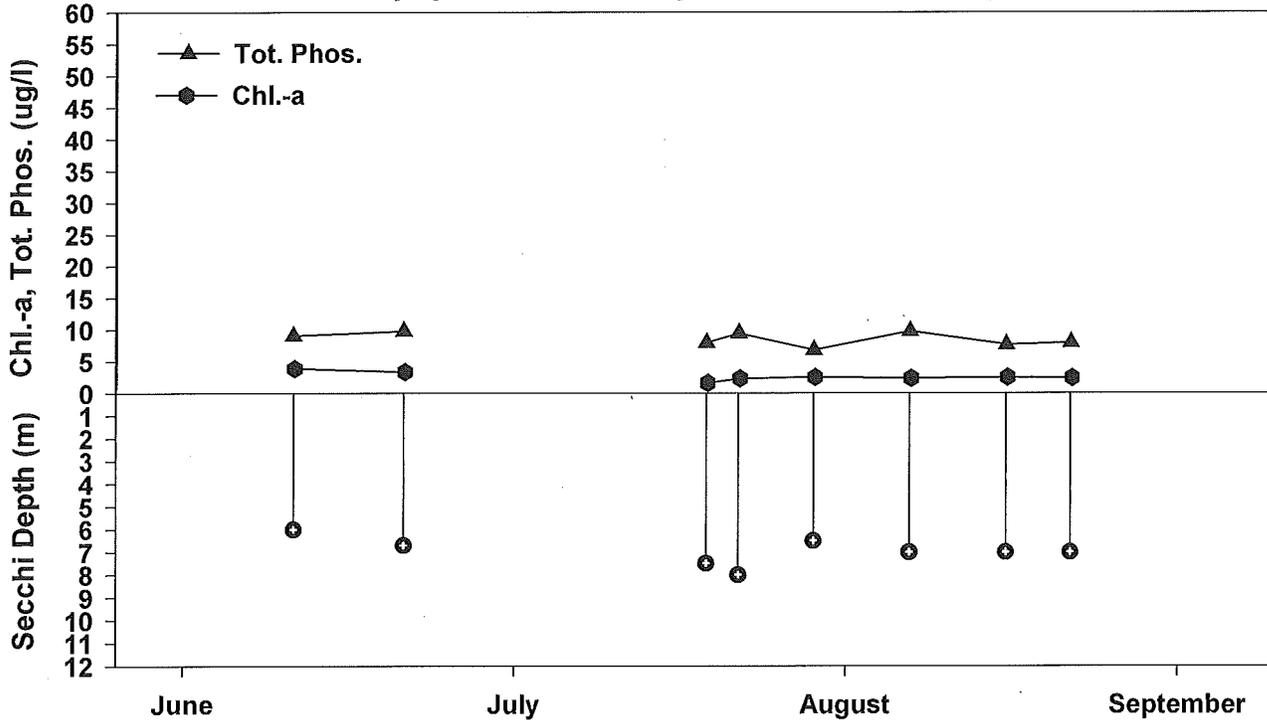
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	10	8.2	2.1	10	
2001	10	8.1	1.5	6.7	
2002	10	6.0	2.7	13	
2003	14	9.4	1.6	10	
2004	14	6.4	2.6	9.3	
2005	13	9.7	1.7	8.6	7.2
2006	11	6.5	3.2	11	9.6
2007	12	7.3	2.0	8.5	7.9
2008	12	7.4	2.1	11	8.0
2009	14	7.4	2.1	9.8	
2010	11	8.3	1.9	11	
2011	12	9.1	1.2	8.6	
2012	8	7.0	1.9	8.6	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	8	6.0	7.0	8.0
Chl-a (ug/l)	8	0.9	1.9	3.2
Summer TP (ug/l)	8	6.8	8.6	9.8

**2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time**



# CHIPMAN LAKE

Tinmouth, VT

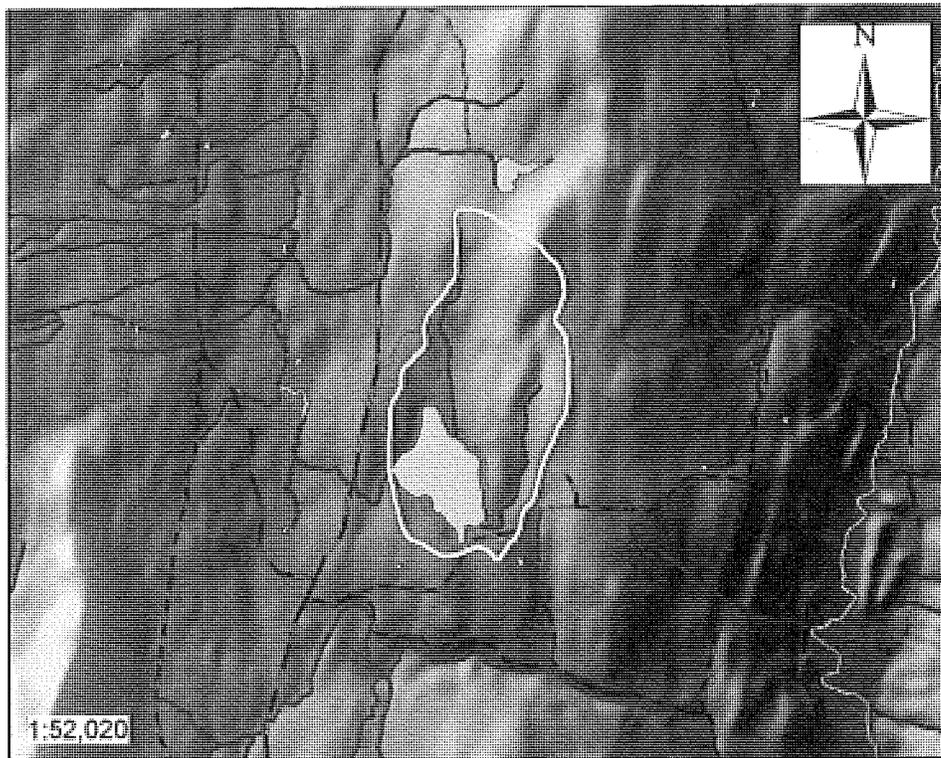
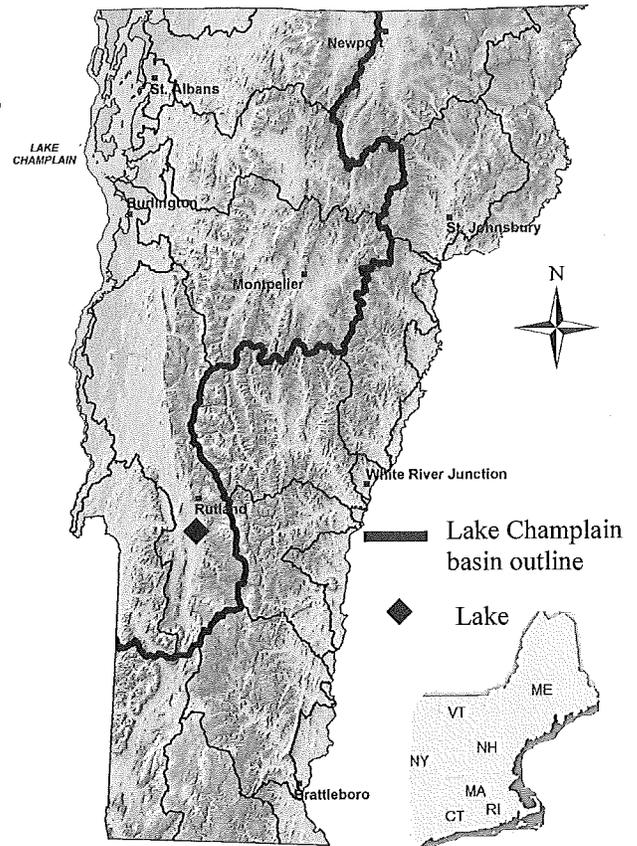
**Lay Monitor:** Annie Robbins and Joe Frankiewicz

Chipman Lake is a small, shallow lake.

Lake Surface Area: 79 acres  
 Drainage Basin Area: 535 acres  
 Maximum depth: 11 ft. (3.4 m)  
 Average depth: 7 ft. (2.1 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g}/\text{l}$	< 7.0 $\mu\text{g}/\text{l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Chipman Lake

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1996	11				
1997	15		2.5	9.1	14
1998	15		1.8	11	
1999	14		3.9	9.6	8.0

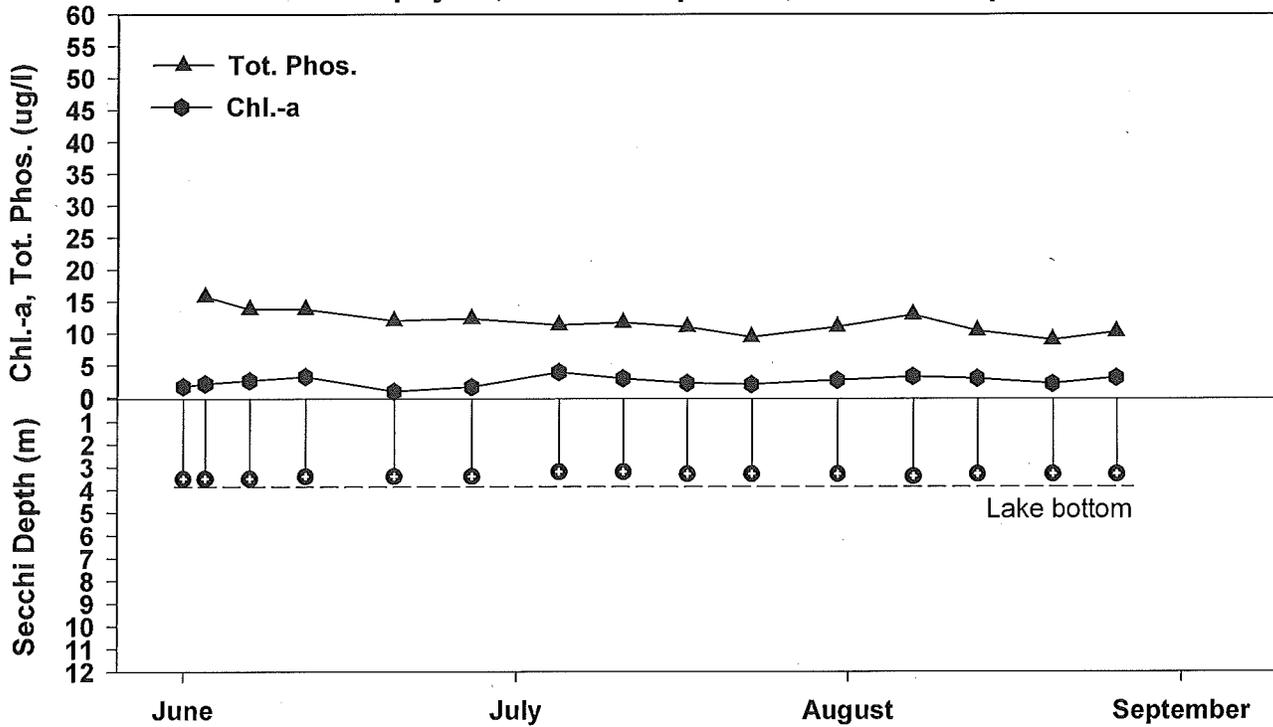
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	14		2.9	9.4	
2001	11		1.5	10	5.0
2002	13		1.8	10	
2003	14		2.7	12	
2004	13		2.7	13	
2005	12		3.1	12	14
2006	14		2.7	16	
2007	12		3.0	13	
2008	12		3.0	14	
2009	12		2.2	14	
2010	11		3.5	14	
2011	15		1.9	13	9.9
2012	15		2.4	12	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	15	3.2	3.4	3.5
Chl-a (ug/l)	15	0.9	2.4	3.9
Summer TP (ug/l)	14	9.0	12	16

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# COLE POND

**Jamaica, VT**

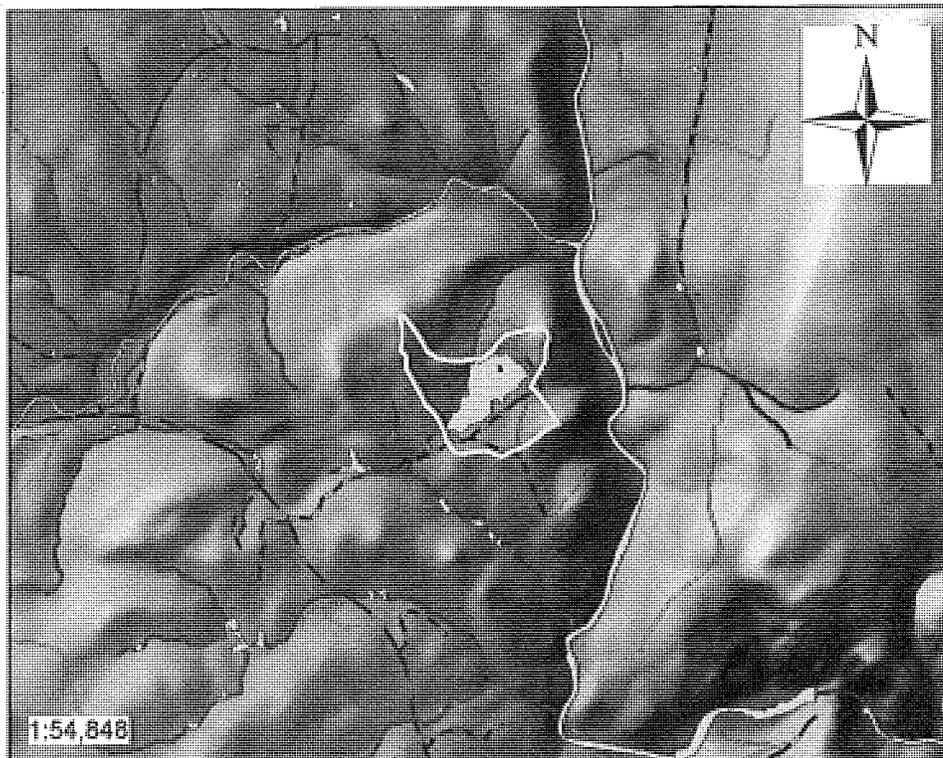
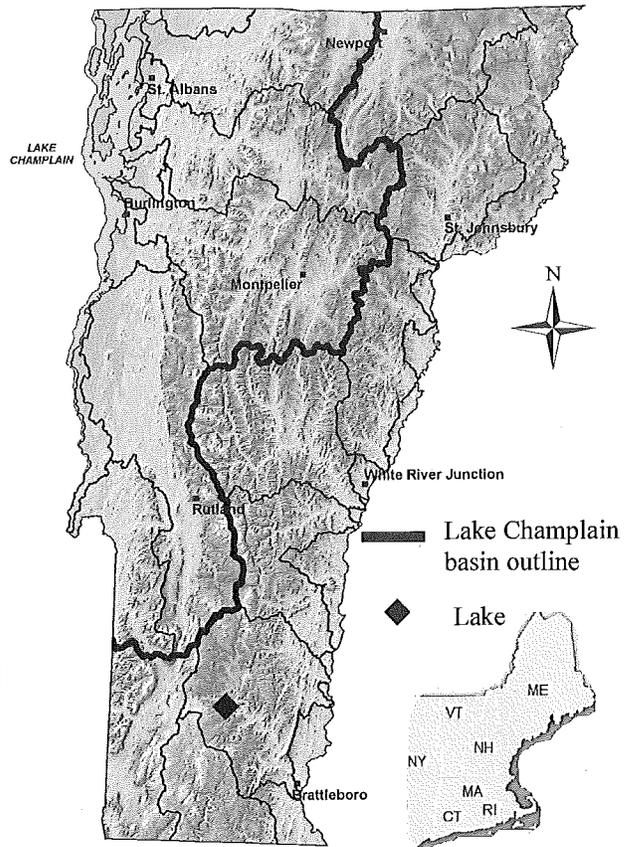
**Lay Monitors:** Sherry and Vaughn Clark

Cole Pond is a fairly remote, small, shallow lake.

Lake Surface Area: 41 acres  
 Drainage Basin Area: 282 acres  
 Maximum depth: 13 ft. (4.0 m)  
 Average depth: 5 ft. (1.5 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Cole Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1980	13		1.0		
1981	13		1.9		5.5
1982	11		1.3		9.0
1983	9		4.1		9.5
1985	11		1.6		
1988	8				
1989	10		3.2	14	12
1990	12		1.9	6.2	
1991	12		2.3	9.6	
1992	13				
1993	12		2.3	6.1	
1994	13		3.5	9.5	
1995	12		2.1	8.2	7.4
1996	13		2.3	8.5	9.7
1997	13		2.0	8.7	
1998	13		1.7	11	8.0
1999	12		2.5	9.0	

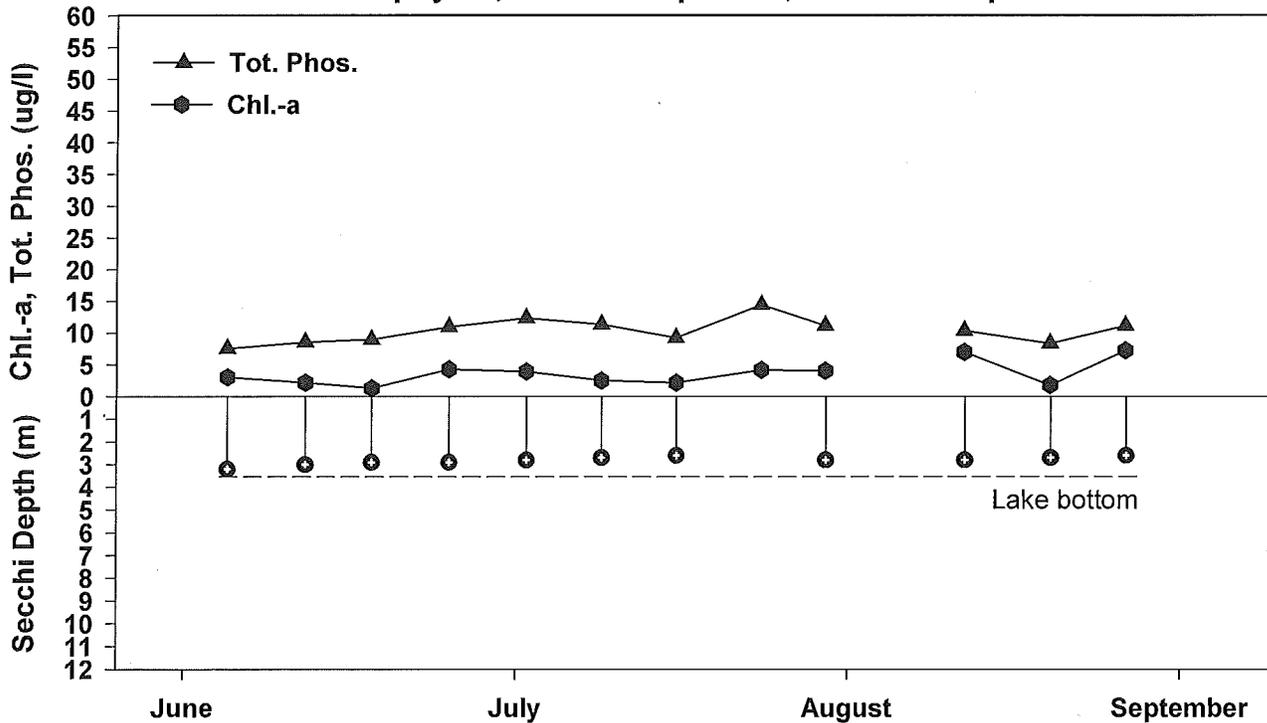
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	12		2.2	8.2	8.9
2001	13		1.8	11	
2002	13		1.7	7.8	
2003	12		1.8	9.5	
2004	12		1.9	8.2	
2005	11		2.8	11	
2006	11		1.6	11	13
2007	11		2.7	9.2	
2008	11		3.4	9.6	
2009	12		2.4	8.9	
2010	12		2.9	9.7	
2011	11		2.7	12	8.8
2012	12		3.4	10	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	12	0.0	2.6	3.2
Chl-a (ug/l)	12	1.1	3.4	7.0
Summer TP (ug/l)	12	7.6	10	15

**2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time**



# COLES POND

Stannard, Walden, VT

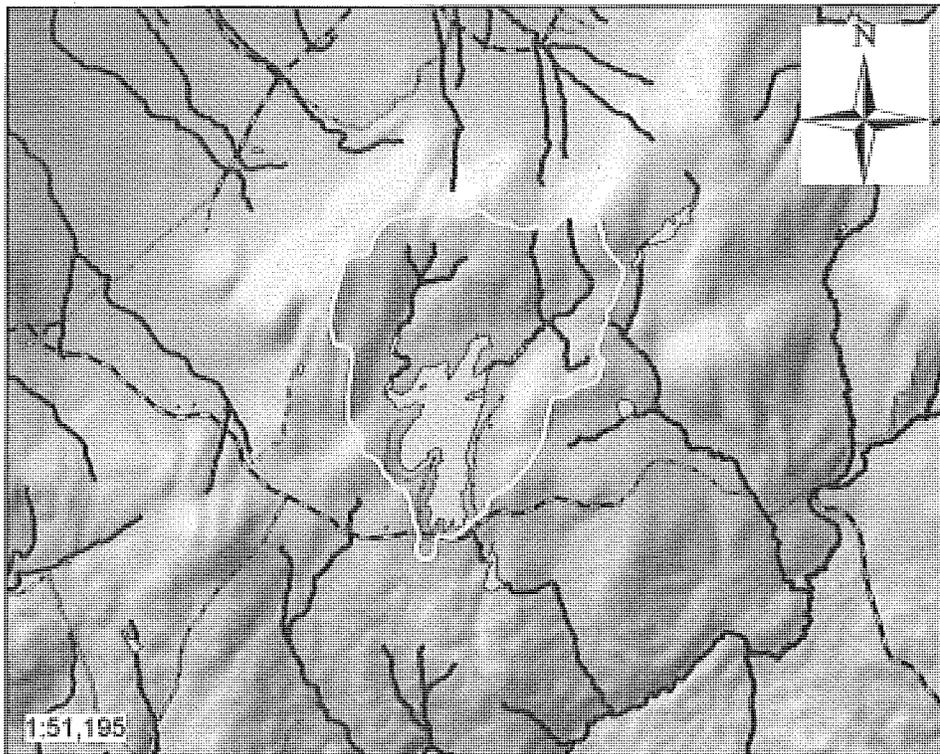
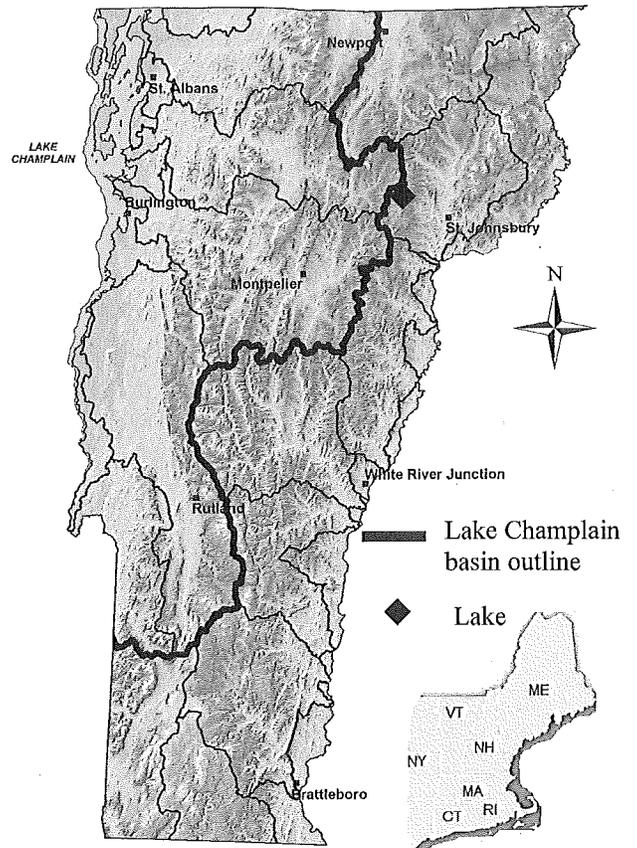
Lay Monitors: Joseph Engel  
Samantha M. Lavertue

Coles Pond is a moderately sized, shallow, natural lake with artificial controls.

Lake Surface Area: 125 acres  
 Drainage Basin Area: 744 acres  
 Maximum depth: 21 ft. (6.4 m)  
 Average depth: 8 ft. (2.4 m)

Compared to other lakes, the trophic state is Mesotrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Coles Pond

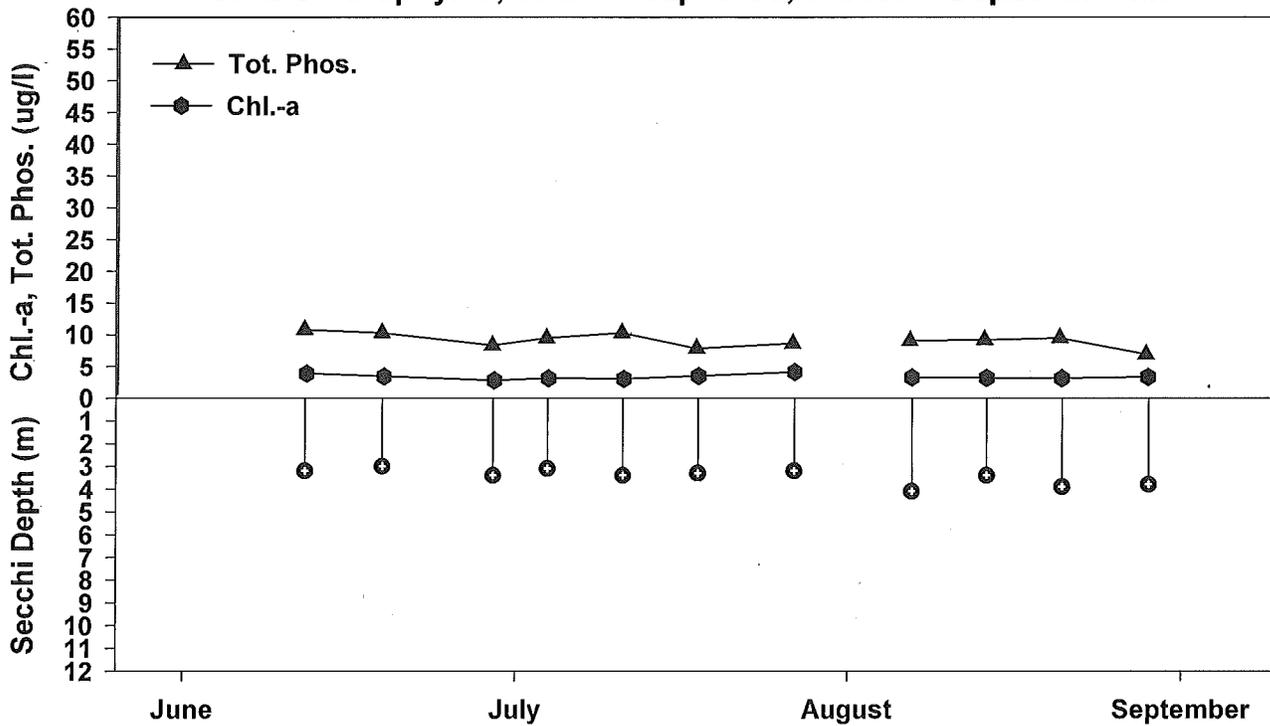
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2006	12	2.9	2.8	9.2	
2007	12	3.7	3.0	8.5	
2008	12	3.1	3.9	12	
2009	13	4.0	2.7	9.4	
2010	13	3.6	2.6	11	8.8
2011	12	3.1	3.1	11	
2012	11	3.4	2.7	9.1	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	11	3.0	3.4	4.1
Chl-a (ug/l)	11	2.1	2.7	3.5
Summer TP (ug/l)	11	6.9	9.1	11

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# CURTIS POND

Calais, VT

**Lay Monitors:** Andrea Triguba and Doug Braasch

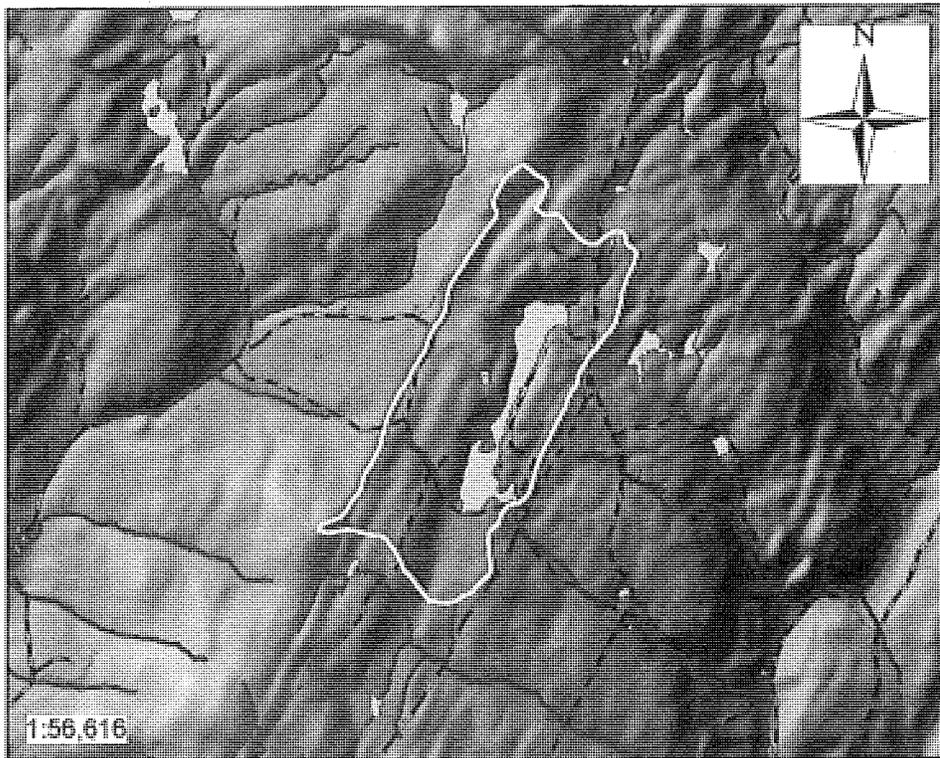
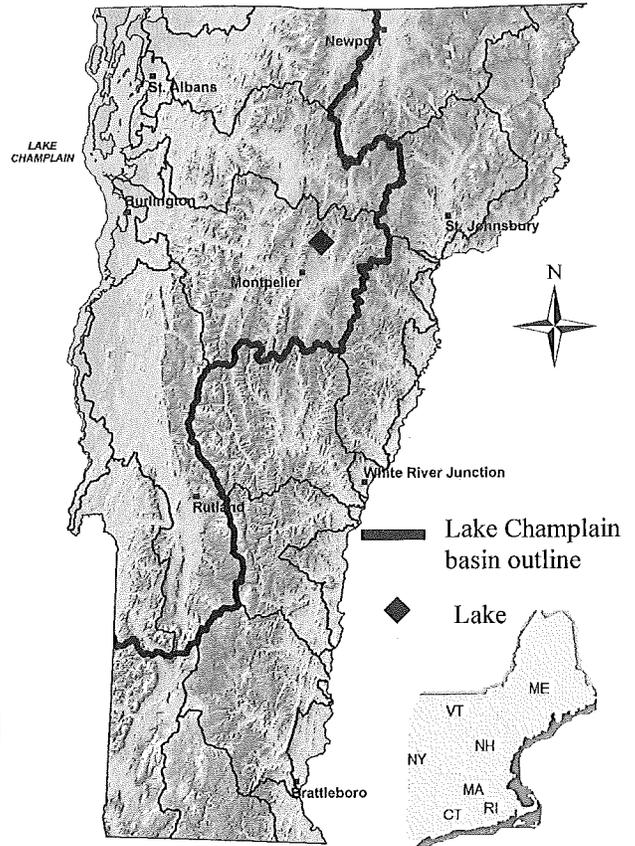
**Former Lay Monitors:** Lucille and Alexander MacLellan

Curtis Pond is a small, warmwater lake.

Lake Surface Area: 72 acres  
 Drainage Basin Area: 917 acres  
 Maximum depth: 31 ft. (9.4 m)  
 Average depth: 11 ft. (3.4 m)

**Compared to other lakes, the trophic state is Eutrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Curtis Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1994	12	3.9	5.1	12	
1995	10	4.7	4.5	11	18
1996	12	4.6	6.9	12	
1997	12	4.4			
1998	12	3.6	10	19	
1999	10	4.7	11	15	

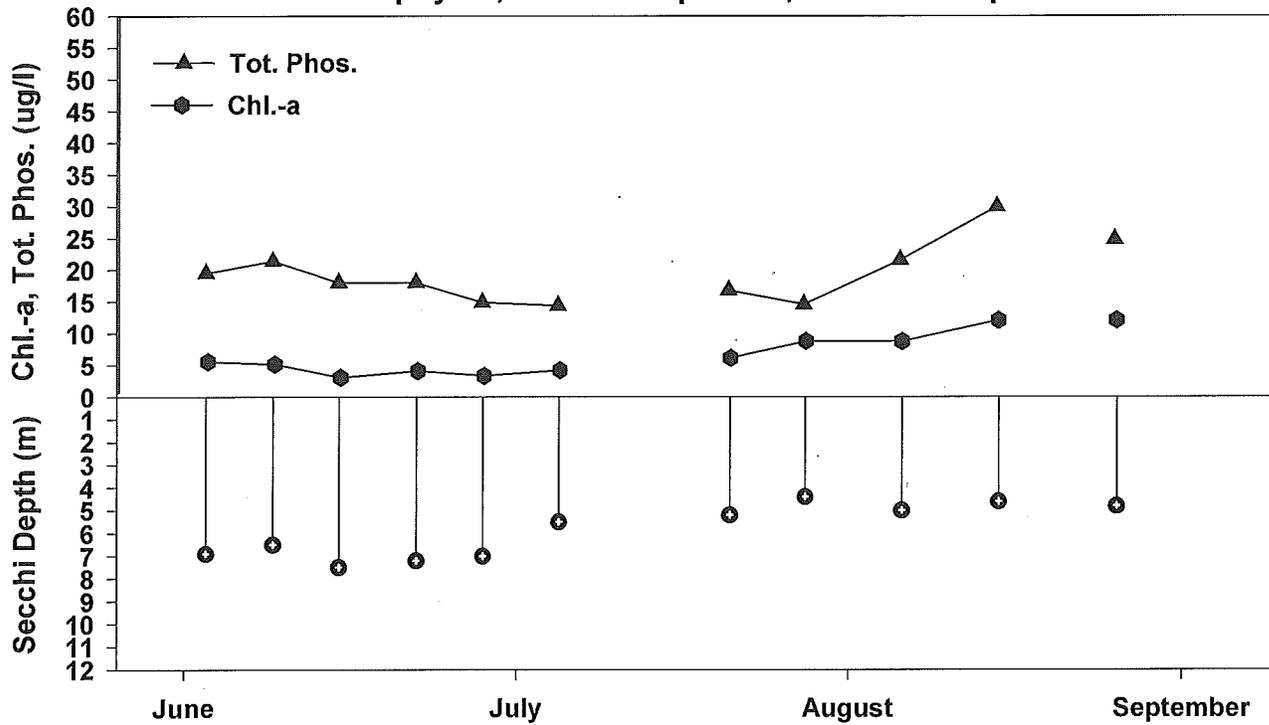
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	11	4.3	9.0	18	
2001	15	3.9	9.5	22	22
2002	13	4.1	6.7	18	
2003	11	5.4	5.8	17	
2004	14	4.6	10	20	22
2005	15	5.3	6.6	22	24
2006	14	5.0	8.5	19	21
2007	12	5.0	8.1	19	
2008	14	4.7	11	24	20
2009	13	6.1	4.7	19	
2010	14	5.4	7.7	19	18
2011	12	5.4	7.7	22	
2012	11	5.9	6.1	19	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	11	4.4	5.9	7.5
Chl-a (ug/l)	11	2.4	6.1	12
Summer TP (ug/l)	11	14	19	30

### 2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# DANBY POND

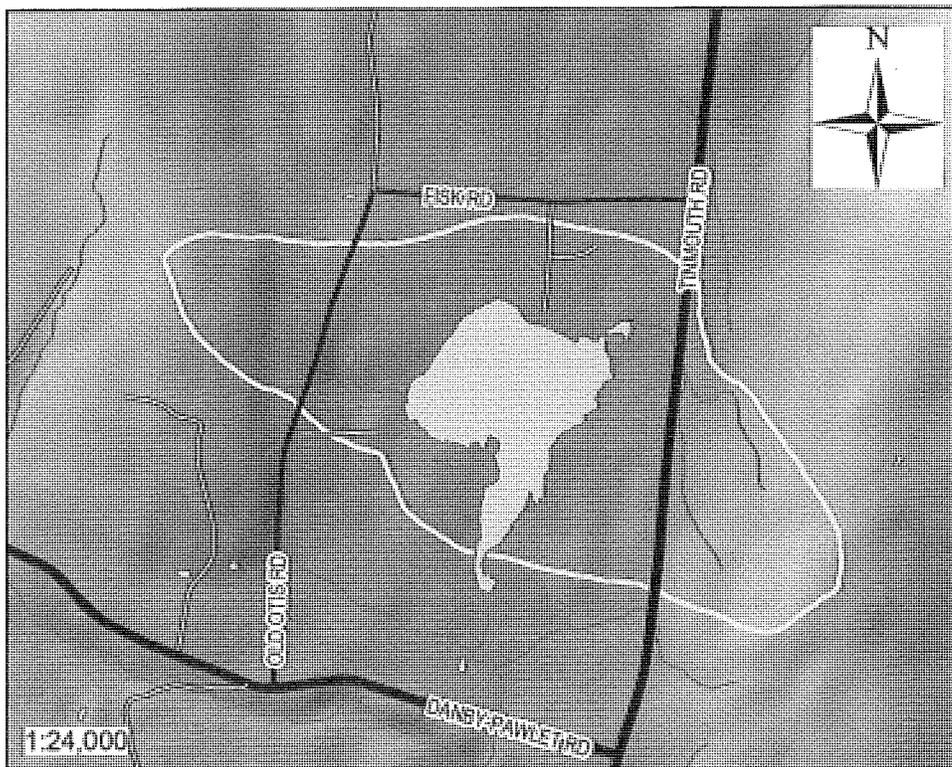
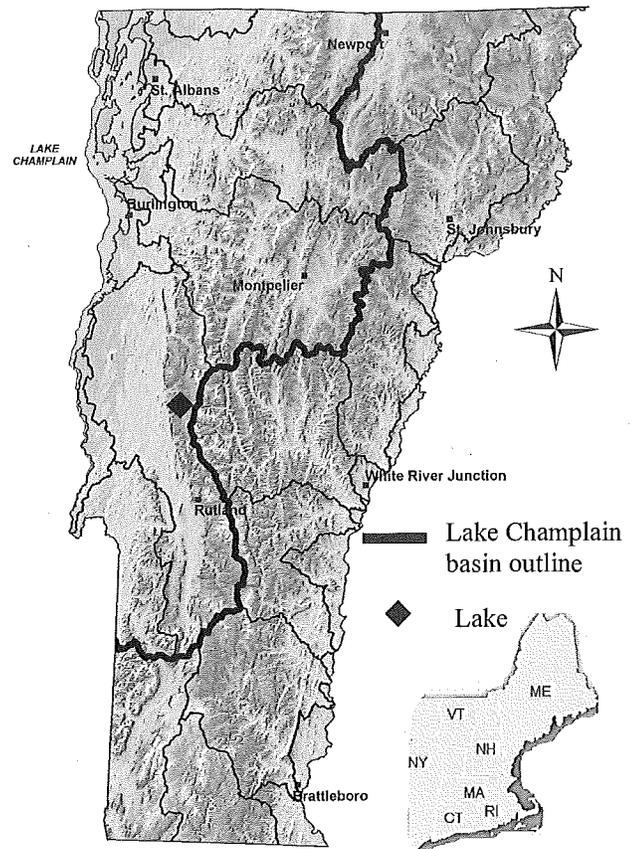
Danby, VT

**Lay Monitor:** Glenn Williams and Mic Kingsley  
**Former Lay Monitors:** Bob and Ruth Easton

Danby Pond is a small, warm water, natural pond.  
 Lake Surface Area: 56 acres  
 Drainage Basin Area 388 acres  
 Maximum depth: 6 ft. (1.8m)

Compared to other lakes, the trophic state is Eutrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Danby Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1993	14		3.7	14	
1994	13		4.1	14	6.7
1995	14		4.5	15	5.2
1996	13		3.8	13	
1997	14		3.5	14	9.4
1998	14		3.1	15	
1999	14		5.9	17	

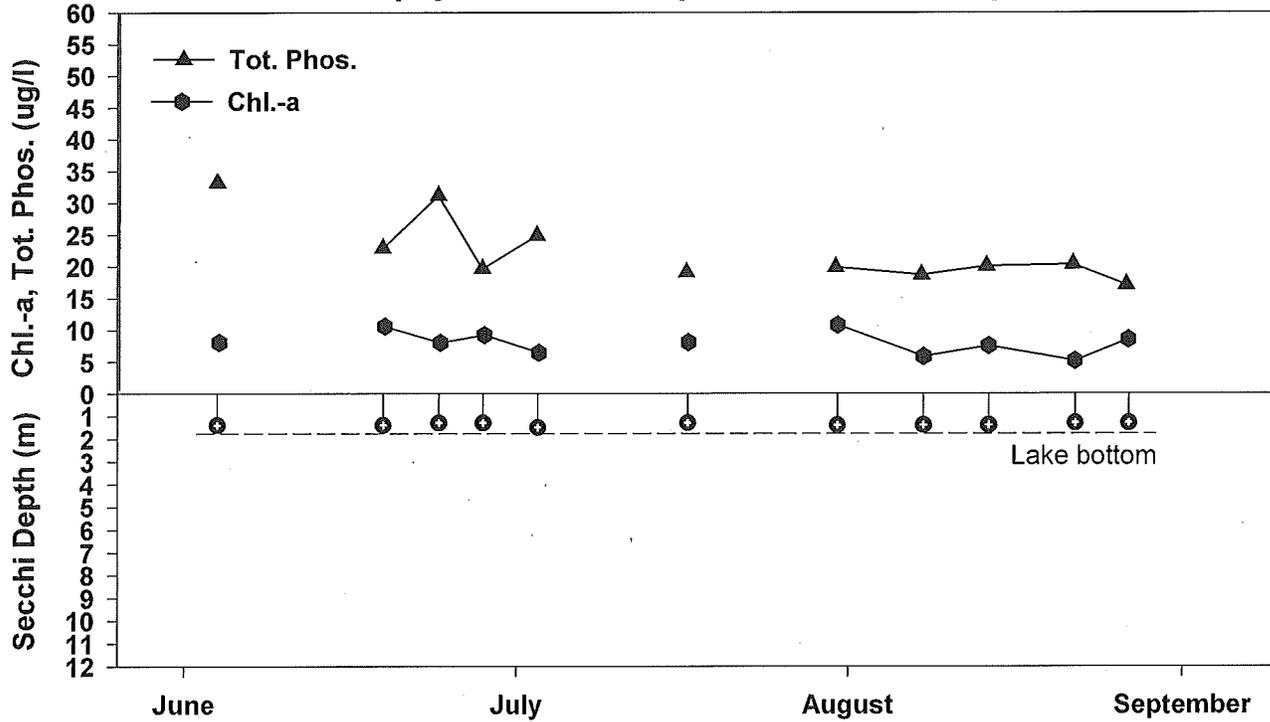
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	12		3.2	17	10
2001	13		2.8	18	12
2002	13		6.4	23	
2003	12		3.8	17	
2004	13		4.5	18	13
2005	12		5.0	20	12
2006	11		9.0	34	
2007	11		8.2	26	
2010	10		6.1	21	12
2011	11		5.7	21	16
2012	11		7.4	22	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	11	1.3	1.4	1.5
Chl-a (ug/l)	11	4.6	7.4	10
Summer TP (ug/l)	11	17	22	33

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LAKE DUNMORE

Salisbury, Leicester, VT

**Lay Monitor:** Troy Carr, LDFLA Milfoil Project Crew

**Former Lay Monitors:** Joe Carr, Rob Nicol, Will Pitkin, &  
David Volz  
Andrew Menkart and milfoil crew  
Liam Powers  
Matt Hayden  
Nick Staats

Lake Dunmore is a long lake divided into two sections, a deep northern section in the town of Salisbury and a shallow southern section in the town of Leicester.

Lake Surface Area: 985 acres

Drainage Basin Area 13,068 acres

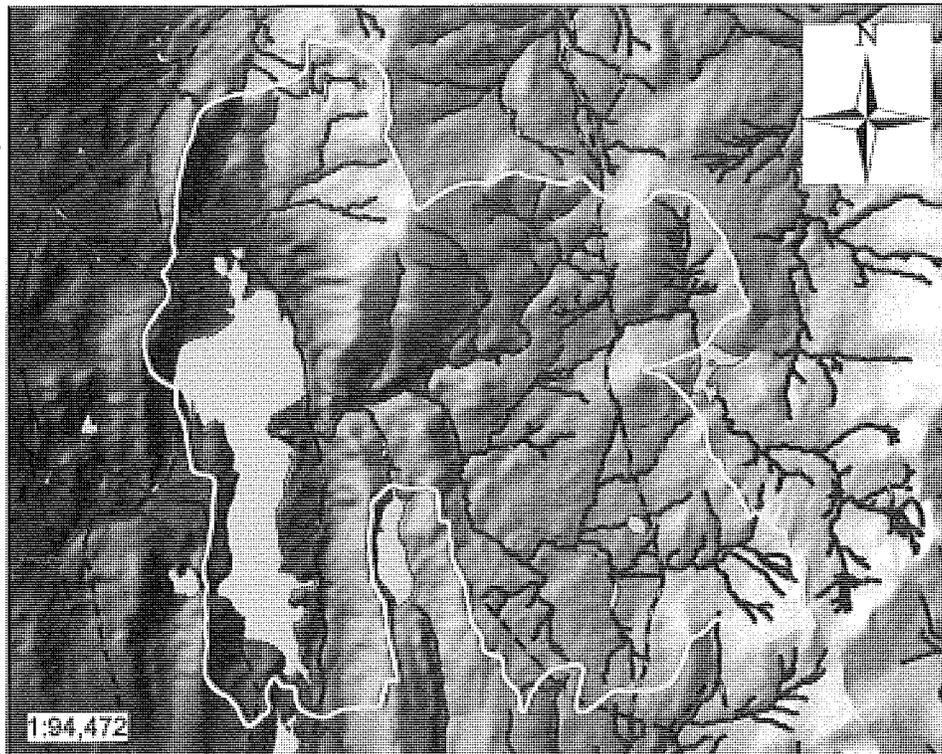
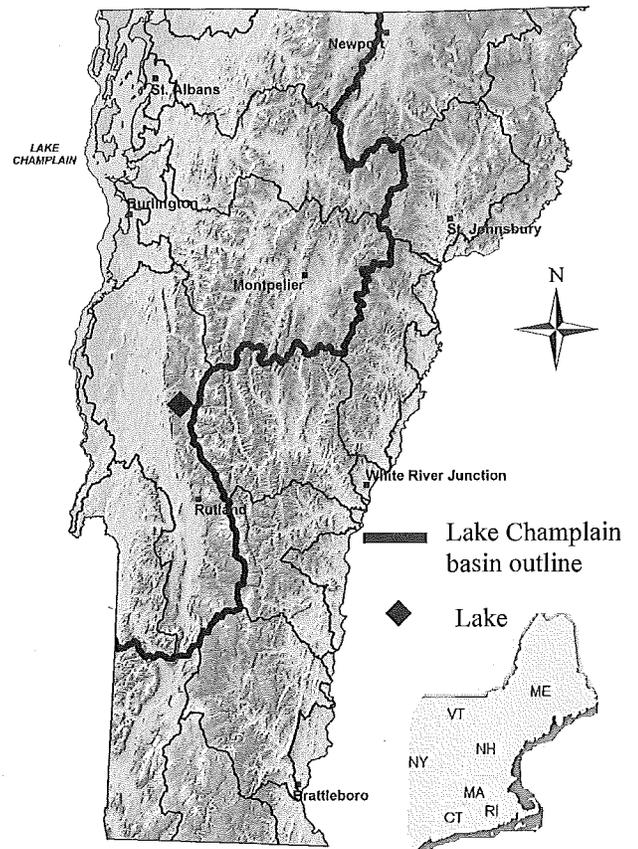
Maximum depth: 105 ft. (32 m)

Average depth: 28 ft. (8.5 m)

**Compared to other lakes, the trophic state is**

Transitional between Oligotrophic and Mesotrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g}/\text{l}$	< 7.0 $\mu\text{g}/\text{l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Lake Dunmore

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	15	5.8			8.5
1980	13	7.2			3.7
1982	11	5.8	4.5		10
1984	13	5.7	3.1		8.3
1985	9	6.4	4.2		7.7
1986	12	5.4	3.5		7.7
1987	10	5.4	2.9		8.0
1993	10	7.7			
1994	11	6.8			
1995	8	7.8			6.7
1996	9	5.7			7.3
1997	9	7.8	1.7	9.9	
1998	10	4.2	3.2	11	6.7
1999	10	7.1	3.4	10	6.2

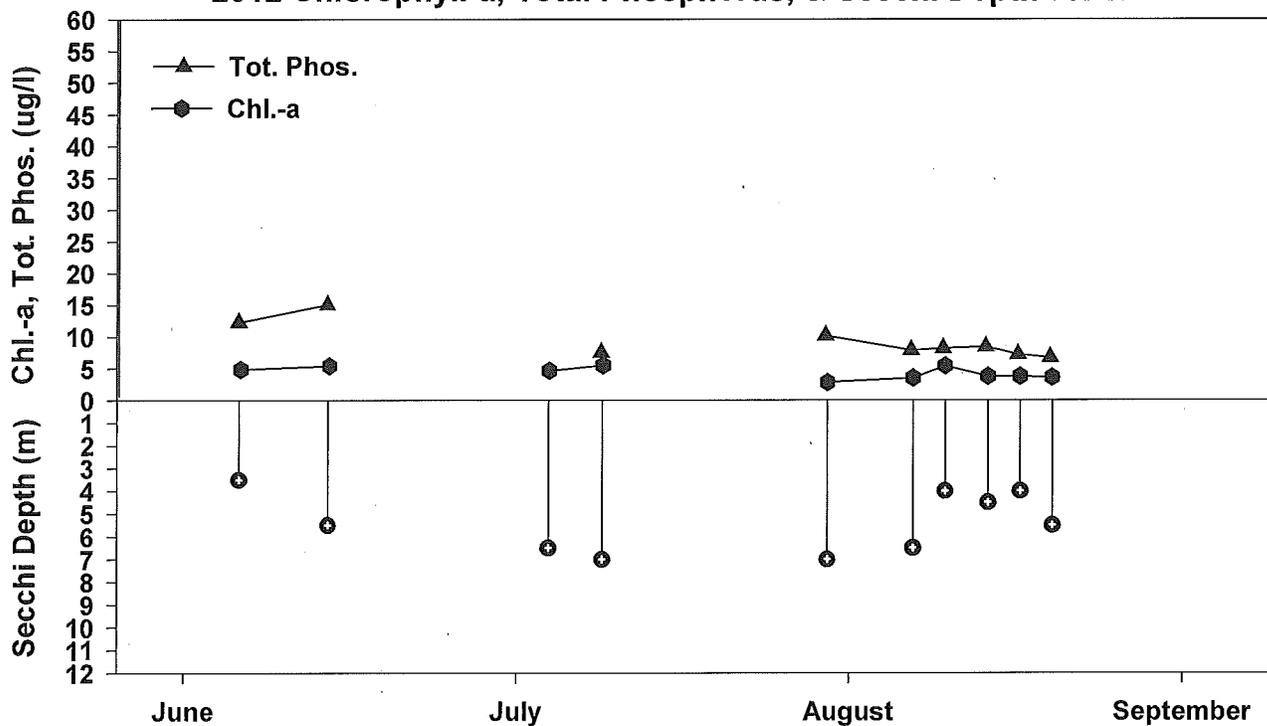
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	10	7.4	2.3	7.7	8.5
2001	8	6.0		9.3	
2002	14	8.4	1.8	11	
2003	12	6.7	3.7	11	
2004	12	6.6	3.3	14	9.8
2005	9	5.6	4.5	13	7.3
2006	10	5.9	3.9	12	
2007	11	5.9	3.6	11	
2008	10	4.6	4.1	17	7.1
2009	11	5.6	2.5	15	8.2
2010	7				
2011	9	5.2			7.9
2012	10	5.4	3.7	9.3	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	10	3.5	5.4	7.0
Chl-a (ug/l)	10	2.2	3.7	4.9
Summer TP (ug/l)	9	6.7	9.3	15

### 2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# ECHO LAKE

**Charleston, VT**

**Lay Monitors:** Peter Engels  
Mike Vinton

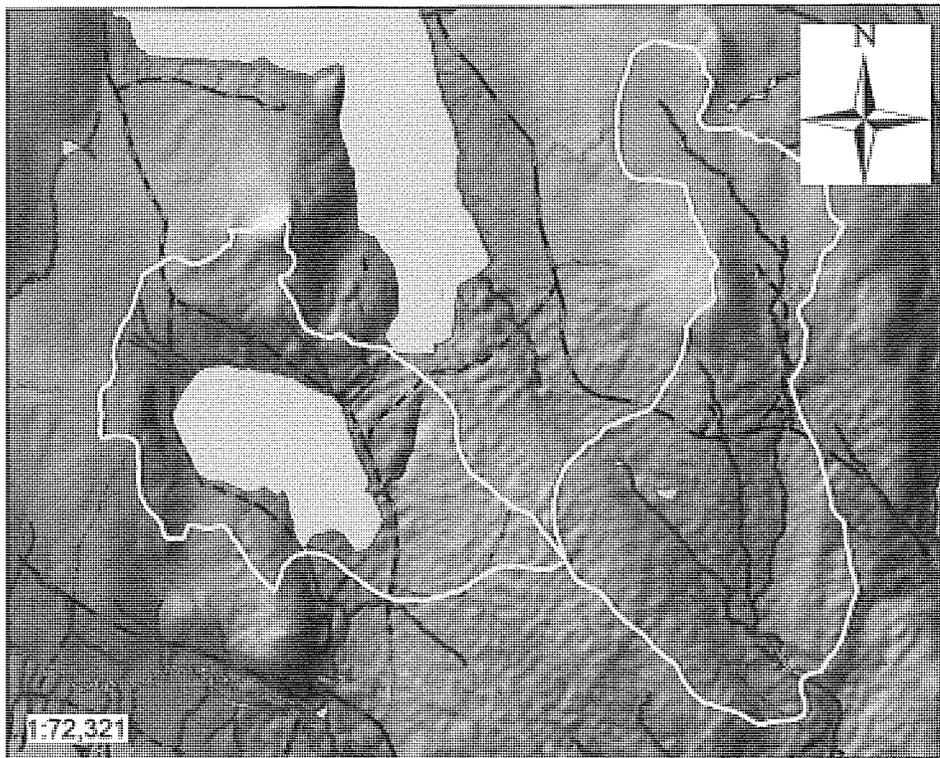
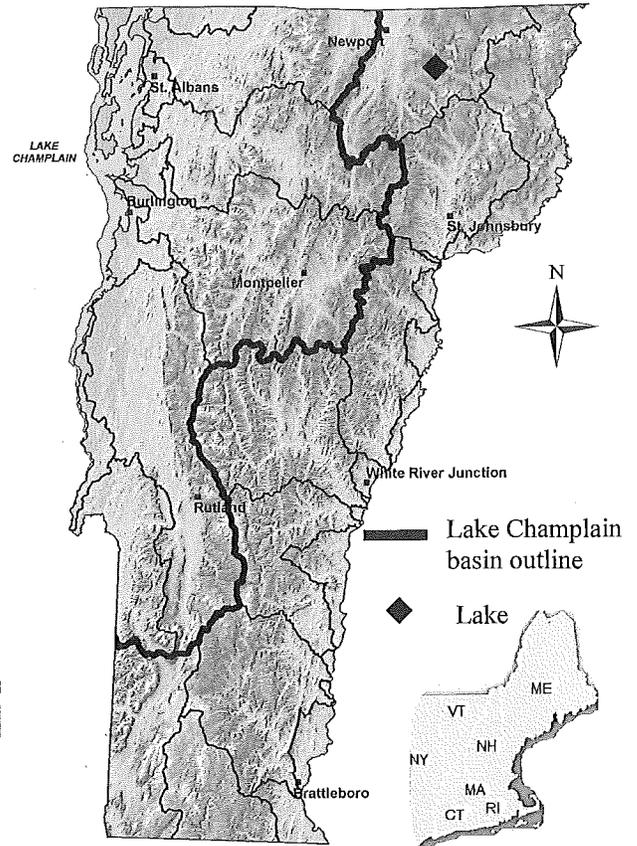
**Former Lay Monitors:** Eric Stevens

Echo Lake is a large lake that supports both warm- and coldwater fish.

Lake Surface Area: 550 acres  
 Drainage Basin Area: 15,186 acres  
 Maximum depth: 129 ft. (39 m)  
 Average depth: 58 ft. (17 m)

**Compared to other lakes, the trophic state is Oligotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Echo Lake

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	16	7.3			3.0
1980	13	7.8	1.9		7.0
1981	14	8.0	1.6		7.5
1982	10	7.5			9.0
1983	8		2.4		6.5
1984	9	7.9	1.9		8.0
1985	15	8.0	2.3		9.0
1986	14	7.8	2.0		8.0

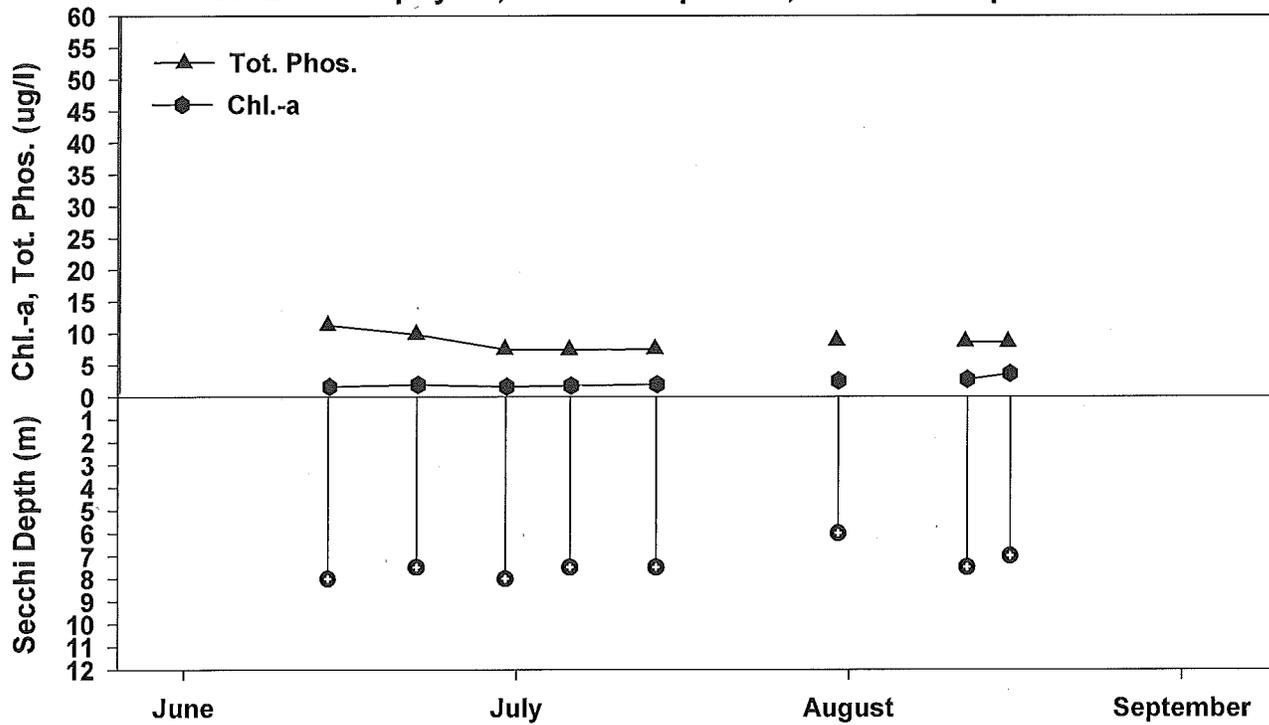
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2004	12	8.1			7.2
2005	11	8.4	1.7	8.3	
2006	13	8.6	1.4	7.9	10
2007	11	9.1	1.3	7.9	8.5
2008	10	8.8	1.7	9.7	
2009	10	8.4	1.9	8.7	
2010	10	8.7	1.6	9.5	
2011	8	8.2		10	
2012	8	7.4	1.5	8.7	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	8	6.0	7.4	8.0
Chl-a (ug/l)	8	0.9	1.5	3.0
Summer TP (ug/l)	8	7.4	8.7	11

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LAKE EDEN

Eden, VT

Lay Monitors: Sue and Ed Gilbert

**Former Lay Monitors:**

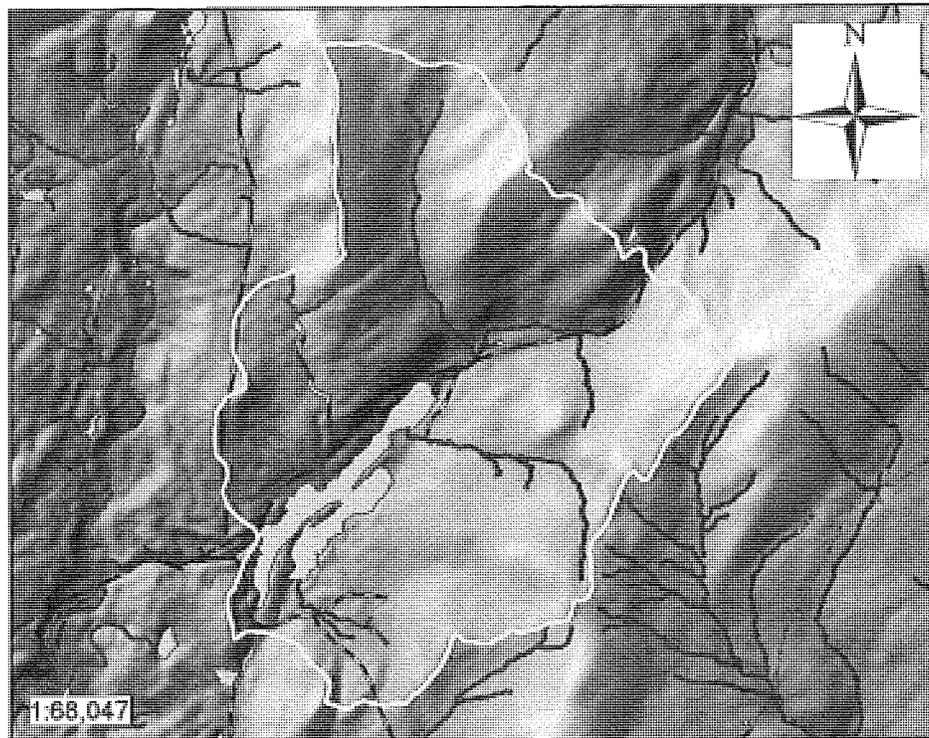
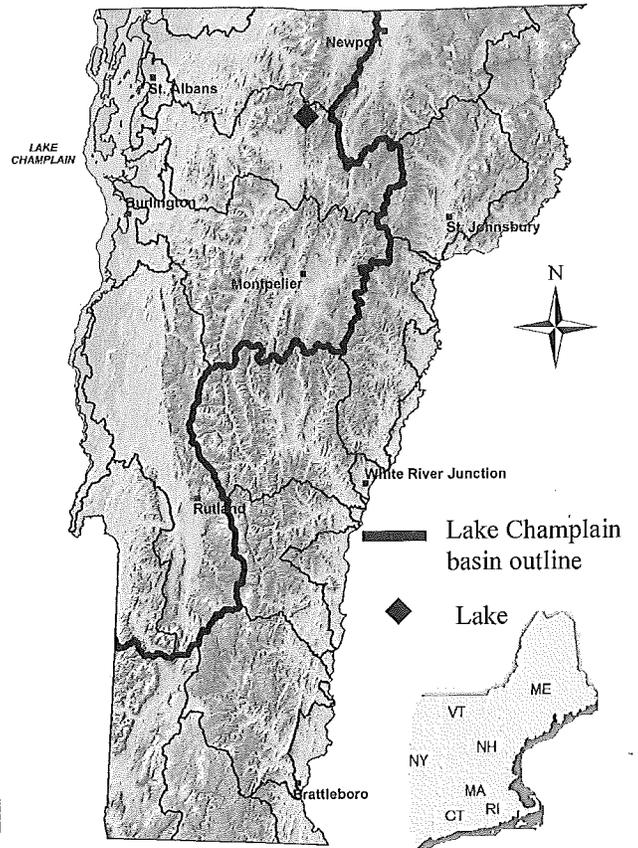
Terry and Bonnie Francis  
 Steve and Teela Leach  
 Bruce Lyon  
 Gary Duret  
 Conrad Klefos

Lake Eden is a moderately sized, warmwater lake which is nearly bisected by narrow peninsulas of the northeastern and southwestern lake shores.

Lake Surface Area: 194 acres  
 Drainage Basin Area 2,347 acres  
 Maximum depth: 40 ft. (12.2 m)  
 Average depth: 15 ft. (4.5 m)

Compared to other lakes, the trophic state is Mesotrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Lake Eden

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1989	9	4.4	6.8		9.7
1990	3				
1991	9	3.9	3.3		
1992	13	4.4	3.9		
1993	12	4.6	3.4	7.6	
1994	12	4.5	3.4	9.4	6.3
1995	13	5.0	3.7	7.8	
1996	11	3.9	4.1	11	
1997	9	4.4	3.3	13	
1998	6				5.7
1999	7				

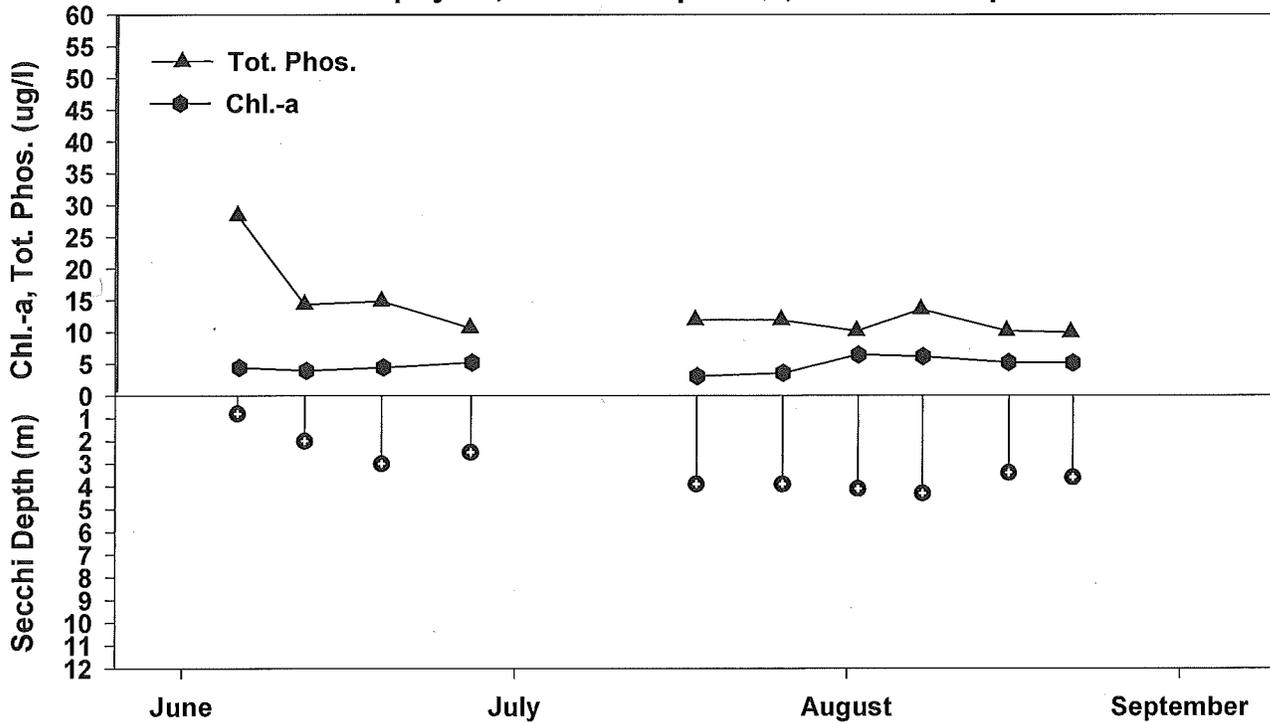
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	9	4.0			
2001	9	4.6			8.6
2002	9	3.4			
2004	8	4.5			
2005	13	4.8			
2006	11	4.4	2.9	11	
2007	12	4.4	2.9	9.1	14
2008	13	3.5	2.4	16	
2009	9	4.0	2.4	11	11
2010	12	3.8	3.1	12	
2011	13	3.3	4.2	13	
2012	10	3.2	4.1	14	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	10	0.8	3.2	4.3
Chl-a (ug/l)	10	2.4	4.1	5.8
Summer TP (ug/l)	10	10.0	14	28

### 2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# ELFIN LAKE

Wallingford, VT

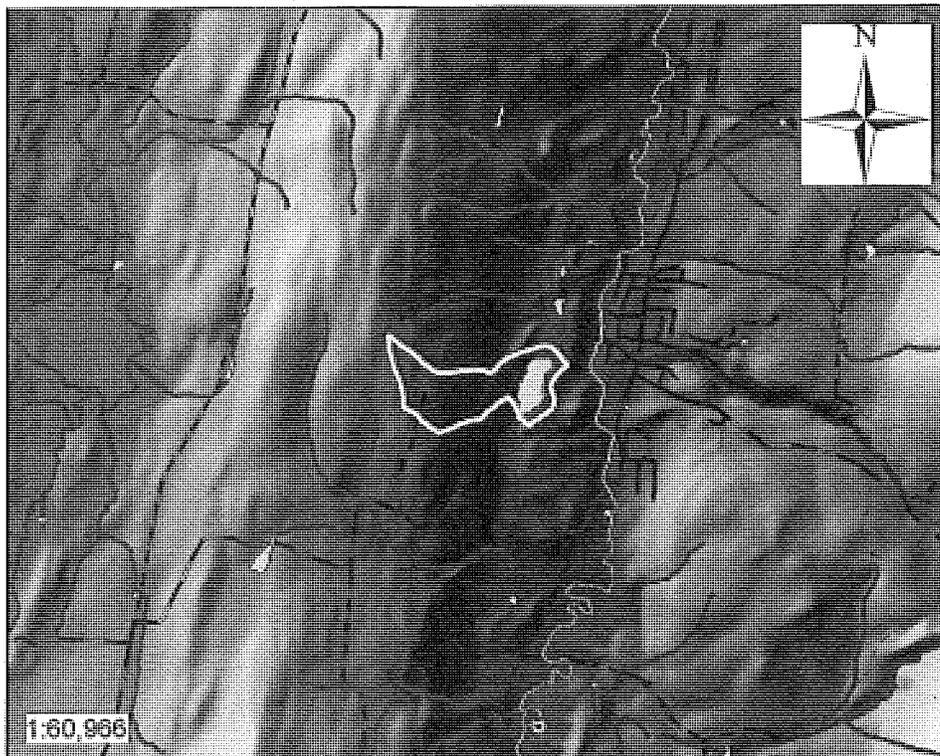
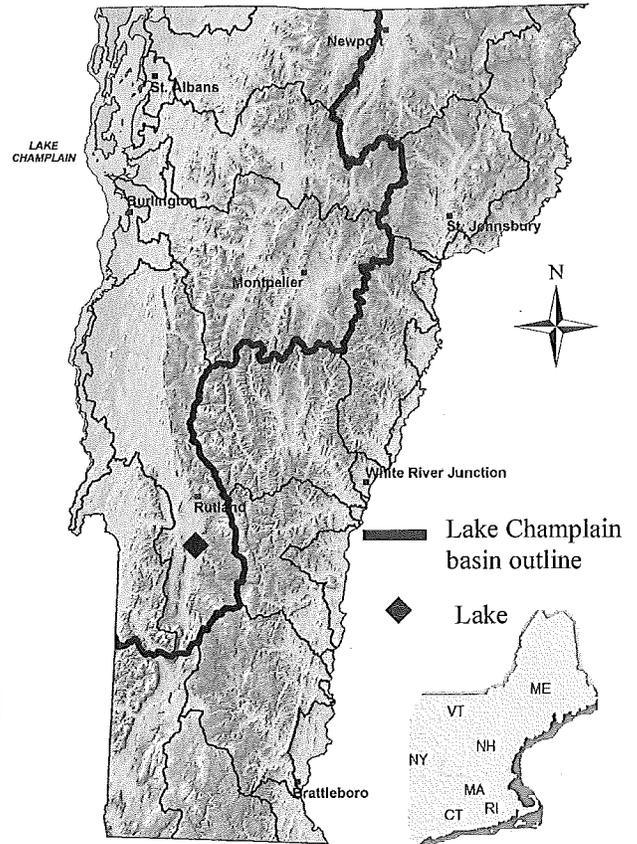
**Lay Monitor:** Michael Bird  
**Former Lay Monitors:** Anne Miller

Elfin Lake is a small, undeveloped lake.

Lake Surface Area: 16 acres  
 Drainage Basin Area: 228 acres  
 Maximum depth: 37 ft. (11.2 m)  
 Average depth: 12 ft. (3.7 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g}/\text{l}$	< 7.0 $\mu\text{g}/\text{l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Elfin Lake

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1983	12	3.9			11
1984	13	3.6	7.0		17
1985	13	5.0	5.6		17
1986	13	5.5	2.0		
1987	13	5.2	4.6		
1988	14	4.6	7.8		
1989	8	4.7			19
1990	6				
1991	14	5.0			
1992	10	4.6			
1993	11	4.9			
1994	11	4.4			
1995	11	4.4	4.3	14	
1996	12	2.7	6.4	15	12
1997	10	4.4	5.4	15	
1998	11	4.1	3.4	13	
1999	11	4.7	8.7	18	

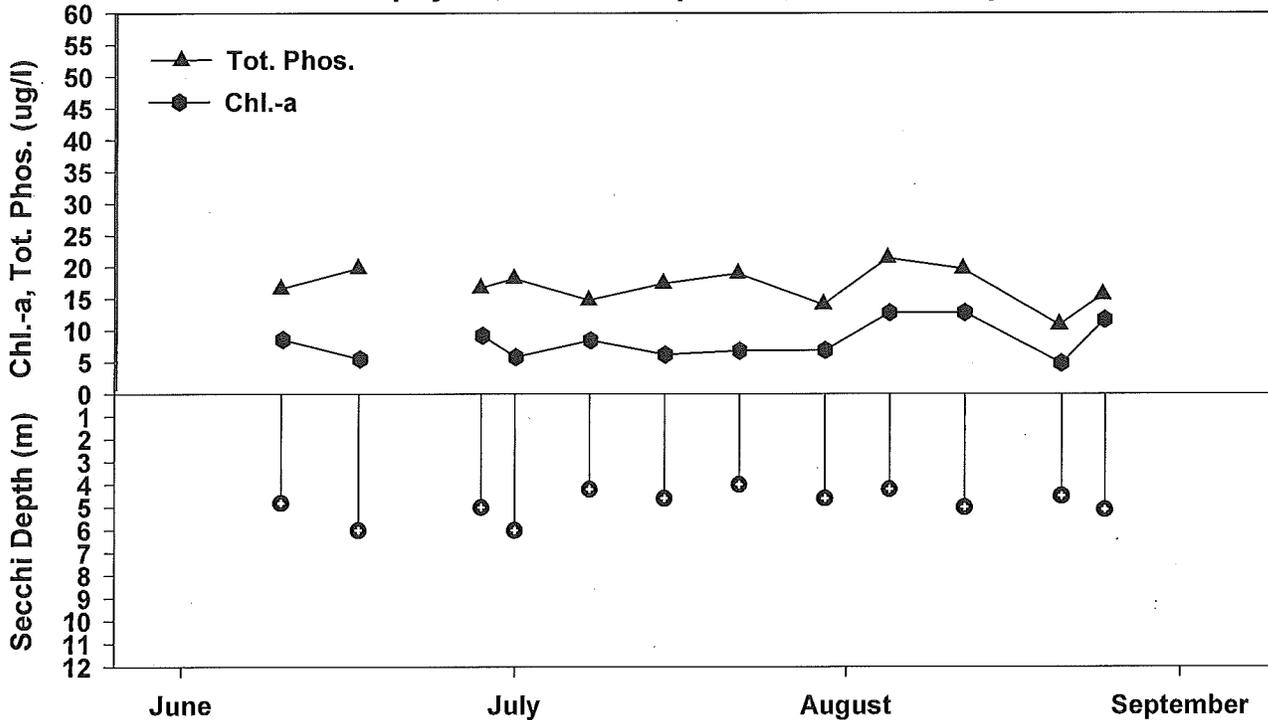
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	11	2.7	17	22	
2001	12	3.4	12	22	
2002	12	4.3	11	18	
2003	10	4.5	5.9	15	
2004	10	3.7	7.5	16	17
2005	12	3.8	8.0	16	
2006	11	3.9	4.5	18	
2007	11	3.7	7.4	19	20
2008	11	4.0	7.7	21	
2009	11	4.4	9.7	21	
2010	12	4.7	4.8	17	
2011	12	4.1	6.1	18	
2012	12	4.8	7.7	17	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	12	4.0	4.8	6.0
Chl-a (ug/l)	12	4.2	7.7	12
Summer TP (ug/l)	12	11	17	21

**2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time**



# LAKE ELMORE

## Elmore, VT

**Lay Monitor:** Dave Anderson

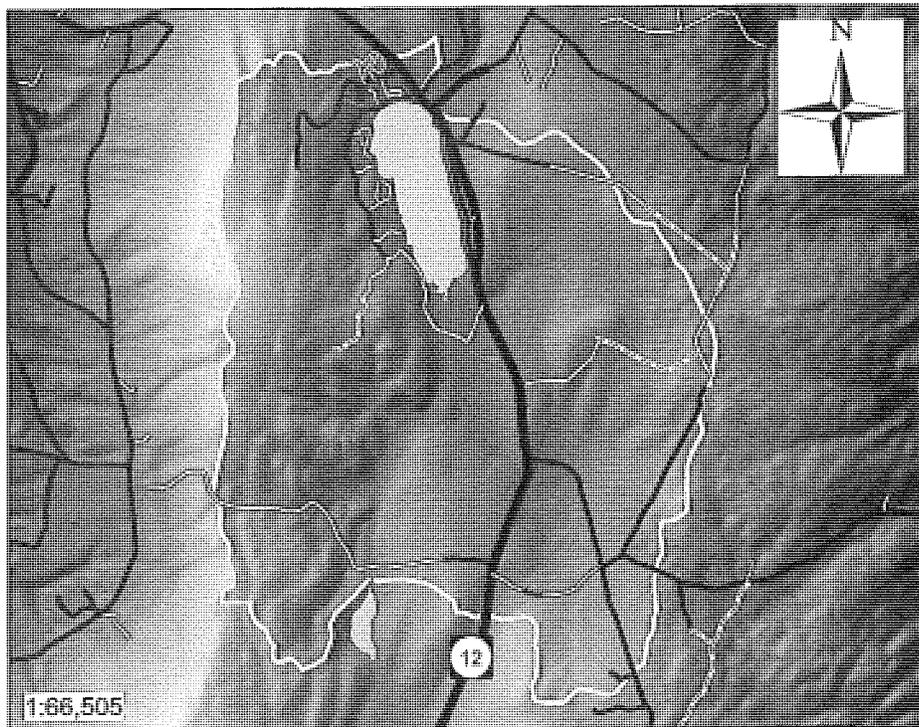
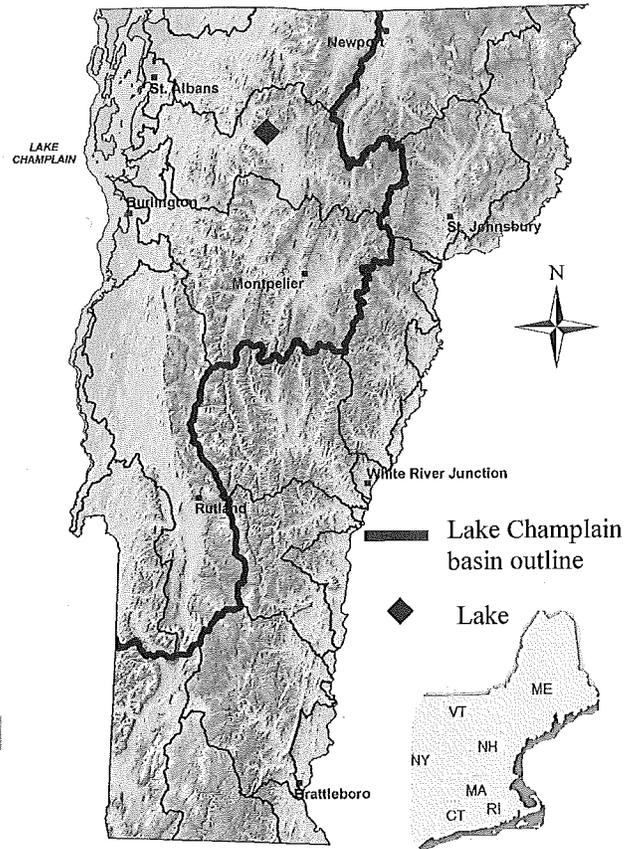
**Former Lay Monitors:** Cindy Blackburn, Joe Ciccolo,  
Lisa Kelly & Dave Peters  
June Mendell

Lake Elmore is a large, fairly shallow, natural lake.

Lake Surface Area: 219 acres  
 Drainage Basin Area: 5,574 acres  
 Maximum depth: 17 ft. (5.1 m)  
 Average depth: 11 ft. (3.3 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
<b>Mesotrophic</b>	<b>3.0 - 5.5</b>	<b>3.5 - 7.0</b>	<b>7.0 - 14</b>
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Lake Elmore

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	15	2.5	3.5		10
1980	9	2.9	5.4		10
1981	7				15
1982	13	2.9	5.2		13
1983	12	3.0	5.1		14
1984	13	2.7	8.5		11
1985	13	3.2	6.4		12
1986	11	3.1			9.7
1987	13	3.8			13
1995	11	2.9	2.8	19	14
1996	12	3.6	4.1	17	10
1997	9	3.3	2.8	20	

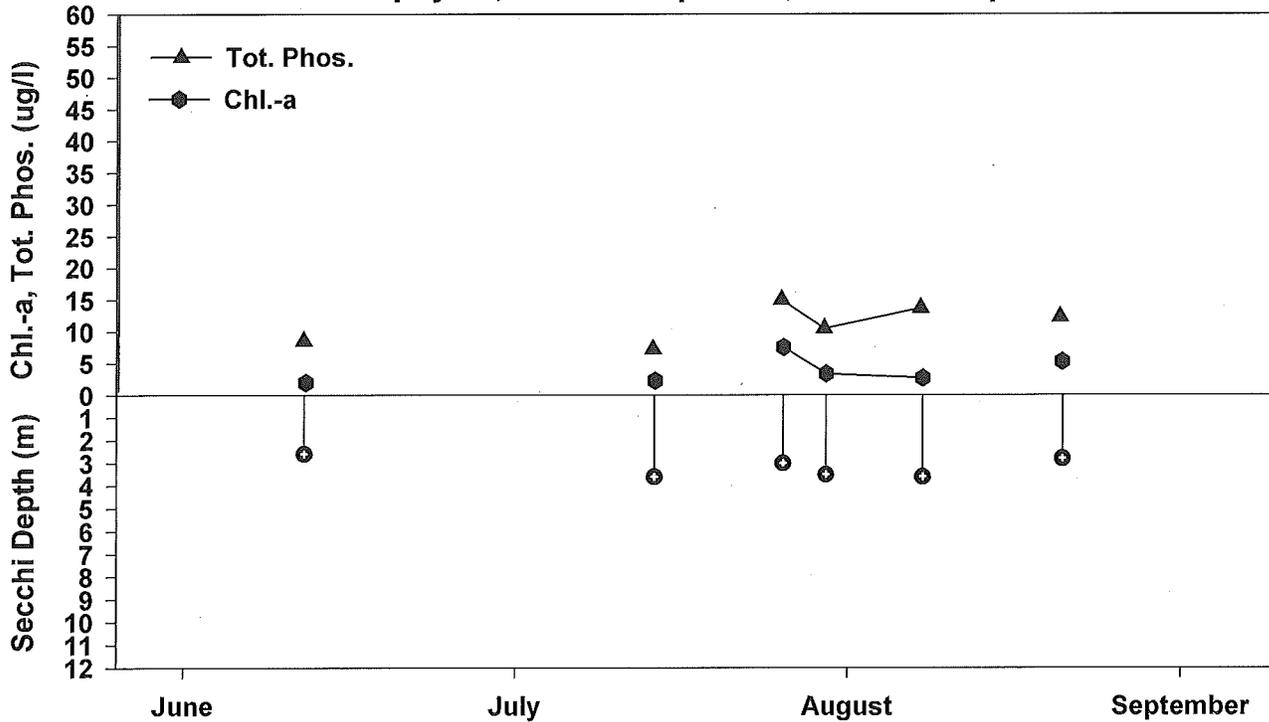
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2011	9	2.5	2.8	16	
2012	6				

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	6	2.6	3.2	3.6
Chl-a (ug/l)	6	1.3	3.2	6.9
Summer TP (ug/l)	6	7.3	11	15

**2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time**



# FAIRFIELD POND

## Fairfield, VT

**Lay Monitors:** Donald and Harriet Gray

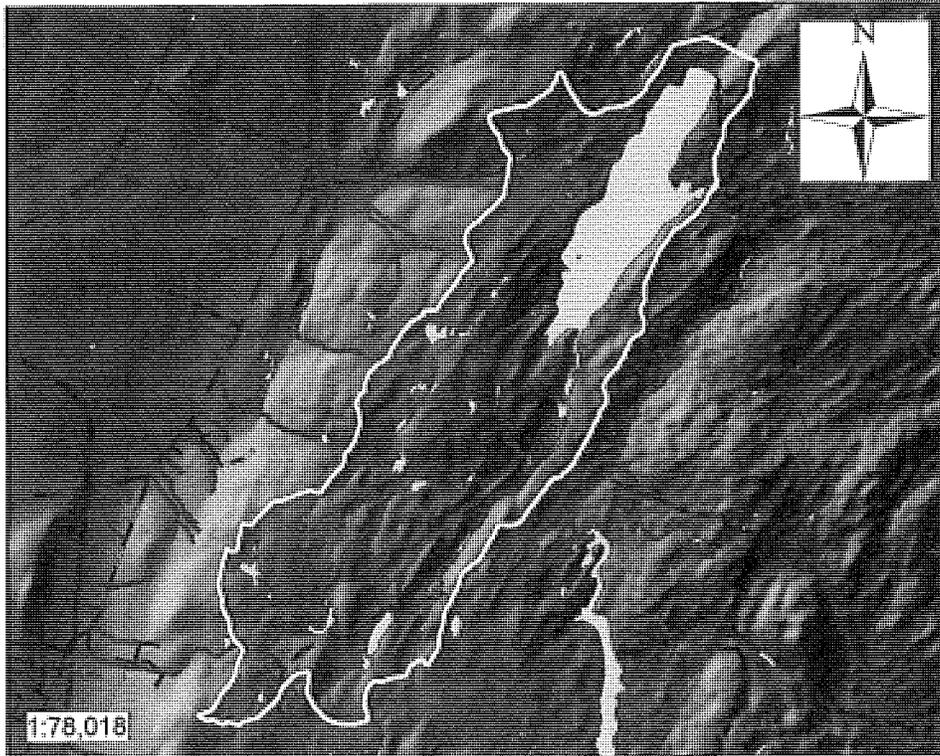
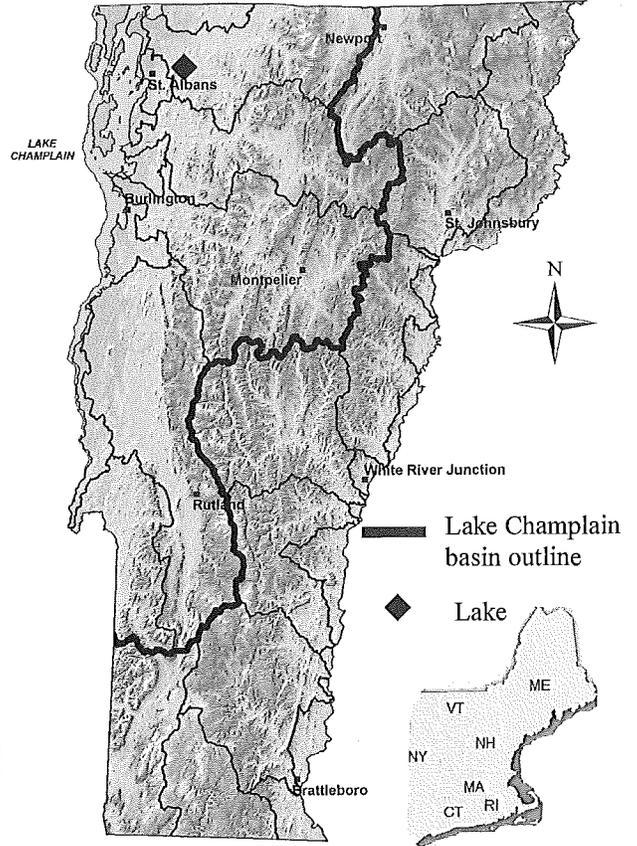
**Former Lay Monitors:** Thomas Benoure  
Kimberly Benoure  
Ron Bocash

Fairfield Pond is a large, fairly shallow, natural lake.

Lake Surface Area: 446 acres  
Drainage Basin Area: 3,758 acres  
Maximum depth: 42 ft. (12.8 m)  
Average depth: 23 ft. (7.0 m)

**Compared to other lakes, the trophic state is Eutrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Fairfield Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1980	13	2.9	14		25
1981	13	2.2	9.3		22
1982	12	4.9	11		30
1983	12	3.5	8.5		34
1984	9	2.7	13		44
1985	12	2.4	15		46
1986	12	1.7	24		52
1987	13	2.1	17	35	39
1988	14	1.3	23	46	41
1989	12	3.0	10	20	27
1990	13	3.5	18	21	40
1991	13	4.0	6.5	35	18
1992	9	2.9	11	20	15
1993	12	7.1	5.0	20	17
1994	10	4.5	7.3	14	17
1995	11	6.0			14
1996	14	6.2			18
1997	11	3.7			16
1998	13	5.0	6.7	16	16
1999	12	5.4	10	17	14

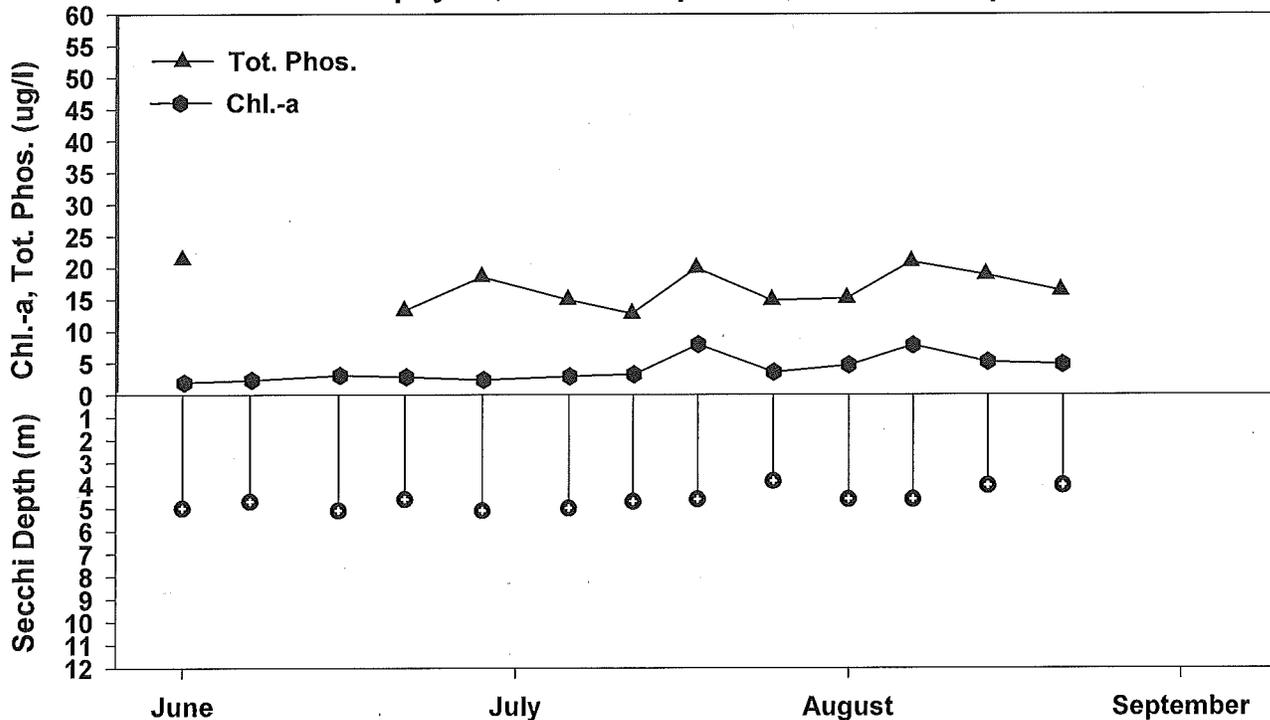
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	8	5.0	7.0	15	15
2001	5				16
2002	9	3.5	4.6	15	
2003	8	3.6	10	18	
2006	13	3.2	7.8	17	
2007	12	6.2	2.7	17	17
2008	13	5.1	4.0	17	
2009	14	5.2	4.1	18	
2010	14	3.8	5.6	17	
2011	3				
2012	13	4.6	3.4	17	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	13	3.8	4.6	5.1
Chl-a (ug/l)	13	1.3	3.4	7.3
Summer TP (ug/l)	11	13	17	21

**2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time**



# LAKE FAIRLEE

## Fairlee, West Fairlee and Thetford, VT

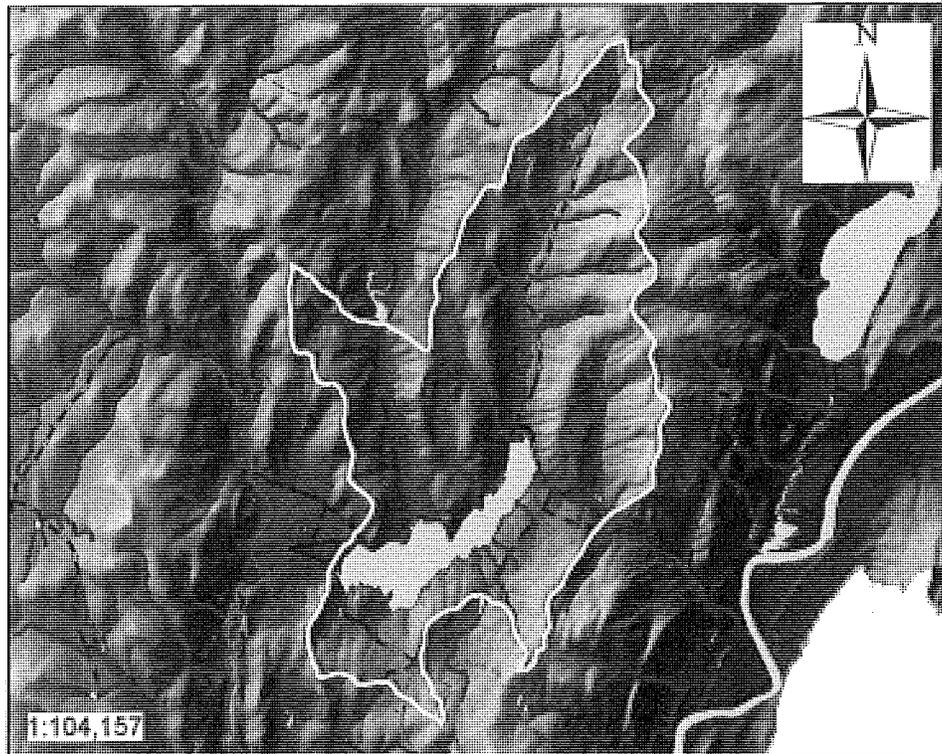
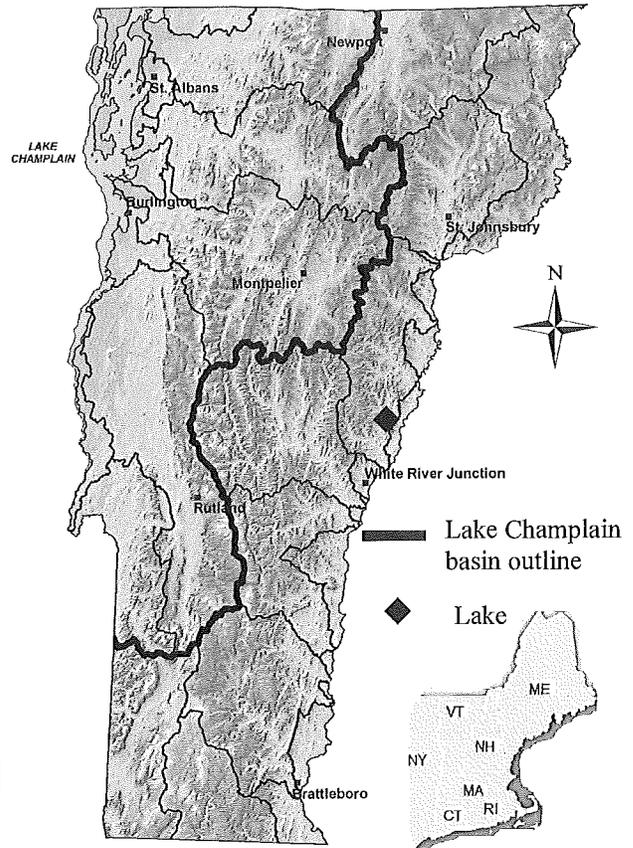
**Lay Monitors:** Gordon Kerr  
**Former Lay Monitors:** Chris Madden  
 Don Wilson

Lake Fairlee is a large, warmwater lake.

Lake Surface Area: 457 acres  
 Drainage Basin Area: 12,976 acres  
 Maximum depth: 50 ft. (15.0 m)  
 Average depth: 23 ft. (7.0 m)

**Compared to other lakes, the trophic status is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Lake Fairlee

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	13	6.3	3.3		6.0
1980	13	6.5	3.6		8.3
1981	13	5.4	4.3		12
1982	11	6.3	5.0		15
1983	13	6.5	4.1		10
1984	12	6.1	4.1		9.3
1985	11	6.4	3.1		10
1986	8	6.4			13
1987	12	6.4			15
1988	12	6.9			
1989	11	5.9			
1990	12	5.9			
1991	13	6.5			
1992	14	5.8			
1993	12	6.7			
1994	13	6.0			
1995	13	7.2			
1996	13	5.7			12
1997	13	5.9	5.7	12	
1998	13	5.5	3.8	11	9.0
1999	13	6.4	4.0	11	

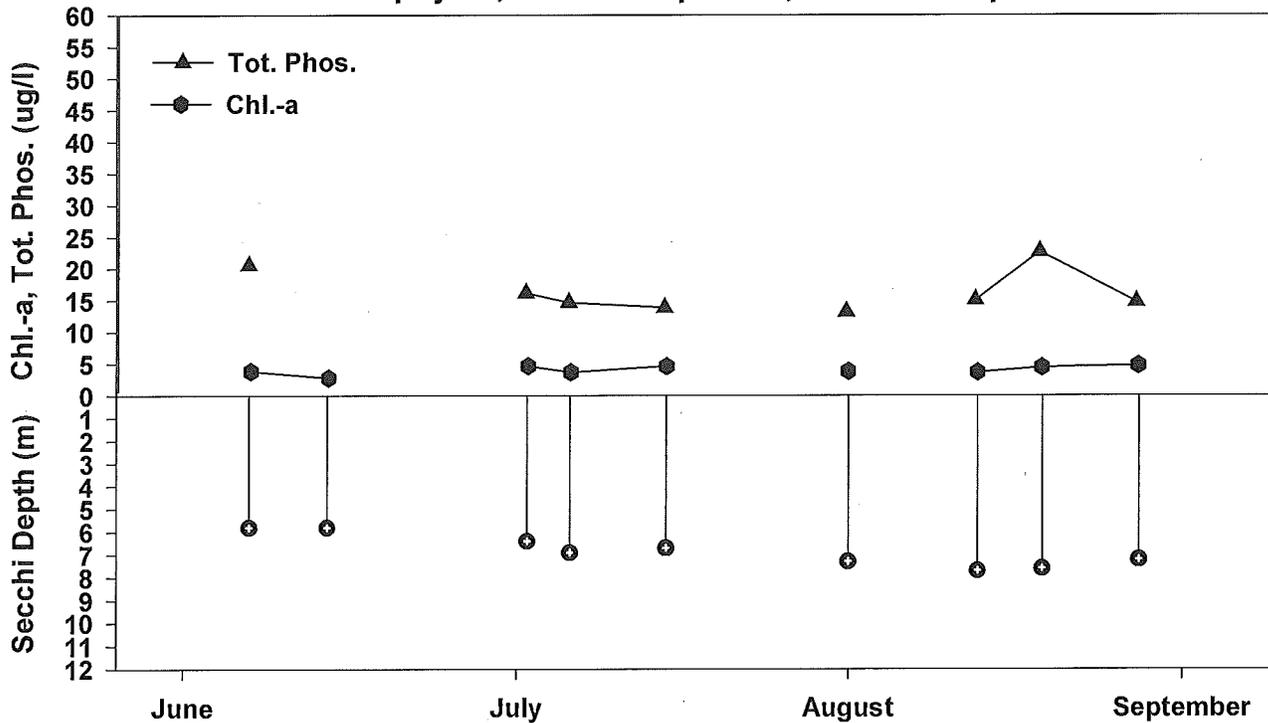
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	13	5.8	5.1	12	
2001	10	6.7	3.6	13	
2002	9	6.2	2.6	14	
2003	8	6.0	5.1	16	
2004	10	5.3	3.7	13	15
2005	10	5.8	5.1	17	
2006	10	5.0	9.2	19	13
2007	9	6.2	2.9	13	14
2008	9	6.0	3.5	17	11
2009	9	5.3	3.8	18	15
2010	9	5.5	4.6	16	
2011	8	5.4	8.0	18	
2012	9	6.8	3.4	16	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	9	5.8	6.8	7.7
Chl-a (ug/l)	9	2.1	3.4	4.1
Summer TP (ug/l)	8	13	16	23

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# FOSTERS POND

**Peacham, VT**

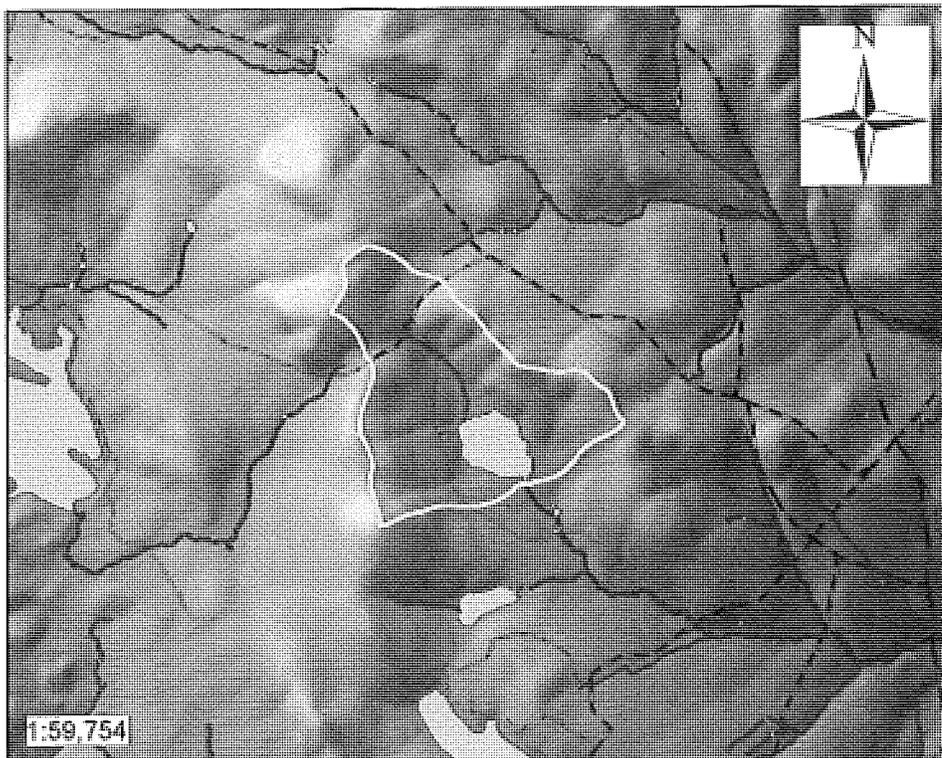
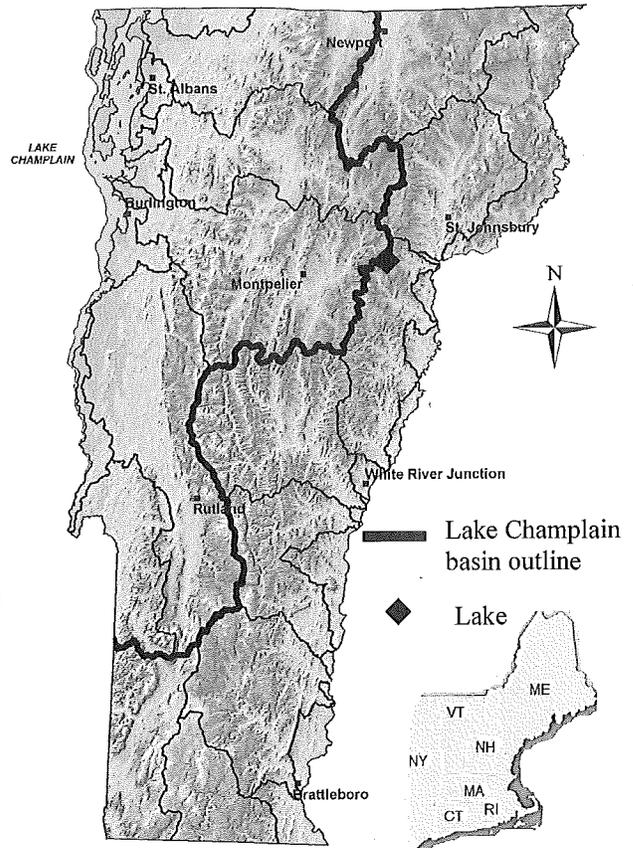
**Lay Monitors:** David and Marilyn Magnus

Fosters Pond is a small, shallow pond.

Lake Surface Area: 61 acres  
 Drainage Basin Area: 647 acres  
 Maximum depth: 13 ft. (3.9 m)  
 Average depth: 8 ft. (2.4 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Fosters Pond

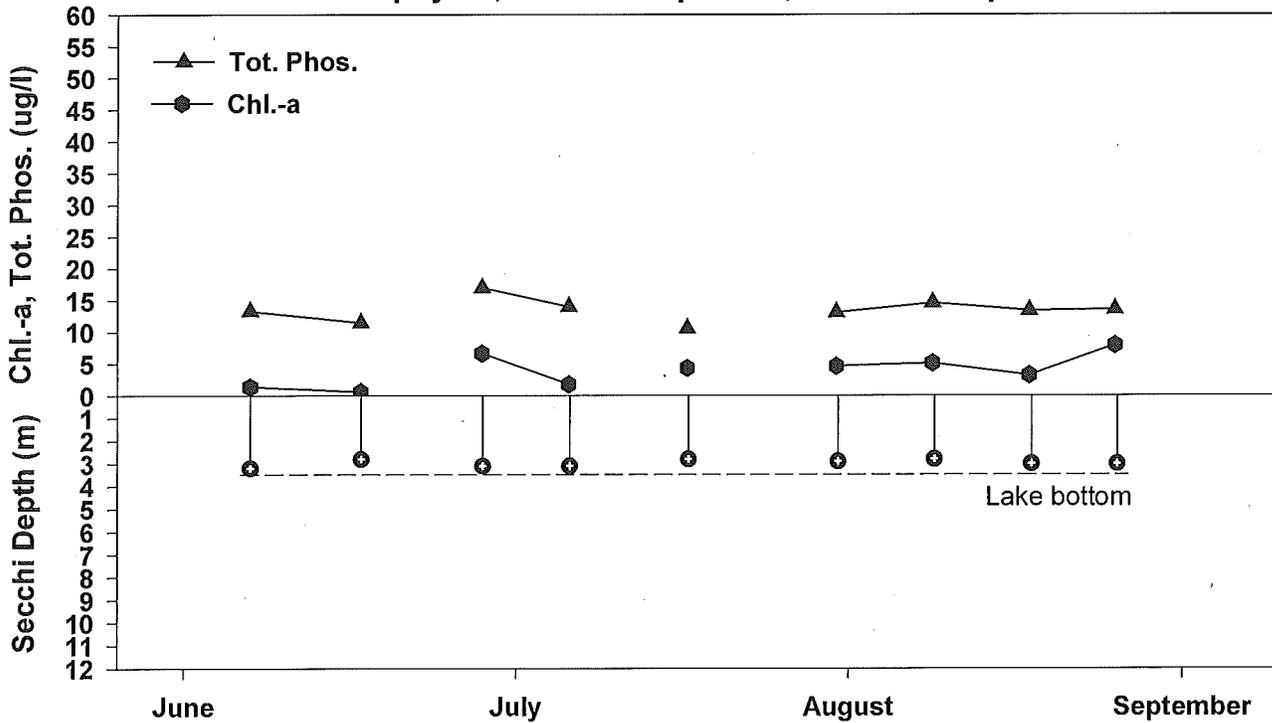
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2005	8				
2006	10		3.4	13	11
2007	9	2.6	4.3	12	9.3
2008	10	2.9	3.4	12	7.8
2009	9		4.0	14	
2010	9		1.9	11	
2011	10		2.3	13	
2012	9		4.5	13	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	9	2.8	3.0	3.2
Chl-a (ug/l)	9	1.1	4.5	8.4
Summer TP (ug/l)	9	11	13	17

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# GREAT HOSMER POND

## Craftsbury and Albany, VT

**Lay Monitors:** John Brodhead, Amy Glen,  
Susan Dunklee

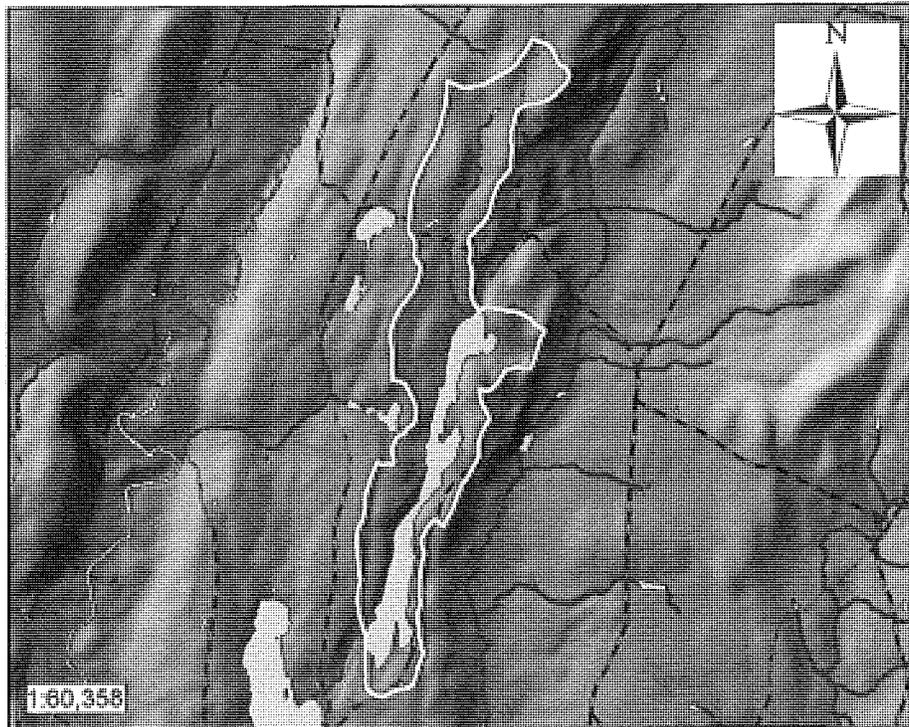
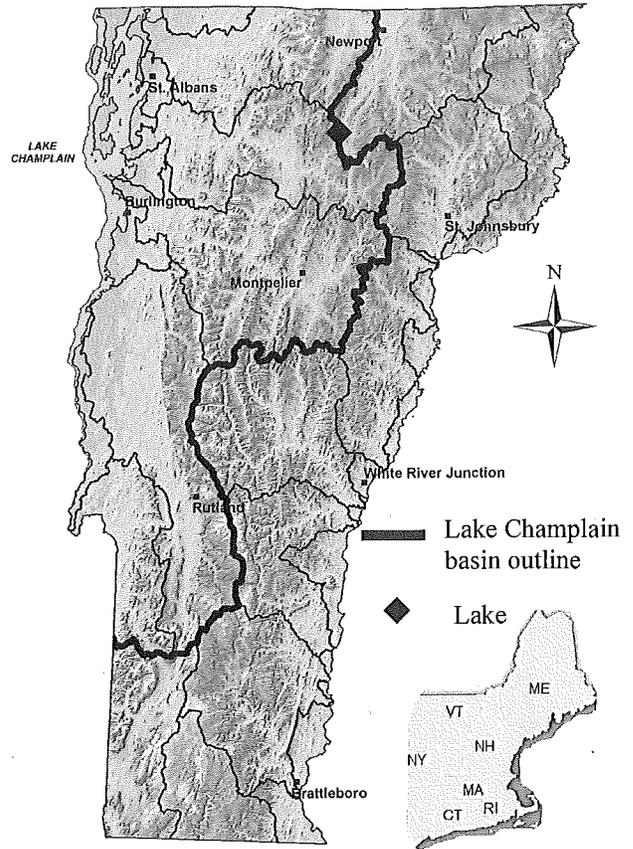
**Former Lay Monitors:** Luc Brodhead

Great Hosmer is a moderately sized, long,  
narrow, relatively deep lake.

Lake Surface Area: 140 acres  
 Drainage Basin Area: 860 acres  
 Maximum depth: 57 ft. (17.4 m)  
 Average depth: 20 ft. (6.1 m)

**Compared to other lakes, the trophic state is  
Eutrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Great Hosmer Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1984	13	4.8	9.7		24
1985	13	5.3	12		30
1986	14	4.7	4.5		
1987	13	4.9	6.9		
1988	11	5.2	8.1		
1989	12	5.7			
1990	11	5.3			23
1991	11	6.0			
1992	8	5.4			
1993	6				
1994	10	5.4			
1995	10	5.6	7.3	18	
1996	10	5.3	7.7	21	
1997	8	5.7	7.5	18	28
1998	9	5.3	4.7	15	
1999	11	5.2	12	17	

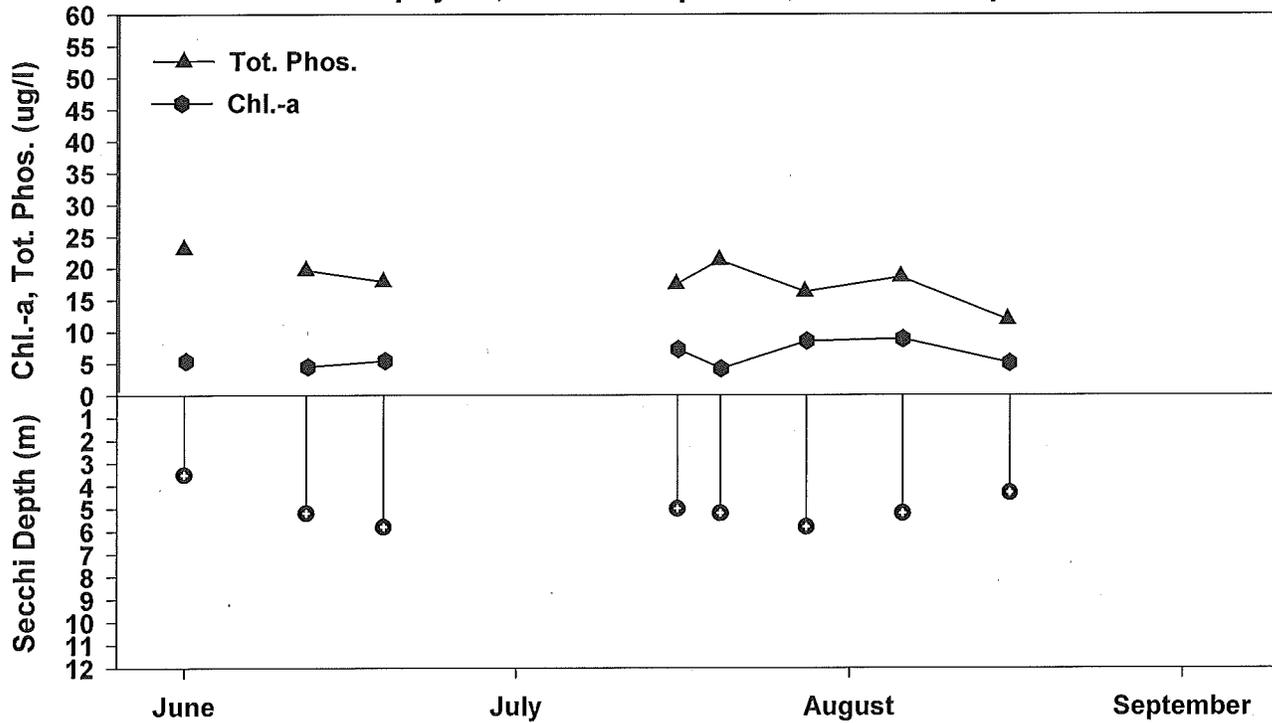
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	9	4.4	9.1	22	
2001	9	5.6		20	
2002	11	5.6	8.6	26	18
2003	11	6.2	14	25	
2004	10	5.6	12	24	21
2005	9	5.4	10	18	
2006	10	5.9	9.3	25	
2007	9	5.4	8.7	24	22
2008	9	5.0	13	25	
2009	11	6.3	10	30	
2010	11	5.7	9.6	23	
2011	12	5.2	9.1	23	
2012	8	5.0	5.5	18	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	8	3.5	5.0	5.8
Chl-a (ug/l)	8	3.6	5.5	8.3
Summer TP (ug/l)	8	12	18	23

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# GREEN RIVER RESERVOIR

## Hyde Park, VT

**Lay Monitors:** Sharlotte Williams, Alexis Drane, Lucas Griggs, Michale McAtee, Ryan Harlow, and Thomas Gregory

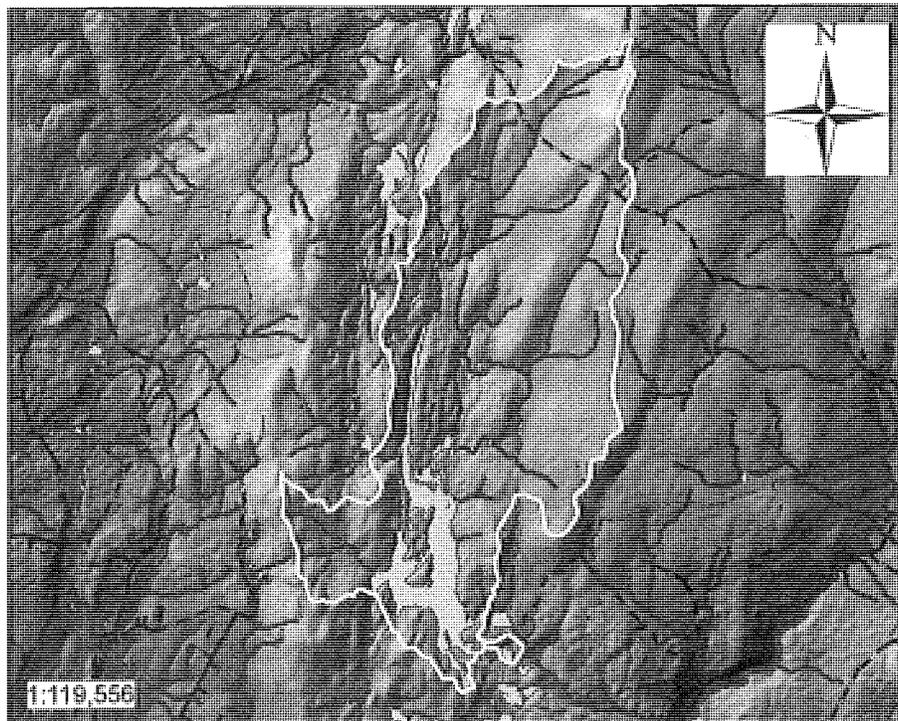
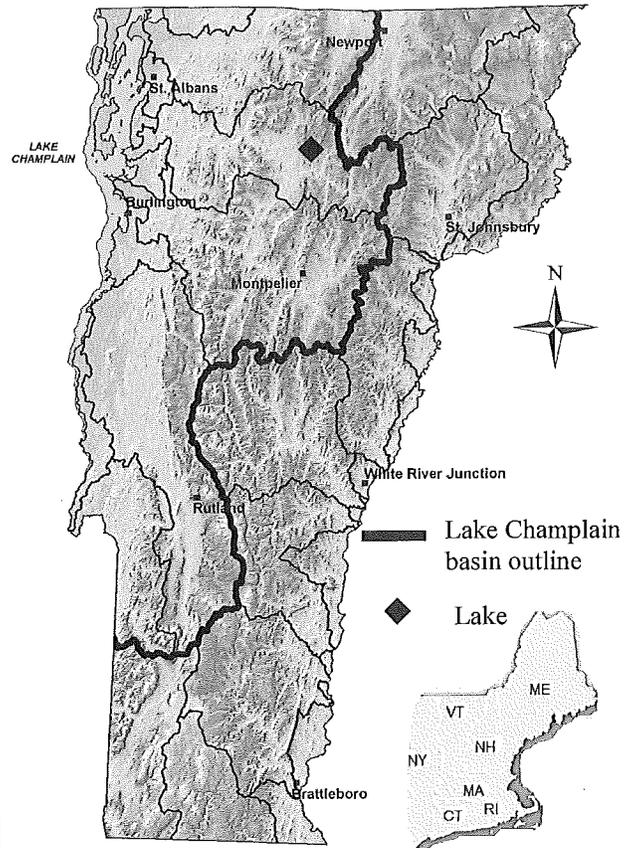
**Former Lay Monitors:** Jason Kelley and Harry Dunn-Davenport  
Terry and Bonnie Francis  
Heather Thomas  
Debbie Benjamin  
Terry Gregory

Green River Reservoir is a large, artificial, warmwater lake.

Lake Surface Area: 554 acres  
Drainage Basin Area: 9,075 acres  
Maximum depth: 93 ft. (28.4 m)

Compared to other lakes, the trophic state is

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g}/\text{l}$	< 7.0 $\mu\text{g}/\text{l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Green River Reservoir

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1997	8	4.9	1.9	14	
1998	8	4.0	2.0	14	17
1999	8	5.6	4.7	12	14

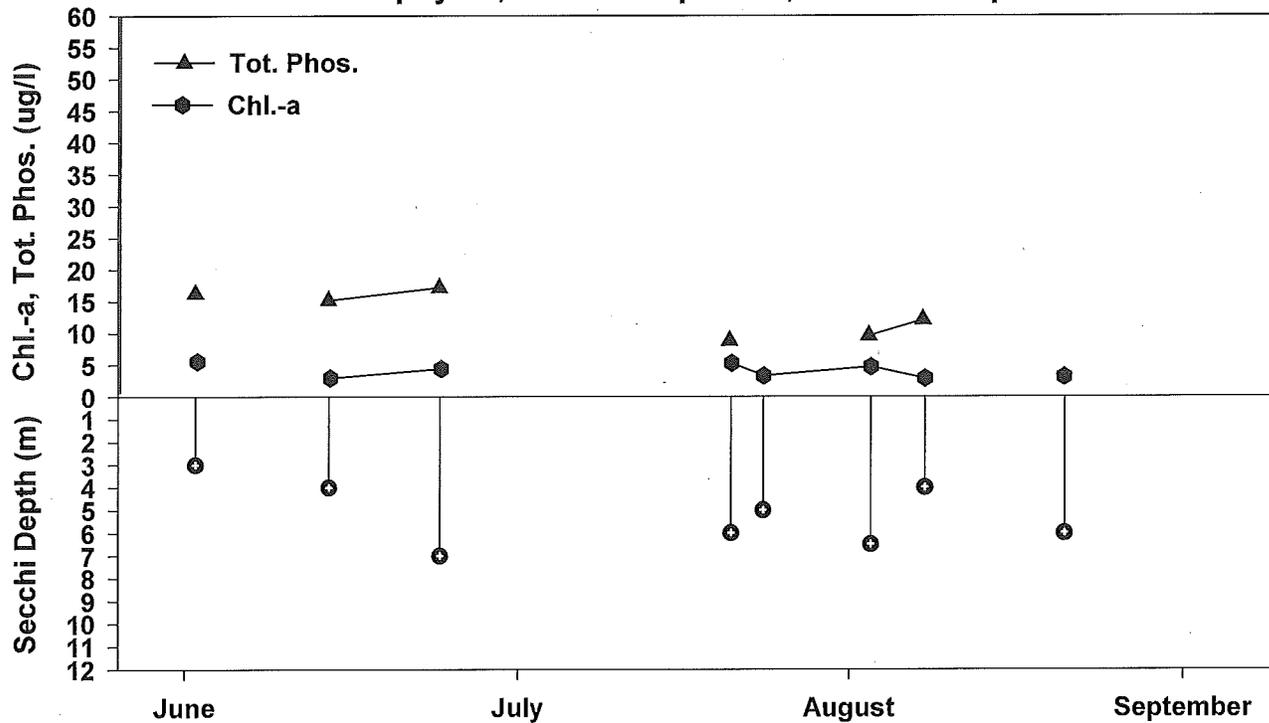
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	9	3.7	2.9	11	
2001	8	3.9		15	
2002	9	4.4	2.4	12	
2003	9	5.2	3.6	11	
2004	12	4.3	3.4	12	
2005	10	4.9	4.4	11	11
2006	10	4.3	3.7	11	
2007	11	4.4	3.7	10	17
2008	11	4.3	3.9	14	
2009	11	4.0	4.1	14	
2010	11	4.5	2.7	11	
2011	13	3.7	4.0	13	17
2012	8	5.2	3.4		

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	8	3.0	5.2	7.0
Chl-a (ug/l)	8	2.2	3.4	5.0
Summer TP (ug/l)	6	8.8	13	17

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LAKE GROTON

Groton, VT

Lay Monitors: Cathy and David Donath

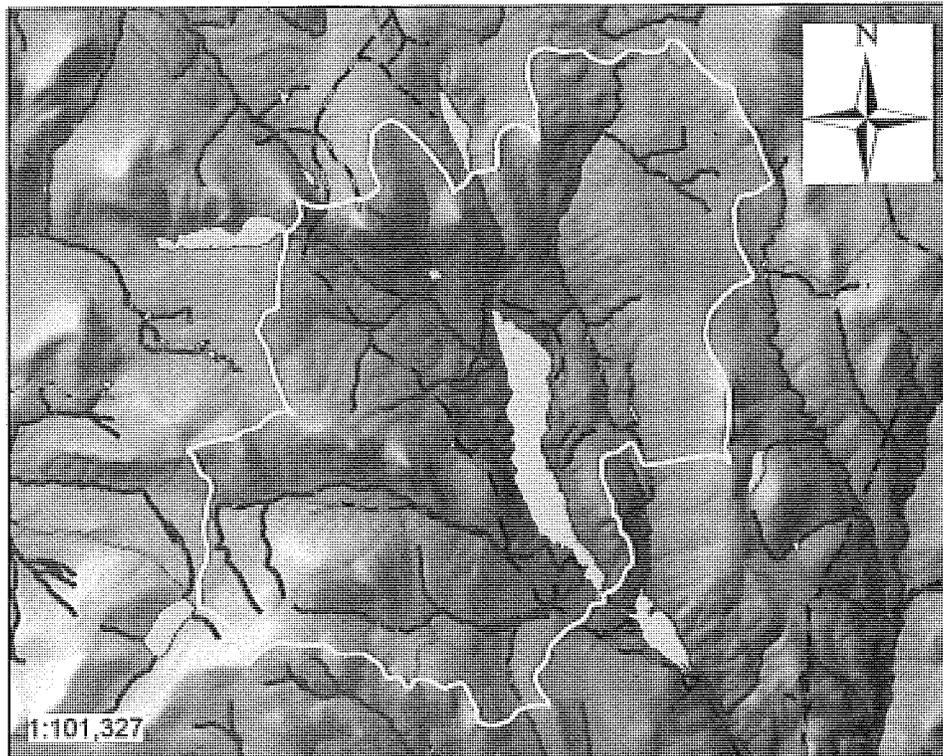
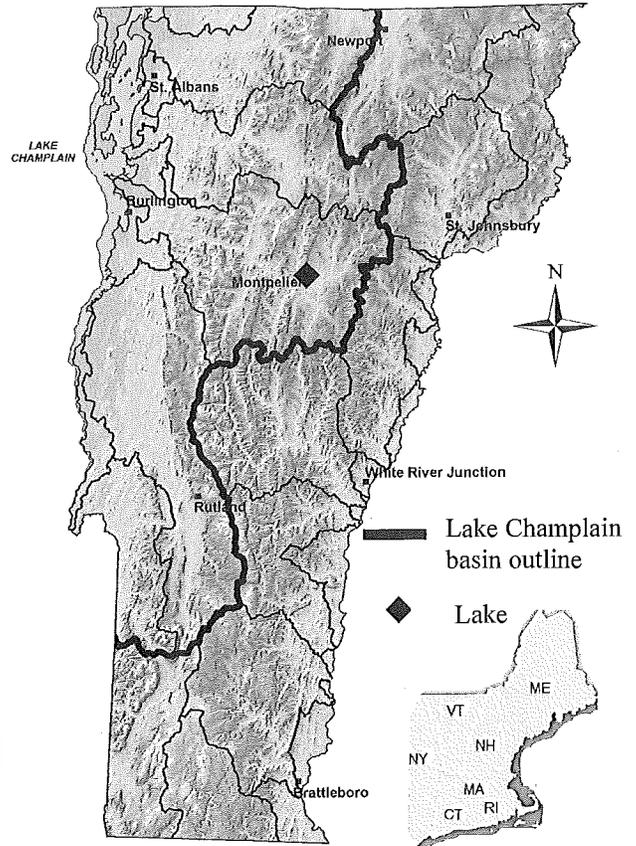
Former Lay Monitors: Diana Rudd  
Milton Lamberton

Lake Groton is a large, shallow, warmwater lake.

Lake Surface Area: 422 acres  
 Drainage Basin Area: 12,006 acres  
 Maximum depth: 35 ft. (10.7 m)  
 Average depth: 13 ft. (4.0 m)

Compared to other lakes, the trophic state is Mesotrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Lake Groton

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	6				4.0
1980	10	3.6			8.3
1981	9	3.7			6.7
1982	12	4.0			9.0
1983	4				10
1984	13	3.0	3.6		6.3
1985	13	3.9	3.9		6.7
1986	14	3.5	2.6		8.3
1987	14	3.9	3.1		16
1988	21	4.3	2.5		
1999	12	3.8			6.9

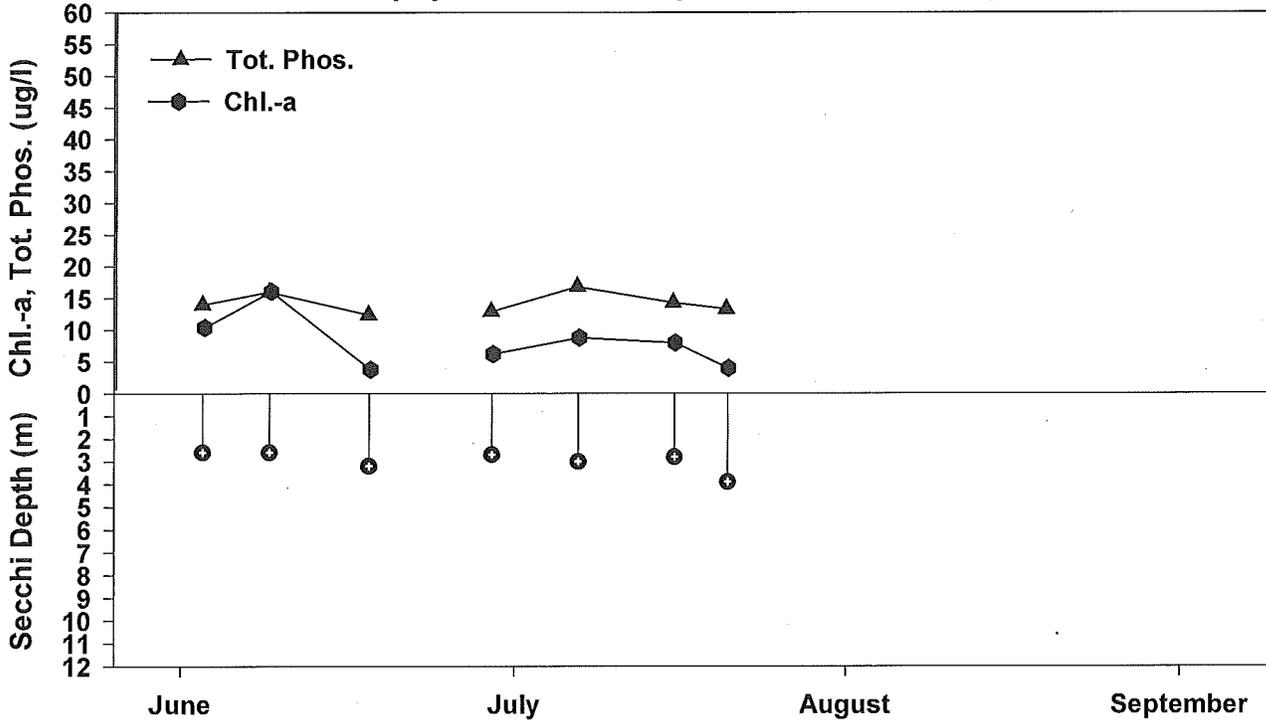
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	10	3.4			
2001	11	4.3			
2002	8	3.2			
2003	8	3.7			
2004	9	3.6			
2005	9	3.6	3.4	12	8.6
2006	9	3.3	4.1	12	9.8
2007	10	3.4	6.7	12	
2008	10	3.1	4.0	13	
2010	9	3.5	5.9	12	
2011	9	2.6	5.1	15	
2Q12	7				

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	7	2.6	3.0	3.9
Chl-a (ug/l)	7	3.1	7.6	16
Summer TP (ug/l)	7	12	14	17

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# HALLS LAKE

Newbury, VT

**Lay Monitor:** Jeff MacQueen

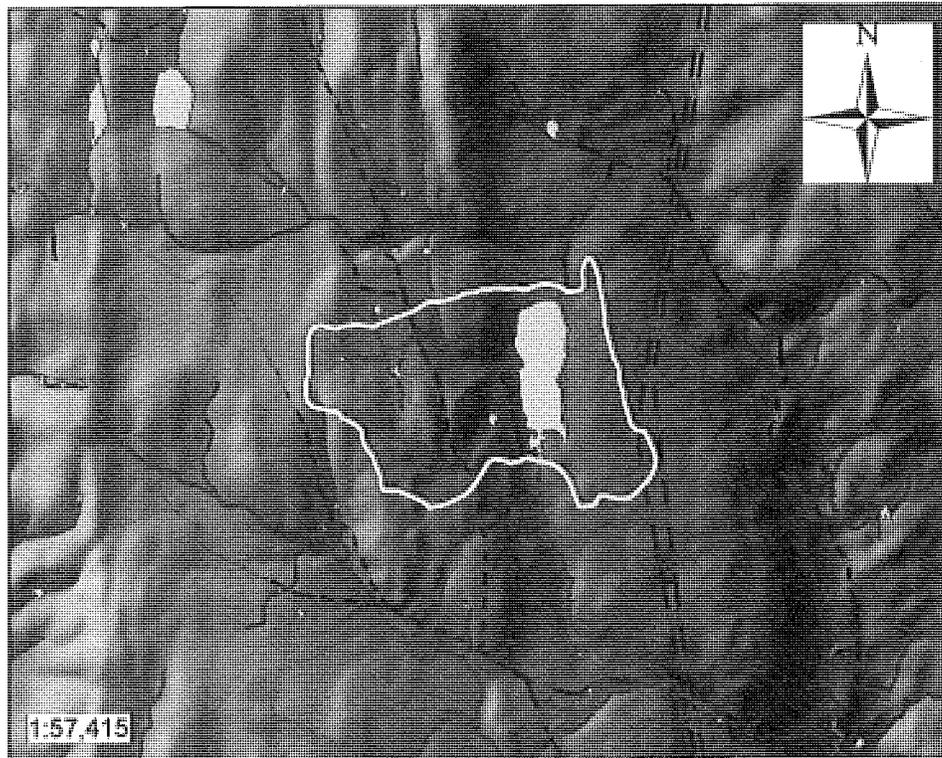
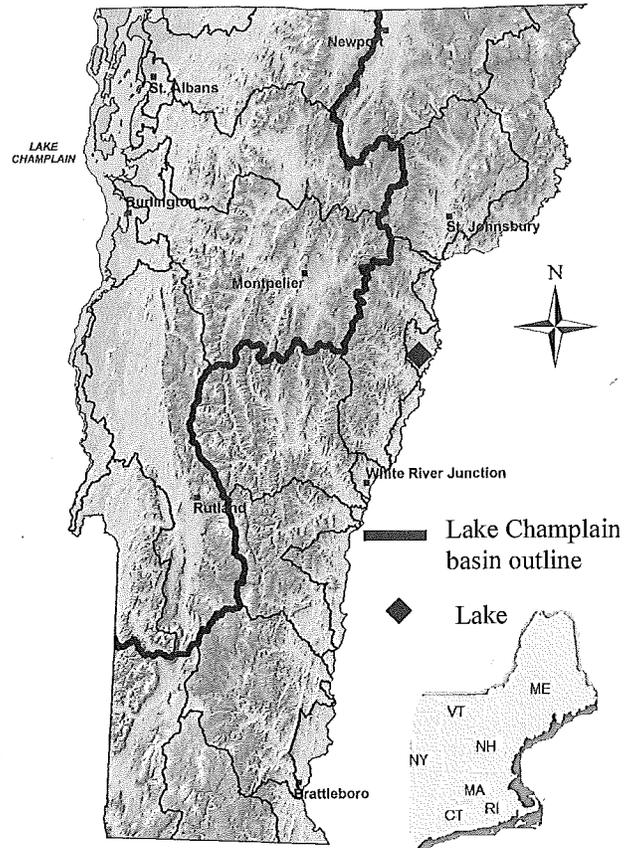
**Former Lay Monitors:** Joe and Mike Dekens  
Albert Wright

Halls Lake is a small, shallow, warmwater lake.

Lake Surface Area: 85 acres  
 Drainage Basin Area: 561 acres  
 Maximum depth: 30 ft. (9.1 m)  
 Average depth: 17 ft. (5.2 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Halls Lake

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	13	3.7			6.0
1980	10	4.0	14		9.0
1981	12	4.2	5.2		20
1982	10	4.5	6.6		12
1983	9	4.4	4.0		19
1984	12	4.3	4.2		14
1985	11	5.1	2.8		13
1986	12	3.0			14
1987	13	3.0	6.6		13
1988	14	3.2	4.5		
1989	10	3.5	6.8		
1990	11	4.5	5.3		16
1991	16	4.9	3.4		
1992	9	4.4			
1993	11	5.0			
1994	10	3.8			
1995	11	4.1			
1996	11	4.4			
1997	11	4.3			12
1998	10	5.0			
1999	12	5.1			

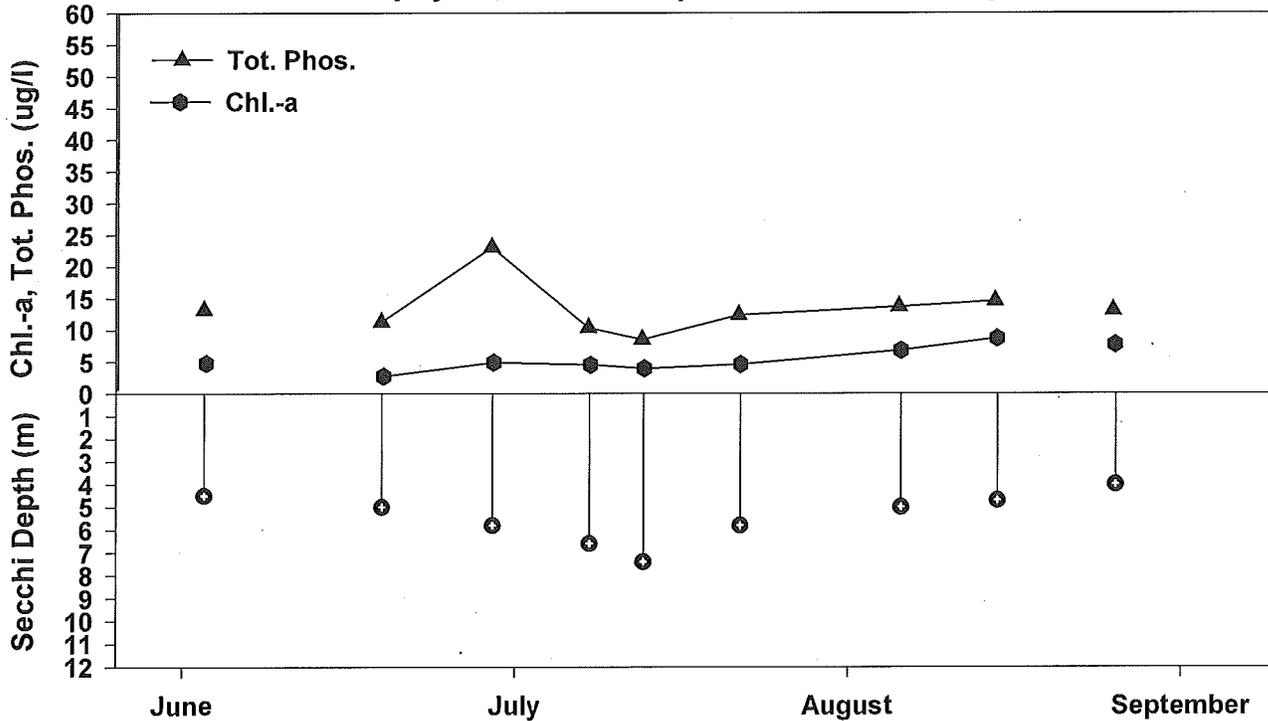
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	13	4.8			
2001	9	4.5	2.8	19	
2002	9	5.0	2.8	21	14
2003	9	4.9	4.3	29	
2004	9	5.1	6.9	23	18
2005	9	5.2	4.6	20	19
2006	9	4.8	6.1	21	20
2007	9	4.6	4.2	15	
2008	9	4.6	4.4	15	
2009	9	4.9	5.8	14	23
2010	9	3.5	21	24	25
2011	9	4.4	4.3	18	16
2012	9	5.4	4.8	13	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	9	4.0	5.4	7.4
Chl-a (ug/l)	9	2.1	4.8	8.1
Summer TP (ug/l)	9	8.5	13	23

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# HARVEY'S LAKE

**Barnett, VT**

**Lay Monitor:** Steve Mills

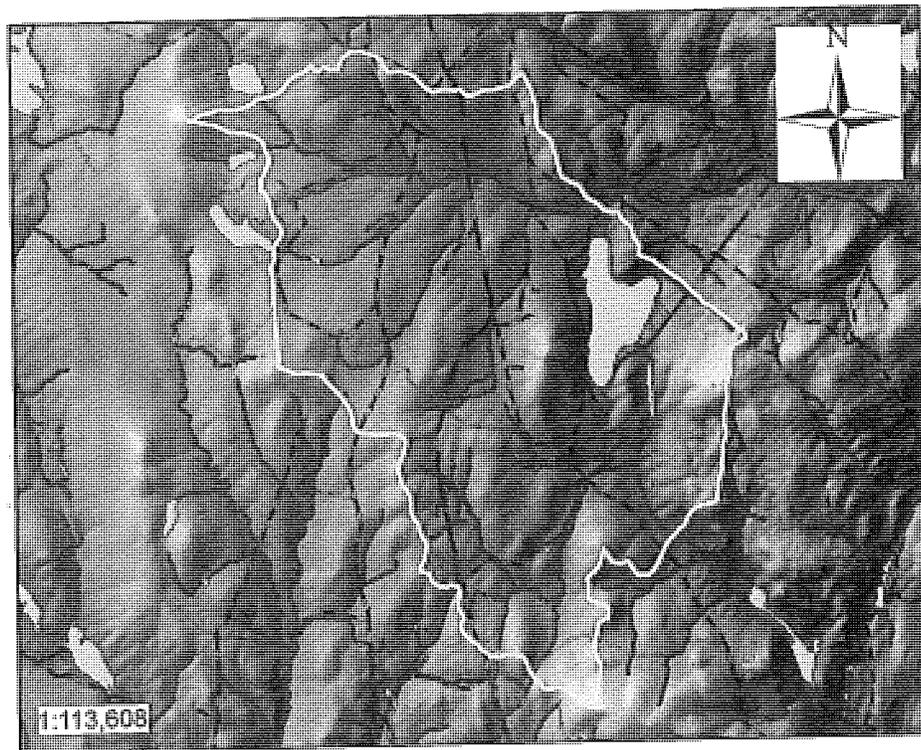
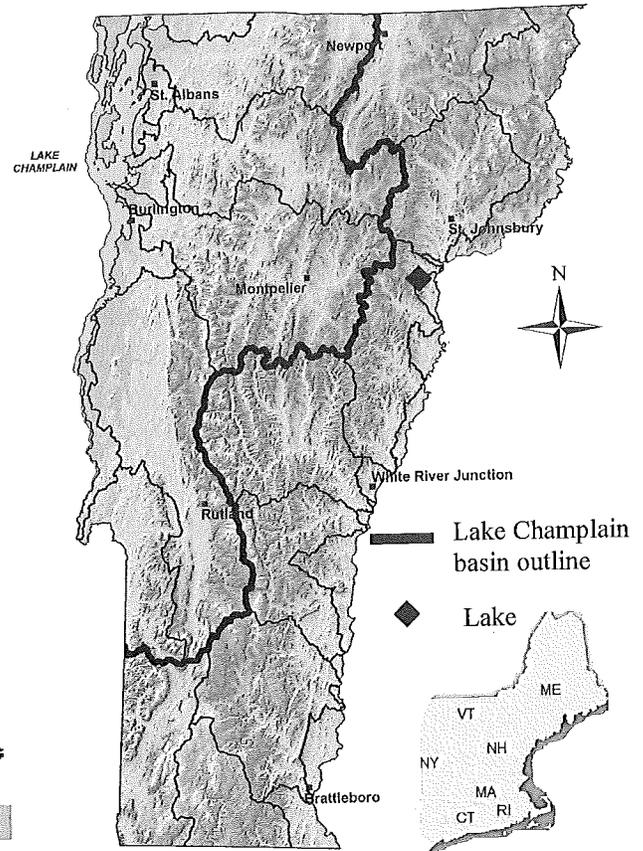
**Former Lay Monitors:** Jackie Sprague  
Wayne Berg  
Ruth Anderson  
Jean Hall Bouffard  
Leon and Marilyn Rank

Harvey's Lake is a large, deep, coldwater lake.

Lake Surface Area: 351 acres  
Drainage Basin Area: 5,364 acres  
Maximum depth: 145 ft. (44.2 m)  
Average depth: 66 ft. (20.1 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Harvey's Lake

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	14	6.2	3.8		14
1980	13	6.6	5.1		15
1981	12	6.5	5.2		23
1982	11	5.7	4.4		16
1983	12	4.2	3.9	14	13
1984	12	4.3	3.0	22	12
1985	6				13
1986	12	5.0	3.1	18	10
1987	7				11
1991	13	5.5			11
1992	12	5.8			9.0
1993	12	6.0			11
1994	11	6.2			8.6
1995	9	7.2			10
1996	11	4.9			
1997	13	6.7	1.7	11	8.1
1998	12	6.4	1.2	9.8	8.0
1999	11	5.7	3.1	10	11

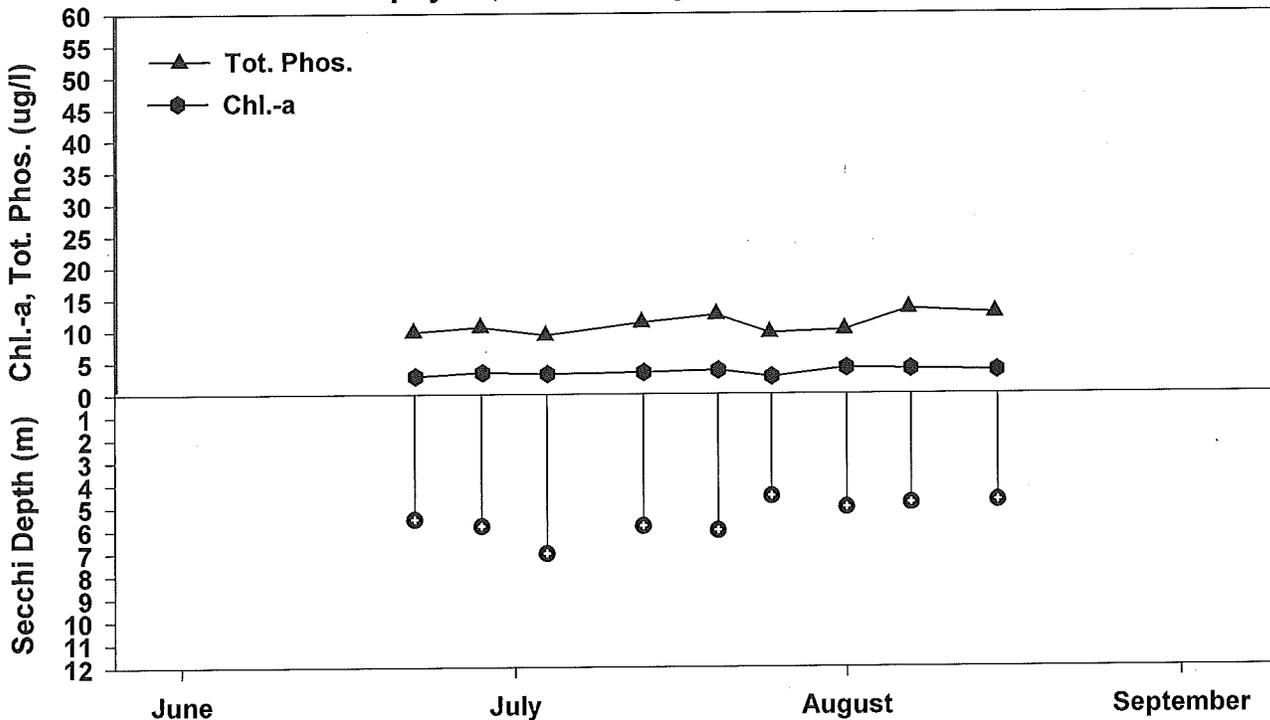
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	11	4.8	4.0	12	11
2001	7				11
2002	11	5.9	2.1	11	7.7
2003	9	8.7	2.2	13	
2004	9	7.1	2.5	13	10
2005	9	5.5	4.2	14	13
2006	9	7.5	1.9	12	11
2007	9	5.7	2.0	12	15
2008	9	3.8	2.9	13	
2009	12	6.0	1.9	11	11
2010	12	6.7	2.4	11	
2011	9	5.5	3.3	12	
2012	9	5.5	2.8	11	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	9	4.5	5.5	7.0
Chl-a (ug/l)	9	2.1	2.8	3.4
Summer TP (ug/l)	9	9.3	11	13

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# HOLLAND POND

**Holland, VT**

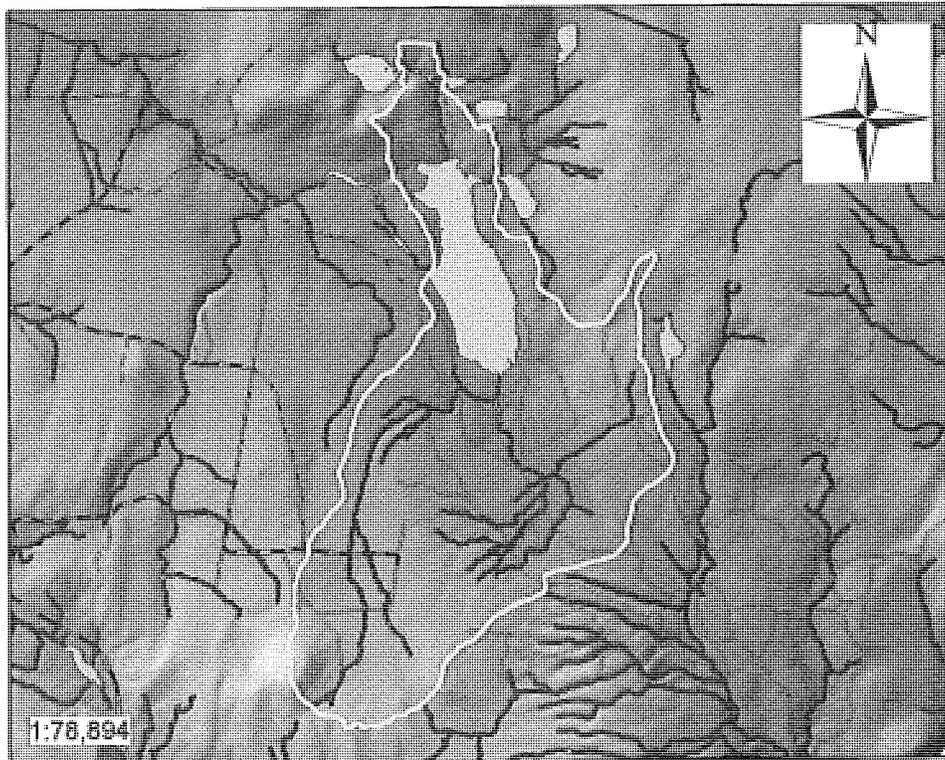
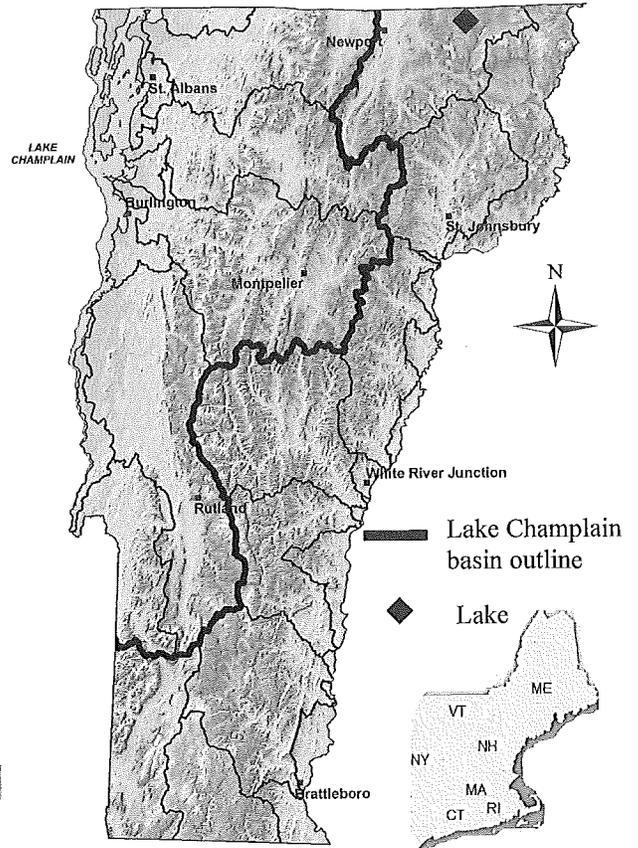
**Lay Monitors:** Tom Fetter and Chris Owen

Holland Pond is a relatively large, coldwater lake with little shoreland development.

Lake Surface Area: 325 acres  
 Drainage Basin Area: 4,431 acres  
 Maximum depth: 39 ft. (11.9 m)  
 Average depth: 17 ft. (5.2 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Holland Pond

## Annual Data

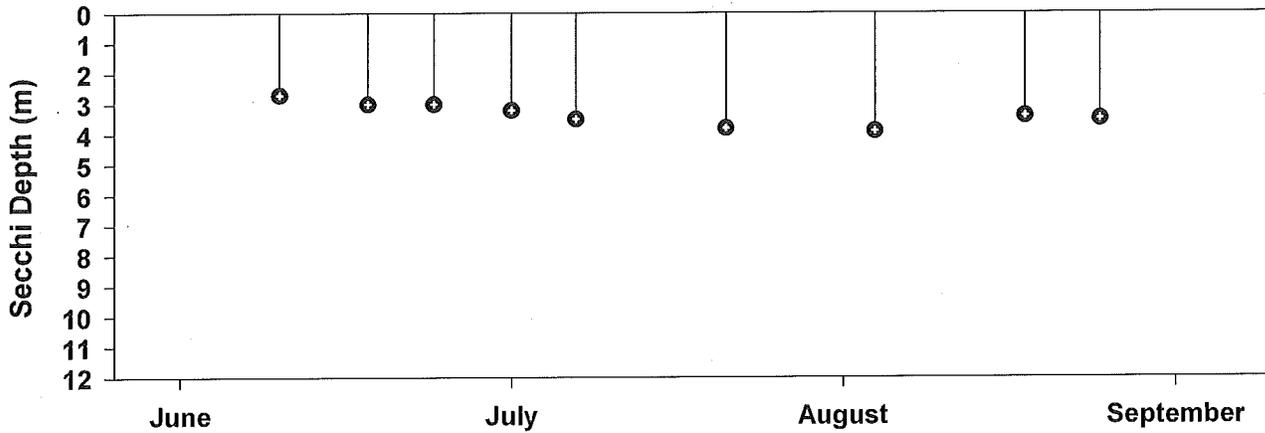
Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1993	9	3.0	3.3	11	
1994	8	3.0			4.8
1995	6				8.0
1996	10	2.4	4.1	12	
1997	13	2.7	2.6	8.6	
1998	10	2.8	2.2	8.7	6.9
1999	12	3.0	4.4	9.0	8.1

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	10	2.5			
2001	11	2.4			
2002	11	2.9			
2003	10	3.3			6.7
2004	9	3.3			
2005	12	3.2			
2006	10	2.7			
2007	11	3.3			8.9
2008	10	3.2			
2009	9	3.3			8.2
2010	10	3.9			9.5
2011	10	2.9			
2012	9	3.3			

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	9	2.7	3.3	3.9



# INDIAN BROOK RESERVOIR

Essex, VT

**Lay Monitor:** Beth Glaspie

**Former Lay Monitors:** Kate Crawford and Garnet Smith

Indian Brook Reservoir is a small, warm water lake.

Lake Surface Area: 50 acres

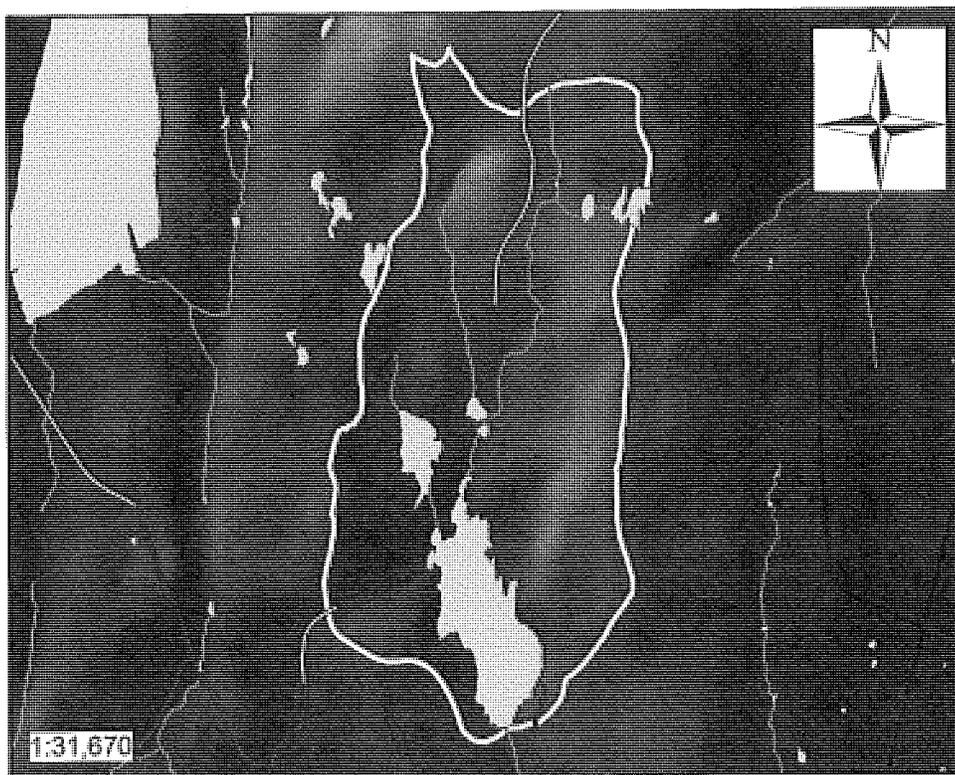
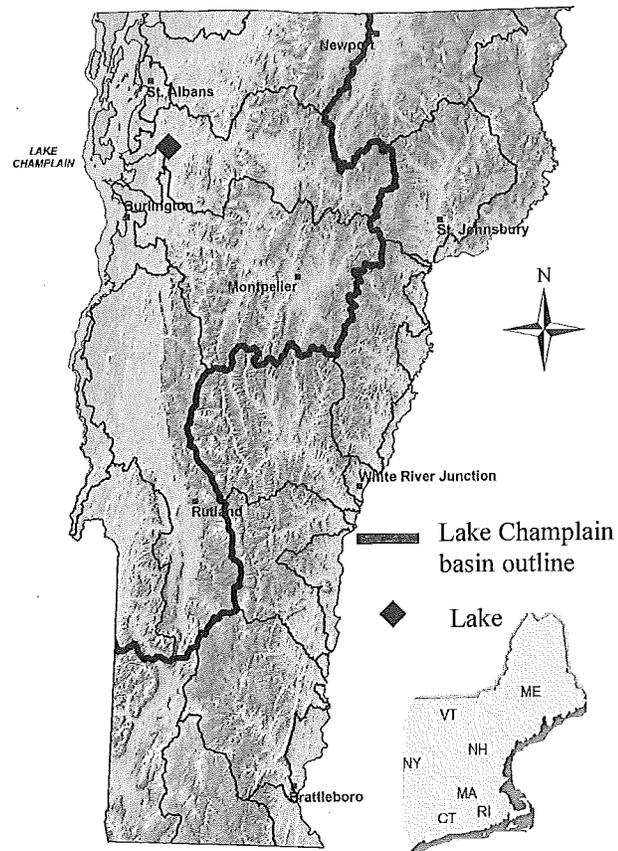
Drainage Basin Area: 761 acres

Maximum depth: 22 ft. (11.3 m)

Average depth: 13 ft. (5.8 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Indian Brook Reservoir

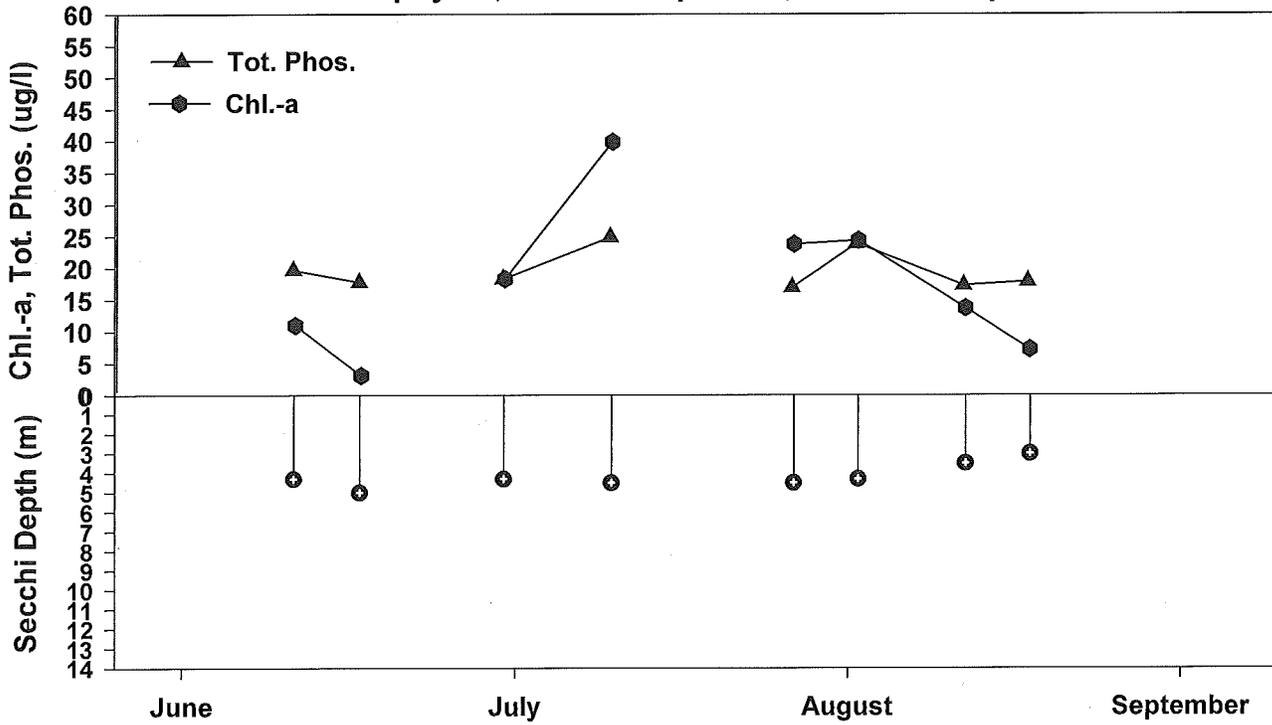
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2010	10	4.0	6.2	18	
2012	8	4.2	17	20	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	8	3.0	4.2	5.0
Chl-a (ug/l)	8	2.4	17	40
Summer TP (ug/l)	8	17	20	25

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LAKE IROQUOIS

## Williston and Hinesburg, VT

**Lay Monitor:** Dan Sharpe

**Former Lay Monitors:** Adam Kaminsky

Steve Lidle

Chip and Joanne Wright

Kelli Brown

Ginger and Eric Johnson and Judy E

Robert and Helen Hall

Lake Iroquois is a relatively large lake. It has a shallow northern section and a deeper, southern basin.

Lake Surface Area: 243 acres

Drainage Basin Area: 2,418 acres

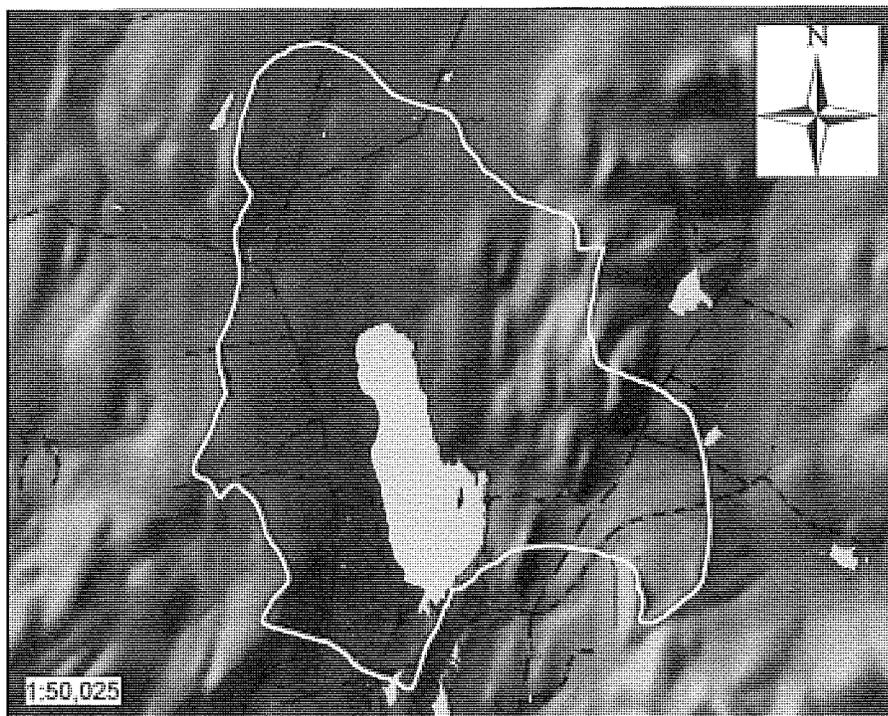
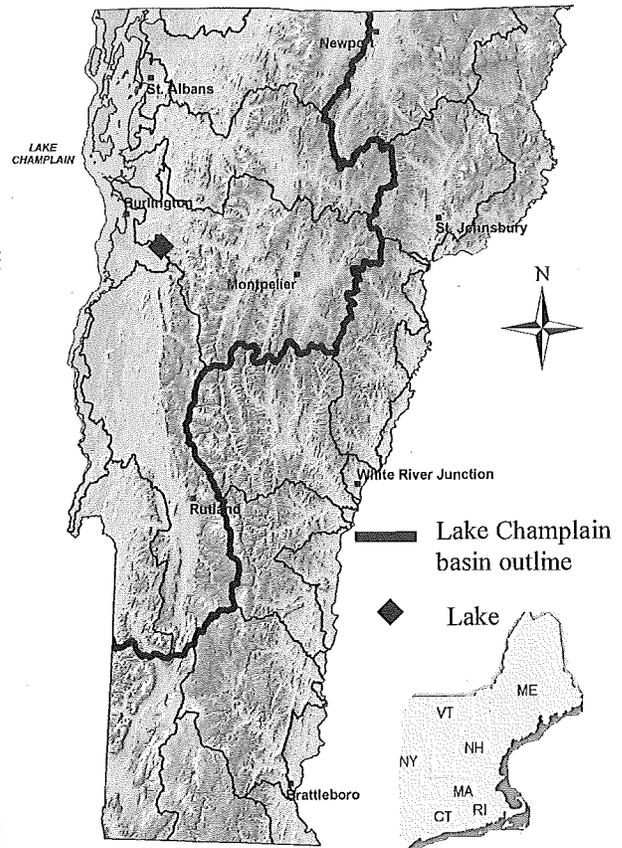
Maximum depth: 37 ft. (11.3 m)

Average depth: 19 ft. (5.8 m)

**Compared to other lakes, the trophic state is**

Eutrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g}/\text{l}$	< 7.0 $\mu\text{g}/\text{l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Lake Iroquois

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	12	2.8	9.5		26
1980	12	3.7	8.8		30
1981	13	2.0	15		29
1982	11	7.0	4.6		37
1983	13	4.4	12		27
1984	12	3.3	9.5	26	27
1985	12	5.6	13	48	28
1986	13	2.1	21	27	25
1987	12	2.5	13	26	28
1988	12	4.8	9.9	27	29
1989	11	4.7	14	38	39
1990	12	3.3	16	28	30
1991	12	4.9	16	35	23
1992	12	4.7	11	32	32
1993	11	5.3	10	27	29
1994	12	3.2	10	25	40
1995	11	4.7	9.6	30	25
1996	12	1.4			48
1997	13	4.3			13
1998	10	3.2			27
1999	12	4.7			19

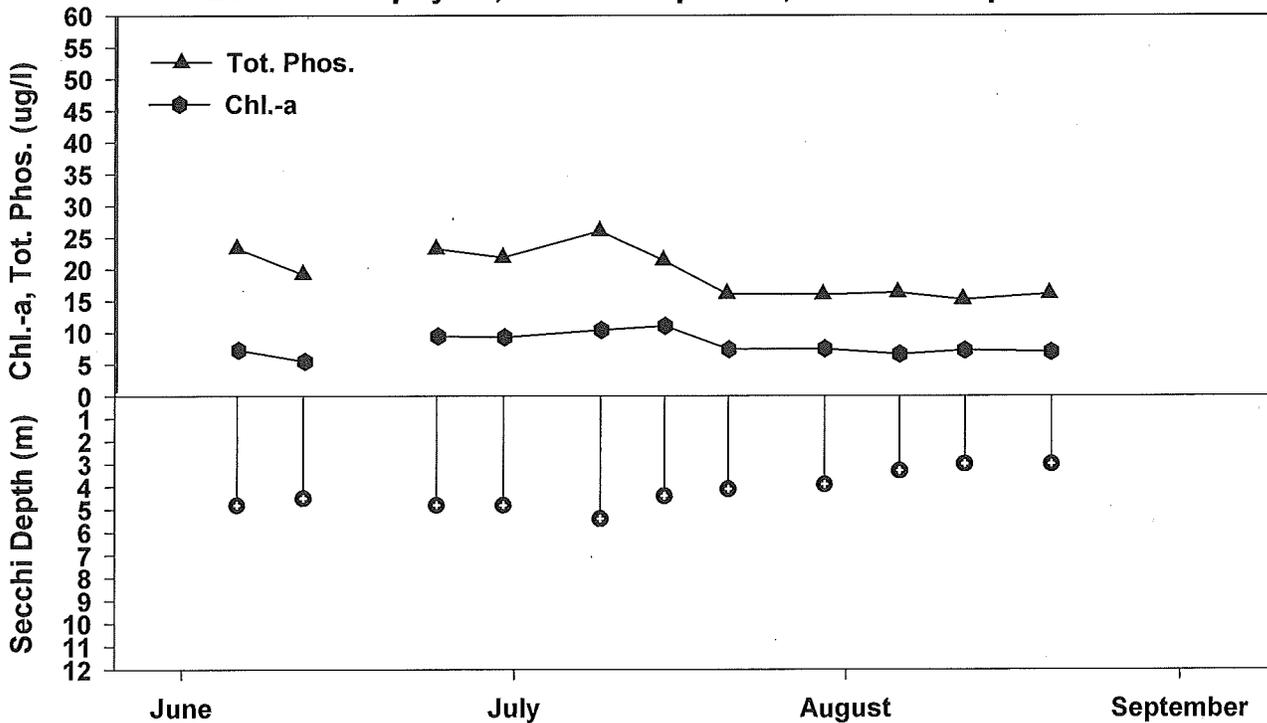
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	11	2.3			22
2001	10	3.7			22
2002	10	3.4			16
2003	9	4.7			
2004	12	3.7			25
2005	9	4.7			
2007	10	3.8			
2008	14	4.7	11	32	
2009	14	5.5	5.7	17	27
2010	10	4.4	9.7	24	
2011	10	3.7		20	
2012	11	4.2	7.5	20	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	11	3.0	4.2	5.4
Chl-a (ug/l)	11	4.9	7.5	11
Summer TP (ug/l)	11	15	20	26

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# ISLAND POND

**Brighton, VT**

**Lay Monitors:** George and Patricia Wilcox

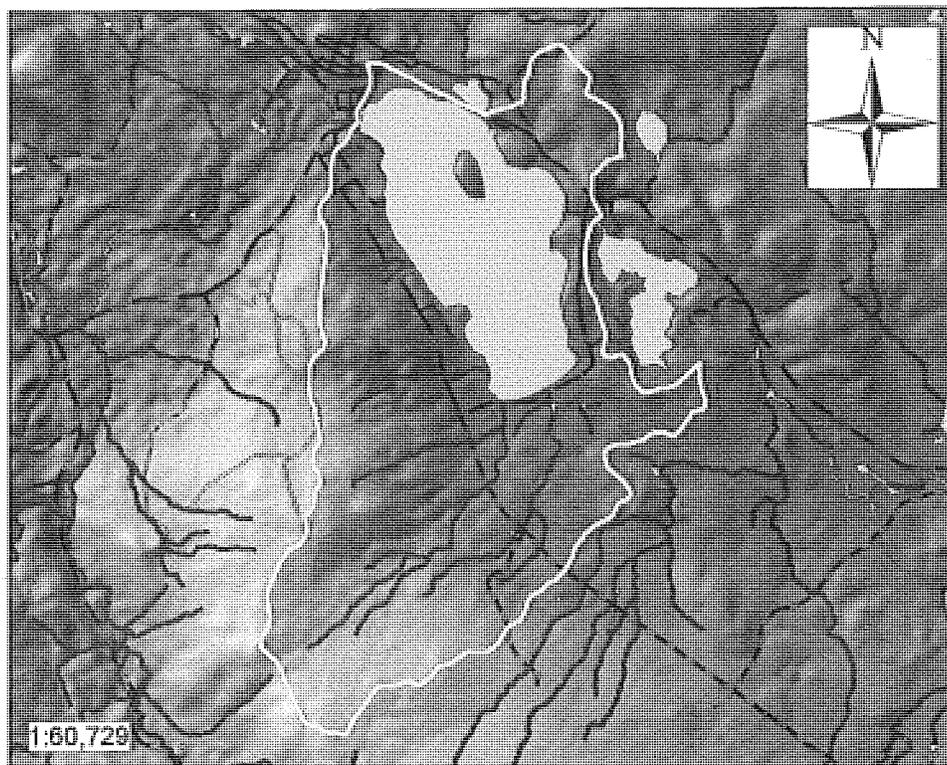
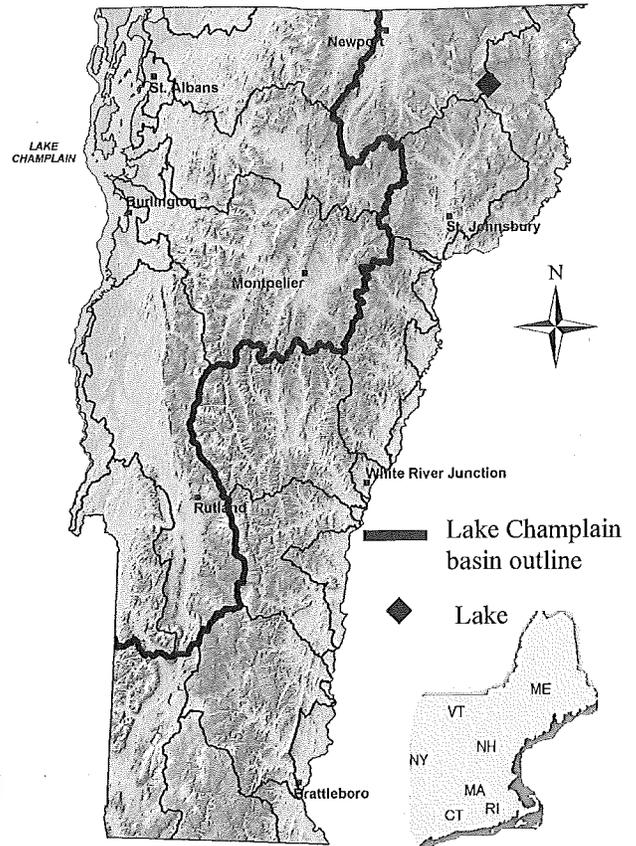
**Former Lay Monitors:** Patrick Clarke  
David Molloy  
Ed Larsen

Island Pond is a large, warmwater lake with a large island in the middle.

Lake Surface Area: 626 acres  
 Drainage Basin Area: 6,295 acres  
 Maximum depth: 63 ft. (19.0 m)  
 Average depth: 31 ft. (9.4 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Island Pond

## Annual Data

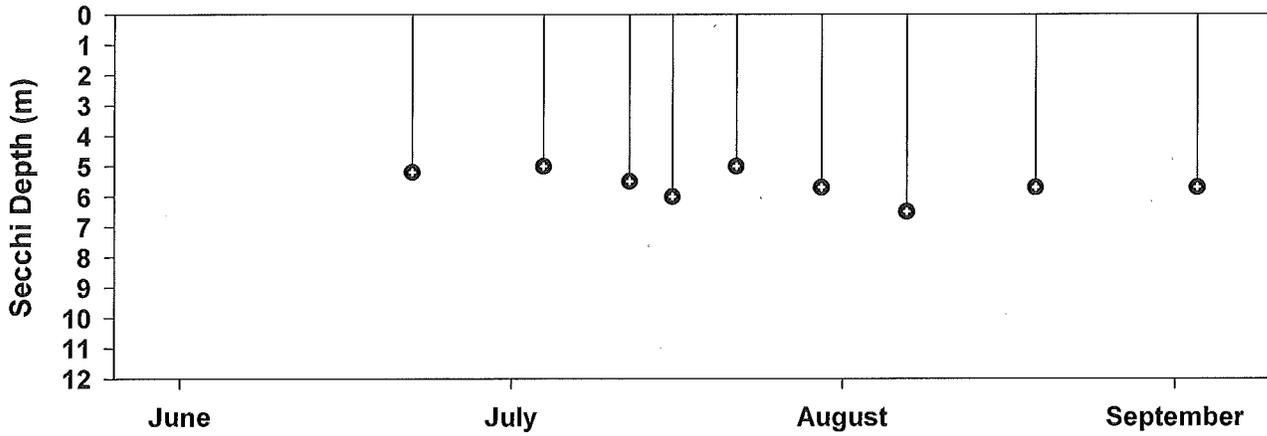
Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	4				3.0
1980	13	6.0	4.8		6.7
1981	11	5.0	4.3		6.3
1982	9	5.2	3.8		8.7
1983	12	5.2	4.0		9.3
1984	12	5.2	3.3		8.7
1985	10	5.8	5.5		10
1986	14	5.7			9.0
1987	13	5.4			8.7
1988	12	6.8			
1989	13	5.9			
1990	12	6.5			
1992	11	6.7			
1993	13	7.3			
1994	13	6.6			
1995	13	7.2			6.5
1996	14	5.5			

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	7				
2001	9	6.3			7.7
2002	11	5.4			
2003	8	6.4			
2004	8	5.8			10
2005	9	6.0			
2006	9	4.9			
2007	10	5.4			8.5
2008	8	5.4			9.9
2009	9	5.4			12
2010	9	5.7			
2011	9	5.3			
2012	9	5.6			

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	9	5.0	5.6	6.5



# JOES POND

**Danville and Cabot, VT**

**Lay Monitor:** Gina Kurrle and Marti Talbot

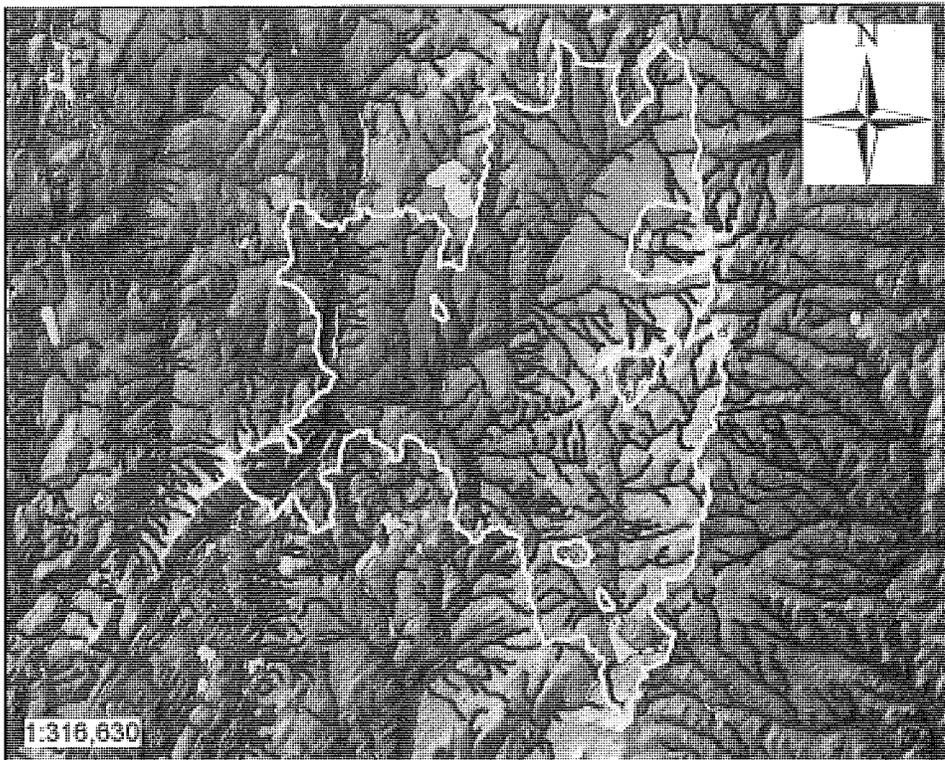
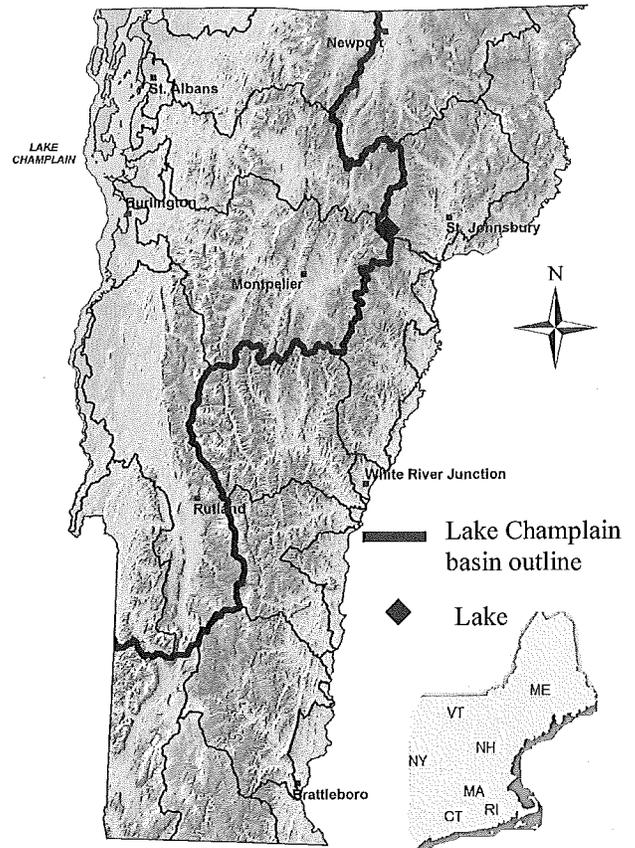
**Former Lay Monitors:** James and Marie Dimick  
Maurice Gardner

Joes Pond is an irregularly-shaped lake comprised of three distinct lake basins connected by narrow, shallow channels.

Lake Surface Area: 396 acres  
 Drainage Basin Area: 18,445 acres  
 Maximum depth: 78 ft. (23.8 m)  
 Average depth: 21 ft. (6.4 m)

**Compared to other lakes, the trophic state is Oligotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Joes Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	9	4.7			7.7
1980	4				6.7
1981	7				5.0
1982	8	4.8			7.3
1983	7				17
1984	12	3.9	2.2		6.3
1985	13	4.7	2.9		8.0
1986	13	4.6	2.8		6.7
1987	14	4.2	3.1		8.3
1988	13	4.9	3.2		
1989	5				
1993	11	4.7			7.8
1994	12	4.9			6.0
1995	10	4.2			

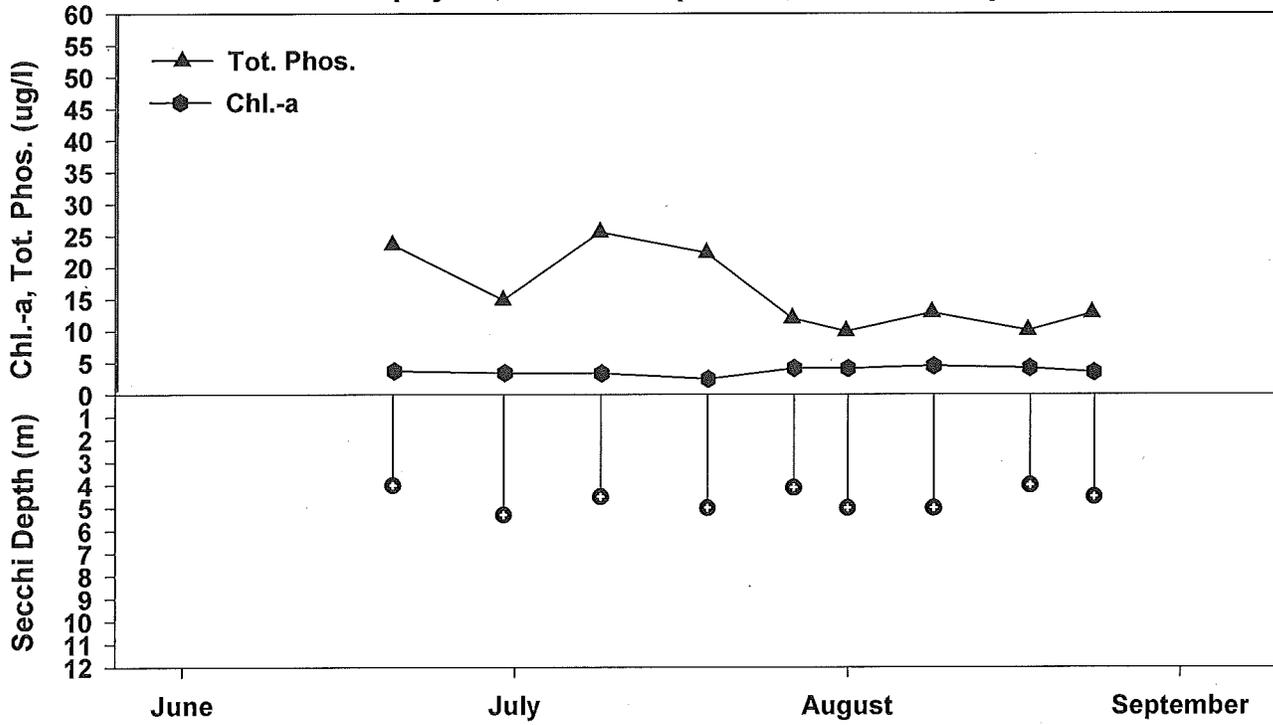
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	8	5.1			
2001	10	4.7			
2002	9	3.8			
2003	9	4.8			
2004	7				8.0
2005	8	4.4	3.3	18	12
2006	8			24	
2007	10	4.6	2.4	19	12
2008	10	3.8	2.8	23	9.2
2009	9	4.8	2.1	33	
2010	8	4.6	3.0	32	8.6
2011	9	4.9	2.7	18	
2012	9	4.6	3.1	16	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	9	4.0	4.6	5.3
Chl-a (ug/l)	9	1.8	3.1	3.9
Summer TP (ug/l)	9	10	16	26

**2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time**



# MAIDSTONE LAKE

Maidstone, VT

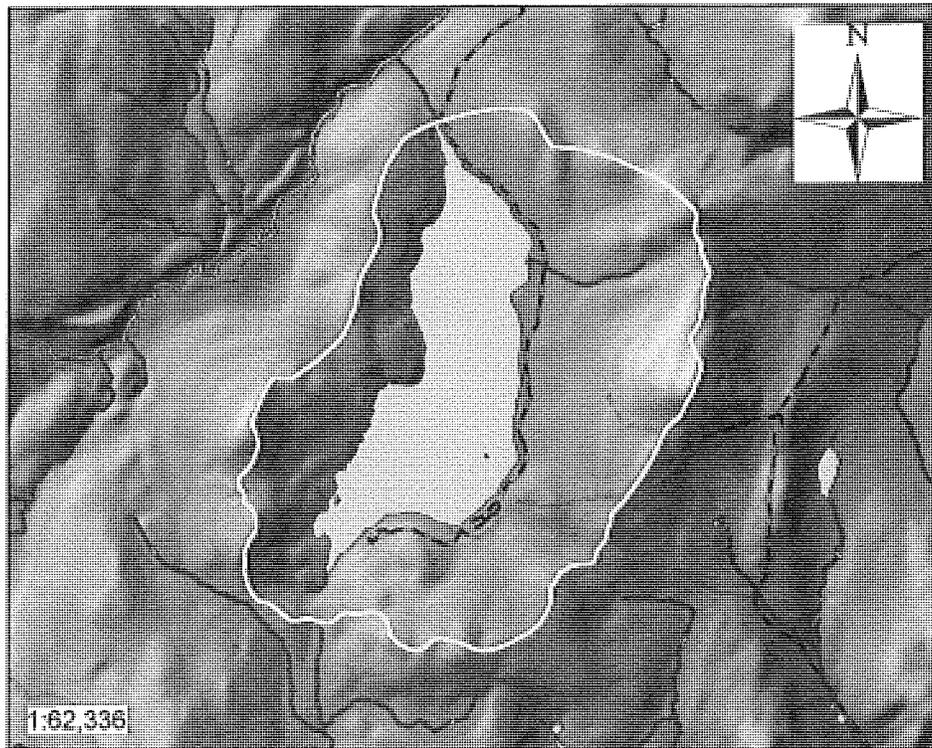
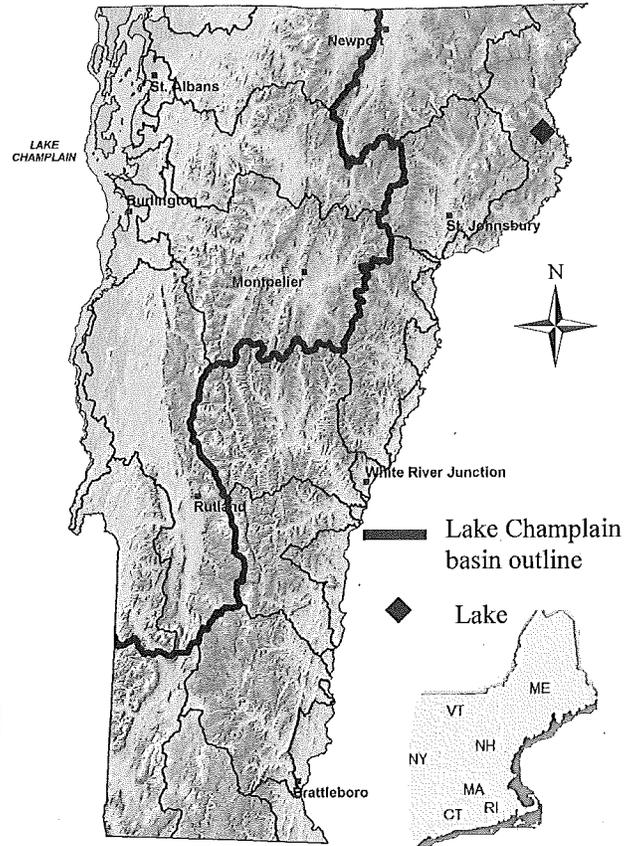
**Lay Monitors:** Lee, Mary, Todd, Angie and  
 Jack Stewart  
 Lin Mixer  
 Burbank Family

Maidstone Lake is a large, deep, coldwater lake.

Lake Surface Area: 745 acres  
 Drainage Basin Area: 3,103 acres  
 Maximum depth: 121 ft. (36.9 m)  
 Average depth: 46 ft. (14.0 m)

Compared to other lakes, the trophic state is  
 Oligotrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Maidstone Lake

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	16	7.3			4.3
1980	14	8.2			4.0
1981	13	7.7			6.0
1989	11	8.6	2.0		
1990	14	8.2	2.0		
1991	13	7.7	1.3		
1992	13	8.4	1.7		
1993	14	9.5	2.0		
1994	13	7.5	1.8	6.2	
1995	13	9.2	1.6	5.6	
1996	14	8.3	1.8	4.6	
1997	14	7.9	1.5	5.4	
1998	13	7.5	1.4	4.9	
1999	14	8.7	2.1	5.5	4.3

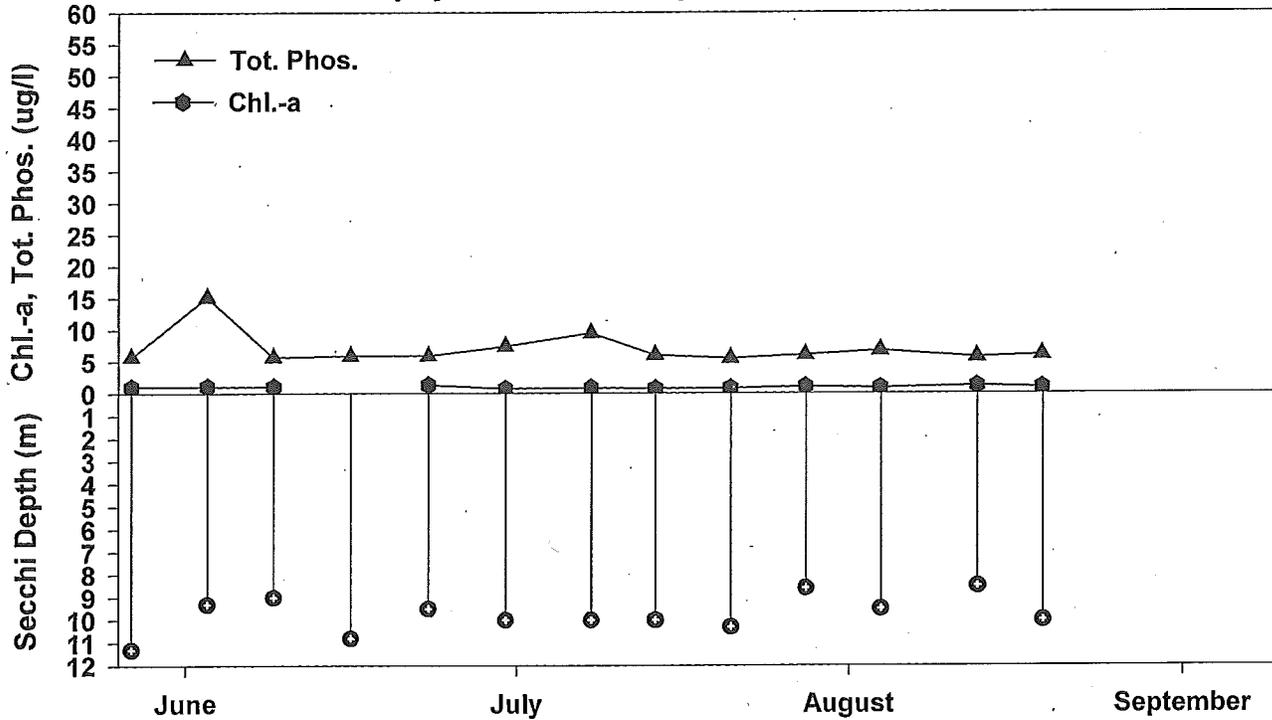
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	13	8.9	1.7	7.2	
2001	14	9.8	1.3	5.4	
2002	14	7.8	2.0	5.6	
2003	12	8.5	1.7	7.2	6.0
2004	12	9.7	1.3	6.9	
2005	14	9.5	1.3	6.3	6.1
2006	13	8.6	1.4	7.7	7.7
2007	13	8.5	1.6	6.3	6.3
2008	13	8.2	1.8	9.8	6.2
2009	13	8.1	1.8	6.5	7.1
2010	14	9.6	1.3	8.2	9.1
2011	14	8.9	1.2	7.3	7.3
2012	13	9.7	1.2	7.1	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	13	8.5	9.7	11
Chl-a (ug/l)	12	1.0	1.2	1.5
Summer TP (ug/l)	13	5.5	7.1	15

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LAKE MEMPHREMAGOG

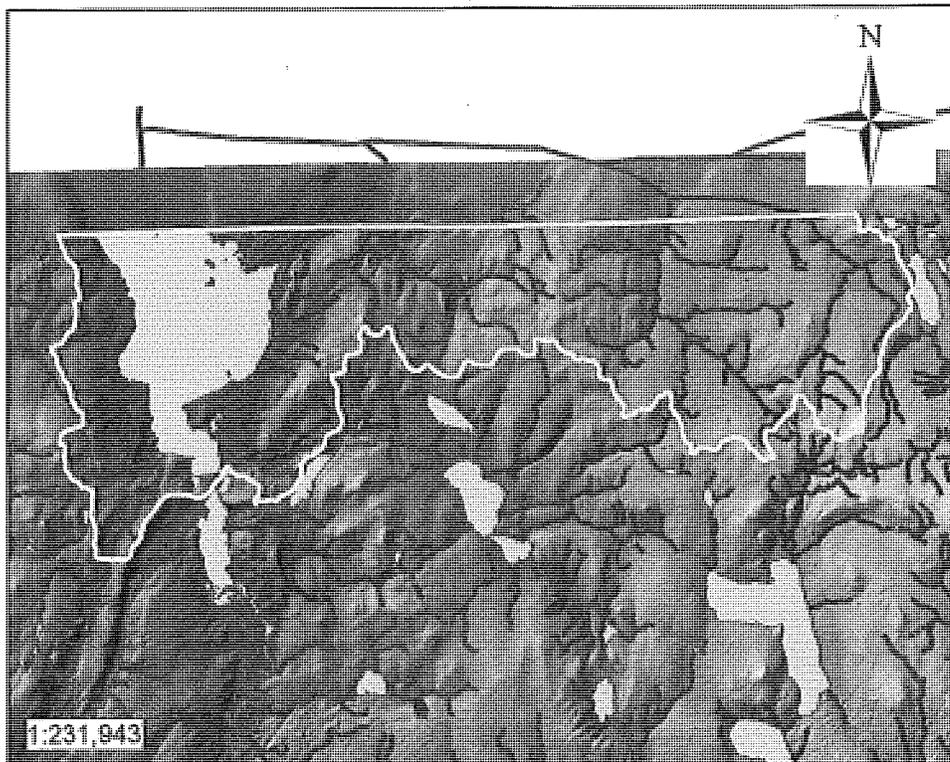
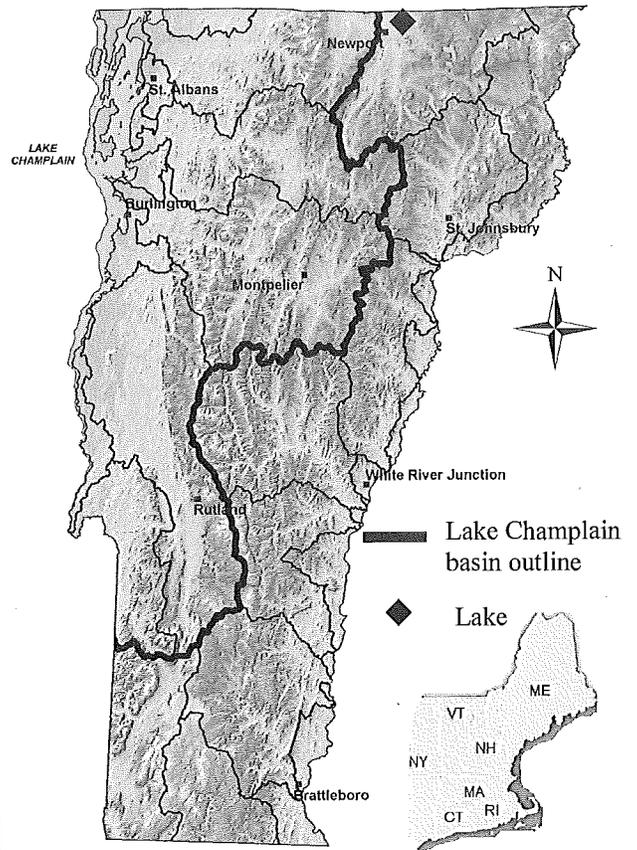
**Canadian – United States Border**  
**Towns of Derby Coventry and Newport, VT**

**Lay Monitor:** Tim Daley  
**Former Lay Monitors:** Steve Edgerley  
 David Converse  
 King Boyd  
 Harry Corron  
 Bill Morse

Lake Memphremagog is a 32 mile long, narrow lake.  
 Lake Surface Area: 5,966 acres  
 Drainage Basin Area 416,320 acres  
 Maximum depth: 351 ft. (106 m)  
 Average depth: 21 ft. (6 m)

**Compared to other lakes, the trophic state is**  
 Mesotrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Lake Memphremagog

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1985	13	2.9	5.9		
1986	13	2.8	5.1	24	
1987	12	4.0	3.7	21	
1988	8	4.7	4.0	24	
1989	10	4.0	7.9	30	
1990	9	3.8	6.8	20	
1991	9	3.7	4.4	16	
1993	8	3.2	4.9		
1994	10	3.9	5.3	14	
1995	11	4.9	3.7	14	
1996	11	4.3	5.1	14	
1997	13	4.3	4.2	21	

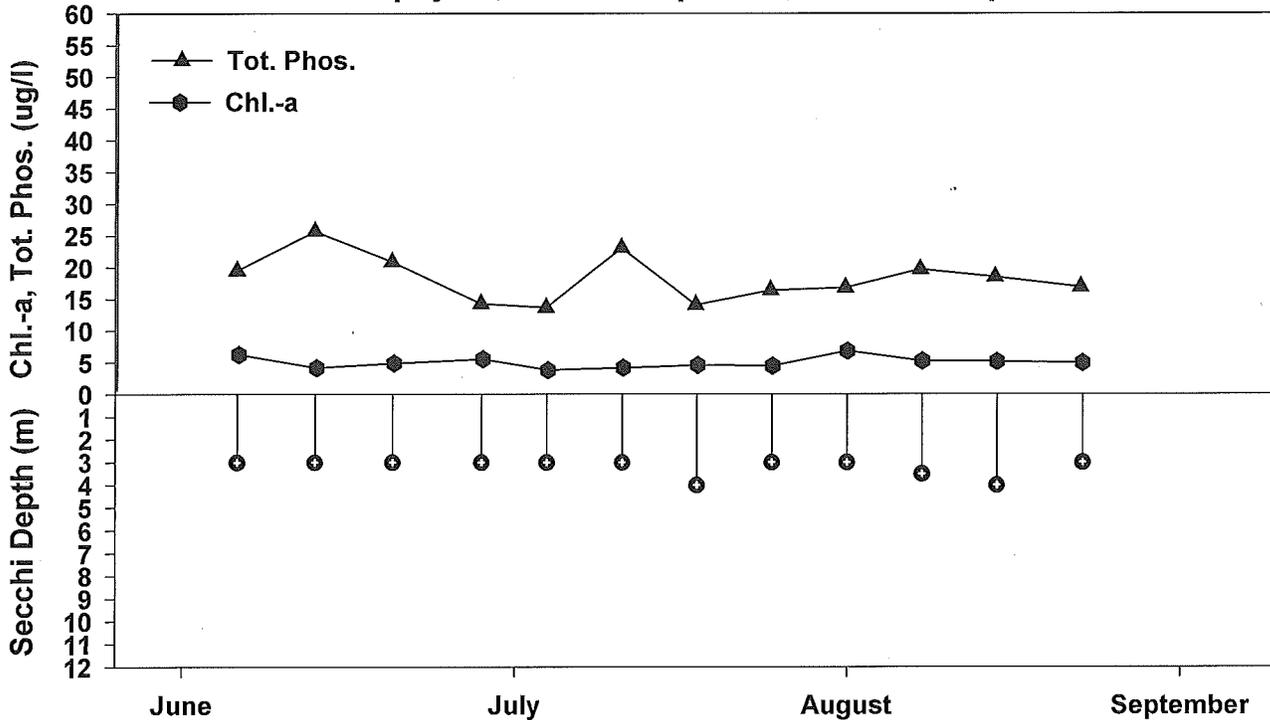
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2004	8	3.7	3.3	20	
2005	11	3.5	4.8	18	
2006	10		4.2	22	
2007	13	3.8	3.9	21	
2008	12	2.9	4.5	22	
2009	14	3.3	4.4	16	20
2010	15	3.6	3.9	17	16
2011	14	3.4	4.7	18	
2012	12	3.2	4.4	18	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	12	3.0	3.2	4.0
Chl-a (ug/l)	12	3.2	4.4	6.2
Summer TP (ug/l)	12	14	18	26

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# MILES POND

Concord, VT

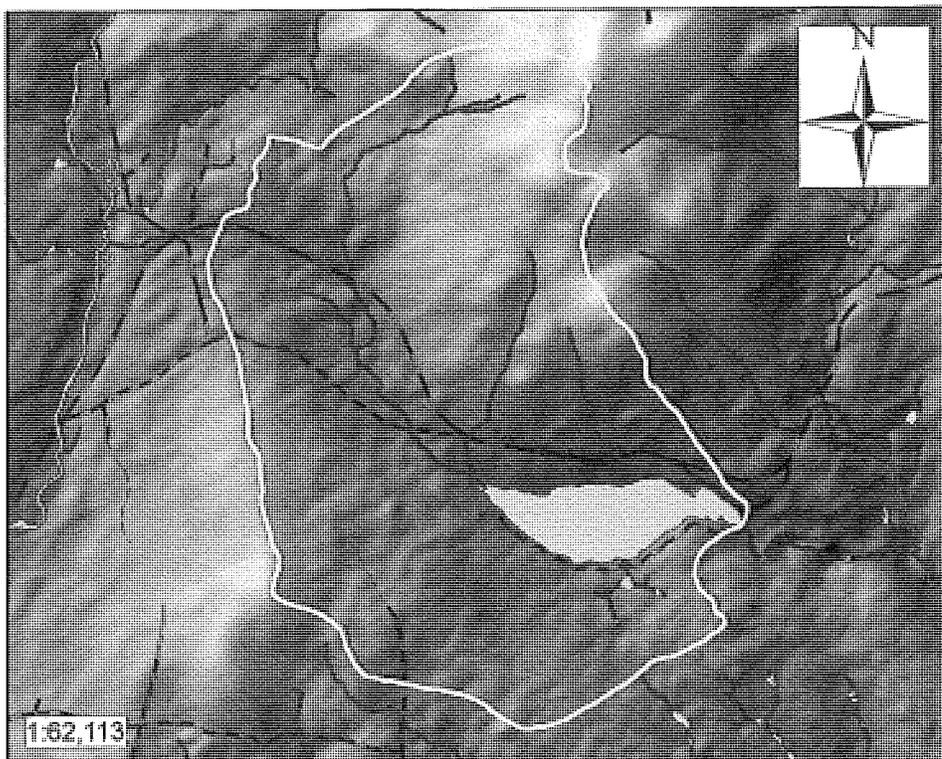
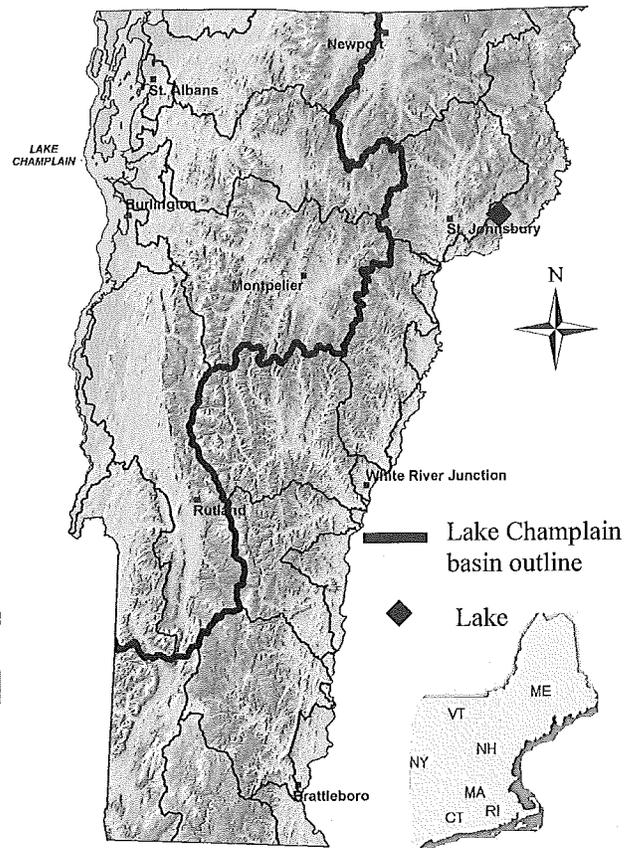
Lay Monitor: Nancy Darrah

Miles Pond is a small, relatively deep, warmwater lake.

Lake Surface Area: 215 acres  
 Drainage Basin Area 4,158 acres  
 Maximum depth: 55 ft. (16.7 m)  
 Average depth: 20 ft. (6 m)

Compared to other lakes, the trophic state is Mesotrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Miles Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1985	9	4.7			9.5
1986	8	4.2	5.3		10
1987	9	4.5	4.3		8.5
1988	9	4.8	5.1		
1989	6				
1990	7				
1991	7				
1992	7				
1993	9	5.5			

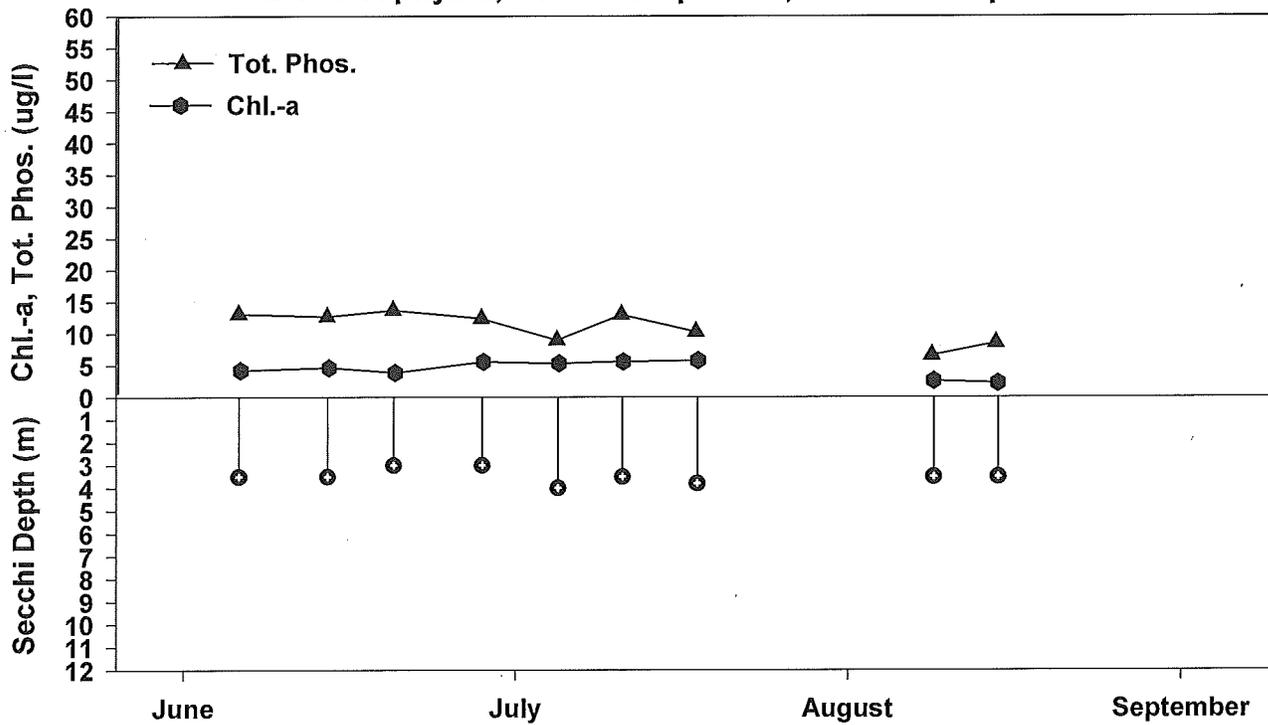
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2007	8	4.8	2.3	10	9.8
2008	7				
2009	9	3.4	2.2	11	
2010	9	4.0	2.8	12	14
2011	9	3.5	1.9	11	14
2012	9	3.5	3.8	11	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	9	3.0	3.5	4.0
Chl-a (ug/l)	9	1.6	3.8	5.2
Summer TP (ug/l)	9	6.6	11	14

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# MIRROR LAKE

Calais, VT

**Lay Monitor:** Ram Verma

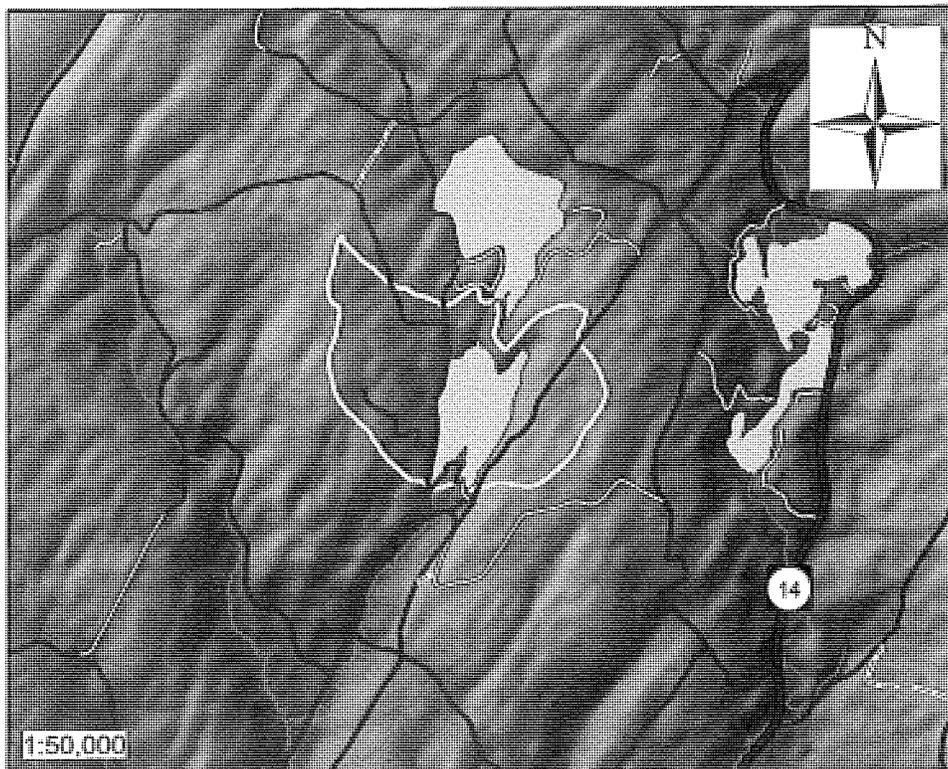
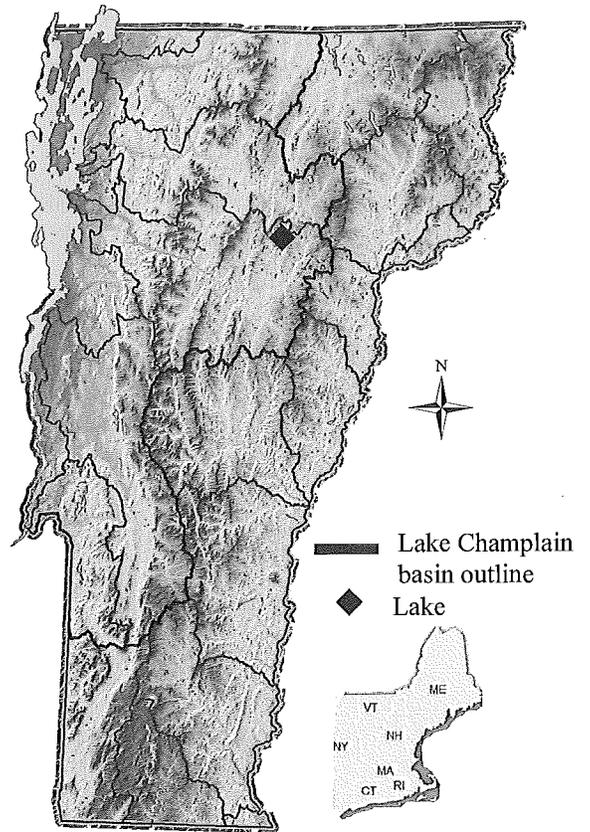
**Former Lay Monitors:** Rowan Jacobson

Miles Pond is a small, relatively deep, warmwater lake.

Lake Surface Area: 85 acres  
 Drainage Basin Area: 3,349 acres  
 Maximum depth: 106 ft. (32 m)  
 Average depth: 43 ft. (13 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
<b>Mesotrophic</b>	<b>3.0 - 5.5</b>	<b>3.5 - 7.0</b>	<b>7.0 - 14</b>
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Lake Mirror

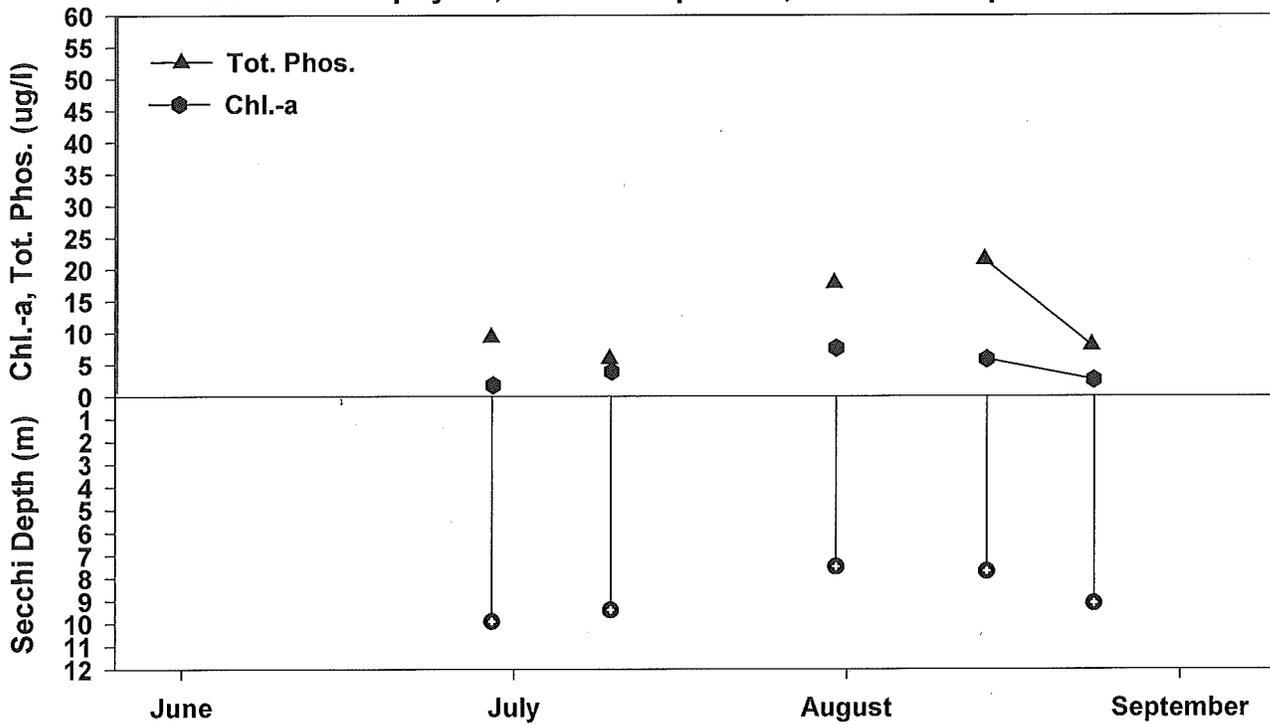
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2004	8	7.3			10
2005	10	7.6	3.4	13	
2012	5				

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	5	7.5	8.7	9.9
Chl-a (ug/l)	5	1.1	3.7	7.0
Summer TP (ug/l)	5	5.9	13	22

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LAKE MOREY

**Fairlee, VT**

**Lay Monitors:** Don Weaver

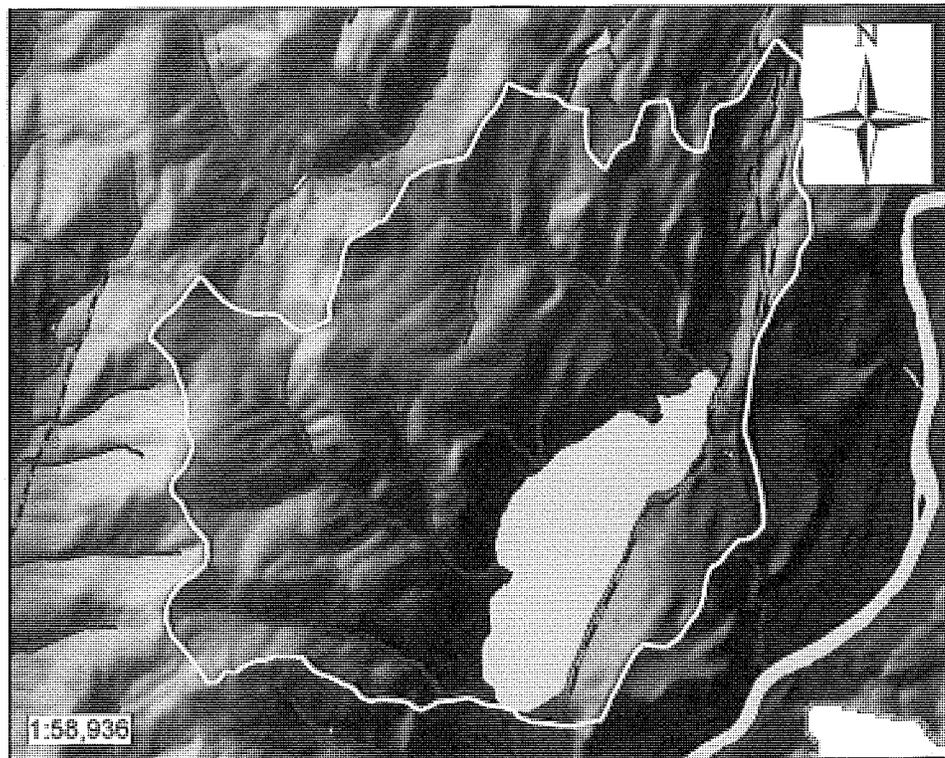
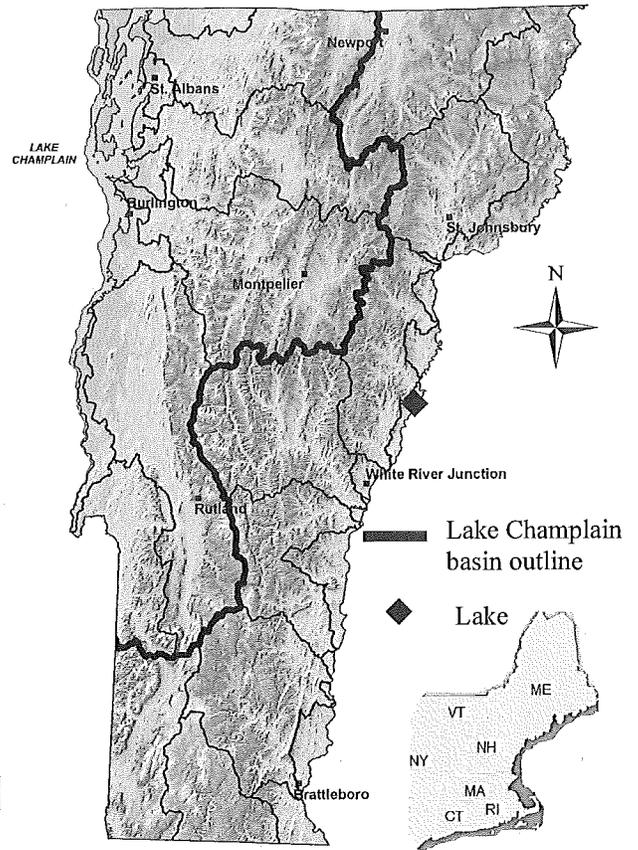
**Former Lay Monitors:** Bill Scott  
Deb Williams

Lake Morey is a large, relatively deep, warmwater lake.

Lake Surface Area: 547 acres  
 Drainage Basin Area: 5,101 acres  
 Maximum depth: 43 ft. (13.1 m)  
 Average depth: 24 ft. (7.3 m)

**Compared to other lakes the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Lake Morey

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	13	5.0	7.4		32
1980	14	2.8	12		20
1981	14	4.3	12		48
1982	8		7.6		46
1983	7				39
1984	9	4.2	15		37
1985	12	1.6	31	68	58
1986	13	4.7	4.5	18	39
1987	13	6.7	8.3	13	9.0
1988	12	6.0	2.2	13	12
1989	8	6.6	17		17
1990	11	7.9		15	16
1991	9	6.7	4.6	15	12
1992	7				11
1993	10	7.2	3.4	13	12
1994	8	8.2	1.8	13	
1995	8	8.6	2.4	16	12
1996	8	7.5			11
1997	9	8.2	2.8	12	11
1998	9	8.0	2.5	14	12
1999	9	8.3	6.7	13	

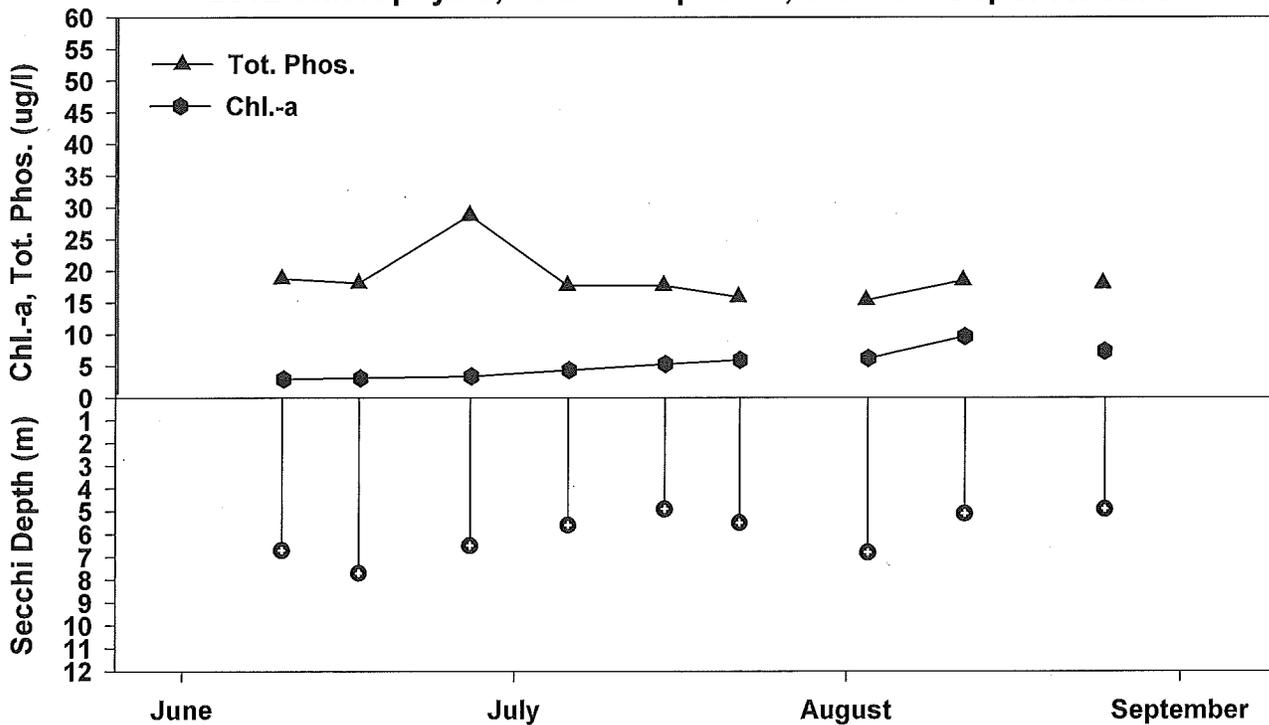
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	9	7.9	8.0	22	
2001	9	8.1	2.4	15	
2002	9	7.1	6.3	17	10
2003	9	7.2	4.2	20	15
2004	9	7.7	3.3	16	14
2005	9	8.4	2.2	18	12
2006	9	6.0	5.0	25	
2007	9	7.8	2.3	14	14
2008	9	8.1	2.3	16	12
2009	9	6.9	2.3	18	17
2010	9	6.5	3.6	17	30
2011	9	6.4	2.9	18	
2012	9	6.0	4.8	19	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	9	4.9	6.0	7.7
Chl-a (ug/l)	9	2.3	4.8	9.1
Summer TP (ug/l)	9	15	19	29

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# NELSON POND

Calais and Woodbury, VT

**Lay Monitor:** Chris Bean

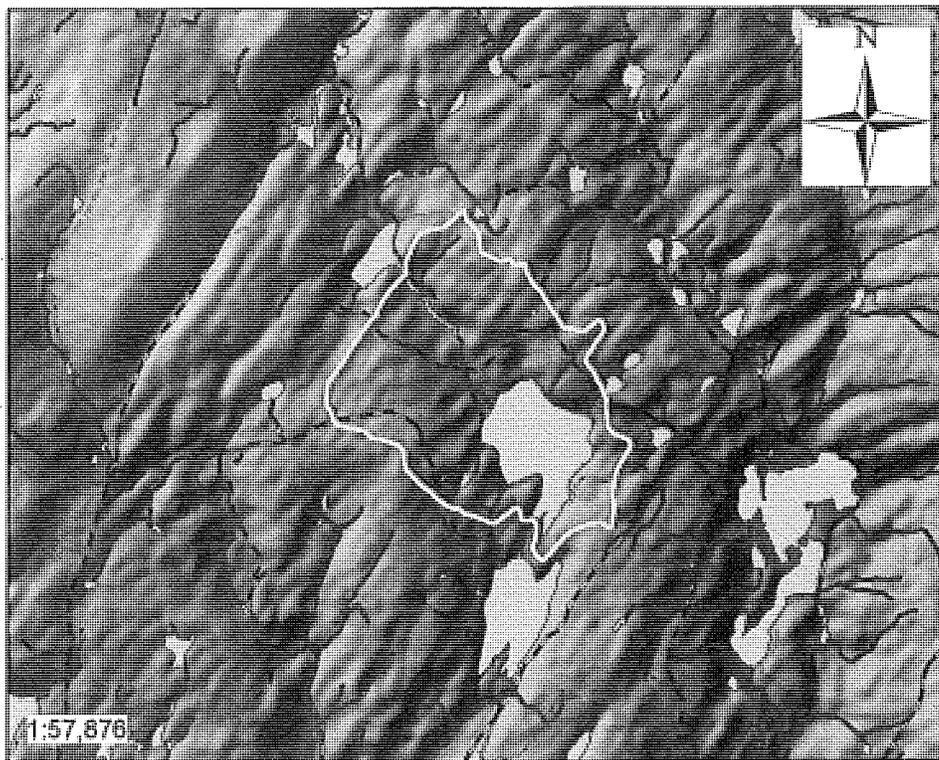
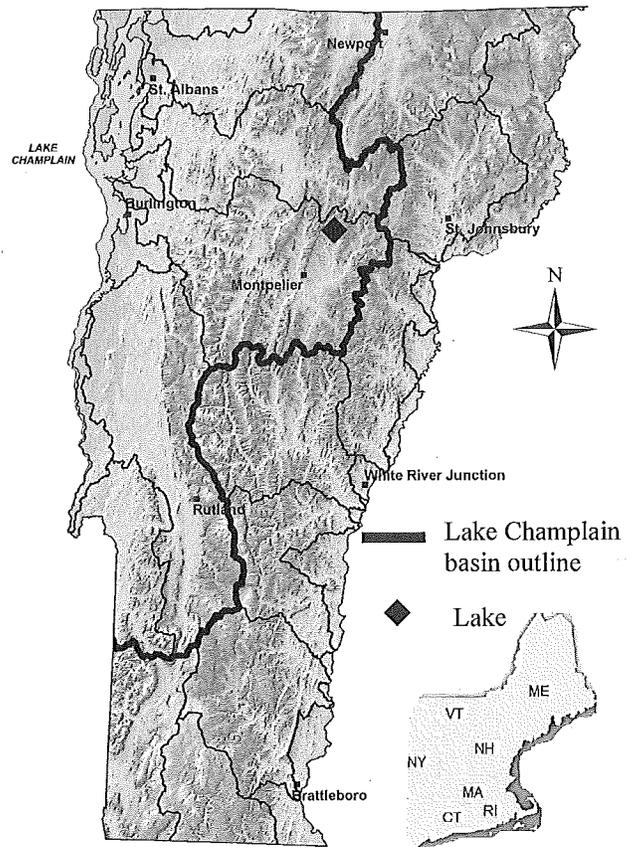
**Former Lay Monitors:** Doug Stitely  
Jan Brough

Nelson Pond, also known as Forest Lake, is a moderately sized, deep, coldwater lake.

Lake Surface Area: 133 acres  
 Drainage Basin Area: 2,827 acres  
 Maximum depth: 97 ft. (29.6 m)  
 Average depth: 49 ft. (14.9 m)

**Compared to other lakes, the trophic state is Oligotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Nelson Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	6				5.0
1980	6				3.5
1990	10	7.4	3.4	7.6	8.0
1991	6				7.5
1992	10	9.2	1.3	8.3	5.5

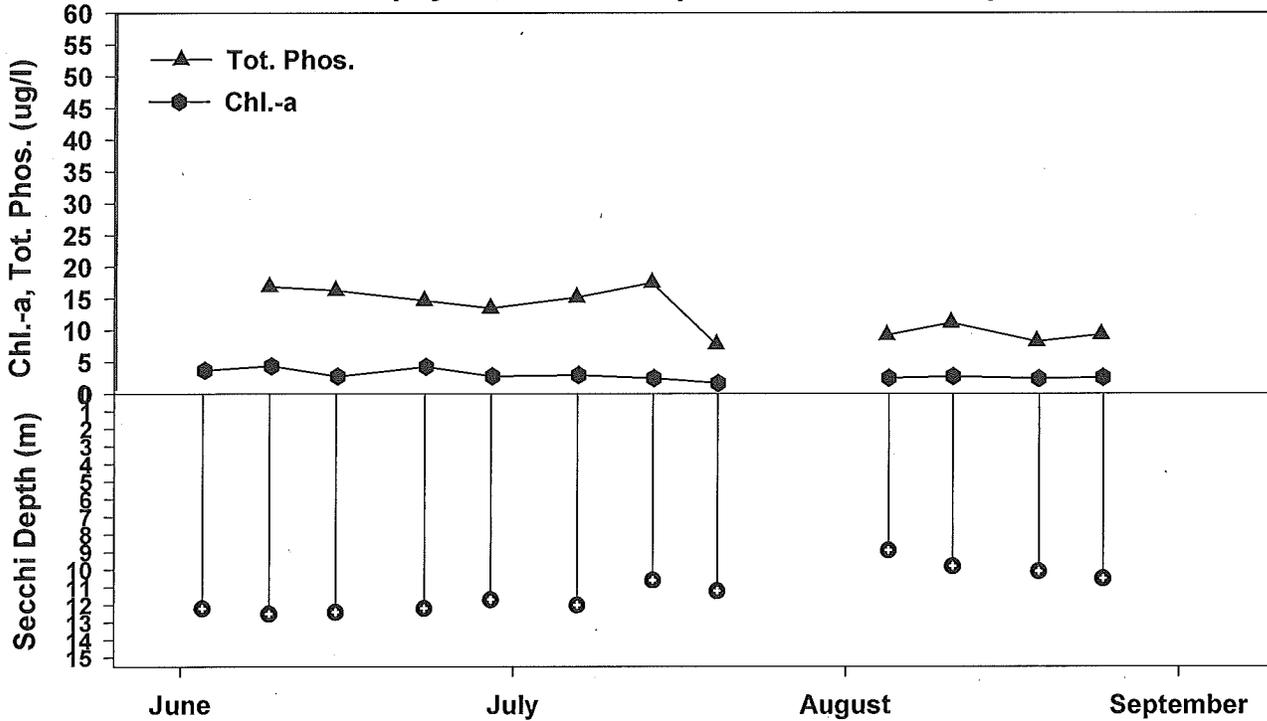
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	10	8.8	1.9	12	
2001	12	9.1	2.0	8.1	
2002	11	9.1	3.0	11	
2003	11	11	1.9	12	
2004	12	10.0	2.1	17	7.0
2005	11	11	1.9	18	6.5
2006	11	11	1.9	18	8.7
2007	12	10	1.5	17	12
2008	11	10	2.8	19	
2009	11	11	1.1	15	9.5
2010	12	12	1.3	16	8.1
2011	12	9.6	2.6	20	
2012	12	11	2.3	13	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	12	8.9	11	13
Chl-a (ug/l)	12	1.0	2.3	3.8
Summer TP (ug/l)	11	7.8	13	18

**2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time**



# NEWARK POND

Newark, VT

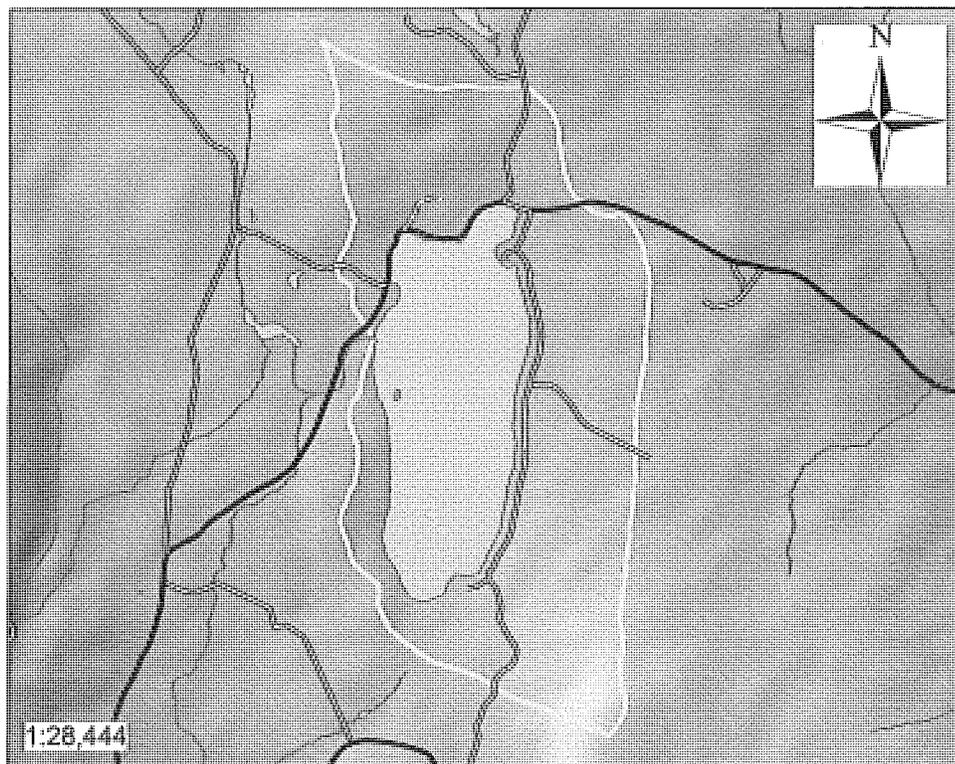
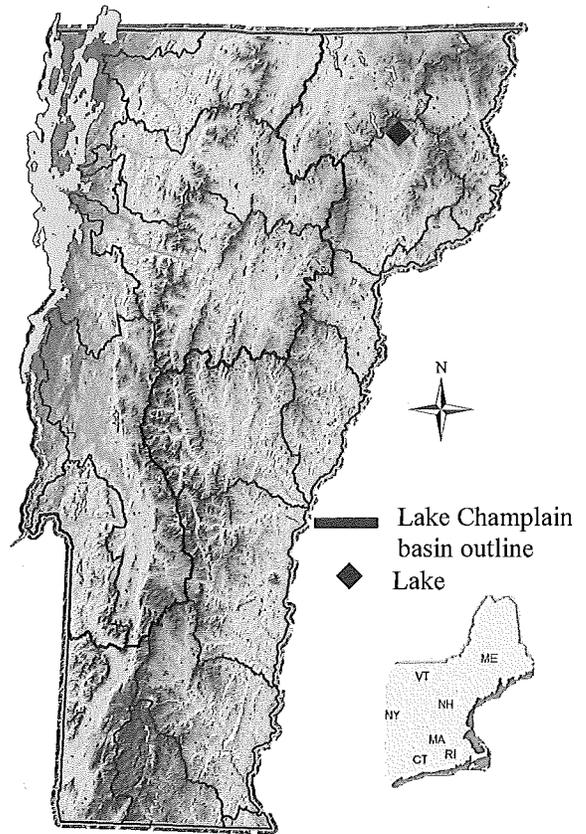
**Lay Monitors:** Libby and Don Welch  
**Former Lay Monitors:**

Nichols Pond is a moderately sized, deep, coldwater lake.

Lake Surface Area: 153 acres  
 Drainage Basin Area: 554 acres  
 Maximum depth: 31 ft. (9.4 m)  
 Average depth: 14 ft. (4.3m)

**Compared to other lakes the trophic state is Oligotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Newark Pond

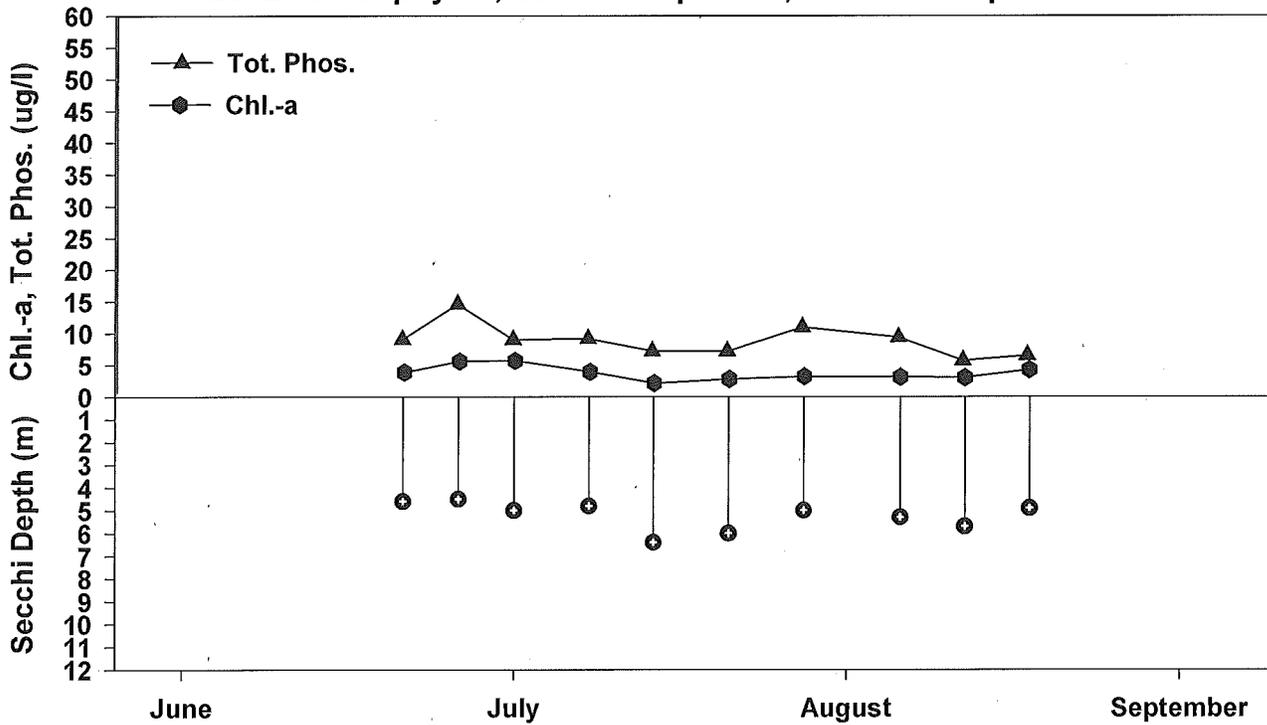
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2012	10	5.2	3.1	8.9	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	10	4.5	5.2	6.4
Chl-a (ug/l)	10	1.5	3.1	5.1
Summer TP (ug/l)	10	5.7	8.9	15

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# NICHOLS POND

Woodbury, VT

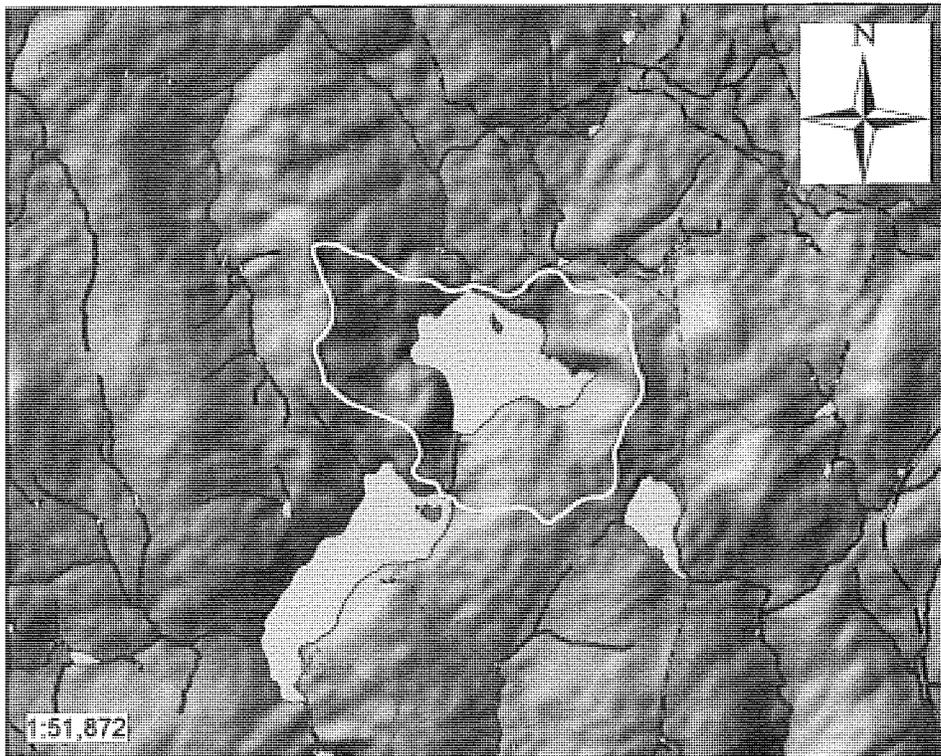
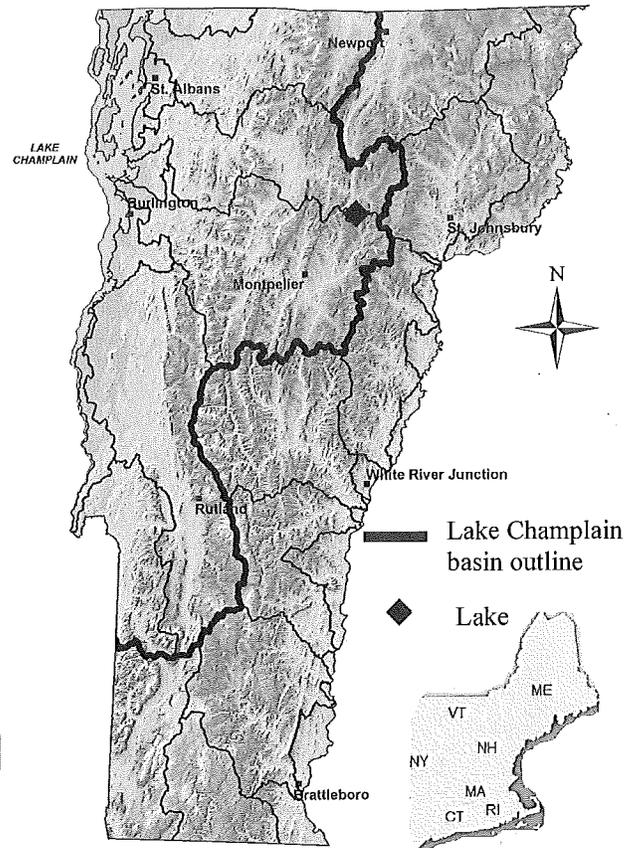
**Lay Monitors:** Michael Gray  
 Ellie Hayes  
**Former Lay Monitors:** Doug Stitely

Nichols Pond is a moderately sized, deep, coldwater lake.

Lake Surface Area: 171 acres  
 Drainage Basin Area: 2,920 acres  
 Maximum depth: 109 ft. (33.2 m)

Compared to other lakes the trophic state is Mesotrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Nichols Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1990	12		9.1	11	9.0
1991	9	6.1	2.7	9.9	7.0
1993	8	7.0	2.8	9.5	
1994	9	6.1	3.3	13	
1995	11	7.5	4.4	9.7	
1997	12	7.8			7.3
1998	10	7.6	8.2	11	10
1999	11	8.2	14	11	

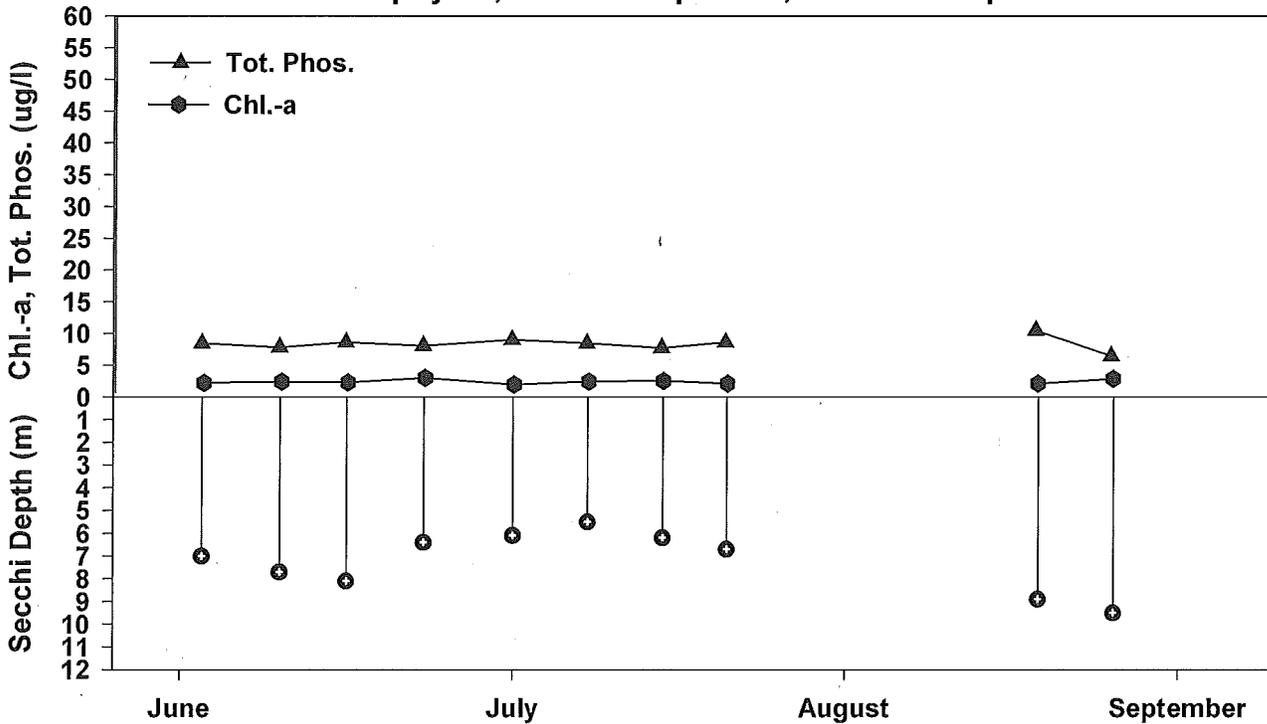
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	11	7.1	6.6	12	
2001	10	8.1	4.1	12	
2002	12	6.9	5.7	11	
2003	12	8.0	7.1	13	
2004	12	8.3	9.3	15	10
2005	8	7.9	8.0	13	
2006	10	8.0	10.0	14	
2007	10	6.2	7.8	15	14
2008	11	6.9	7.8	15	
2009	11	7.0	5.4	12	
2010	12	6.9	3.8	11	11
2011	11	6.2	5.7	12	10
2012	10	7.2	1.7	8.4	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	10	5.5	7.2	9.5
Chl-a (ug/l)	10	1.3	1.7	2.4
Summer TP (ug/l)	10	6.5	8.4	11

## 2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# NORTH MONTPELIER POND

East Montpelier, VT

**Lay Monitor:** Laura Brown

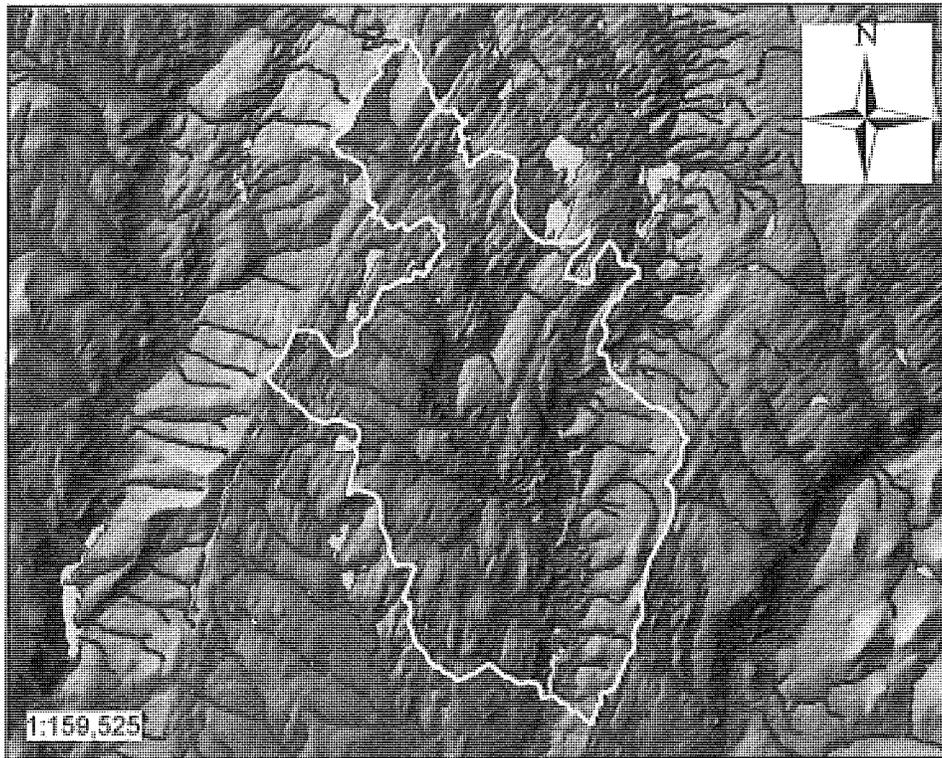
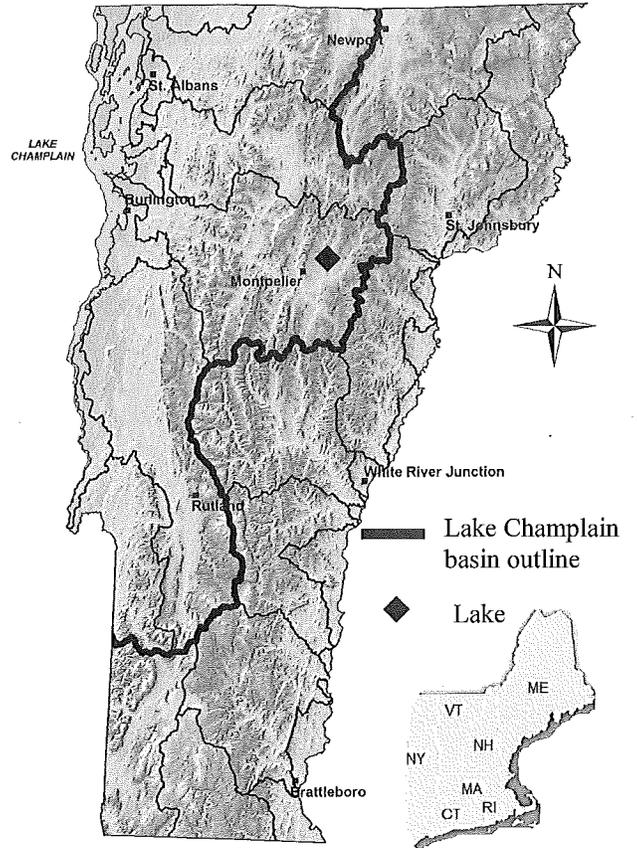
**Former Lay Monitors:** Rose Paul  
George Springston

North Montpelier Pond is a small, warmwater lake.

Lake Surface Area: 72 acres  
 Drainage Basin Area: 32,581 acres  
 Maximum depth: 12 ft. (3.6 m)

**Compared to other lakes the trophic state is Eutrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# North Montpelier Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1997	8	1.7	3.1	17	
1998	9	2.0	1.3	14	
1999	10	2.0	8.9	19	

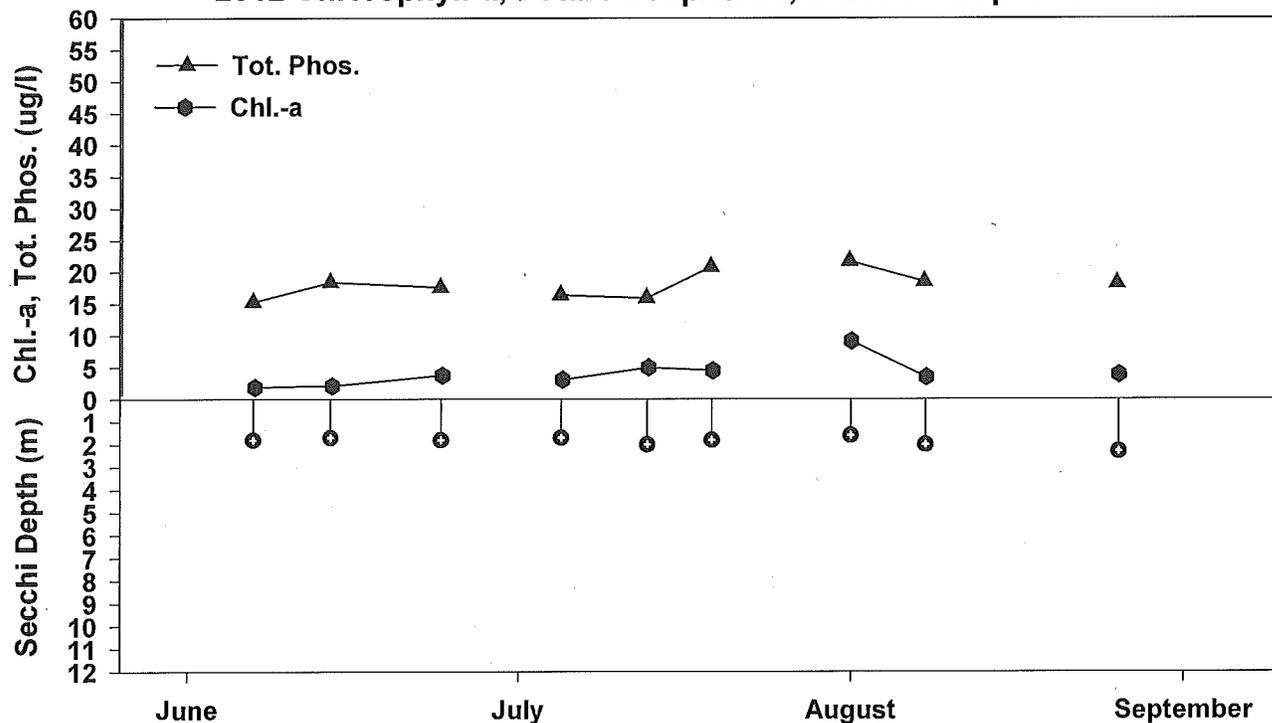
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	9	2.0	6.9	15	
2001	10	2.0	4.4	17	
2005	10	1.3	2.5	17	
2006	9	1.6	1.7	15	
2007	9		2.3	15	
2008	9	1.6	1.3	19	
2009	9	2.0	1.4	17	
2010	9	1.9	4.1	18	18
2011	10	1.6	1.3	20	
2012	9	1.9	3.4	18	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	9	1.6	1.9	2.3
Chl-a (ug/l)	9	1.2	3.4	8.5
Summer TP (ug/l)	9	15	18	22

**2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time**



# LAKE PARKER

**Glover, VT**

**Lay Monitor:** Bob Richards

**Former Lay Monitors:** Bob Johnson  
Marjorie and Arnold Smith

Lake Parker is a relatively large, fairly shallow, warmwater lake.

Lake Surface Area: 250 acres

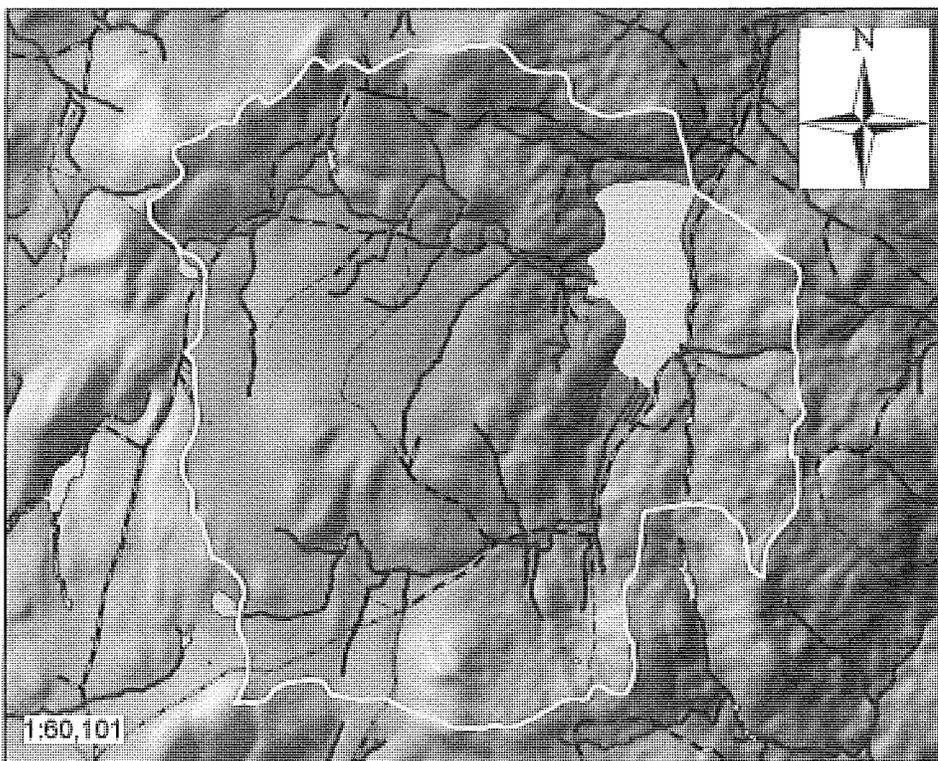
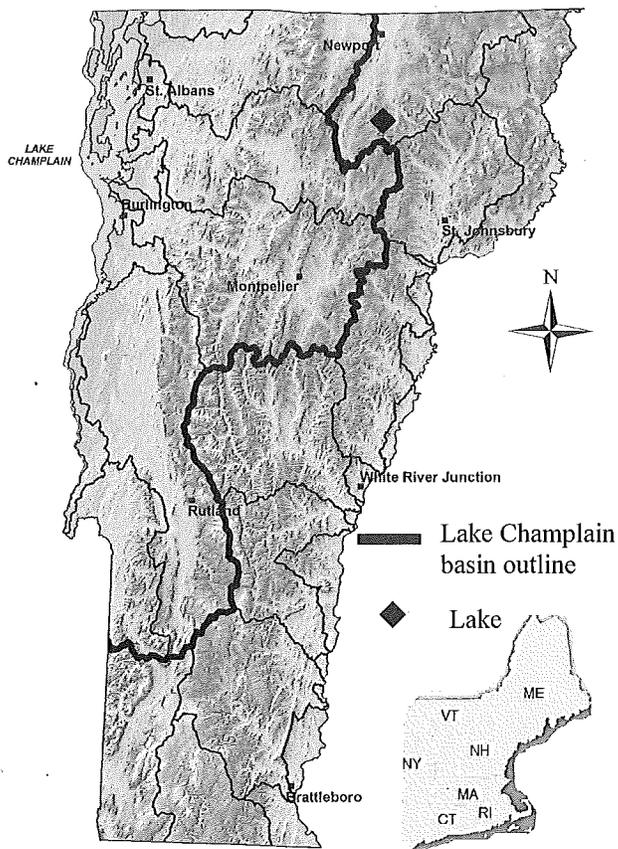
Drainage Basin Area: 5,418 acres

Maximum depth: 45 ft. (13.7 m)

Average Depth: 25 ft. (7.6 m)

**Compared to other lakes, the trophic state is Eutrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Lake Parker

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	18	3.2	6.3		17
1980	13	3.7	7.2		20
1981	13	3.2	5.9		21
1982	13	4.0	5.2		18
1983	13	4.2	5.6	14	15
1984	13	3.6	5.8	15	12
1985	12	5.3	6.9	15	14
1986	12	4.5	6.1	14	13
1987	12	4.0	5.4	16	13
1988	12	2.4	8.0	17	
1989	12	3.8	19	23	
1990	12	2.5	14	20	19
1991	12	4.2	5.9	15	14
1992	13	3.6			
1993	12	4.0	4.8	13	
1994	10	2.7	7.6	16	
1995	11	4.1	8.1	15	19
1996	9	3.5			
1997	9	2.8	5.7	20	16
1998	9	3.4	6.5	21	
1999	11	4.3	8.5	15	17

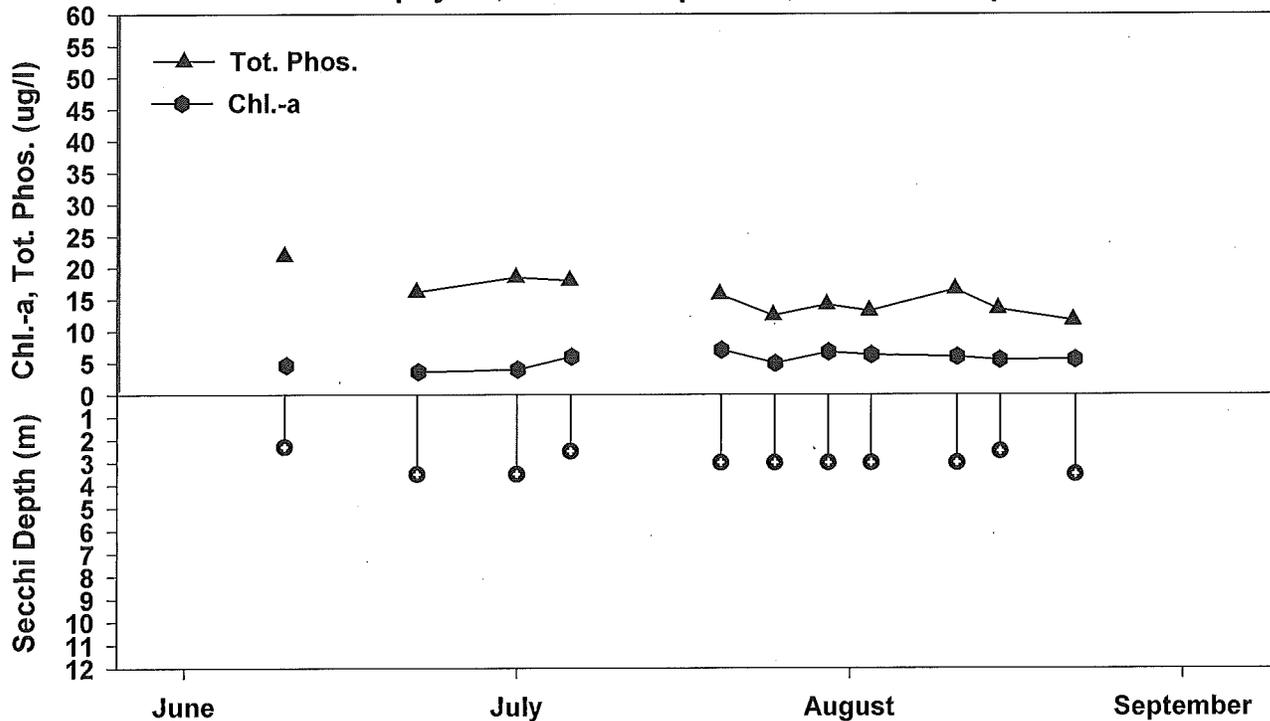
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	12	3.5	6.5	17	21
2001	11	4.3	4.8	17	13
2002	10	3.4	5.4	26	18
2003	12	4.0	16	22	
2004	13	3.3	7.1	17	14
2005	11	3.7	8.0	18	16
2006	12	2.8	8.7	22	17
2007	12	3.5	6.6	17	22
2008	14	2.2	17	25	
2009	15	2.4	6.5	17	18
2010	14	3.1	8.1	22	
2011	14	2.5	8.4	19	
2012	11	3.0	4.8	16	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	11	2.3	3.0	3.5
Chl-a (ug/l)	11	3.0	4.8	6.5
Summer TP (ug/l)	11	12	16	22

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# PEACHAM POND

## Peacham, VT

**Lay Monitor:** John and Martha Winston

**Former Lay Monitors:** Vic and Lu Laprade

Dennis Hendy

Peacham pond is a relatively large, deep lake.

Lake Surface Area: 340 acres

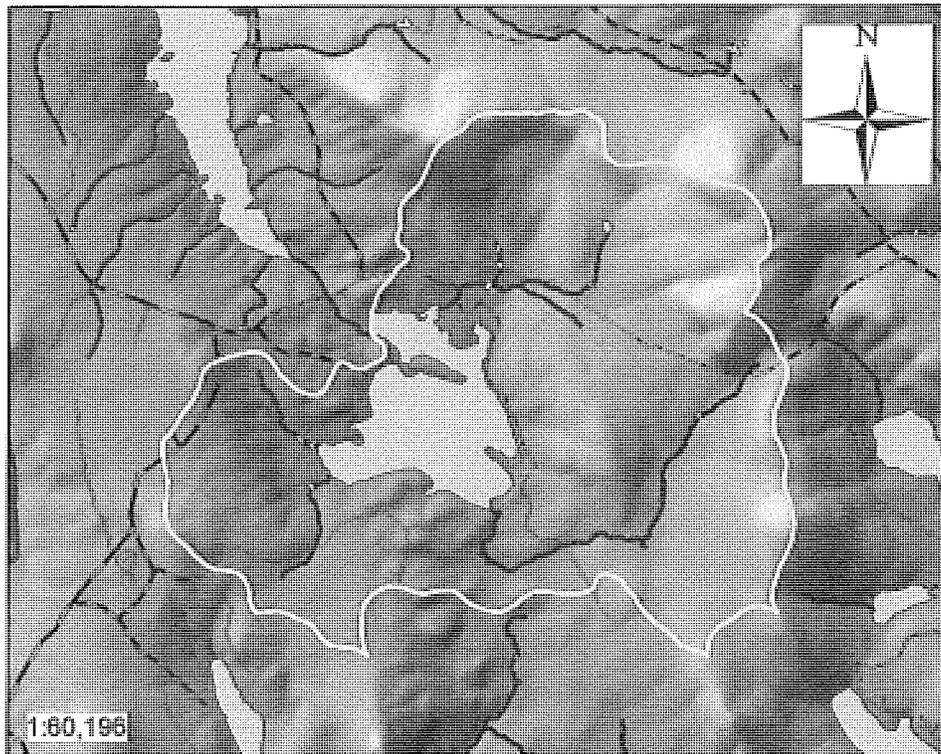
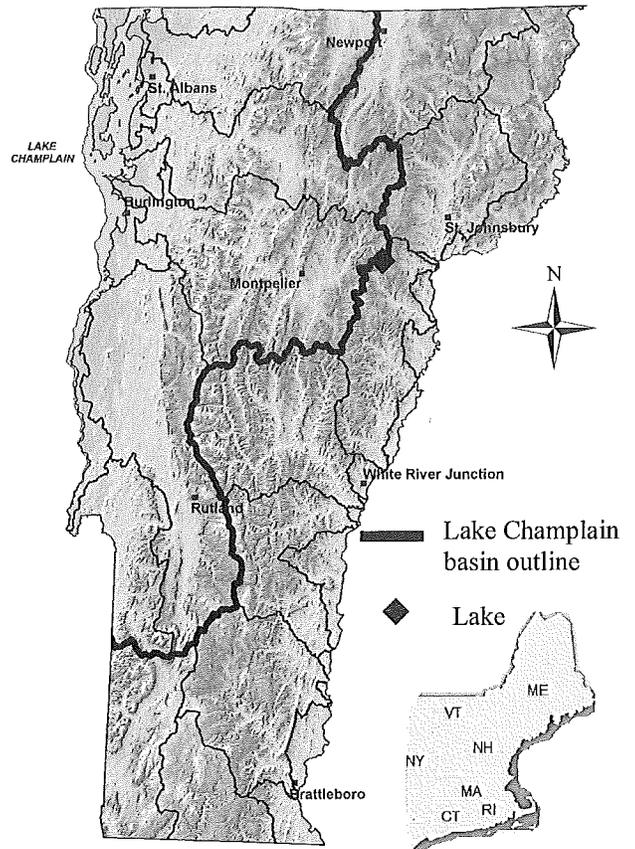
Drainage Basin Area 3,750 acres

Maximum depth: 61 ft. (18.5 m)

Average depth: 20 ft. (6.1 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
<b>Mesotrophic</b>	<b>3.0 - 5.5</b>	<b>3.5 - 7.0</b>	<b>7.0 - 14</b>
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Peacham Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1983	10	4.9			12
1984	13	4.7	3.5		7.7
1985	11	5.5	3.7		8.3
1986	9	5.2	2.6		
1987	12	5.3	3.0		
1988	10	5.2	3.7		

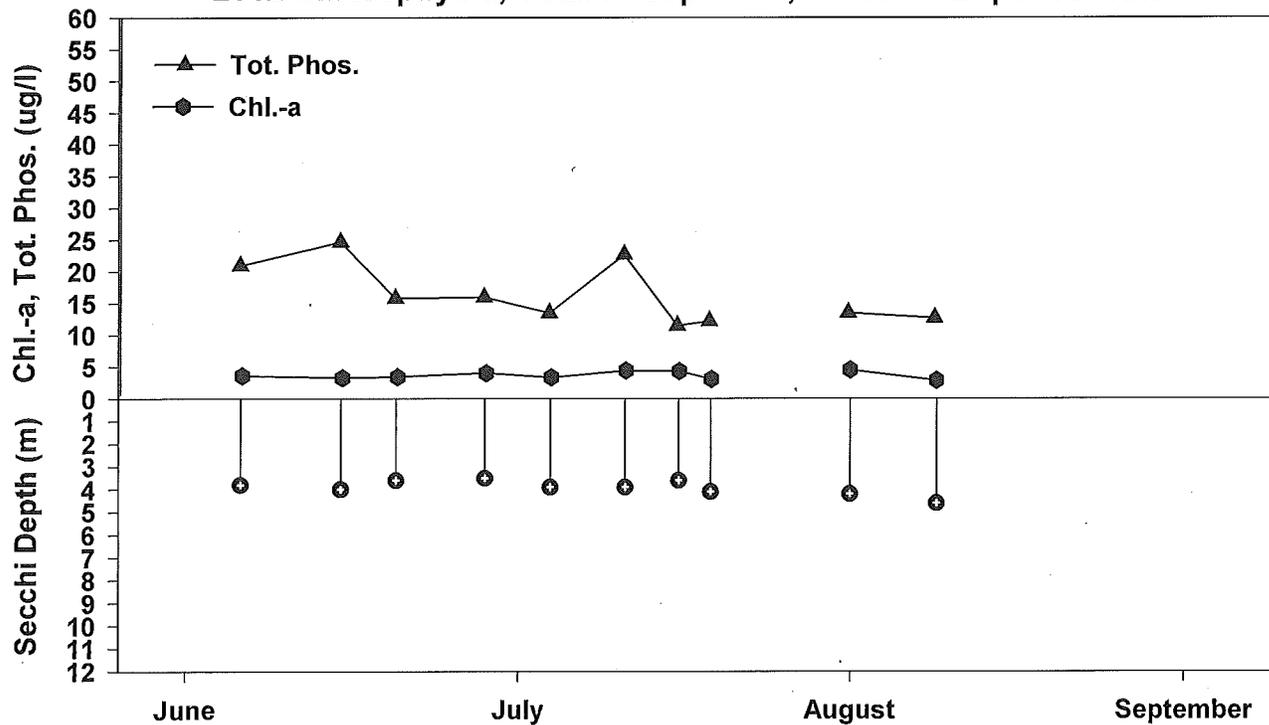
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2001	12	4.5	3.6	14	
2002	11	4.3	3.5	10	8.6
2003	10	4.6	4.6	12	
2004	10	4.3	5.6	12	
2005	10	4.5	5.7	12	
2006	10	4.3	4.3	16	
2008	8	3.7	4.4	17	10
2009	10	3.6	3.4	16	
2010	10	4.3	3.1	15	
2011	9	3.7		13	
2012	10	3.9	3.1	16	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	10	3.5	3.9	4.6
Chl-a (ug/l)	10	2.2	3.1	3.9
Summer TP (ug/l)	10	12	16	25

### 2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# PERCH POND

Benson, VT

**Lay Monitors:** Dwight Fowler

**Former Lay Monitors:** John Molnar

Gordon and Harriet Mitchell

Ginny Shaw

Perch Pond is a small relatively deep warmwater lake.

Lake Surface Area: 24

Drainage Basin Area: 110

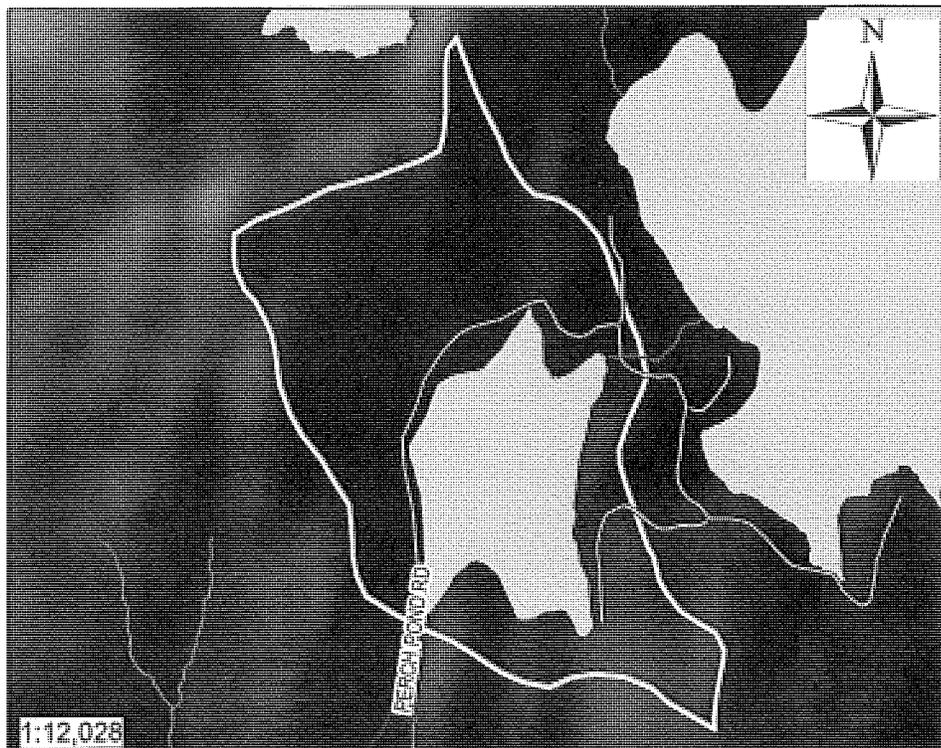
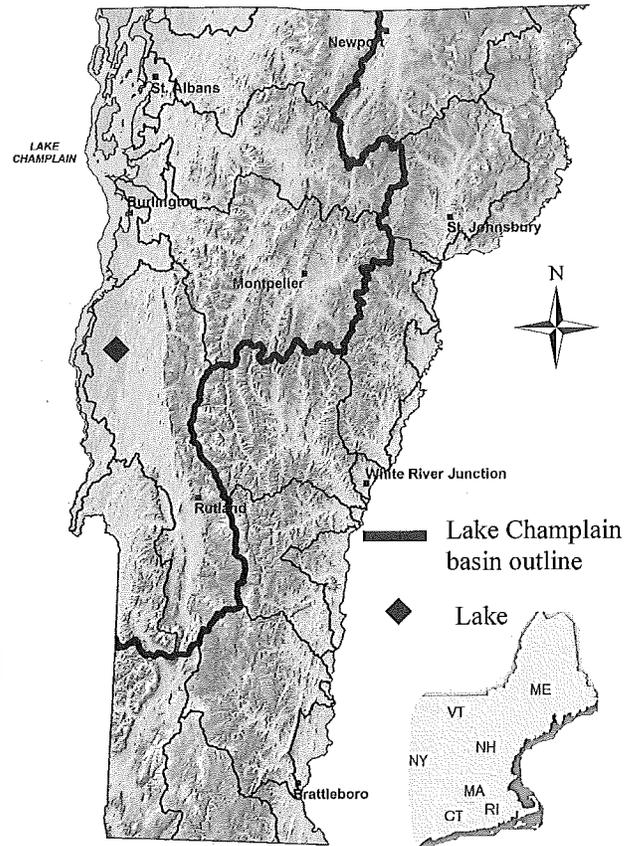
Maximum Depth: 44ft. (3.3 m)

Average Depth: 16 ft. (4.8 m)

**Compared to other lakes, the trophic state is:**

Oligotrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Perch Pond

## Annual Data

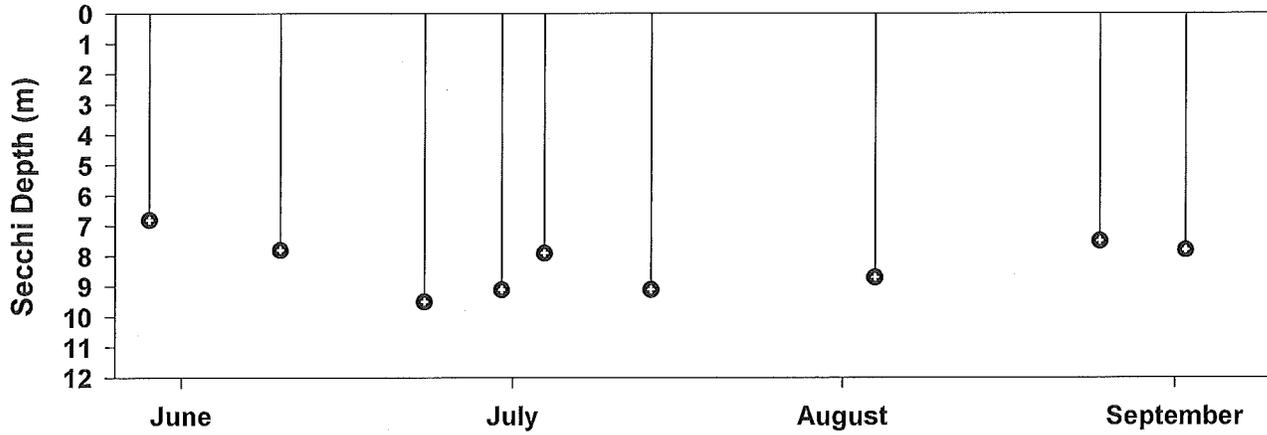
Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1983	12	6.6			8.0
1984	6				11
1986	14	6.8	2.6		8.5
1987	13	5.8	2.2		
1988	13	7.0	2.5		
1989	12	6.4	2.8		
1998	8	6.3			
1999	9	8.5			

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	8	6.1			
2003	9	7.8			12
2004	10	6.6			
2005	11	8.1			11
2009	9	7.3			
2010	10	8.2			
2011	10	7.7			8.3
2012	9	8.2			

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	9	6.8	8.2	9.5



# RAPONDA

Wilmington, VT

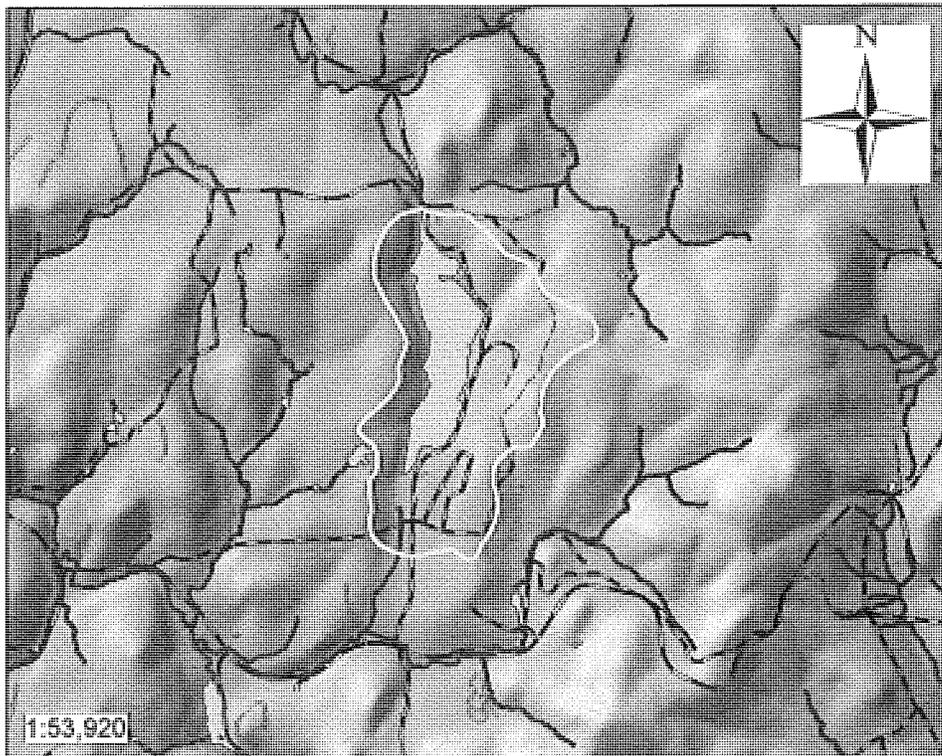
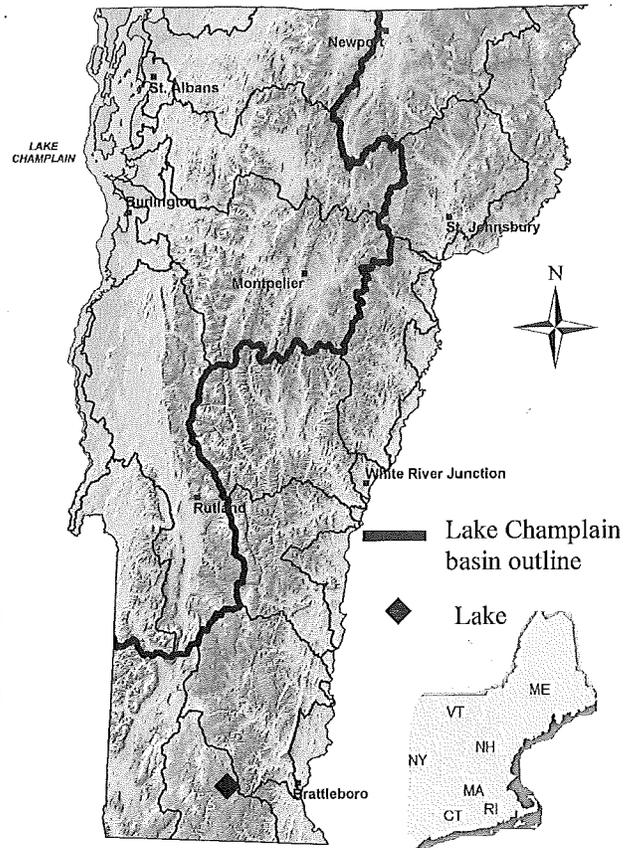
Lay Monitor: Cindy Meyer

Raponda is a moderately sized, warmwater lake.

Lake Surface Area: 121 acres  
 Drainage Basin Area: 616 acres  
 Maximum depth: 12 ft. (3.7 m)  
 Average Depth: 8 ft. (2.4 m)

Compared to other lakes, the trophic state is Mesotrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Lake Raponda

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1980	13		2.5		11
1981	13		2.8		9.3
1982	12		2.2		5.7
1983	10		3.2		7.3
1984	11	3.3	3.0		8.7
1991	12				

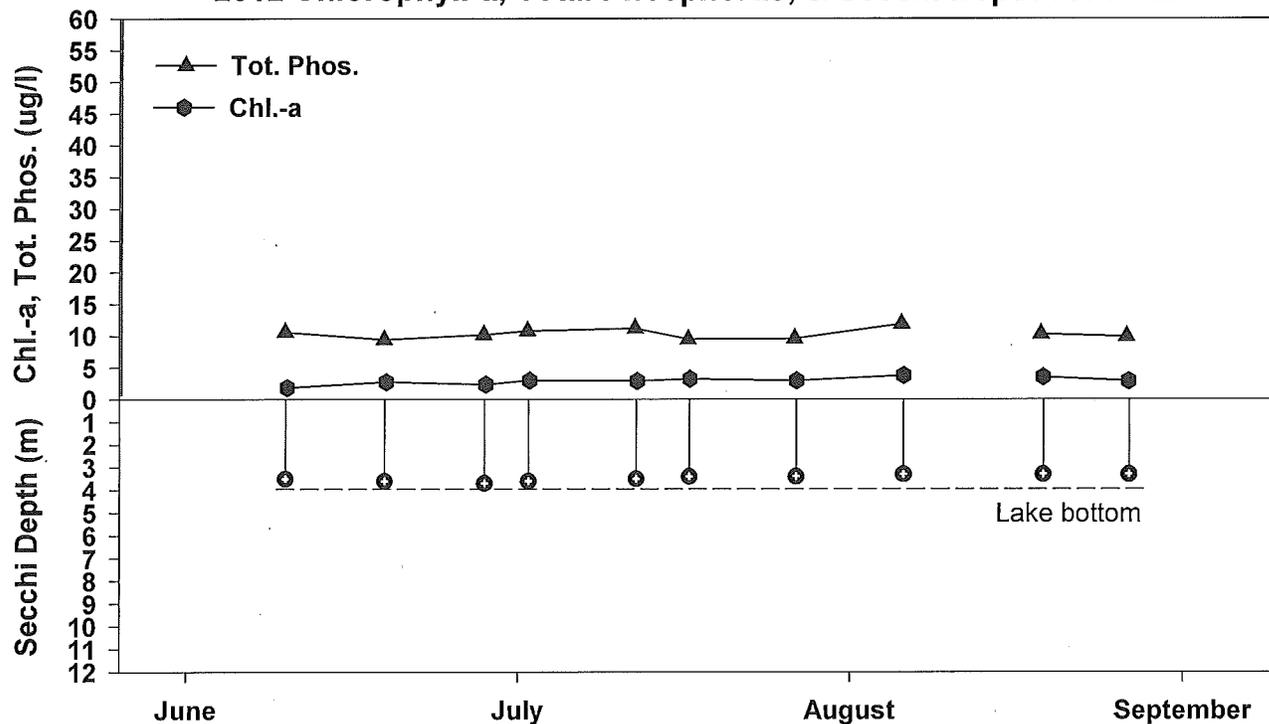
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2002	11		2.1	13	
2003	10		2.2	18	
2004	10		2.6	9.7	
2005	9		1.9	10	
2006	10	3.3	3.2	14	11
2007	9		5.8	12	
2008	11	3.5	2.1	13	
2009	11	3.4	2.9	12	
2010	11	3.4	2.9	11	
2011	8	3.3	3.0	12	
2012	10		2.3	10	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	10	3.3	3.5	3.7
Chl-a (ug/l)	10	1.2	2.3	3.1
Summer TP (ug/l)	10	9.4	10	12

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LAKE RESCUE

## Ludlow, VT

**Lay Monitors:** Jim and Janine Norman

**Former Monitors:** David Hearne

Lake Rescue is a moderately sized, natural lake.

Lake Surface Area: 180 acres

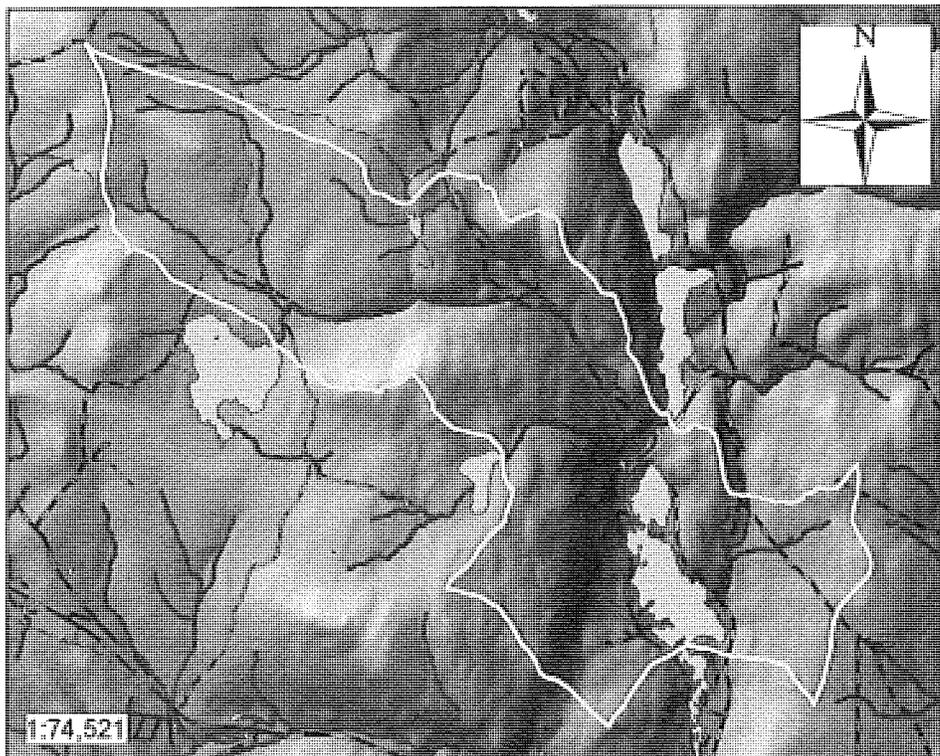
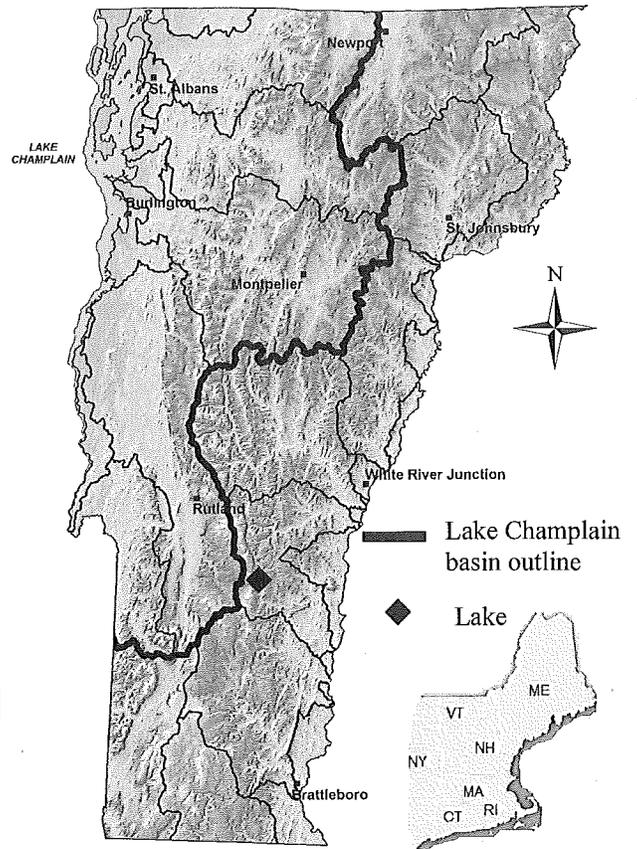
Drainage Basin Area: 22,859 acres

Maximum depth: 90 ft. (27 m)

Average Depth: 40 ft. (12 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g}/\text{l}$	< 7.0 $\mu\text{g}/\text{l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Rescue Lake

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	16	5.5			5.5
1980	6				6.0

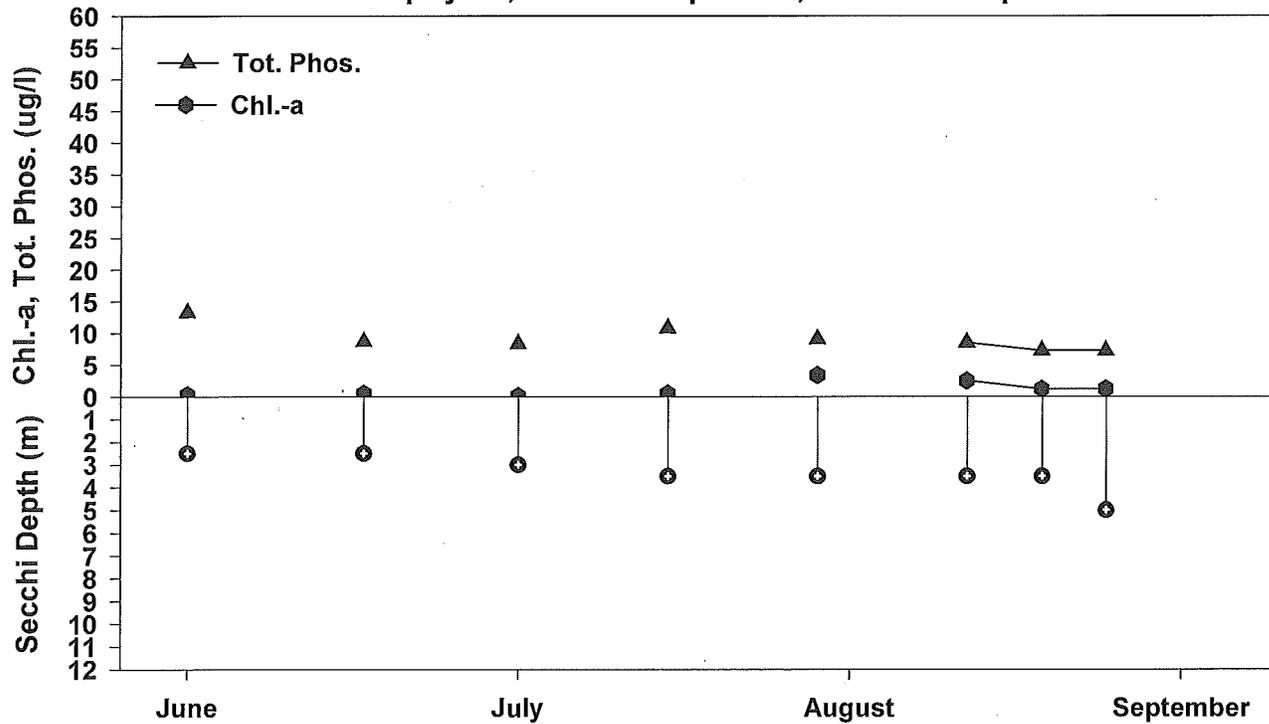
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2005	11	4.0			9.4
2006	11	2.8	4.0	10	
2007	11	4.8	3.8	7.5	8.6
2008	10	4.0	3.5	10	8.1
2009	10	3.4	3.5	10	8.9
2010	10	3.7	4.8	11	
2011	10	3.1		34	
2012	8	3.4	4.2	9.2	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	8	2.5	3.4	5.0
Chl-a (ug/l)	8	1.6	4.2	9.2
Summer TP (ug/l)	8	7.3	9.2	13

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LAKE RUNNEMEDE

**Windsor, VT**

**Lay Monitor:** Andrew Robbins

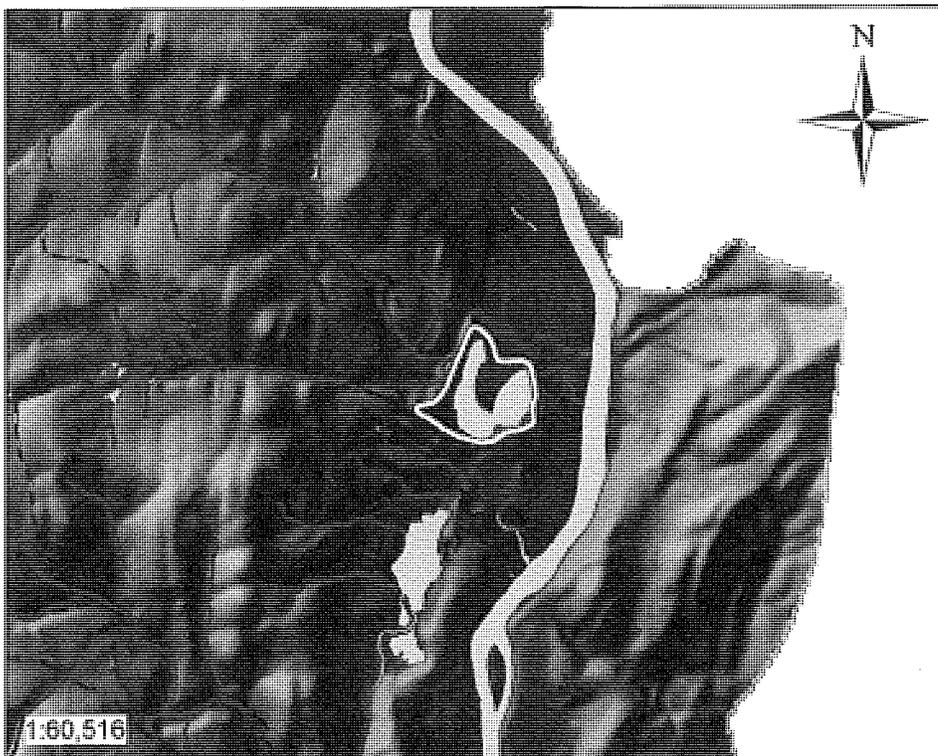
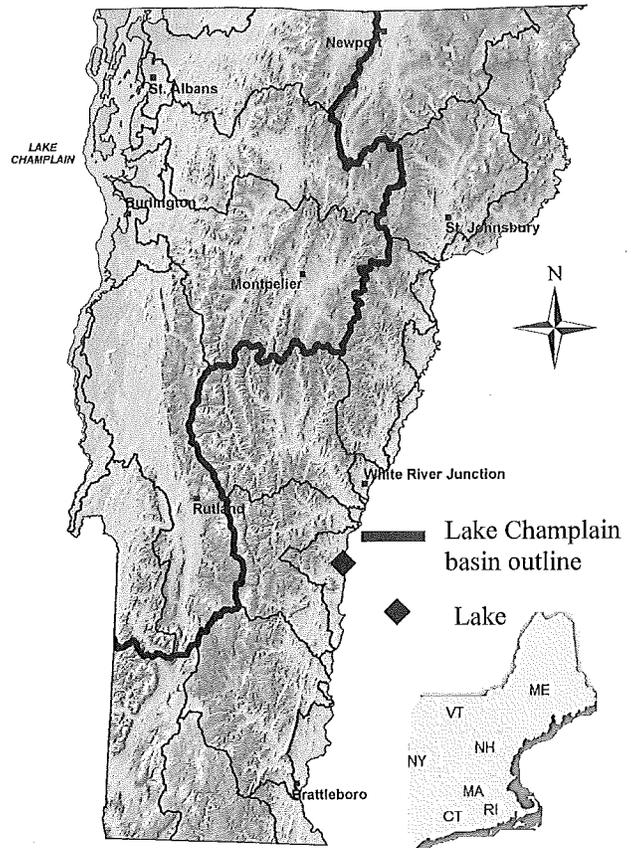
**Former Lay Monitors:** Micheal Quinn  
Donna Ewald

Runnemede is a small, warmwater lake.

Lake Surface Area: 62 acres  
 Drainage Basin Area: 133 acres  
 Maximum depth: 13 ft. (3.9 m)  
 Average Depth: 13 ft. (3.9 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g}/\text{l}$	< 7.0 $\mu\text{g}/\text{l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Lake Runnemedede

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1991	8		1.5	13	
1998	6				

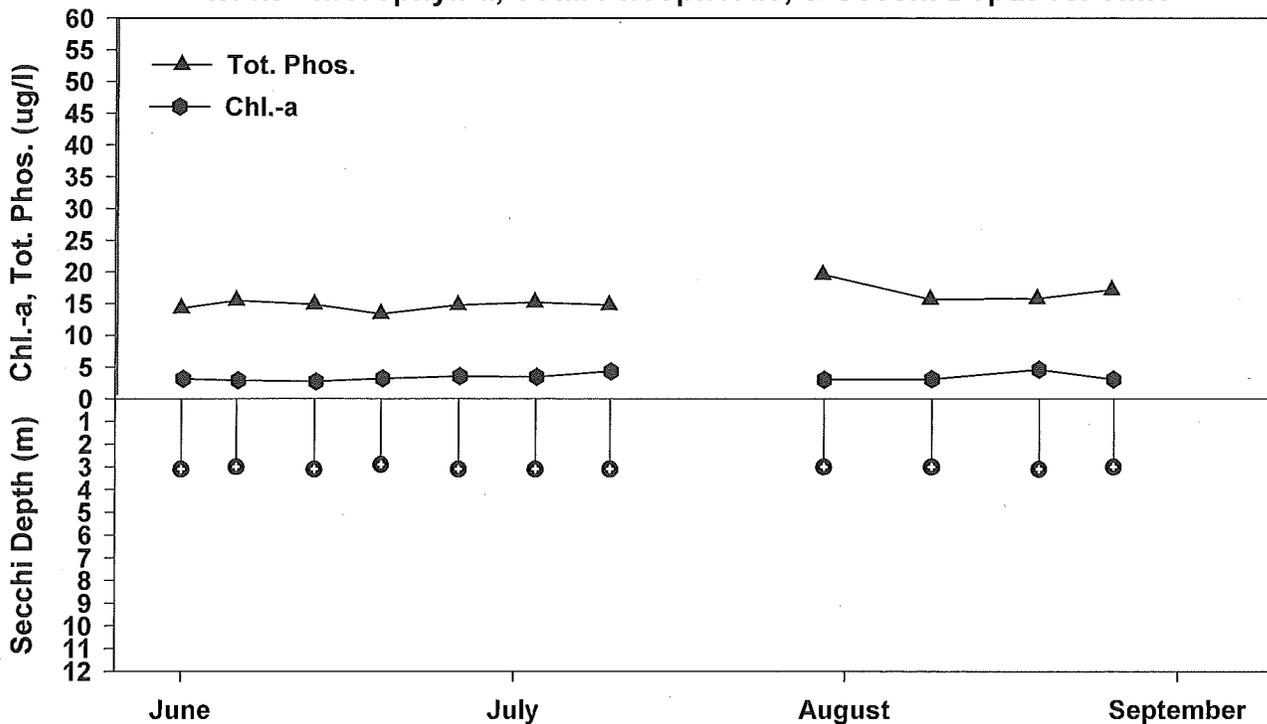
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	16	2.7	2.6	14	19
2001	19		2.0	14	
2002	19		1.7	14	
2003	17	3.1	3.6	16	
2004	16		3.2	12	
2005	18	3.4	2.6	14	
2006	16		2.5	13	
2007	15		2.5	13	
2008	17		2.3	17	20
2009	15		2.7	17	
2010	13		3.2	21	
2011	12		2.8	20	
2012	11		2.7	16	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	11	2.9	3.0	3.1
Chl-a (ug/l)	11	2.1	2.7	4.0
Summer TP (ug/l)	11	13	16	20

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LAKE SALEM

Derby, VT

**Lay Monitors:** Claire Roberts  
Paula Staples

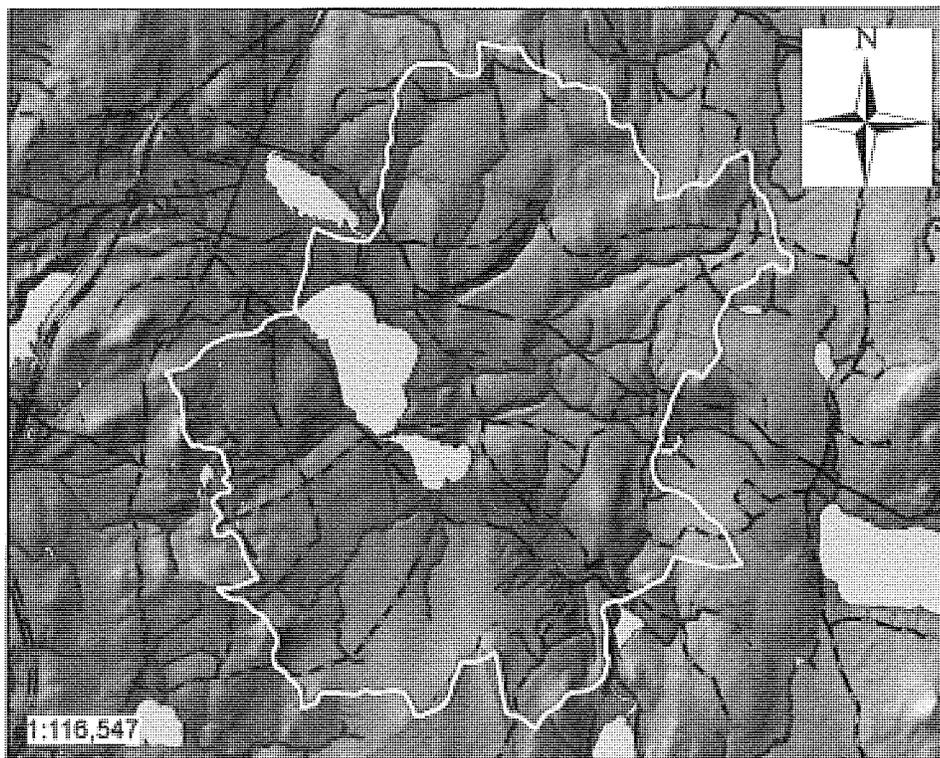
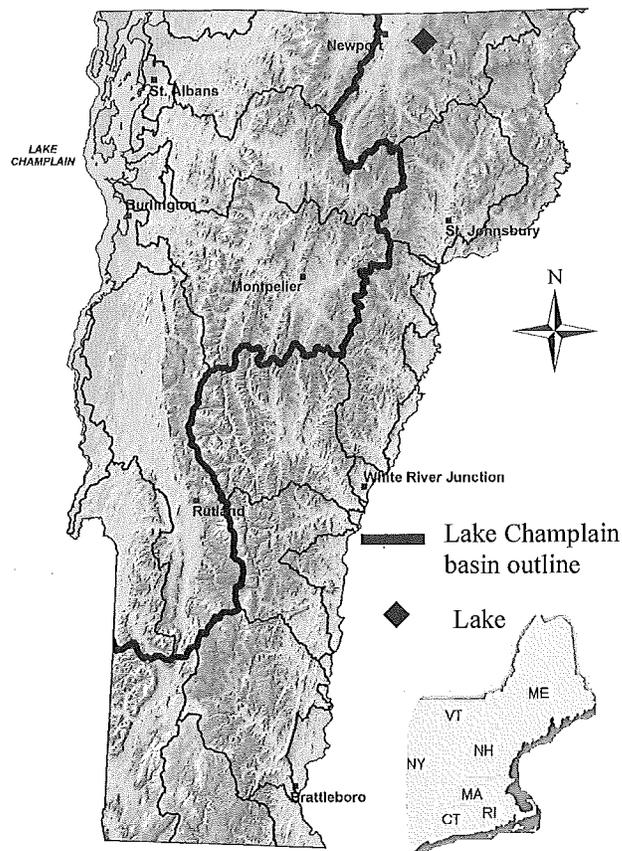
**Former Lay Monitors:** David Wood  
Bobbie Cummings  
Raymond Stabb  
Ted and Marni Surdy

Lake Salem is a large, warmwater lake.

Lake Surface Area: 764 acres  
 Drainage Basin Area: 84,133 acres  
 Maximum depth: 70 ft. (21.3 m)  
 Average Depth: 20 ft. (6.1 m)

Compared to other lakes, the trophic state is Mesotrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Lake Salem

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	7				3.0
1980	8	5.7			10
1985	13	4.8	3.2		10
1986	13	5.0	1.5		11
1987	11	3.1	2.2		13
1988	12	4.4	2.5		
1989	12	4.5	4.4		
1990	12	4.3	3.2		
1991	10	4.2			
1992	12	4.6			
1999	9	5.1			9.8

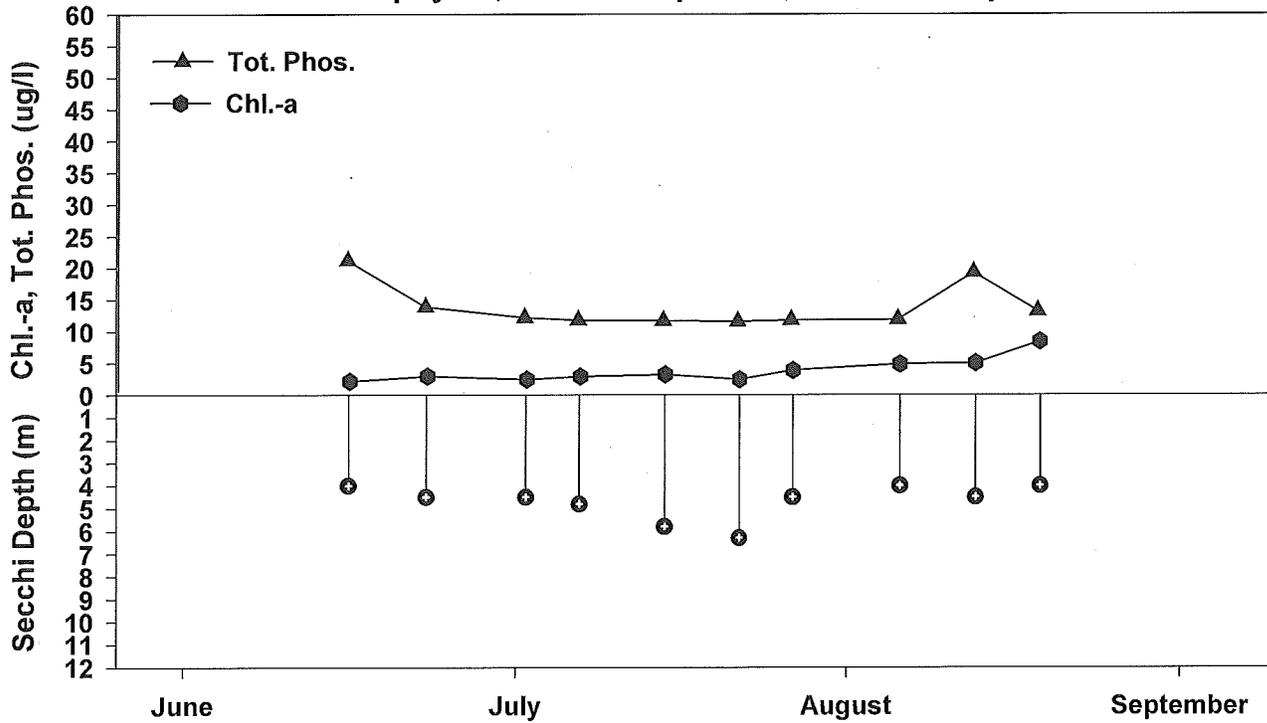
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	9	5.2	2.1	12	11
2001	10	5.9	2.5	9.8	
2002	9	5.5	1.0	13	
2003	11	5.4	3.6	11	
2004	12	5.1	2.9	11	11
2005	11	5.0	4.0	12	
2006	12	4.0	1.6	13	
2007	10	4.6	1.8	11	13
2008	11	4.0	3.2	18	
2009	10	4.1	2.5	18	
2010	9	5.4	2.7	16	
2011	8	4.7		14	
2012	10	4.7	3.2	14	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	10	4.0	4.7	6.3
Chl-a (ug/l)	10	1.5	3.2	7.8
Summer TP (ug/l)	10	12	14	21

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LAKE ST. CATHERINE

## Poultney and Wells, VT

**Lay Monitor:** Mary Jo Teeter

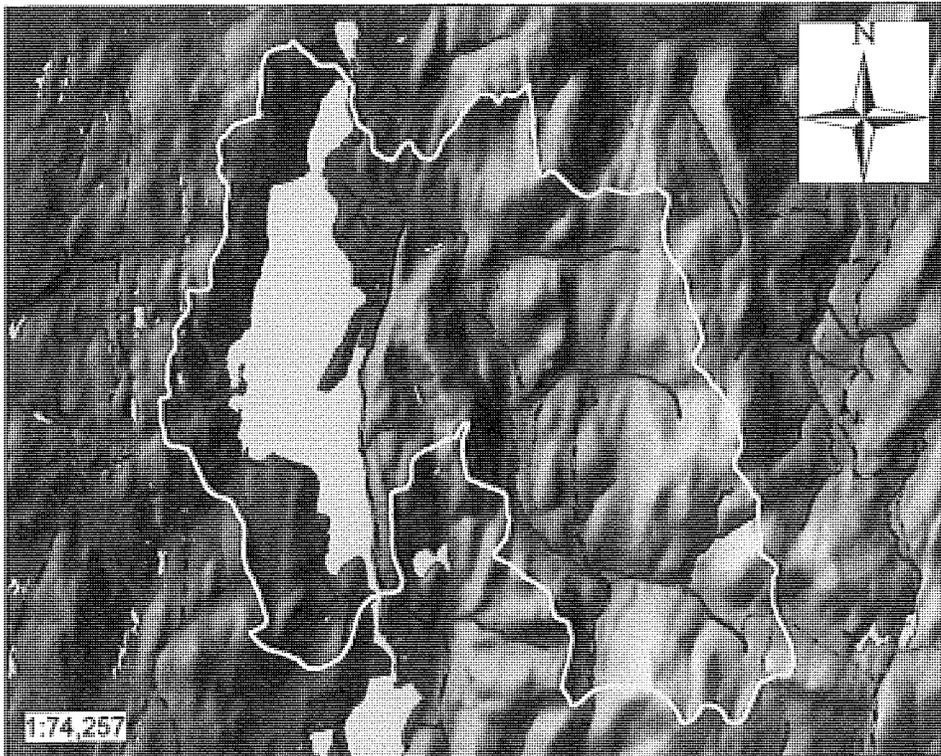
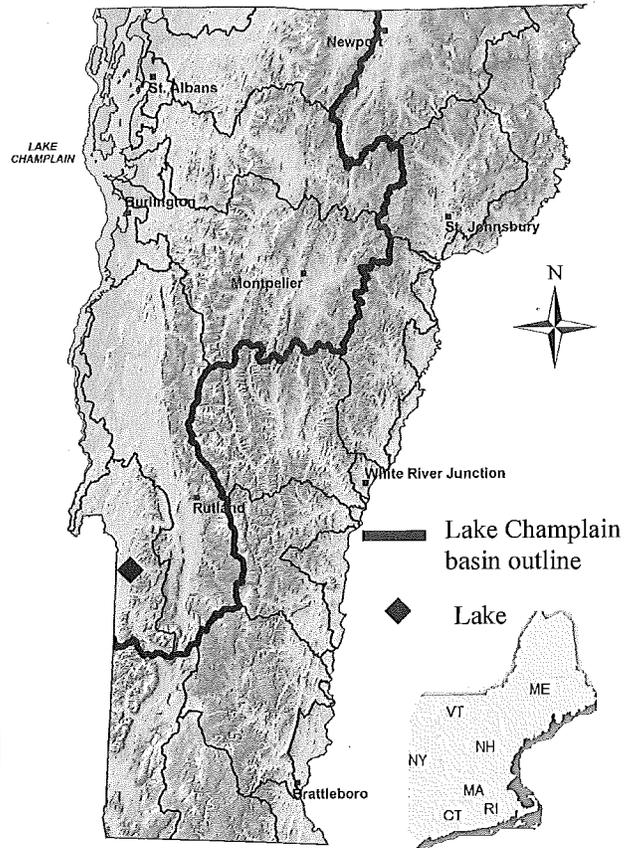
**Former Lay Monitors:** Phil Alden  
Harry Spindler  
Vincent Meyers

Lake St. Catherine is a large, coldwater lake.

Lake Surface Area: 904 acres  
 Drainage Basin Area: 7,447 acres  
 Maximum depth: 68 ft. (19.5 m)  
 Average Depth: 37 ft. (10.7 m)

Compared to other lakes, the trophic state is Mesotrophic

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Lake St. Catherine

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	19	6.1	3.2		10
1980	14	6.5	3.3		12
1981	14	5.5	4.8		17
1982	13	4.7	5.1		19
1983	13	6.4	4.4	16	16
1984	13	5.3	3.6		15
1985	13	5.9	3.8	14	13
1986	13	5.4	5.3	13	12
1987	12	6.7			17
1993	13	6.6			
1994	12	5.5			10
1995	10	6.5			15
1996	13	6.3	4.4	11	16
1997	7				
1998	11	4.3	4.1	16	15
1999	12	3.9	6.3	17	15

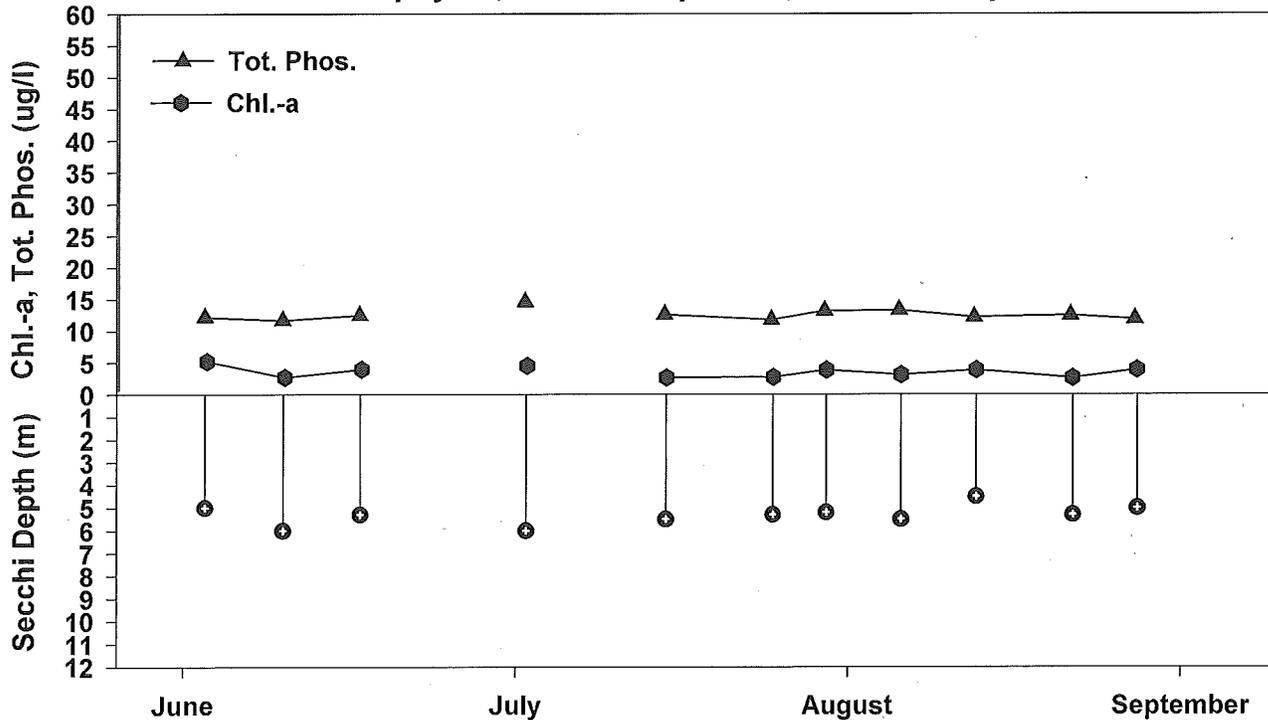
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	10	3.7	6.3	17	13
2001	11	4.5	4.3	18	9.8
2002	11	3.9	4.3	19	14
2003	11	3.8	6.7	20	
2004	10	4.5	3.9	17	14
2005	8	5.0			14
2006	10	3.9	4.1	13	17
2007	10	4.4	4.1	15	18
2008	9	4.4	2.9	14	12
2009	11	5.1	3.6	15	16
2010	11	4.4	3.7	14	
2011	8			11	
2012	11	5.3	2.9	13	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	11	4.5	5.3	6.0
Chl-a (ug/l)	11	2.0	2.9	4.6
Summer TP (ug/l)	11	12	13	15

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LITTLE LAKE of LAKE ST. CATHERINE

**Poultney and Wells, VT**

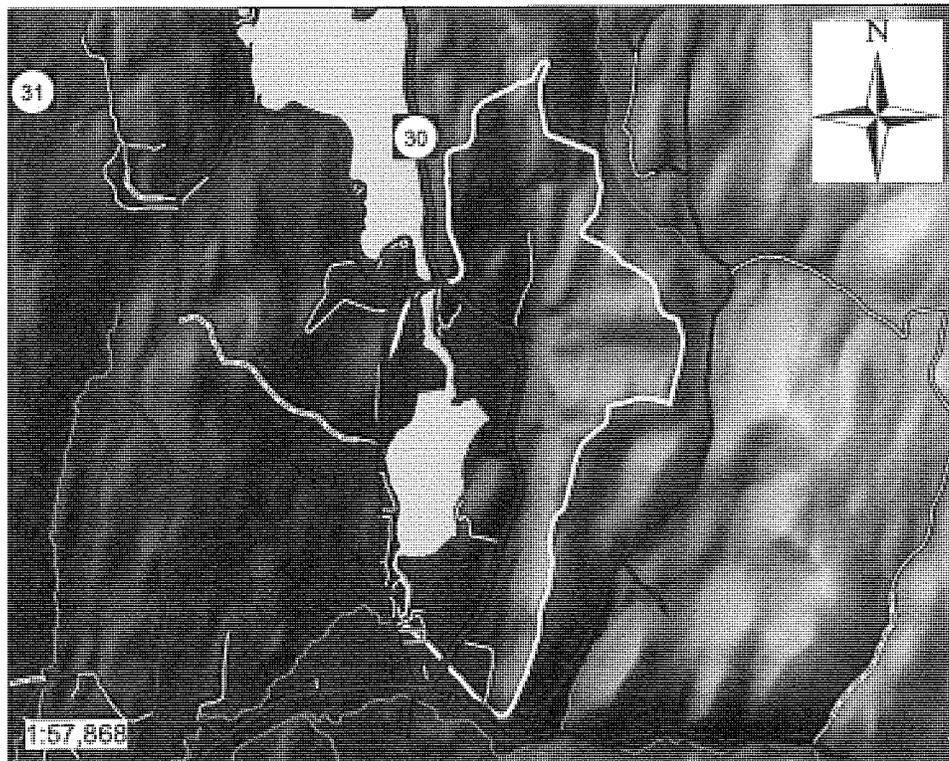
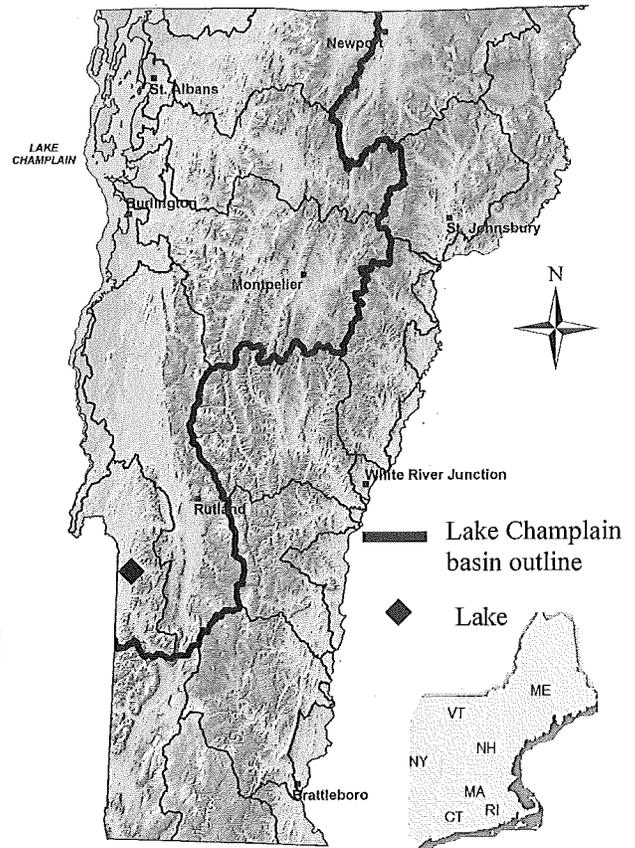
**Lay Monitor:** Mary Jo Teeter

Little Lake is a small, shallow, warm water lake.

Lake Surface Area: 162 acres  
 Drainage Basin Area: 8,989 acres  
 Maximum depth: 5ft. (1.5 m)  
 Average Depth: 4ft. (1.2 m)

**Compared to other lakes, the trophic state is Eutrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Little Lake

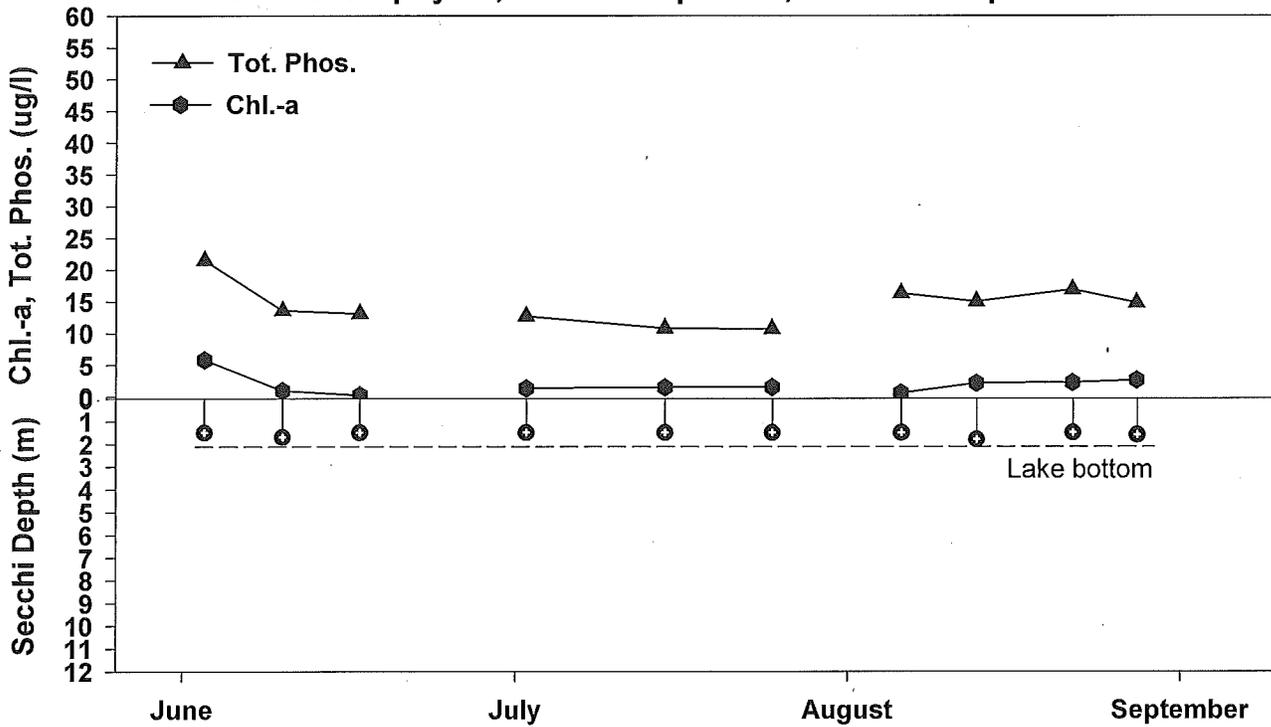
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2009	11		3.4	18	12
2010	11		3.9	18	
2011	7				
2012	10		2.5	15	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	10	1.5	1.6	1.8
Chl-a (ug/l)	10	0.8	2.5	6.4
Summer TP (ug/l)	10	11	15	22

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# SEYMOUR LAKE

## Morgan and Charleston, VT

**Lay Monitor:** Tom Emery

**Former Lay Monitors:** Joseph and Anna Puente

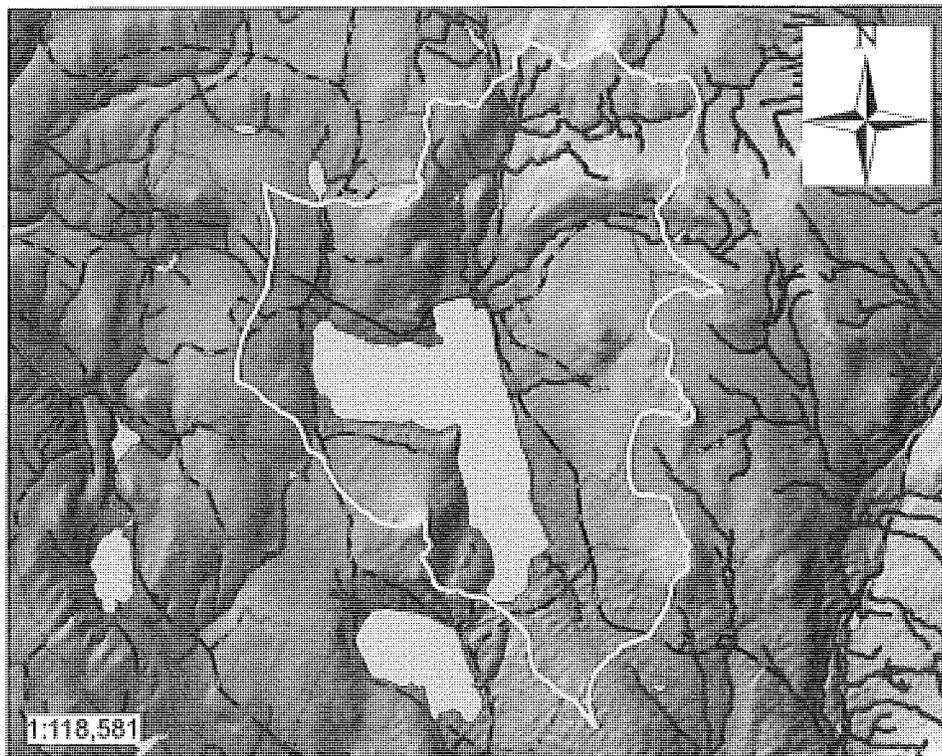
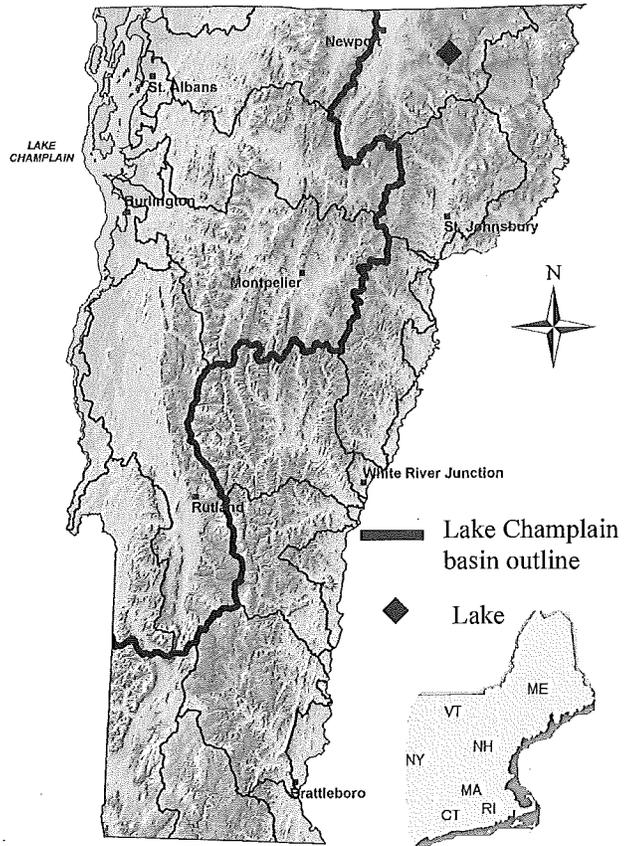
Dan Barry  
Andrew Emery  
Robert Arnold  
Harold Kimball

Seymour Lake is a large, deep, coldwater lake.

Lake Surface Area: 1,769 acres  
Drainage Basin Area: 12,920 acres  
Maximum depth: 167 ft. (50.9 m)  
Average Depth: 70 ft. (21.3 m)

**Compared to other lakes, the trophic state is Oligotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Seymour Lake

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	15	7.4	1.3		7.7
1980	13	8.5	2.8		8.7
1981	13	8.0	2.8		5.3
1982	13	7.8	4.5		10
1983	14	8.4	2.8		7.7
1984	13	8.3	2.3		8.3
1985	13	9.0	2.6		9.0
1986	12	9.6			7.7
1987	14	8.6			9.5
1988	13	9.0			
1989	12	9.5			
1990	14	8.9			
1991	13	8.8			
1992	12	8.8			
1993	13	8.1			
1994	13	7.2	2.2	5.9	6.1
1995	8	9.4	2.0	6.1	7.0
1996	8	8.2	2.8	6.0	
1997	13	7.8			
1998	11	7.4			6.0
1999	14	9.2			

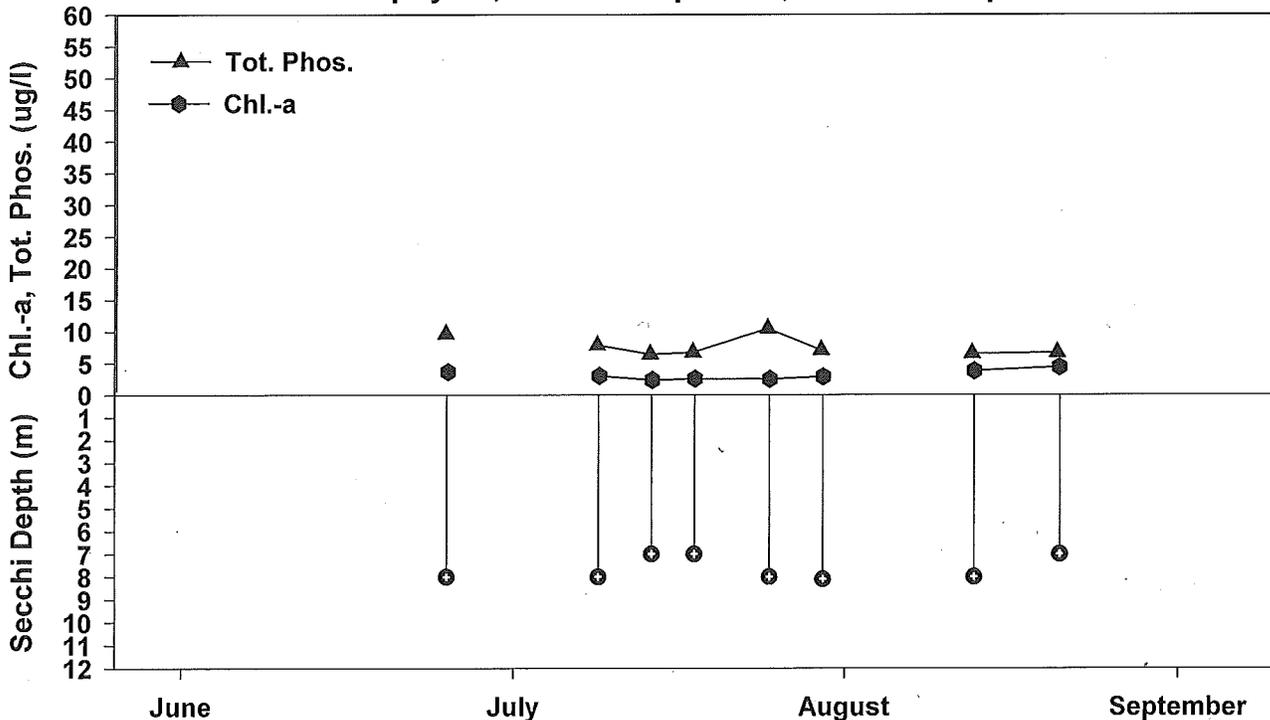
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	11	8.0	2.1	7.2	9.9
2001	12	8.1	2.5	8.9	
2002	9	8.3	2.9	8.7	
2003	8	6.6	1.7		
2004	11	6.8	1.8	12	
2005	12	6.8	2.1	11	
2006	11	6.5	2.1	11	10
2007	10	7.2	2.4	7.2	11
2008	10	7.6	2.1	12	10
2009	10	6.9	2.3	10.0	10.0
2010	11	8.0	3.4	8.4	12
2011	10	6.9	2.5	11	
2012	8	7.6	2.5	7.7	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	8	7.0	7.6	8.1
Chl-a (ug/l)	8	1.7	2.5	3.8
Summer TP (ug/l)	8	6.4	7.7	11

**2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time**



# SHADOW LAKE

**Glover, VT**

**Lay Monitors:** Sara and Larry Gluckman

**Former Lay Monitors:** Susan Alexander

Ed and Linda Zalenski

Shadow Lake is a small, deep, coldwater lake.

Lake Surface Area: 210 acres

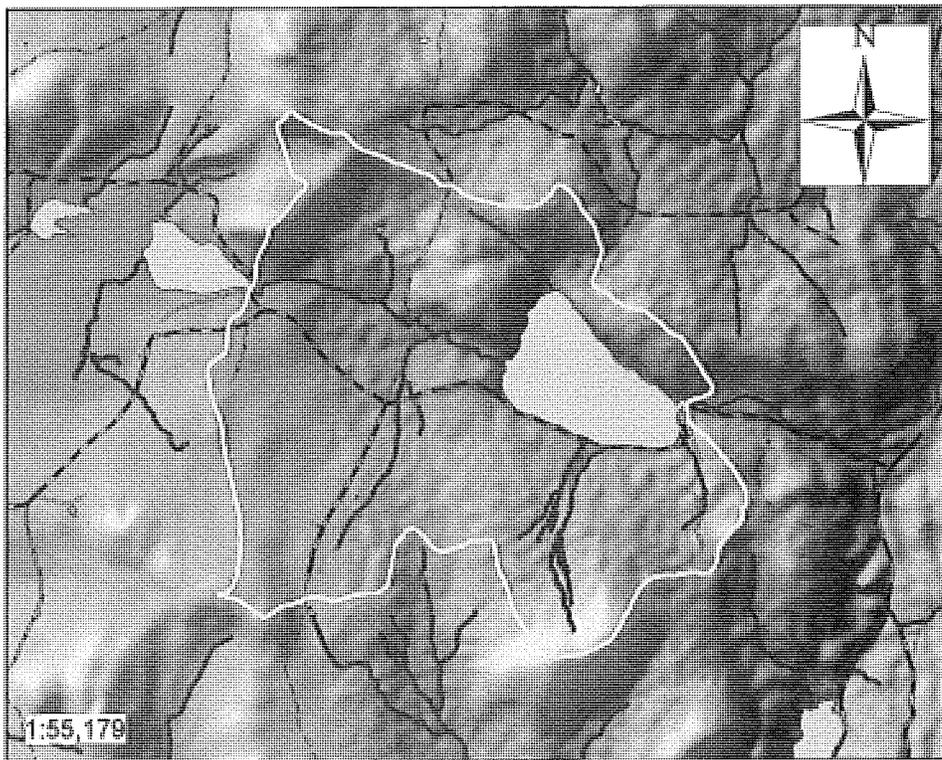
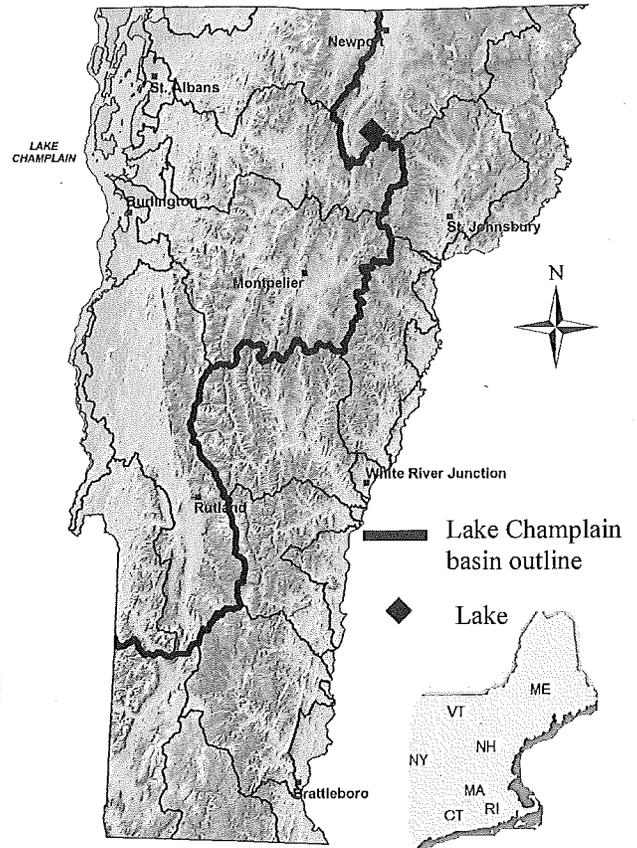
Drainage Basin Area: 3,575 acres

Maximum depth: 139 ft. (42.4 m)

Average Depth: 55 ft. (16.8 m)

**Compared to other lakes, the trophic state is Oligotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Shadow Lake

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	17	7.3	4.5		4.0
1980	14	6.7	3.0		5.0
1981	13	7.4	3.5		6.5
1982	13	8.7	3.3		5.5
1983	13	7.0	3.6		6.5
1984	9	6.1	3.7		5.5
1993	5				10
1994	9	6.3	3.5	6.3	
1995	10	7.2	2.1	9.0	
1996	10	7.8	1.7	6.1	
1997	9	7.9	1.1	6.0	
1998	8	6.7	1.4	6.6	
1999	10	7.7	2.0	9.9	9.4

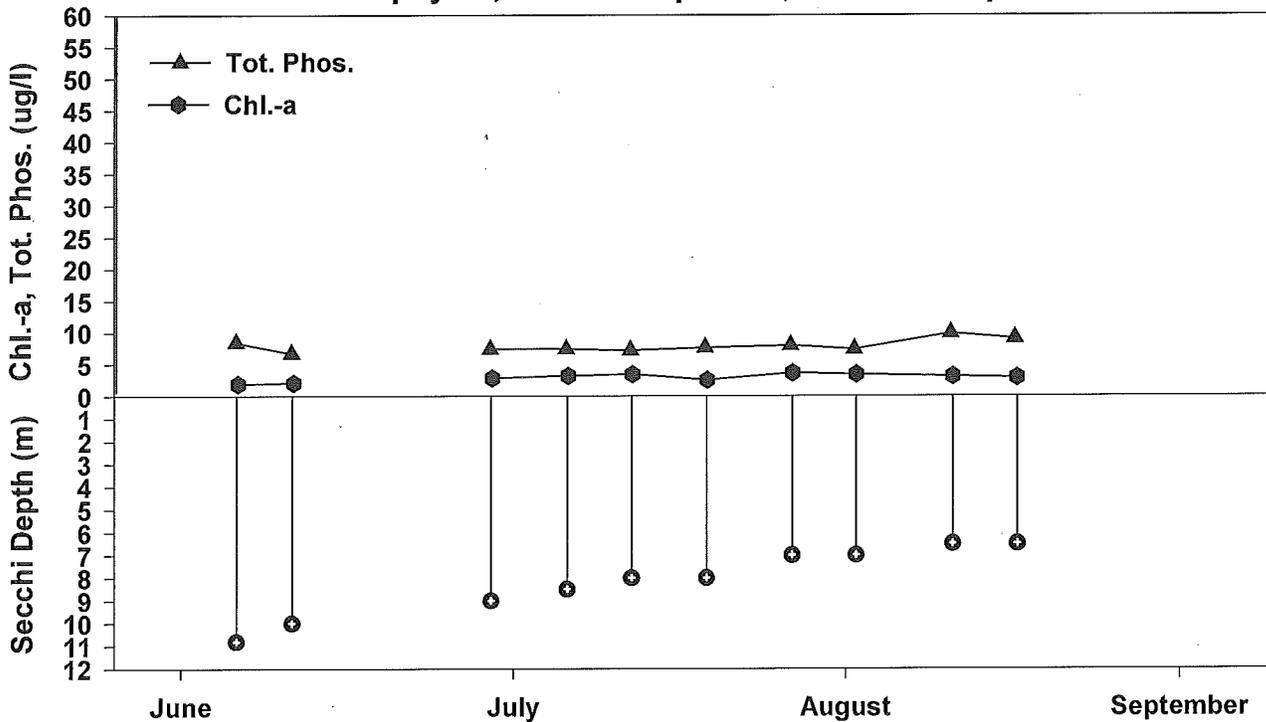
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	10	7.4	2.1	7.5	11
2001	10	8.0	1.5	8.5	5.5
2002	10	7.1	1.4	7.5	
2003	9	7.6	2.4	9.1	
2004	10	7.9	1.9	8.1	7.3
2005	9	8.1	1.9	9.5	
2006	9	8.7	1.3	7.9	
2007	10	8.2	1.4	7.4	11
2008	9	6.9	2.6	13	
2009	10	8.6	1.3	11	10
2010	9	8.9	1.9	8.3	9.3
2011	10	7.8	1.9	9.9	
2012	10	8.1	2.3	7.9	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	10	6.5	8.1	11
Chl-a (ug/l)	10	1.2	2.3	3.0
Summer TP (ug/l)	10	6.7	7.9	9.9

**2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time**



# SILVER LAKE

**Barnard, VT**

**Lay Monitors:** Craig Hadden

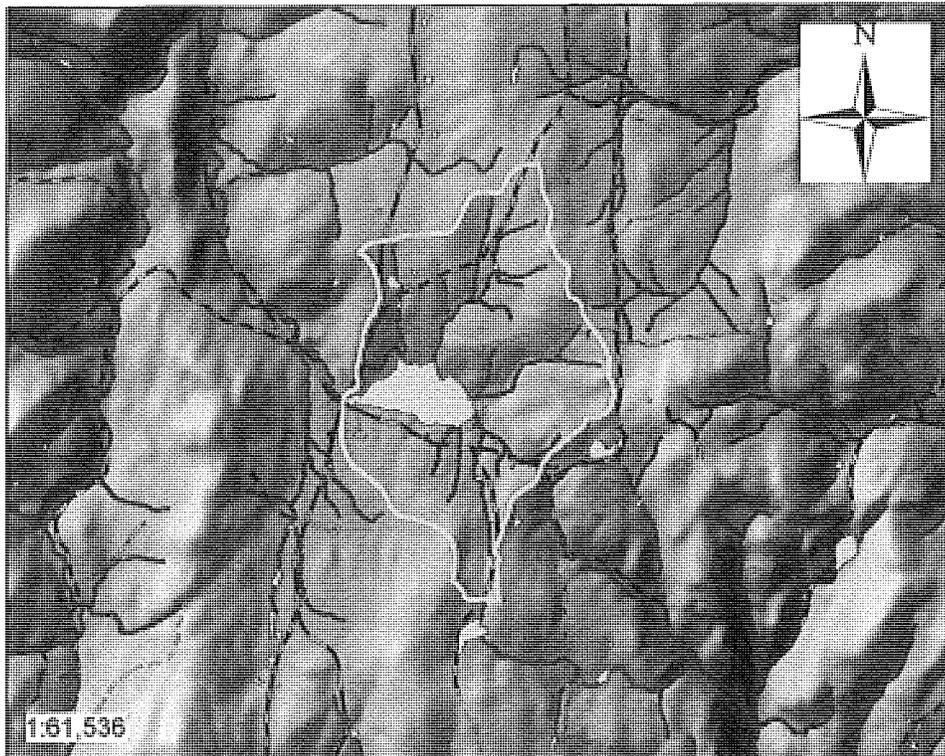
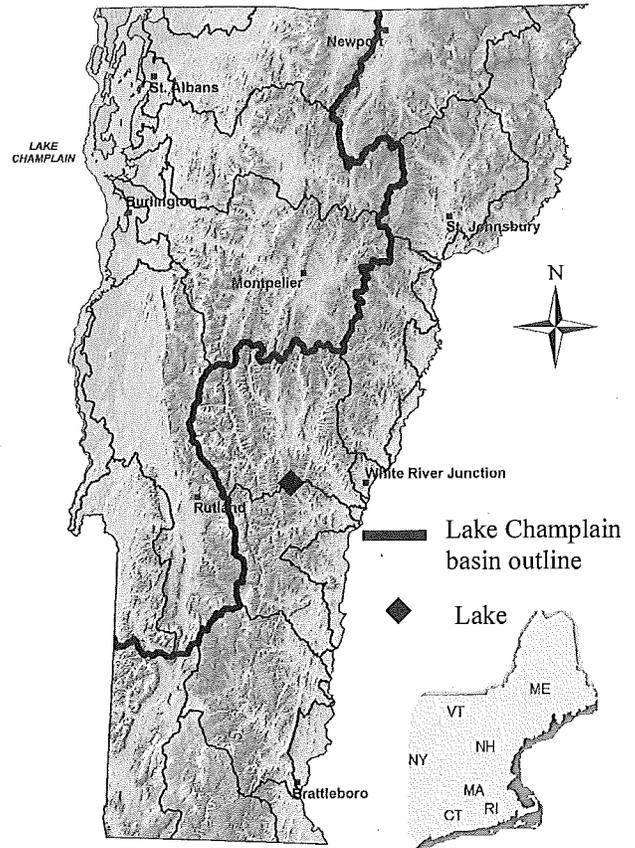
**Former Lay Monitors:** Lloyd and Susan Randolph  
 Don Munroe  
 Jack Frake  
 George Roy

Silver Lake is a small, warmwater lake.

Lake Surface Area: 84 acres  
 Drainage Basin Area: 1,091 acres  
 Maximum depth: 32 ft. (9.8 m)  
 Average Depth: 16 ft. (4.9 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Silver Lake

## Annual Data

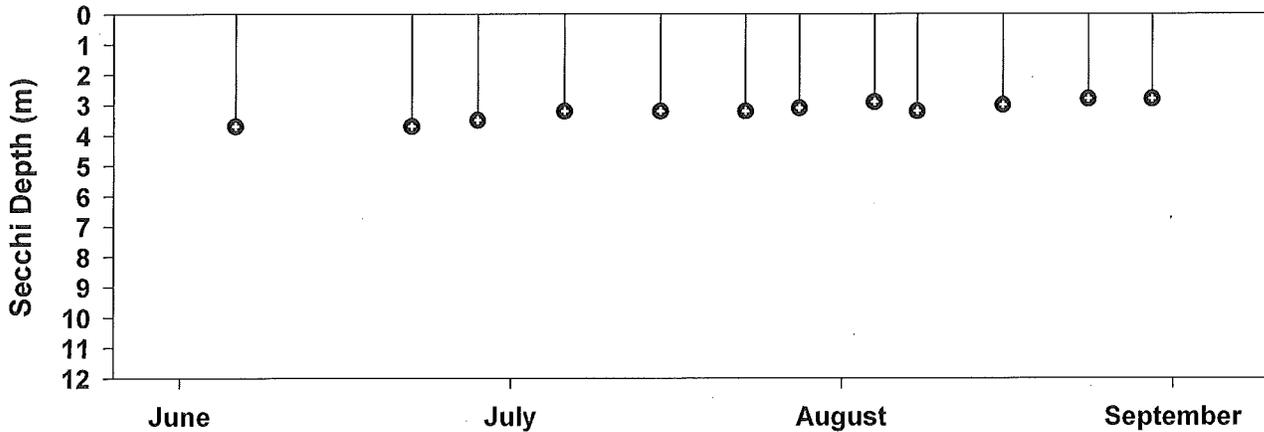
Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1983	10	4.4			21
1984	11	4.4	6.5	19	16
1985	9	4.7	7.0		16
1986	9	4.3	6.1	17	13
1987	10	3.5	8.5		8.0
1988	8	4.6	3.8	16	11
1989	8	3.9	13		20
1990	10	4.8	19	23	
1991	5				
1993	9	5.4			
1994	4				
1997	14	4.0			11
1998	8	4.2			
1999	5				

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	6				
2001	9	4.1			10
2002	8	4.8			
2003	9	4.7			
2004	8	4.1			
2005	9	3.8			
2006	9	4.0			17
2007	10	3.9			
2008	9	4.8			
2009	9	4.3			
2011	6				11
2012	12	3.2			

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	12	2.8	3.2	3.7



# SOUTH POND

Eden, VT

**Lay Monitors:** Chandler and Madonna Parker

South Pond is a moderately sized, warmwater lake.

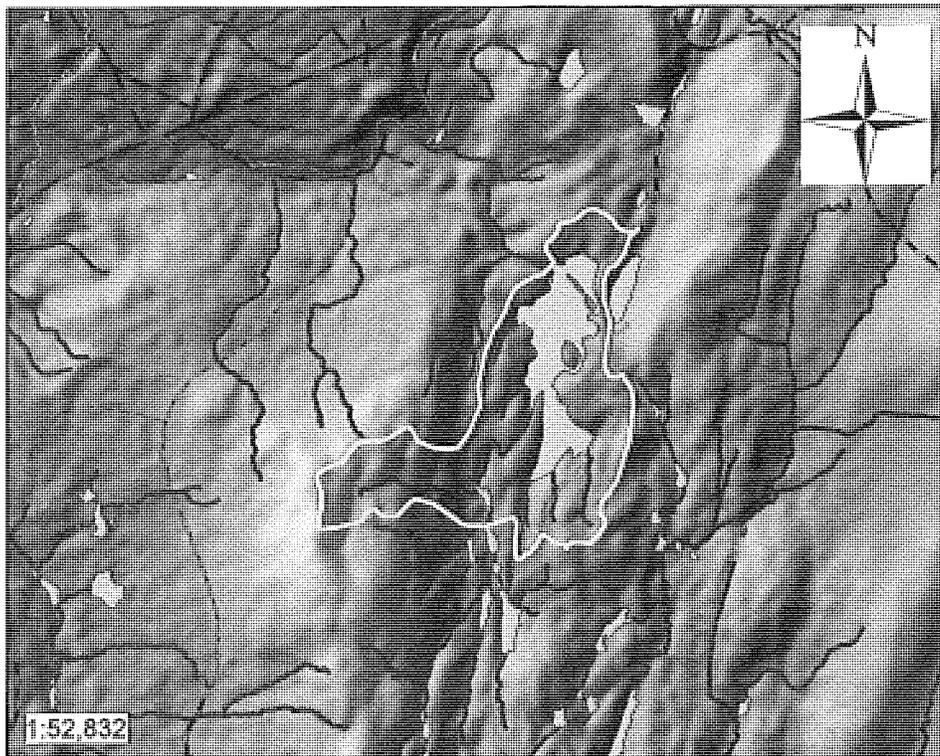
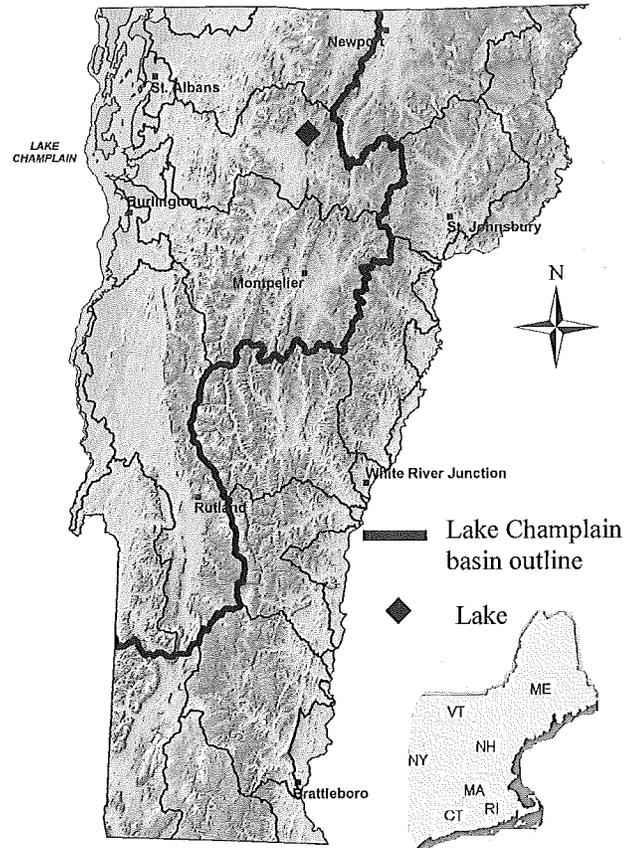
Lake Surface Area: 103 acres

Drainage Basin Area 1,382 acres

Maximum depth: 66 ft. (20.1 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# South Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1991	11	4.0	3.4	10	
1992	13	4.6	3.1	9.0	
1993	13	5.2	3.8	7.7	
1994	13	4.2	3.4	11	
1995	13	4.6	4.0	8.9	
1996	12	4.2	4.8	9.3	
1997	13	4.5	3.0	9.6	
1998	11	4.1	3.4	10	6.7
1999	12	5.0	5.6	12	8.7

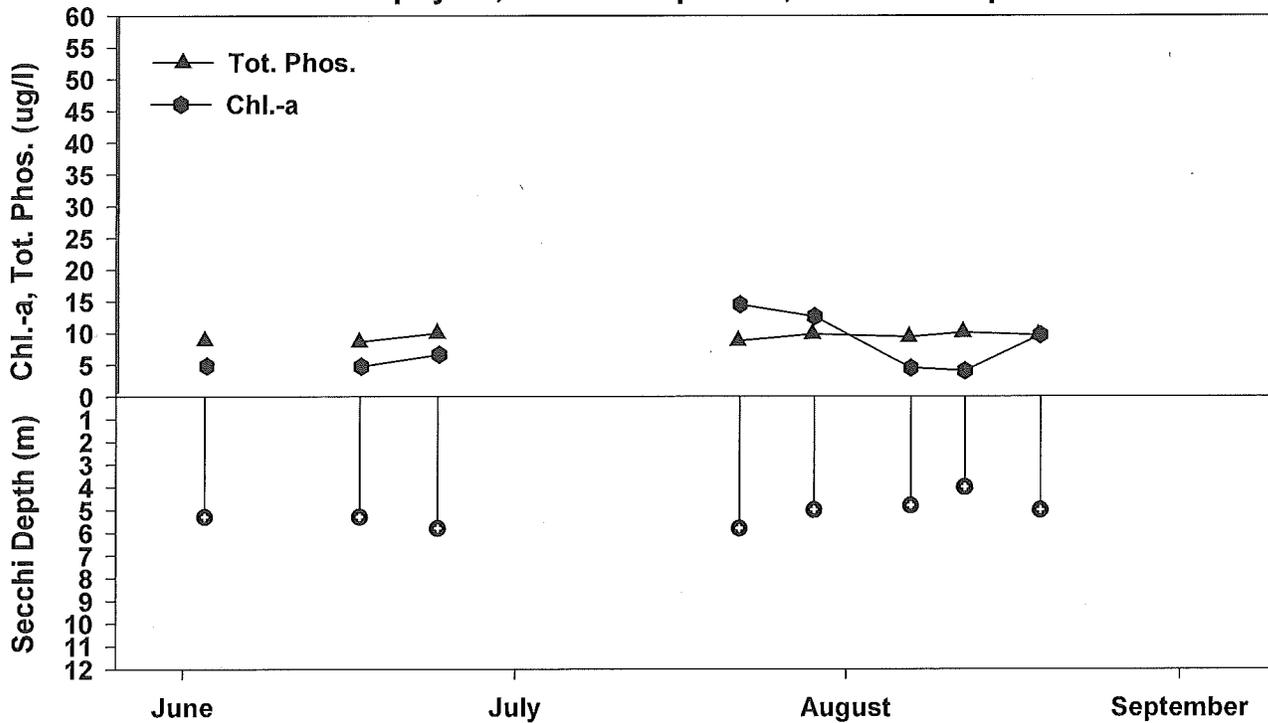
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	13	4.7	3.4	8.5	8.4
2001	12	4.9	3.6	9.3	
2002	12	4.0	5.3	12	
2003	13	5.2	3.0	9.2	
2004	12	4.3	7.8	10	
2005	11	5.8	2.3	9.5	
2006	11	4.8	2.9	9.2	
2007	12	4.5	4.9	11	13
2008	12	3.8	4.5	13	
2009	12	4.8	3.8	9.1	
2010	12	4.7	2.8	10.0	
2011	12	4.9	4.6	10	10
2012	8	5.1	7.1	9.4	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	8	4.0	5.1	5.8
Chl-a (ug/l)	8	3.4	7.1	14
Summer TP (ug/l)	8	8.6	9.4	10

**2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time**



# SUNSET LAKE

**Benson and Orwell, VT**

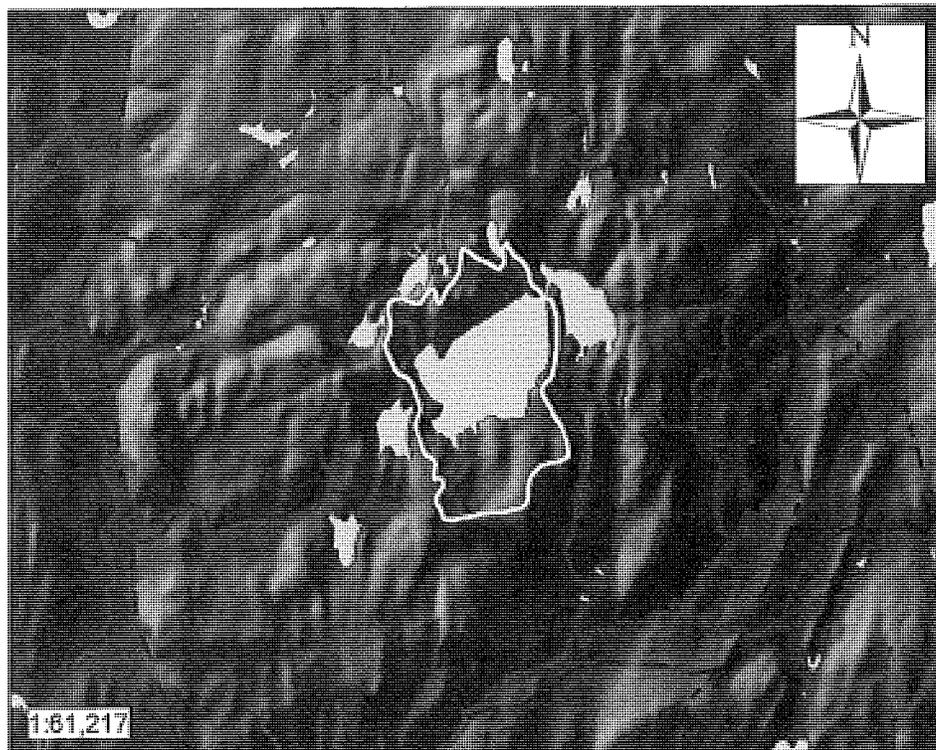
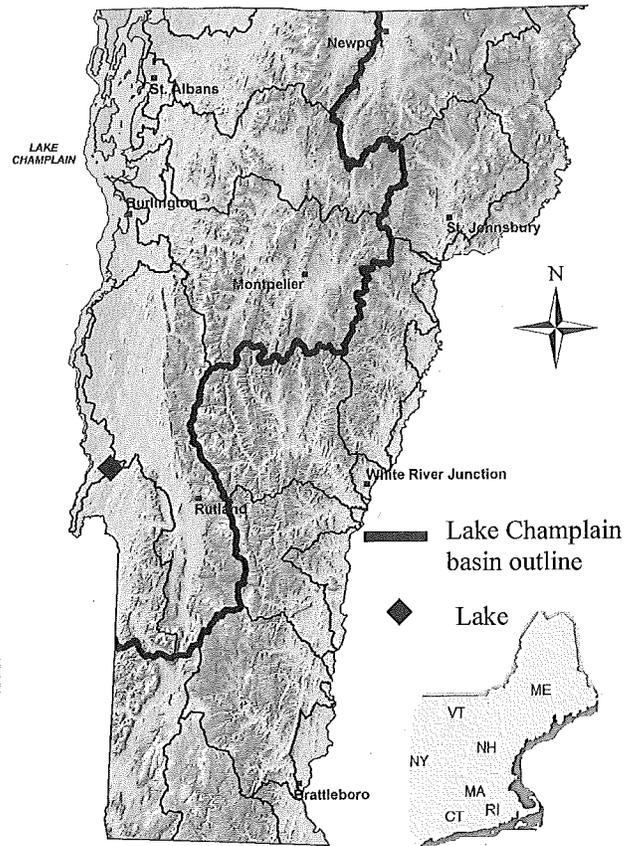
**Lay Monitors:** Jamie Longtin and Harry Saxon

Sunset Lake is a small, deep, coldwater lake.

Lake Surface Area: 202 acres  
 Drainage Basin Area: 1,192 acres  
 Maximum depth: 118 ft. (36 m)  
 Average depth: 50 ft. (15.0 m)

**Compared to other lakes, the trophic state is Oligotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Sunset Lake

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	19	9.4	1.4		8.0
1980	16	10.0	1.5		7.0
1981	13	9.0	1.7		8.0
1982	13	10	1.6		10
1983	14	11	2.1		4.5
1998	11	10			9.5
1999	13	12			

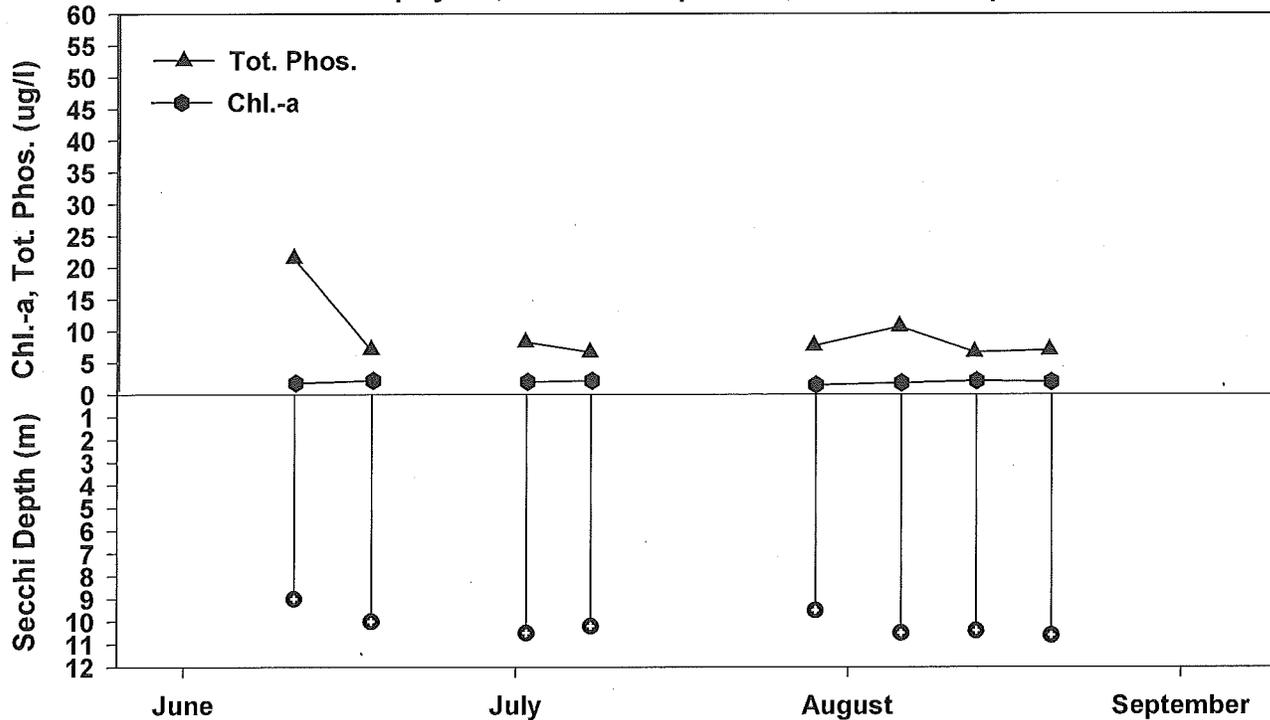
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	13	11			
2001	13	12			
2002	11	14			
2003	11	12			
2004	13	11			7.3
2005	13	12			
2006	12	11			6.1
2008	11	13			
2009	12	11			
2010	10	13			
2011	11	11	2.8	11	6.8
2012	8	10	1.3	9.4	

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	8	9.0	10	11
Chl-a (ug/l)	8	0.8	1.3	1.5
Summer TP (ug/l)	8	6.7	9.4	22

## 2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# SUNSET LAKE

**Brookfield, VT**

**Lay Monitors:** Ed Koren

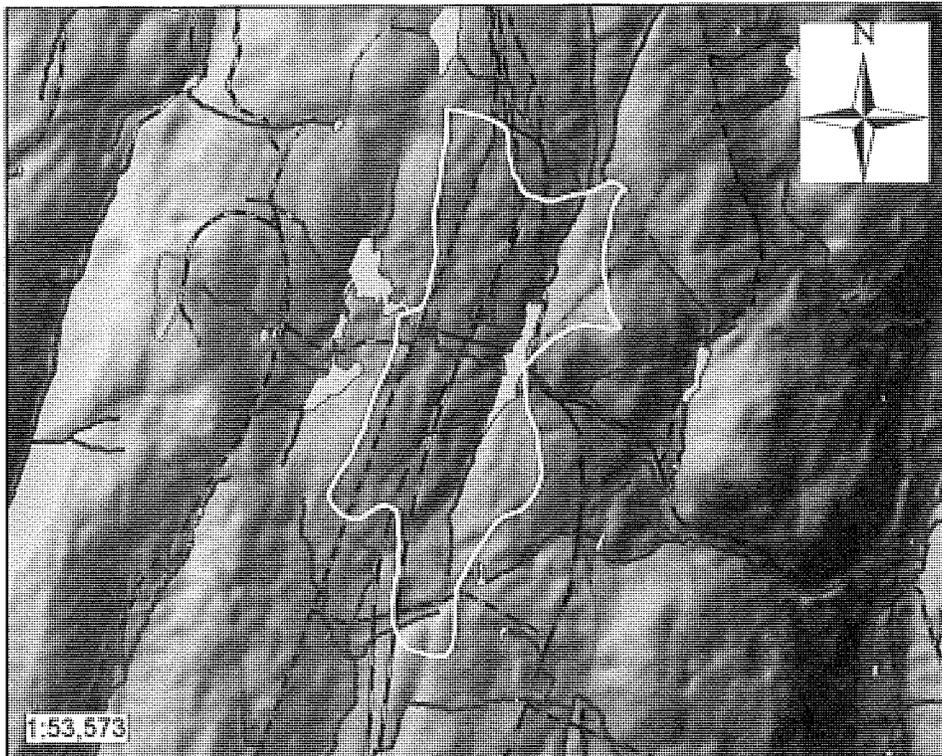
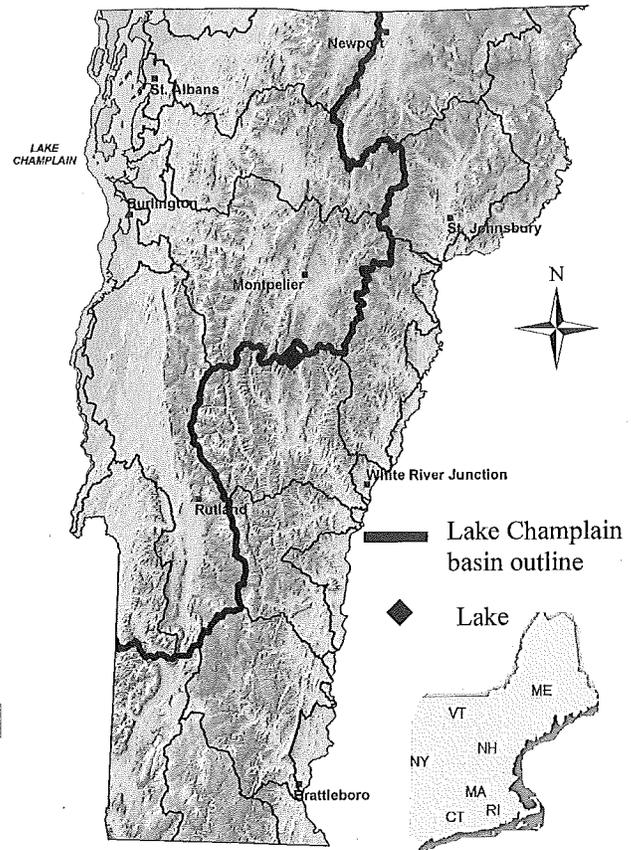
**Former Lay Monitors:** Rachel Brownstein  
Jack Russel

Sunset Lake is a small, narrow lake.

Lake Surface Area: 25 acres  
 Drainage Basin Area: 2,664 acres  
 Maximum depth: 32 ft. (9.8 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Sunset Lake

## Annual Data

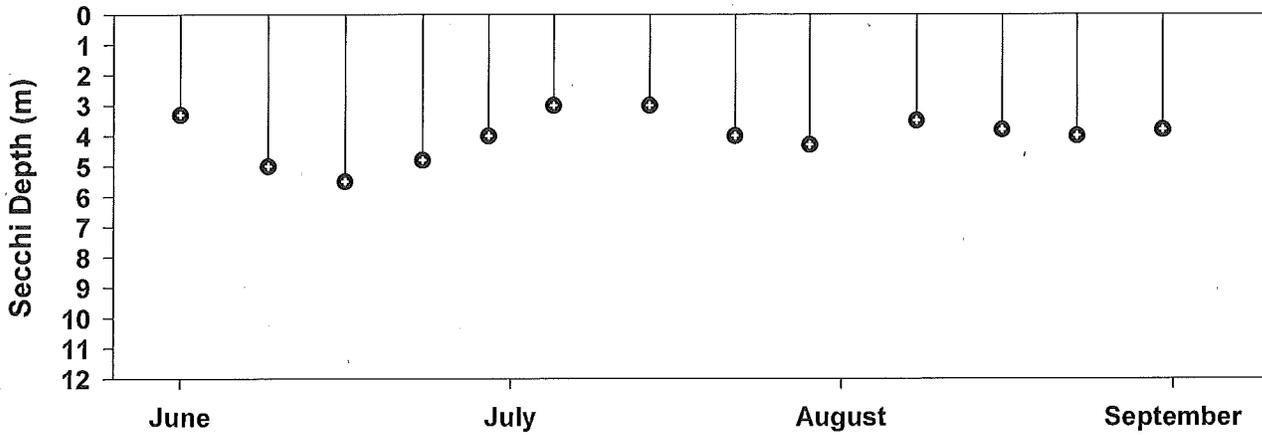
Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1986	9	3.5	8.8		
1987	9	2.8	4.3		8.5
1988	8	3.0	5.2		
1989	8	2.7	12		13
1990	10	2.9	12	22	8.5
1991	9	2.2	3.5	17	8.5
1992	8	4.0			
1993	14	3.8			
1994	13	3.5			
1995	12	3.4			
1996	9	4.4			
1997	7				
1998	11	3.3			5.8
1999	9	4.0			

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	12	3.9			
2001	11	3.4			8.2
2002	12	3.2			
2003	13	3.4			
2004	11	4.1			
2005	12	3.6			
2006	13	4.0			14
2007	13	3.6			
2008	12	3.5			
2009	12	3.7			
2010	14	3.5			
2011	14	3.3			11
2012	13	4.0			

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	13	3.0	4.0	5.5



# TICKLENAKED POND

Ryegate, VT

**Lay Monitors:** Peter and Mary Wood

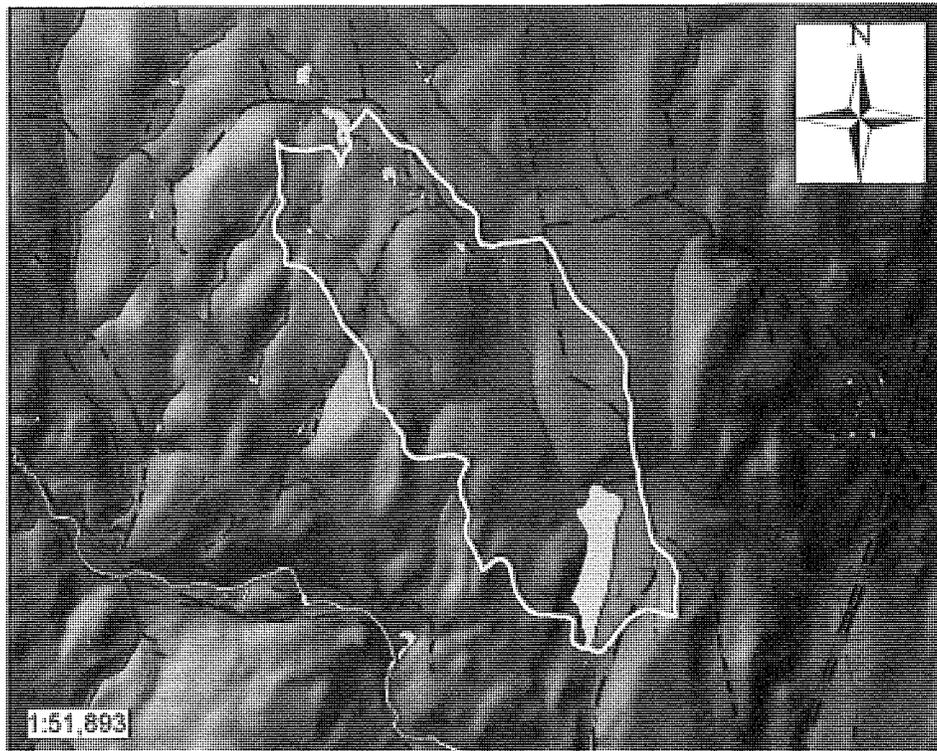
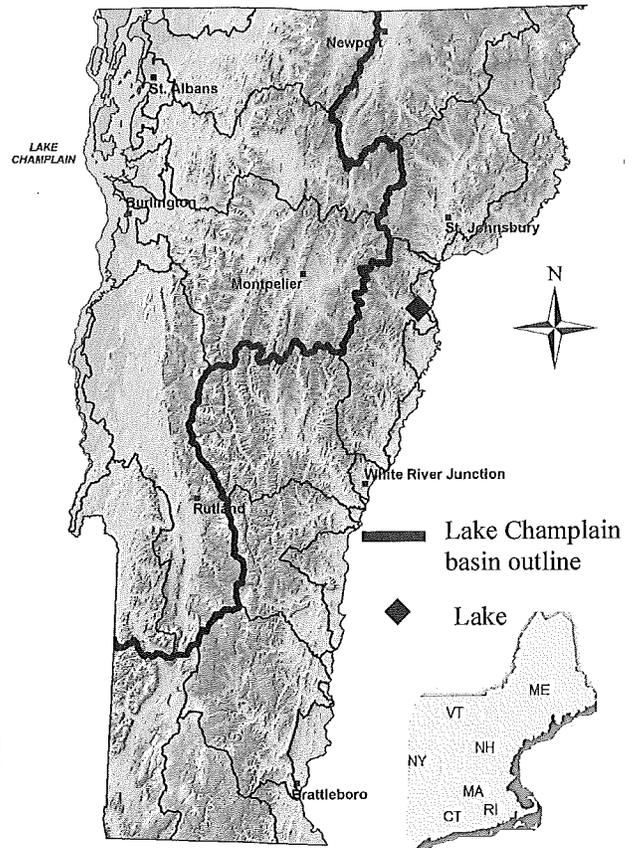
**Former Lay Monitors:** Polly and Chuck Hebble  
Kristine Elder

Ticklenaked is a small, warm water pond.

Lake Surface Area: 54 acres  
 Drainage Basin Area: 1,444 acres  
 Maximum depth: 51 ft. (15.5 m)  
 Average depth: 16 ft. (4.9 m)

**Compared to other lakes, the trophic state is Eutrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g}/\text{l}$	< 7.0 $\mu\text{g}/\text{l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Ticklenaked Pond

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1999	8	1.5	13	19	54

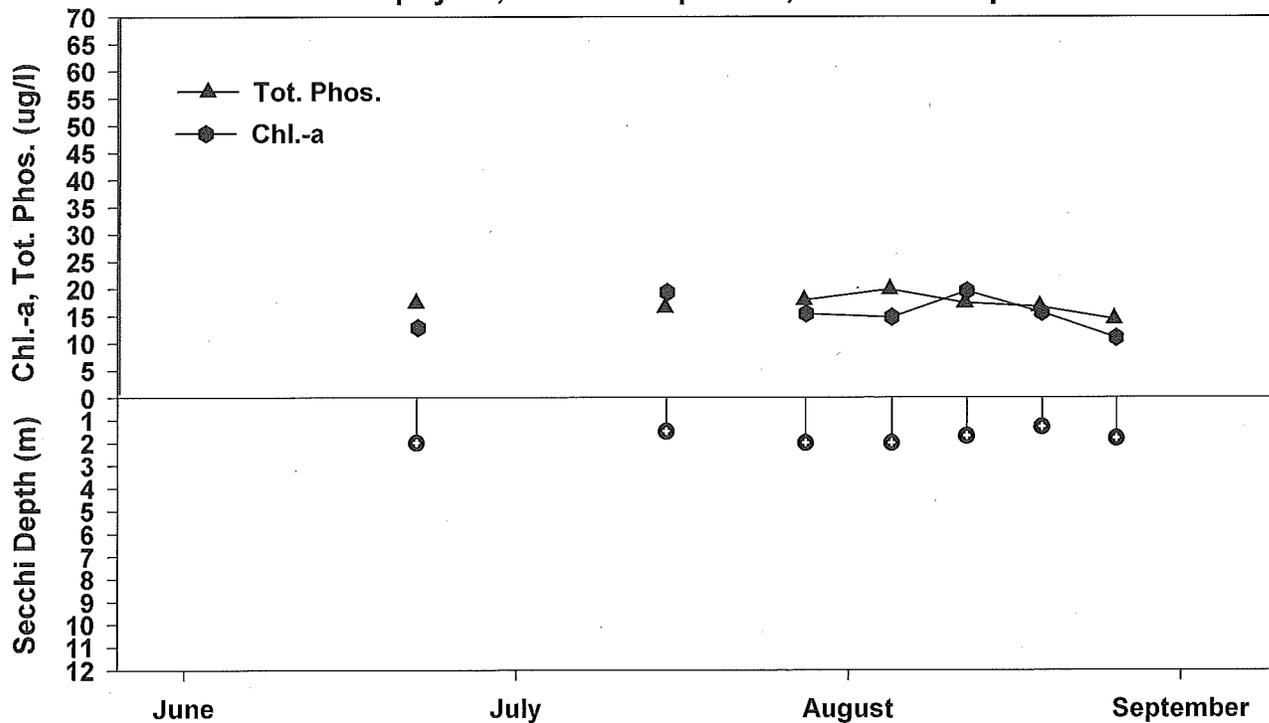
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	7				43
2001	9	1.2	9.1	33	77
2002	9	1.5	16	36	52
2003	9	1.3	13	37	42
2004	9	1.0	20	44	42
2005	9	1.3	22	42	67
2006	10	2.9	11	29	39
2007	9	1.3	26	28	36
2008	10	1.0	25	32	30
2009	10	1.5	9.7	28	34
2010	9	2.7	7.8	25	
2011	10	1.8	16	31	33
2012	7				

## 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	7	1.3	1.8	2.0
Chl-a (ug/l)	7	8.8	13	16
Summer TP (ug/l)	7	14	17	20

2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time



# LAKE WILLOUGHBY

Westmore, VT

**Lay Monitor:** John Alexander

Leo Alexander

**Former Lay Monitors:** Roy Hill

Ethan Swift

Lake Willoughby is a large, deep, cold water lake.

Lake Surface Area: 1,687 acres

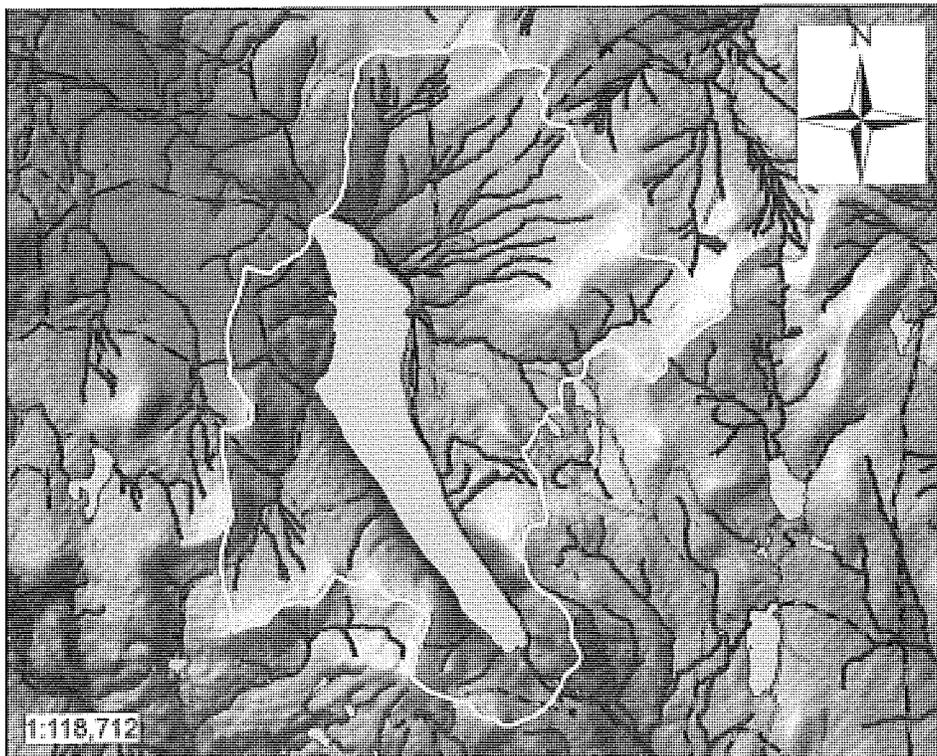
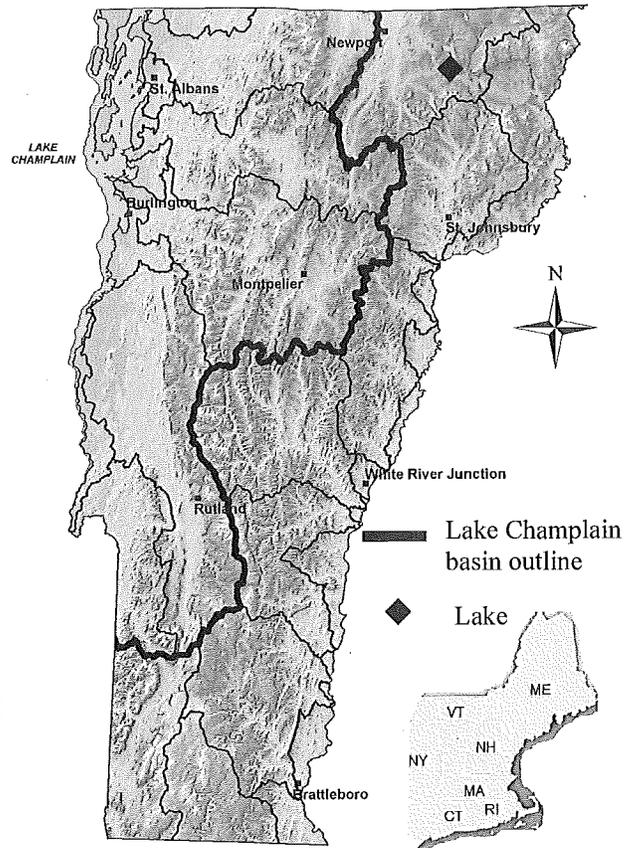
Drainage Basin Area: 12,256 acres

Maximum depth: 308 ft. (93.3 m)

Average depth: 140 ft. (42.7 m)

**Compared to other lakes, the trophic state is Oligotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 $\mu\text{g/l}$	< 7.0 $\mu\text{g/l}$
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



Lake outlined by its watershed

# Lake Willoughby

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1980	13	8.1	1.9		3.0
1981	11	8.4			4.7
1983	11	11			5.0
1990	10	5.8			
1991	12	7.6			
1992	13	8.2			5.0
1993	12	8.9	1.5	7.5	
1994	12	7.1			
1995	12	7.8			
1996	15	8.9			
1997	16	8.1	1.1	8.5	3.7
1998	18	7.8	1.0	6.9	3.3
1999	10	8.4	1.6	6.5	

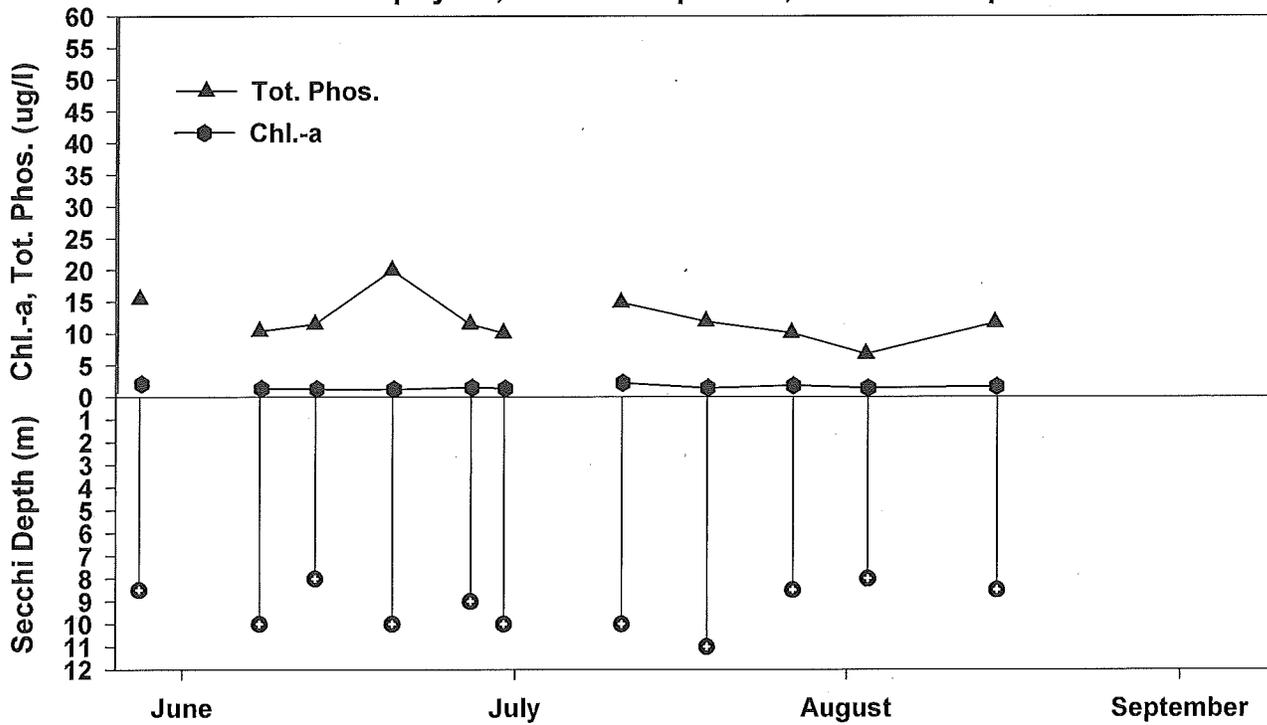
## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	10	7.7	1.0	6.3	
2001	9	6.8	1.2	8.6	
2002	11	7.3	0.9	6.3	
2003	10	7.3	1.3	9.5	5.0
2004	15	7.8	1.1	8.3	5.7
2005	12	7.5	1.4	10	
2006	10	7.4	1.1	11	7.4
2007	13	8.1	1.0	9.7	9.0
2008	11	8.3	0.9	18	6.2
2009	13	8.2	1.0	12	6.5
2010	14	8.0	1.2	16	5.3
2011	13	7.3	1.3	19	
2012	11	9.2	0.9	12	

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	11	8.0	9.2	11
Chl-a (ug/l)	11	0.5	0.9	1.6
Summer TP (ug/l)	11	6.8	12	20

**2012 Chlorophyll-a, Total Phosphorus, & Secchi Depth vs. Time**



# WOODBURY LAKE

Woodbury, VT

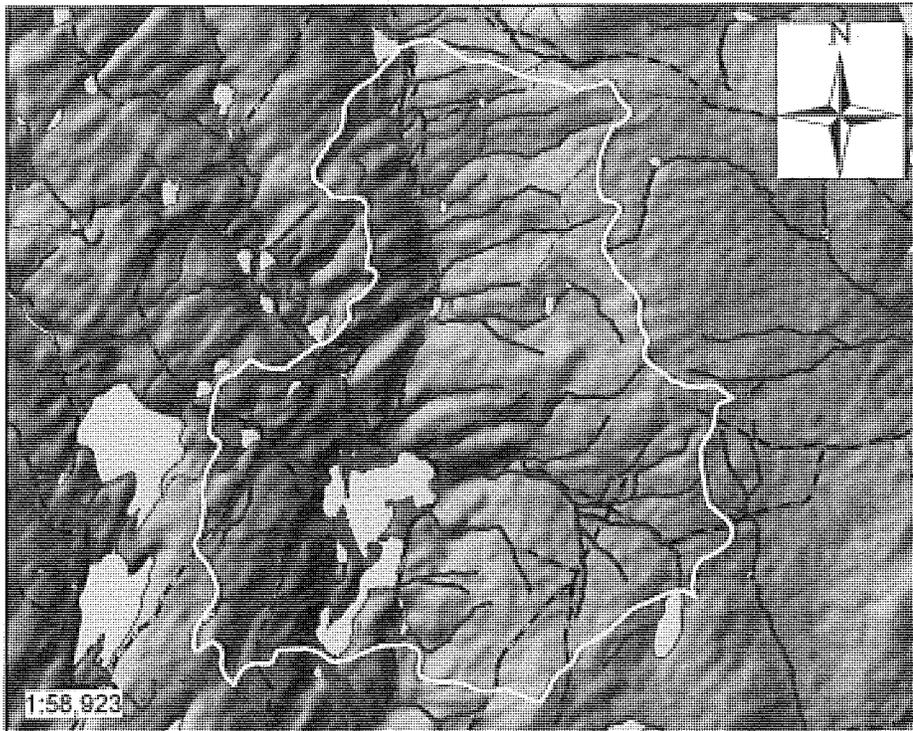
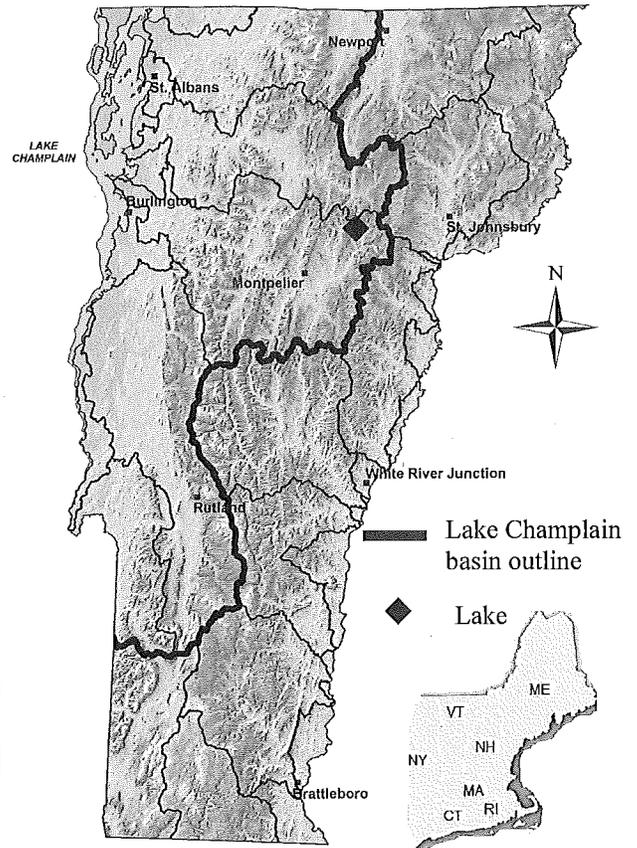
**Lay Monitor:** Bob and Susan Martin  
Olivia and Iris  
Oscar and Sasha Martin

Woodbury Lake is a moderately sized, warm water lake composed of three basins separated by shallow channels. It is also called Sabin Pond.

Lake Surface Area: 142 acres  
Drainage Basin Area: 9,014 acres  
Maximum depth: 58 ft. (17.6 m)  
Average depth: 18 ft. (5.5 m)

**Compared to other lakes, the trophic state is Mesotrophic**

Trophic State	Average Secchi Clarity	Ave. Chlorophyll-a	Ave. Total Phosphorus
Oligotrophic	> 5.5 meters	< 3.5 µg/l	< 7.0 µg/l
Mesotrophic	3.0 - 5.5	3.5 - 7.0	7.0 - 14
Eutrophic	< 3.0	> 7.0	> 14



**Lake outlined by its watershed**

# Woodbury Lake

## Annual Data

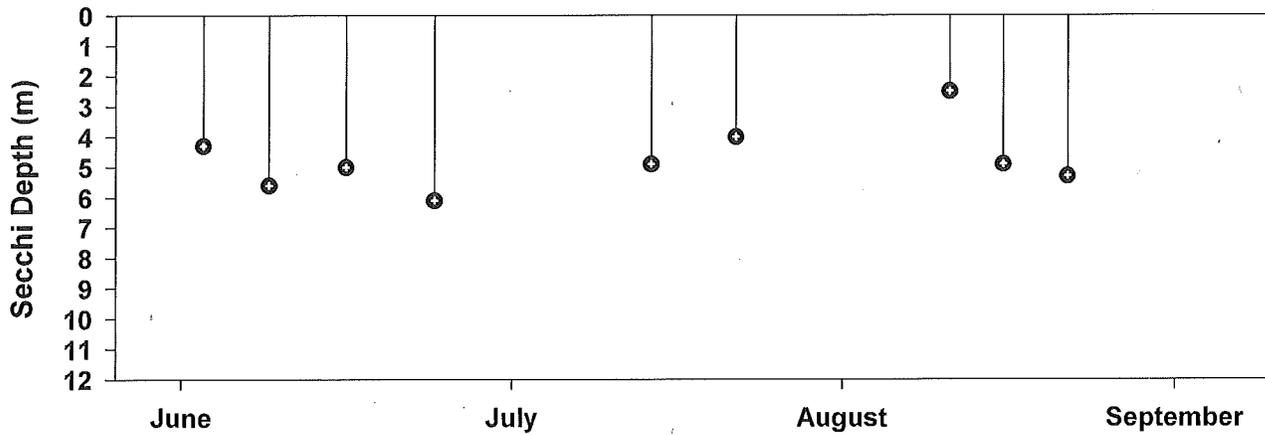
Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
1979	16	4.0	3.5		6.7
1980	11	5.2	3.9		5.7
1981	8	4.6	4.1		8.0
1982	10	5.0	4.3		8.7
1983	9	5.5	5.1		10
1984	9	4.6	3.8		8.7
1985	3				9.7
1986	6				9.3
1987	10	5.4		8.2	12
1988	6				
1989	7				
1990	10	4.0	6.2	13	
1991	10	6.0			
1992	11	4.9			
1993	10	4.1			
1994	9	4.3			
1995	10	4.9			
1996	9	4.6			11
1998	8	4.0			

## Annual Data

Year	Days Sampled	Secchi (m)	Chloro-a (ug/l)	Summer TP (ug/l)	Spring TP (ug/l)
2000	10	4.5			
2001	9	4.6			
2002	10	4.3			11
2003	11	5.5			
2004	9	5.5			11
2005	10	5.1			9.5
2006	11	3.9			13
2007	10	4.2			12
2008	9	4.4			11
2009	8	5.0			11
2010	11	4.7			11
2011	12	4.7			
2012	10	4.8			

### 2012 Summary

Parameter	Days	Min	Mean	Max
Secchi (m)	10	2.5	4.8	6.1



Appendix 1 - Participation, 1979 - 2012  
Inland Lakes

Lake	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012				
Arrowhead Mountain	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S			
Beebe	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
Bliss	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
Bomoseen	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
Buck	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
Burr	BP	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
Carmi	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
Caspian	BP	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
Cedar (Monkton)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Chipman	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Colchester	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Cole	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
Coles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Crystal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Curtis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Danby	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Derby	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dunmore	B	B	-	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
East Long	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Echo (Charleston)	B	S	S	B	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
Echo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Eden	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Elfin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Elligo	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Elmore	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	
Fairfield	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Fairlee	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Fern	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Forest (Nelson)	BP	BP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fosters	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Glen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Great Averill	B	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Great Hosmer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Green River	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Greenwood	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Groton	BP	B	B	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	
Halls	B	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Harvey's	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

B = basic monitoring, Secchi water clarity only  
 S = supplemental monitoring - Secchi water clarity, total phosphorus and chlorophyll-a  
 P = partial data

Appendix 1 - Participation, 1979 - 2012

Inland Lakes

Lake	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012					
Hortonia	S	S	S	S	S	S	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Indian Brook Reservoir	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Iroquois	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
Island Pond	BP	S	S	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
Joos	B	BP	SP	B	SP	S	S	S	S	S	BP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Little	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Long	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Lowell	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Lower	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Lyford	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Maidstone	B	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Martins	-	SP	S	S	S	SP	S	SP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Memphremagog	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Memphremagog South Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Metcalf	-	-	S	S	S	S	S	S	S	S	SP	SP	SP	BP	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Miles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mirror	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Morey	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	
Newark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nichols	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ninevah	-	-	S	SP	SP	S	S	S	S	B	BP	B	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
North Montpelier	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Paran	-	S	SP	S	SP	SP	SP	SP	S	S	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Parker	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	
Peacham	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pensioner	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pinneo	-	-	-	SP	S	S	S	S	S	SP	B	B	BP	B	B	B	B	B	BP	B	BP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Raponda	-	S	S	S	S	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rescue	B	BP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Runnemed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
St. Catherine	S	S	S	S	S	S	S	S	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Salem	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Seymour	S	S	S	S	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Shadow	S	S	S	S	S	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shelburne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

B = basic monitoring, Secchi water clarity only  
 S = supplemental monitoring - Secchi water clarity, total phosphorus and chlorophyll-a  
 P = partial data

Appendix 1 - Participation, 1979 - 2012

Inland Lakes

Lake	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012			
Spring	S	-	-	-	-	-	-	S	S	S	S	S	S	B	B	B	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	
Star	S	SP	-	-	-	-	-	S	S	S	S	S	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stratton	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunset (Benson)	S	S	S	S	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunset (Brookfield)	-	-	-	-	-	-	-	S	S	S	S	S	S	S	SP	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Ticklenaked	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Valley	-	S	S	S	S	S	S	B	B	BP	B	-	SP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wapanacki	-	-	-	-	S	S	S	S	S	S	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Willoughby	-	S	S	-	S	S	S	S	S	BP	B	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Winona	-	S	-	-	S	-	-	-	-	-	-	-	-	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woodbury	S	S	S	S	S	S	BP	BP	S	BP	SP	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Woodford/Big Pond	-	-	S	S	S	S	-	S	-	-	-	-	-	-	S	SP	S	SP	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Woodward	-	-	S	SP	S	S	S	S	B	BP	BP	-	BP	-	B	BP	-	BP	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

B = basic monitoring, Secchi water clarity only  
 S = supplemental monitoring - Secchi water clarity, total phosphorus and chlorophyll-a  
 P = partial data



Appendix 1 - Participation, 1979 - 2012  
 Lay Monitoring Lake Champlain Stations

Lake Champlain Stations	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012		
#36 - West Haven	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
#37 - Outer Carry Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
#38 - Town Farm Bay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
#39 - Inner Thompson point	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
#40 - North Beach	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
#41 - Queneska Island	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
#42 - Champlain Bridge	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Appendix 2 Nuisance Exotic Species

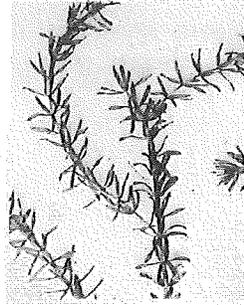
### Vermont Invasive Species!



#### Water chestnut

*Trapa natans*

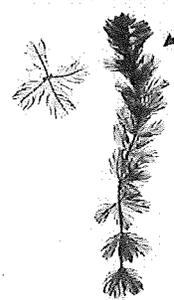
This is a glossy, green, triangular-leaved plant that can easily choke the waterbodies it invades, out-compete native plants, and reduce oxygen levels which can increase the potential for fish kills. Dense, nearly impenetrable water chestnut growth can make fishing, hunting, swimming, boating, and other recreational activities nearly impossible.



#### Hydrilla

*Hydrilla verticillat*

This is a submersed rooted perennial, and highly adaptable to a wide range of environmental conditions. Hydrilla has leaves in whorls of 3 to 8 joined directly to the stem, visible toothed leaf margins and small potato-like tubers at the end of the underground stems. This species is considered one of the most problematic aquatic plant invaders. Preventing its introduction into Vermont waters is imperative.



#### Eurasian watermilfoil

*Myriophyllum spicatum*

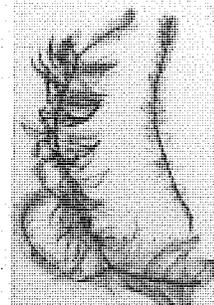
This is a stringy, submerged plant that quickly proliferates. It is known for its delicate, feathery appearance and has whorls of leaves around the stem, 4 are common, but often 3 to 6 can be found. The leaves are divided into pairs of thread like segments, typically 12 or more. Sometimes tops of the plant exhibit a reddish color.



#### Variable-leaved watermilfoil

(*Myriophyllum heterophyllum*)

This is a rooted, submerged perennial species, first confirmed in a Vermont water in 2008. It has densely packed whorls of 4 to 6 underwater leaves around the stem, each underwater leaf has 7 to 11 pairs of segments, thick, robust, reddish stems and mature plants show blade-like leaves above water surface with serrated edges.



#### Didymo

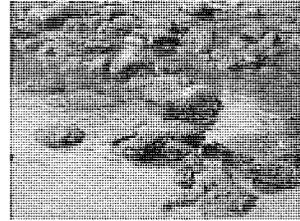
(*Didymosphenia geminata*) A non-native alga (diatom) species capable of forming thick nuisance mats on river and stream bottoms with potentially significant impacts to fisheries and other habitat.



#### Purple loosestrife

*Lythrum salicaria*

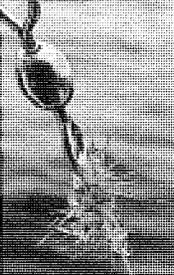
A wetland perennial plant that is highly successful and able to out-compete native vegetation due to its high germination rate, and its abundant and easily transported seed. Dense growth can eliminate food and shelter for wildlife including shallow water fish spawning grounds.



#### Zebra mussel

*Dreissena polymorpha*

Zebra mussels are small barnacle-like mollusks. They have caused some very serious economic and environmental problems in many areas. They are highly prolific and able to form dense colonies out-competing native species. Zebra mussels feed by filtering plankton out of the water which impacts water clarity and alters the food web.



#### Spiny waterflea

*Bythotrephes longimanus*

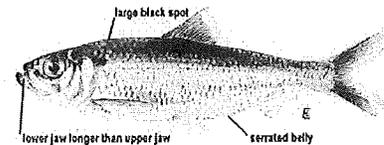
The spiny waterflea is a small (5-15 mm) predaceous crustacean that threatens aquatic ecosystems by competing with native fish for food. Anglers often discover new infestations. The flea collects on fishing lines and cables in gelatin like clumps. They can spread to other lakes when fishing gear is contaminated. Females die out of water, but eggs can remain viable and can establish a new population. Eradicating established infestations is impossible.



#### Rusty crayfish

*Orconectes rusticus*

Rusty crayfish can be identified by their robust claws with black bands on the tips, and dark, rusty spots on each side of their carapace (body). They can out-compete native species, forcing native crayfish from daytime hiding areas and destroying aquatic plant beds. They have likely been spread into numerous waterbodies in Vermont by anglers using them for bait.



#### Alewife

*Alosa pseudoharengus*

Alewife is a marine fish from the herring family capable of surviving in freshwater. They reproduce quickly and can soon become the most dominant fish species in a lake. They are very efficient feeders and consume huge quantities of zooplankton which enable them to out-compete other species.



## Appendix 3

### Glossary

**ALGAE** - Simple aquatic plants which are usually microscopic in size. Algae can grow suspended in the water or attached to plants or the lake bottom. Algae do not have true roots, flowers, and leaves.

**ANAEROBIC** - (also **anoxic**) - Environment in which oxygen is absent.

**BACTERIA** - Microscopic single cell organisms that are similar to plants but lacking in chlorophyll.

**BLOOM** - A very large algal population that may cause a green coloration of the water or form large floating mats. Such a large population may be stimulated by high nutrient levels, warm-water temperatures and long periods of sunlight. Seasonal spring and fall algal blooms usually are part of the normal cycle of a productive lake.

**CHLOROPHYLL** - The photosynthetic, green pigment contained in all green plants.

**CULTURAL EUTROPHICATION** - The acceleration by human activities of the natural aging process in a lake evidenced by increasing nutrient concentrations.

**DRAINAGE BASIN** - (also **watershed**) - The land area draining into a body of water. The surface area of the lake is included in the calculation of the drainage basin surface area.

**ECOLOGY** - The study of the relationships between organisms and their environment.

**EROSION** - The loosening and subsequent transport of soil away from its native site. In Vermont, erosion typically results from the removal of vegetation, which is a soil stabilizer.

**EUTROPHIC** - A general classification of lakes which have a high level of nutrients. Eutrophic lakes are often shallow, warm, seasonally deficient in oxygen in the lower depths of the lake, and supportive of large algal and/or aquatic plant populations.

**EUPHOTIC ZONE** - The layer of lake water where light penetrates through the water and is useable by plants and algae.

**EUTROPHICATION** - The natural aging process of a lake whereby nutrients and sediments increase in the lake over time, increasing its productivity and eventually turning it into a marsh. If the process is accelerated by human-made influences, it is referred to as "cultural eutrophication."

**FECAL COLIFORM BACTERIA** - Bacteria found in the feces of warm-blooded animals. Fecal coliform bacteria are used as indicators of recent sewage contamination. Fecal coliform bacteria are not harmful themselves, rather they indicate the potential presence of other disease-causing organisms.

**GROUNDWATER** - Water that lies beneath the earth's surface in water-filled layers of sand, gravel, clay or cracked rock.

**LAKE BASIN** - A depression in the surface of the land that forms a lake when full of water. Lakes may be composed of more than one basin.

**LIMITING NUTRIENT** - The nutrient whose demand exceeds its supply such that growth is restricted until more is available.

**LIMNOLOGY** - The study of the physical, biological, and chemical aspects of inland ponds (generally freshwater), lakes, and streams.

**MACROPHYTES** - Rooted aquatic plants which grow in or on the water. They have true roots, flowers, and leaves.

**MEAN** - (also **average**) - Calculated by adding the values of all the data points and dividing this sum by the number of data points.

**MESOTROPHIC** - A general classification of lakes between the levels of oligotrophic and eutrophic. Mesotrophic lakes have a moderate level of nutrients and are somewhat productive (supportive of moderate growths of algae and aquatic plants).

**METER** - A measure of length in the metric system, approximately equivalent to 3.25 feet. One meter (m) equals 39.37 inches or 1.0936 yards.

**MICROGRAM** - ( $\mu\text{g}$ ) - The unit of measurement used to express one part per million (ppm).

**NON-POINT SOURCE POLLUTION** - Pollution that comes from a diffuse area, as opposed to a discharge pipe, and that enters lakes or streams via runoff, groundwater, or tributary streams. Examples are soil erosion, septic system pollution, and manure runoff.

**NUTRIENT** - A chemical required for growth, development or maintenance by a plant or animal. Examples are nitrogen and phosphorus.

**OLIGOTROPHIC** - A general classification of lakes which have a low level of nutrients. Oligotrophic lakes are usually deep and cold. They usually have a sufficient amount of oxygen at all depths and they support little algal and aquatic plant growth.

**ORGANIC COMPOUND** - A chemical compound containing carbon as the base element. Some kinds of organic compounds can be toxic to plant and animal life.

**OVERTURN** - The thorough mixing of the water in a lake during the spring and during the fall when the water is uniform in temperature and density.

**PHOSPHORUS** - A nutrient required by plants, including algae, for growth. In lakes, phosphorus is usually the nutrient in shortest supply relative to other nutrients. The addition of phosphorus to a lake will stimulate plant and algal growth.

**PHOTOSYNTHESIS** - Production of organic compounds using light by chlorophyll-containing cells.

**PHOTIC ZONE** - The lighted region of a lake where photosynthesis takes place.

**PHYTOPLANKTON** - Small plants, usually microscopic, suspended in the water, that drift in the water with waves or currents.

**POINT SOURCE POLLUTION** - Pollution from discharge pipes or outfalls from sources, such as wastewater treatment plants or industrial facilities.

**RIPARIAN** - A term used to describe the shoreland area of lakes, ponds and streams.

**SECCHI DISK** - A white and black disk 8 inches (20 cm) in diameter used to measure transparency of water.

**SEDIMENT** - Bottom material in a lake that has been deposited after the formation of a lake basin. Sediment results from the accumulation of decomposing remains of aquatic organisms, chemical precipitation of dissolved minerals, and erosion of surrounding lands. Sediment particles may also be suspended in the water.

**SEDIMENTATION** - The sinking of silt, algae, and other particles through the lake water column and their deposition on the lake bottom (where they form sediment). Sedimentation is an important process in the life of a lake, transferring nutrients throughout the lake's layers and providing a critical link between surface plankton and bottom-dwelling organisms.

**STRATIFICATION** - The formation of thermal zones in deep lakes during the summer. These zones are referred to as the epilimnion (warm upper region), hypolimnion (cold lower region), and metalimnion (thin boundary between the other two layers).

**TROPHIC LEVEL** - A relative level of productivity. Three trophic levels of Vermont lakes are eutrophic, mesotrophic and oligotrophic.

**TURBIDITY** - A measurement of water clarity. High turbidity (low water clarity) is caused by suspended particles such as silt, soil or algae which reduce light penetration.

**WATER TABLE** - The upper surface of groundwater below which the soil is saturated with water.

**WATERSHED** - (also **drainage basin**) - The land area draining into a body of water. The surface area of the lake is included in the calculation of the drainage basin surface area.

**WETLAND** - An area that is inundated by surface or ground water with a frequency sufficient to support significant vegetation or aquatic life dependent on saturated or seasonally saturated soil conditions for growth and reproduction.

**ZOOPLANKTON** - Small aquatic animals, often microscopic in size and capable of mobility.