King County Lake Monitoring Report

A Lake Stewardship Program

Volunteer Lake Monitoring Results for the Water Year 1999–2000

March 2002

KING COUNTY

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Special thanks go to the numerous staff involved in the administration, training, volunteer coordination, and equipment management of the lake volunteer monitoring program. Staff efforts include data reduction and management; laboratory analysis, quality assurance and data verification; data analysis; technical writing; and report production. The following individuals contributed significantly to the volunteer monitoring program and production of this report:

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Many individuals have contributed to the collection of lake volunteer monitoring data. Special thanks to our dedicated volunteers, many of whom have participated for several years. The success of this program is dependent upon their diligent and dedicated effort. The results of our volunteers' efforts provide an understanding of individual lake quality and a bigger picture of lake health across the county. Our understanding of lake quality is especially important as the region is challenged to respond to the Endangered Species Act and listing for Chinook and Bulltrout. King County, other agencies, consultants, and many citizens use this information to protect water quality and investigate flooding problems related to lake level fluctuation. All data users are grateful for the long hours and contributions made by our lake volunteers.

Alice	Jenny Emsky and Cheri Enevold
Allen	David and Betty Burton
Ames	Bob Young
Angle	Diane and Alden Chace; Edward and Jeannie Montry; andTaylor Evans-Race
Beaver 1	Donna Carlson
Beaver 2	Al and Shirley Jokisch; Larry Miller
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Boren	Ray Clark; Mary Alice and Eric Root
Burien	Steve Locher
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Desire	Jan Falkenhagen; Ed and Min Merrill
Dolloff	Jason Hesla
Easter	Mayetta E. Tiffany
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Francis	Brian and Erica Moriarty
Garrett	Dick Thurnau
Geneva	Laura Stiles and Bruce Harpham; Sue Yunker and Thomas Jones
Haller	Barbara Gross and Jim Taylor; Rud Okeson
Horseshoe	Mark and Ben Harris
Jones	Dale and Linda Anson
Joy	James Polybank; Gary Rauen
Kathleen	Keith Lanan; Steve Thomas
Killarney	Craig Rice
Leota	David Mangels
Lucerne	Milo Dullum and Barbara Winter
Marcel	Chuck Willis
Margaret	Douglas Johnston
McDonald	Suzanne Lowry
Meridian	Kathe Dizard; Al Flores
Mirror	John and Pat Hardman; Bob Roper
Morton	Dick Balash; Paul and Laura Mueller

Neilson	Kevin and Kurtis Schultz
Panther	Chris Riley; Peter Sturtevant
Paradise	Kay and Nancy Doolittle; Shirley Egerdahl
Pine	Kate Bradley; Ilene Stahl
Pipe	Ralph Beede; Bob Brenner
Retreat	Todd and Janice Hammerstrom
Sawyer	John Davies; Glenn Ross; Dick Veldhuis
Shadow	Billy Aliment; Virgil Mudd
Shady	Ray Konecke
Spring	Caren Adams
Star	Bruce, Cheryl, Ryan and Justin Amundsen; Mark Baughman
Steel	Art Bender; Susan Pearson
Trout	Pam Hilsenberg; Brenda and Jim Sherwood
Twelve	Jan Delacy and Libby Moscardini
Walker	Mike Baker
Welcome	Dave Hadley
Wilderness	Ray Petit; John Vasboe

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Executive Summary



Purpose of this Monitoring Report

This document is the fifth in an annual series, reporting on the results of data collection on small lakes in King County by volunteer monitors. The intent of the report is to provide citizens, scientists, managers, and other interested individuals with current information on water quality and lake level fluctuations for the monitored bodies of water. For many lakes, the data presented in this report is the only source of information available for assessment and for addressing general questions regarding characteristics of a specific lake. The information in this report is intended to help with guidance of protection and stewardship activities of participating lakes. The data and accompanying analysis is not intended to substitute for more detailed limnological studies that may be needed to produce specific management recommendations to guide restoration activities on particular lakes.

Monitoring Program

Two levels of participation are offered to citizen volunteers. The Level I program measures daily precipitation and lake level, in addition to surface water temperature, and Secchi depth. The Level II program includes the collection of water samples for laboratory analysis of total phosphorus, total nitrogen, chlorophyll *a*, and phytoplankton, as well as the measurement of water temperature and Secchi depth

Preciptation was very close to the 50-year average in water year 2000 (October 1999–September 2000). Water level ranges were evaluated for 28 lakes with sufficient data. Most lakes follow a pattern of annual high winter levels, with the minimum stand in early autumn. In addition, short-term rises were often linked to large storm events.

Water quality was classified by trophic state or degree of biological activity (Carlson 1977), divided into three levels from low to high productivity: oligotrophic, mesotrophic, and eutrophic. In 2000, there was sufficient data to rate 46 lakes with Level II monitors. Of these, 15 lakes were rated oligotrophic, three were borderline oligotrophic to mesotrophic, 15 were mesotrophic, three were borderline

mesotrophic to eutrophic, and 10 were eutrophic. Details on each lake participating will be found in Chapter 3 and comparisons in Chapter 4. While many lakes have retained the same rating over the years, there are more declines in productivity than increases over the last five years, thus suggesting a possible overall gain in water quality on a countywide basis.

Program Thanks and Outlook

We want to emphasize the invaluable work done by the 95+ volunteer monitors, who brave the cold, rain, and wind in the winter (and in the summer too!) to measure the properties of their lakes. They deserve the moments of warm, sunny, and mild weather that occur on occasion. A rough calculation of how much it would cost King County to perform the same work done by volunteers during the 1999–2000 monitoring year is estimated to be in the range of $600,000. Thus, volunteer efforts are the life of this program; it simply could not be done without their hard work.

The Lake Stewardship Program at King County has undergone many changes over the past two years, involving major turnovers in staffing, cuts and reallocation of the program budget, and reorganization of the Water and Land Resources Division. Due to those changes, this report is behind its scheduled date of publication. However, current staff members are committed to meeting established deadlines for this annual report and bringing the publication schedule back in line with the current sampling year.

More changes may occur over time as the budget situation continues to evolve, but the primary goals of the program will remain: to monitor as many small lakes in the county as possible, summarize findings for use by citizens, groups, and jurisdictions in planning for lake protection and stewardship, and to provide technical support and limnological advice in response to requests.

CHAPTER 1

Introduction

Purpose of Report

This report is the sixth in a series that summarizes data collected by volunteer lake monitors annually. This volume, covering water year 2000 (October 1999 through September 2000), provides citizens, scientists, lake managers, and other interested individuals with current information on King County lake water quality and physical conditions for lakes monitored by participating citizens.

For many lakes, these data represent the only available source of information for assessing current water quality and addressing questions regarding the characteristics of a particular lake. The information in this report may help to guide lake protection and stewardship activities in King County. The data and accompanying analysis cannot substitute for detailed limnological studies that may be needed to produce management recommendations and restoration activities for specific lakes.

Report Layout

The report includes a discussion of the methods followed in data collection and analysis, results compiled by individual lake, and a general comparison of the lakes included in the program. The report concludes with an outlook for future monitoring. Individual lake data are summarized in Appendices A and B.

Why Monitor?

The collection of data on lakes varies from one program to another, depending on the objectives of the program. For the King County Lake Stewardship Program, the objectives of data include: (1) gathering baseline data and assessing long-term trends; (2) defining seasonal and water column variability; (3) identifying potential problems and proposing possible management solutions or pinpointing additional studies to be made; (4) educating lake residents, lake users, and policy makers regarding lake water quality and its protection; and (5) providing a knowledge based foundation for long term stewardship of King County lakes.

Every lake is a unique body of water, reflecting the character of the watershed as well as its basin. Water quality is affected by water inflows and outflows, as well as nutrient sources from the watershed, in particular nitrogen and phosphorus. Land use practices throughout the watershed can play a major role in influencing changes within a lake.

Water chemistry and physical characteristics in lakes vary seasonally and by depth at certain times of the year. The most dynamic period for lakes is during the "growing season" of mid-spring through early fall when lake dwelling organisms are most active. To maximize information obtained for the effort, the Volunteer Monitoring Program offers two different programs: Level I monitors collect data all year on precipitation, lake level, surface water temperature, and water clarity, while Level II monitors focus on temperature, clarity and sample collection for water chemistry from May through October. Level II also coincides with the primary recreational period for lakes in the Pacific Northwest.

Most of the 700+ lakes and ponds in King County have never been monitored, and only a few have long monitoring records. In 2000, the Lake Stewardship Program staff worked with volunteer monitors in the collection of Level I data on 38 lakes and Level II data on 46 lakes. Eight lakes had chemistry data collected for the first time, establishing a baseline for comparison in years to come. Twenty-five lakes completed five or more years of continuous water quality monitoring, thus building a solid body of information for use in the future.

During the summer, water chemistry and temperature vary with depth in most lakes. On two dates in water year 2000, Level II samples were collected from the surface, middle, and one meter above the bottom in the deepest part of the lake to define the vertical profiles.

Lake Classification and Eutrophication

Lakes can be classified by measurements of potential and actual biological activity or trophic state. Lakes with high concentrations of nutrients and algae, accompanied by low transparencies are called eutrophic or highly productive. Lakes with low concentrations of nutrients and algae, accompanied by high transparencies are oligotrophic or low in productivity. Lakes intermediate between eutrophic and oligotrophic are mesotrophic. A commonly used index of water quality for lakes is the Trophic State Index (TSI) developed by Robert Carlson (1977), which separates lakes into the three categories by scoring average concentrations of phosphorus, chlorophyll *a,* and water clarity. This index and its application to King County lakes is discussed further in Chapter 4.

Each lake's productivity is influenced by a variety of factors, including watershed size and geology, lake depth and surface area, climate, and the quality and quantity of water entering and leaving the lake. Lakes may be naturally eutrophic, mesotrophic, or oligotrophic based on the original character and stability of the surrounding watershed.

Increases in a lake's biological activity over time (eutrophication) may occur naturally in some lakes, but can be accomplished quickly by human activities in others. Natural eutrophication occurs on a time scale of hundreds to thousands of years and is generally not observable in a lifetime. However, the effects of human-induced (cultural) eutrophication can be seen in as little as a decade.

Land use activities, including home building, commercial development, agriculture, forestry, resource extraction, landscaping, gardening, and animal keeping all contribute nutrients into surface and ground waters and change sediment movement. Increases in impervious surfaces associated with land development also result in increased surface water runoff. This surface

water, as it enters lakes and streams, can increase biological productivity by the addition of nutrients that stimulate plant growth. Additional sediment input associated with increased surface water runoff can also impact lakes in various ways.

Lakes in particular trophic states can also be characterized by the frequency of algal blooms and the type of algae present. Large amounts of algae can affect the use of a lake for swimming, fishing, boating, wildlife, aesthetics, and other uses. Eutrophic lakes, for example, may have frequent nuisance algal blooms dominated by bluegreen algae (cyanobacteria). These blooms can form surface scums, give off noxious odors, and may occasionally produce toxins with direct health impacts on animals as well as people. (See Chapter 2 for further discussions on algae identification.)

Excess growth of rooted aquatic plants can also impact the use of a lake for boating, fishing, and swimming. A lake need not be eutrophic to support a large amount of aquatic plant life. Many aquatic plants are rooted in the sediments, from which they draw nutrients. An important factor is the depth to which light can penetrate in the lake and how much of the lake bottom is within that depth range. Clear lakes with large areas of shallow water can support more aquatic plant growth than deep or colored water lakes.

Seasonality of Lake Water Quality

Lakes are complex ecosystems with many kinds of living organisms interacting with each other and their environment. Inputs from outside such as sunshine, wind, air temperature and water inflows combine with internal forces such as evaporation, currents, nutrient release from sediments, nutrient uptake by algae, and plant-animal interactions to produce an intricate web of relationships.

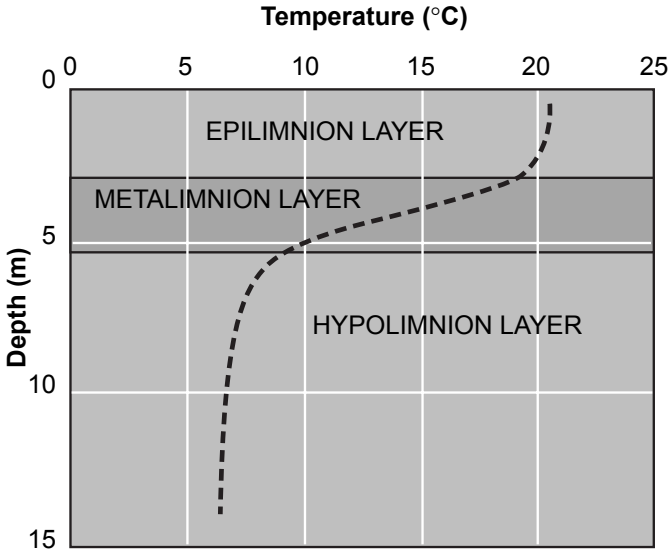


Figure 1: Typical Summer Temperature Profile

An annual process known as thermal stratification occurs when the water column separates into layers by temperature difference (Figure 1). In late fall and winter, water temperature is essentially uniform from top to bottom. As spring begins, the surface water warms faster than heat can conduct downward through the water column. Eventually, the difference stabilizes into three layers: the upper warm epilimnion, the lower cool hypolimnion, and the zone of rapid change in between, termed the metalimnion.

Water does not readily move across the boundaries due to the density differences and the water chemistry changes in each layer over the summer, related to the activities taking place at each level. The epilimnion stays warm and algae continue to grow and reproduce until the nutrient supply is depleted. A hiatus in algal growth then occurs until cool air temperatures in the fall cause the sharply defined thermal layers to begin mixing together, releasing the nutrients held in the hypolimnion back up to shallow water. This sometimes stimulates a fall burst of algal growth, but this is generally short-lived, eventually slowed down by the onset of colder weather and shorter days.

The amount of oxygen in the hypolimnion is affected by thermal stratification and productivity of the lake. Oxygen enters the waters of a lake by mixing into the surface water from the air and then dispersing through water movements and diffusion.

Once thermal stratification is established, oxygen is no longer supplied to the hypolimnion from the air. There is a demand for oxygen by the animals that live in deep waters such as fish and by the bacterial decomposers that break down the organic material that has accumulated from above, such as algal remains and detritus that comes in from the watershed. If a lake is eutrophic, the algal remains will stimulate massive decomposition activity, and oxygen may get very low or even be totally used up by the bacteria before the end of summer.

This can have an enormous impact on fish such as salmonids, who need the cool temperatures and prefer the safety of deep water, but who may be forced upwards by the lack of available oxygen. Summer surface water temperatures can be too warm for some fish, and massive die-offs may happen if they can't escape to cool, deep water.

Very low oxygen concentrations also have an impact on nutrient availability in future seasons. In the absence of oxygen, a chemical reaction in the sediments facilitates the release of more phosphorus back into the water column than would occur if oxygen levels remained high at the sediment-water interface. This means that more phosphorus is available for algal growth in the next growing season, and the lake is likely to be even more productive than before.

The Lake Stewardship Volunteer Monitoring Program has focused on the monitoring of water chemistry in the upper water layers during the growing season in order to characterize lake trophic state. As funds have allowed, additional sampling has been performed to characterize the water chemistry of the deeper lake layers. This vertical sampling has provided data that is useful in understanding nutrient cycling and relationships in individual lakes.

CHAPTER 2

Methods

Program Overview

Volunteer monitors sampled 48 lakes for the Lake Stewardship Program in water year 2000 (Figure 2). The lakes ranged in surface area from 4 acres to 279 acres and in maximum depth from 7 feet to 90 feet (Table 1), spanning all trophic classifications and degrees of urbanization in their watersheds.

The Lake Stewardship Volunteer Monitoring Program is split into two levels of data collection: Level I and Level II. The Level I participants measure precipitation, lake level, surface water temperature, and clarity (Secchi depth). The Level II participants' program involves collecting water samples for water quality analysis, while also measuring water temperature and clarity.

Level I Data Collection

Level I data collection occurs daily and weekly, and is compiled by the water year which, in North America, begins in October and ends in September. The water year differs from the calendar year because it is based on annual precipitation and hydrologic patterns.

In water year 2000, there were 38 lakes in the Level I program (Table 2). For many lakes, volunteers were able to collect data for the entire year. For some lakes, volunteers were not able to complete this commitment or were recruited later in the year, so the data is incomplete. Gaps and anomalies are noted by lake in Chapter 3 and Appendix A .

Lake level and precipitation measurements were recorded daily by volunteers. Lake level was recorded from a gauge (a porcelain glazed aluminum metric ruler) that is attached permanently to a dock or other fixture in the lake near the volunteer's home. Precipitation was collected in a plastic rain gauge installed in an area exposed to direct rainfall and away from overhanging objects such as trees or buildings.

Figure 2: Location of Lakes Monitored in 2000

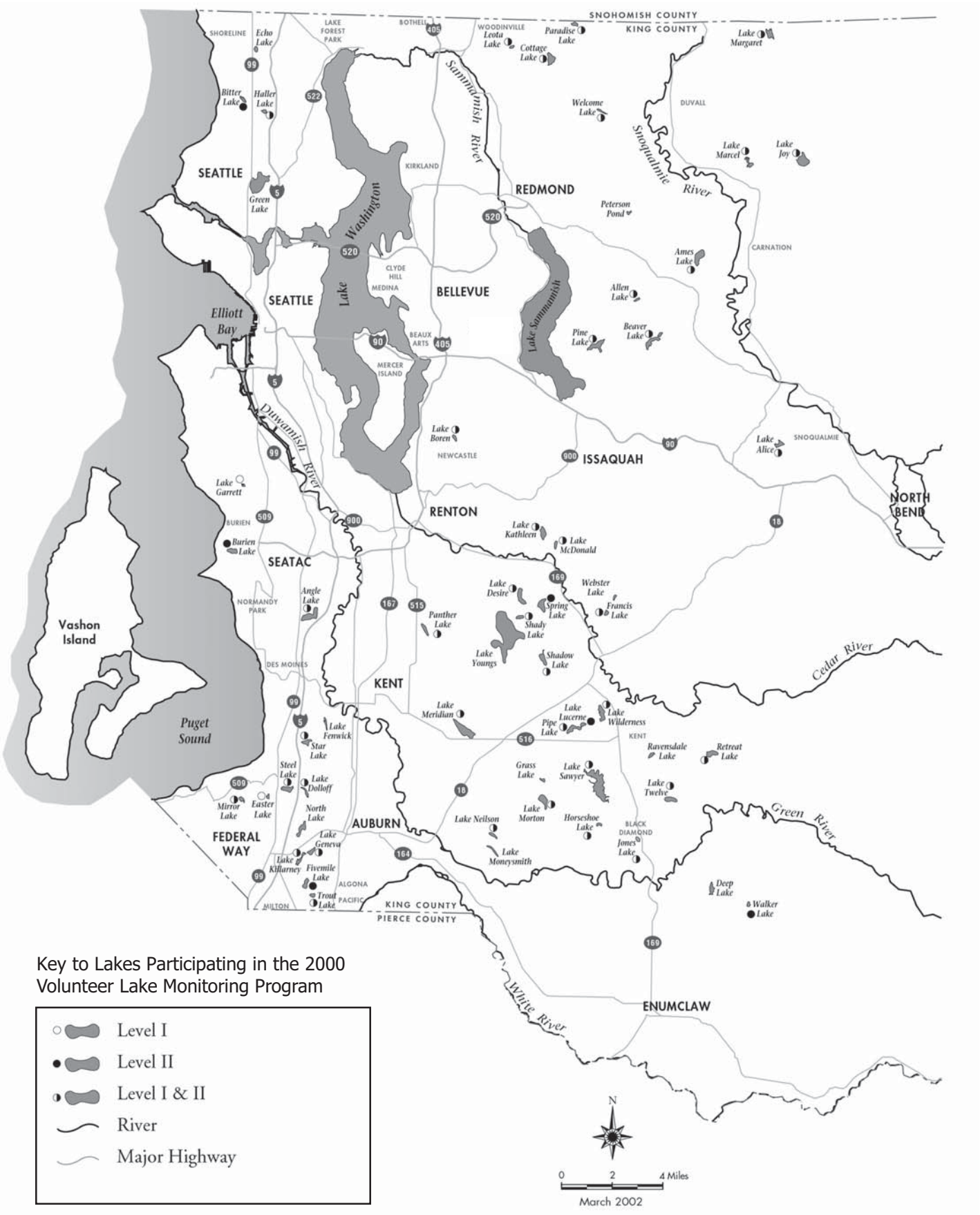


Table 1: Physical Characteristics of Monitored Lakes

Lake Name	Location	Watershed (Acres)	Lake Area (Acres)	Mean Depth (Feet)	Max Depth (Feet)	Public Park	Boat Launch	Fish
Alice	2.5 miles S of Fall City	154	32.1	**8**	30	n	Y	ST,B,O
Allen	6 miles N of Issaquah	441	11	---	---	n	n	---
Ames	2 miles W of Carnation	1178	80	18	28	n	---	---
Angle	SeaTac	512	102	25	52	Y	Y	ST,B,O
Beaver-1	Sammamish	1043	13	22	55	Y	n	---
Beaver-2	Sammamish	1043	62	21	54	Y	Y	ST,B,O
Bitter	Seattle	326	19	16	31	Y	ct	B,O
Boren	Newcastle	685	15	18	34	Y	Y	ST,O
Burien	Burien	250	44	13	29	Y	n	---
Cottage	4 miles E of Woodinville	4371	63	15	25	Y	ct	ST,B,O
Desire	5 miles SE of Renton	875	72	13	21	Y	Y	ST,B,O
Dolloff	3 miles NW of Auburn	518	21	10	19	Y	Y	ST,B,O
Easter	Federal Way	---	11	---	---	n	n	---
Fivemile	4 miles SW of Auburn	640	38	18	32	Y	ct	ST,B
Francis	2 miles N of Maple Valley	390	20	4	9	n	n	---
Garrett	7 miles S of Seattle	673	4	---	---	Y	n	---
Geneva	2.5 miles SW of Auburn	224	29	19	46	Y	Y	ST,B
Haller	Seattle	---	15	---	36	Y	ct	ST,B,O
Jones	0.5 miles S of Black Diamond	742	22.5	4	7	n	n	---
Joy	3.75 miles N of Carnation	486	105	23	50	n	n	---
Kathleen	5.25 miles NW of Maple Valley	314	39	7	22	n	n	---
Killarney	3.5 miles SW of Auburn	154	31	9	15	n	Y	ST,B,O
Leota	Woodinville	506	10	12	24	n	n	---
Lucerne	Maple Valley	403	16	18	37	n	n	---
Marcel	3 miles N of Carnation	960	33	---	17	n	n	---
Margaret	4.25 miles NE of Duvall	1523	44	18	43	n	Y	ST,B
McDonald	6 miles E of Renton	96	18	23	47	n	n	---
Meridian	Kent	742	150	41	90	Y	Y	ST,B,O
Mirror	Federal Way	166	19	12	27	n	n	---
Morton	4 miles W of Black Diamond	256	66	15	23	n	Y	ST,B
Neilson	4.75 miles E of Auburn	186	19	18	31	Y	Y	ST,B
Panther	3.5 miles NE of Kent	192	33	3	7	Y	---	---
Paradise	4.5 miles NE of Woodinville	2643	18	17	28	n	n	---
Pine	Sammamish	640	88	20	39	Y	Y	ST,B,O
Pipe	Maple Valley/Covington	314	52	27	65	n	n	---
Retreat	1.75 miles E of Ravensdale	1414	53	23	50	n	n	---
Sawyer	Black Diamond	8300	279	26	58	Y	Y	B,O
Shadow	2.5 miles W of Maple Valley	450	50	22	45	n	Y	ST,B,O
Shady	3.5 miles NW of Maple Valley	220	21	21	40	n	Y	ST,B
Spring	3 miles NW of Maple Valley	450	68	19	32	Y	Y	ST,B,O
Star	3 miles SW of Kent	378	34	25	50	n	Y	ST,B,O
Steel	Federal Way	243	46	13	24	Y	Y	ST,B
Trout	4 miles SW of Auburn	979	18	17	27	Y	Y	ST,B
Twelve	1.5 miles NE of Black Diamond	440	43	13	28	n	Y	ST,B,O
Walker	2 miles SE of Hobart	314	12.1	34	54	n	Y	ST,O
Welcome	5 miles NE of Redmond	588	17	---	---	n	n	---
Wilderness	Maple Valley	420	67	21	38	Y	Y	ST,B,O

Key:	N = No	ST = Stocked Trout
	Y = Yes	B = Bass
	CT = Car top boats, no ramp	O = Other fish

Table 2: Volunteer Monitored Lakes and Level of Participation During Water Year 2000

LAKE	LEVEL I Quarterly *(Oct. 1999 - Sept. 2000)*	LEVEL I *Daily* *(Oct. 1999 - Sept. 2000)*	LEVEL II *(May - Oct. 2000)*
Alice	X	X	X
Allen	2nd, 3rd, & 4th qtr.	2nd, 3rd, & 4th qtr.	X
Ames	3rd & 4th qtr.	3rd & 4th qtr.	X
Angle	X	X	X
Beaver-1			X
Beaver-2	X	X	X
Bitter			X
Boren		1st, 2nd, & 3rd qtr.	X
Burien			X
Cottage	X	X	X
Desire	X	X	X
Dolloff	3rd qtr. Only	1st, 2nd, & 3rd qtr.	X
Easter	1st, 3rd, & 4th qtr.	X	
Fivemile			X
Francis	3rd & 4th qtr.	X	X
Garrett	X	X	
Geneva	X	X	X
Haller	X	X	X
Horseshoe	X	X	X
Jones	2nd, 3rd, & 4th qtr.	2nd, 3rd, & 4th qtr.	X
Joy		1st & 2nd qtr.	X
Kathleen	X	X	X
Killarney	1st qtr. Only	1st qtr. Only	X
Leota	X	X	X
Lucerne			X
Marcel	X	X	X
Margaret	X	X	X
McDonald	X	X	X
Meridian	X	X	X
Mirror	X	X	X
Morton	X	X	X
Neilson	X	X	X
Panther	1st qtr. Only	1st qtr. Only	X
Paradise	X	X	X
Pine	X	X	X
Pipe		X	X
Retreat	1st, 2nd, & 4th qtr.	1st & 2nd qtr.	X
Sawyer	X	X	X
Shadow	3rd & 4th qtr.	1st qtr. Only	X
Shady	3rd & 4th qtr.	3rd & 4th qtr.	X
Spring			X
Star	1st qtr. Only	1st qtr. Only	X
Steel	1st, 3rd, & 4th qtr.	1st, 2nd, & 4th qtr.	X
Trout	1st, 2nd, & 3rd qtr.	1st, 2nd, & 3rd qtr.	X
Twelve	2nd, 3rd, & 4th qtr.	2nd, 3rd, & 4th qtr.	X
Walker			X
Welcome	X	X	X
Wilderness	X	X	X

Note: For Level I data, an X indicates the lake was sampled for all four quarters (1: Oct.-Dec.; 2: Jan.-Mar.; 3:Apr.-Jun.; 4:Jul.-Sept.). For Level II data, the X indicates participation during the year.

Water clarity (Secchi depth), water color, and surface water temperature were measured weekly. Secchi depth was measured over the lake's deepest point (Wolcott 1961, USGS 1976). The method involves lowering an eight-inch disk painted with alternating black and white quadrants over the shaded side of the boat until the disk disappears, then lifting it until it reappears again. The depths at each point are noted, and if different, are averaged.

Volunteers measured water temperature at the same location as Secchi depth. The method calls for submerging a Celsius thermometer in the water to about one foot below the water surface for two minutes, then reading the temperature to the nearest 0.5 degrees. Further details on Level I volunteer monitoring sampling methods are supplied in the Sampling and Quality Assurance Manual for Lake Volunteer Monitors (King County 2000).

Water color was rated by lowering the Secchi disk to a depth of one meter and comparing the color of the water seen against the disk with the colors shown on the color chart. The numerical rating of the closest matching color was recorded on the field sheet. Color data was entered into a database; however, analysis of water color data was not done for this report. It should also be noted that water color data collection by volunteers in the field has since been discontinued.

Daily data is averaged into weekly values where complete, while values measured weekly are reported directly (Appendix A). All data are available upon request to King County Water and Land Resources Division.

Level II Data Collection

Level II volunteer monitoring activities were performed every two weeks from May through October on a predetermined schedule. While one meter water was collected on every sampling date, volunteers also collected deeper samples twice during the period, at mid-depth and one meter from the lake bottom.

In water year 2000, 46 lakes participated in the Level II program (Table 2). For most lakes, volunteers were able to collect data for the entire period (May through October). Gaps and anomalies are noted by lake in Chapter 3 and Appendix B.

Volunteers anchored at a specified location, generally over the lake's deepest point. For each date, volunteers recorded the time and weather, adding observations on unusual conditions or activities on the lake. Secchi depth and water color were measured using the same methods as described for Level I. Water samples were collected at one meter using a Van Dorn vertical water sampler. Temperature was read from a thermometer installed inside the sampler, after which water was saved in special containers for labaratory analysis of total phosphorus, total nitrogen, chlorophyll *a*, and phytoplankton

On dates when vertical profiles were taken, samples were gathered at mid-depth, and one meter from the lake bottom, as well as at one meter from the surface. Temperature was measured and samples for total phosphorus and total nitrogen were collected at all three depths. Chlorophyll *a* and phytoplankton analyses were collected for the one meter and mid-depth samples only.

The water samples were analyzed at the King County Environmental Laboratory for total phosphorus, total nitrogen, and chlorophyll *a*, using standard protocols and quality assurance and quality control procedures. Phytoplankton

(algae) identification and enumeration was carried out by a private consultant to the Lake Stewardship Program.

Physical and chemical values for each date are detailed in Appendix B. Phytoplankton data for individual dates are available upon request. Further details on Level II volunteer monitoring sampling methods are described in the Sampling and Quality Assurance Manual for Lake Volunteer Monitors (King County 2000).

Data Analysis

Minimum, maximum, and average values for temperature and Secchi depth were determined for Level I volunteer monitoring data (Appendix A). Annual lake level range and total precipitation were also determined for each participating lake. Physical parameters measured at both levels are illustrated graphically on a five year time scale from October 1995 through September 2000 (Chapter 3). This illustrates seasonal patterns clearly, often better than a single year of data can accomplish. The influence of large precipitation events on lake levels were also examined.

For Level II water quality measurements, the minimum, maximum, and average values were determined for the sampling period (Appendix B). Average values for each parameter are plotted over the last five years for comparison through time (Chapter 3). Averages that represent complete or nearly complete data sets have a contrasting bar pattern than averages representing data with significant gaps or missing values in the set.

The Trophic State Index or TSI (Carlson 1977) and the nitrogen to phosphorus ratios were calculated for Level II volunteer monitoring data. The TSI is a lake productivity scale that can be used to compare water quality over time and between lakes (see discussion in

Algae in Lakes

Algae are the basic food producers in lakes, using the energy of sunlight to change water and carbon dioxide dissolved in the water into substances that animals then use to stay alive, grow, and reproduce. The long chain of life that stretches from algae to large animals, including humans, has been studied intensively, and yet there is still much to learn.

Some algae live by attaching to surfaces such as rocks, docks and large aquatic plants, while others lay on the bottom sediments or float freely through the water column. The last group, known as “phytoplankton,” often makes the biggest contribution to the volume of algae growing in lakes through the year and is the most studied of the various groups.

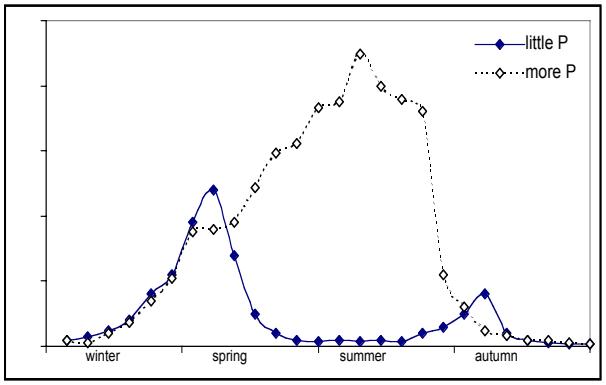
The interactions between phytoplankton and the environment within a lake are often complex and unpredictable, but there are some generalizations that can be made about changes in populations through the year and how those relate to seasonal changes in lakes in temperate climates, such as that of King County. Algae need all the same conditions as land-based plants in order to grow. In addition to the necessary elements for photosynthesis, they need a temperature range to which they are adapted, as well as appropriate concentrations of hydrogen ions (pH) and nutrients, including nitrogen, phosphorus, silica, calcium, magnesium, and iron.

The seasonal interplay between climate, water input and water circulation within a lake result in changes in water temperatures, light availability, and nutrient concentrations. Changing conditions allow different algae to dominate the plankton as time passes and seasons progress.

General patterns of phytoplankton populations through the seasons (“succession”) emerge for lakes situated in moderate climate areas like the Pacific Northwest. There are many small

variations, since each lake is unique. Commonly, phosphorus plays the role of "limiting nutrient" in lakes in the Puget lowlands. A limiting nutrient is the substance that will be exhausted first by the growing algae. When it is essentially gone from the lake, the algae will be limited in growth. Algal growth peaks in spring in lakes with smaller amounts of phosphorus and then drops in summer when the phosphorus is gone from the epilimnion (upper water). In lakes with more phosphorus, the phytoplankton continue to grow into the summer reaching maximum levels in July, August, or even September before decreasing temperatures and light begin to limit growth. Sometimes lakes with algae peaks in spring will produce another peak in fall, when cool temperatures mix the phosphorus from the lower water (hypolimnion) of the lake up into the epilimnion and enough light is present to stimulate the second period of growth.
One simple way to estimate the size of the phytoplankton populations in a lake is to measure the amount of chlorophyll *a* found in a liter of water. All algae have chlorophyll since it is necessary for photosynthesis (food production), so it can be used to estimate how much phytoplankton volume is present. There are several problems with this method, but as a general approximation of the total volume of algae present, it is a useful tool for studying lakes.

Figure 3: Illustration of Seasonal Abundance



This figure shows the two general patterns that volumes of algae in a lake can make over a calendar year. The solid line illustrates a common pattern when little phosphorus is available for growth. The dotted lines illustrate what may happen with more phosphorus available.

Volunteer monitors for the Lake Stewardship Program routinely collect water during the growing season for chlorophyll *a* analysis, as well as identification of the most numerous algae present. However, beginning in water year 2000, samples were taken for more complete analysis of the phytoplankton populations for all dates and lakes where chlorophyll was sampled. This included not only identification of all the commonly found species, but enumeration and volume estimates as well.

Major Groups of Phytoplankton

Algae that float in the water of lakes are diverse and come from all the major groups of algae classified by scientists. However, several groups are predominant in the Puget Sound area. Most have something particular about their requirements that can be used to characterize the environment of the lake in which they are found. Lakes with water colored by imput from adjacent wetlands often feature different phytoplankton species than lakes with clear water, but similar amounts of phosphorus. The following is a description and discussion of the major algal groups and some representative species that are common in the small lakes of King County. Besides the Latin botanical names of the groups, algae are commonly distinguished by their coloration.

Cyanobacteria: the Bluegreen "Algae"

Bluegreens are simple organisms that share many features with bacteria, but produce food in the same way as plants, thus making their place in

biological classifications open to argument. For this reason, some people refer to them as algae although strictly speaking it is not true. They also share many of the environmental requirements of algae and are important in the phytoplankton communities of lakes.

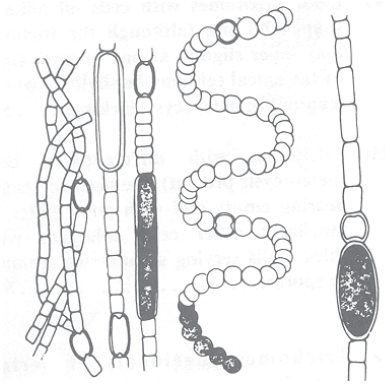
Bluegreens can be blue-green in color, but they can also be red, brown, purple, yellow-green and olive. They always have at least a small amount of chlorophyll, but they also can have a wide variety of other pigments that act as auxiliary light catchers for photosynthesis.

Bluegreens have become especially notorious because several species grow quickly in waters rich in phosphorus, often increased by land use changes or other human impacts. They can outnumber and exclude other naturally occurring species, leading to reduced water clarity, bad smells, and floating scums of decaying colonies, thus adding to their reputation as algae of polluted waters. In addition, some species are known to make compounds toxic to mammals and fish. Although this is a rare occurrence, when it happens the results are often dramatic and make newspaper headlines.

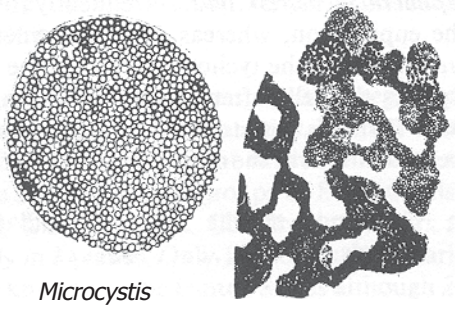
Bluegreens are most often colonial, which means that the cells band together in groups rather than occur alone in nature. The two major forms are simple clusters of cells and cells arranged in long filaments. Some of the filamentous varieties can absorb nitrogen from sources not available to other algae, thus giving them an advantage in lakes where nitrogen may run out before phosphorus. Thus when the nitrogen to phosphorus ratio is low in a lake, some bluegreens may have the opportunity to grow faster than the other algae present.

In general, bluegreens do very well in warm water and in high light levels, and therefore are considered to be summer algae. However, several species, such as *Aphanizomenon flos-aquae*, seem to be able to increase their population size in every season of the year in temperate lakes if other conditions are right.
Common bluegreens found in King County lakes include *Aphanizomenon flos-aquae*, *Microcystis aeruginosum* and *Anabaena* (several species). The last two named are most often implicated when toxic blooms are reported, but in fact most occurrences of these species are not toxic.

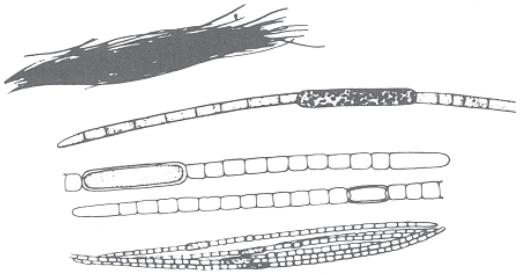
Figure 4:
Common Bluegreen Algae



Anabaena



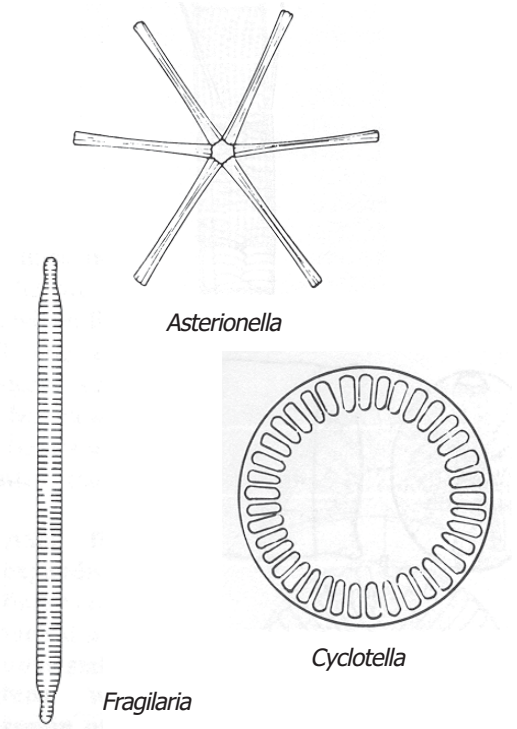
Microcystis



Aphanizomenon

Illustrations obtained from: *how to know freshwater algae* by G.W. Prescott, 1978.

Figure 5: Common Diatom Algae



Illustrations obtained from: *how to know freshwater algae* by G.W. Prescott, 1978.

Chrysophytes: the Golden Brown Algae

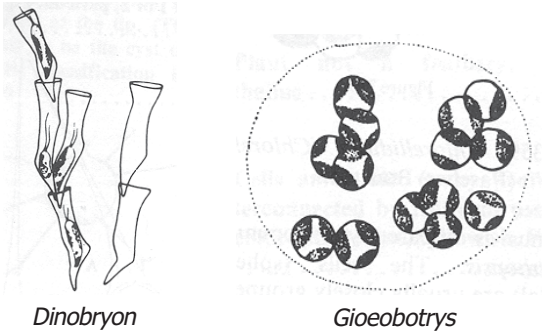
The chrysophyte algae have the necessary chlorophyll *a*, but also have pigments that give them a characteristic golden to brown color. Many are common in springtime, although one or two varieties can make large populations in summer under the right conditions.

Diatoms are an important subgroup of the chrysophytes, often dominating spring phytoplankton since they can grow better than other algae in low light and cool temperatures, thus getting a head start on the growing season. Diatoms make hard coverings for their cells, known as "frustules" and this characteristic has two effects: their growth can be limited by the amount of silica present rather than by the phosphorus limiting other algae, and the extra weight of the frustule makes it hard for some diatoms to stay in shallow water where light is available. Therefore, most diatom populations will be seen in spring before the beginning of thermal layering in area lakes or fall when the water cools, with one or two exceptions.

Diatom species can either be found as groups of cells (colonial) or solitary. Typical diatoms found in King County include *Cyclotella* species (solitary) and colonial varieties of *Fragilaria*, and *Asterionella*. Some diatoms, such as several species of *Cyclotella*, have the reputation of being indicators of clean water or oligotrophic conditions. Others, such as *Fragilaria*, are known to be more common in mesotrophic lakes.

Several other chrysophytes are quite common in lakes of our area. The colonial alga *Dinobryon* does not make a frustule, but does make a thin protective covering shaped a little like a drinking glass, termed a "lorica." Individual cells connect to each other in a manner reminiscent of tree branching, and large colonies are more buoyant because of this shape, allowing Dinobryon to stay higher in the water column and persist through the summer in many lakes. It predominates in summer in many small lakes in King County. Another buoyancy device used by some chrysophytes is the surrounding of the colonies of algae cells with a coat of jelly that is less dense than water thus making them lighter. This adaptive scheme can been seen in *Gloeobotrys*.

Figure 6:
Other Chrysophytes Algae



Illustrations obtained from: *how to know freshwater algae* by G.W. Prescott, 1978.

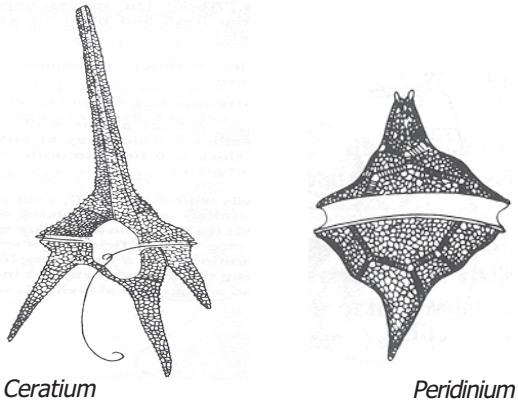
Chlorophytes: the Green Algae

Green algae produce chlorophyll as the predominant pigment, hence their bright green coloration. They are a large and varied group, with some characteristics closer to the higher plants than found in other groups of algae, and therefore some authorities have considered them an evolutionary link to land plants. They can occur in lakes all year, but tend to reproduce and grow much better in warm temperatures and high light levels, thus generally producing their biggest populations in summer.

Green algae can be solitary or colonial, and the colonies can take many different shapes from globular to elaborately geometrical to filamentous. Most of the filamentous green algae grow attached to surfaces rather than floating in the water. Typical colonial greens found in area lakes include *Volvox* and the rather peculiar large chlorophyte called *Botryococcus*, which makes large amounts of oils that keep it buoyant through the season, often turning from green to bright orange as it gets old and dies off.

Another group of specialized green algae, called the Desmids, are often found in highly colored, acidic waters such as bogs and cool water wetlands. The desmids make a hard cell surface out of an organic material that can have an elaborate shape, ornamented with many spines and knobs. *Cosmarium* is a commonly found representative in our lakes.

Figure 8: Common Dinoflagellates



Ceratium *Peridinium*

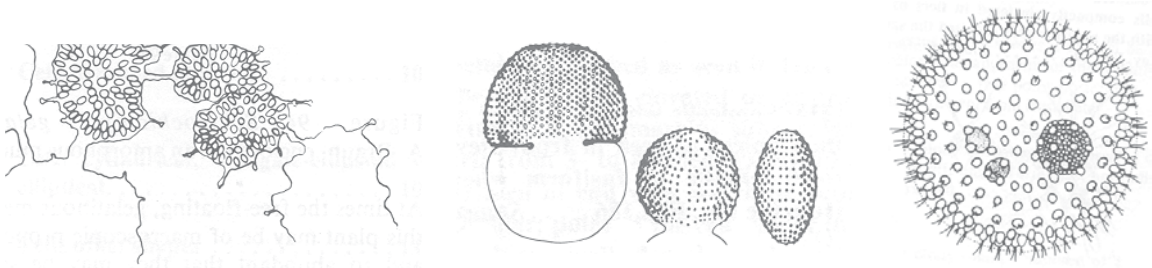
Illustrations obtained from: *how to know freshwater algae* by G.W. Prescott, 1978.

Pyrrhophytes: the Dinoflagellates

The dinoflagellates are a group that has been characterized both as algae and protozoa because of their ability to move quickly through the water, characteristic of animals, but also being able to make food like plants. Dinoflagellates are nearly always solitary and are common in marine water, where they are notorious for toxic blooms (red tides) that render shellfish poisonous for humans and other animals to eat.

Freshwater dinoflagellates are mostly harmless to people, but can color the water red or brown on rare occasions. Large populations will occur in the summer, if at all, in our area. The most common forms seen are species of *Peridineum* and *Ceratium*.

Figure 7: Common Chlorophytes Algae



Botryococcus *Cosmarium* *Volvox*

Illustrations obtained from: *how to know freshwater algae* by G.W. Prescott, 1978.

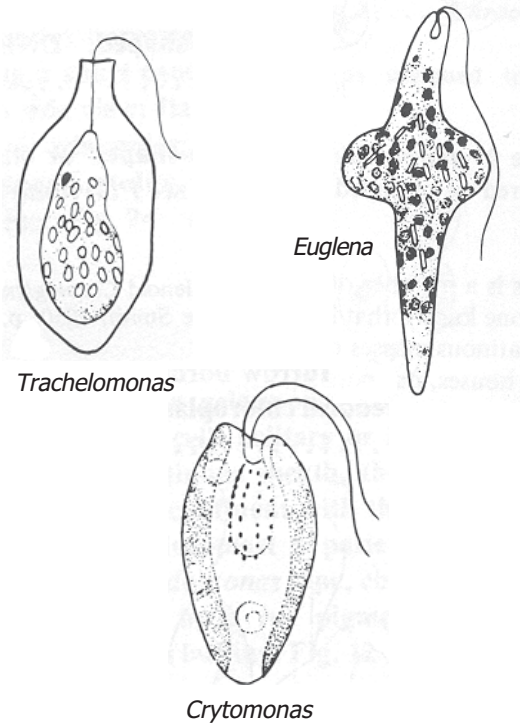
Two Other Lesser Known Groups of Algae

There are two other groups of algae that have no common names, but which are found frequently in the lakes of our region.

Euglenophytes

Euglena and its allies are often the first algae introduced to students in high school. Its large size and clear structure make it a good subject for beginning biologists to see with a microscope. These algae are always solitary, quite mobile, and generally are found in small bodies of water such as ponds and ditches rather than lakes. However, they were found in several of the lakes in the Lake Stewardship Program, such as Jones, Panther, and Paradise. Examples of common euglenoids include *Euglena* and the unusual *Trachelomonas*, which makes an organic shell colored golden or brown.

Figure 9: Common Euglenophytes and Cryptomonas Algae



Illustrations obtained from: *how to know freshwater algae* by G.W. Prescott, 1978.

Cryptophytes

The cryptophytes are a group of solitary, mobile algae quite distinct from other groups, but with little variation among the species. They are generally small, can move quickly, and are known as an excellent food source for many small planktonic animals. Abundances of these algae can vary throughout the year, filling in quickly when other algal populations fail to thrive, but disappearing just as fast as the animals graze on them. *Cryptomonas* is a common inhabitant of our lakes.

Summary

Each lake monitored by the Lake Stewardship volunteers has a characteristic suite of algae that do well in its waters. While the patterns of phytoplankton abundance for any lake will be approximately the same from year to year, following the seasonal changes in light, temperature and nutrients, the actual species that dominate may be different, due to the complexities of competition and changing circumstances. This first year of detailed phytoplankton identification and counting for the lakes in the monitoring program may be compared to succeeding years. The presence of certain species can be taken as indicators of particular conditions, which can be very useful when analyzing the situation of a specific lake. However, the relationships between different groups of algae, the animals that eat them, and the environment are far too complex to make broad conclusions.

CHAPTER 3

Results and Discussion

Introduction

Between October 1999 and October 2000, volunteers monitored 48 lakes, collecting data at either Level I, Level II, or both levels. In this chapter the results are reported for each lake individually, assembled in alphabetical order.

Level I data such as precipitation, water level, Secchi transparency, and surface temperature are presented as line plots on a scale of five years to allow comparisons over time. Level II data on Secchi depth and temperature are plotted with different symbols in the same chart with Level I data.

Level II chemistry data, including chlorophyll *a*, total phosphorus, and total nitrogen, were averaged for each year, and the result was plotted on bar charts to allow for quick assessment. When there were more than four missing values for a year, the bar was shaded to acknowledge that data for the particular year was incomplete.

A new chart was added for the year 2000, reporting on the identification of algae and the estimation of algal volumes in the surface waters of each lake. The data was plotted in a bar chart, with each bar representing one sample date over the collection period. The height of the bar shows the total volume of the phytoplankton on that date, while the proportions of different major groups are represented by different patterns along the bar, in the same order from date to date. A discussion of the different groups of algae and their general significance in the phytoplankton is included at the end of Chapter 2.

Eight new lakes were added to the program in water year 2000, all of which were sampled for Level II data, while six had Level I data collected as well.

Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Weekly averages of Level I data are reported in Appendix A. Level II data are presented in Appendix B. Since this was the first year of Level II sampling for the lake, the data will become the baseline for comparison in years to come. No samples were missed out of 13 collection dates.

On the opposite page, available data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed for the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen show the average values for May through October.

The lake level pattern appears to be the same as many small lakes in King County, with higher levels in the wet winter months and an annual low occurring in early autumn. Based on Secchi data, water clarity is generally good throughout the year, related to the low abundance of algae. Surface water temperatures were unusually low in winter, but were similar to other lakes in the summer.

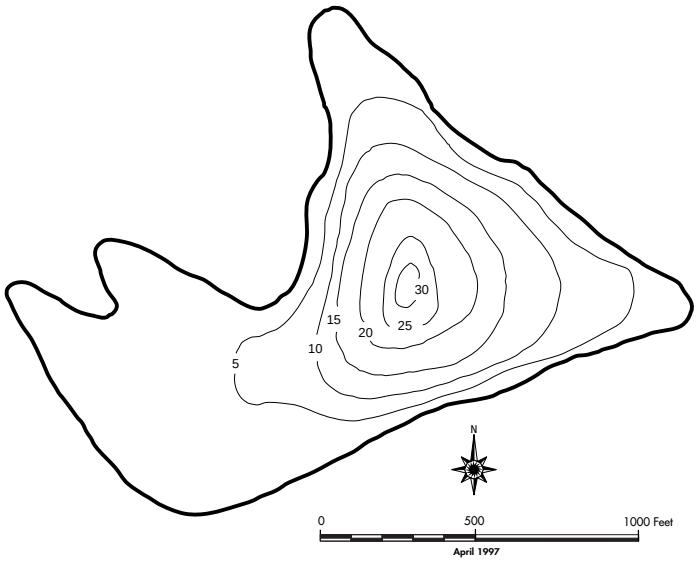
Individual trophic state indicators were calculated for Secchi (40), Chlorophyll *a* (39), and total phosphorus (36). The average (38) indicates that Lake Alice is low in productivity (oligotrophic) in 2000, with very good water quality. The average nitrogen to phosphorus ratio was 36, with a minimum of 18. This indicates that the phosphorus concentrations were likely to limit the growth of algae for most of the period, but there may have been periods when bluegreens found favorable conditions.

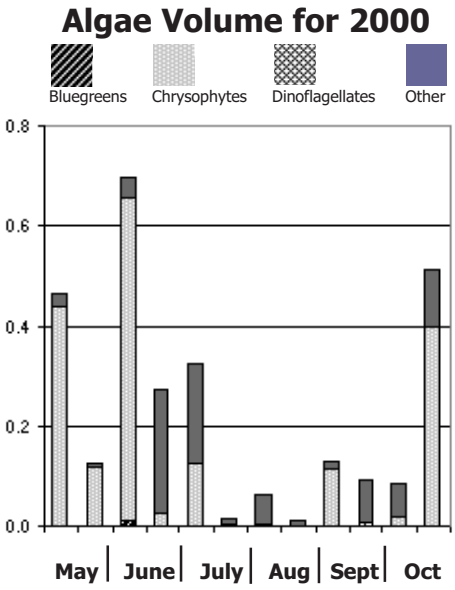
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see discussion of algae in Chapter 2). Algae peaked in volume in spring, decreased through summer, and increased in fall, which is common in lakes with clear water. The chrysophyte *Dinobryon* and the chlorophyte *Botryococcus* dominated the phytoplankton, which is consistent with excellent water quality.

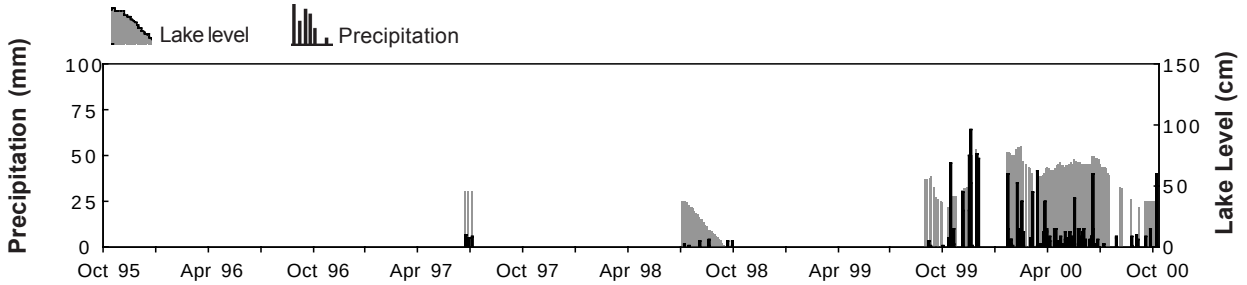
Volunteer Monitors

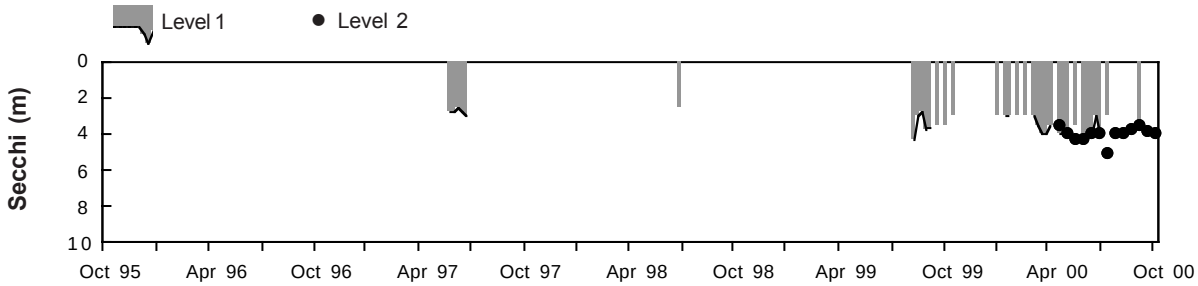
Level I (Oct 1999–Sept 2000)
Primary: Jenny Emsky; Cheri Enevold

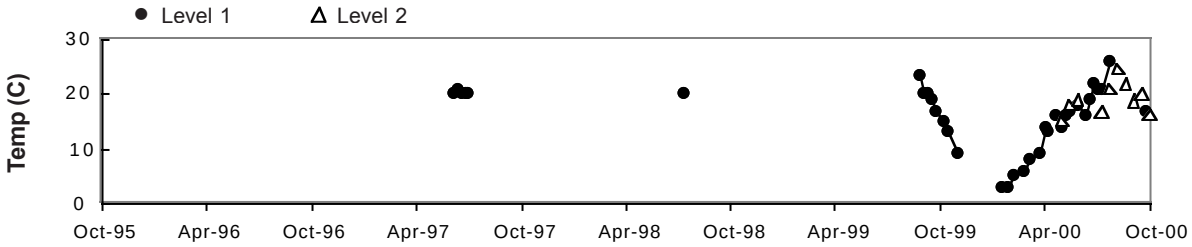
Level II (May–Oct 2000)
Primary: Jenny Emsky





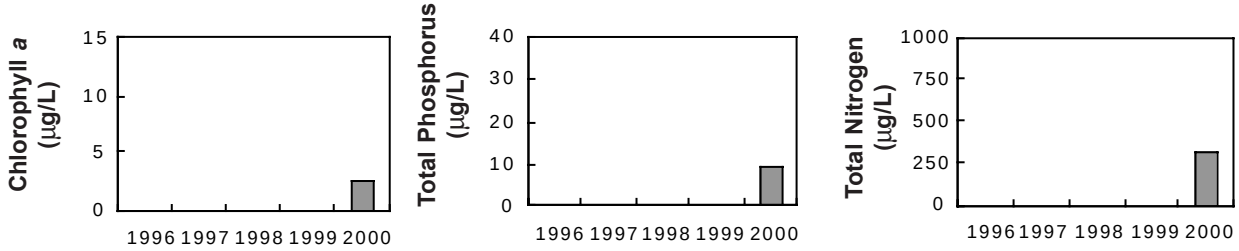






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1040	—
Days Precipitation Measured	217	—
Lake Level Fluctuation (cm)	49	—
Average Secchi Depth (meters)	3.5	4.0
Average Surface Temperature (°C)	14.0	18.5



Volunteer monitors made physical measurements and collected water samples for both Level I and Level II during water year 2000. The average weekly Level I data are recorded in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of 13 collection dates.

On the opposite page, precipitation, lake level, Secchi transparency, and surface water temperatures are graphed for the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

Lake level patterns were consistent, with higher levels in the wet winter months and annual lows in early autumn. Sudden rises in level appear to be related to large storm events. Based on the Secchi data, water clarity is generally low throughout the year, related to the dark color of the water, as well as the abundance of algae. The temperature record is similar to other small lakes in King County.

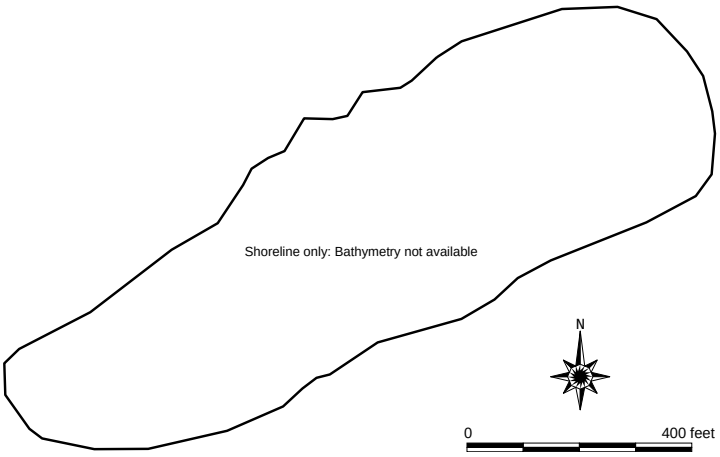
Individual trophic state indicators were calculated for Secchi (64), Chlorophyll *a* (62), and total phosphorus (55). The average (60) indicates that Allen Lake is highly productive (eutrophic) with fair water quality, consistent with past ratings. The average nitrogen to phosphorus ratio was 25, with a minimum of 14. This indicates that the phosphorus concentrations were likely to limit the growth of algae for much of the period, but there were periods when bluegreens found favorable conditions.

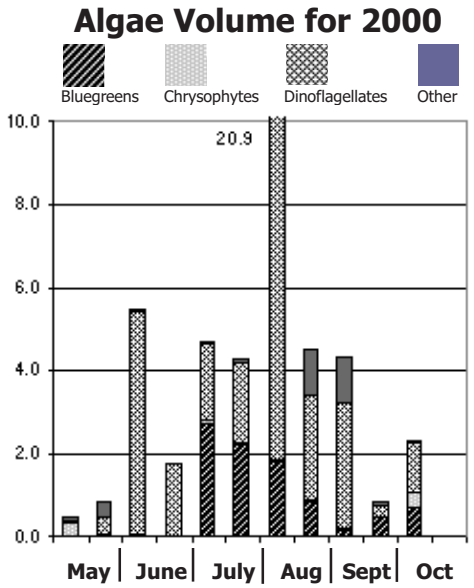
Volunteer Monitors

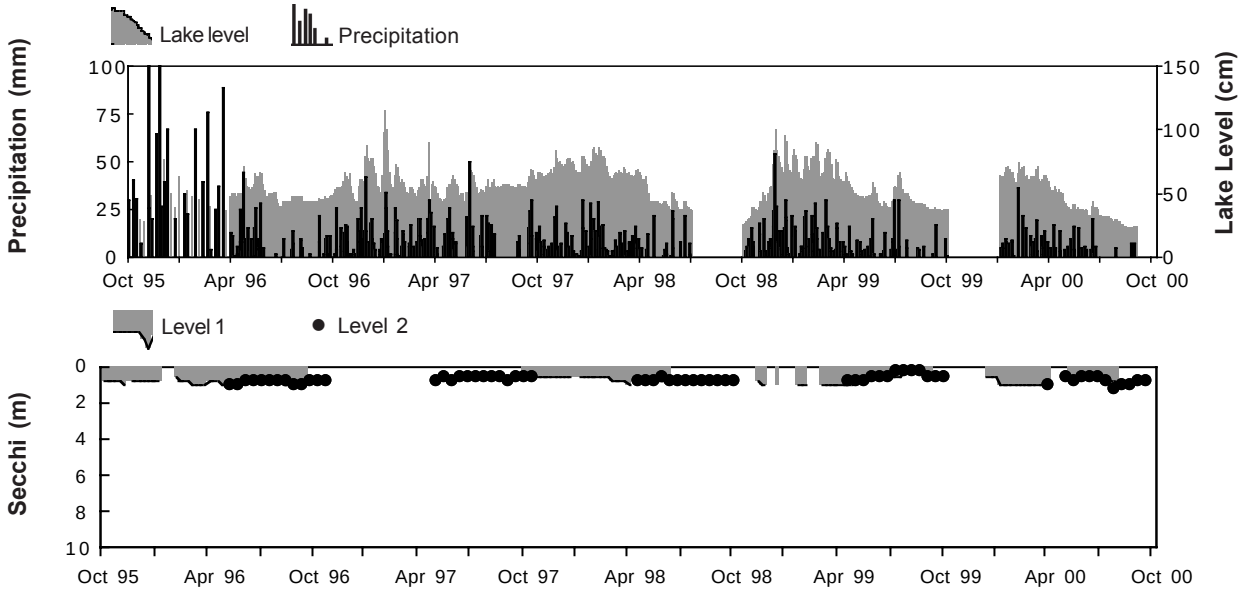
Level I (Oct 1999–Sept 2000)
Primary: David and Betty Burton

Level II (May–Oct 2000)
Primary: David and Betty Burton

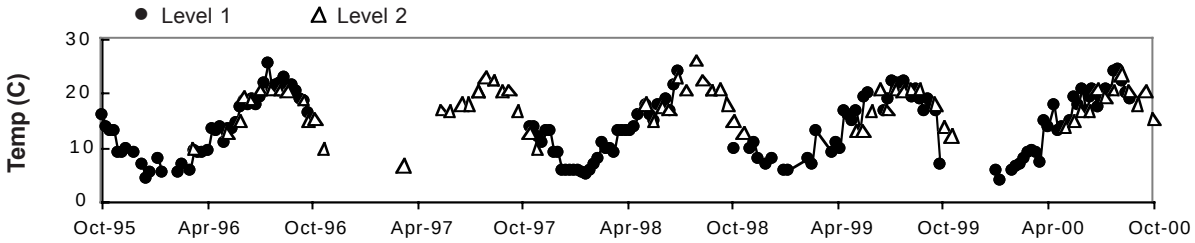
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). Abundance was very high throughout the summer, with a major peak in early August. This pattern is common in eutrophic lakes and affects water clarity. The dinoflagellate *Ceratium* was dominant through the growing season, typical of dark water lakes, but significant amounts of bluegreen algae were found in July and August as well. This was mostly the genus *Anabaena*, which can make nuisance blooms in some lakes, but remained subdominant in Allen Lake this year.





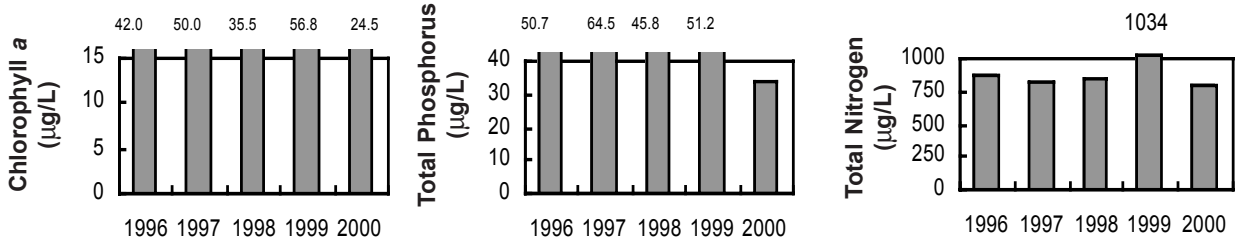


Note: Lake level data was collected weekly October 1995–March 1996 and daily April 1996–2000



Physical Characteristics for 2000

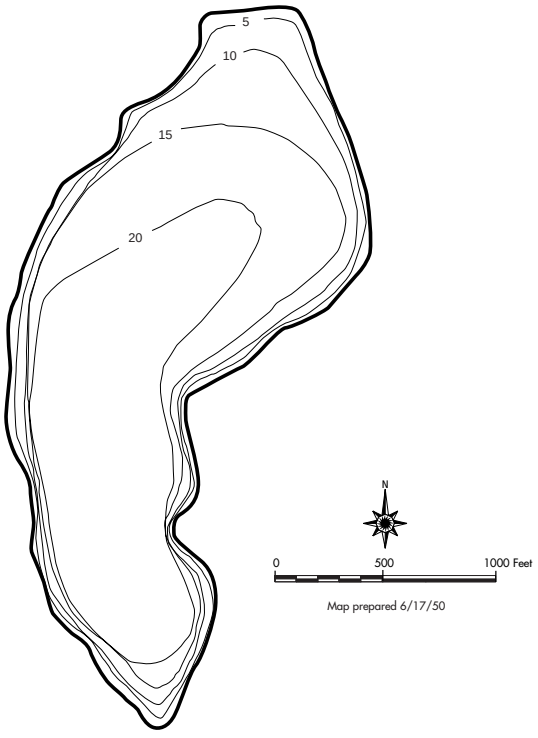
	Level I Annual	Level II Summer
Sum of Precipitation (mm)	496	—
Days Precipitation Measured	210	—
Lake Level Fluctuation (cm)	52	—
Average Secchi Depth (meters)	0.77	0.77
Average Surface Temperature (°C)	14.8	17.8



A volunteer monitor made physical measurements and collected water samples for both Levels I and II data during water year 2000. Weekly averages of Level I data are reported in Appendix A. Level II data are presented in Appendix B. Since this was the first year of sampling for the lake, the data will become the baseline for comparisons in years to come. No samples were missed out of 13 collection dates.

On the opposite page, available data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed for the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen show the average values for the period of May through October.

The lake level pattern appears similar to many small lakes in King County, with higher levels in the wet winter months and an annual low occurring in early autumn. The watershed appears to buffer the lake against sudden rises in level due to large storm events. Based on Secchi data, water clarity is lower in spring and increases in summer, related to the abundance of algae and zooplankton grazing.



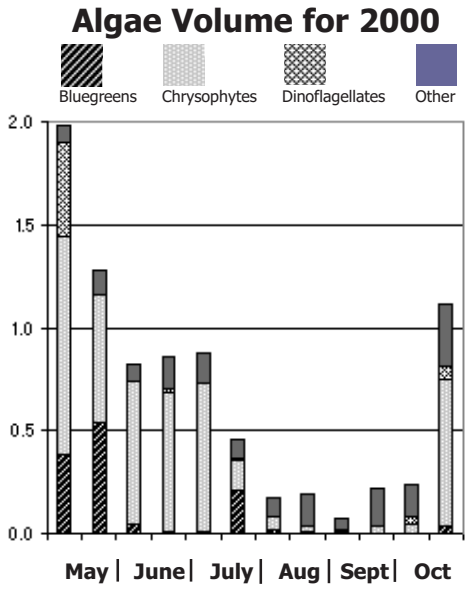
Volunteer Monitors

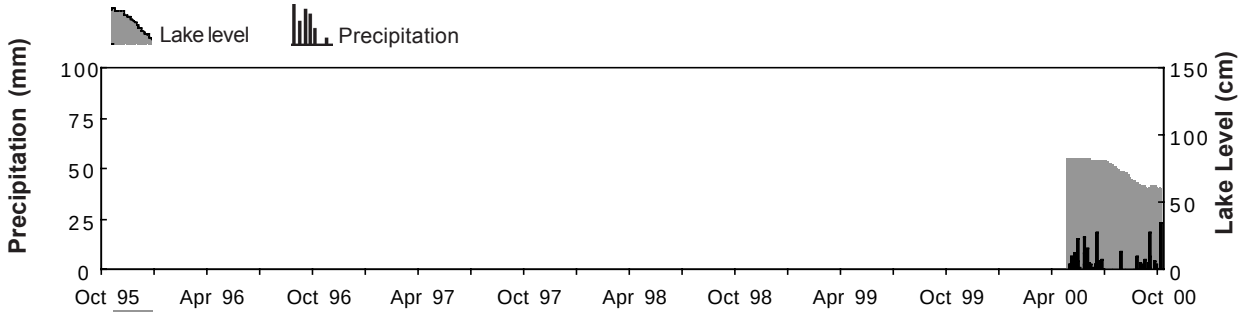
Level I (Oct 1999–Sept 2000)
Primary: Bob Young

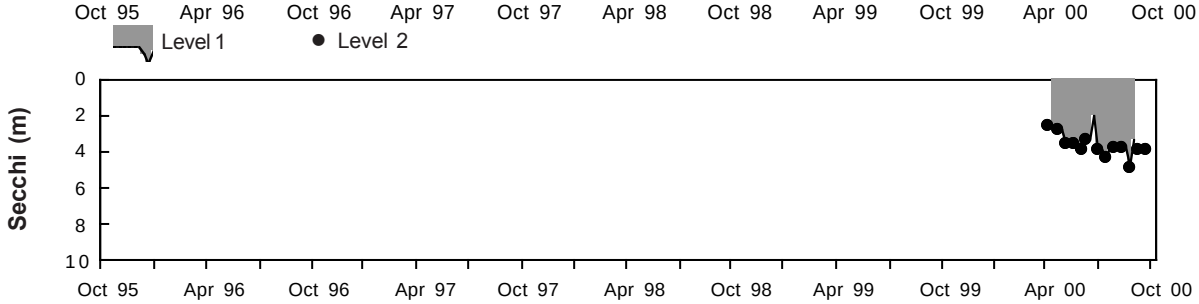
Level II (May–Oct 2000)
Primary: Bob Young

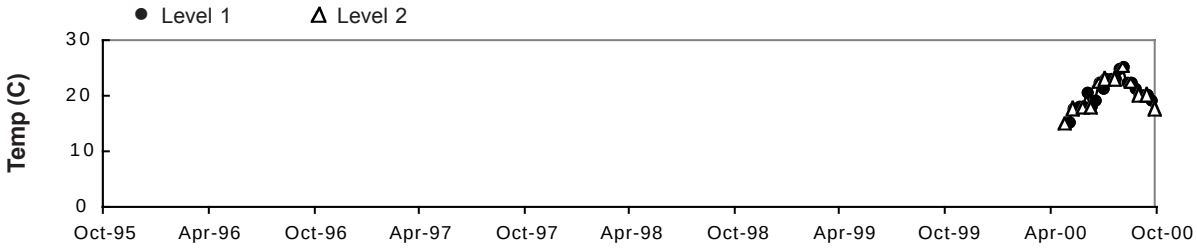
Individual trophic state indicators were calculated for Secchi (41), Chlorophyll *a* (42), and total phosphorus (34). The average (39) indicates that Ames Lake is low to moderately productive (oligo to mesotrophic) with very good water quality. The average nitrogen to phosphorus ratio was 47, with a minimum of 26. This indicates that phosphorus concentrations were likely to limit the growth of algae for much of the period.

A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). Algae peaked in volume in spring, decreased in volume through summer, and increased in fall, which is a common pattern in lakes with clear water. Many species were found, which is consistent with excellent water quality. The chrysophyte diatom *Cyclotella* and the cryptophyte *Cryptomonas* (included in "Other") were especially prominent.





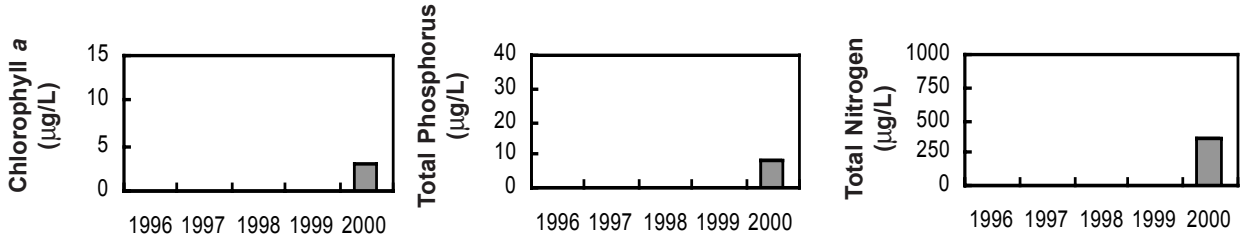




Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	214	—
Days Precipitation Measured	152	—
Lake Level Fluctuation (cm)	IN*	—
Average Secchi Depth (meters)	IN*	3.64
Average Surface Temperature (°C)	IN*	20.0

*Insufficient data



Angle

Volunteer monitors measured physical parameters and collected water samples for both Level I and Level II during water year 2000. The average weekly Level I data are recorded in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of 13 collection dates.

On the opposite page, available data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed for the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

Lake level patterns were consistent over the period of record, with high levels in the wet winter months that dropped steadily to lows in early autumn. The Secchi data indicates that water clarity is excellent throughout the year; the summer maximum probably is related to the abundance of zooplankton grazing on algae. Surface temperatures show some variation in summer values over the last few years.

Individual trophic state indicators were calculated for Secchi (35), Chlorophyll *a* (39), and total phosphorus (35). The average (36) indicates that Angle Lake continues to be low in productivity (oligotrophic), consistent with past ratings. The average nitrogen to phosphorus ratio was 40, with a minimum of 24. This suggests that the phosphorus concentrations limited the growth of algae though most of the period, and conditions were rarely favorable for bluegreen algae.

A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). Algae were abundant in spring, dropping off in summer, with a slow rise through fall. Diverse algae were represented in the lake. Some distinctive forms were the chrysophytes *Dinobryon* and *Fragilaria,* as well as the dinoflagellate *Ceratium*. The bluegreen *Anabaena*, which can make nuisance blooms in some lakes, had a significant presence in September.

Volunteer Monitors

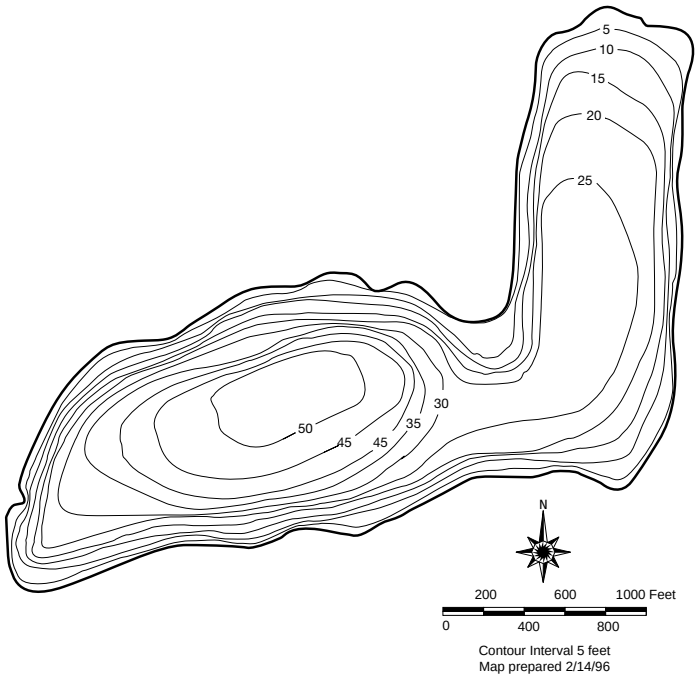
Level I (Oct 1999–Sept 2000)

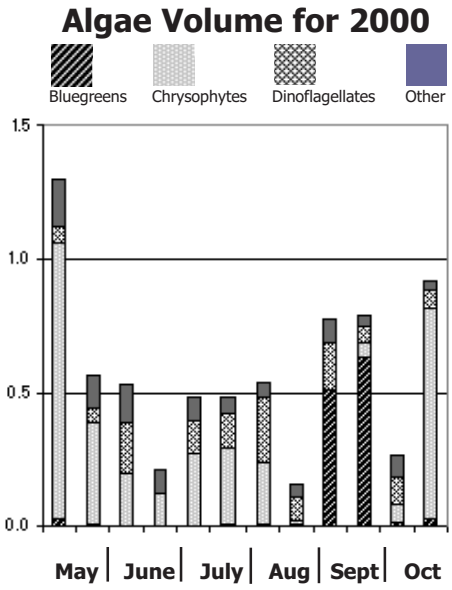
Primary: Diane and Alden Chace

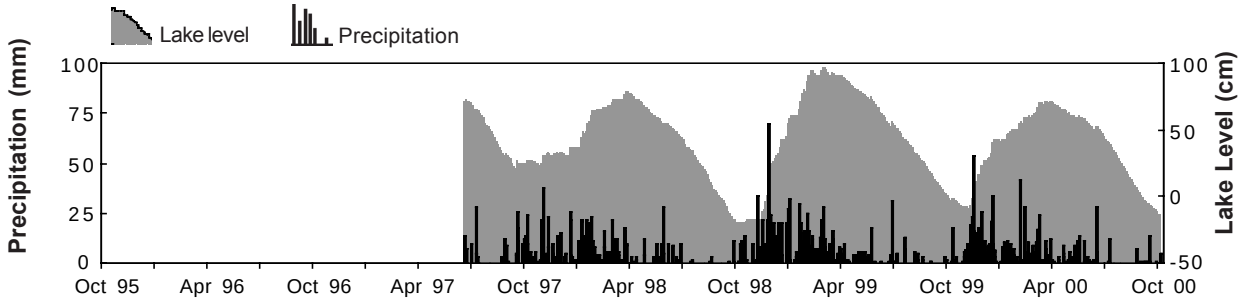
Level II (May–Oct 2000)

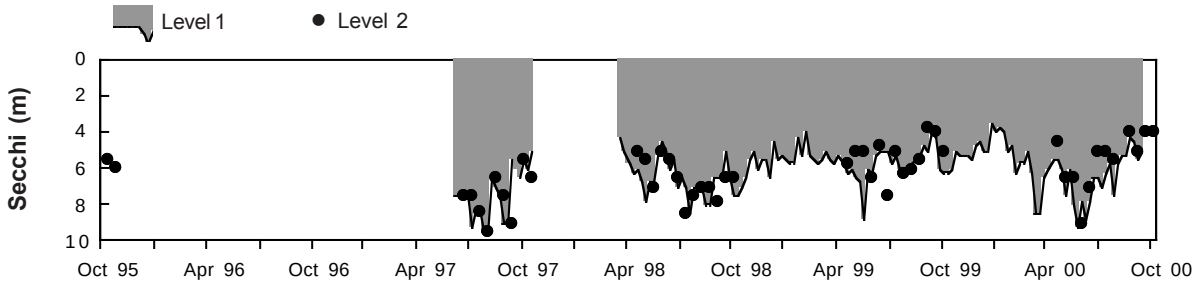
Primary: Ed and Jeannie Montry

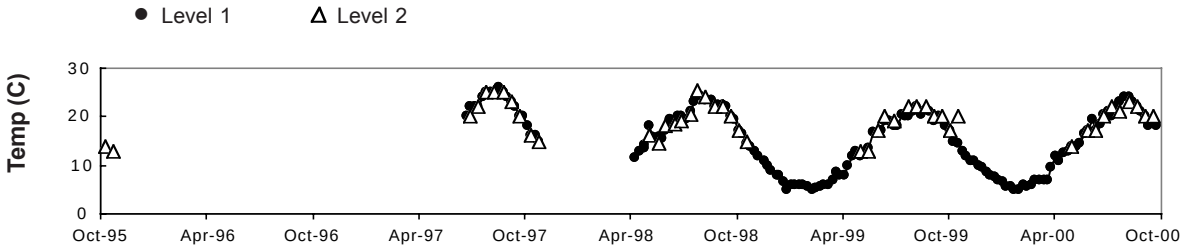
Back-up: Taylor Evans-Race





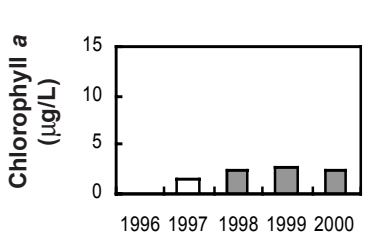


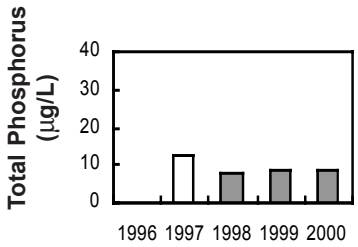


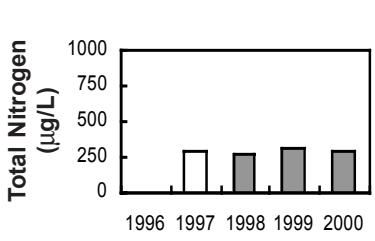


Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1027	—
Days Precipitation Measured	366	—
Lake Level Fluctuation (cm)	86	—
Average Secchi Depth (meters)	5.86	5.50
Average Surface Temperature (°C)	13.5	19.3







Beaver 1

A Level II volunteer monitor made physical measurements and collected water samples during water year 2000. All biweekly summer Level II data are recorded in Appendix B. No samples were missed out of 13 collection dates. An updated management plan for Beaver Lake was published in 2000, and a renewal of the Beaver Lake Management District was under consideration.

On the opposite page, Secchi transparency and surface water temperatures are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus and total nitrogen compare the average values for May through October.

The Secchi data indicates that water clarity is generally low throughout the year, probably related to the dark color of the water, which is due to high organic content. Summer temperatures are consistent over the years of measurement.

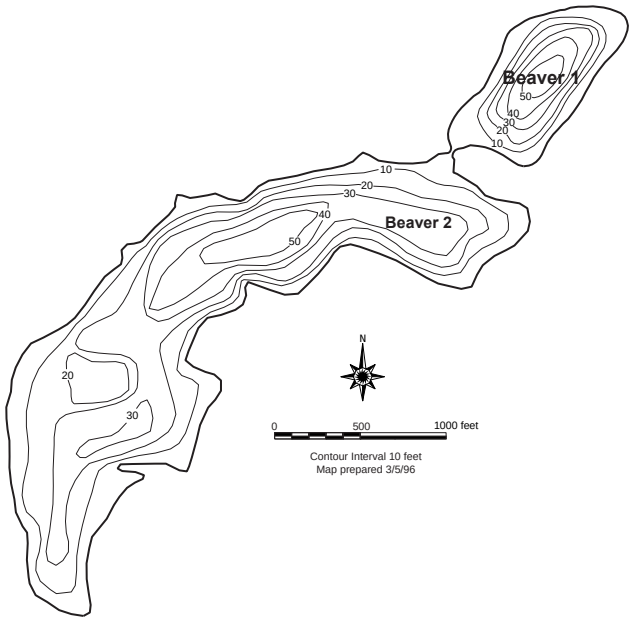
Individual trophic state indicators were calculated for Secchi (57), Chlorophyll *a* (50), and total phosphorus (50). The average (52) indicates that Beaver Lake 1 is very productive (eutrophic), consistent with past ratings. The water quality of Beaver Lake 1 has a major impact on Beaver Lake 2 because of their connection. The average nitrogen to phosphorus ratio was 26, with a minimum of 14. This indicates that the phosphorus likely limited the growth of algae much of the time, but there were periods of good conditions for bluegreen algae.

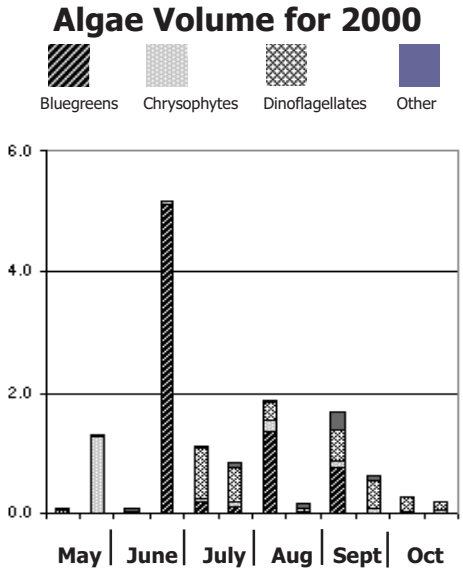
Volunteer Monitors

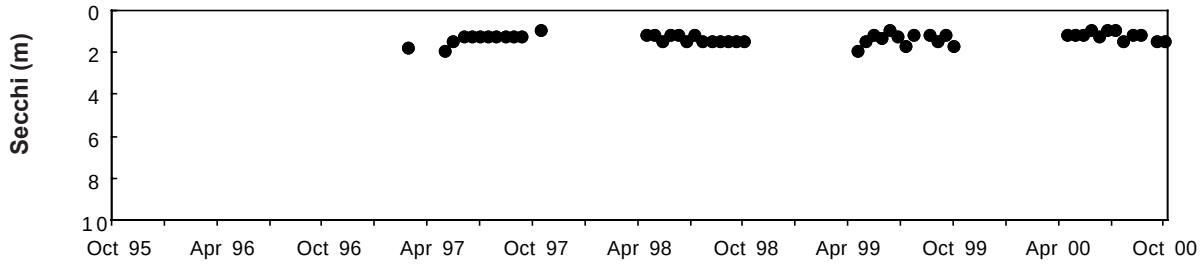
Level I (Oct 1999–Sept 2000)
Primary: None

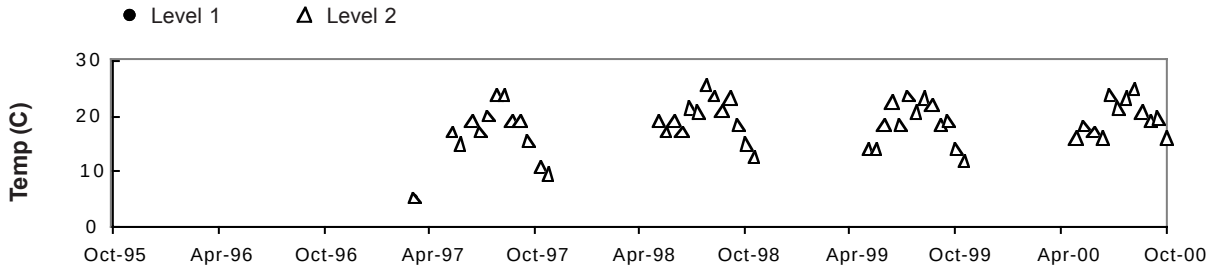
Level II (May–Oct 2000)
Primary: Donna Carlson

A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). A bloom of the bluegreen alga *Aphanizomenon* occurred in June, followed by smaller amounts of the dinoflagellate *Ceratium*. *Aphanizomenon* can create scums on the water surface in calm weather, and may produce toxins on rare occasions, but toxic blooms have never been recorded for Beaver Lake 1.



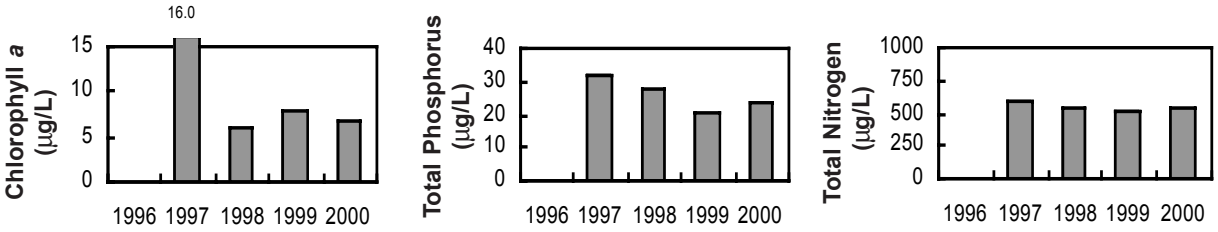






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	—	—
Days Precipitation Measured	—	—
Lake Level Fluctuation (cm)	—	—
Average Secchi Depth (meters)	—	1.25
Average Surface Temperature (°C)	—	19.5



Beaver 2

Volunteer monitors made physical measurements and collected water samples for both Levels I and II during water year 2000. The average weekly Level I data are recorded in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of the 13 collection dates. An updated management plan for Beaver Lake was published in 2000, and a renewal of the Beaver Lake Management District was under consideration.

On the opposite page, precipitation, lake level, Secchi transparency, and surface water temperatures are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

Lake level patterns were consistent over the five-year record, with high levels in the wet winter months and annual lows occurring in early autumn. Sudden rises in level appear frequently related to large storm events. The Secchi data indicates that water clarity is generally low to moderate through the year, related to the dark color of the water due to high organic content. Surface temperatures are generally similar to other small lakes in the area.

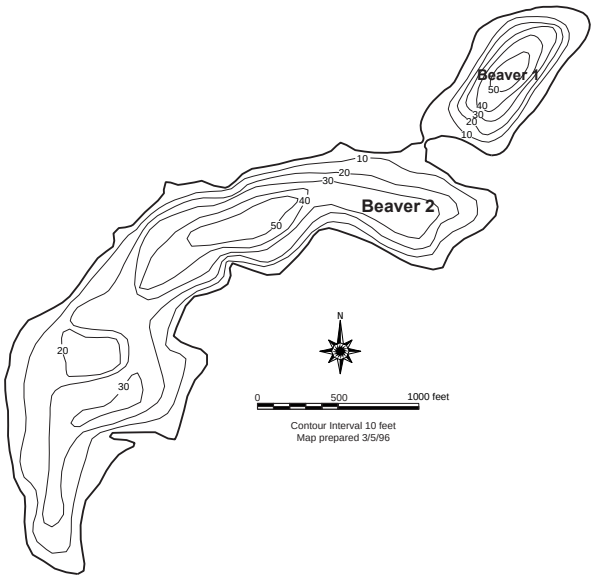
Individual trophic state indicators were calculated for Secchi (45), Chlorophyll *a* (46), and total phosphorus (37). The average (43) classifies Beaver Lake 2 as moderately productive (mesotrophic), but the value is an improvement over past ratings. The average nitrogen to phosphorus ratio was 43, with a minimum of 27. This indicates that the phosphorus concentrations were likely to limit the growth of algae throughout the period. This is a much higher ratio than found in the adjoining Beaver Lake 1.

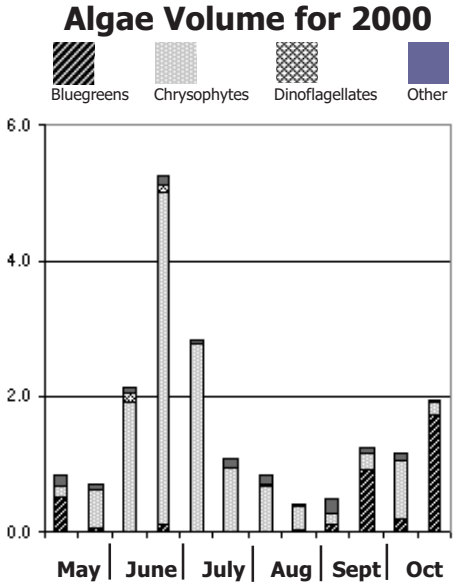
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). The bluegreen alga *Aphanizomenon* dominated in early May and again in October. However, the chrysophyte *Cyclotella*, which is a clean water indicator, was most common in summer. *Aphanizomenon* can create scums on the water surface in calm weather, and may produce toxins on occasion, but toxic blooms have never been recorded for Beaver Lake 2.

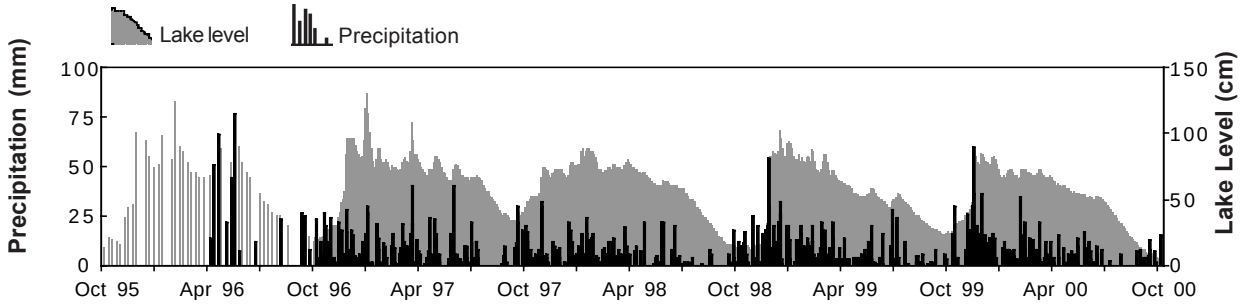
Volunteer Monitors

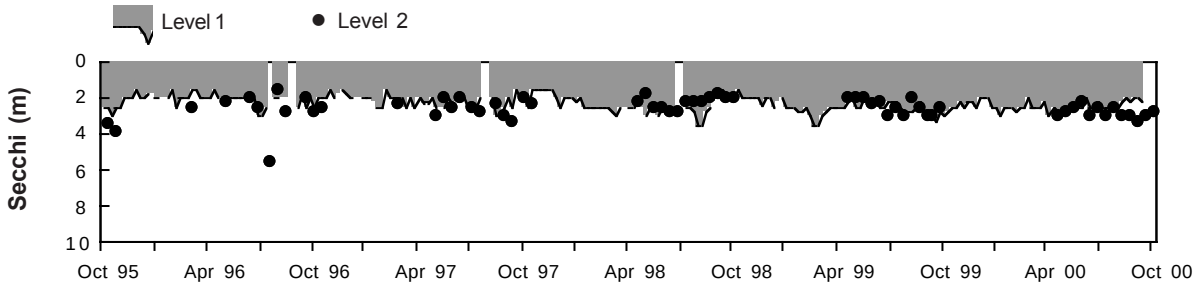
Level I (Oct 1999–Sept 2000)
Primary: Al and Shirley Jokisch

Level II (May–Oct 2000)
Primary: Larry Miller

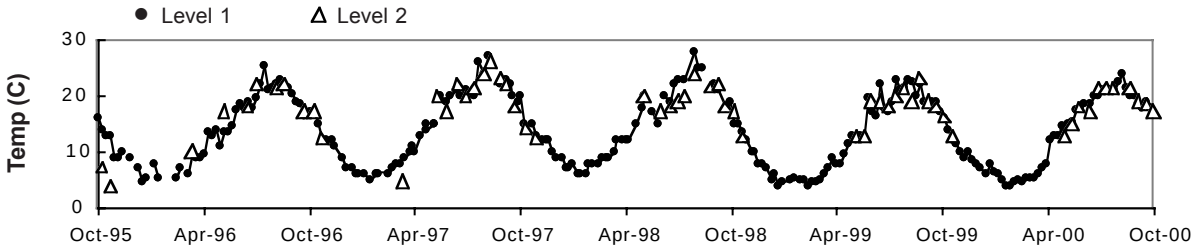






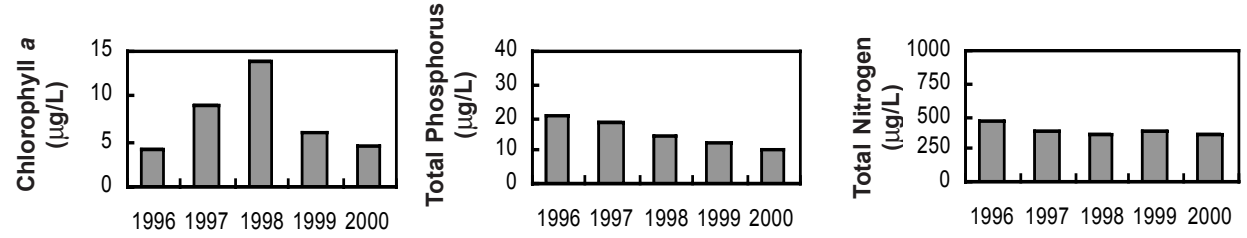


Note: Lake level data was collected weekly 1995–1996, and daily 1997–2000



Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1189	—
Days Precipitation Measured	353	—
Lake Level Fluctuation (cm)	84	—
Average Secchi Depth (meters)	2.45	2.81
Average Surface Temperature (°C)	12.9	18.9



Volunteer monitors made physical measurements and collected water samples for Level II during water year 2000. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperatures are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a,* total phosphorus and total nitrogen compare the average values for May through October.

The lake level record suggests a typical pattern of high winter levels, dipping to annual lows in the early fall. The Secchi data ranges from 2 to 5 meters, probably related to changes in algal abundance. Summer temperatures are consistent from year to year, reaching slightly warmer levels than many small county lakes.

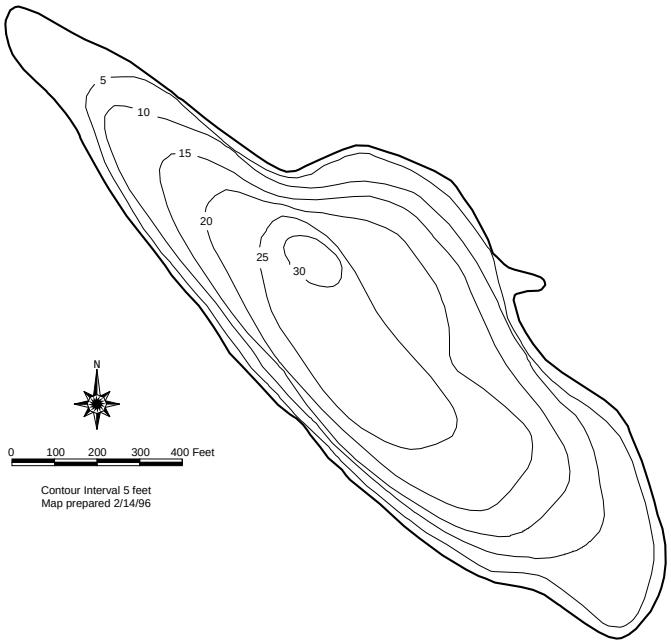
Individual trophic state indicators were calculated for Secchi (43), Chlorophyll *a* (43), and total phosphorus (40). The average (42) indicates that Bitter Lake continues to be moderately productive (mesotrophic) in 2000, remaining stable. The average nitrogen to phosphorus ratio was 31, with a minimum of 25, which indicates that phosphorus concentrations limited the growth of algae for most of the period.

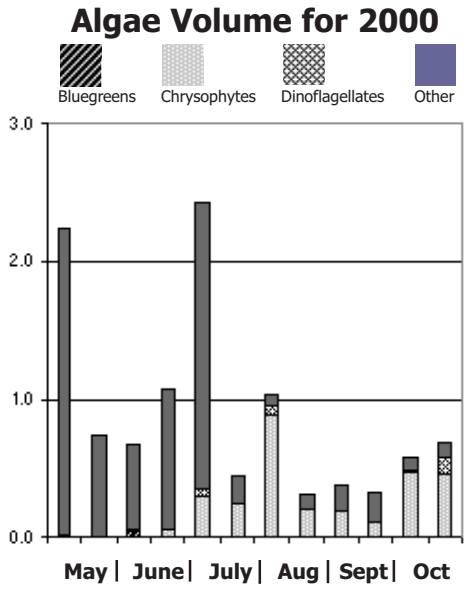
Volunteer Monitors

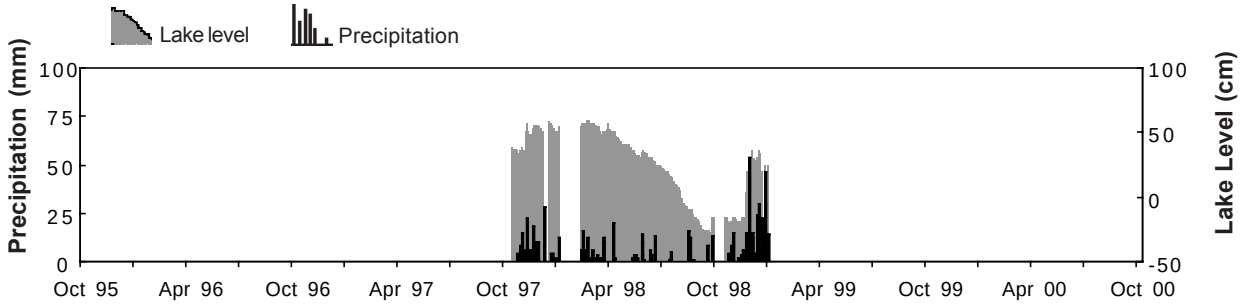
Level I (Oct 1999–Sept 2000)
Primary: None

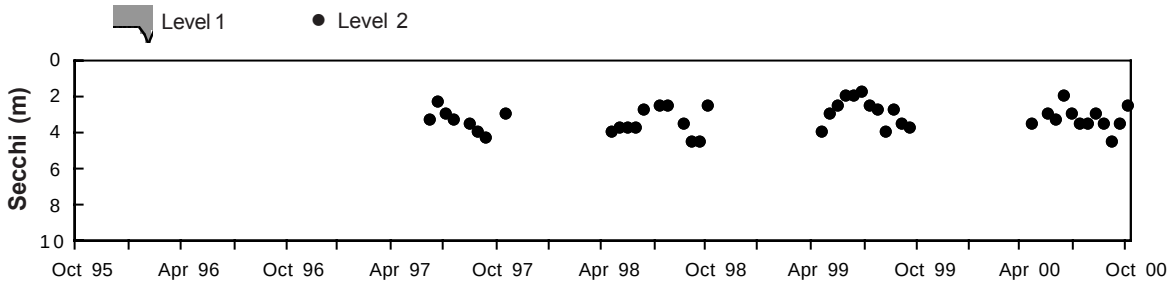
Level II (May–Oct 2000)
Primary: Tom and Danae Hollowed

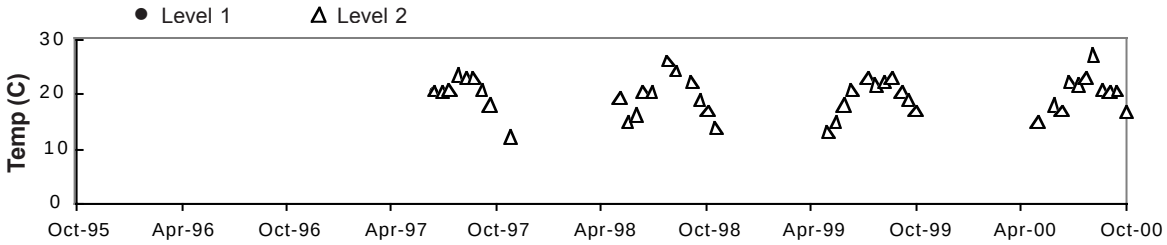
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). The high values in spring were made by several different chlorophytes, typified by *Sphaerocystis* (graphed as "Other"). The chrysophyte *Dinobryon* replaced the chlorophytes over summer and remained dominant into the fall. These algal varieties are often found in moderately productive lakes.





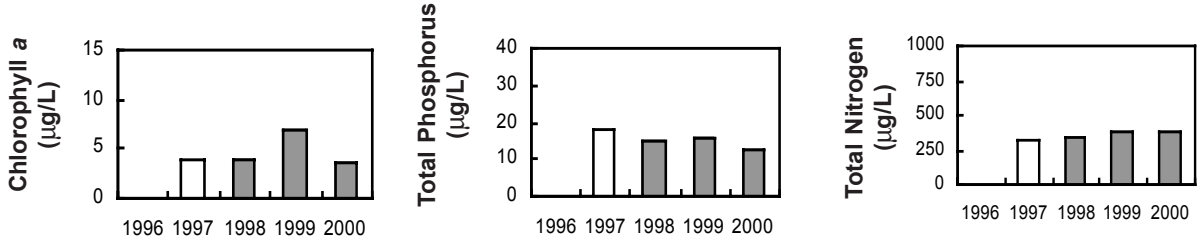






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	—	—
Days Precipitation Measured	—	—
Lake Level Fluctuation (cm)	—	—
Average Secchi Depth (meters)	—	3.23
Average Surface Temperature (°C)	—	19.8



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. The average weekly Level I data are recorded in Appendix A. The biweekly summer Level II data are recorded in Appendix B. One sample was missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record suggests an irregular pattern of water level, often rising with rainfall, but without the seasonal pattern typical of many King County lakes. The Secchi data indicate that water clarity fluctuates between 2 to 5 meters, probably related to algal abundance. Summer temperatures appear to have decreased slightly over the last few years.

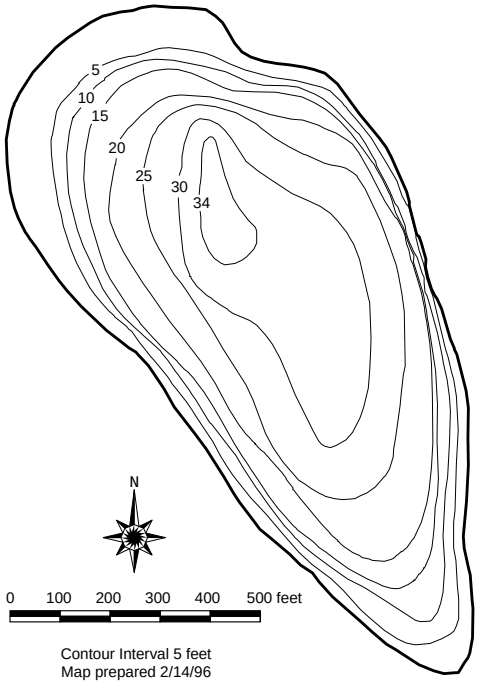
Individual trophic state indicators were calculated for Secchi (42), Chlorophyll *a* (45), and total phosphorus (40). The average (42) indicates that Lake Boren is still moderately productive (mesotrophic), although phosphorus has declined over the past several years. The average nitrogen to phosphorus ratio was 39, with a minimum of 23, which indicates that phosphorus concentrations limited the growth of algae for most of the period.

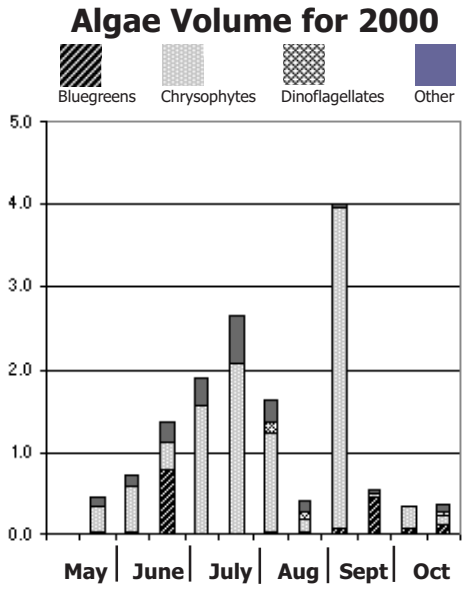
Volunteer Monitors

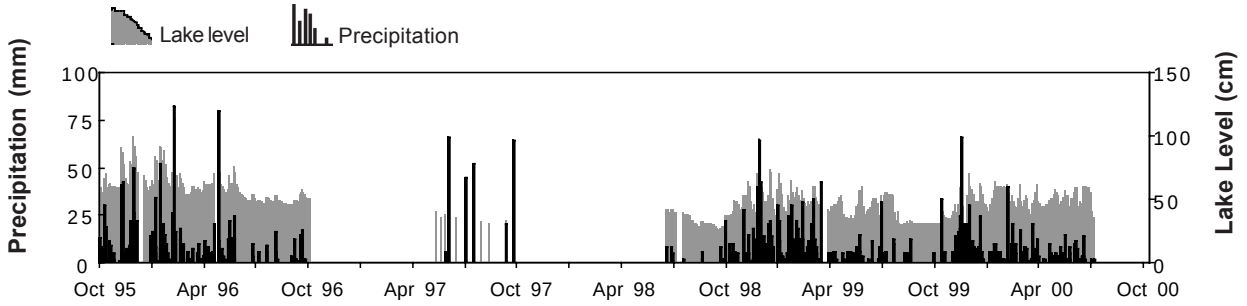
Level I (Oct 1999–Sept 2000)
Primary: Mary Alice and Eric Root

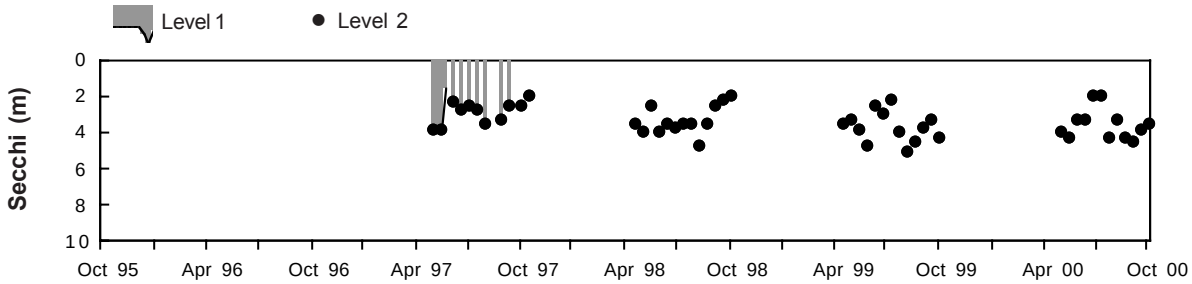
Level II (May–Oct 2000)
Primary: Ray Clark

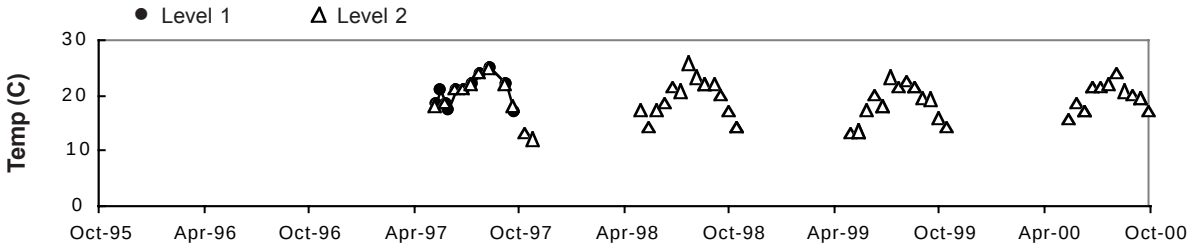
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). There was no sample taken in early May. The chrysophyte diatom *Cyclotella* dominated the algae early in the season, which reached a maximum in July, followed by the chrysophyte *Dinobryon* in early September. These varieties are often found in low to moderately productive lakes. There were also sizeable populations made by the bluegreen alga *Aphanizomenon* in June and late September. This can produce surface scums and very rarely may produce toxins as well.





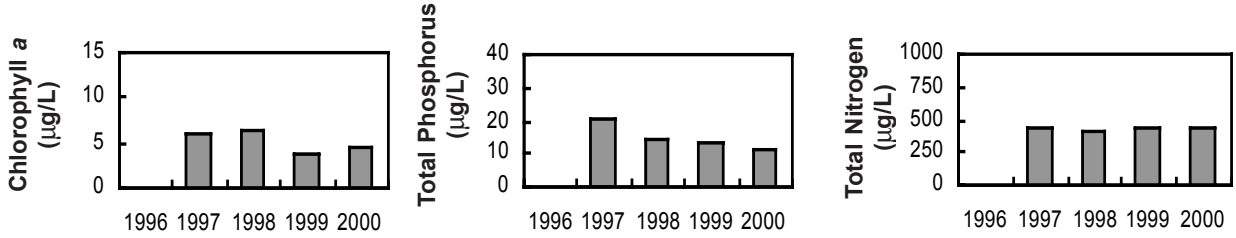






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	929	—
Days Precipitation Measured	270	—
Lake Level Fluctuation (cm)	—	—
Average Secchi Depth (meters)	—	3.53
Average Surface Temperature (°C)	—	19.3



A volunteer monitor made physical measurements and collected water samples for Level II during water year 2000. The biweekly summer Level II data are recorded in Appendix B. Two samples were missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record suggests the typical pattern of water level in King County lakes, high in the wet winter months and dropping to an annual low in early autumn. The Secchi data indicates that water clarity fluctuates through the year, probably related to algal abundance. Temperature data are sketchy, but suggest that the lake was cooler in 2000 than in 1997 or 1998.

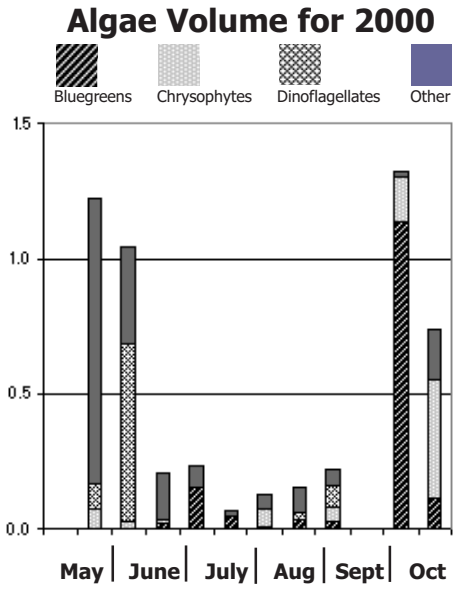
Individual trophic state indicators were calculated for Secchi (45), Chlorophyll *a* (45), and total phosphorus (41). The average (44) indicates that Lake Burien is moderately productive (mesotrophic), consistent with the rating in 1998. The average nitrogen to phosphorus ratio was 31, with a minimum of 24, which indicates that phosphorus concentrations were likely to limit the growth of algae through the period.

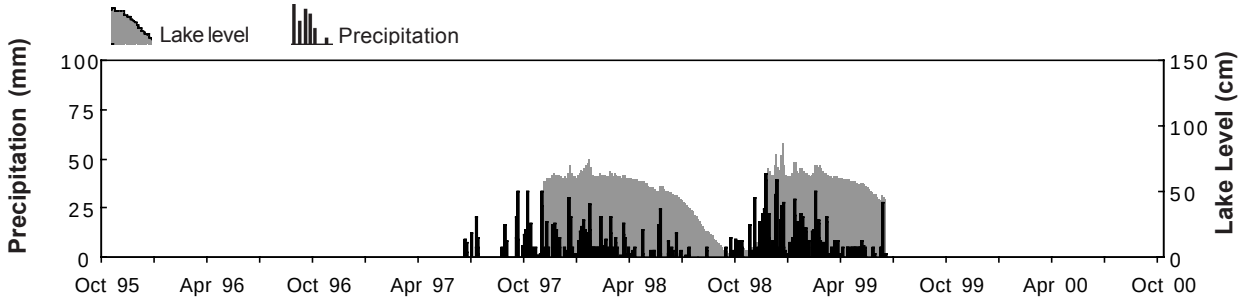
Volunteer Monitors

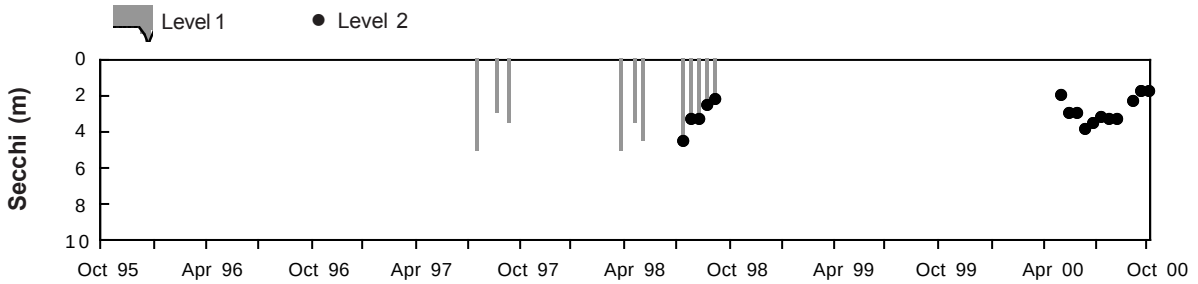
Level I (Oct 1999–Sept 2000)
Primary: None

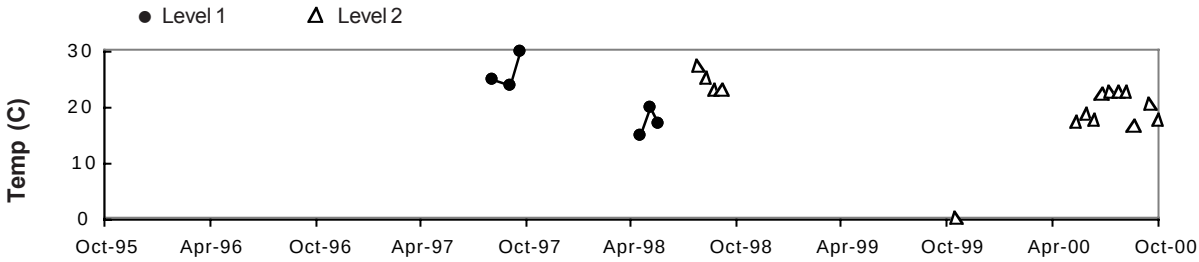
Level II (May–Oct 2000)
Primary: Steve Locher

A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). The algae in the lake were dominated in the spring by chlorophytes (graphed as "Other"), followed by the dinoflagellate *Peridineum*. Total abundance was low through the summer, ending with a bloom of the bluegreen *Anabaena* in late September. *Anabaena* has been known to make nuisance blooms in some lakes and can produce toxins on rare occasions, but this has not been recorded for Lake Burien.



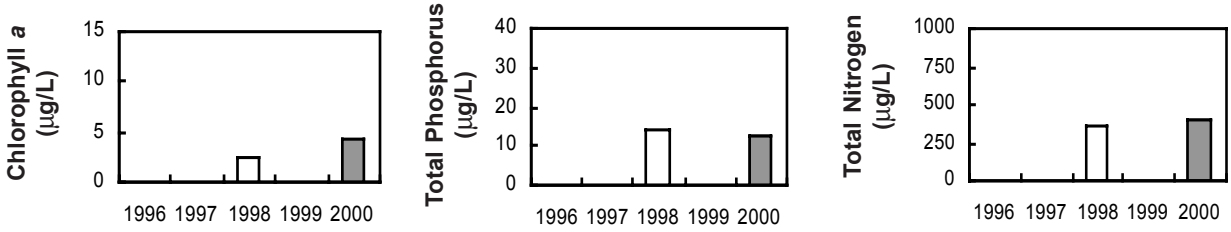






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	—	—
Days Precipitation Measured	—	—
Lake Level Fluctuation (cm)	—	—
Average Secchi Depth (meters)	—	2.81
Average Surface Temperature (°C)	—	19.4



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. One sample was missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level pattern is generally similar to other King County lakes though less pronounced, higher in winter and low stands in early autumn. There are some sharp rises, often tied to major rain storms. The Secchi data indicates that water clarity fluctuates little through the year, generally between 2 and 4 meters. A fairly complete temperature record shows little change between years.

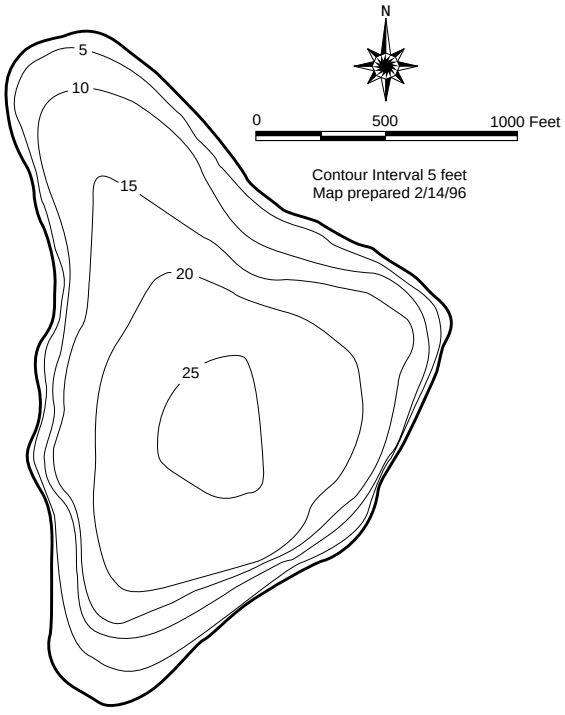
Individual trophic state indicators were calculated for Secchi (52), Chlorophyll *a* (58), and total phosphorus (51). The average (54) indicates that Cottage lake continues to be highly productive (eutrophic) in 2000, although phosphorus levels have dropped over the last three years. The average nitrogen to phosphorus ratio was 34, with a minimum of 18. This indicates that phosphorus concentrations were likely to limit the growth of algae through the period, but this ratio dropped in late summer, favoring growth of bluegreen algae.

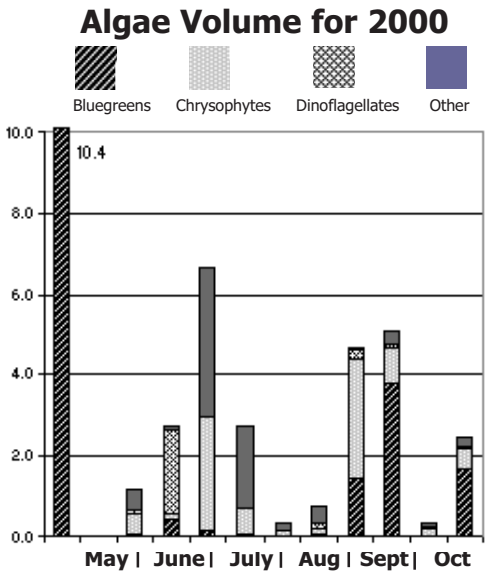
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The spring algae were dominated by the bluegreen *Aphanizomenon*, followed by several different species, including the chrysophyte diatom *Fragilaria* and the chlorophyte *Volvox* (graphed as "Other"). In September, the bluegreen *Anabaena* became abundant. It has been known to make nuisance blooms in some lakes and can produce toxins on rare occasions, so careful monitoring of the algae will be desirable for this lake.

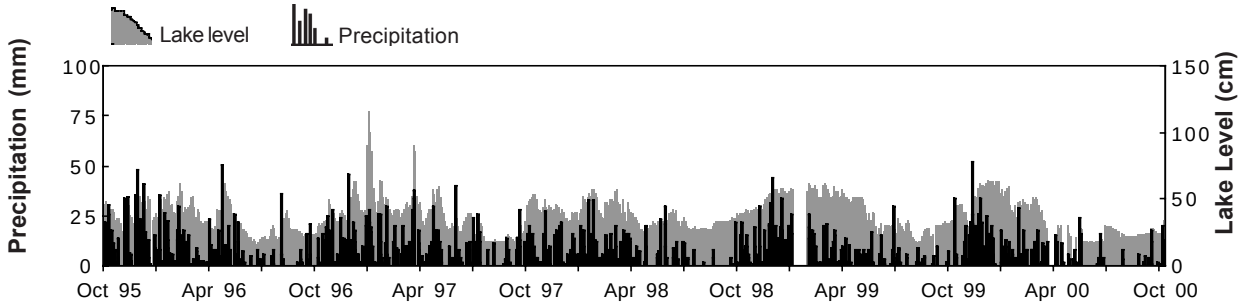
Volunteer Monitors

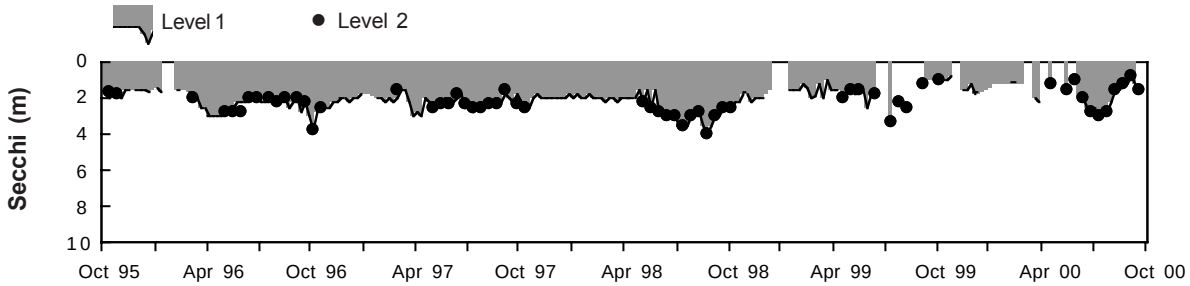
Level I (Oct 1999–Sept 2000)
Primary: Stafford Miller; Ed Grubbs
Back-up: Ann Whitney

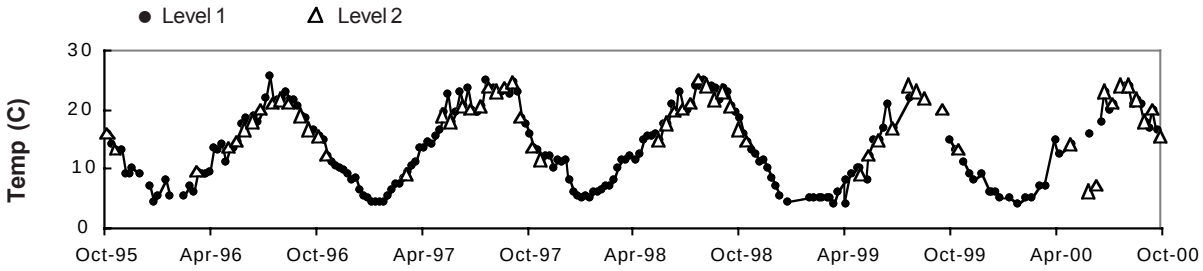
Level II (May–Oct 2000)
Primary: Ed Grubbs
Back-up: Stafford Miller





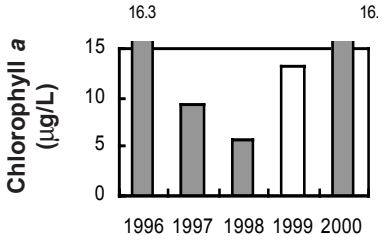


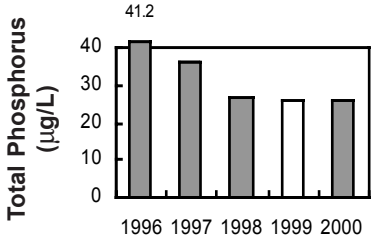


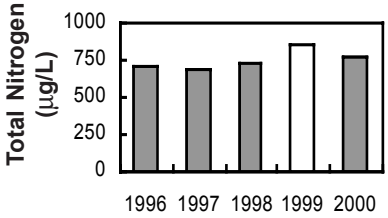


Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1110	—
Days Precipitation Measured	295	—
Lake Level Fluctuation (cm)	60	—
Average Secchi Depth (meters)	1.62	1.75
Average Surface Temperature (°C)	13.4	17.8







Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record follows a pattern similar to other King County lakes: higher in the wet winter months, dropping to annual low stands in early autumn, with sharp rises in level often tied to major rain storms. The Secchi data indicates that water clarity fluctuates little through the year, generally remaining around 2 meters. A fairly complete temperature record shows little change between years.

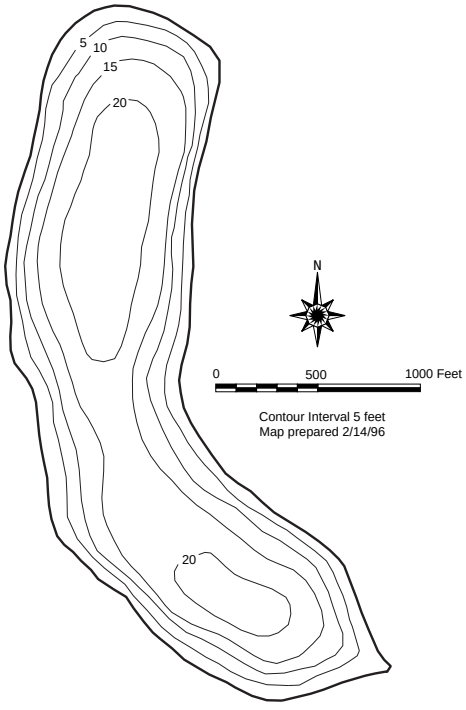
Individual trophic state indicators were calculated for Secchi (51), Chlorophyll *a* (60), and total phosphorus (50). The average (54) indicates that Lake Desire continued to be highly productive (eutrophic) in 2000, although phosphorus levels have dropped over the last three years. The average nitrogen to phosphorus ratio was 30, with a minimum of 16. This indicates that phosphorus concentrations limited the growth of algae through the period. However, the ratio dropped in late summer, possibly explaining the growth of bluegreen algae at that time (see chart below).

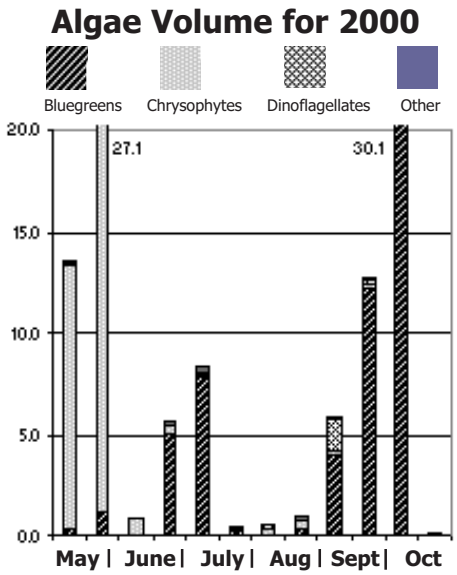
Volunteer Monitors

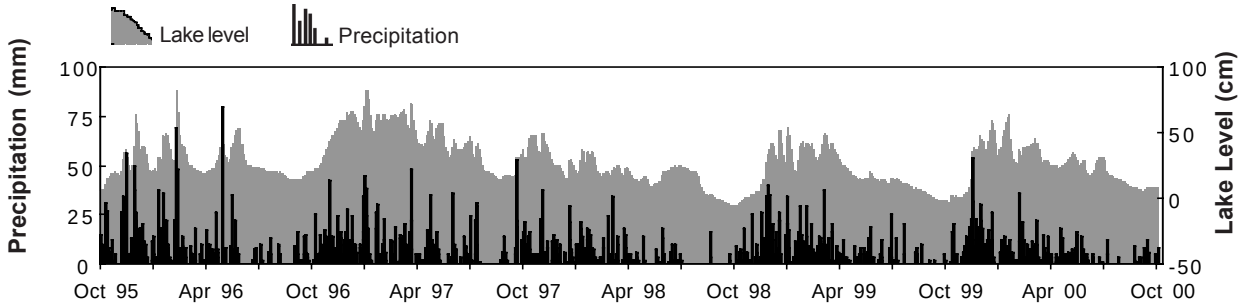
Level I (Oct 1999–Sept 2000)
Primary: Ed and Min Merrill

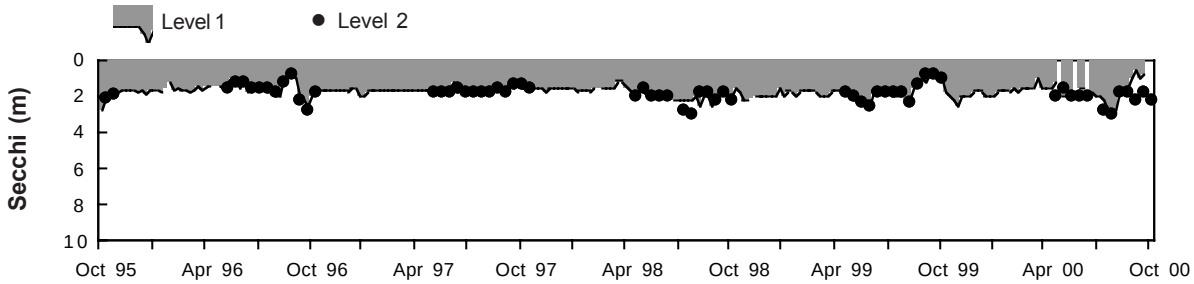
Level II (May–Oct 2000)
Primary: Jan Falkenhagen

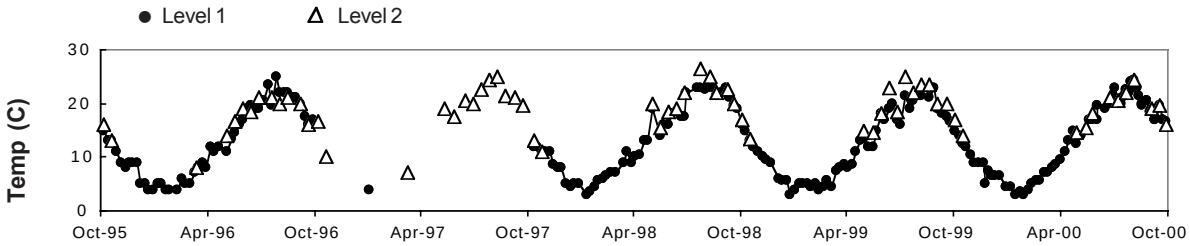
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). The algae in the lake were dominated in the spring by a bloom of the chrysophyte diatom *Tabellaria*, followed by the bluegreens *Aphanizomenon* and *Anabaena.* In late September, *Anabaena* became exceptionally abundant. It has been known to make nuisance blooms in lakes and can produce toxins on very rare occasions, so careful monitoring of the algae will be desirable for this lake.





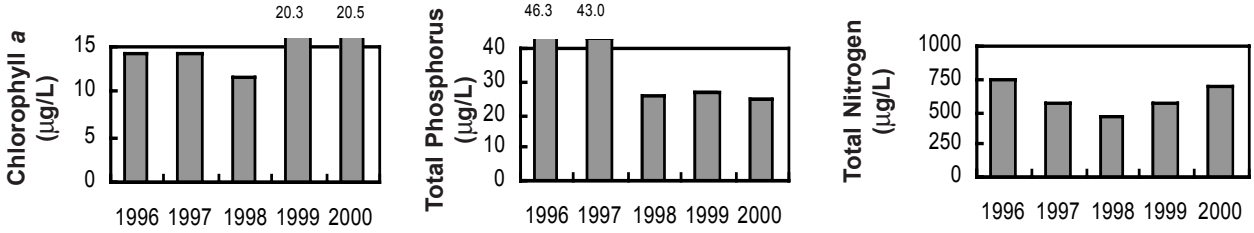






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1202	—
Days Precipitation Measured	341	—
Lake Level Fluctuation (cm)	68	—
Average Secchi Depth (meters)	1.71	1.84
Average Surface Temperature (°C)	14.2	18.8



A volunteer monitor made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. Four samples were missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level pattern is similar to other King County lakes, higher in the wet winter months, dropping to annual low stands in early autumn, with sharp rises in level tied to major rain storms. The Secchi data indicates that water clarity fluctuates little through the year, generally remaining at or below 2 meters. Summer temperatures may have declined slightly over the past three years.

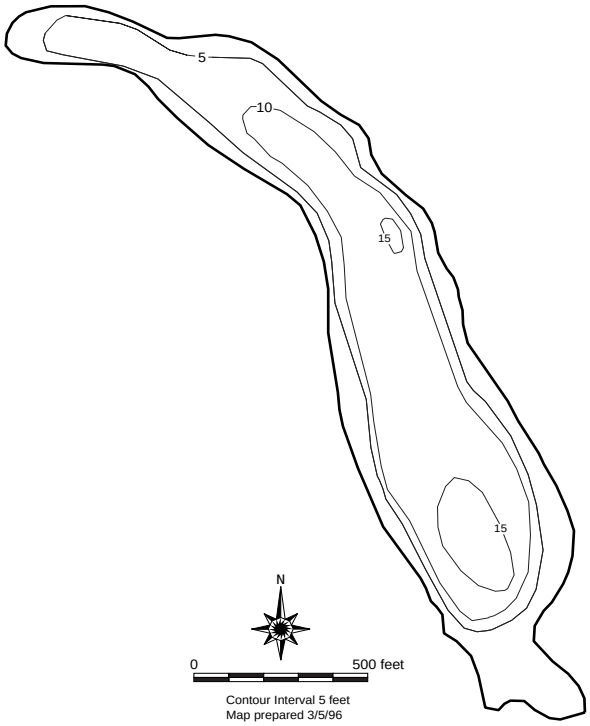
Individual trophic state indicators were calculated for Secchi (56), Chlorophyll *a* (57), and total phosphorus (55). The average (56) indicates that Lake Dolloff continues to be highly productive (eutrophic) in 2000, although phosphorus levels may have dropped recently. The average nitrogen to phosphorus ratio was 25, with a minimum of 12. This indicates that phosphorus concentrations limited the growth of algae through some of the period, but at times conditions may have encouraged the growth of bluegreen algae.

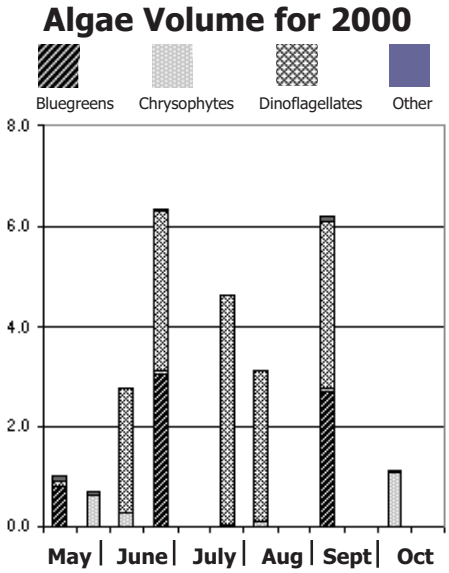
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The dinoflagellate *Ceratium* dominated the summer algae, accompanied by the bluegreen *Aphanizomenon* in June and *Oscillatoria* in late summer. *Oscillatoria* has been known to make nuisance blooms in some King County lakes, so its presence should be monitored carefully.

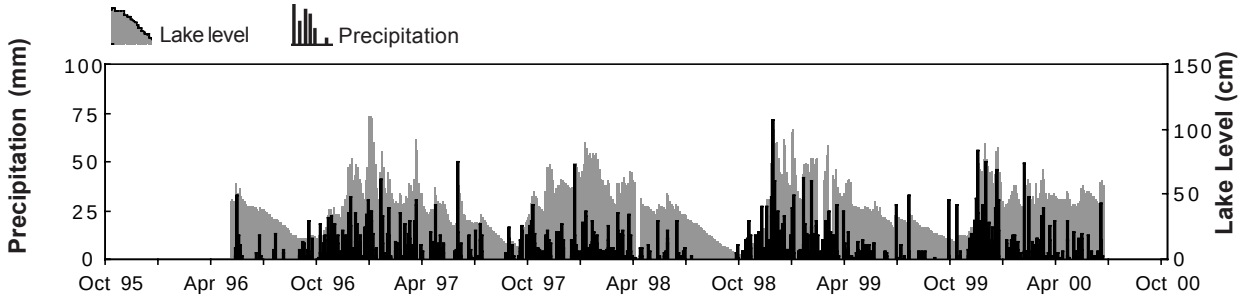
Volunteer Monitors

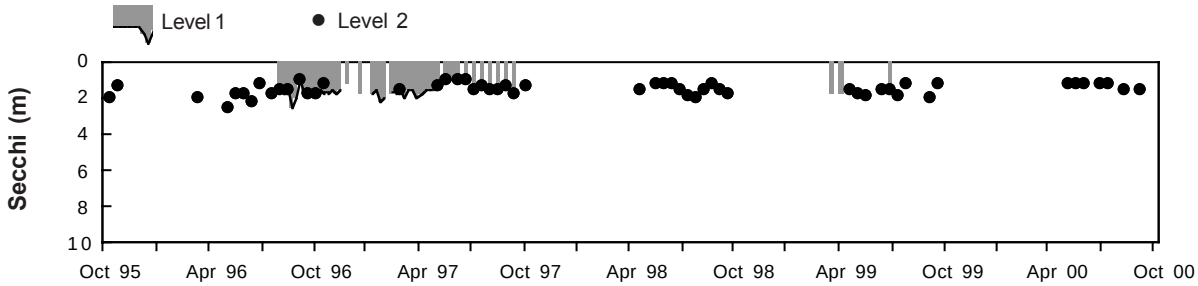
Level I (Oct 1999–Sept 2000)
Primary: Jason Hesla

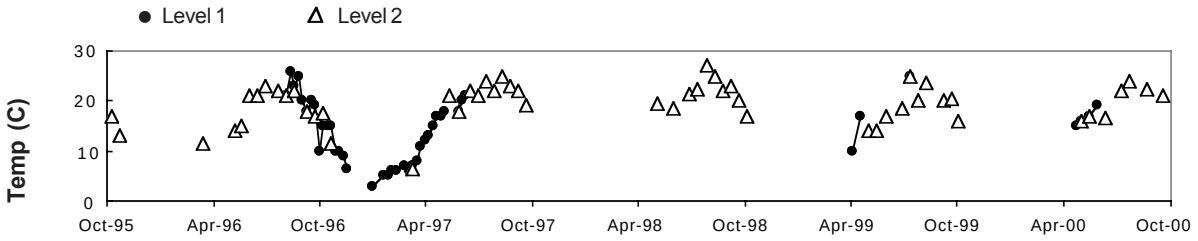
Level II (May–Oct 2000)
Primary: Jason Hesla







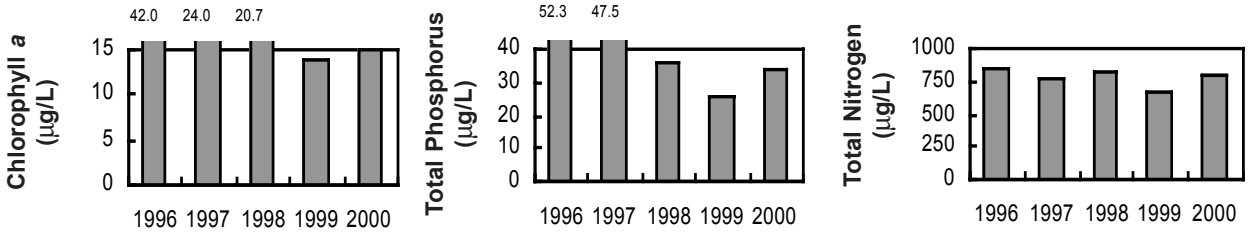




Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1227	—
Days Precipitation Measured	257	—
Lake Level Fluctuation (cm)	IN*	—
Average Secchi Depth (meters)	IN*	1.6
Average Surface Temperature (°C)	IN*	19.5

*Insufficient data



Easter

A volunteer monitor made physical measurements for Level I during the 2000 water year. Average weekly Level I data are presented in Appendix A.

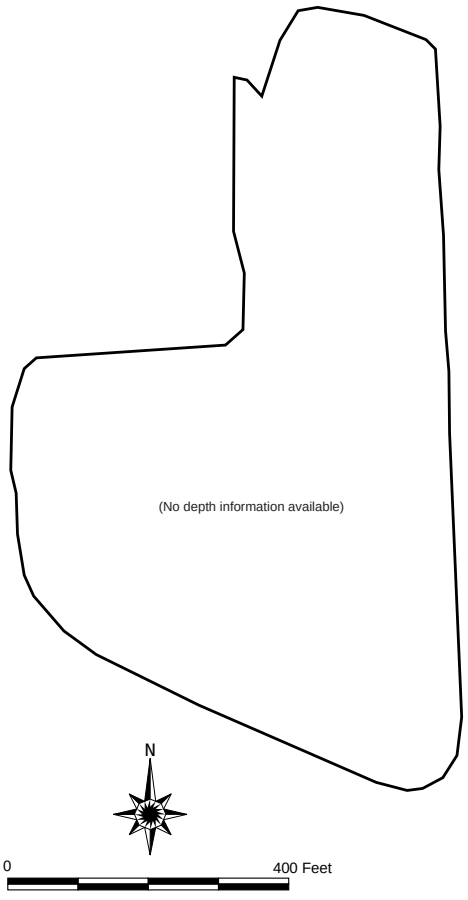
On the opposite page, data on precipitation, lake level, and Secchi transparency are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000.

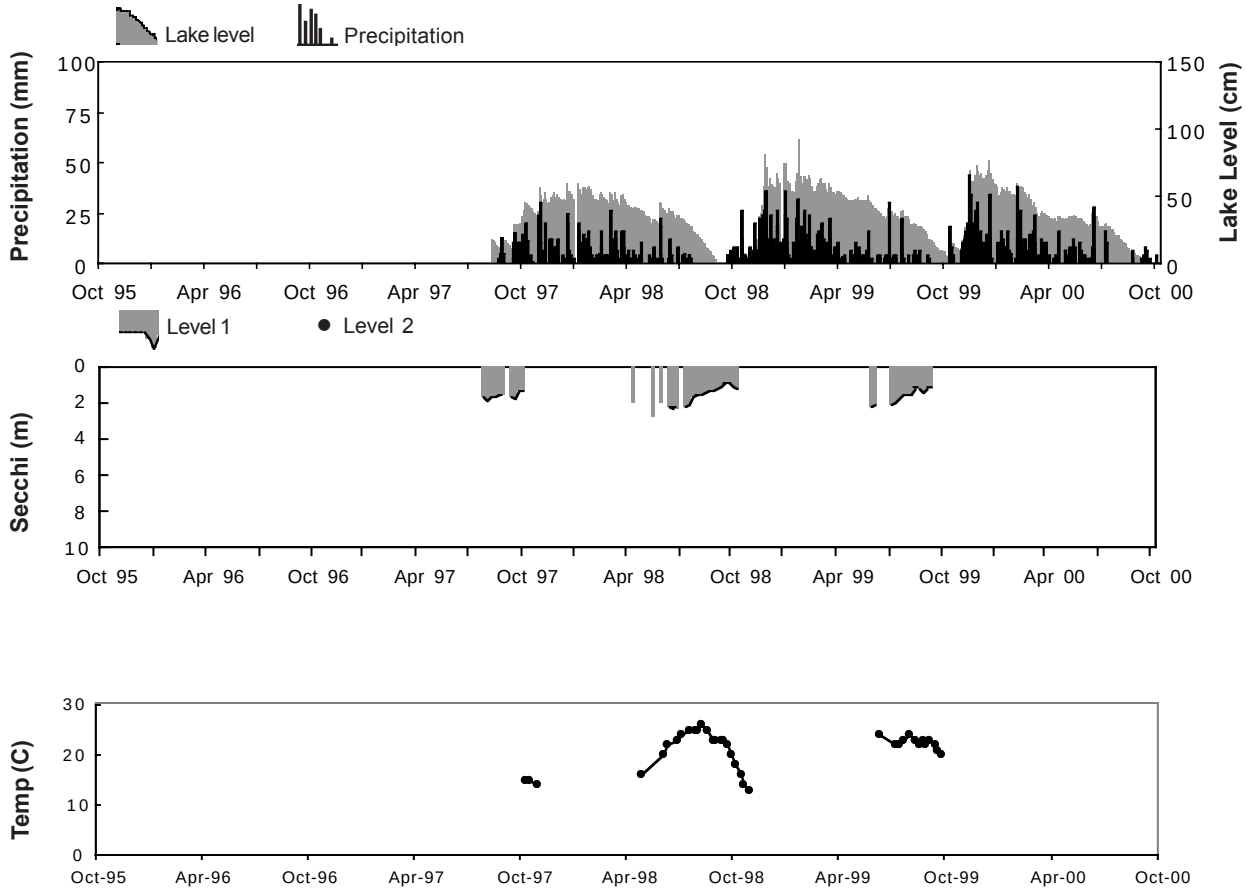
The lake level record is similar to other King County lakes, higher in the wet winter months, dropping to annual low stands in early autumn, with sharp rises in level tied to major rain storms. Secchi data was taken only when the volunteer had access to the lake and therefore is incomplete, but indicates that water clarity fluctuates a little through the year, generally remaining at or below two meters.

Volunteer Monitors

Level I (Oct 1999–Sept 2000)
Primary: Mayetta E. Tiffany

Level II (May–Oct 2000)
Primary: None





Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1151	—
Days Precipitation Measured	332	—
Lake Level Fluctuation (cm)	76	—
Average Secchi Depth (meters)	—	—
Average Surface Temperature (°C)	—	—

Volunteer monitors made physical measurements and collected water samples for Level II during water year 2000. The biweekly summer Level II data are recorded in Appendix B. One sample was missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level data suggests a similar pattern to other King County lakes, higher in the wet winter months, dropping to annual low stand in early autumn. The Secchi data indicates that water clarity fluctuates little through the year, generally remaining below 2 meters, and is probably related to the dark color of the water. Surface temperatures have declined slightly over the last three years.

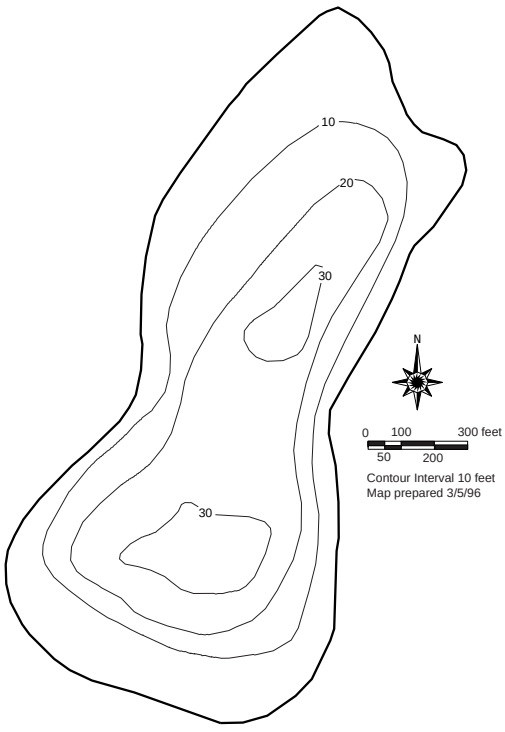
Individual trophic state indicators were calculated for Secchi (59), Chlorophyll *a* (46), and total phosphorus (47). The average (51) indicates that Fivemile Lake continues to be quite productive (eutrophic) in 2000, although phosphorus levels have dropped slightly over the last three years. The average nitrogen to phosphorus ratio was 47, with a minimum of 30, which indicates that phosphorus concentrations limited the growth of algae through the period.

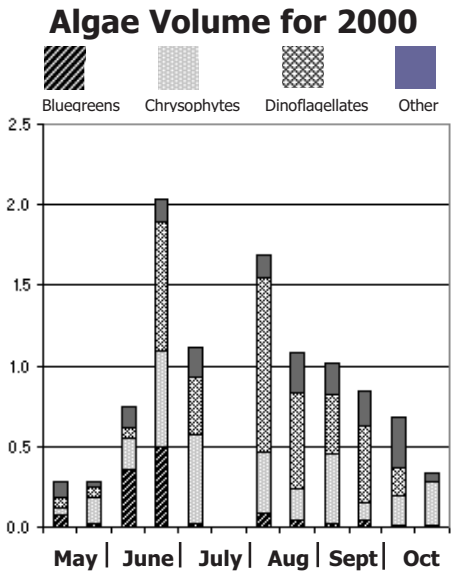
Volunteer Monitors

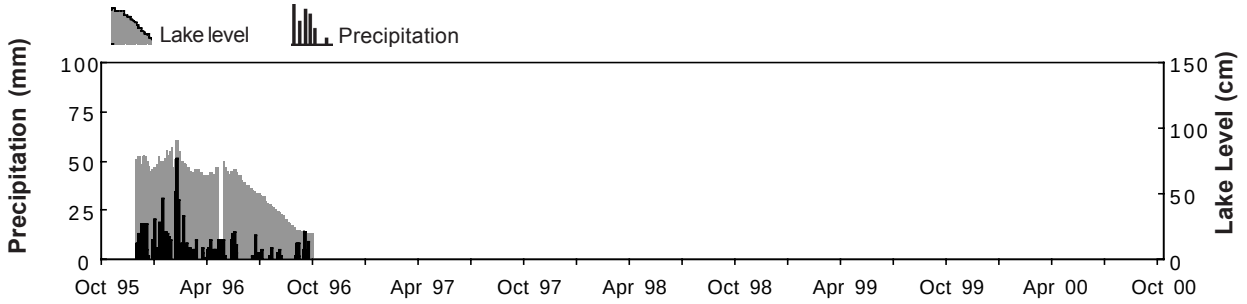
Level I (Oct 1999–Sept 2000)
Primary: None

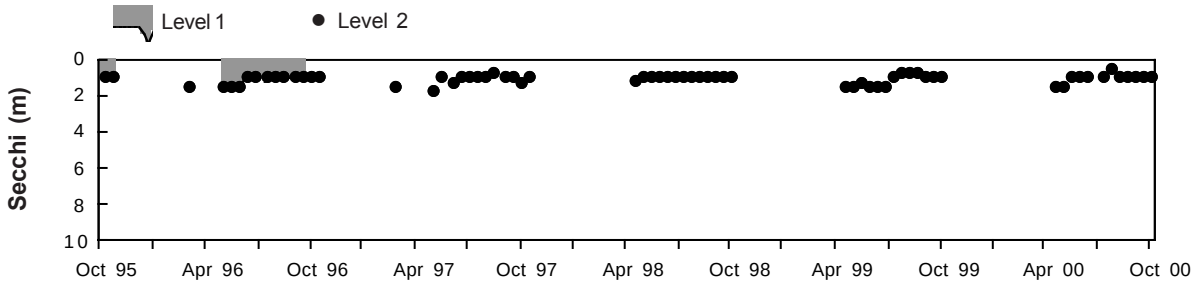
Level II (May–Oct 2000)
Primary: Janet Gillies
Back-up: Jenny Reilly

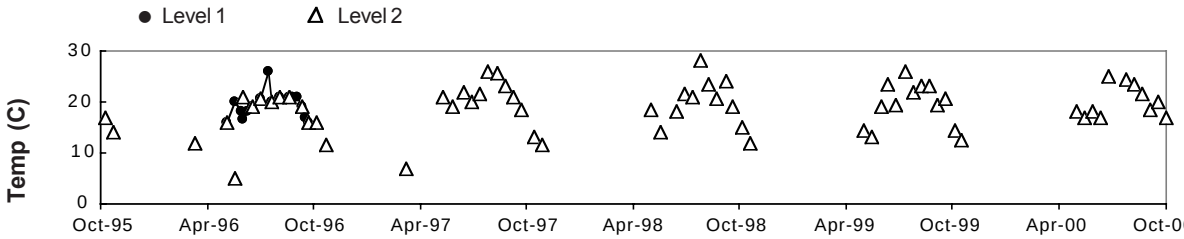
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The dinoflagellate *Ceratium* dominated the summer algae, accompanied by the chrysophyte *Dinobryon*. In late spring, the bluegreen *Aphanizomenon* appeared, but remained subdominant. The dark color of the water may affect which algae do well in the lake.





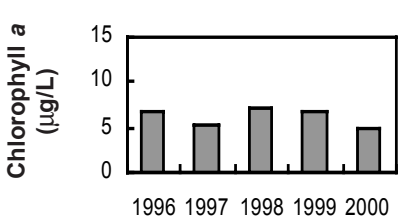


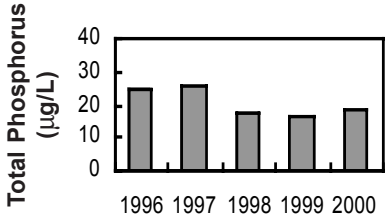


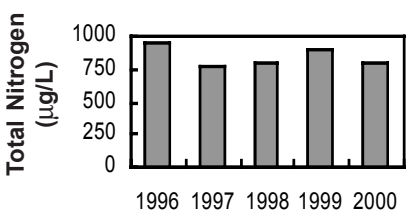


Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	—	—
Days Precipitation Measured	—	—
Lake Level Fluctuation (cm)	—	—
Average Secchi Depth (meters)	—	1.04
Average Surface Temperature (°C)	—	19.6







Francis

Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. One sample was missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, and Secchi transparency are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level data follows a pattern similar to other King County lakes, high in the wet winter months, dropping to annual low stand in early autumn, and rising quickly in response to storm events. The Secchi data indicates that water clarity fluctuates little through the year, generally remaining below 3 meters, and is probably related in part to the dark color of the water. Summer temperatures seem to be lower in general than many small lakes in the area and are relatively stable from year to year.

Individual trophic state indicators were calculated for Secchi (51), Chlorophyll *a* (56), and total phosphorus (52). The average (53) indicates that Lake Francis continues to be quite productive (eutrophic) in 2000,

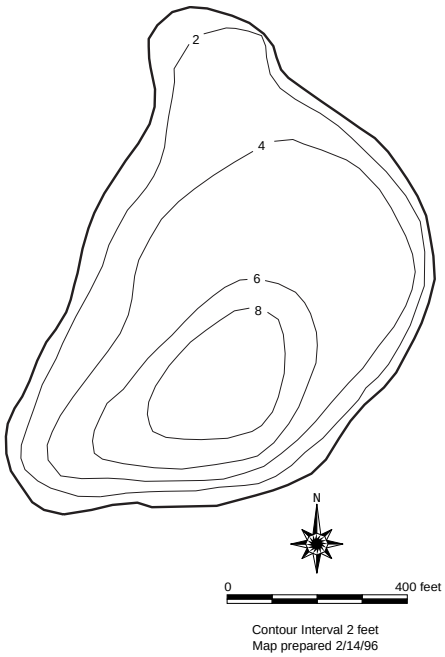
Volunteer Monitors

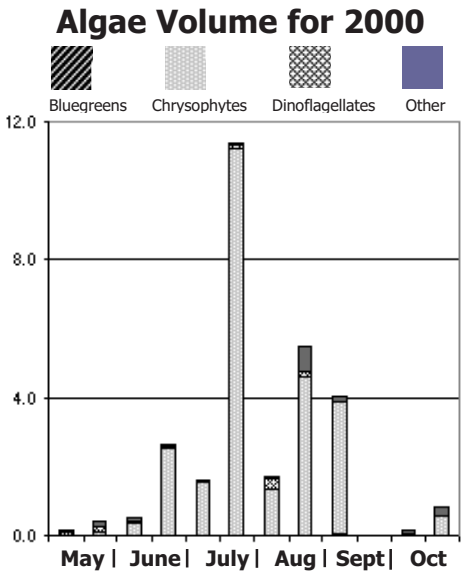
Level I (Oct 1999–Sept 2000)
Primary: Brian and Erica Moriarty

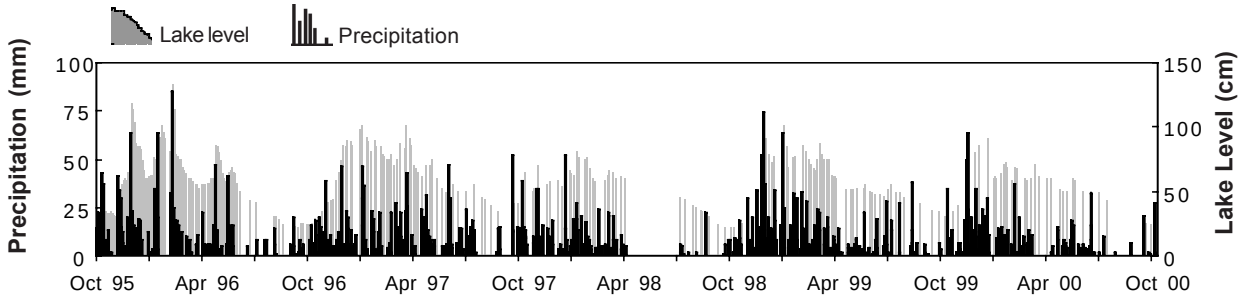
Level II (May–Oct 2000)
Primary: Brian and Erica Moriarty

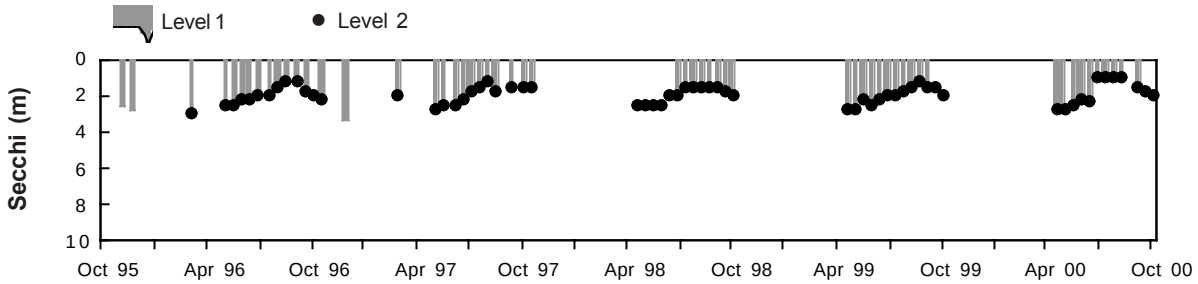
hovering between oligotrophy and mesotrophy as in previous years. The average nitrogen to phosphorus ratio was 24, with a minimum of 17. This indicates that phosphorus concentrations limited the growth of algae through the period, but occasionally conditions could have been good for bluegreen algae.

A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The chrysophyte *Dinobryon* dominated the summer algae, accompanied by the dinoflagellate *Ceratium* and other varieties. The color of the water may affect the types of algae that can do well in the lake. For example, the N/P ratio suggested bluegreens might thrive in the lake, but no significant populations were found.

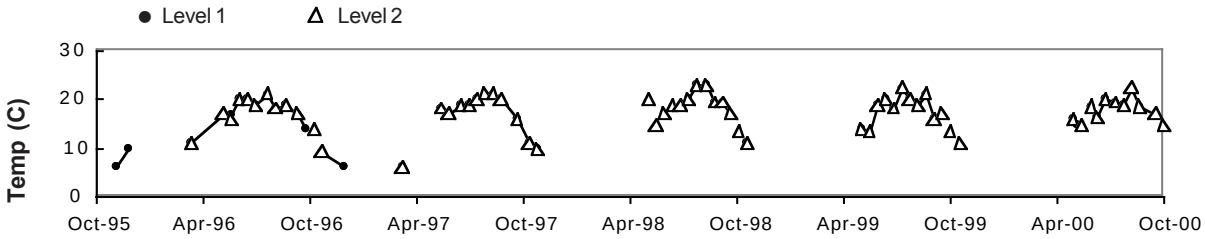








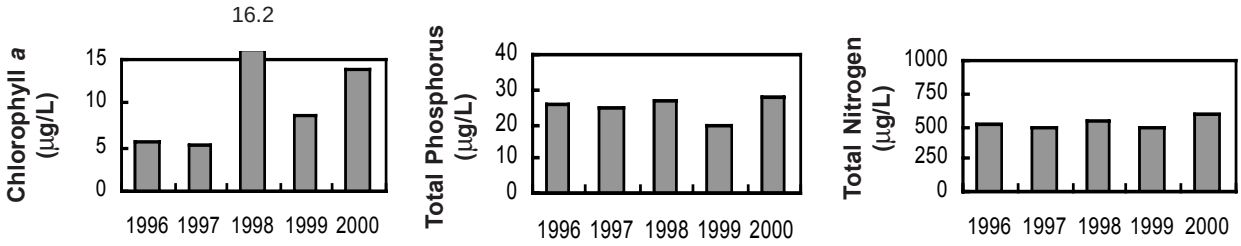
Note: Lake level data was collected weekly 1996–2000



Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1192	—
Days Precipitation Measured	307	—
Lake Level Fluctuation (cm)	66	—
Average Secchi Depth (meters)	IN*	1.82
Average Surface Temperature (°C)	IN*	17.7

*Insufficient data



A volunteer monitor made physical measurements for Level I during water year 2000. The average weekly Level I data are recorded in Appendix A.

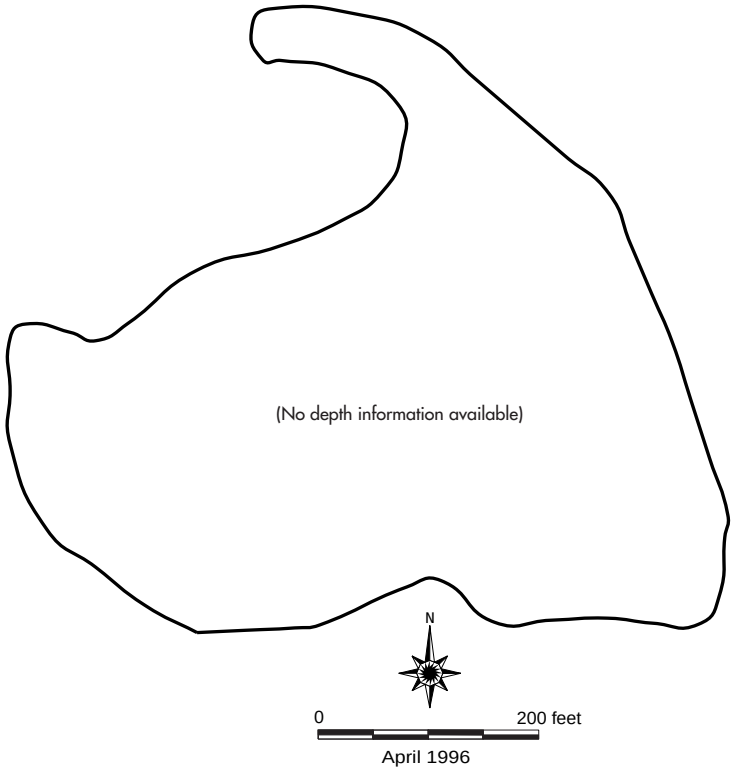
On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000. Water quality data from past years is included for reference. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

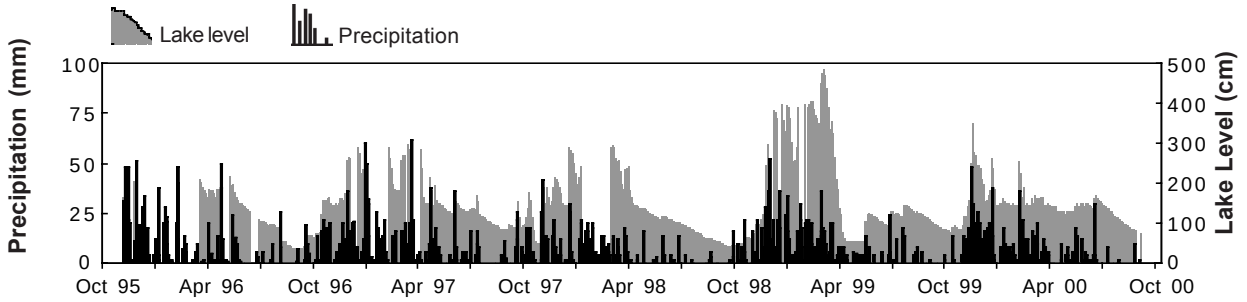
The lake level record suggests an irregular pattern of water level, rising quickly with rainfall, with only a suggestion of the seasonal pattern typical of many King County lakes. The Secchi data indicates that water clarity fluctuates between 1 to 3 meters through the year. This is probably related to abundance of algae since Garrett Lake has been classified as highly productive (eutrophic) on the basis of water quality samples in the past. Surface water temperature fluctuates widely through the year, reaching summer levels equal to other shallow lakes in the area. The bluegreens *Aphanizomenon* and *Anabaena* have dominated the algal communities during summer in the past and may have made nuisance blooms.

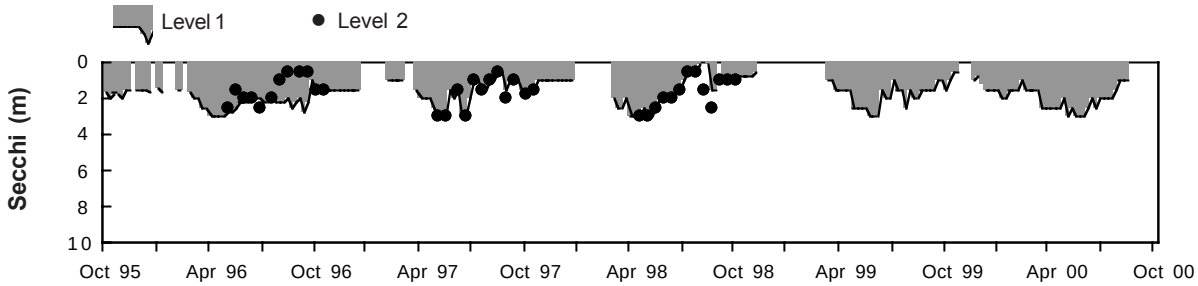
Volunteer Monitors

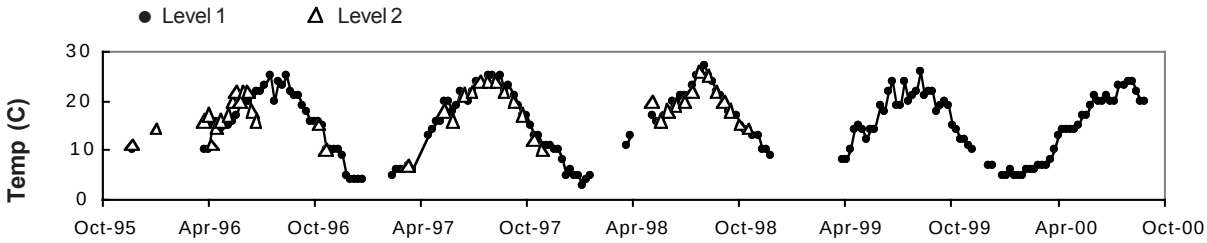
Level I (Oct 1999–Sept 2000)
Primary: Dick Thurnau

Level II (May–Oct 2000)
Primary: None



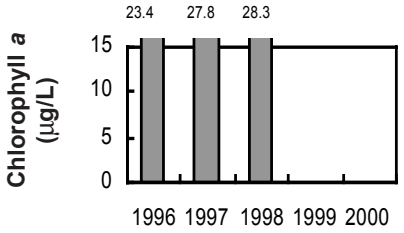


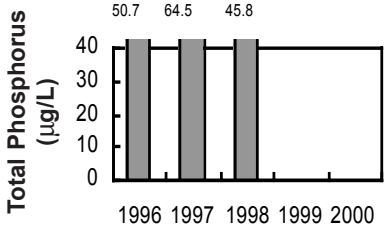


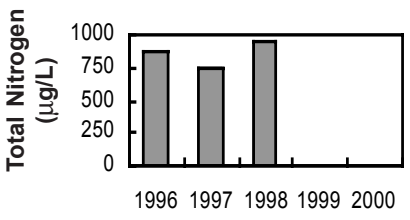


Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1054	—
Days Precipitation Measured	313	—
Lake Level Fluctuation (cm)	276	—
Average Secchi Depth (meters)	1.76	—
Average Surface Temperature (°C)	13.4	—







Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. no samples were missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus and total nitrogen compare the average values for May through October.

The lake level record is similar to other King County lakes, higher in the wet winter months, dropping to an annual low stand in early autumn, with sharp rises in level coinciding with major rain storms. The Secchi data indicates that water clarity between 3 and 7 meters annually, probably related to changes in the algae and grazing zooplankton. Summer water temperatures were quite high in 1997 and 1998, but have decreased in the last two years.

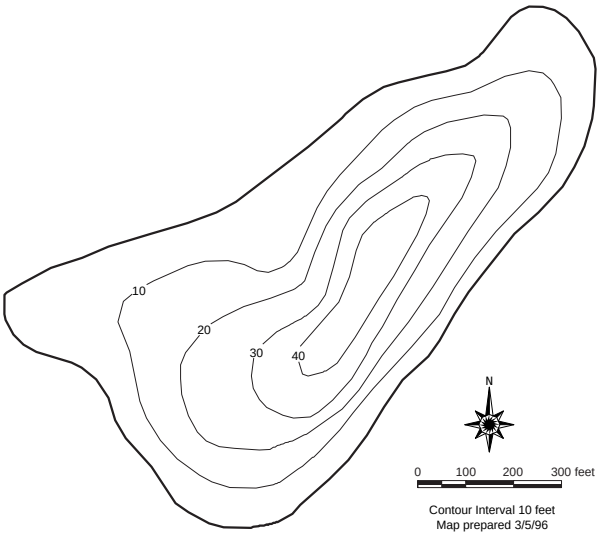
Individual trophic state indicators were calculated for Secchi (40), Chlorophyll *a* (44), and total phosphorus (40). The average (42) indicates that Lake Geneva continues to have moderate productivity (mesotrophic) in 2000, similar to past ratings. The average nitrogen to phosphorus ratio was 36, with a minimum of 18. This indicates that phosphorus concentrations limited the growth of algae through the period, but there may have been times when conditions were favorable to bluegreen algae.

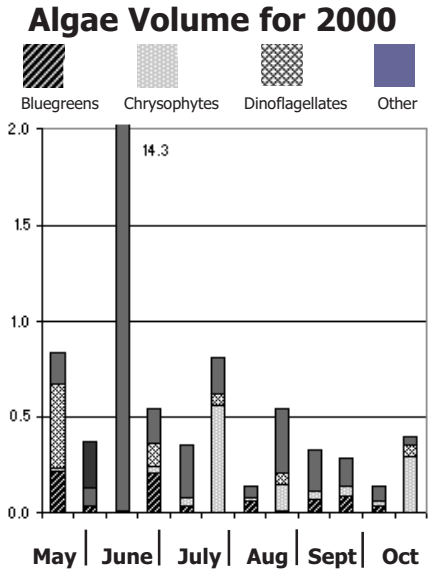
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). The high value in early June is misleading because the dominant form present was the colonial alga *Volvox*, which is a large hollow sphere. The algae were quite diverse in the lake, with many species identified in the samples. The chrysophyte *Dinobryon* dominated in late July, and the bluegreen *Aphanizomenon* was present in small quantities throughout the sampling period.

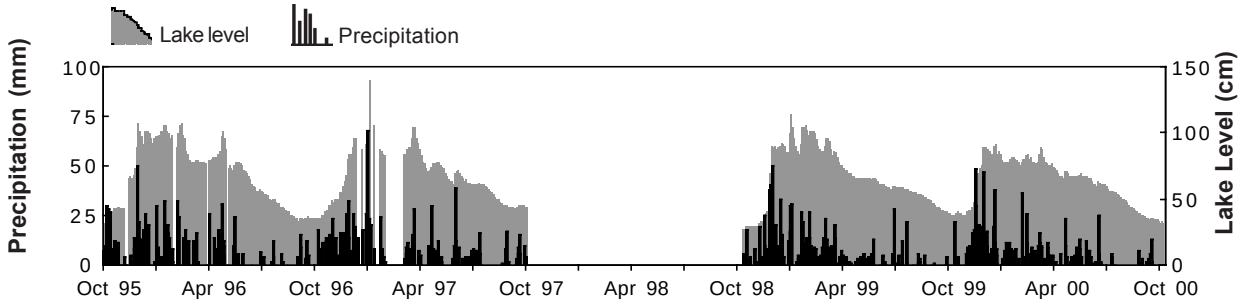
Volunteer Monitors

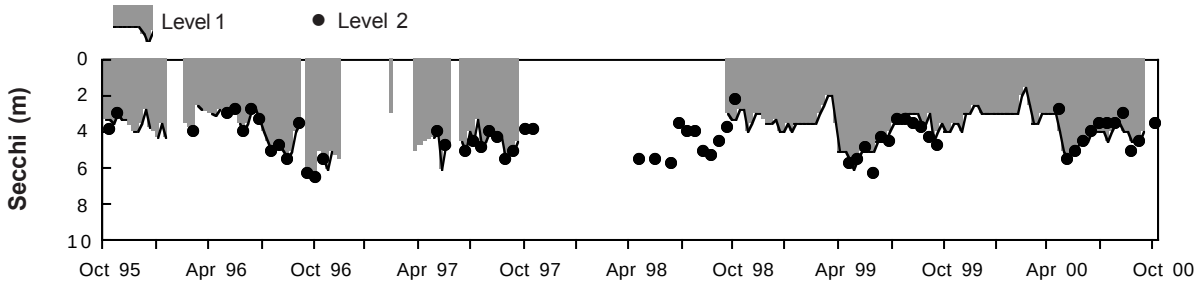
Level I (Oct 1999–Sept 2000)
Primary: Tom Jones and Sue Yunker

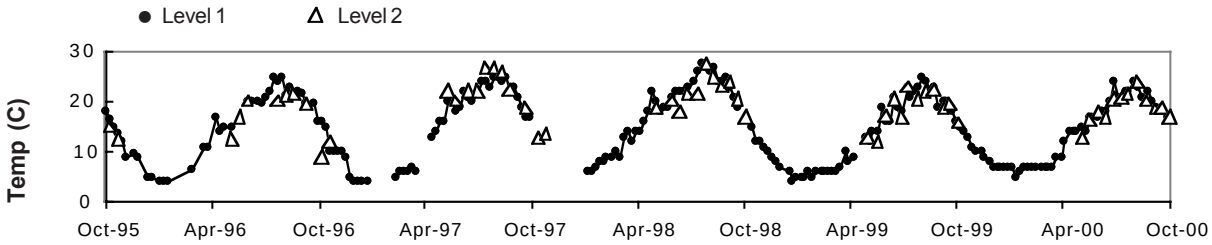
Level II (May–Oct 2000)
Primary: Laura Stiles and Bruce Harpham
Back-up: Tom Jones and Sue Yunker





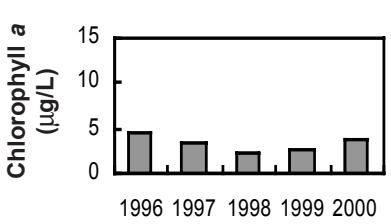


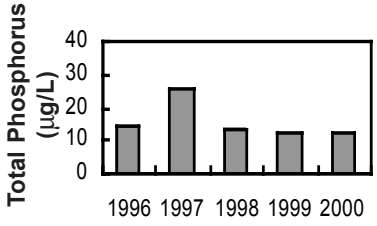


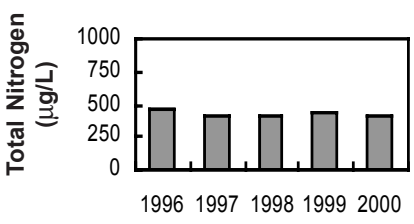


Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1052	—
Days Precipitation Measured	330	—
Lake Level Fluctuation (cm)	59	—
Average Secchi Depth (meters)	3.61	3.98
Average Surface Temperature (°C)	13.5	18.6







Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed over the past five years. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record is similar to other King County lakes, higher in the wet winter months, dropping to an annual low stand in early autumn, with some rises in level tied to major rain storms. The Secchi data indicates that water clarity fluctuates through the year, generally remaining between 3 to 4 meters. Summer water temperatures have been lower in the last two years than the other years shown. This is less apparent in Level II data than in Level I.

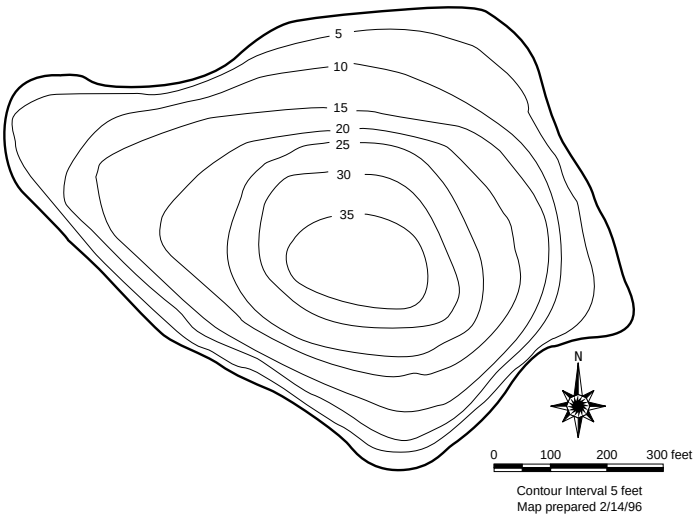
Individual trophic state indicators were calculated for Secchi (44), Chlorophyll *a* (50), and total phosphorus (45). The average (46) indicates that Haller Lake continues to be moderately productive (mesotrophic) in 2000, consistent with past ratings. The average nitrogen to phosphorus ratio was 24, with a minimum of 16. This indicates that phosphorus concentrations limited the growth of algae through much of the period, but conditions at times could have favored the growth of bluegreen algae.

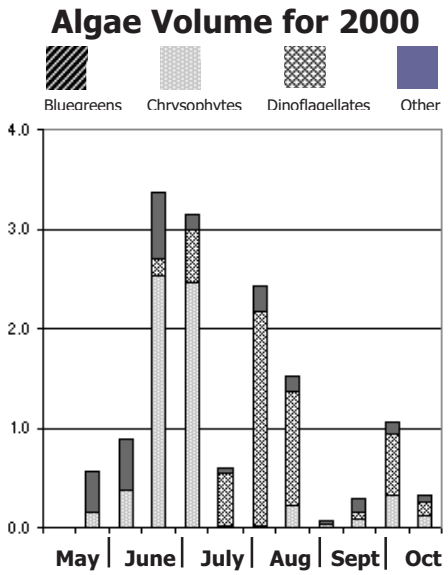
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). The chrysophyte *Dinobryon* made large populations in late spring, followed by the dinoflagellate *Ceratium*, both common residents of small lakes. Very few bluegreen algae were observed in the samples.

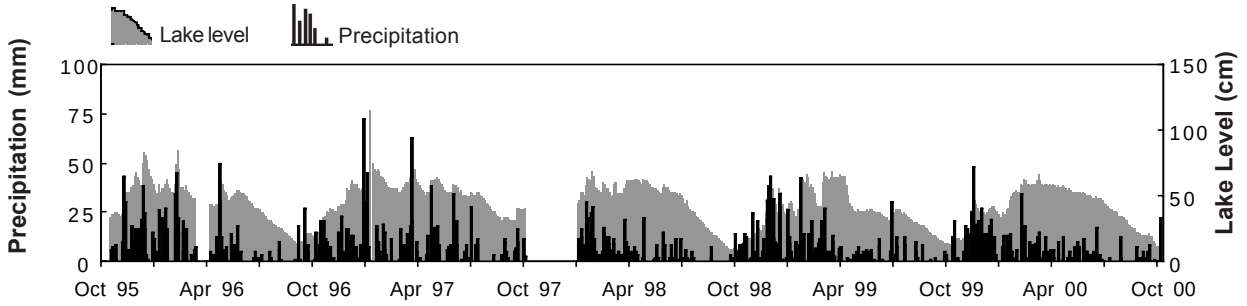
Volunteer Monitors

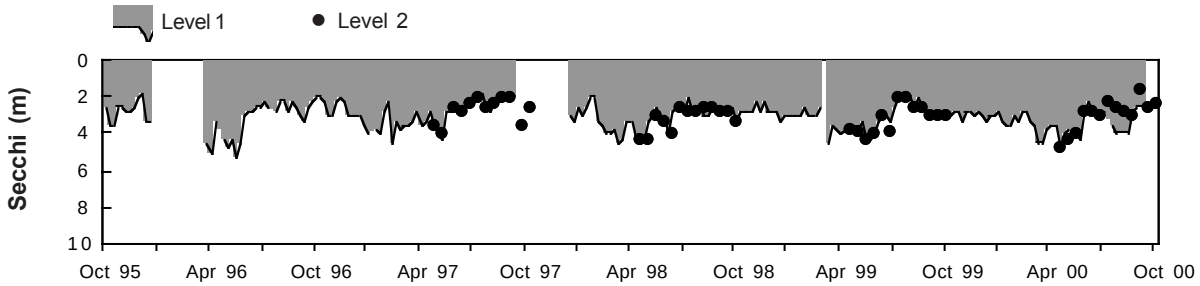
Level I (Oct 1999–Sept 2000)
Primary: Rud Okeson

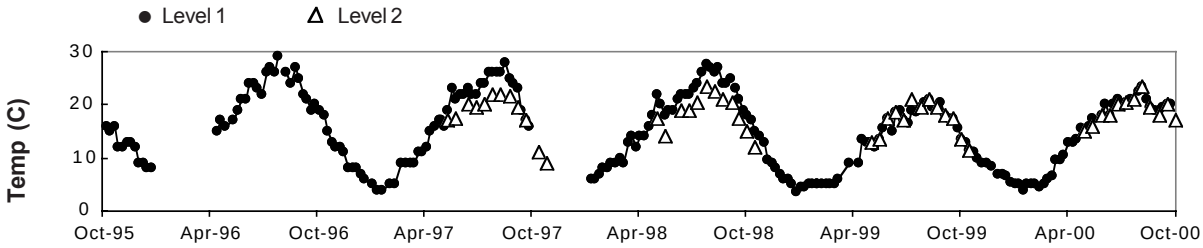
Level II (May–Oct 2000)
Primary: Rud Okeson
Back-up: Jim Taylor and Barbara Gross





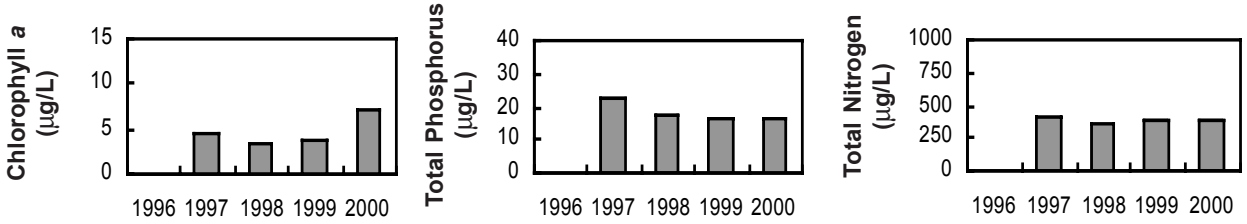






Physical Characteristics for 2000

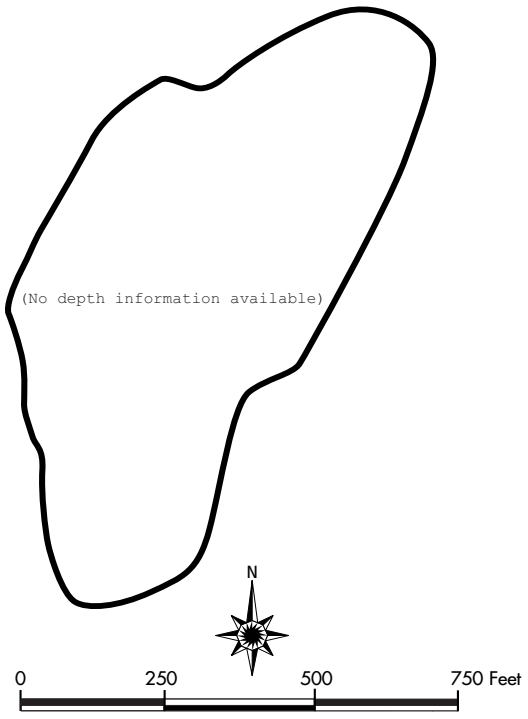
	Level I Annual	Level II Summer
Sum of Precipitation (mm)	957	—
Days Precipitation Measured	364	—
Lake Level Fluctuation (cm)	61	—
Average Secchi Depth (meters)	3.25	2.95
Average Surface Temperature (°C)	13.0	18.6



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. One sample was missed out of the 13 collection dates. Since this was the first year of sampling, the data will become a baseline for comparison in years to come

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level pattern differed from many King County lakes in that the maximum stand was achieved in mid-spring rather than in winter, dropping to a low stand in early autumn. There is a significant history in the Horsheshoe Lake watershed of rapid responses in water level to large scale rain events, but this is not reflected in the 2000 water year data, perhaps because rainfall was near the 50 year average. The



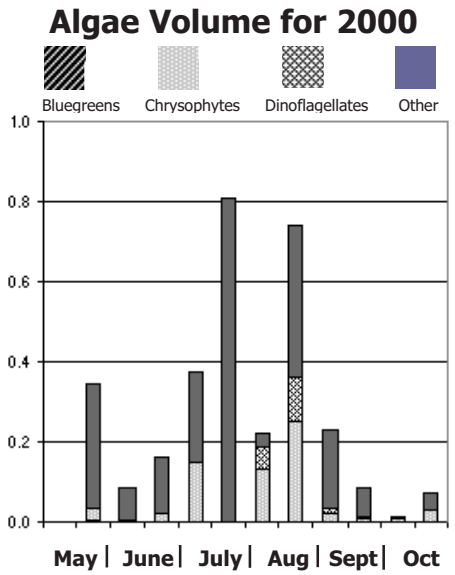
Volunteer Monitors

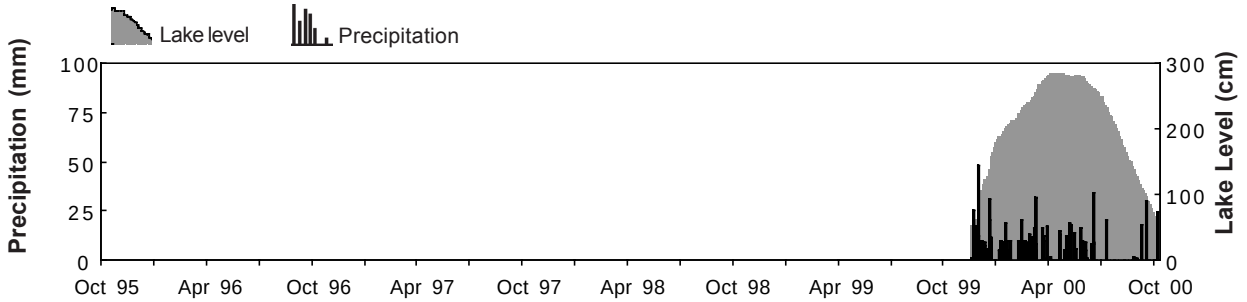
Level I (Oct 1999–Sept 2000)
Primary: Mark and Ben Harris

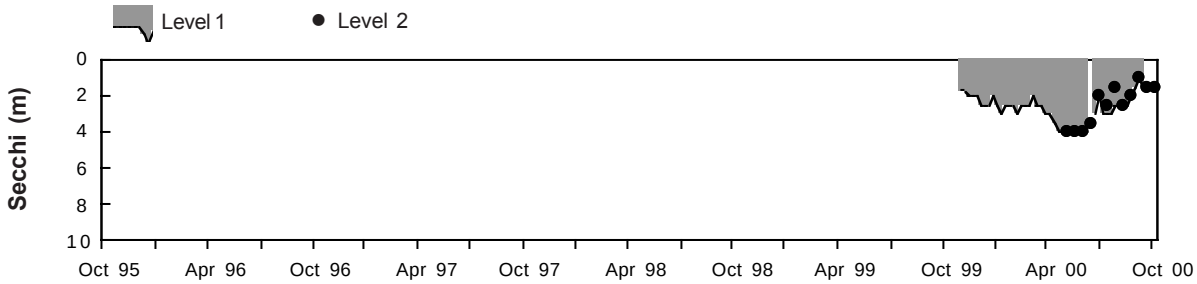
Level II (May–Oct 2000)
Primary: Mark and Ben Harris

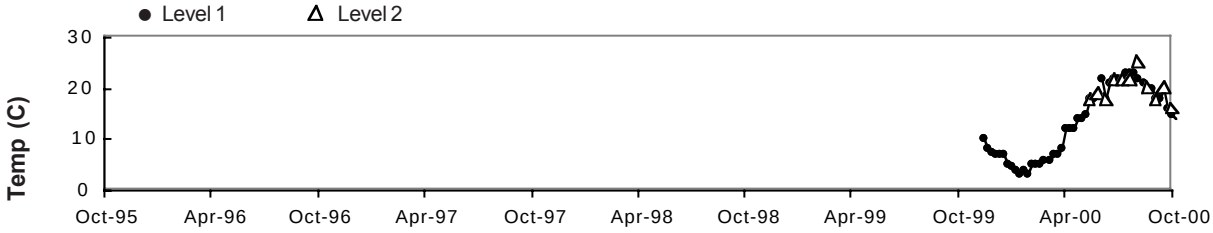
Secchi fluctuated through the year, reaching a maximum of 4 meters in late spring. The temperature record is similar to other small lakes in the area.
Individual trophic state indicators were calculated for Secchi (47), Chlorophyll *a* (42), and total phosphorus (43). The average (44) indicates that Horseshoe Lake is moderately productive (mesotrophic). The average nitrogen to phosphorus ratio was 52, with a minimum of 41, which indicates that phosphorus concentrations limited the growth of algae though the period.

A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The total volume of algae was small, dominated by various species of chlorophyte algae (graphed as "Other"), including *Sphaerocystis*, through most of the period. An unusual peak of the euglenophyte *Euglena* (graphed as "Other") occurred in August.



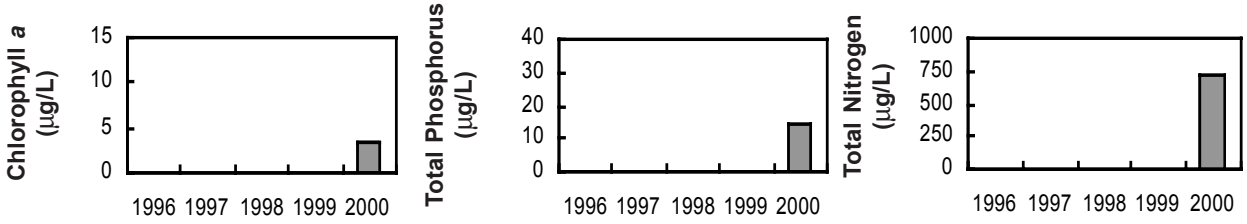






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	884	—
Days Precipitation Measured	322	—
Lake Level Fluctuation (cm)	233	—
Average Secchi Depth (meters)	2.69	2.50
Average Surface Temperature (°C)	13.0	19.7



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly Level II data are recorded in Appendix B. No samples were missed out of the 13 collection dates. Since this was the first year of sampling, the data will become a baseline for comparison in years to come

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record appears similar to many King County lakes, with the low stand in early autumn. Little response was seen to large rain events. The Secchi remains steady through the year near 2 meters. Surface water temperatures follow a pattern similar to many small lakes in the area.

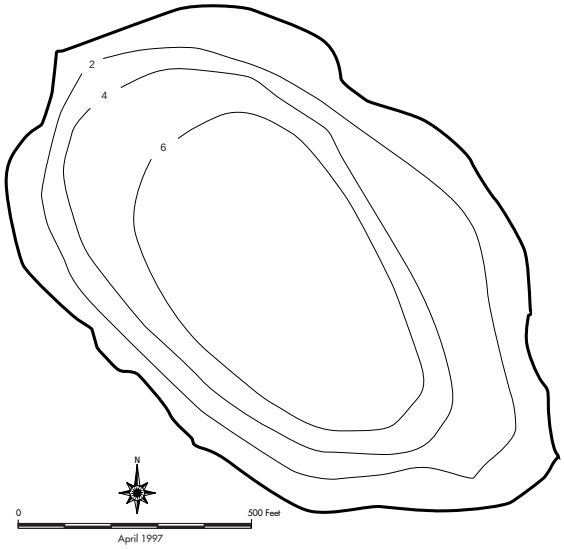
Individual trophic state indicators were calculated for Secchi (51), Chlorophyll *a* (49), and total phosphorus (48). The average (49) indicates that Jones Lake is moderately productive (mesotrophic), but nearing the threshold for eutrophy. The average nitrogen to phosphorus ratio was 32, with a minimum of 18, which indicates that phosphorus concentrations limited the growth of algae though the period, but at times conditions may have been favorable for bluegreen algae.

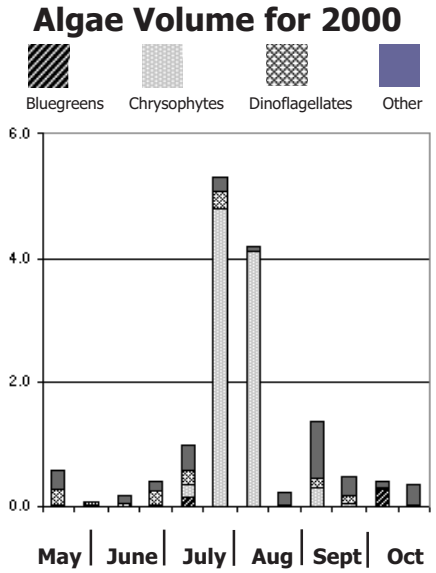
Volunteer Monitors

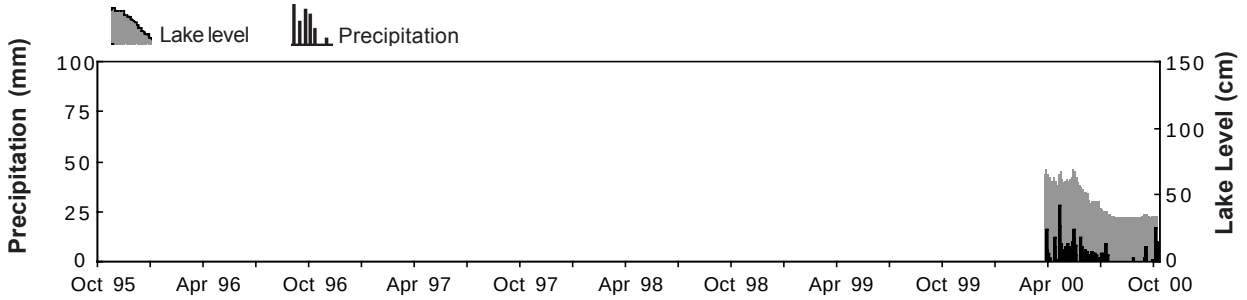
Level I (Oct 1999–Sept 2000)
Primary: Dale and Linda Anson

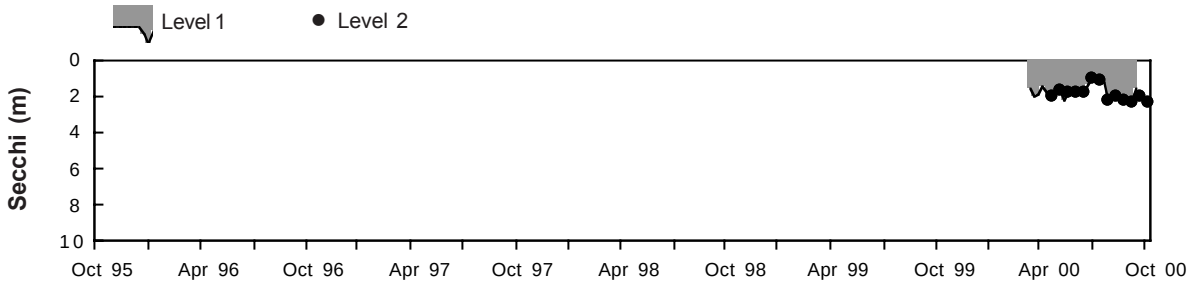
Level II (May–Oct 2000)
Primary: Dale and Linda Anson
Back-up: Bill Jones

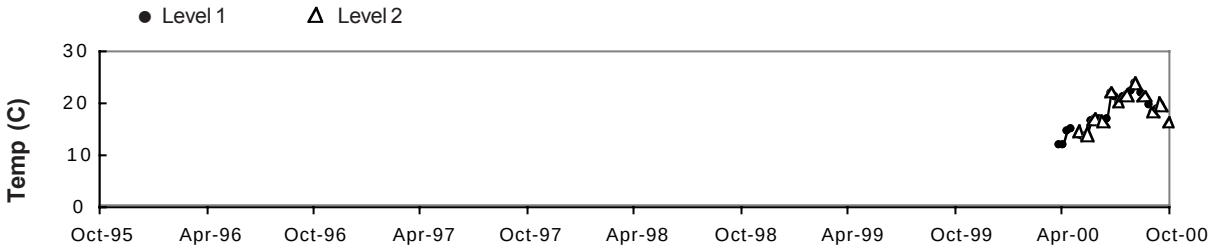
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). Initial dominance by the dinoflagellate *Ceratium* gave way to a bloom of the chrysophyte diatom *Asterionella* in July. This was followed by the chrysophyte *Dinobryon*, which made up the majority of the phytoplankton for the rest of the period. Small amounts of the bluegreen *Oscillatoria* were present in early summer. In one sample in autumn, a large proportion of the algae present was the bluegreen *Anabaena*, which has been known to make nuisance blooms in other lakes.







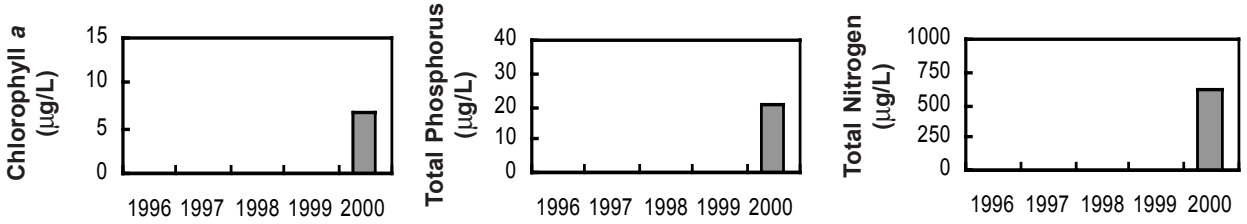




Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	367	—
Days Precipitation Measured	193	—
Lake Level Fluctuation (cm)	IN*	—
Average Secchi Depth (meters)	IN*	1.85
Average Surface Temperature (°C)	IN*	18.5

*Insufficient data



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. Two samples were missed out of the 13 collection dates. Since this was the first year of sampling for Level II, the data will become a baseline for comparison in years to come

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record is similar to many King County lakes, with the highest levels in wet winter months, dropping to low stands in early autumn. Some quick rises coincided with large rain events. The Secchi ranged from 1 to 9 meters in 2000. This is likely due to interactions between algae and the zooplankton grazers. The surface temperature record shows a pattern similar to many small lakes in the area.

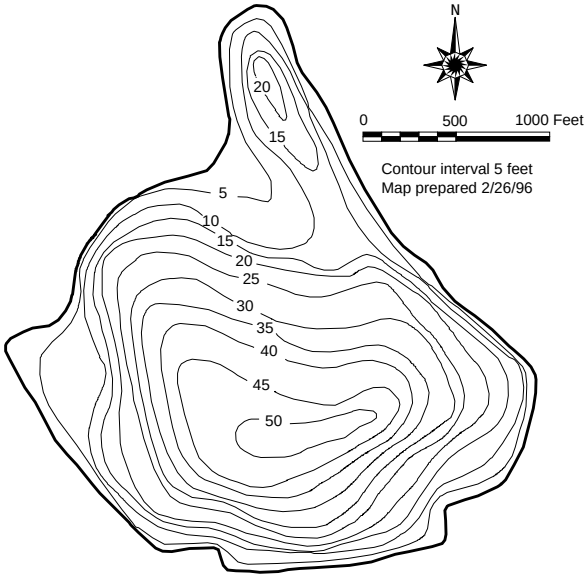
Individual trophic state indicators were calculated for Secchi (41), Chlorophyll *a* (39), and total phosphorus (34). The average (38) indicates that Lake Joy is low in productivity (oligotrophic), and has excellent water quality. The average nitrogen to phosphorus ratio was 59, with a minimum of 34, which indicates that phosphorus concentrations limited the growth of algae though the sample period.

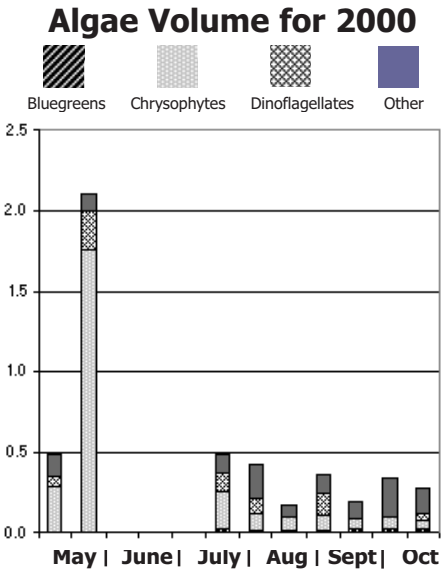
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The chrysophyte diatom *Cyclotella* dominated initially, which is an indication of oligotrophic conditions, as is the generally low algal abundance. A wide variety of algae made up the summer and fall phytoplankton, typified by the chlorophytes *Botryococcus* and *Scenedesmus* (graphed as "Other"). A large number of co-occurring species can be a sign of a healthy phytoplankton community and good water quality.

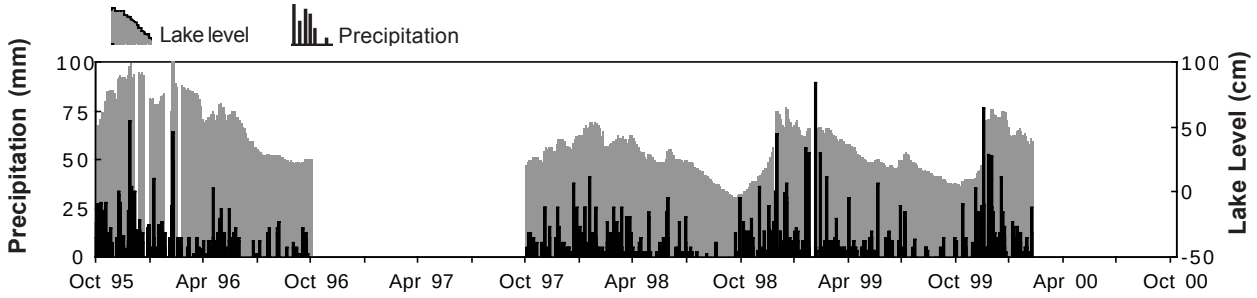
Volunteer Monitors

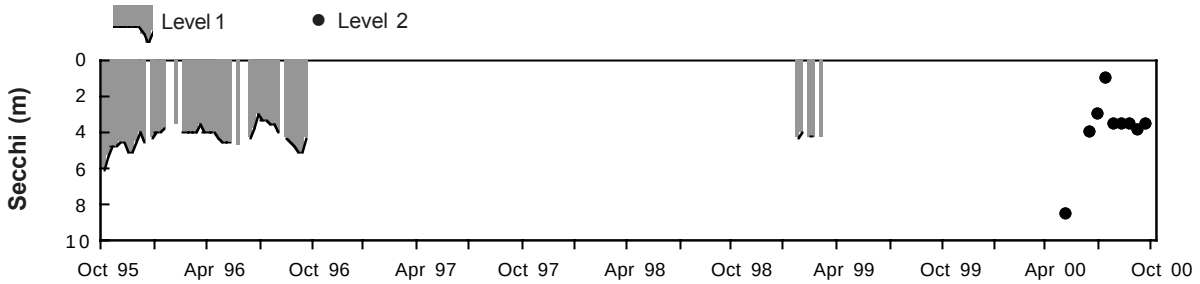
Level I (Oct 1999–Sept 2000)
Primary: James Polybank

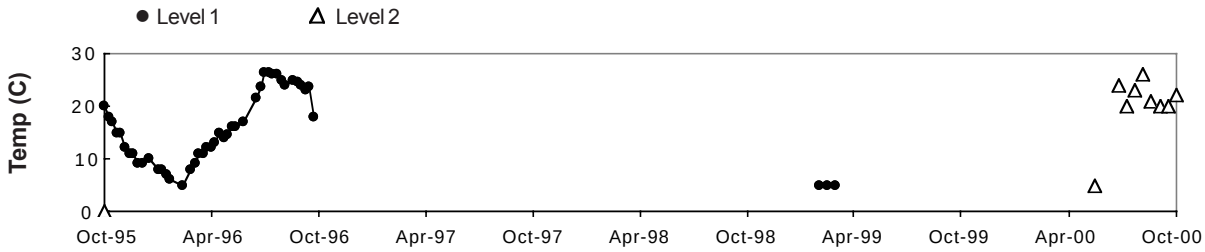
Level II (May–Oct 2000)
Primary: Gary Rauen







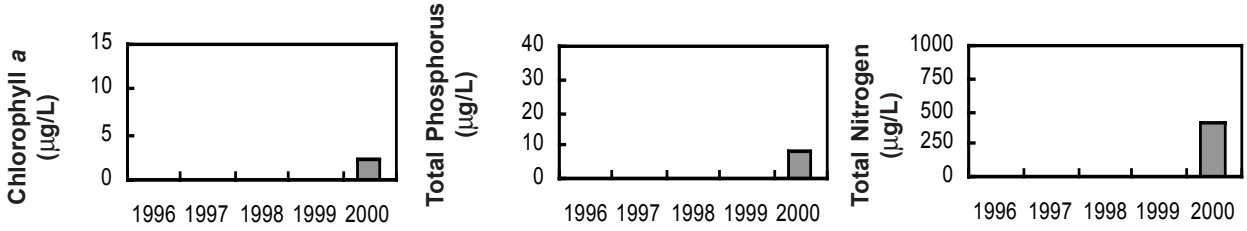




Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1009	—
Days Precipitation Measured	125	—
Lake Level Fluctuation (cm)	IN*	—
Average Secchi Depth (meters)	IN*	3.81
Average Surface Temperature (^{O}C)	IN*	20.5

*Insufficient data



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record appears similar to many King County lakes, with the highest levels in the wet winter months, decreasing steadily to the low stand in early autumn. Some short term increases in level were responses to large rain events. The Secchi appears to have fluctuated more in past years than in 2000, when it ranged between 1 and 3 meters. Summer temperatures were lower in the past two years than in previous years.

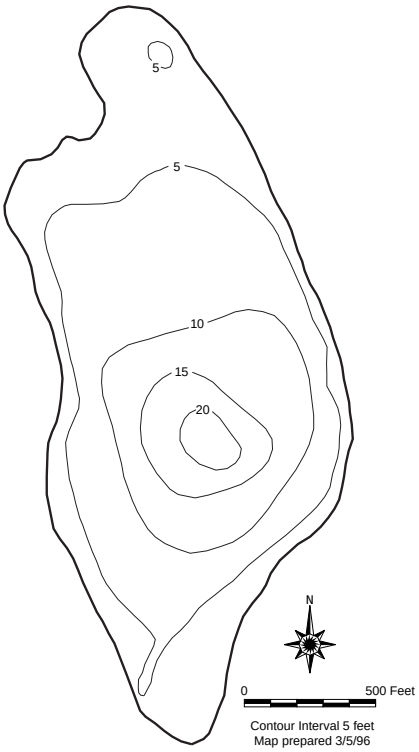
Individual trophic state indicators were calculated for Secchi (52), Chlorophyll *a* (55), and total phosphorus (46). The average (51) indicates that Lake Kathleen is classified as borderline high in productivity (eutrophic), while in past years it was considered mesotrophic. This is largely due to the increase in chlorophyll *a* over the last few years. The average nitrogen to phosphorus ratio was 31, with a minimum of 18. This suggests that phosphorus concentrations limited the growth of algae though the period, but conditions may have been favorable for bluegreen algae at times.

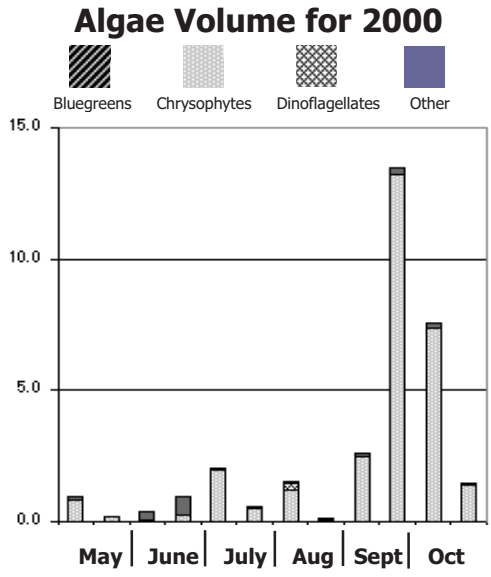
Volunteer Monitors

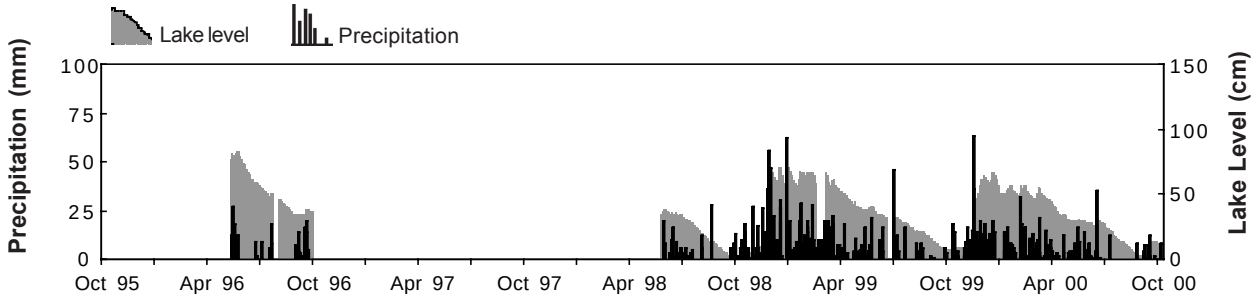
Level I (Oct 1999–Sept 2000)
Primary: Steve Thomas
Backup: Keith Lanan

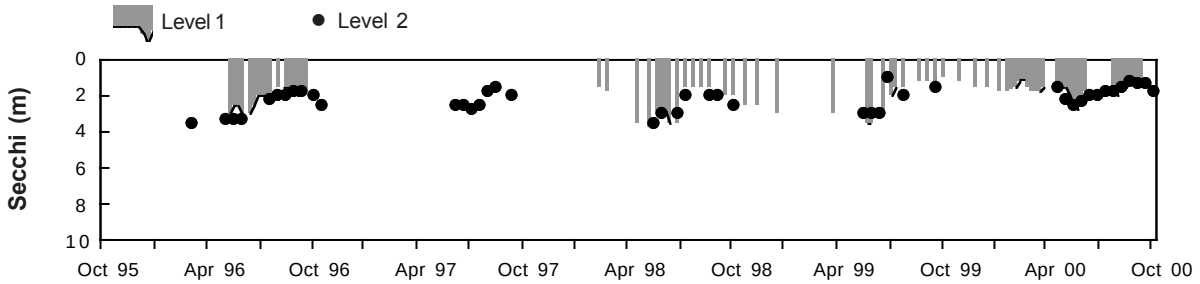
Level II (May–Oct 2000)
Primary: Keith Lanan
Backup: Steve Thomas

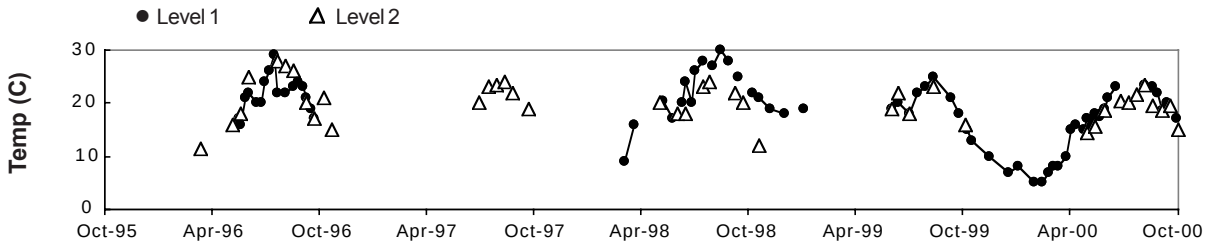
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified (see the discussion of algae in Chapter 2). Algae were low in abundance, with a variety of species represented, until early September when the chrysophyte *Dinobryon* began to build a large population. Other algae typically found in the lake were the dinoflagellate *Trachelomonas* and the chrysophyte *Gloeobotrys*. These are the varieties found in lakes with darkly colored water. No bluegreen algae found in the lake in 2000.





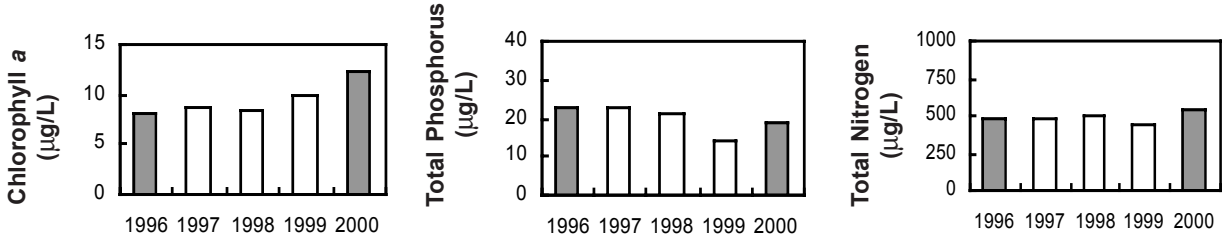






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1133	—
Days Precipitation Measured	365	—
Lake Level Fluctuation (cm)	66	—
Average Secchi Depth (meters)	1.60	1.78
Average Surface Temperature (^{O}C)	14.9	18.3



A volunteer monitor made physical measurements and collected water samples for Level II and part of the year for Level I during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. Two samples were missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record appears similar to many King County lakes, with the high level in the wet winter months, decreasing steadily to the low stand in early autumn. Some short term increases correlate with large rain events. The Secchi fluctuates very little, remaining stable from year to year, almost always between 2 to 3 meters. The temperature pattern appears similar to many other small lakes in the area.

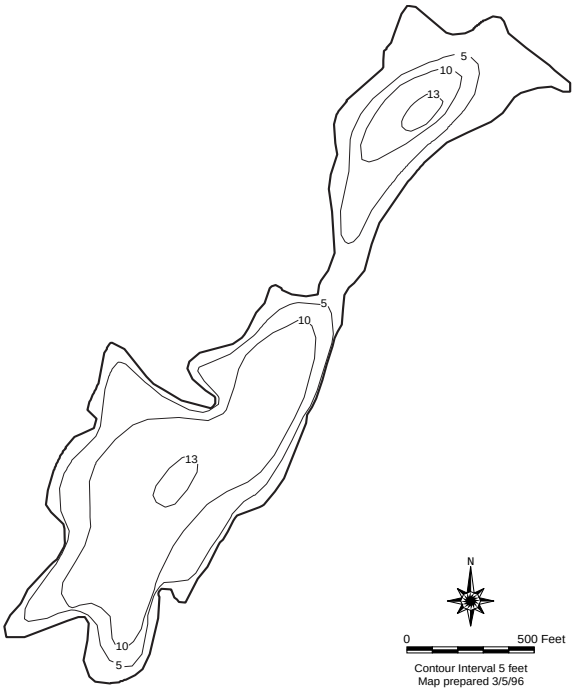
Individual trophic state indicators were calculated for Secchi (46), Chlorophyll *a* (51), and total phosphorus (50). The average (49) indicates that Lake Killarney is moderately productive (mesotrophic), but it has been classified as eutrophic in the recent past. Average phosphorus appears to have decreased over the last five years, which accounts for some of the trophic shift. The average nitrogen to phosphorus ratio was 25, with a minimum of 20. This suggests that phosphorus concentrations limited the growth of algae though the period, but conditions might have been favorable for bluegreen algae part of the time.

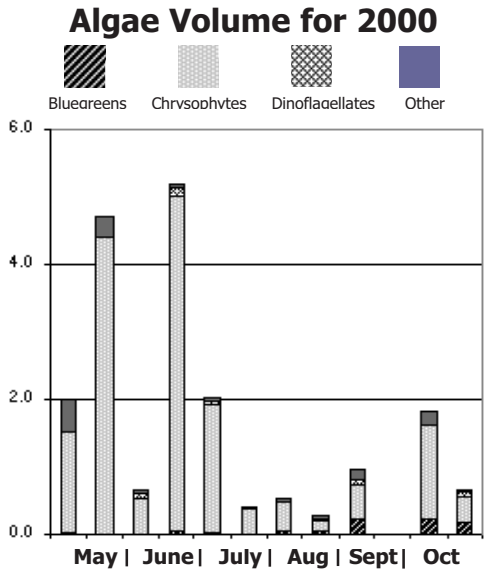
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). A large spring bloom of the chrysophyte *Dinobryon* was followed by low total abundance in summer. A small increase by *Dinobryon* in the fall was accompanied by the bluegreen *Chroococcus*. This variety does not create nuisance blooms.

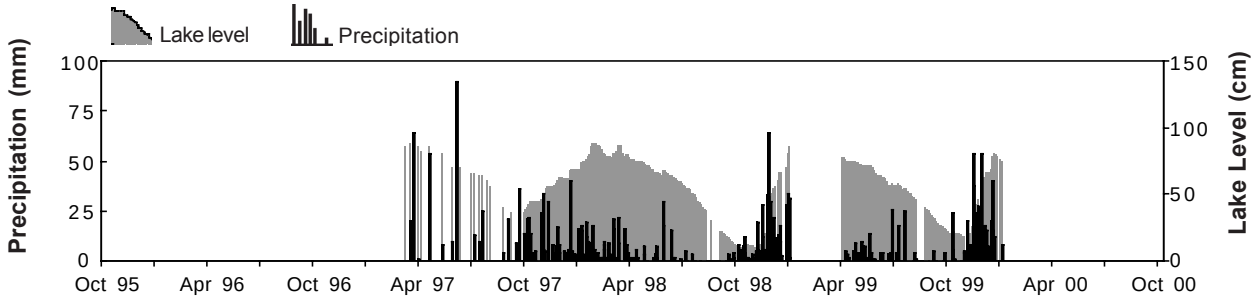
Volunteer Monitors

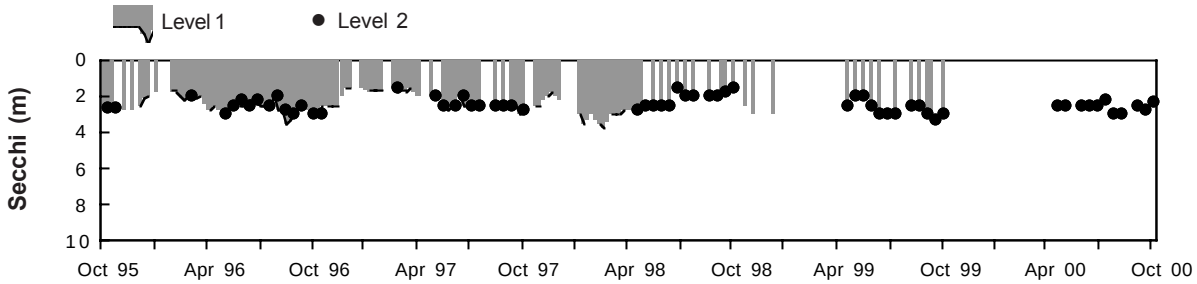
Level I (Oct 1999–Sept 2000)
Primary: Craig Rice

Level II (May–Oct 2000)
Primary: Craig Rice

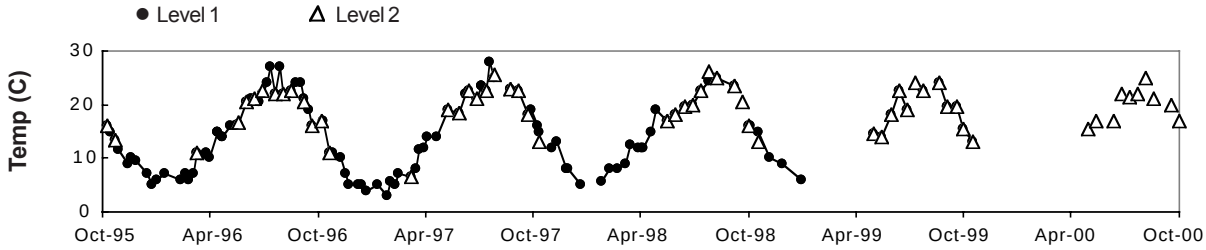








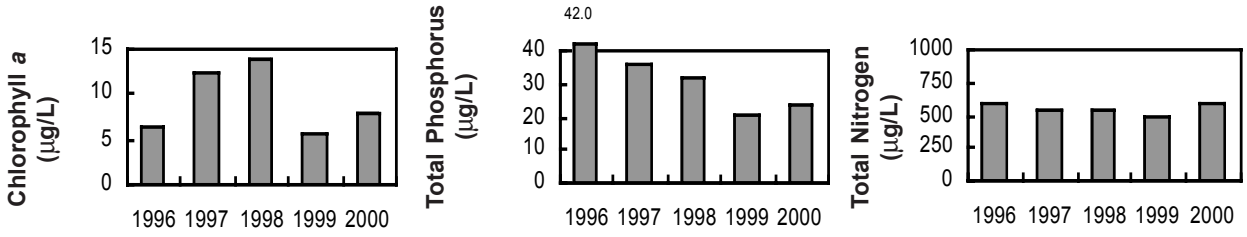
Note: Lake level data was collected weekly 1997, and daily 1998-2000



Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	445	—
Days Precipitation Measured	67	—
Lake Level Fluctuation (cm)	62	—
Average Secchi Depth (meters)	IN*	2.58
Average Surface Temperature (^{O}C)	IN*	19.4

*Insufficient data



Leota

A volunteer monitor made physical measurements and collected water samples for Levels I and II during water year. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record is similar to many King County lakes, with high levels in the wet winter months, decreasing to a low stand in early autumn. Sudden rises in level coincide with large rain events. The Secchi fluctuates through the year, and is at a maximum in May-June. Summer temperatures appear lower in the last two years than in previous summers.

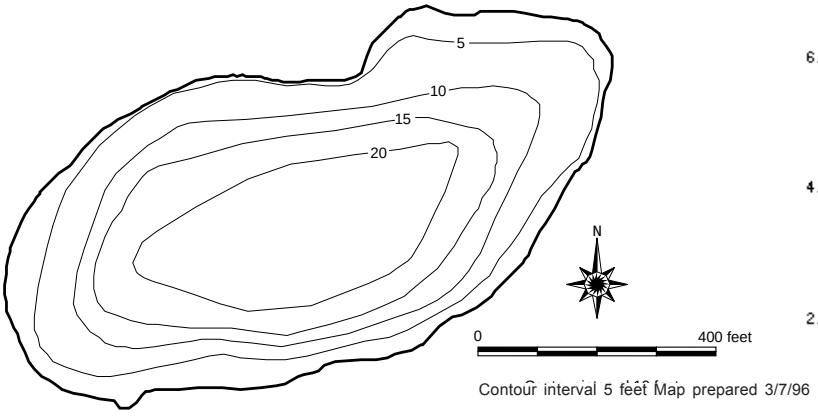
Individual trophic state indicators were calculated for Secchi (46), chlorophyll *a* (55), and total phosphorus (48). The average (50) indicates that Lake Leota is moderately productive (mesotrophic, bordering on eutrophic) and has good to fair water quality. This is consistent with past ratings. Both chlorophyll *a* and phosphorus have increased in recent years. The average nitrogen to phosphorus ratio was 29, with a minimum of 16. This suggests that phosphorus concentrations limited the growth of algae though most of the period.

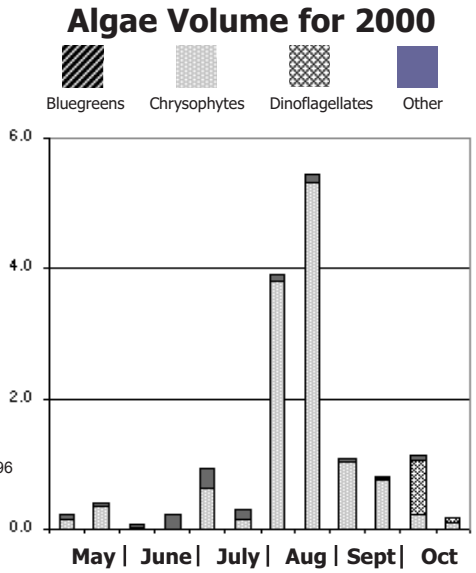
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). Total algal volume was low early in the year, but chrysophyte algae, mainly *Dinobryon* with a smaller amount of the diatom *Cyclotella,* formed a large bloom in August. A smaller bloom by the dinoflagellate *Ceratium* occurred in October.

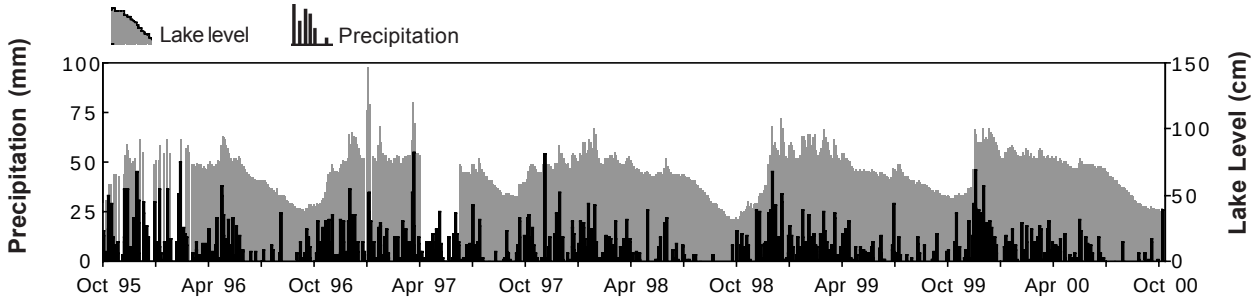
Volunteer Monitors

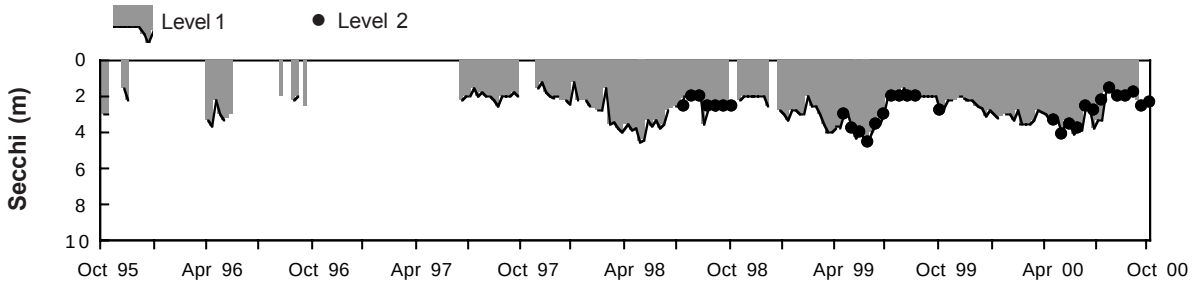
Level I (Oct 1999–Sept 2000)
Primary: David Mangels

Level II (May–Oct 2000)
Primary: David Mangels

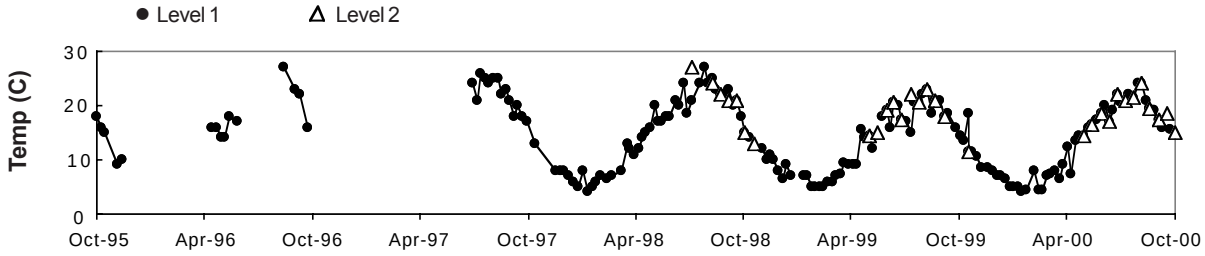






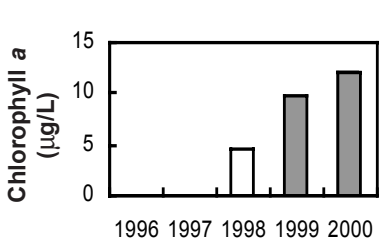


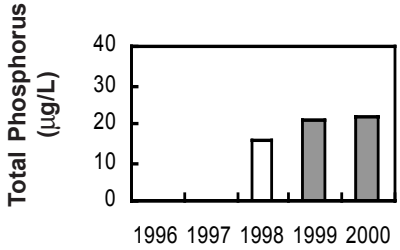
Note: Lake level data was collected weekly 1996, and daily 1996–2000

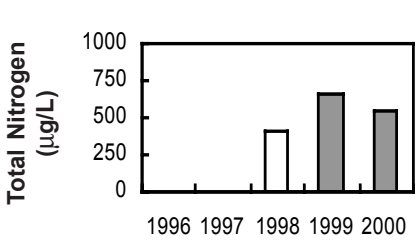


Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1080	—
Days Precipitation Measured	328	—
Lake Level Fluctuation (cm)	63	—
Average Secchi Depth (meters)	2.79	2.63
Average Surface Temperature (^{O}C)	10.6	18.3







Volunteer monitors made physical measurements and collected water samples for Level II during water year 2000. The biweekly summer Level II data are recorded in Appendix B. One sample was missed out of the 13 collection dates.

On the opposite page, available data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record is similar to many King County lakes, with high levels in the wet winter months, decreasing to a low stand in early autumn. The Secchi fluctuates through the year, varying between 2 to 6 meters, without a clear-cut seasonal pattern. Summer temperatures appear to be warmer than other small lakes in the area.

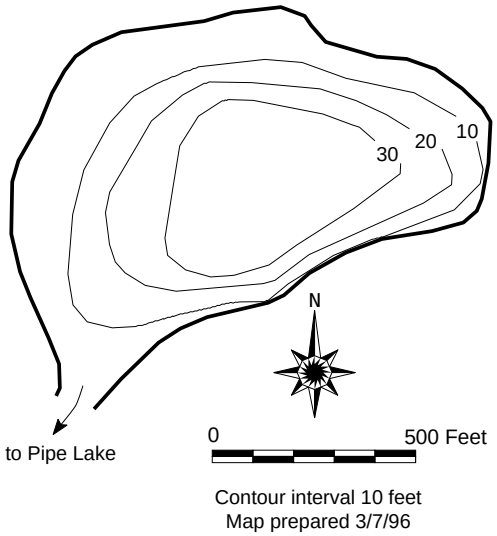
Individual trophic state indicators were calculated for Secchi (40), chlorophyll *a* (41), and total phosphorus (37). The average (39) indicates that Lake Lucerne is low to moderately productive (oligotrophic to mesotrophic), consistent with past ratings. The average nitrogen to phosphorus ratio was 45, with a minimum of 29. This suggests that phosphorus concentrations limited the growth of algae though the period.

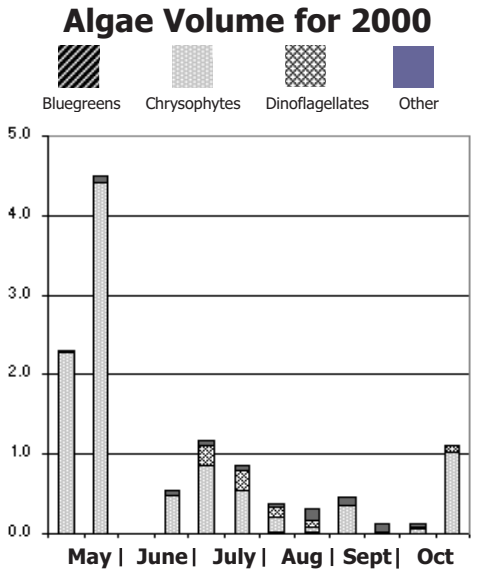
Volunteer Monitors

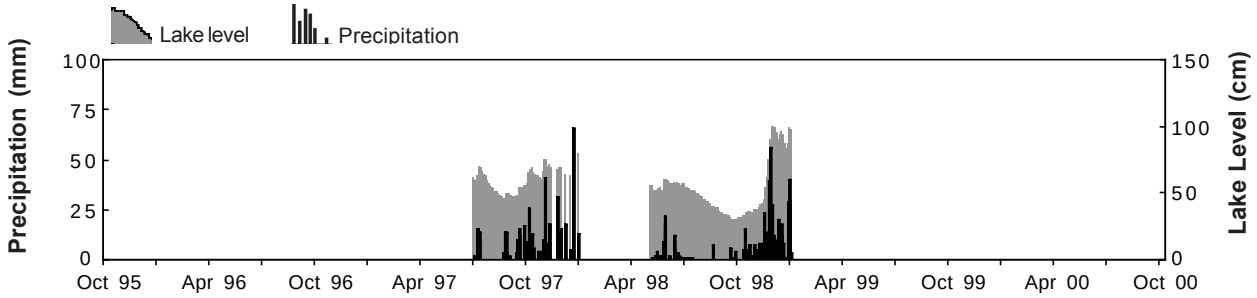
Level I (Oct 1999–Sept 2000)
Primary: None

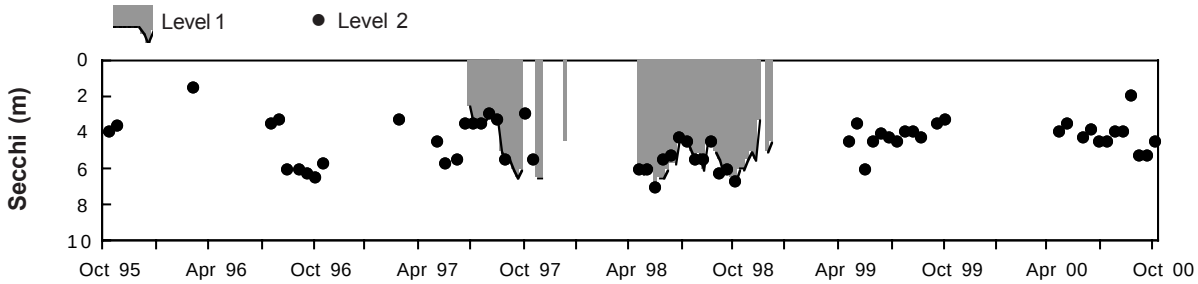
Level II (May–Oct 2000)
Primary: Milo Dullum and Barbara Winter

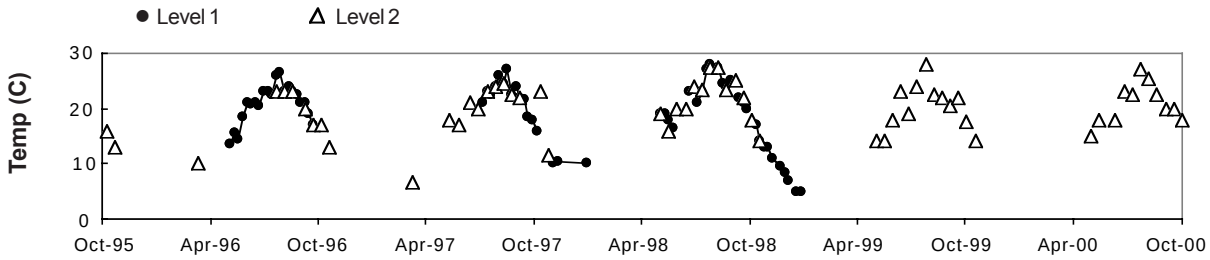
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). Chrysophyte algae, mostly *Dinobryon* and the diatom *Cyclotella* dominated the community through the entire sampling period, except in June, when overall abundance was very low. A significant population of the dinoflagellate *Ceratium* occurred in October. Lucerne and Pipe lakes were treated in 2000 with a granular form of the herbicide fluridone to eradicate the noxious weed *Hydrilla*, but the resulting concentrations were unlikely to have affected the phytoplankton populations.





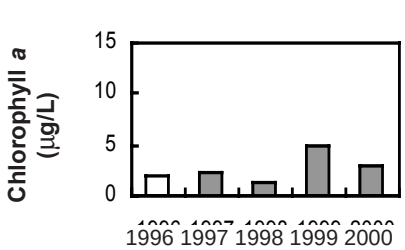


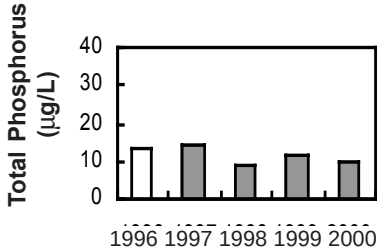


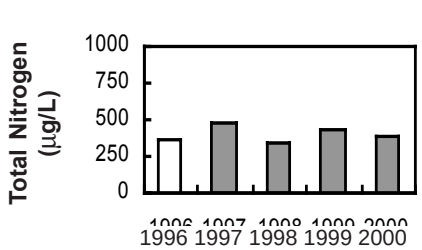


Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	—	—
Days Precipitation Measured	—	—
Lake Level Fluctuation (cm)	—	—
Average Secchi Depth (meters)	—	4.14
Average Surface Temperature (^{O}C)	—	20.6







A volunteer monitor made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of 13 collection dates. Since this was the first year for Level II sampling, the data will become the baseline for comparison in years to come.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record is very stable, due to threshold control at the outlet. There may be some short-lived rises related to rainfall events. The Secchi fluctuates a little through the year, with the minimum usually in late summer. Summer water temperatures were cooler the last two summers than in previous years, while winter temperatures were approximately the same.

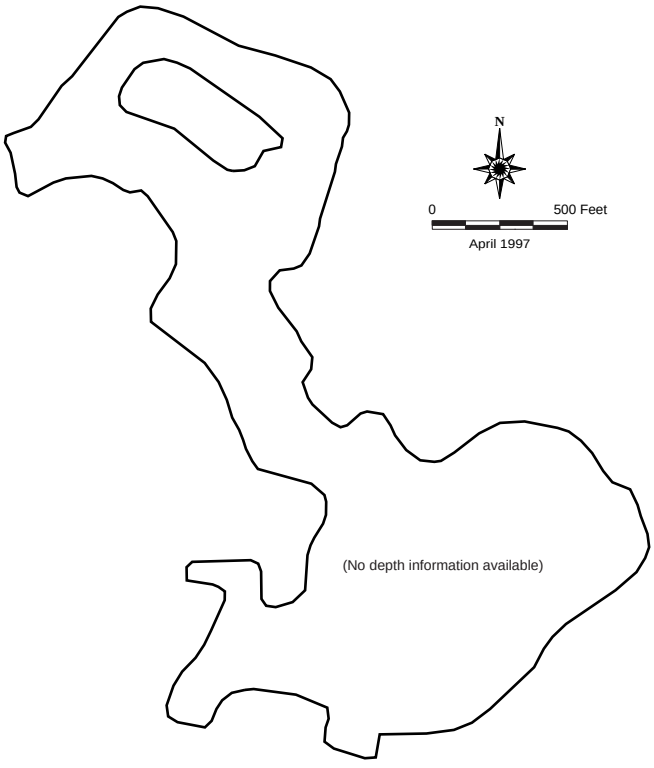
Volunteer Monitors

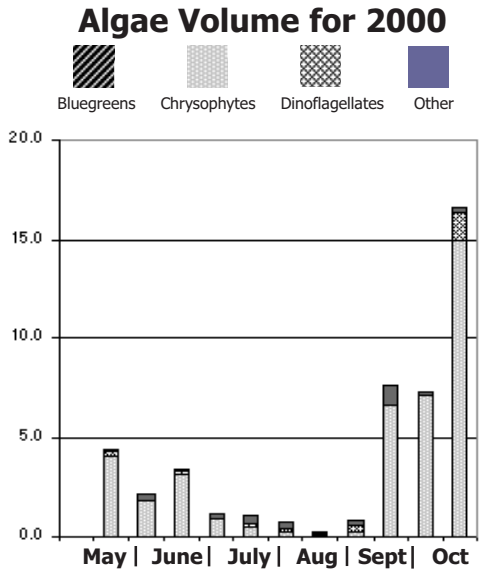
Level I (Oct 1999–Sept 2000)
Primary: Chuck Willis

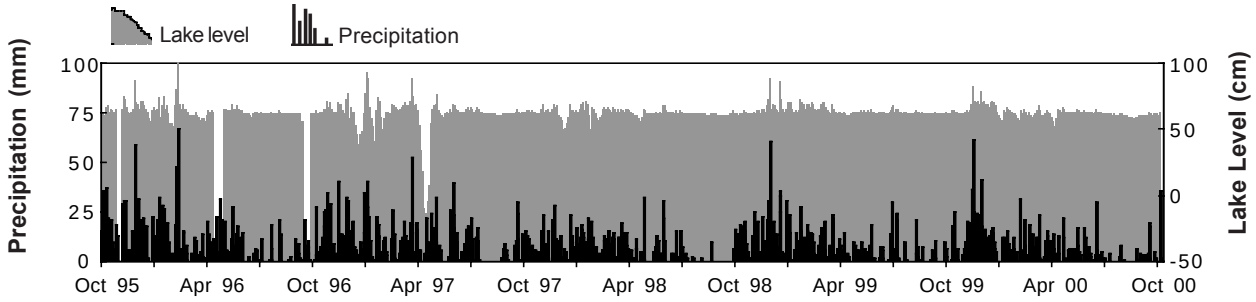
Level II (May–Oct 2000)
Primary: Chuck Willis

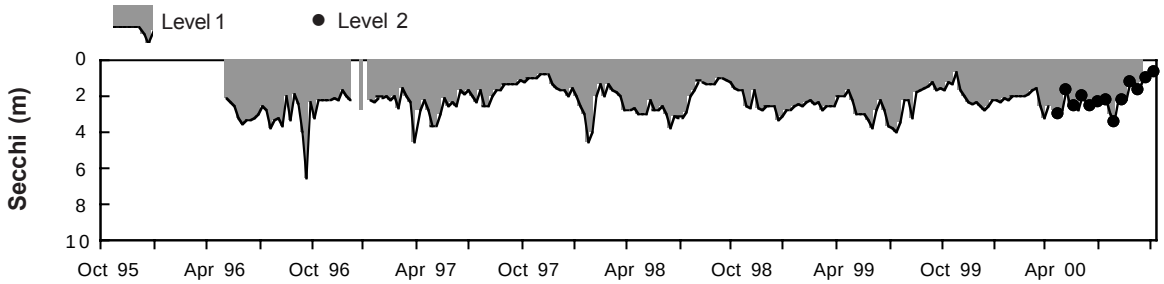
Individual trophic state indicators were calculated for Secchi (50), chlorophyll *a* (64), and total phosphorus (46). The average (53) indicates that Lake Marcel is very productive (eutrophic) and has fair water quality. The average nitrogen to phosphorus ratio was 44, with a minimum of 16. This suggests that phosphorus concentrations limited the growth of algae much of the time.

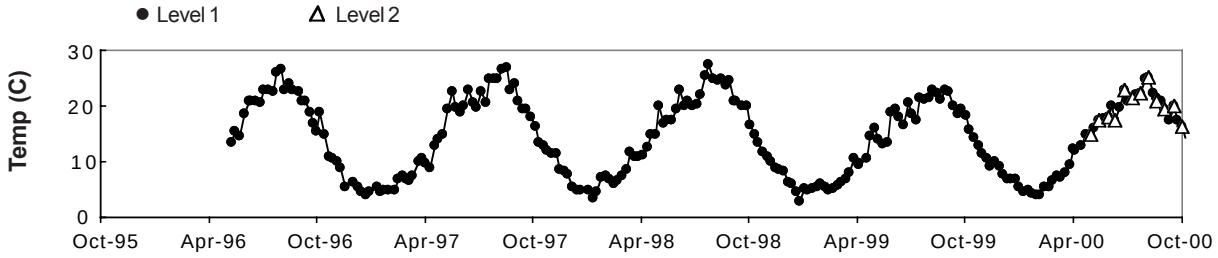
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). Chrysophyte algae, mostly *Dinobryon* and the diatom *Asterionella* dominated the algae in the spring, making a moderately sized bloom. In summer the combined volumes of all species were very low. *Dinobryon* returned in early fall and made a much larger population.





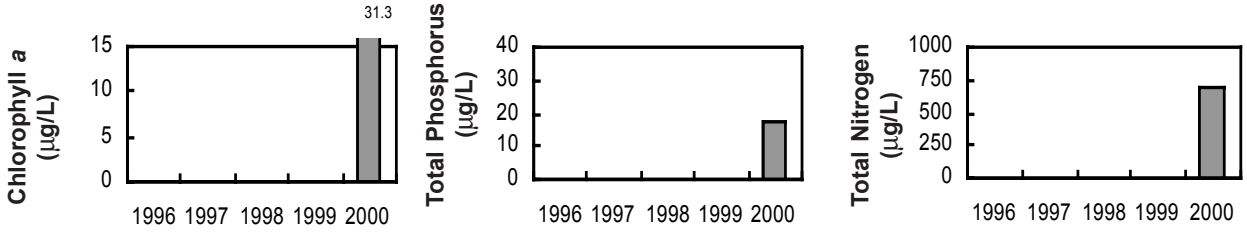






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1449	—
Days Precipitation Measured	287	—
Lake Level Fluctuation (cm)	32	—
Average Secchi Depth (meters)	2.10	2.02
Average Surface Temperature (^{O}C)	11.3	19.0



A volunteer monitor made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of 13 collection dates. Since this was the first year of Level II sampling for the lake, the data will become the baseline for comparison in years to come.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level is controlled at the outlet to accommodate winter storm inputs and domestic water use of through the year. The lake is lowered in fall and raised to a higher level in spring. There are some short-lived rises in winter probably related to rainfall events. The Secchi fluctuates through the year, sometimes a minimum is recorded in October when the lake level drops.

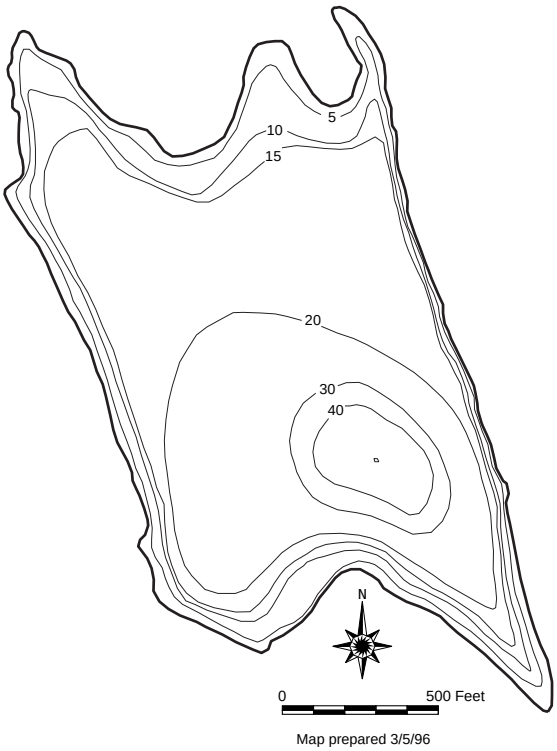
Individual trophic state indicators were calculated for Secchi (39), chlorophyll *a* (44), and total phosphorus (31). The average (38) indicates that Lake Margaret is low in productivity (oligotrophic) and has very good water quality. The average nitrogen to phosphorus ratio was 57, with a minimum of 28. This suggests that phosphorus concentrations limited the growth of algae much of the time.

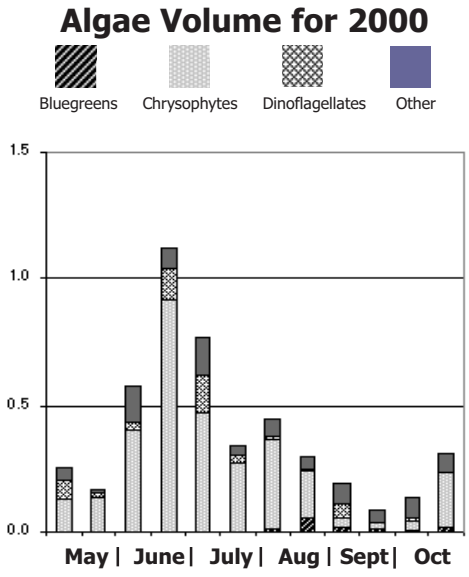
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The total abundance of algae was low throughout the sampling period. Chrysophyte algae, mostly *Dinobryon* and the diatoms *Asterionella* and *Cyclotella,* dominated the algae in the spring and early summer.

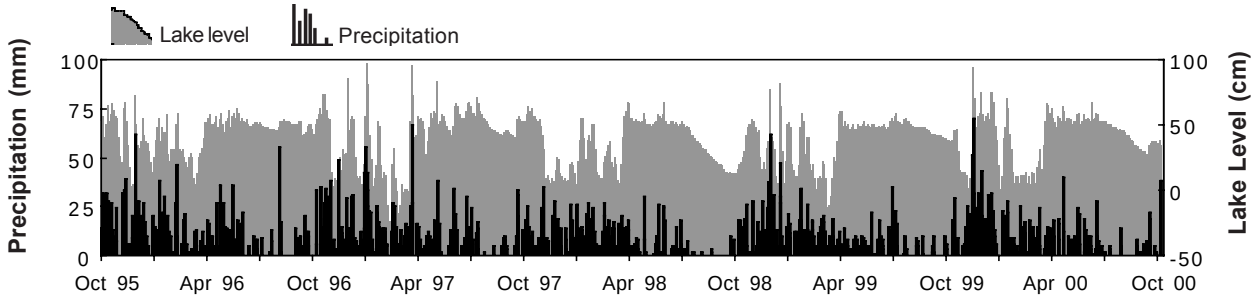
Volunteer Monitors

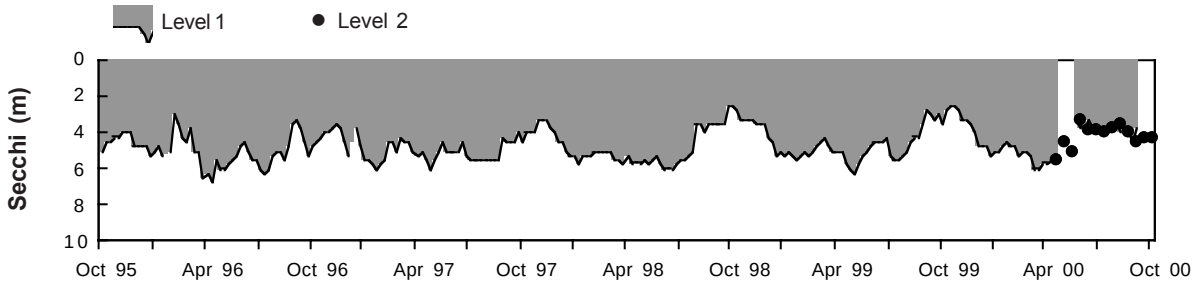
Level I (Oct 1999–Sept 2000)
Primary: Douglas Johnston

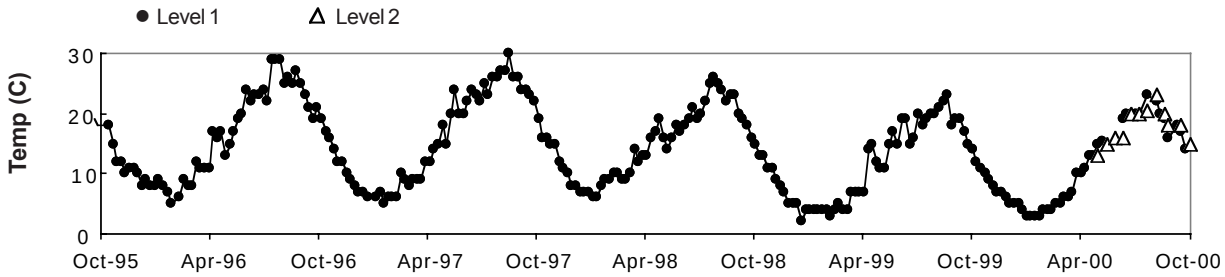
Level II (May–Oct 2000)
Primary: Douglas Johnston





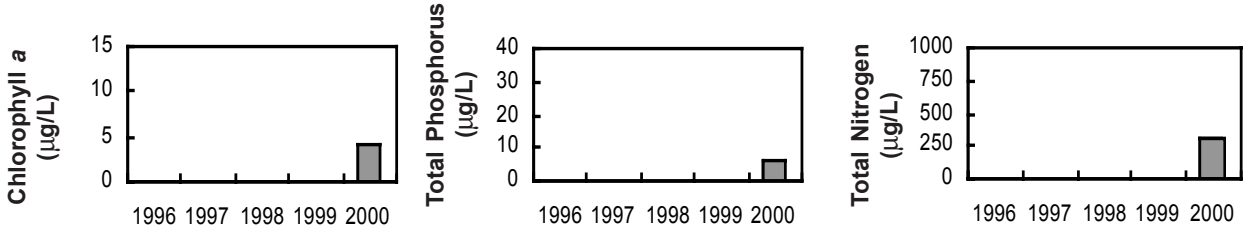






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1768	—
Days Precipitation Measured	336	—
Lake Level Fluctuation (cm)	96	—
Average Secchi Depth (meters)	4.21	4.17
Average Surface Temperature (^{O}C)	10.9	17.5



A volunteer monitor made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. Two samples were missed out of 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record is similar to many King County lakes, with high levels in the wet winter months, decreasing to a low stand in early autumn, but the overall fluctuation is not very great. Large rainfall events produce very small rises in level. The Secchi fluctuates through the year, but a maximum is often seen in mid to late spring. Surface water temperatures appear very similar to other small lakes in the area.

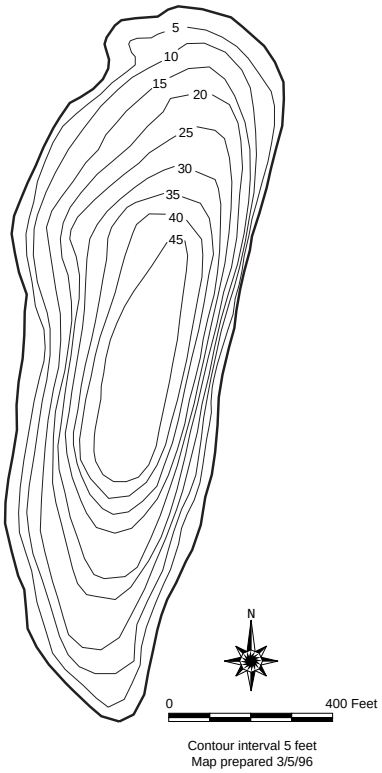
Individual trophic state indicators were calculated for Secchi (45), chlorophyll *a* (55), and total phosphorus (49). The average (50) indicates that Lake McDonald is quite productive (eutrophic), but it is getting close to the threshold for classification as mesotrophic, based on declines in chlorophyll and phosphorus over the past several years. The average nitrogen to phosphorus ratio was 27, with a minimum of 17. This suggests that phosphorus concentrations limited the growth of algae much of the time, but low ratios in late summer suggest good conditions for growth of bluegreen algae.

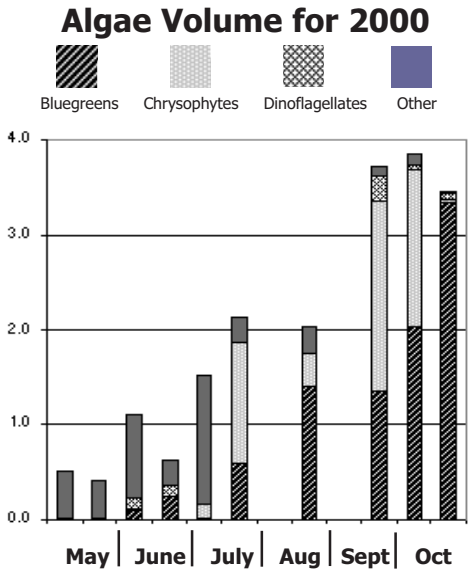
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The total abundance of algae was lower in spring, dominated by chlorophytes such as *Volvox* (graphed as "Other"). Bluegreen algae increased in July and were still increasing at the end of the sampling season. The most common varieties were *Anabaena* and *Aphanizomenon*. *Anabaena* has been known to make nuisance blooms and can produce toxins, though this is rare. The algae of Lake McDonald should be monitored carefully.

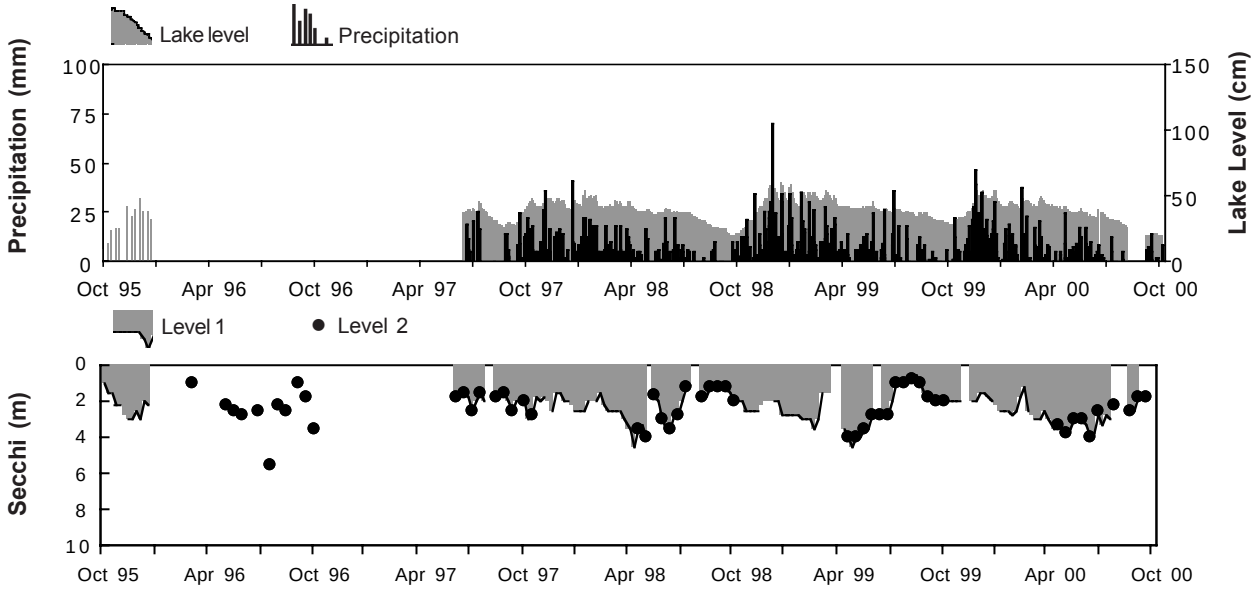
Volunteer Monitors

Level I (Oct 1999–Sept 2000)
Primary: Suzanne Lowry

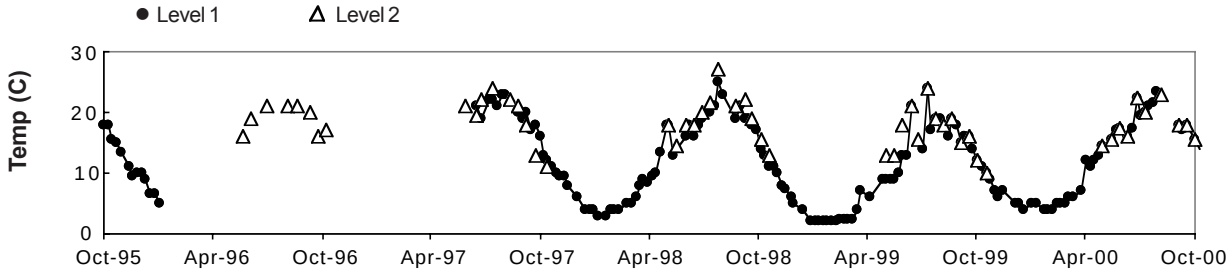
Level II (May–Oct 2000)
Primary: Suzanne Lowry





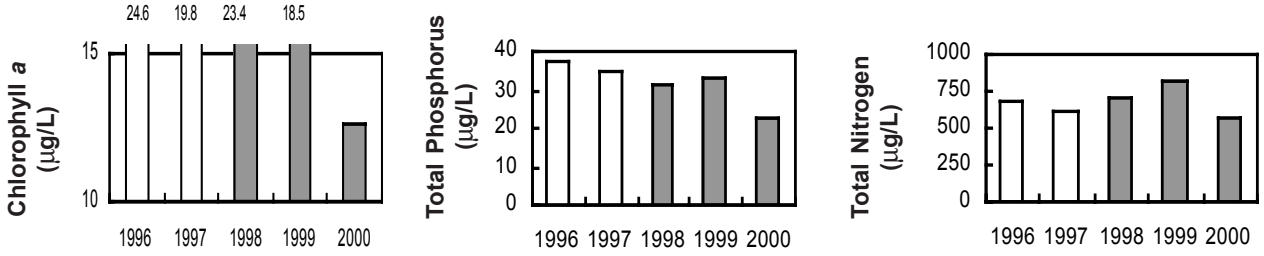


Note: Lake level data was collected weekly 1996, and daily 1997–2000



Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1226	—
Days Precipitation Measured	330	—
Lake Level Fluctuation (cm)	39	—
Average Secchi Depth (meters)	2.54	2.79
Average Surface Temperature (^{O}C)	11.5	18.5



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. One sample was missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record is similar to many King County lakes, with high levels in the wet winter months, decreasing to a low stand in autumn. Large rainfall events produce only small changes in level, probably because of the large area of the lake relative to the size of the watershed. The Secchi fluctuates through the year, usually varying between 4 to 6 meters. Summer water temperatures were lower in the last two years; conversely, it appears that winter temperatures may have been warmer.

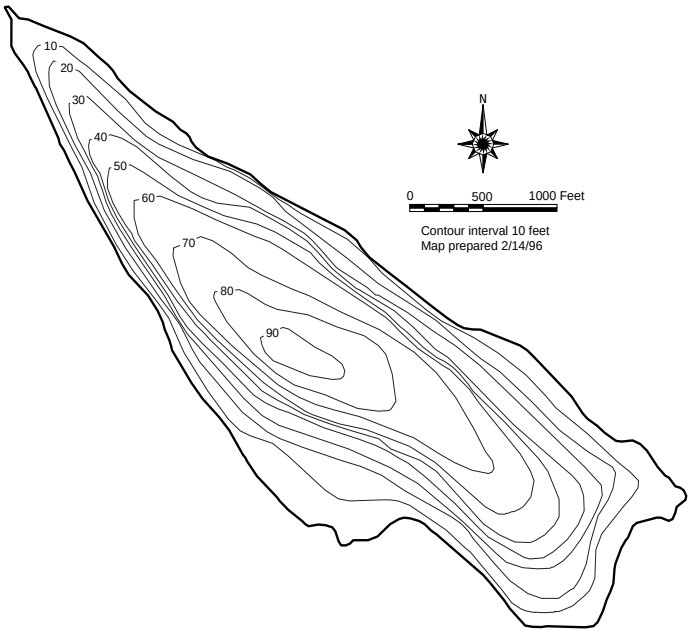
Individual trophic state indicators were calculated for Secchi (37), chlorophyll *a* (38), and total phosphorus (31). The average (35) indicates that Lake Meridian is low in productivity (oligotrophic), consistent with recent ratings. The average nitrogen to phosphorus ratio was 54, with a minimum of 35. This indicates that phosphorus concentrations limited the growth of algae much of the time.

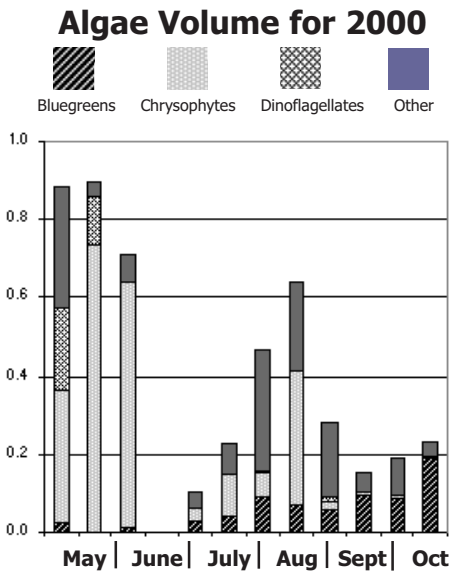
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The total abundance of algae was low throughout the sampling period. The highest values were in spring, with the chrysophyte diatom *Cyclotella* and the dinoflagellate *Ceratium* making major contributions. Important algae in the summer included the chlorophyte *Botryococcus* (graphed as Other in the chart below) and the bluegreen variety *Aphanocapsa*, which has never been known to make nuisance blooms or produce toxins.

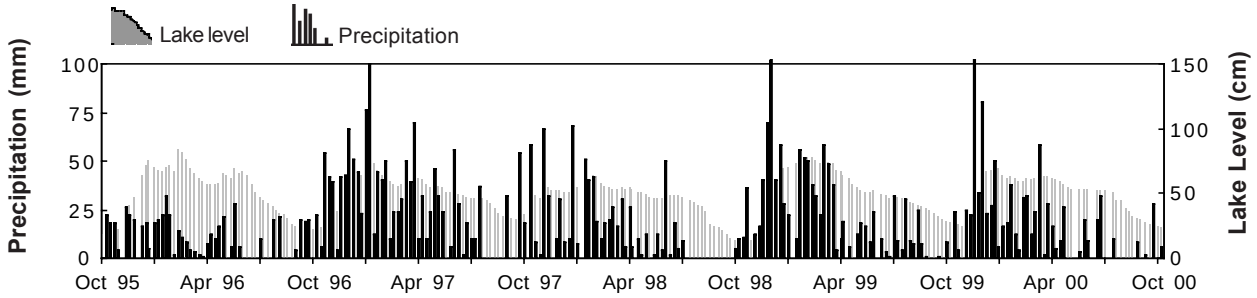
Volunteer Monitors

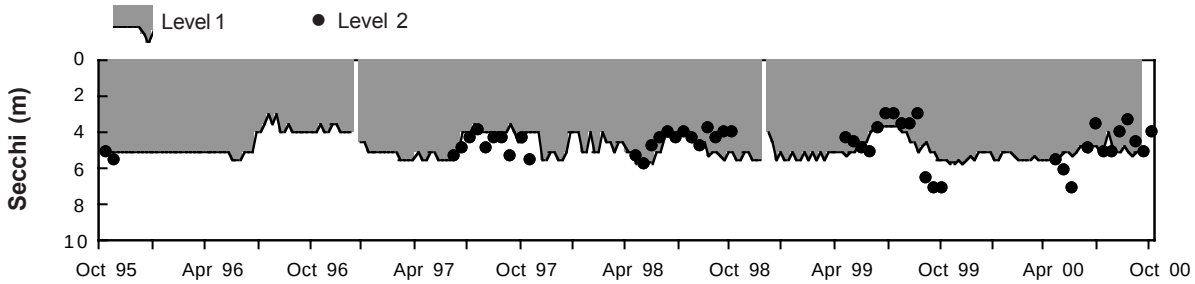
Level I (Oct 1999–Sept 2000)
Primary: Kathe Dizard

Level II (May–Oct 2000)
Primary: Al Flores

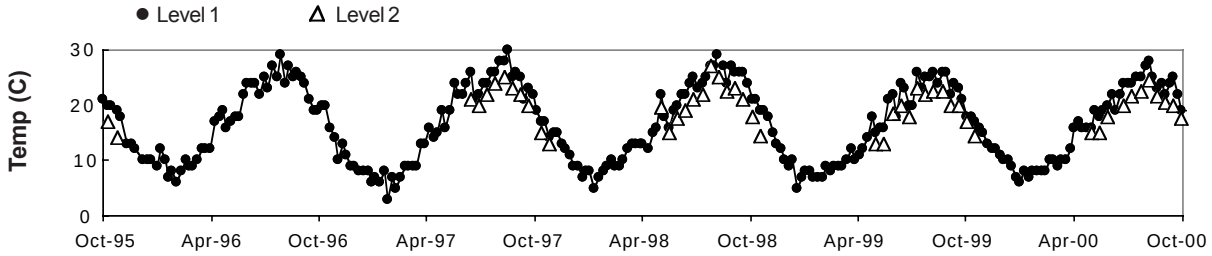






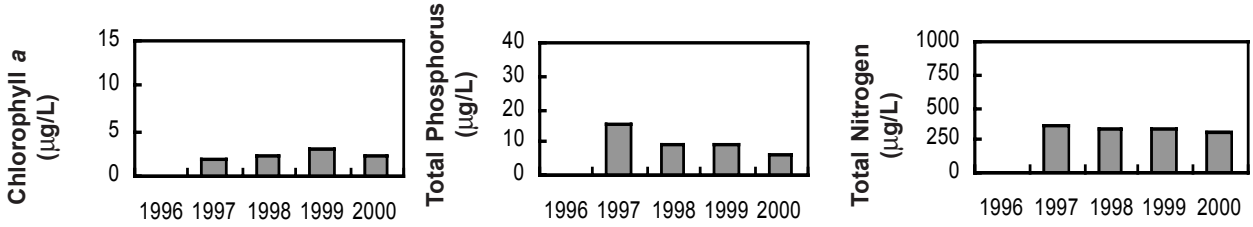


Note: Lake level data was collected weekly 1996–2000



Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	880	—
Days Precipitation Measured	48	—
Lake Level Fluctuation (cm)	49	—
Average Secchi Depth (meters)	5.18	4.80
Average Surface Temperature (^{O}C)	16.3	19.1



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. no samples were missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record is similar to many King County lakes, with high levels in the wet winter months, decreasing to a low stand in autumn. Large rainfall events coincide with some short term changes in level. The Secchi fluctuates through the year, usually varying between 2 to 6 meters, with clarity generally lower in the summer coincident with algal growth. The annual temperature pattern appears very consistent from year to year.

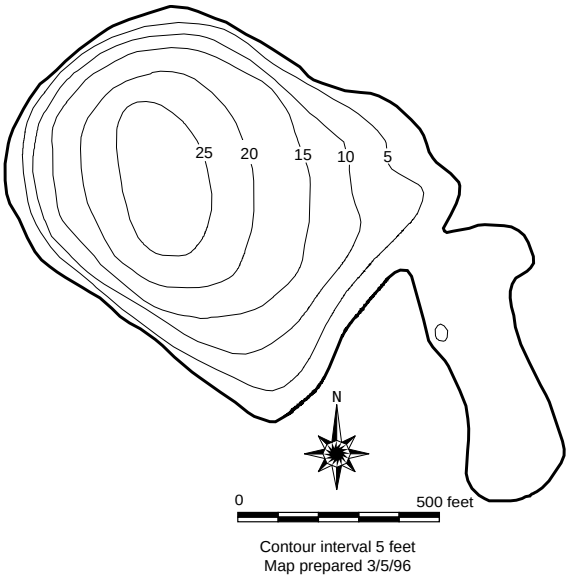
Individual trophic state indicators were calculated for Secchi (43), chlorophyll *a* (54), and total phosphorus (45). The average (47) indicates that Mirror Lake is moderately productive (mesotrophic), consistent with recent ratings. The average nitrogen to phosphorus ratio was 29, with a minimum of 16. This indicates that phosphorus concentrations limited the growth of algae much of the time, but conditions might have been good for bluegreens on occasion.

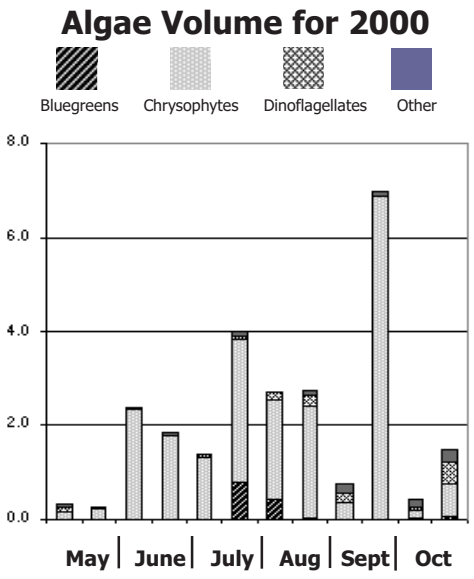
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). The chrysophyte *Dinobryon* dominated the algae for most of the sampling period, making sizeable populations, accompanied in summer by the bluegreen *Anabaena*, which was present in smaller amounts. *Anabaena* can make nuisance blooms under certain conditions, but this has not been found in Mirror Lake.

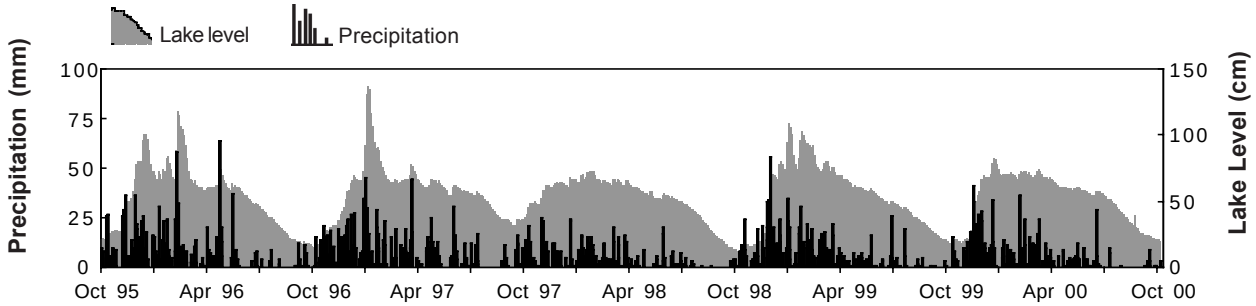
Volunteer Monitors

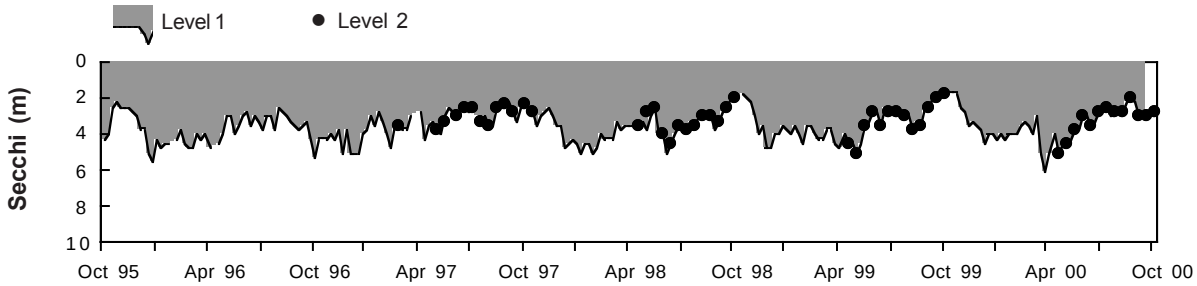
Level I (Oct 1999–Sept 2000)
Primary: Bob Roper

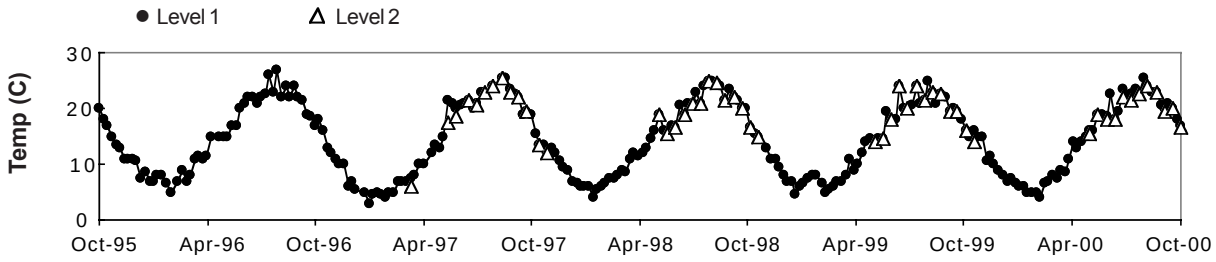
Level II (May–Oct 2000)
Primary: Bob Roper
Back-up: John and Pat Hardman





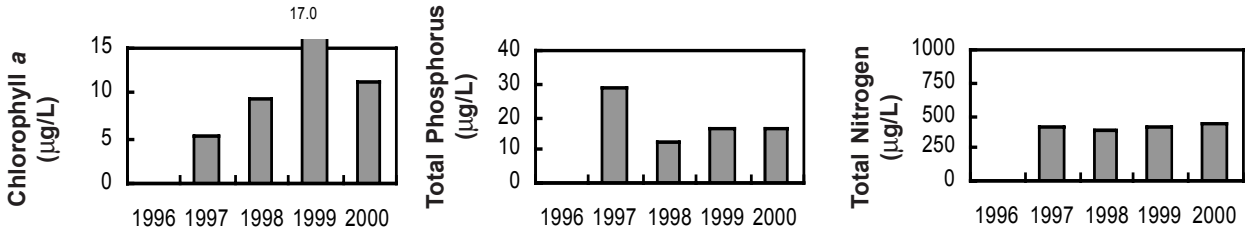






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1043	—
Days Precipitation Measured	366	—
Lake Level Fluctuation (cm)	65	—
Average Secchi Depth (meters)	3.34	3.18
Average Surface Temperature (^{O}C)	14.4	19.2



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. no samples were missed out of 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record is similar to many King County lakes, with high levels in the wet winter months, decreasing to a low stand in autumn. Large rainfall events coincide with some short term changes in level. The Secchi fluctuates through the year, usually varying between 3 to 5 meters, with no clear seasonal pattern. There was a small amount of variation in maximum and minimum temperatures between years.

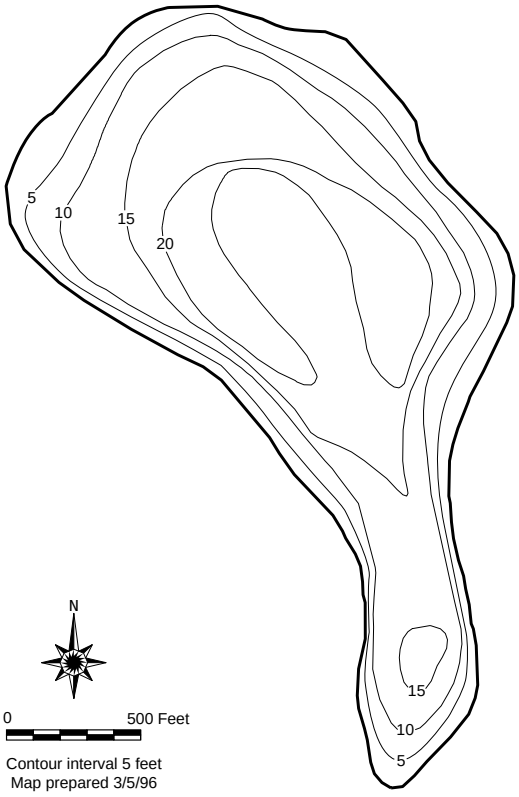
Individual trophic state indicators were calculated for Secchi (41), chlorophyll *a* (43), and total phosphorus (34). The average (39) indicates that Lake Morton is low to moderately productive (oligotrophic to mesotrophic), which is a slight improvement in water quality from past years, due mostly to decreasing phosphorus. The average nitrogen to phosphorus ratio was 49, with a minimum of 36. This indicates that phosphorus concentrations limited the growth of algae most of the time.

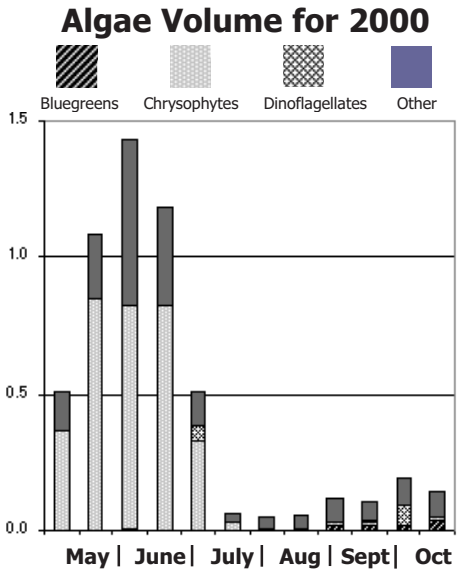
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The total volume of algae remained low over the sampling period. The chrysophyte diatom *Cyclotella*, which is an indicator of clean water, dominated the algae for in spring and early summer. Several varieties of chlorophyte algae (graphed as "Other") were also present. By midsummer, algal abundance was very low and remained so for the rest of the period of record.

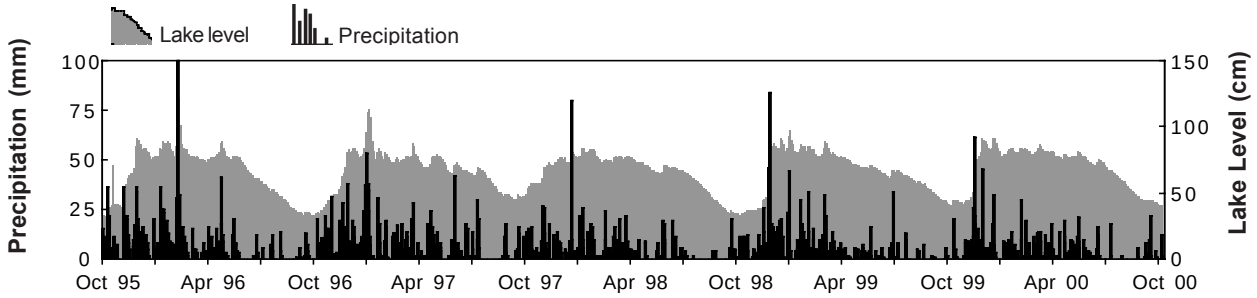
Volunteer Monitors

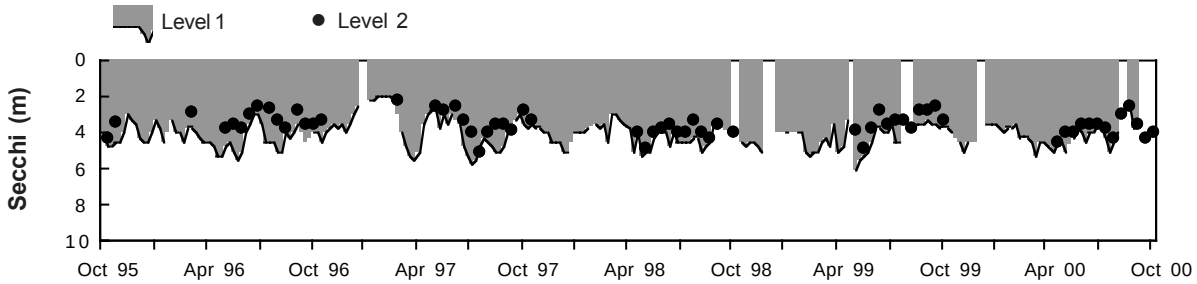
Level I (Oct 1999–Sept 2000)
Primary: Dick Balash

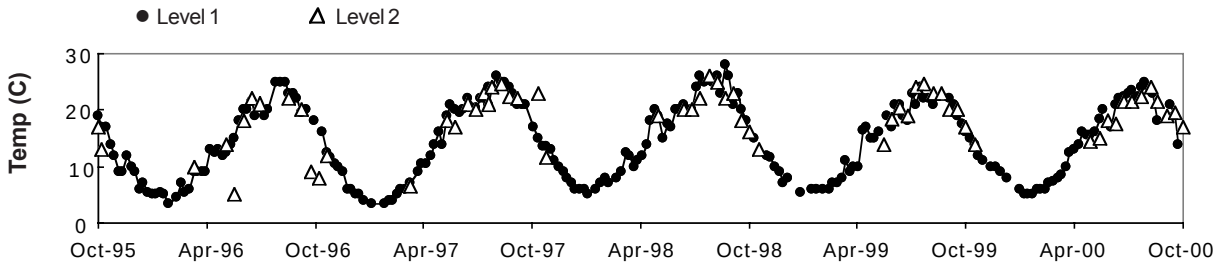
Level II (May–Oct 2000)
Primary: Laura and Paul Mueller





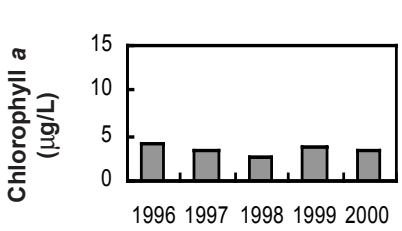


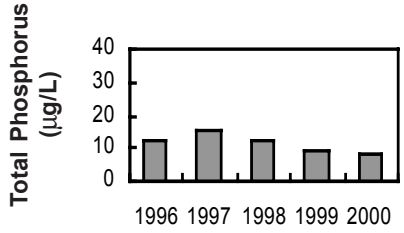


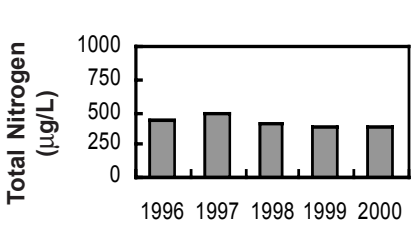


Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1122	—
Days Precipitation Measured	338	—
Lake Level Fluctuation (cm)	51	—
Average Secchi Depth (meters)	4.09	3.72
Average Surface Temperature (^{O}C)	14.4	19.0







Neilson (Holm)

Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record is similar to many King County lakes, with high levels in the winter months, decreasing to a low stand in autumn. Large rainfall events coincide with some short term changes in level. The Secchi fluctuates little through the year, generally around 3 to 4 meters, but there was a decrease at the end of the 2000 water year to 2 meters. The temperature record is fairly consistent between years.

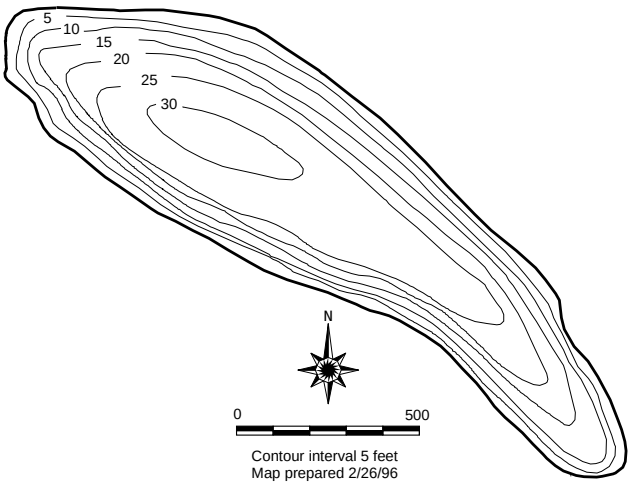
Individual trophic state indicators were calculated for Secchi (47), chlorophyll *a* (53), and total phosphorus (45). The average (48) indicates that Lake Neilson is moderately productive (mesotrophic), consistent with past ratings. However, all three trophic indices have increased over the last three years, so this lake should be watched carefully. The average nitrogen to phosphorus ratio was 36, with a minimum of 19. This indicates that phosphorus concentrations limited the growth of algae much of the time.

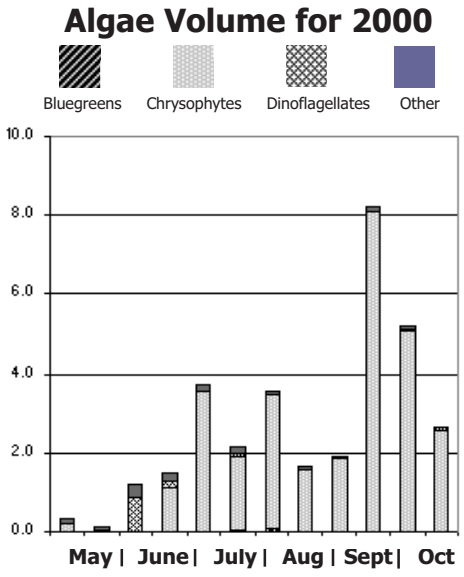
Volunteer Monitors

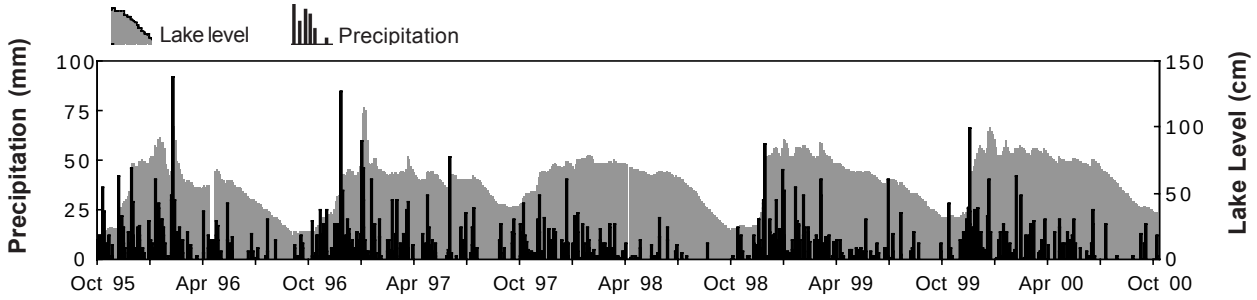
Level I (Oct 1999–Sept 2000)
Primary: Kevin and Kurtis Schultz

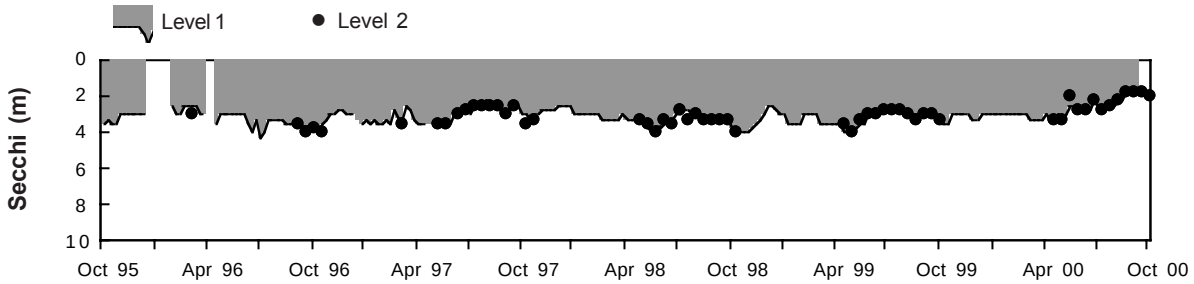
Level II (May–Oct 2000)
Primary: Kevin and Kurtis Schultz

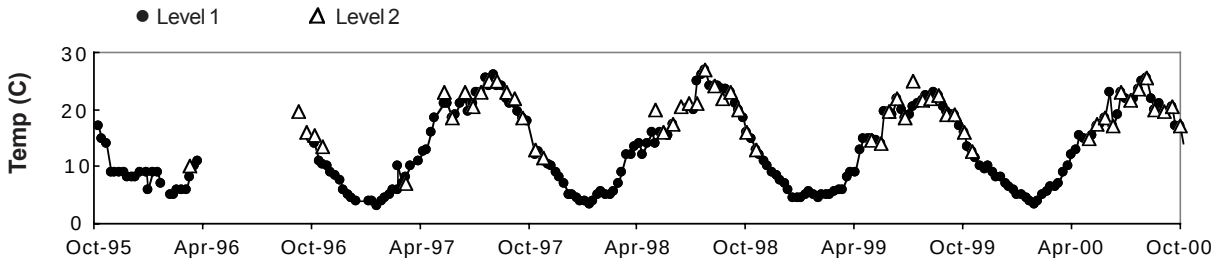
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). The total volume of algae was low in spring, but increased to a maximum in early fall, likely reducing water clarity (see Secchi data). A small population of the dinoflagellate *Ceratium* in mid-spring gave way to the chrysophytes *Dinobryon* and *Synura*, which co-dominated the algae for the rest of the period of record.





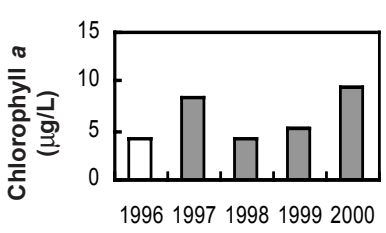


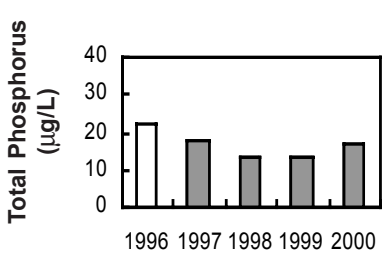


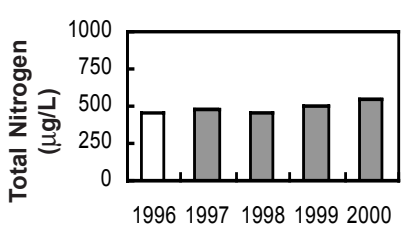


Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1037	—
Days Precipitation Measured	358	—
Lake Level Fluctuation (cm)	69	—
Average Secchi Depth (meters)	2.84	2.40
Average Surface Temperature (^{O}C)	13.5	19.8







Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data for part of the year are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. One sample was missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October. An extraordinarily high value for one date in September raised the chlorophyll average in 2000, although algal volume was low. Since the lake is shallow, dominated by rooted aquatic vegetation in late summer, bits of vascular plants in the sample could have introduced an error.

The lake level record appears similar to many King County lakes, with high levels in the winter months decreasing to a low stand in autumn. Large rainfall events coincide with some short term changes in level. Secchi transparency remains low, usually at or below 2 meters, due to the very dark color of the water.

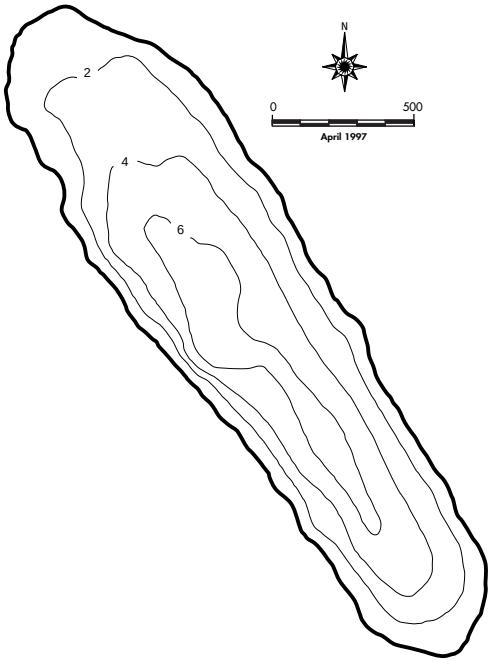
Volunteer Monitors

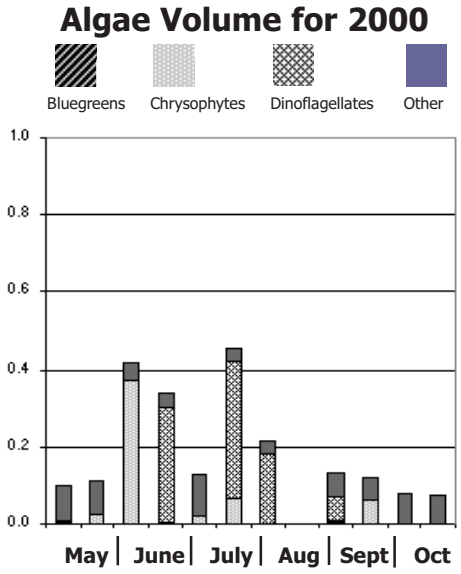
Level I (Oct 1999–Sept 2000)
Primary: Chris Riley

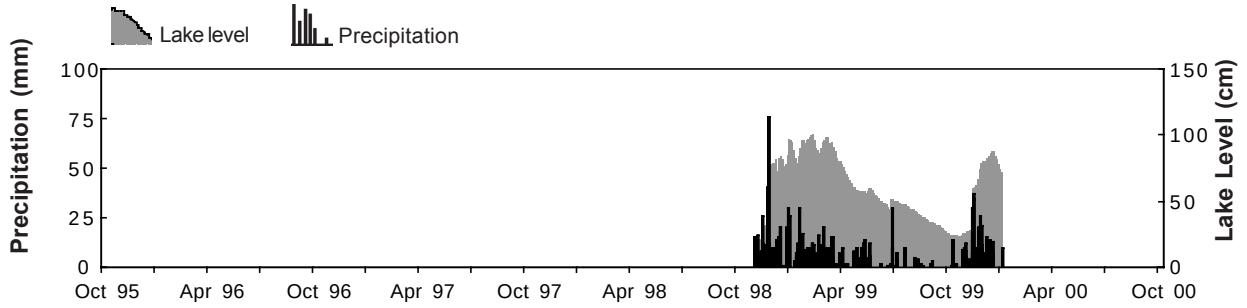
Level II (May–Oct 2000)
Primary: Peter Sturtevant

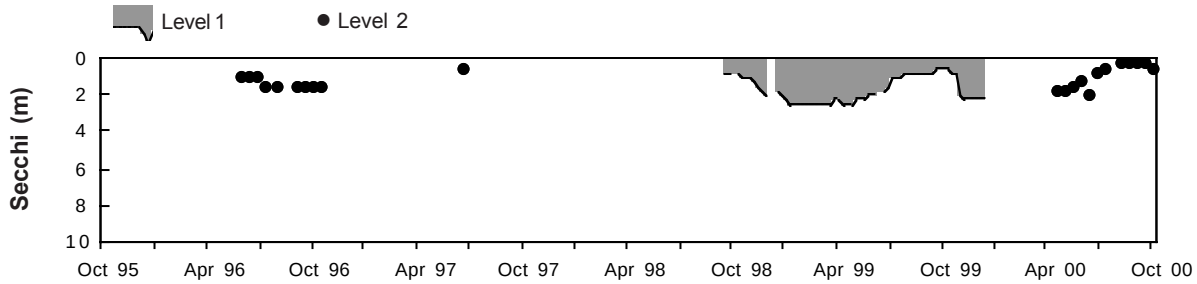
Individual trophic state indicators were calculated for Secchi (61), chlorophyll *a* (65), and total phosphorus (53). The average (60) indicates that Panther Lake is highly productive (eutrophic), consistent with the rating in 1996. The average nitrogen to phosphorus ratio was 30, with a minimum of 14. This indicates that phosphorus concentrations limited the growth of algae much of the time.

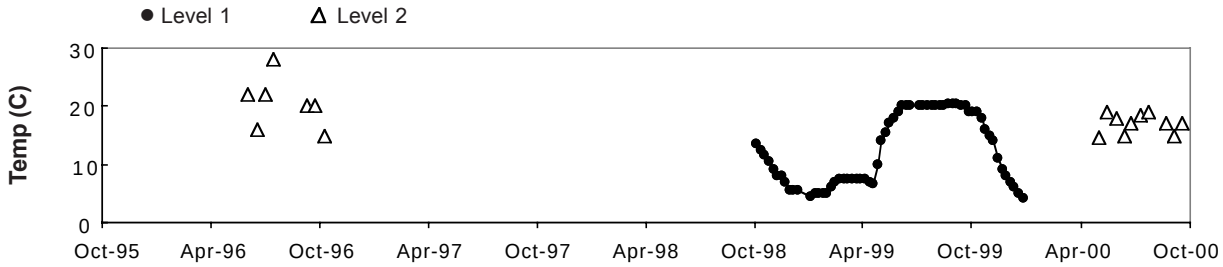
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The total volume of algae was low throughout the period of record, dominated by the dinoflagellate *Ceratium* through the summer. A small population of the chrysophyte *Dinobryon* occurred in mid-spring. The euglenophytes *Trachelomonas* and *Euglena* (graphed as "Other") were found in late summer and fall. These varieties are common in shallow, darkly colored ponds.







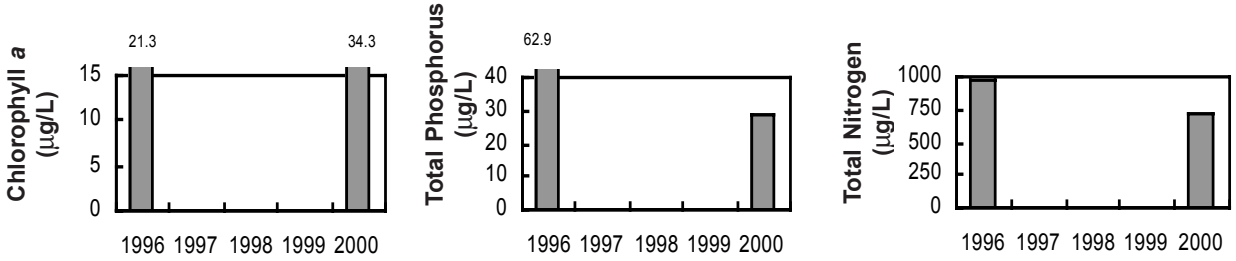




Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	488	—
Days Precipitation Measured	92	—
Lake Level Fluctuation (cm)	IN*	—
Average Secchi Depth (meters)	IN*	.92
Average Surface Temperature (°C)	IN*	16.2

*Insufficient data



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data for part of the year are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. One sample was missed out of the 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus and total nitrogen compare the average values for May through October.

The lake level record is irregular over time, possibly showing a subdued seasonal pattern. Large rainfall events often coincide with short term changes in level. Secchi transparency ranges from 1 to 4 meters, but no seasonal pattern is apparent. While winter temperatures appear to have remained steady, summer values have been lower over the past two years, in common with several other small lakes in the area.

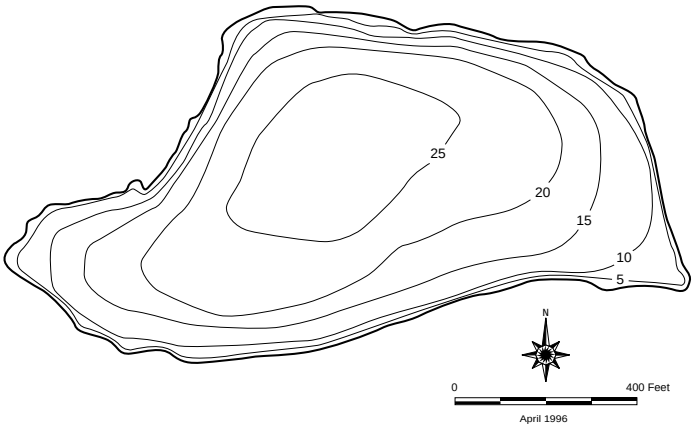
Individual trophic state indicators were calculated for Secchi (47), chlorophyll *a* (64), and total phosphorus (55). The average (55) indicates that Paradise Lake is highly productive (eutrophic), consistent with past ratings. The average nitrogen to phosphorus ratio was 19, with a minimum of 11. This suggests that phosphorus concentrations might have limited the growth of algae part of the time, but nitrogen may have played a limiting role at times.

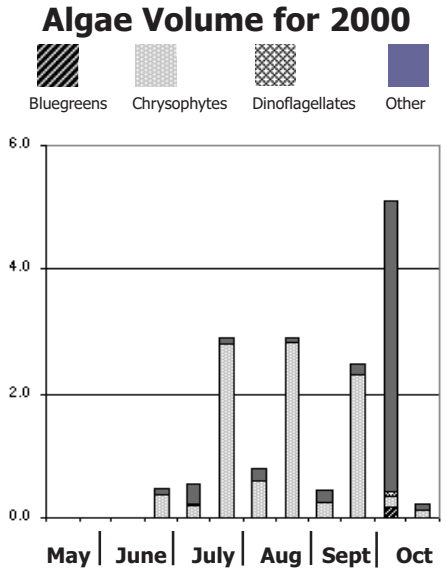
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The total volume of algae was low in spring and did not increase until July, when the chrysophyte *Dinobryon* made a sizeable population. This was followed by the rise in small, mobile chrysophytes, typified by *Chrysochromulina*, that dominated the algal community for much of the period measured.

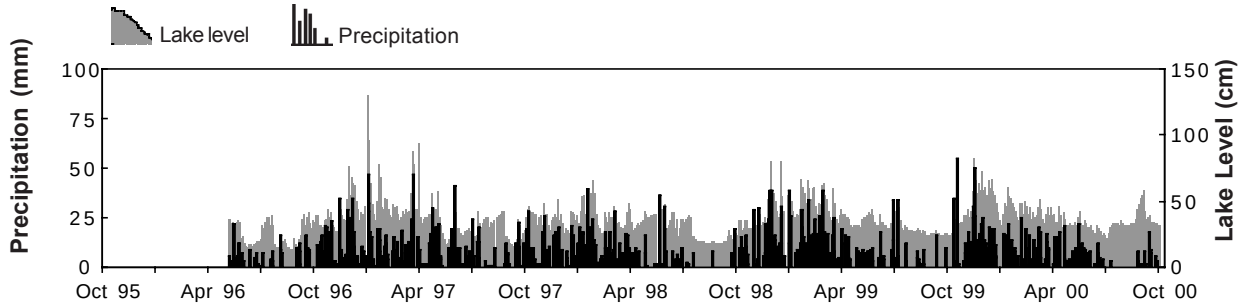
Volunteer Monitors

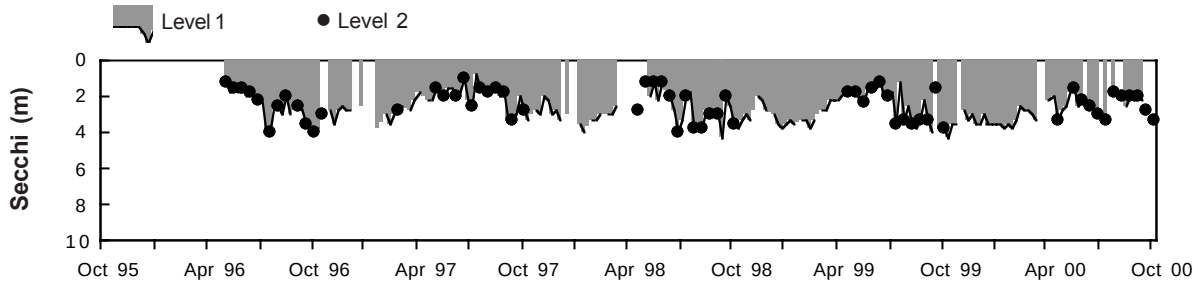
Level I (Oct 1999–Sept 2000)
Primary: Shirley Egerdahl; Kay Doolittle

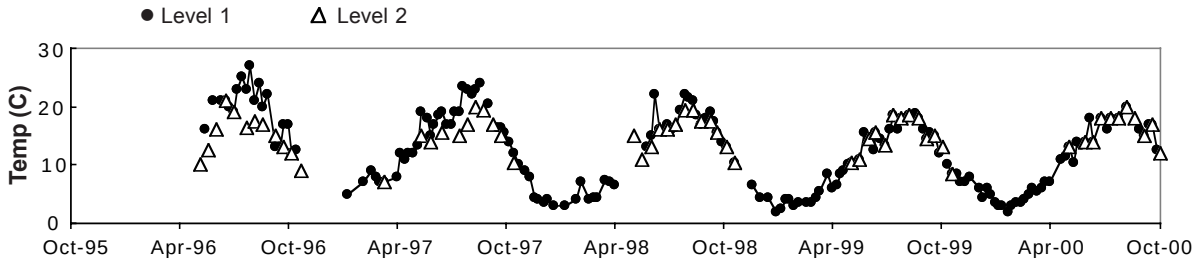
Level II (May–Oct 2000)
Primary: Shirley Egerdahl
Back-up: Nancy Doolittle





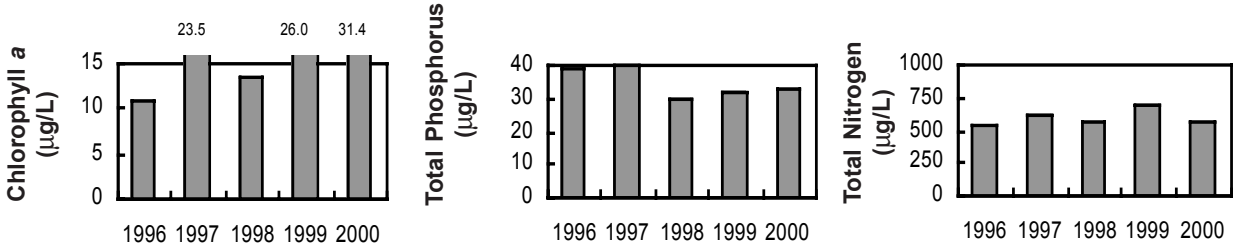






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1337	—
Days Precipitation Measured	342	—
Lake Level Fluctuation (cm)	61	—
Average Secchi Depth (meters)	2.91	2.47
Average Surface Temperature (°C)	9.8	15.8



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data for part of the year are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. One sample was missed out of 13 collection dates.

On the opposite page, data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record follows the typical pattern of small King County lakes: high in winter, dropping to a minimum in autumn. Large rainfall events appear in general to have relatively small effects on the level. Secchi transparency ranges from 2 to 6 meters, often reaching a minimum in April. Surface water temperatures follow a pattern similar to many of the small lakes in the area.

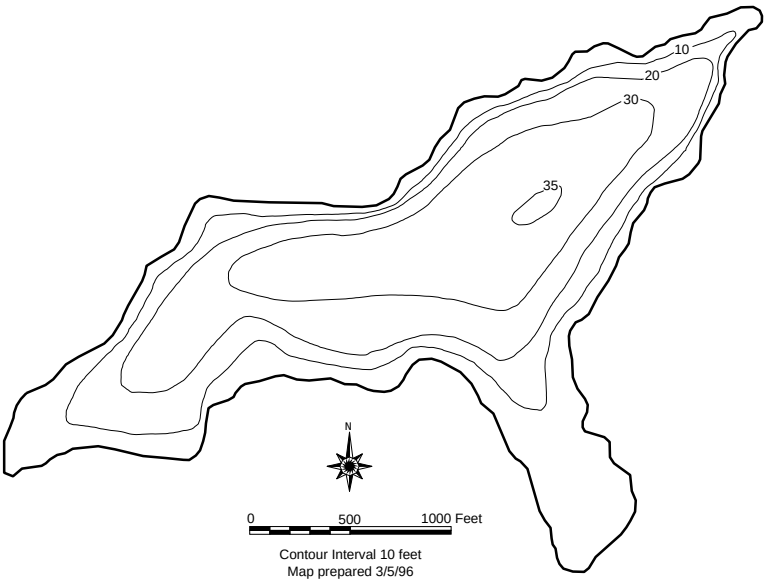
Individual trophic state indicators were calculated for Secchi (38), chlorophyll *a* (43), and total phosphorus (37). The average (39) indicates that Pine Lake is low to moderate in productivity (borderline oligotrophic to mesotrophic), consistent with past ratings. The average nitrogen to phosphorus ratio was 42, with a minimum of 22. This indicates that phosphorus concentrations limited the growth of algae much of the time.

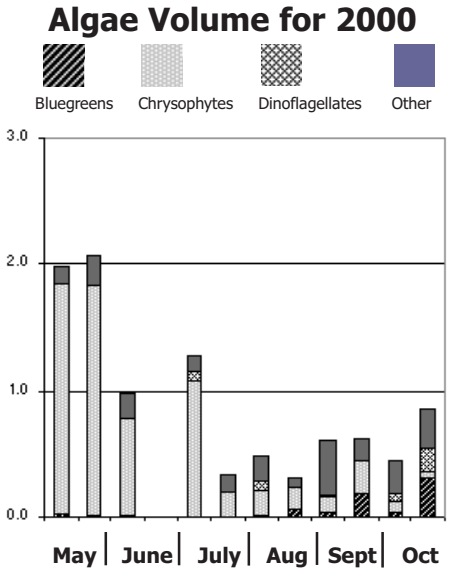
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The total volume of algae was highest in spring, dominated by the chrysophyte diatom *Cyclotella*, which is a clean water indicator. It was followed by the chrysophyte *Dinobryon* in July. Several species occurred together during the remainder of the period, but none became dominant. These included the chlorophyte *Cosmarium* (graphed as "Other"), the dinoflagellate *Ceratium*, and small populations of the bluegreens *Aphanizomenon* and *Anabaena*.

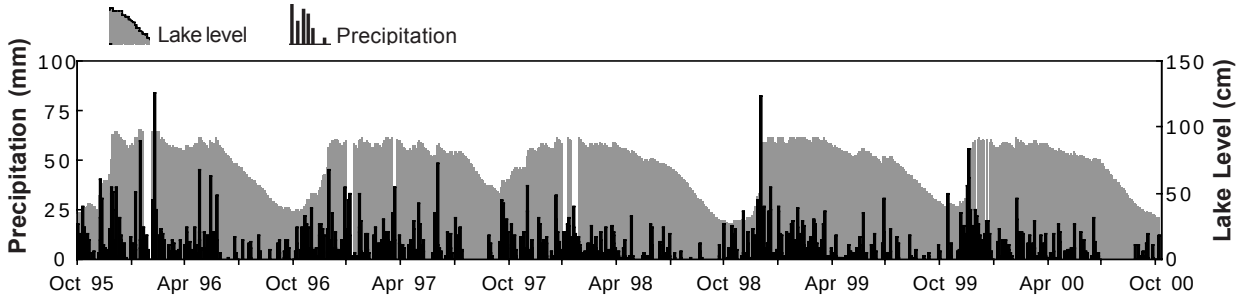
Volunteer Monitors

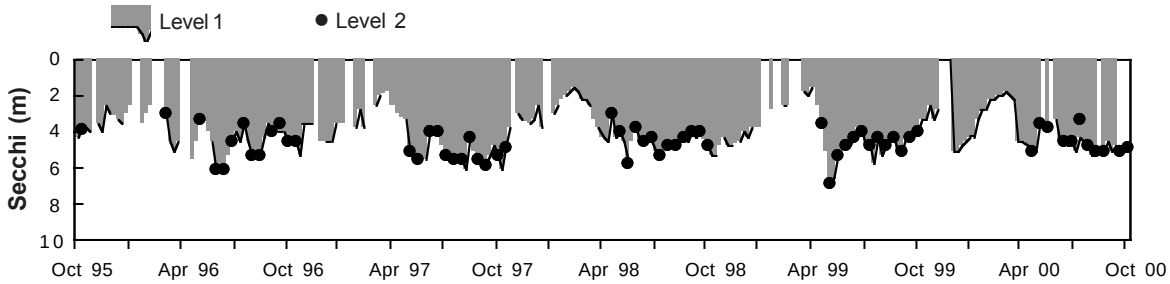
Level I (Oct 1999–Sept 2000)
Primary: Kate Bradley

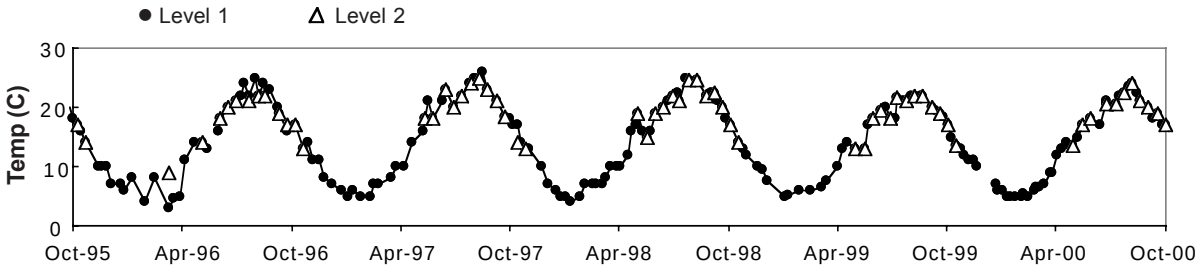
Level II (May–Oct 2000)
Primary: Kate Bradley
Back-up: Ilene Stahl





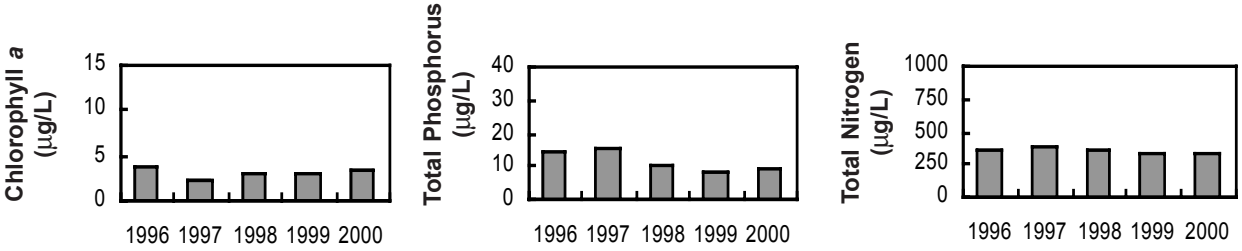






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1188	—
Days Precipitation Measured	344	—
Lake Level Fluctuation (cm)	61	—
Average Secchi Depth (meters)	3.89	4.50
Average Surface Temperature (°C)	13.5	19.1



Pipe

Volunteer monitors made physical measurements and collected water samples for Level I and Level II during water year 2000. The biweekly summer Level II data are recorded in Appendix B. Two samples were missed out of 13 collection dates. Pipe Lake and Lake Lucerne are connected, and the data should be compared.

On the opposite page, available data on precipitation, lake level, Secchi transparency, and surface water temperatures are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record follows the typical pattern of small King County lakes: high in winter, dropping to a minimum in autumn. It rises quickly in response to large precipitation events. The Secchi has been more constant recently than in past years, ranging between 3 and 5 meters. Surface water temperatures follow a pattern similar to many of the small lakes in the area.

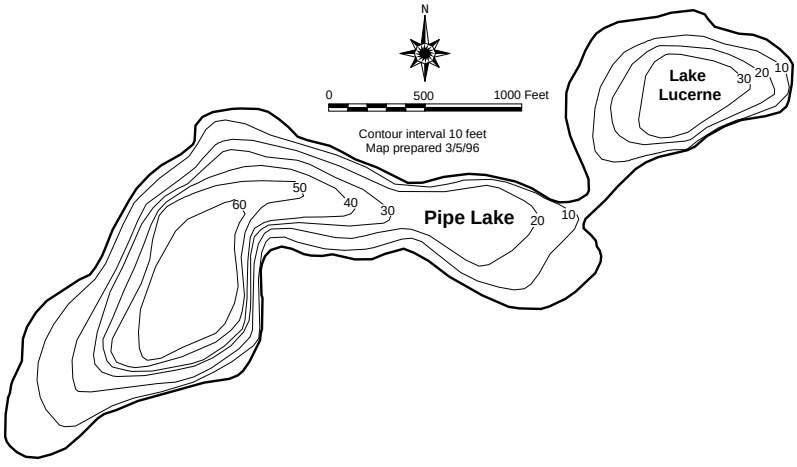
Individual trophic state indicators were calculated for Secchi (40), chlorophyll *a* (46), and total phosphorus (37). The average (41) indicates that Pipe Lake is moderately productive (mesotrophic) and has good water quality. The average nitrogen to phosphorus ratio was 51, with a minimum of 32. This indicates that phosphorus concentrations limited the growth of algae though the period.

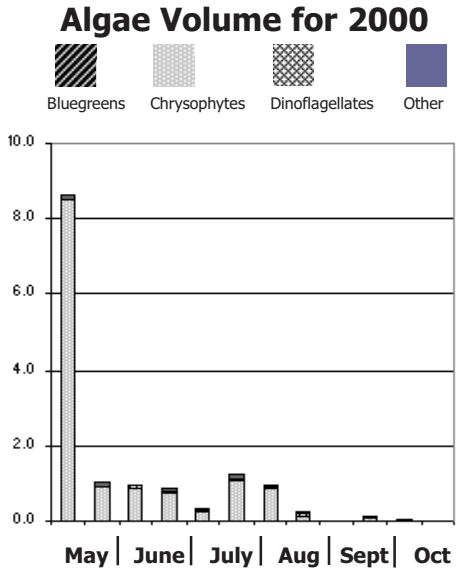
Volunteer Monitors

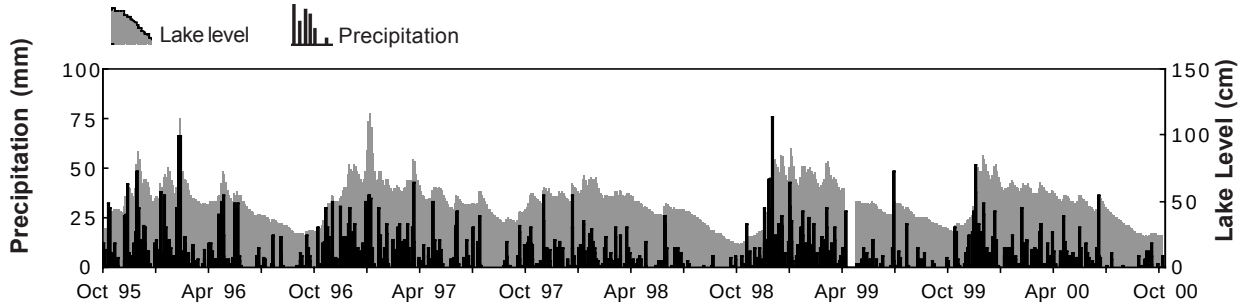
Level I (Oct 1999–Sept 2000)
Primary: Ralph Beede

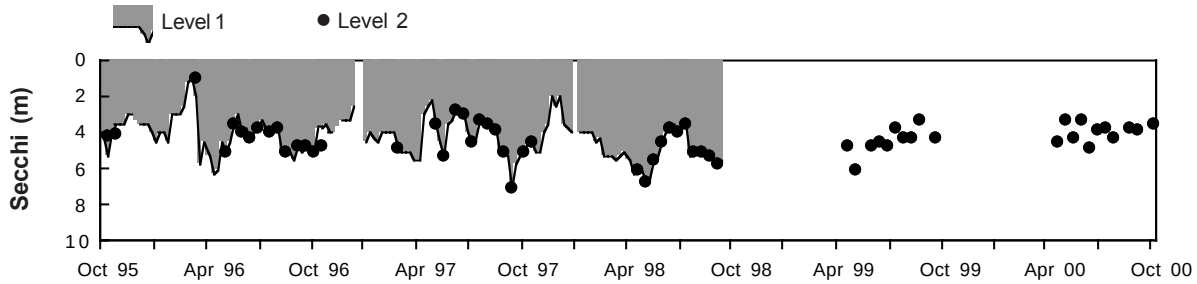
Level II (May–Oct 2000)
Primary: Bob Brenner

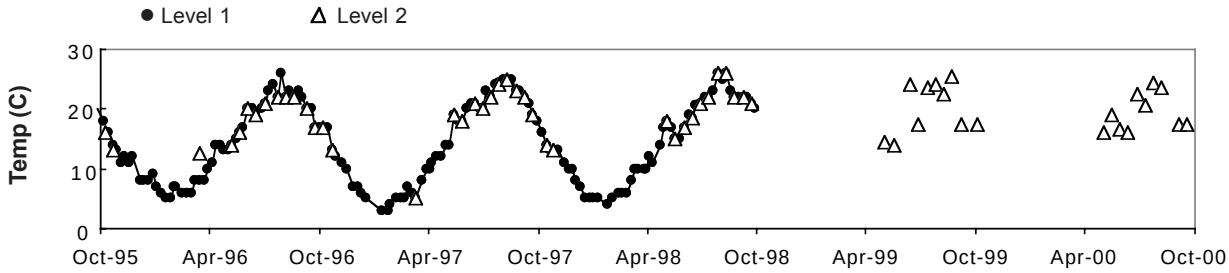
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The chrysophyte algae dominated the phytoplankton, in particular Dinobryon, with various species of diatoms of secondary importance. With the exception of the Dinobryon bloom found in the first sample, total volume was low through the season, similar to Lake Lucerne with which it is connected. Lucerne and Pipe lakes were treated in 2000 with a granular form of the herbicide fluridone to eradicate the noxious weed *Hydrilla*, but the resulting concentrations were unlikely to have affected the phytoplankton populations.





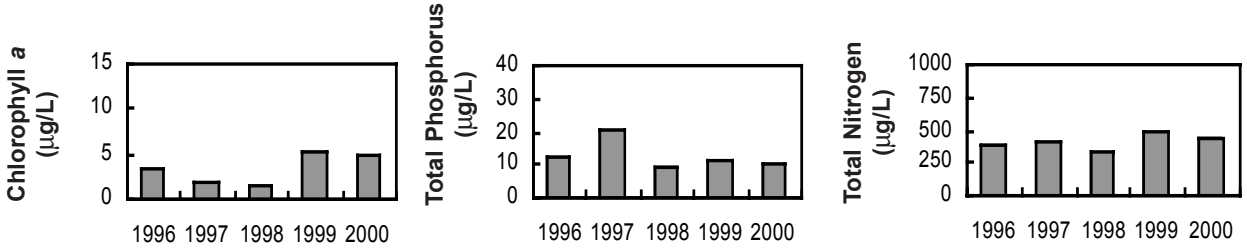






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1199	—
Days Precipitation Measured	344	—
Lake Level Fluctuation (cm)	62	—
Average Secchi Depth (meters)	—	3.90
Average Surface Temperature (°C)	—	19.3



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data for part of the year are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of 13 collection dates.

On the opposite page, available data on precipitation, lake level, Secchi transparency, and surface water temperatures are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record shows a relatively steady level throughout the year, with only a small increase in winter. It is not particularly responsive to precipitation except for very large-scale events. The Secchi fluctuates considerably through the year, possibly in response to relationships between algal production and grazing zooplankton.

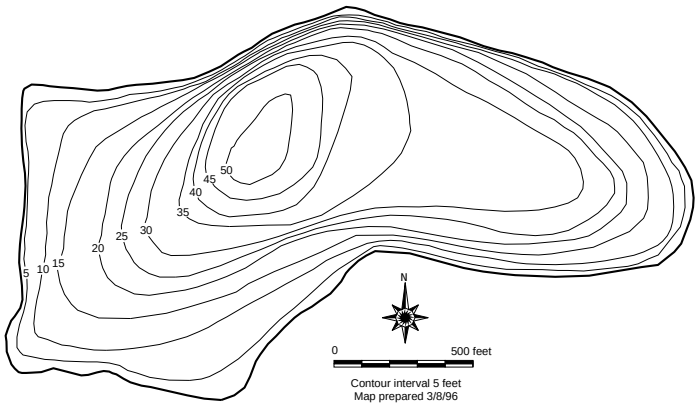
Individual trophic state indicators were calculated for Secchi (31), chlorophyll *a* (42), and total phosphorus (26). The average (33) indicates that Lake Retreat is low in productivity (oligotrophic) and has very good water quality. The average nitrogen to phosphorus ratio was 122, with a minimum of 48. This indicates that phosphorus concentrations limited the growth of algae though the period.

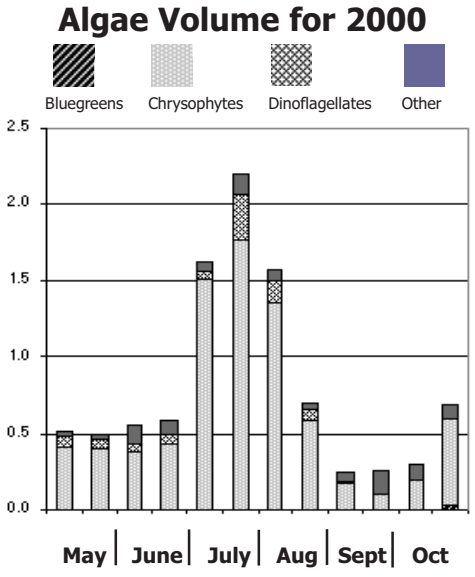
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The chrysophyte algae dominated the phytoplankton, in particular several species of the diatom genus *Cyclotella,* with various dinoflagellates such as *Ceratium* of secondary importance. Total volume was low to moderate through the season, consistent with algae found in lakes with low nutrient concentrations.

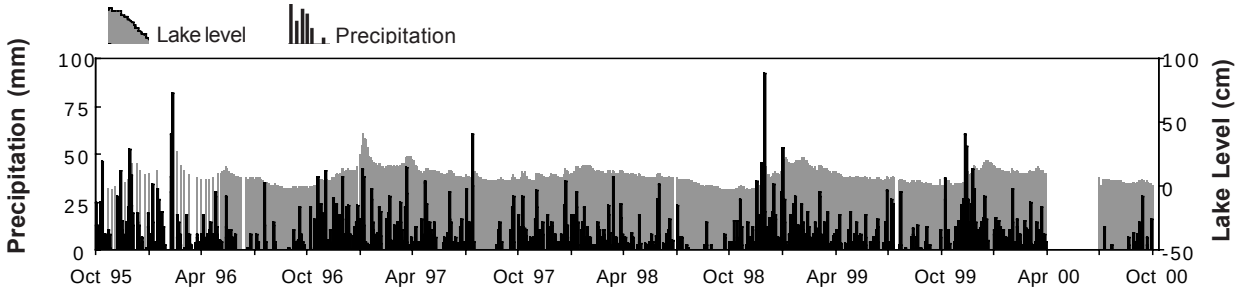
Volunteer Monitors

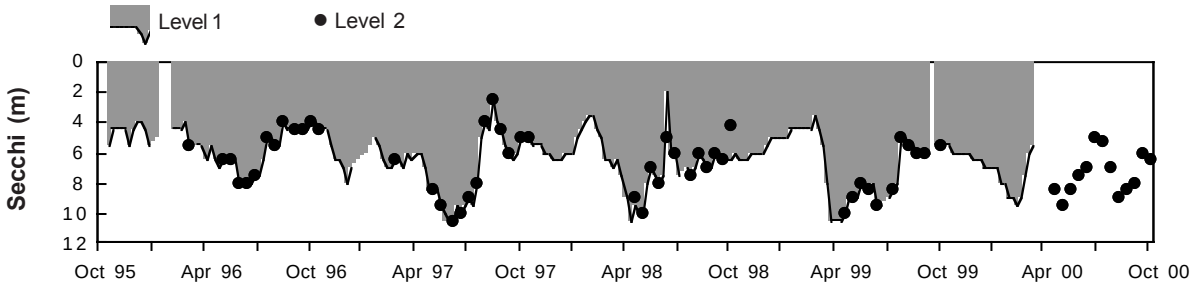
Level I (Oct 1999–Sept 2000)
Primary: Todd and Janice Hammerstrom

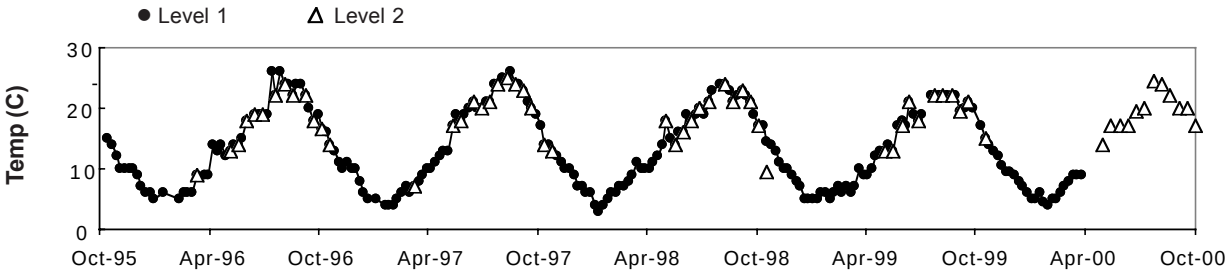
Level II (May–Oct 2000)
Primary: Todd and Janice Hammerstrom







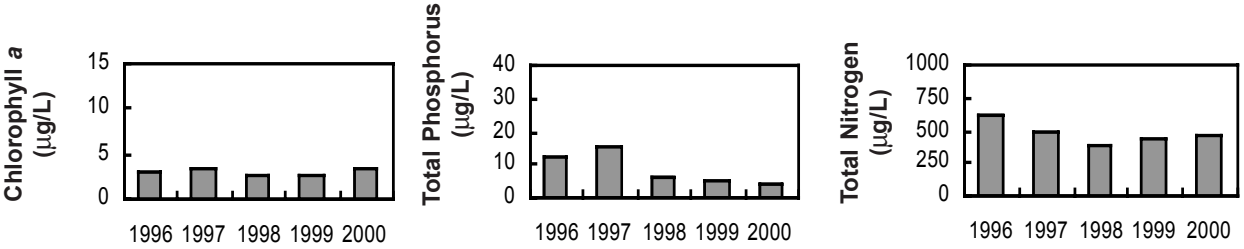




Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1264	—
Days Precipitation Measured	260	—
Lake Level Fluctuation (cm)	IN*	—
Average Secchi Depth (meters)	IN*	7.40
Average Surface Temperature (°C)	IN*	19.0

*Insufficient data



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On the opposite page, available data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

Lake level remains fairly constant through much of the year and drops to a variable low in autumn, which changes a great deal from year to year. Very large rainstorms can cause abrupt rises in level that do not persist. The Secchi ranges between 3 to 7 meters, without a consistent seasonal pattern. While winter temperatures appear steady, summer values have been lower over the past two years, in common with several other small lakes in the area.

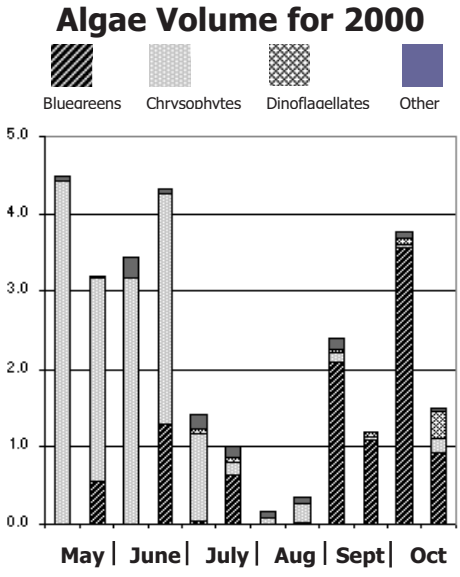
Individual trophic state indicators were calculated for Secchi (37), chlorophyll *a* (44), and total phosphorus (37). The average (39) indicates that Lake Sawyer is low to moderate in productivity (oligotrophic, bordering on mesotrophic) and has good water quality. The average nitrogen to phosphorus ratio was 36, with a minimum of 18. This indicates that phosphorus concentrations limited the growth of algae through much of the period, but that conditions might at times have been good for bluegreen algae.

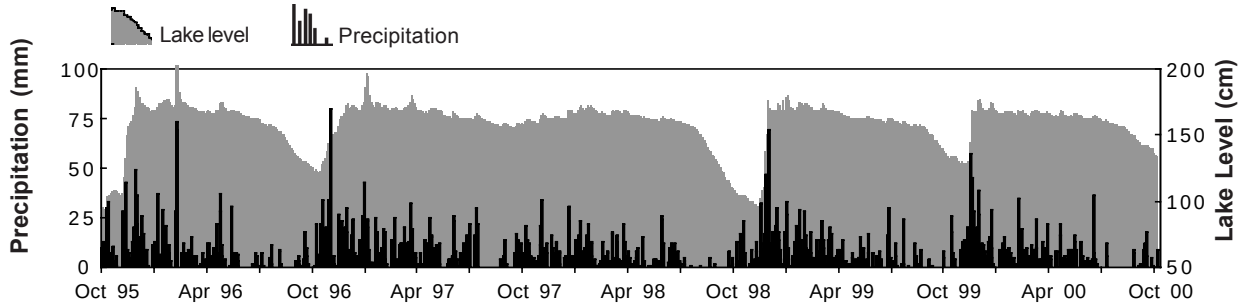
Volunteer Monitors

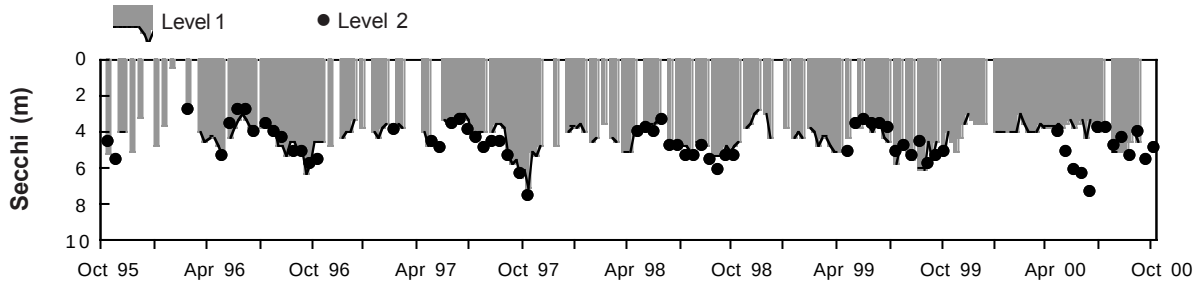
Level I (Oct 1999–Sept 2000)
Primary: Dick Veldhuis; John Davies

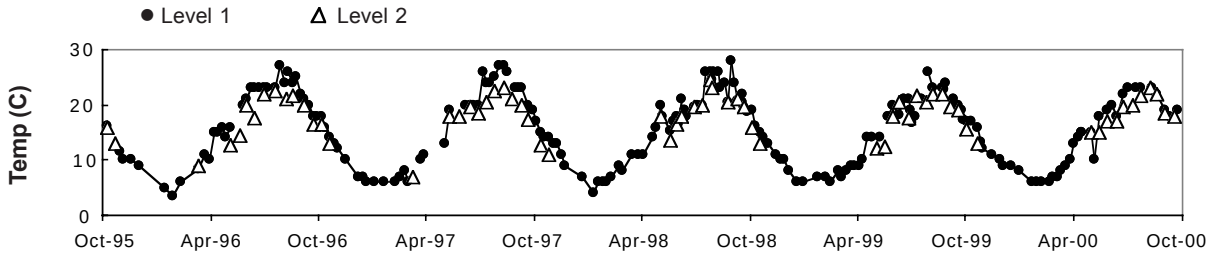
Level II (May–Oct 2000)
Primary: Glenn Ross
Back-up: John Davies

A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). The chrysophyte diatom *Cyclotella* dominated the algae in spring, with bluegreen algae present, but of lesser importance. However, by late summer the bluegreen *Lynbya* was the most important algal species in the lake, making sizeable populations. *Lynbya* can produce several toxic compounds, but has not been implicated in harmful blooms in freshwater in this area.



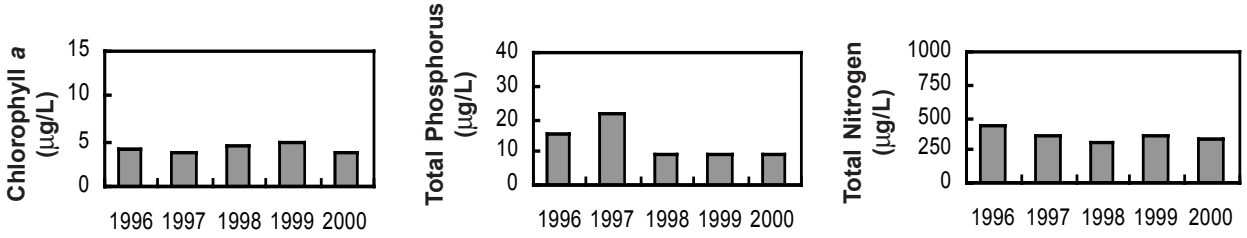






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1358	—
Days Precipitation Measured	364	—
Lake Level Fluctuation (cm)	49	—
Average Secchi Depth (meters)	3.97	4.97
Average Surface Temperature (°C)	14.1	18.3



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data for the period sampled are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. Since sampling began in June, five samples were missed out of the 13 collection dates.

On the opposite page, available data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus and total nitrogen compare the average values for May through October. Note that the bars for 2000 represent average values for July through October instead and are therefore biased toward summer and fall conditions.

The lake level record is incomplete, but does suggest that Shadow Lake shares the same high in winter, low in autumn pattern typical of small lakes in King County. The Secchi generally fluctuates between 2 and 4 meters. Temperature data is also incomplete, but the pattern appears similar to other small lakes in the area.

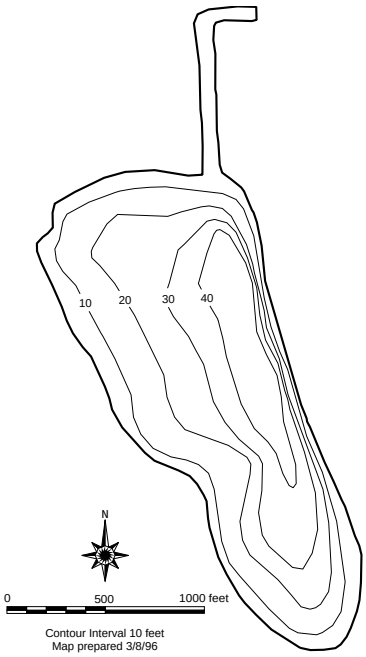
Individual trophic state indicators were calculated for Secchi (47), chlorophyll *a* (44), and total phosphorus (44). Although spring was not sampled in 2000, the average (45) indicates that Shadow Lake is moderate in productivity (mesotrophic), which is consistent with past ratings. The average nitrogen to phosphorus ratio was 37, with a minimum of 19 during the period measured. This suggests that phosphorus concentrations limited the growth of algae through much of the period, but that conditions might have been good at times for bluegreen algae.

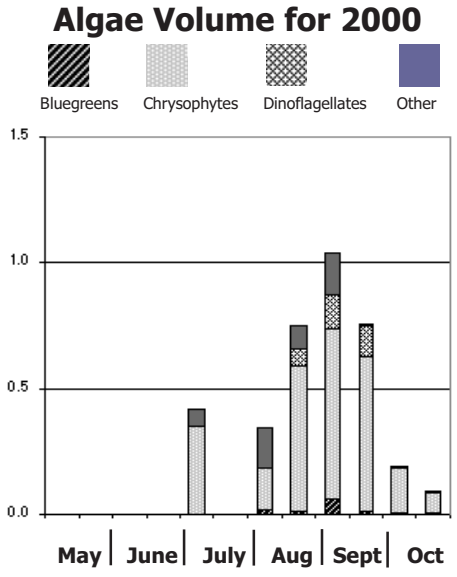
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and (see the discussion of algae in Chapter 2). No samples were available from spring. The summer algae were dominated by chrysophytes such as *Dinobryon* and the diatoms *Fragilaria* and *Tabellaria*. A small population of the dinoflagellate *Ceratium* was present in late summer, as well as smaller amounts of the bluegreens *Aphanizomenon* and *Anabaena.*

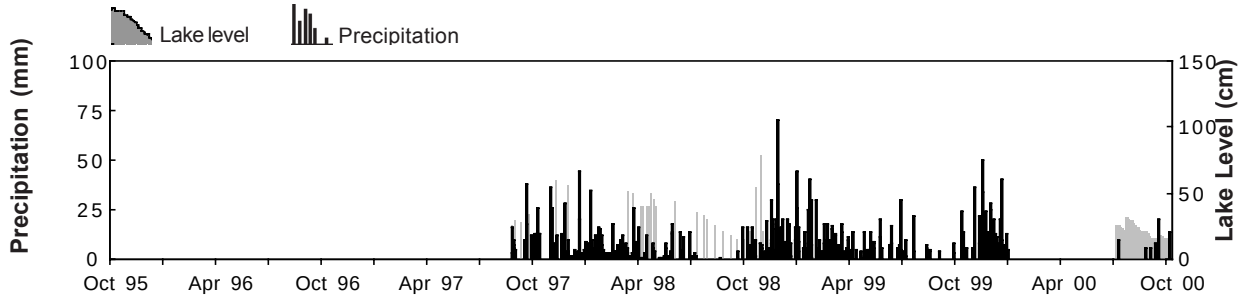
Volunteer Monitors

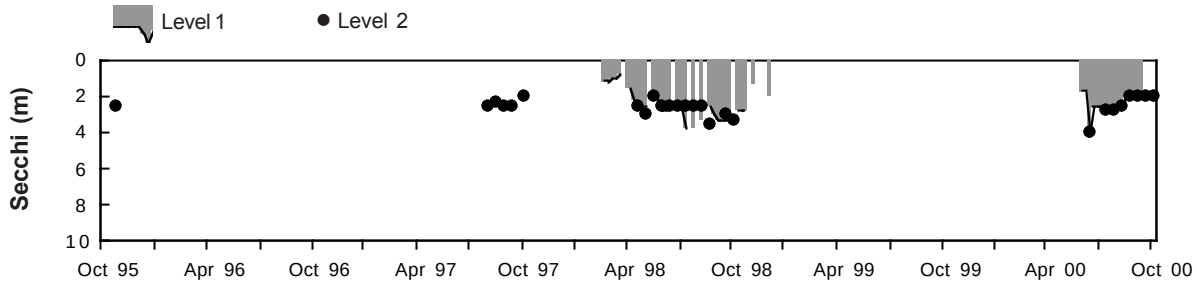
Level I (Oct 1999–Sept 2000)
Primary: Billy Aliment
Back-up: Virgil Mudd

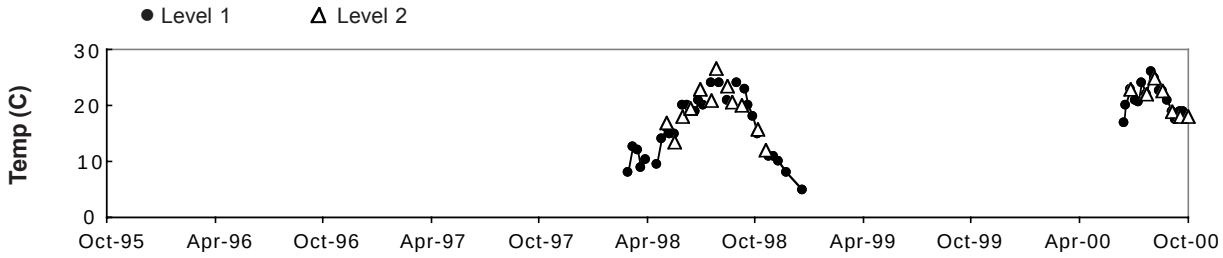
Level II (May–Oct 2000)
Primary: Billy Aliment







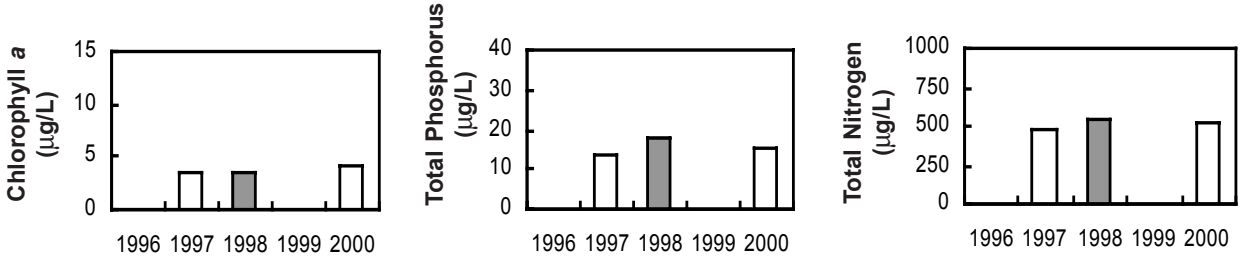




Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	662	—
Days Precipitation Measured	175	—
Lake Level Fluctuation (cm)	IN*	—
Average Secchi Depth (meters)	IN*	2.50
Average Surface Temperature (°C)	IN*	20.3

*Insufficient data



Shady

A volunteer monitor made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data for the latter part of the year are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of the 13 collection dates.

On the opposite page, available data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level record though incomplete suggests a pattern typical of King County lakes, high in winter, with an annual low stand in autumn. The Secchi fluctuates between 2 and 4 meters, but the record is too short to make interpretations. The water temperature records show that winter values dropped very low in 1996-97, while summer temperatures have stayed relatively constant from year to year.

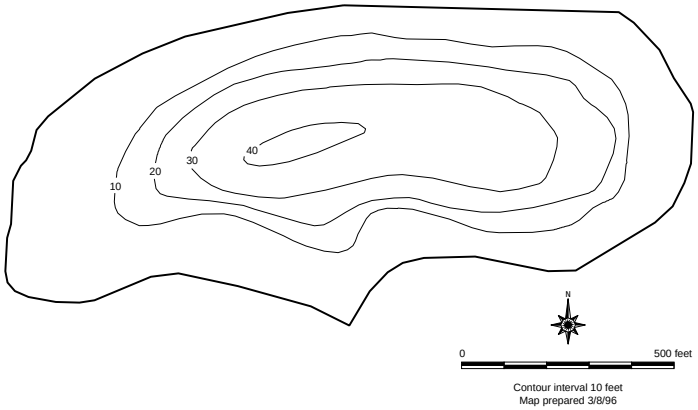
Individual trophic state indicators were calculated for Secchi (39), chlorophyll *a* (41), and total phosphorus (31). The average (37) indicates that Shady Lake is low in productivity (oligotrophic), which is consistent with past ratings. The average nitrogen to phosphorus ratio was 122, with a minimum of 48. This indicates that phosphorus concentrations generally limited the growth of algae through the period.

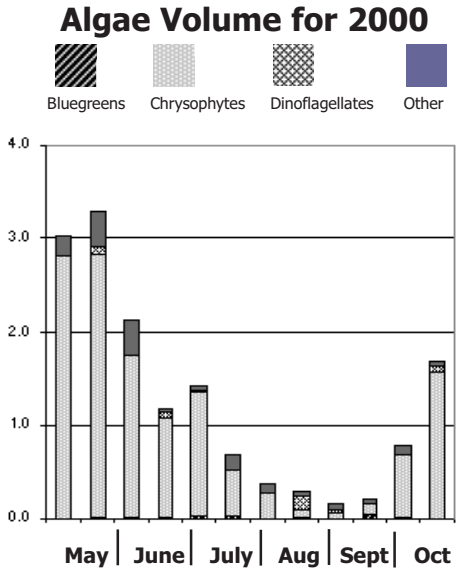
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter2). The chrysophyte algae dominated the phytoplankton, in particular several species of the diatom genus *Cyclotella,* with the dinoflagellate *Ceratium* of secondary importance. Total volume was low to moderate through the season, consistent with algae found in lakes with low nutrient concentrations.

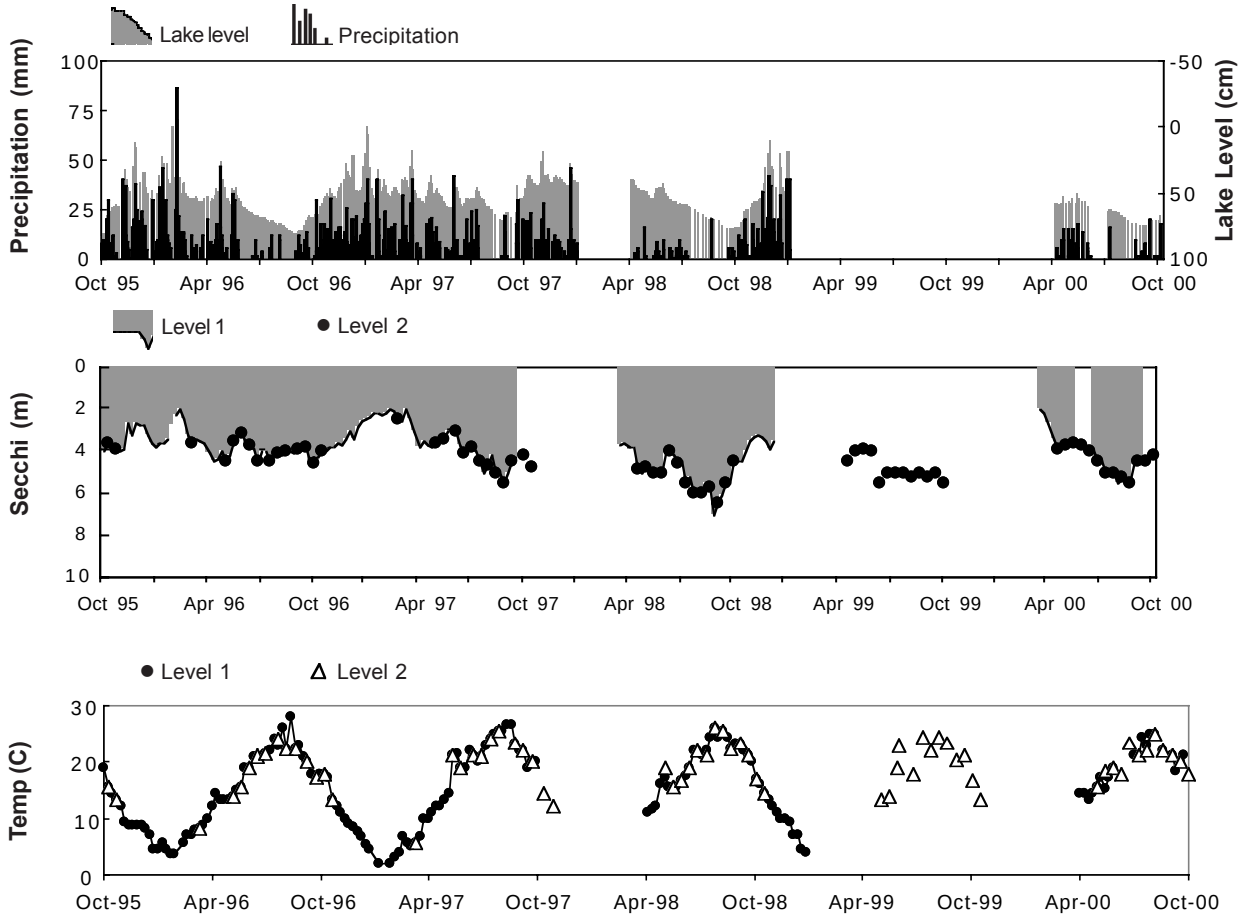
Volunteer Monitors

Level I (Oct 1999–Sept 2000)
Primary: Ray Konecke

Level II (May–Oct 2000)
Primary: Ray Konecke



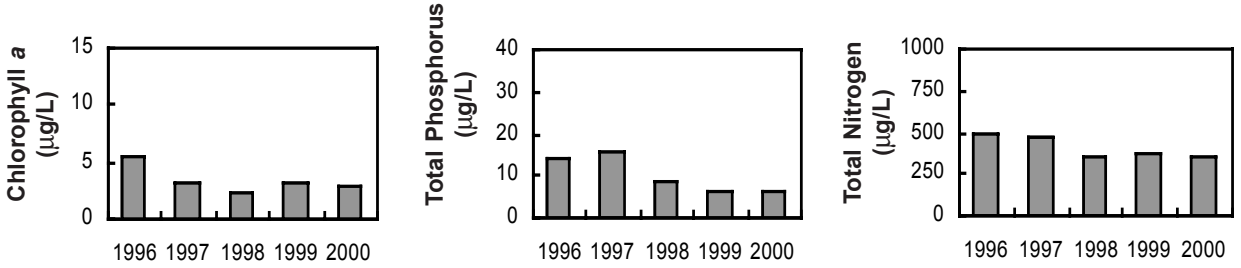




Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	297	—
Days Precipitation Measured	141	—
Lake Level Fluctuation (cm)	IN*	—
Average Secchi Depth (meters)	IN*	4.42
Average Surface Temperature (°C)	IN*	19.8

*Insufficient data



A volunteer monitor made physical measurements and collected water samples for Level II during water year 2000. The biweekly summer Level II data are recorded in Appendix B. One sample was missed out of the 13 collection dates.

On the opposite page, available data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The available lake level data shows some rise and fall, with increases in level after large rainfall events, but there is not enough data to characterize an annual pattern. The Secchi fluctuates between 3 and 8 meters, with low values usually occurring in June. Summer water temperatures appear generally consistent from year to year, although 1996 values are lower.

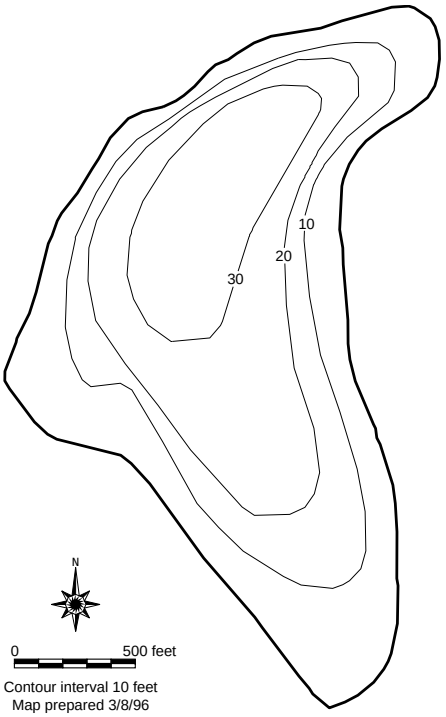
Individual trophic state indicators were calculated for Secchi (48), chlorophyll *a* (45), and total phosphorus (38). The average (43) indicates that Spring Lake is moderately productive (mesotrophic), which is consistent with past ratings. The average nitrogen to phosphorus ratio was 44, with a minimum of 26. This suggests that phosphorus concentrations generally limited the growth of algae through the period.

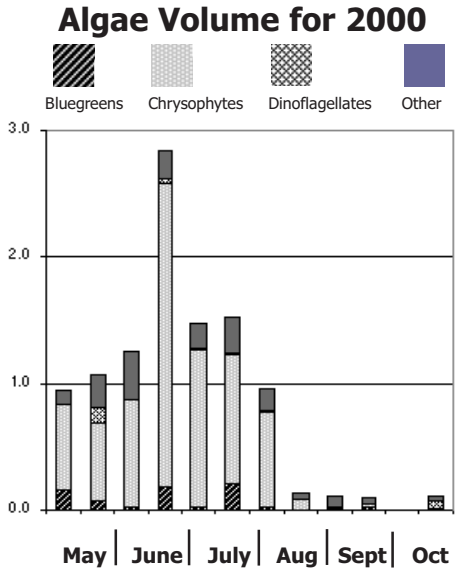
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter2). Chrysophyte algae dominated the phytoplankton, particularly species of the diatom genus *Cyclotella,* with a large variety of less important species. The highest volumes were recorded in late spring, followed by steadily decreasing amounts of algae through summer into autumn.

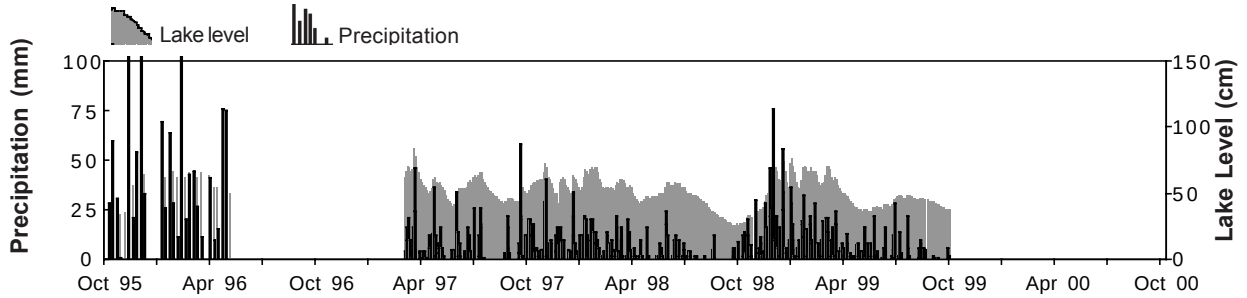
Volunteer Monitors

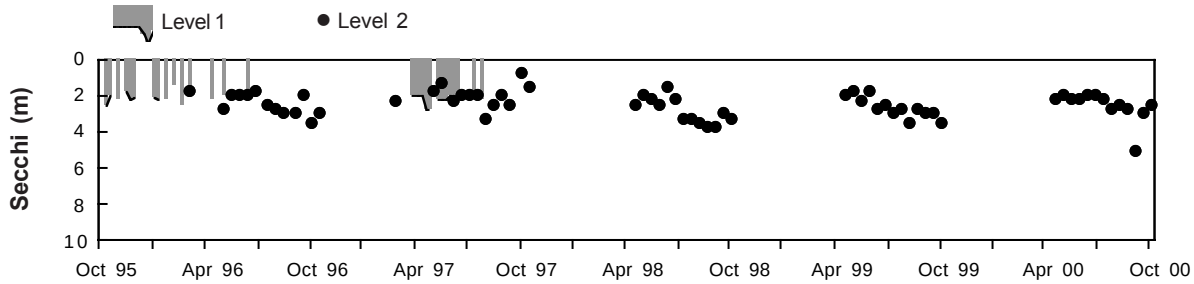
Level I (Oct 1999–Sept 2000)
Primary: None

Level II (May–Oct 2000)
Primary: Caren Adams

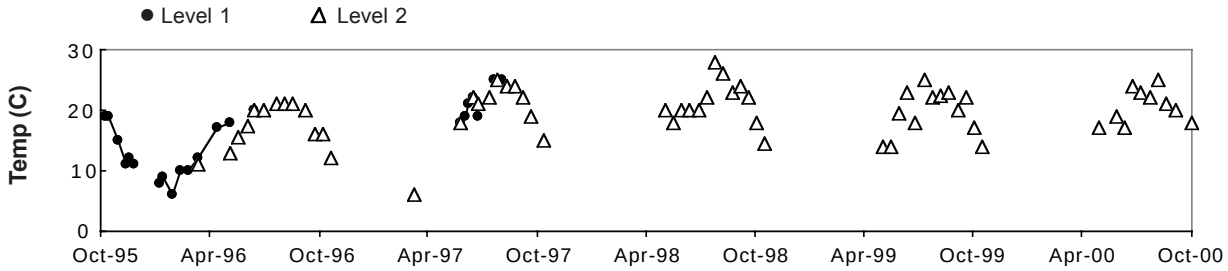






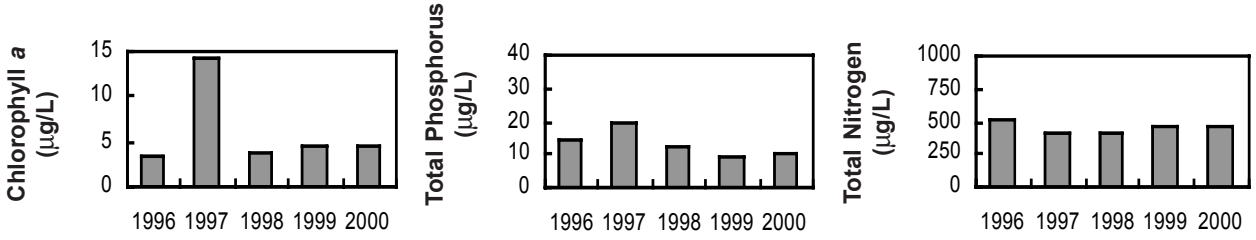


Note: Lake level data was collected weekly 1996, and daily 1997–2000



Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	—	—
Days Precipitation Measured	—	—
Lake Level Fluctuation (cm)	—	—
Average Secchi Depth (meters)	—	2.38
Average Surface Temperature (°C)	—	20.4



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data for part of the year are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of the 13 collection dates.

On the opposite page, available data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The available lake level data shows rises and fall, with some increases in level after large rainfall events, but there is not enough data to characterize the annual pattern. The Secchi fluctuates between 3 and 8 meters, with lowest values often occurring in June. The only full record of winter water temperatures was in 1996-97 when the lake reached 5 degrees centigrade. Summer maxima appear to be approximately the same from year to year.

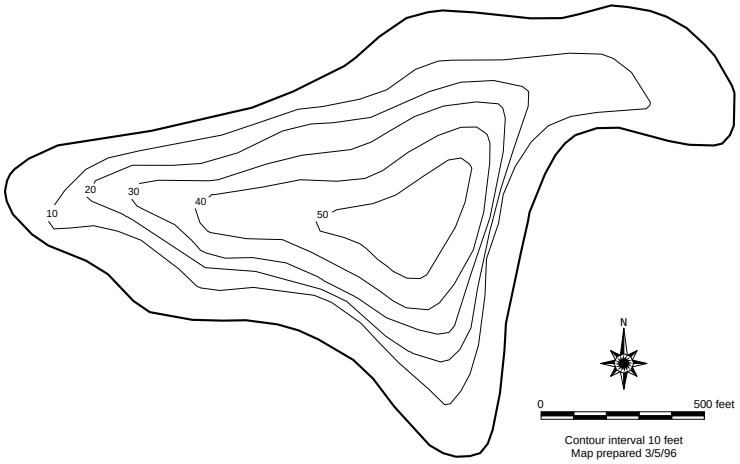
Individual trophic state indicators were calculated for Secchi (36), chlorophyll *a* (42), and total phosphorus (33). The average of the three TSI values (37) indicates that Star Lake is low in productivity (oligotrophic) with very good water quality, which is consistent with past ratings. The average nitrogen to phosphorus ratio was 49, with a minimum of 28. This suggests that phosphorus concentrations generally limited the growth of algae through the period.

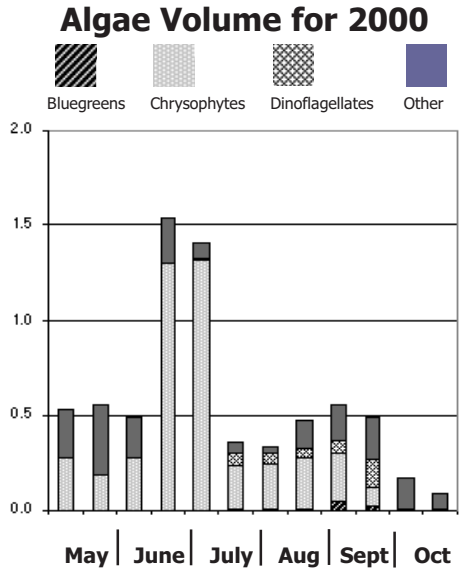
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter2). Chrysophyte algae made the biggest populations, particularly species of the genus *Gloeobotrys* and the diatom *Cyclotella bodanica*. A large variety of other species occurred, including the dinoflagellate *Ceratium* and the chrysophyte *Dinobryon*. The highest volumes were recorded in late spring, followed by lower amounts of algae through summer and autumn.

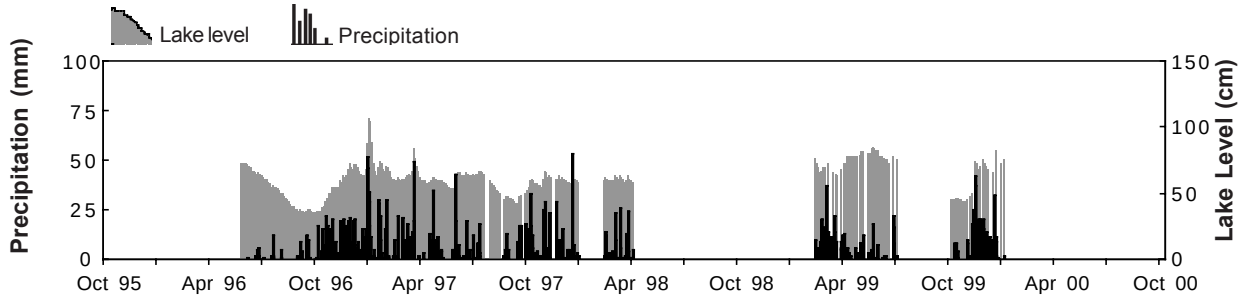
Volunteer Monitors

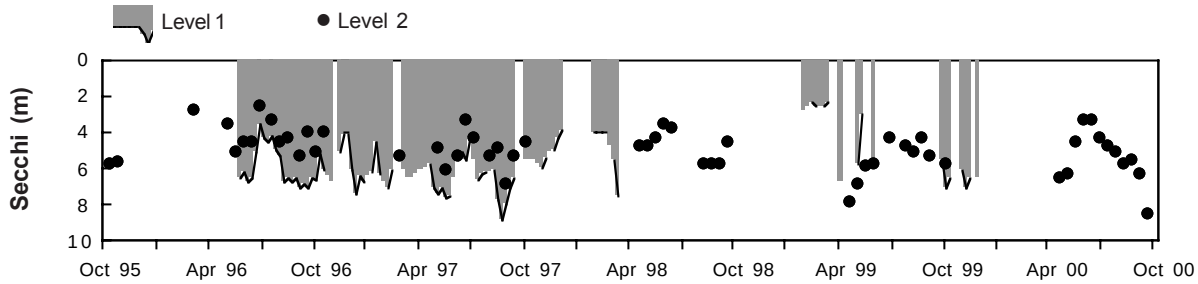
Level I (Oct 1999–Sept 2000)
Primary: Amundsen Family

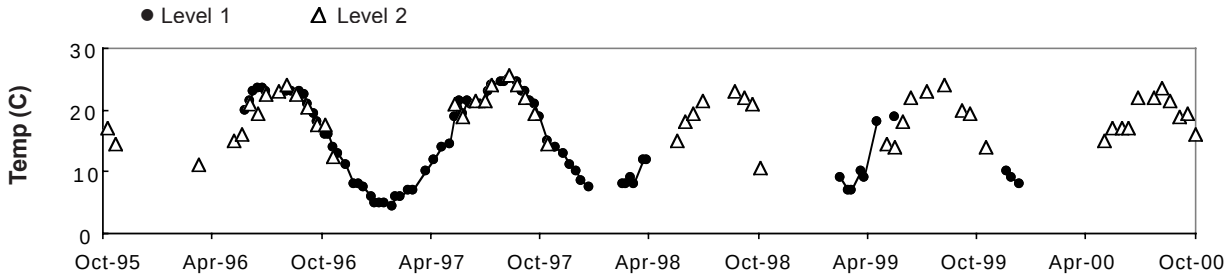
Level II (May–Oct 2000)
Primary: Mark Baughman







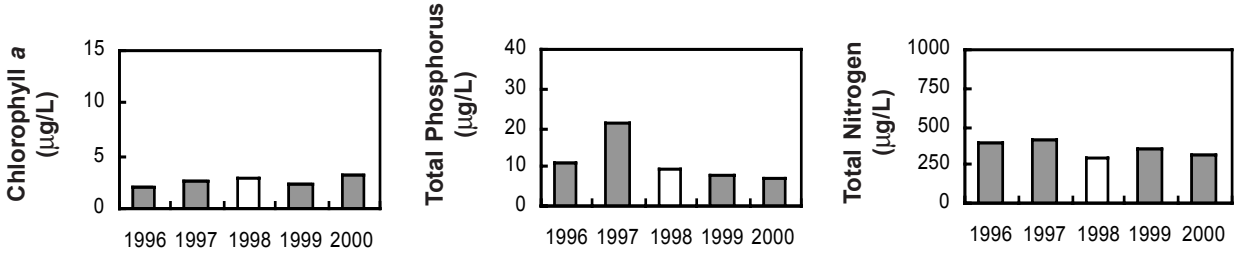




Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	454	—
Days Precipitation Measured	92	—
Lake Level Fluctuation (cm)	IN*	—
Average Secchi Depth (meters)	IN*	5.32
Average Surface Temperature (°C)	IN*	18.8

*Insufficient data



Volunteer Monitors

Level I (Oct 1999–Sept 2000)
Primary: Art Bender; Susan Pearson

Level II (May–Oct 2000)
Primary: Susan Pearson

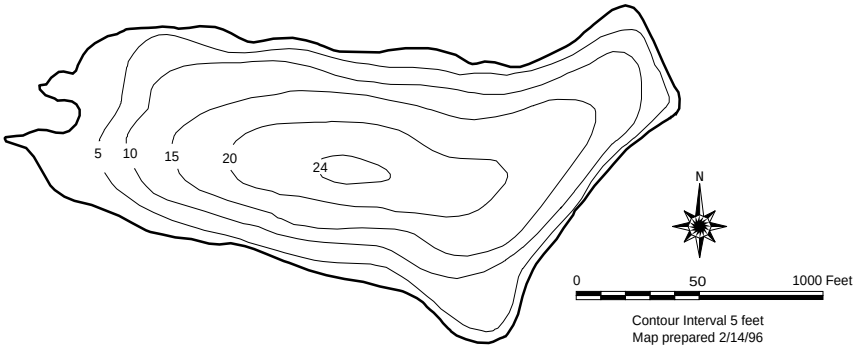
Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data for part of the year are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. Five samples were missed out of the 13 collection dates, four of which were in spring, potentially biasing the average values.

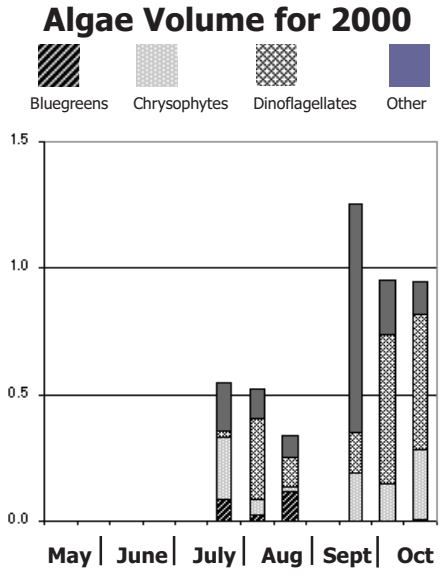
On the opposite page, available data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

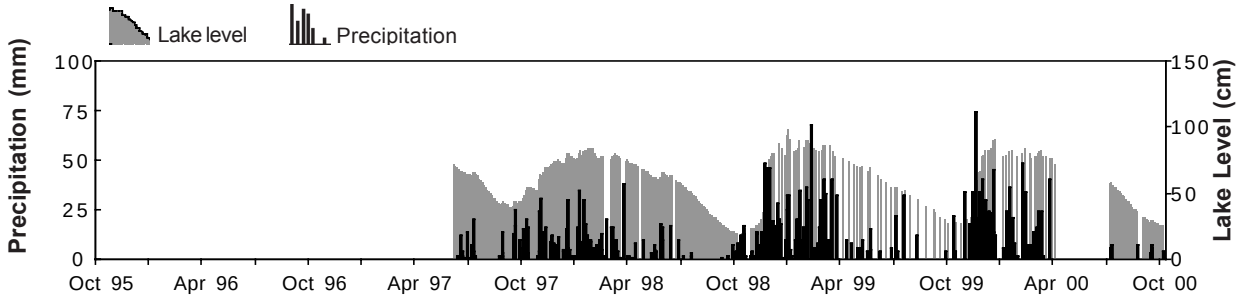
The available lake level data indicates a common pattern, with the high stand in winter, decreasing steadily to an annual low in early fall. Small increases appear related to rainfall events. The Secchi fluctuates between 2 and 6 meters, but a pattern cannot be generated from the record. Surface temperatures are in the same range with other small King County lakes. Temperatures were highest in the summer of 1997.

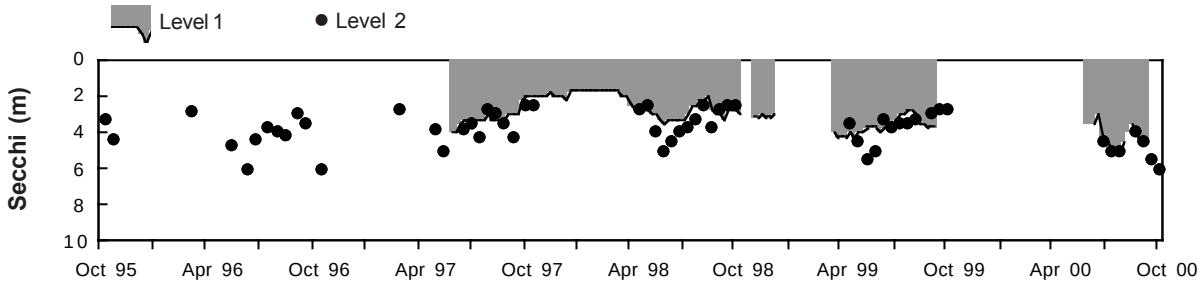
Individual trophic state indicators were calculated for Secchi (36), chlorophyll *a* (42), and total phosphorus (33). The average of the three TSI values (37), based on available data, suggests that Steel Lake is relatively unproductive (oligo-mesotrophic) with very good water quality. This is consistent with past ratings. The average nitrogen to phosphorus ratio was 32, with a minimum of 18, suggesting that phosphorus concentrations generally limited the growth of algae through the period, but conditions could have favored bluegreen algae at times.

A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter 2). The dinoflagellate *Peridinium* dominated the summer and fall algae, with the bluegreen *Anabaena* present in smaller quantities. On one date in September, a large amount of the chlorophyte *Botryococcus* was found. The highest total volumes were recorded in fall, but spring data were not available for comparison.

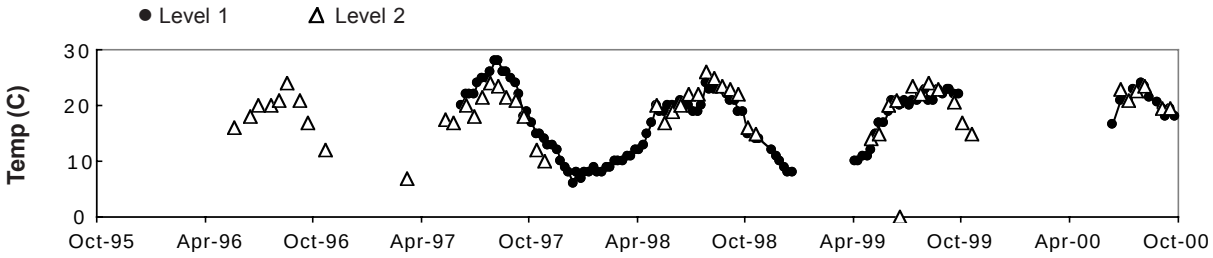








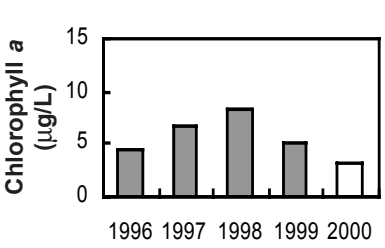
Note: Lake level data was collected weekly 1999–2000

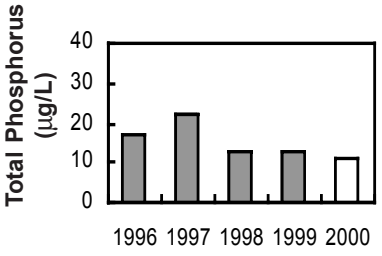


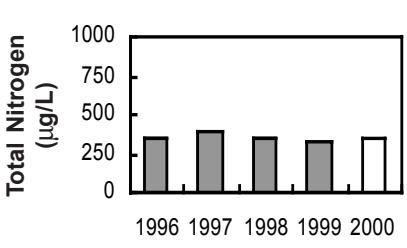
Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	854	—
Days Precipitation Measured	126	—
Lake Level Fluctuation (cm)	IN*	—
Average Secchi Depth (meters)	IN*	4.93
Average Surface Temperature (°C)	IN*	20.7

*Insufficient data







Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data for part of the year are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed of the 13 collection dates.

On the opposite page, available data on precipitation, lake level, Secchi transparency, and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The lake level data indicates a general pattern of high stands in winter, decreasing to annual lows in summer and fall. Many rapid rises in winter relate to rainfall events. The Secchi fluctuates between 1 and 3 meters, most likely related to the yellow color of the water. Surface temperatures appear to be in the same range with other small King County lakes, although they were a little higher in the summer of 1998.

Individual trophic state indicators were calculated for Secchi (52), chlorophyll *a* (54), and total phosphorus (50). The average of the three TSI values (52) indicates that Trout Lake is highly productive (eutrophic), with fair water quality. This is consistent with past ratings.

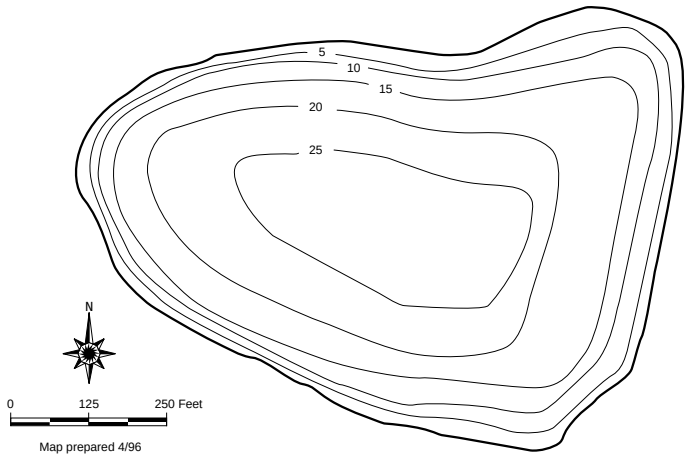
Volunteer Monitors

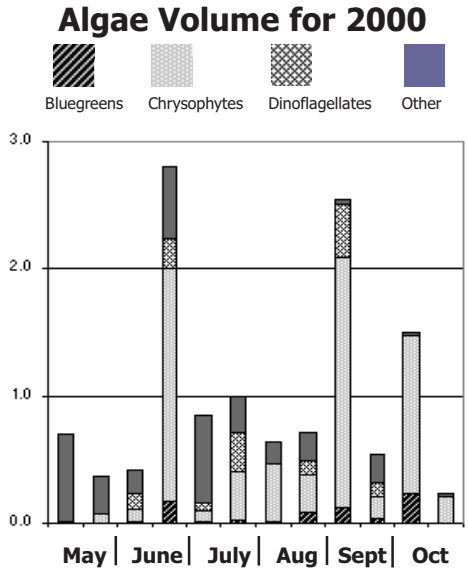
Level I (Oct 1999–Sept 2000)
Primary: Brenda and Jim Sherwood
Back-up: Pam Hilsenberg

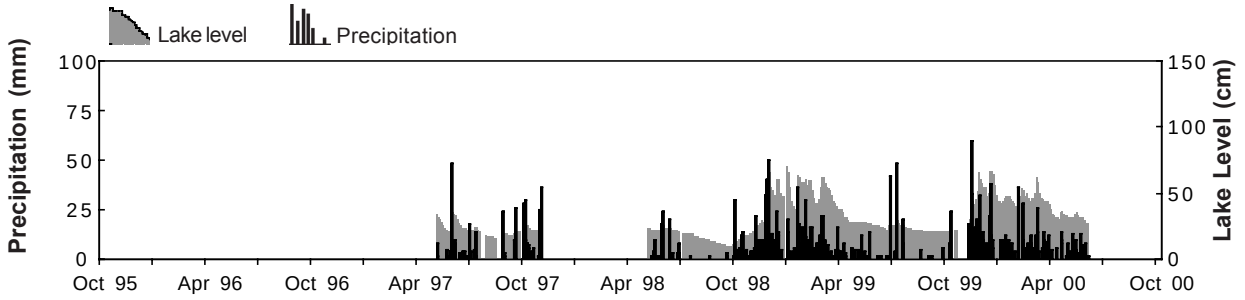
Level II (May–Oct 2000)
Primary: Brenda and Jim Sherwood
Back-up: Pam Hilsenberg

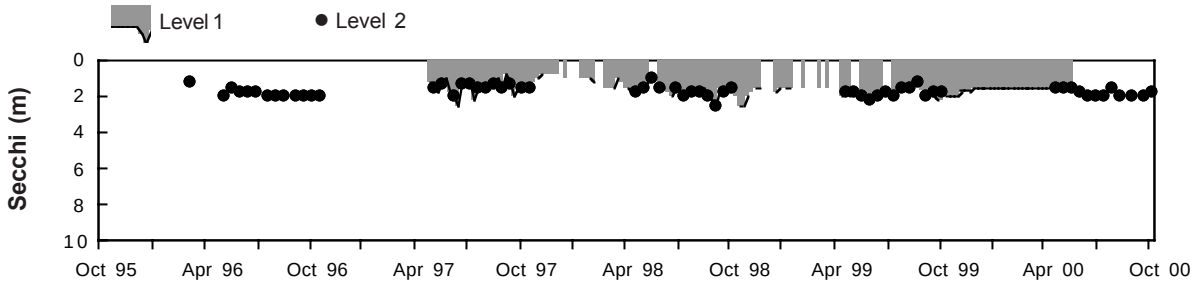
The average nitrogen to phosphorus ratio was 38, with a minimum of 14, suggesting that phosphorus concentrations generally limited the growth of algae through the period, but conditions could have favored bluegreen algae at times.

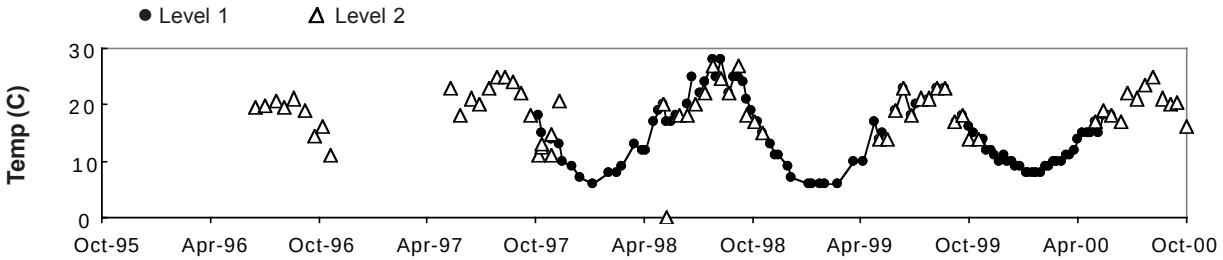
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter2). There were peaks in algal abundance in late spring and early fall, both dominated by the chrysophyte *Dinobryon*, which is a common inhabitant of yellow water lakes. The dinoflagellate *Ceratium* was found through the sampling period, as well as small quantities of the bluegreens *Anabaena* and *Aphanizomenon*.







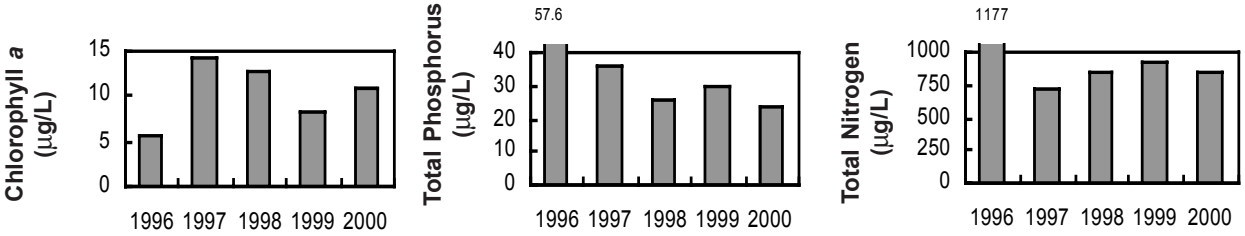




Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	957	—
Days Precipitation Measured	227	—
Lake Level Fluctuation (cm)	IN*	—
Average Secchi Depth (meters)	IN*	1.80
Average Surface Temperature (°C)	IN*	19.8

*Insufficient data



Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. One sample was missed out of the 13 collection dates.

On the opposite page, available data on precipitation, lake level, Secchi transparency and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

Lake level data suggest that there is an annual low in early fall, consistent with other King County lakes. Rapid rises that relate to rain events are also visible. The Secchi fluctuates between 1 and 6 meters, without an observable pattern over the years of measurement. Summer temperatures appear generally similar to other small lakes in the area. The increase shown by Level I data in late summer 1996 may be a reporting anomaly.

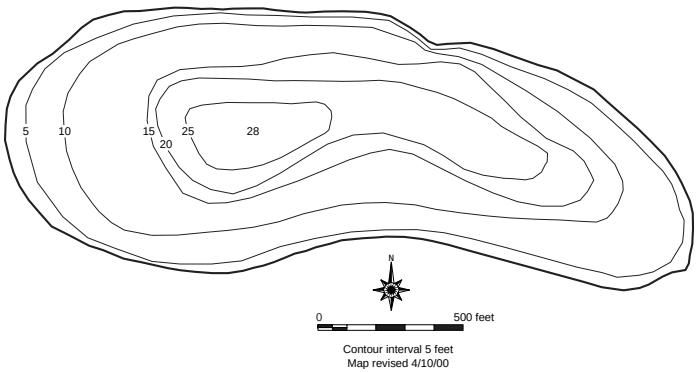
Individual trophic state indicators were calculated for Secchi (45), chlorophyll *a* (49), and total phosphorus (37). The average of the three TSI values (44) indicates that Lake Twelve is moderately productive (mesotrophic) with very good water quality, consistent with past ratings. The average nitrogen to phosphorus ratio was 46, with a minimum of 28, indicating that phosphorus concentrations generally limited the growth of algae through the period.

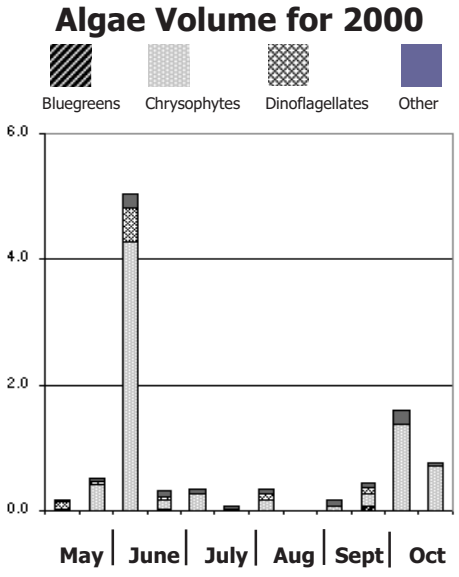
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter2). The major peak of abundance was in late spring, dominated by the chrysophyte *Dinobryon*, with a subdominant population of the dinoflagellate *Ceratium*. Very low abundances of algae were found in summer, followed by a much smaller fall peak made by an unidentified chrysophyte species.

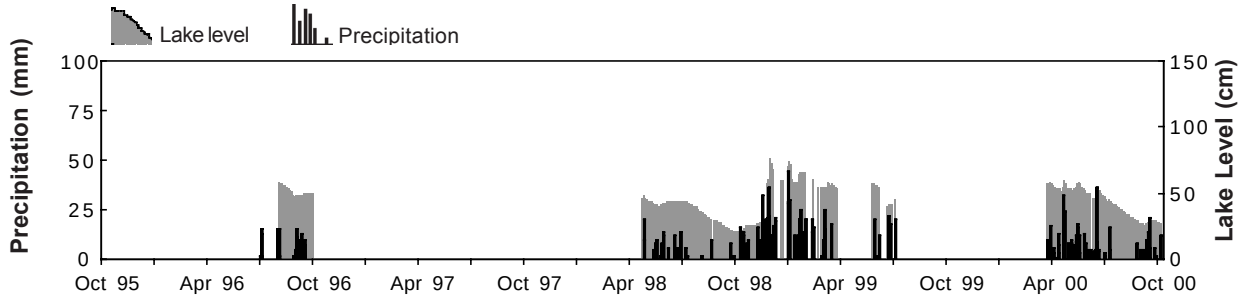
Volunteer Monitors

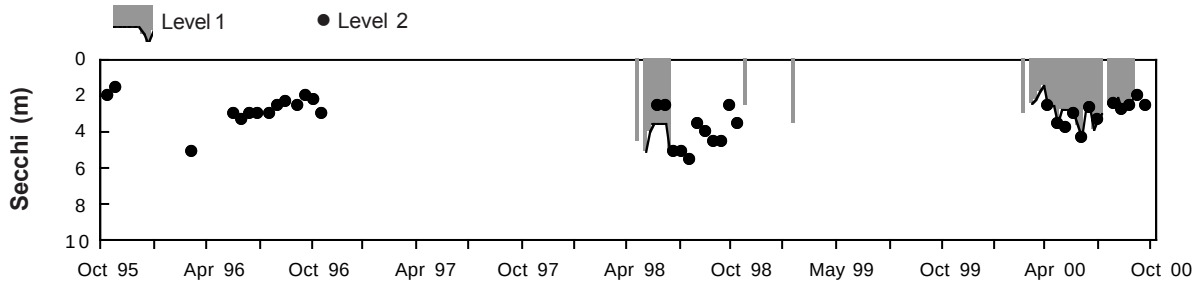
Level I (Oct 1999–Sept 2000)
Primary: Jan Delacy and Libby Moscardini

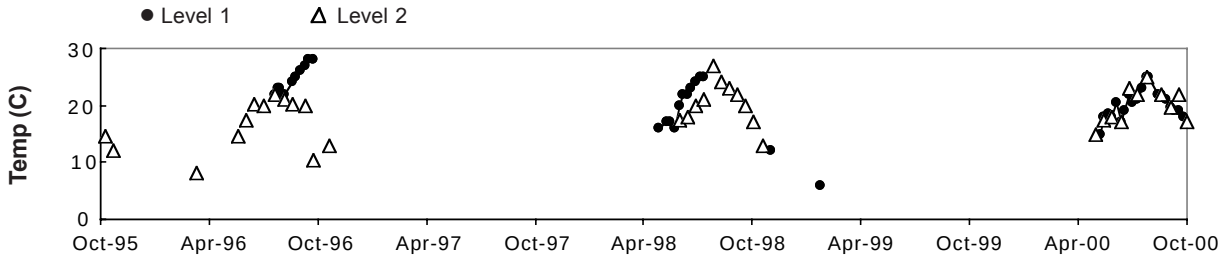
Level II (May–Oct 2000)
Primary: Jan Delacy and Libby Moscardini







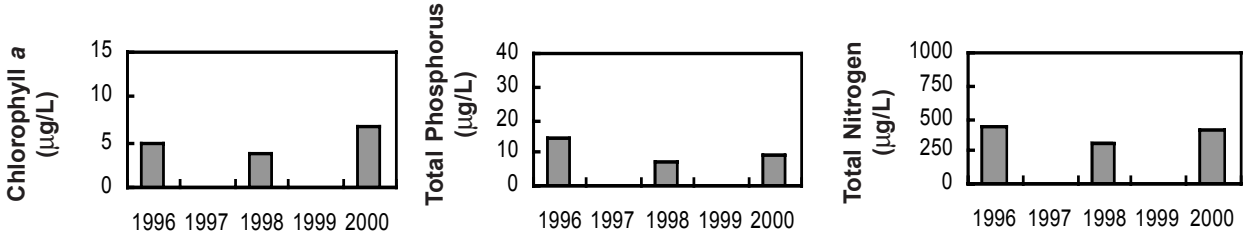




Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	494	—
Days Precipitation Measured	185	—
Lake Level Fluctuation (cm)	IN*	—
Average Secchi Depth (meters)	IN*	2.92
Average Surface Temperature (°C)	IN*	19.8

*Insufficient data



A volunteer monitor made physical measurements and collected water samples for Level II during water year 2000. The biweekly summer Level II data are recorded in Appendix B. Three samples were missed out of the 13 collection dates, two of which were early in the period. Since this was the first year of Level II sampling for the lake, the data will become the baseline for comparison in years to come.

On the opposite page, available data on Secchi transparency and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

The Secchi fluctuates between 4 and 7 meters, generally increasing over the sampling period. Surface temperatures appear slightly lower in summer than other small King County lakes.

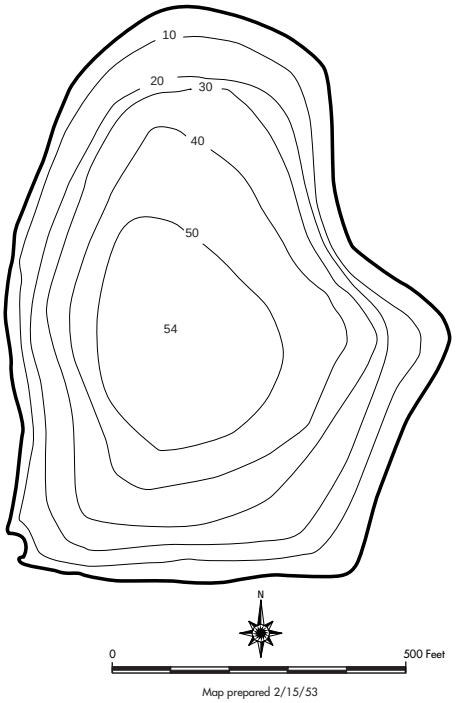
Individual trophic state indicators were calculated for Secchi (35), chlorophyll *a* (42), and total phosphorus (38). The average of the three TSI values (38) indicates that Walker Lake is low in productivity (oligotrophic), with very good water quality. The average nitrogen to phosphorus ratio was 30, with a minimum of 20, indicating that phosphorus concentrations generally limited the growth of algae through the period.

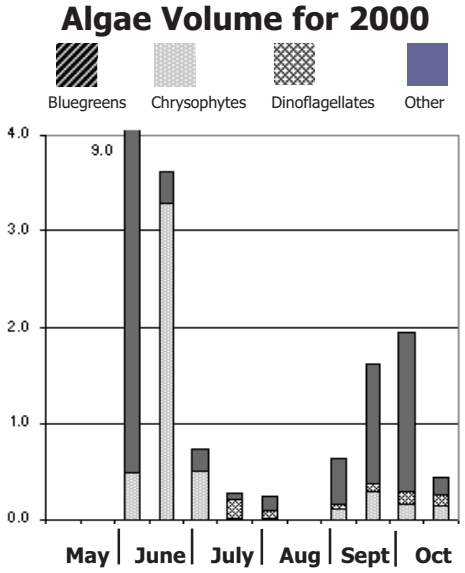
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter2). The major peak of abundance was in late spring, dominated first by the chlorophyte *Volvox* (charted as "Other") which makes large, hollow colonies, and followed by the chrysophyte *Dinobryon*. A smaller fall peak was made by the chlorophyte desmid *Cosmarium*.

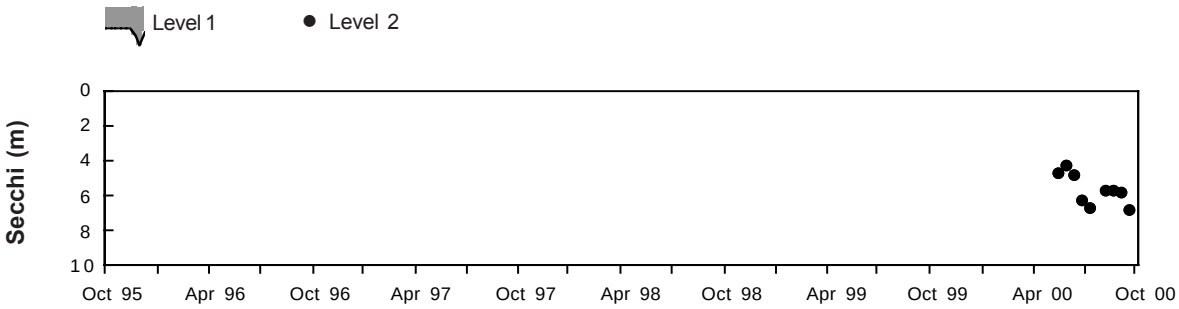
Volunteer Monitors

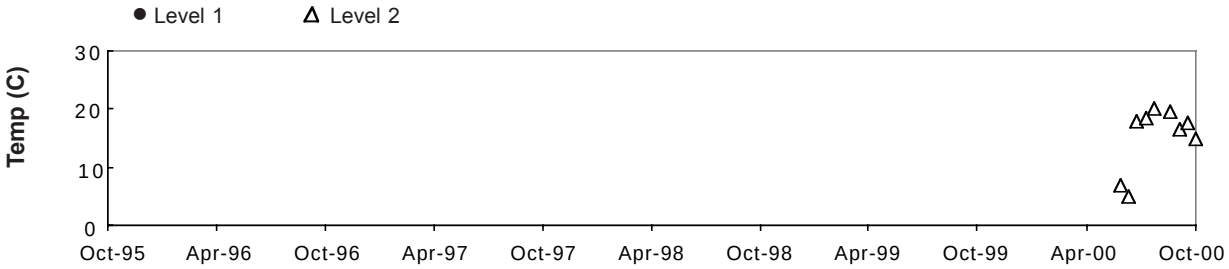
Level I (Oct 1999–Sept 2000)
Primary: None

Level II (May–Oct 2000)
Primary: Mike Baker



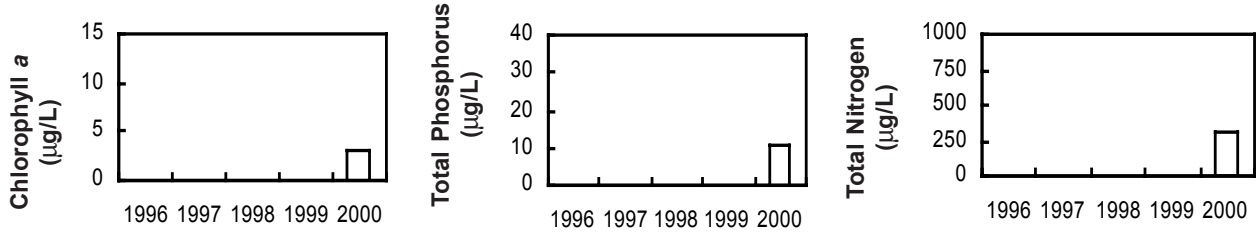






Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	—	—
Days Precipitation Measured	—	—
Lake Level Fluctuation (cm)	—	—
Average Secchi Depth (meters)	—	5.66
Average Surface Temperature (°C)	—	15.5



A volunteer monitor made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of the 13 collection dates.

On the opposite page, available data on precipitation, lake level, Secchi transparency and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

Lake level data indicate that the lake follows the general high winter, low autumn pattern typical of small lakes in King County. Rapid changes in level relate to rainfall events. The Secchi ranges between 1 and 4 meters, but is generally about 2m. Surface temperatures in summer may have declined slightly over the last five years, while winter temperatures have remained steady.

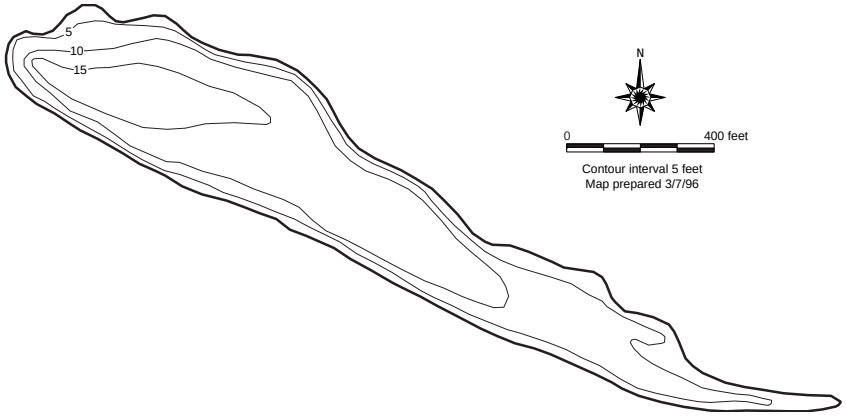
Individual trophic state indicators were calculated for Secchi (48), chlorophyll *a* (56), and total phosphorus (44). The average of the three TSI values (49) indicates that Welcome Lake is moderately to highly productivity (meso to eutrophic), with good to fair water quality. This is consistent with ratings from past years. The average nitrogen to phosphorus ratio was 40, with a minimum of 24, indicating that phosphorus concentrations generally limited the growth of algae through the period.

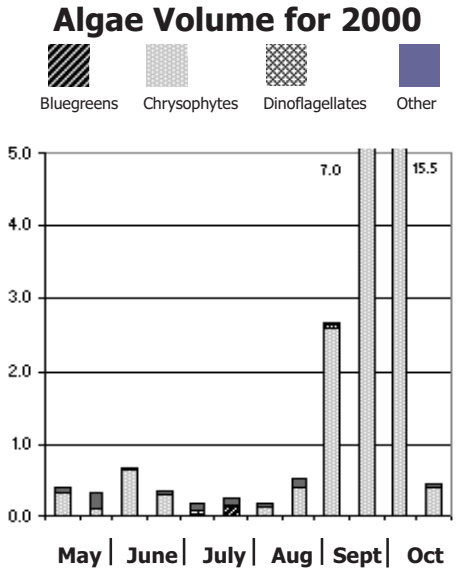
A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter2). Small populations of algae were found in spring and summer, comprised of the chrysophyte diatom *Asterionella*, the bluegreen *Anabaena*, and various species of chlorophytes and cryptophytes ("Other" in the chart). An extremely large burst of algae peak occurred in autumn composed almost entirely of the chrysophyte *Dinobryon*, accompanied by the euglenophyte *Trachelomonas*.

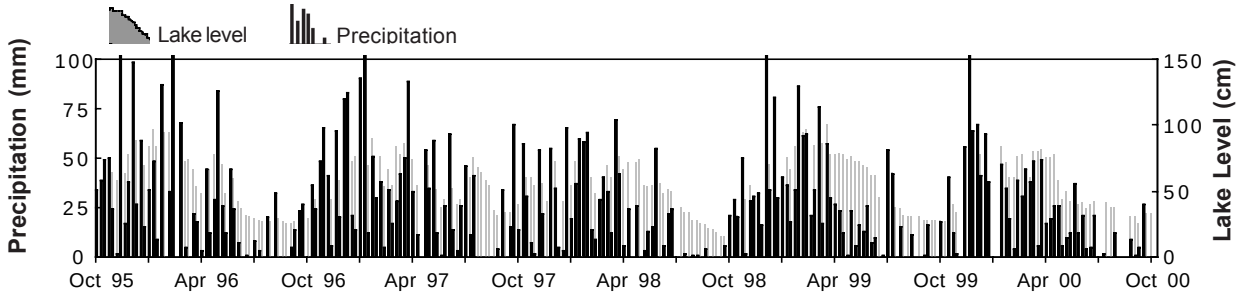
Volunteer Monitors

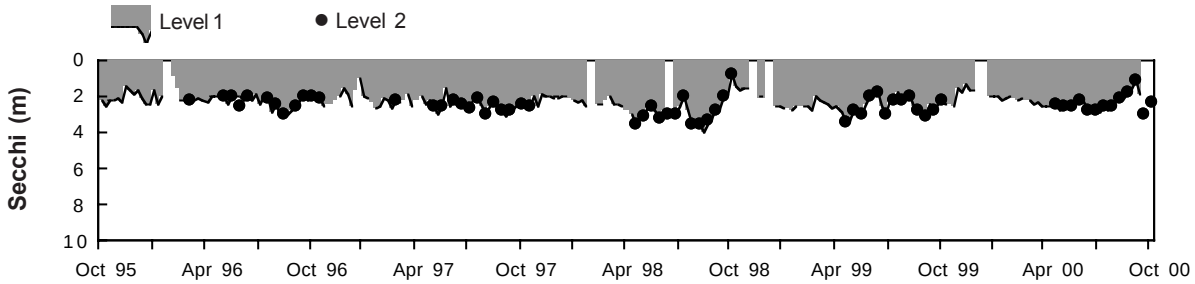
Level I (Oct 1999–Sept 2000)
Primary: Dave Hadley

Level II (May–Oct 2000)
Primary: Dave Hadley

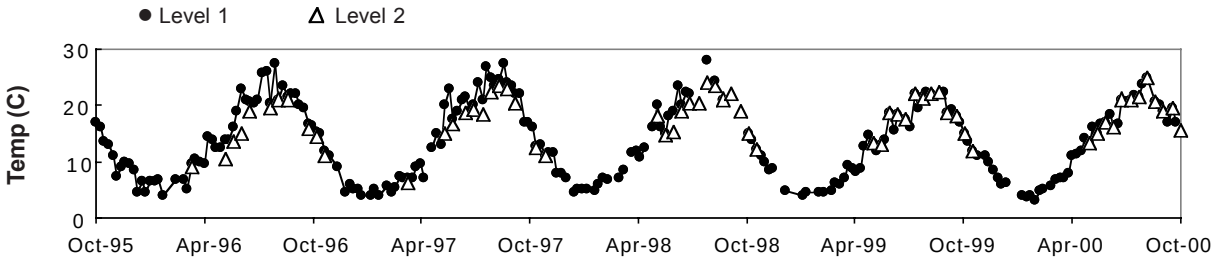








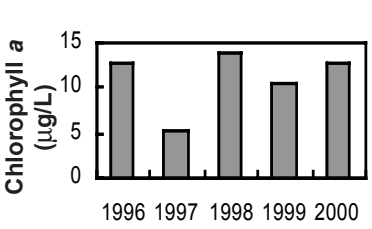
Note: Lake level data was collected weekly 1995–2000

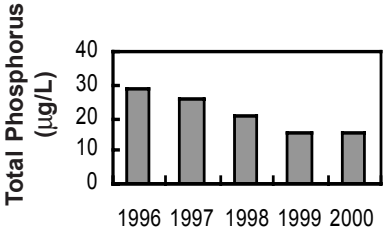


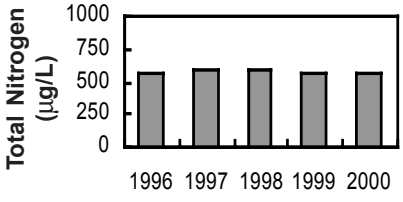
Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1154	—
Days Precipitation Measured *	48	—
Lake Level Fluctuation (cm)	63	—
Average Secchi Depth (meters)	2.22	2.33
Average Surface Temperature (°C)	13.2	18.5

* measured once weekly







Volunteer monitors made physical measurements and collected water samples for Levels I and II during water year 2000. Average weekly Level I data are presented in Appendix A. The biweekly summer Level II data are recorded in Appendix B. No samples were missed out of the 13 collection dates.

On the opposite page, available data on precipitation, lake level, Secchi transparency and surface water temperature are graphed on a five-year scale. The table below the graphs summarizes the physical measurements made in 2000. Charts of chlorophyll *a*, total phosphorus, and total nitrogen compare the average values for May through October.

Lake level data indicate that the lake follows a high winter, low autumn pattern typical of small lakes in King County. Rapid changes in level often relate to rainfall events. The Secchi ranges between 2 and 8 meters, the lower transparencies often found in winter. Surface temperatures in both summer and winter have fluctuated slightly over the last five years, but no general trends can be picked out.

Individual trophic state indicators were calculated for Secchi (35), chlorophyll *a* (44), and total phosphorus (45). The average of the three TSI values (41) indicates

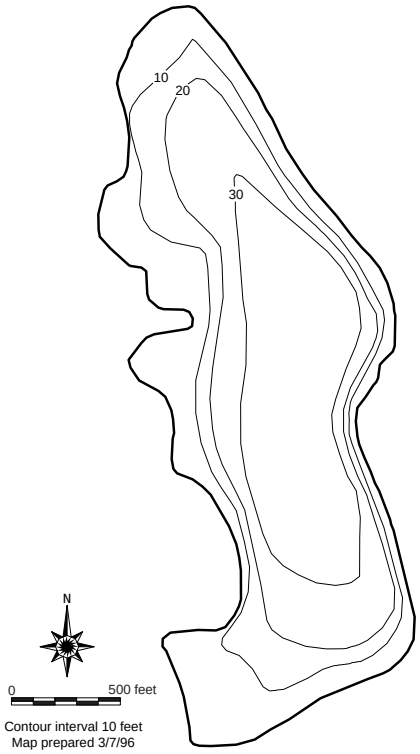
Volunteer Monitors

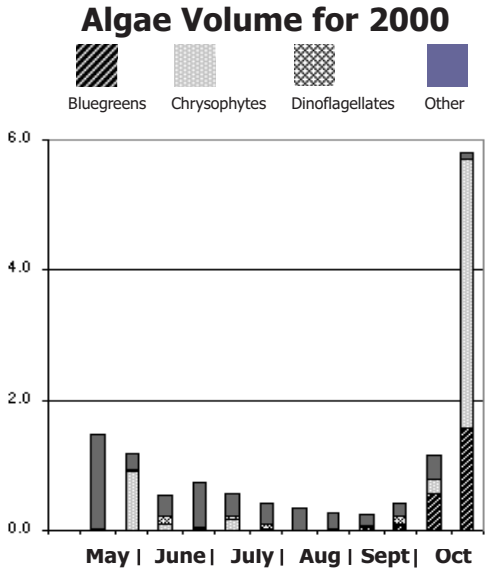
Level I (Oct 1999–Sept 2000)
Primary: Ray Petit

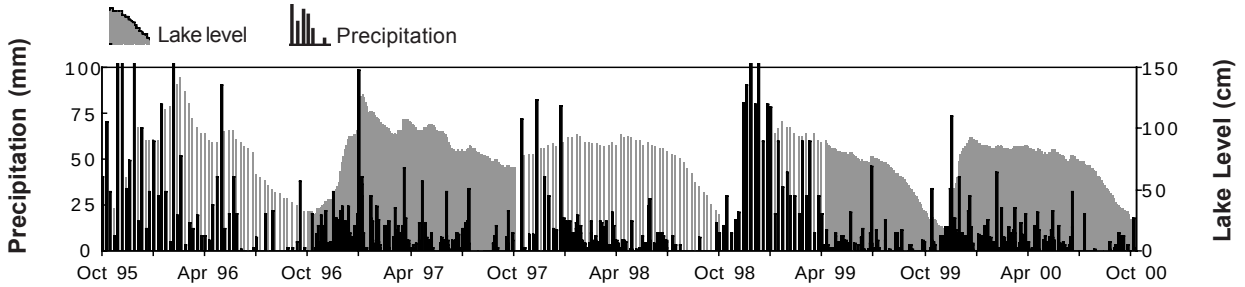
Level II (May–Oct 2000)
Primary: Ray Petit
Back-up: John Vasboe

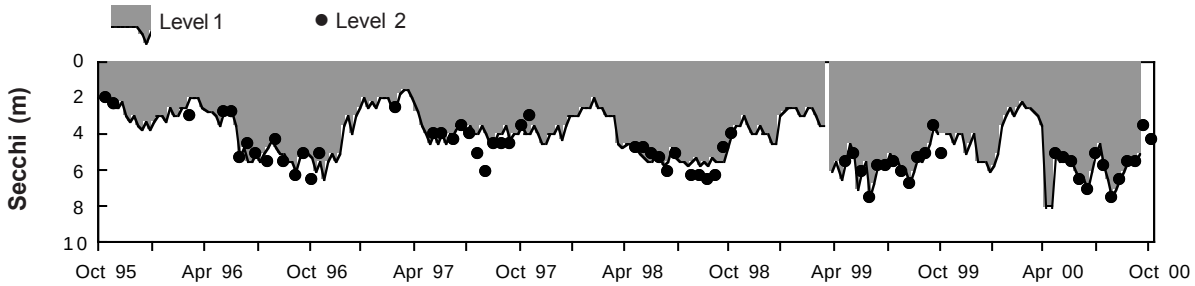
that Lake Wilderness is moderately productive (mesotrophic), with good water quality. This is consistent with ratings from past years. The average nitrogen to phosphorus ratio was 25, with a minimum of 14, indicating that phosphorus concentrations generally limited the growth of algae through the period, but conditions were sometimes favorable for bluegreens.

A chart at the bottom of this page summarizes the volumes of different groups of planktonic algae that were identified and measured (see the discussion of algae in Chapter2). Relatively small populations of a variety of algal species were found in spring and summer, followed by growth in October of a large bloom made up of the chrysophyte *Dinobryon*, the diatom *Melosira* and the bluegreen *Anabaena*.

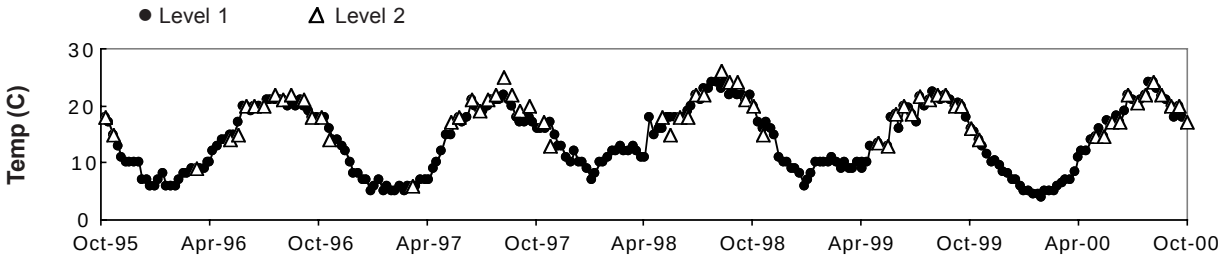






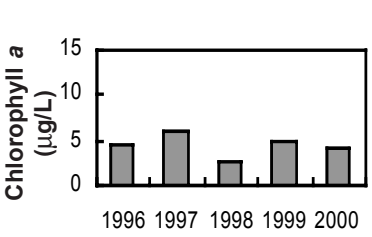


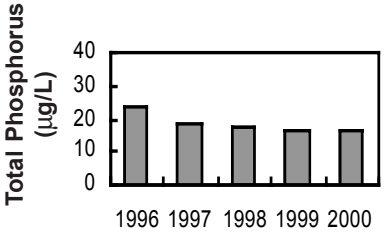
Note: Lake level data was collected weekly 1996 and 1998, and daily 1997 and 1999–2000

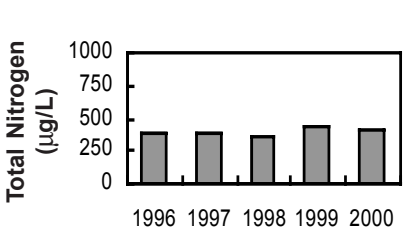


Physical Characteristics for 2000

	Level I Annual	Level II Summer
Sum of Precipitation (mm)	1256	—
Days Precipitation Measured	366	—
Lake Level Fluctuation (cm)	74	—
Average Secchi Depth (meters)	4.89	5.60
Average Surface Temperature (°C)	13.2	19.1







CHAPTER 4

Lake Comparison

Introduction

Comparing the data gathered from all the lakes through water year 2000, as well as looking at data gathered over time, can produce a coherent picture of water quality in the small lakes of the inhabited areas of King County. Level I monitoring data on precipitation, lake water level, and water clarity (Secchi transparency) are compared between lakes as well as for each lake over time. The discussion of Level II monitoring covers the same comparisons for water temperature, average phosphorus and chlorophyll, trophic state ratings, and nitrogen to phosphorus ratios.

Precipitation

While Level I volunteer monitors collected precipitation data at 37 lakes throughout King County in water year 2000, only 20 lakes had comprehensive records for the period. If the records for a lake were incomplete, but had data for 330 or more days, estimated values for the missing days were inserted by averaging all available data from other sites for that day. Discussion of the data set as a whole will be limited to the 20 lakes with the most complete data.

Water Year 2000 Precipitation Data

The sum of precipitation at Seattle-Tacoma International Airport for the 1999 water year totaled 935 millimeters (mm), which is slightly below the 50-year average of 972 mm. Monthly precipitation accumulations for water year 2000 and the four previous years can be compared to the average precipitation accumulation rate for the last 50 years at the Sea-Tac International Airport weather station (Figure 10). Water year 2000 was very close to the average, with only November, December, and May having rainfall above the historical average. All of the remaining months were at or below the monthly averages. The annual total is a substantial decrease from the 1999 total of 1251 mm. In 1996 and 1997 precipitation totals were similar to 1999 levels averaging 1316 mm and 1258 mm, respectively, while the lowest value of the five-year period was in 1998, with an accumulative total of 822 mm.

Figure 10: Monthly Rain Accumulation Rate by Water Year

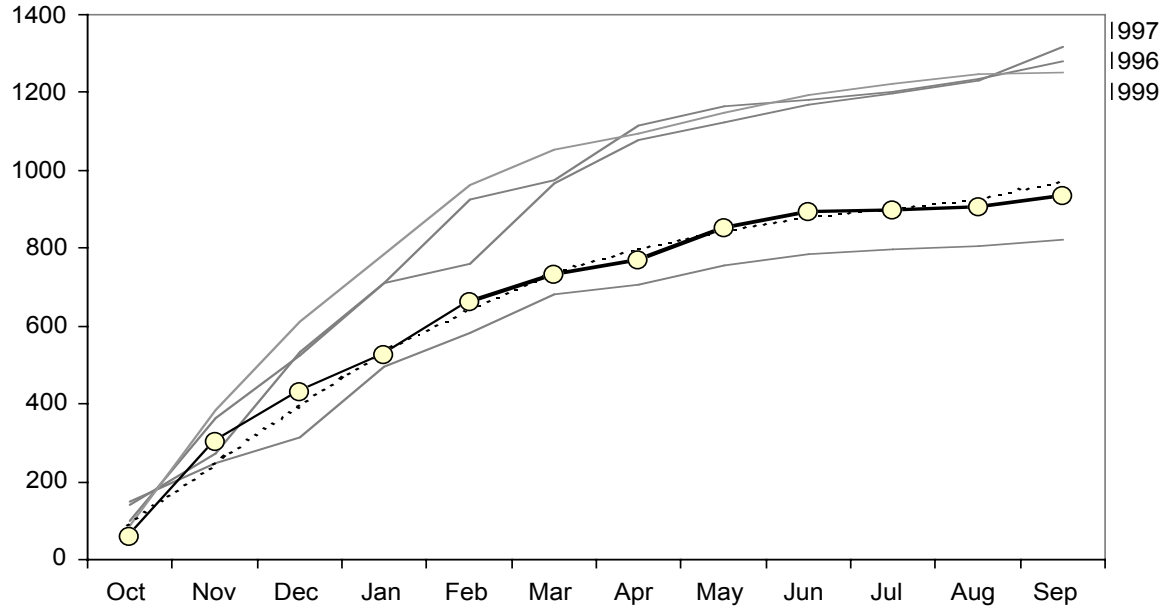
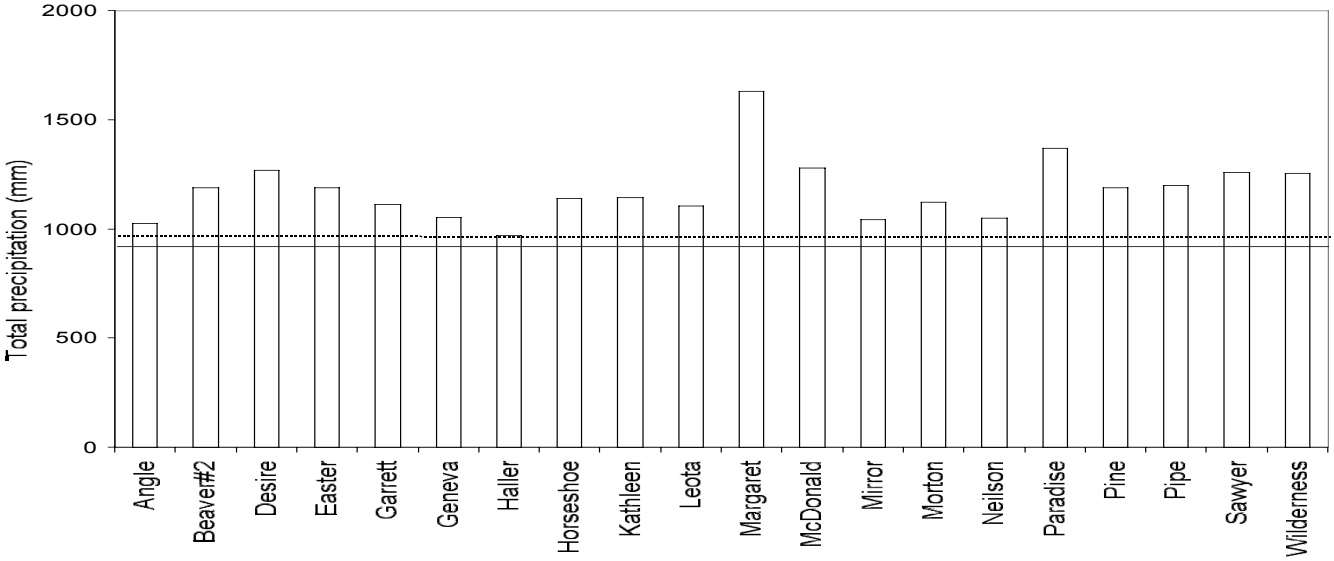


Chart tracks accumlations for the last five years at Sea-Tac airport, accompanied by the 50-year average accumulation rate (dashed line).

Figure 11: Total Precipitation at Individual Lakes for the 1999–2000 Water Year



Dotted line refers to 50-year average at Sea-Tac
Solid line refers to water year 2000 at Sea-Tac

Precipitation totals for water year 2000 for the 20 Level I lakes with excellent precipitation records (Figure 11) show that nearly all the lake sites exceeded the total for the year at Sea-Tac (solid line) as well as the historical average (dotted line). Additionally, the differences in specific lake site totals illustrate the influence of location on daily and annual precipitation values. Topography, as well as storm intensity, patchiness, and movement patterns between Puget Sound and the Cascade Range all influence precipitation recorded at each location. If all the monthly averages for the year are plotted together on a chart to look at the general pattern for the area (Figure 12) it is clear that the Sea-Tac station ranks in the lower ranges of monthly precipitation recorded at the locations manned by King County volunteers.

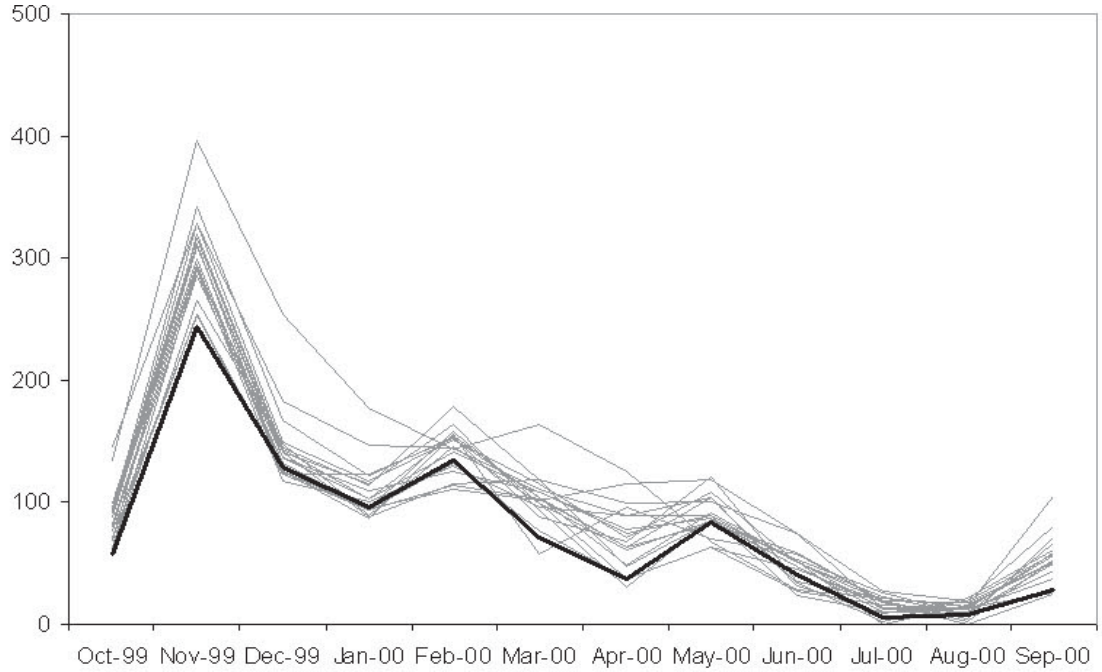
Conclusions

Volunteer monitoring has proved to be an invaluable tool for collecting long-term localized precipitation data, allowing for comparisons to be made across the county, as well as allowing for establishment of realistic ranges in values. The water year 2000 total was very close to the 50-year average at the Sea-Tac weather station. In contrast to the past year, all volunteers recorded higher precipitation levels than observed in 1999. The five-year low was in 1998, and higher totals were recorded for 1996, 1997, and 1999.

Lake Level

Fluctuations of water level in lakes are affected both directly and indirectly by precipitation. Some major influences include: (1) watershed size (sometimes called the "catchment basin"); (2) land use within the watershed boundaries; (3) vegetation types and coverage; (4) nearby or adjacent wetland areas; (5) soil structures and types, as well as specific geology of the area; (4) surface and subterranean hydrology; and (5) outlet type or structure, with or without management. These factors combine to give each

Figure 12: Monthly Total Precipitation at Sea-Tac vs. All Lake Stations



This chart compares data from all the lake stations reporting data for water year 2000.

lake patterns of water level changes that are unique. Nonetheless, some common fluctuation patterns can be found between lakes. In general, lakes in urbanized watersheds commonly respond to precipitation events more quickly and have a greater fluctuation in water level than lakes in rural, undeveloped watersheds. Lakes with large watersheds may respond more slowly to precipitation but may experience a greater overall rise in water level than a lake with a smaller watershed.

2000 Lake Level Fluctuations

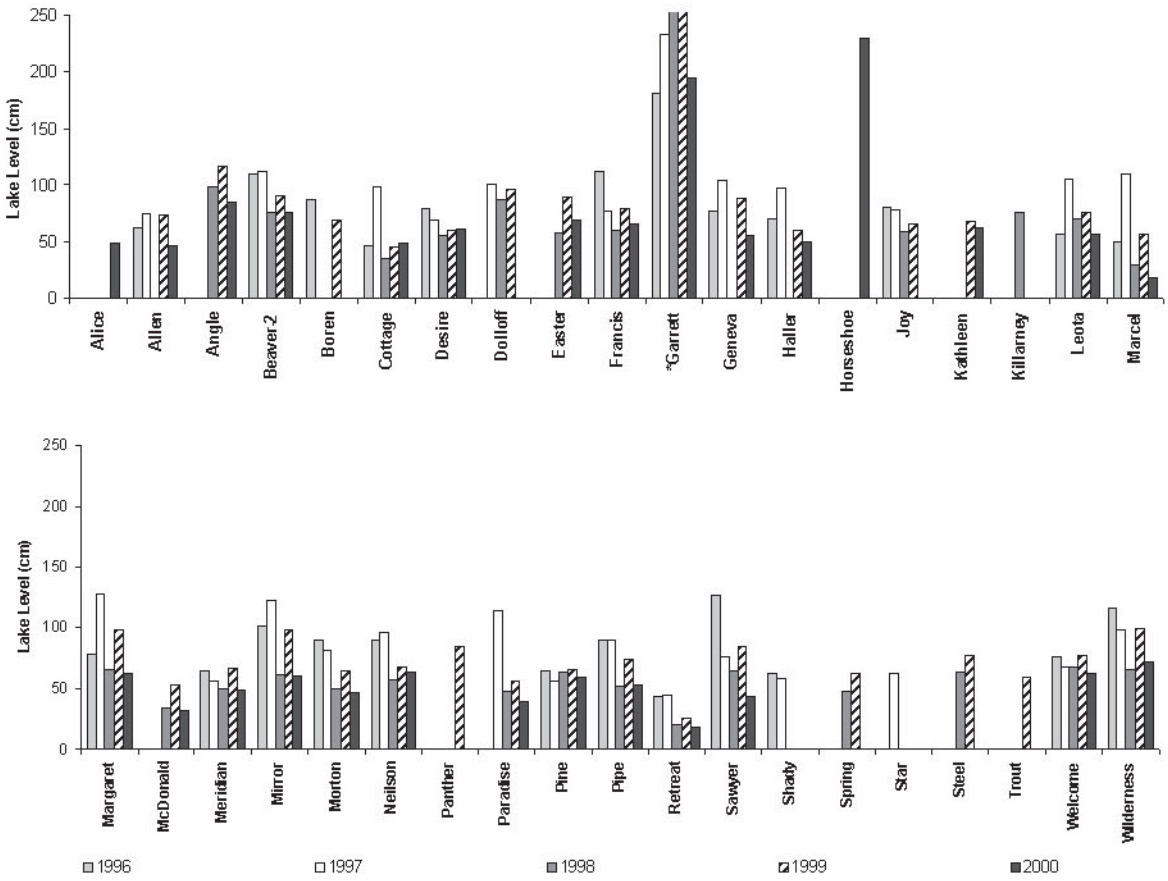
Seasonal fluctuations in water level data were observed at most lakes with complete data sets. Water levels were typically at their lowest during fall and steadily increased during late fall/early winter as precipitation increased (see Chapter 3, individual lake results). During the fall and winter, many lakes also show the greatest fluctuation in daily water level readings, as runoff from watershed with saturated soils quickly flows to the lakes and the excess flows through the outlet. This runoff pattern causes peaks in water levels to track large precipitation events (see Chapter 3, individual lake results).

The range in water level is the difference between the maximum and minimum levels over the entire year (Figure 13). Changes in a particular lake from year to year can be compared as well as the records between lakes. Lakes with very large fluctuations, such as Garrett and Horseshoe, show their high sensitivities to winter precipitation and run-off as well as to evaporation in summer. Lakes with small variations in water level, for example Retreat and McDonald, may be linked to ground water inputs, which are a steadier source of water through the year than rainfall. Some lakes are managed at the outlet for desired water levels, but this does not necessarily mean that the annual range will be small. For example, Lake Margaret is kept lower in the winter as a buffer against high inputs following rainstorms and is allowed to rise to high levels in the spring in order to store water for domestic use by homeowners in the area over the summer.

Where records are available for comparison, it can be noted that water level ranges were generally smaller in water year 2000 than in the previous five years. The largest ranges over the last five years are most often found in water year 1997. The total precipitation at the Sea-Tac station for that year was the highest in the five-year period (1312 mm, see Figure 10), so higher than normal water levels in winter are at least partially responsible for the large ranges found in that year. However, it is likely that evaporation rates in summer are important as well since 1996 and 1999 had similar rainfall totals, but the range in water levels were in general not as great.

The maximum high water level for the year can give you an idea of whether or not the lake was at its capacity for water storage (at or above the outlet height) before the dry season began each year as well as if it rose to unusual heights at any point during the wet season (Figure 14). It is not possible to compare levels from lake to lake because water height measurements for each lake are relative, based on the vertical placement of the fixed meter stick at the lake. However, you can get an idea of whether or not the lake was at capacity by comparing high precipitation years with low ones; for this report the best years to contrast would be 1997 with 1998. As an example, Cottage Lake is relatively constant for most years, with water above the threshold flowing through the outlet creek rapidly enough to maintain the winter level. However, in 1997, there was a period of much higher water inputs than the outlet could drain, and the lake level rose much higher. This kind of evidence can give clues regarding the unusually large water level ranges found for many lakes in 1997.

Figure 13: Annual Range in Water Level for Five Consecutive Years, Ending in 2000



Conclusions

Many volunteers recorded smaller water level fluctuations in 2000 than in the previous five years. Continued volunteer observation is important for determining how changes in precipitation patterns affect individual water levels. Ongoing monitoring will help lakeside residents, citizens in nearby communities, and city and county officials to understand more thoroughly the trends and relationships of water level fluctuations with precipitation, thus leading to more effective drainage management.

Color and Secchi Depth Transparency

The Secchi depth measures the relative transparency of water. Transparency can be affected by water color, algal population sizes and kinds of species present, and turbidity or suspended solids. In many western Washington lakes the water is often naturally stained yellow or brown from the presence of large organic molecules called "humic acids" that derive from decaying matter coming into the lake from the watershed soils and wetlands. This happens when soils tend to remain cool and wet through the year, such as those soils that are present under dense forest

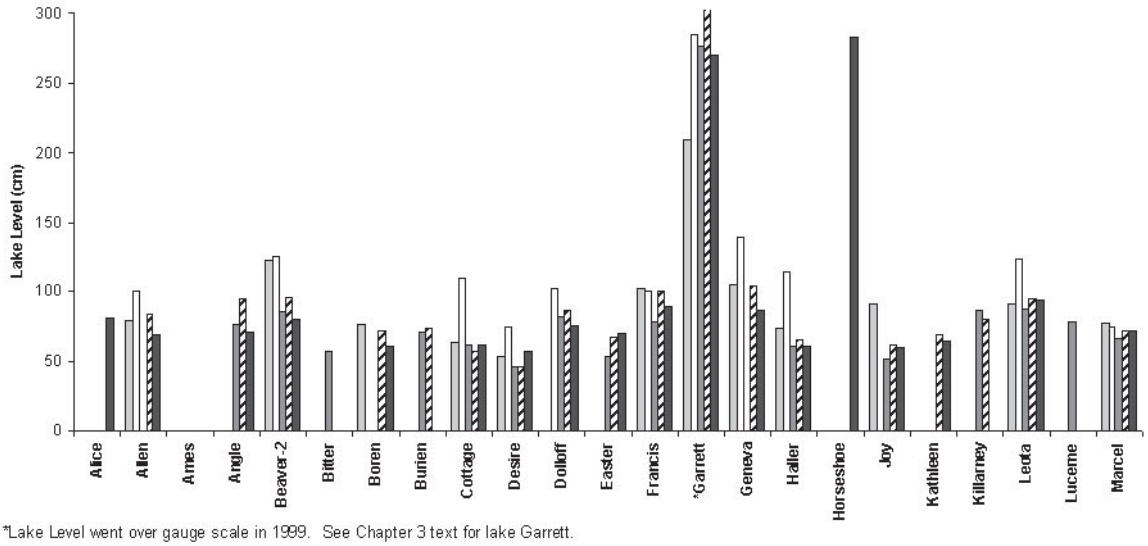
canopies. More plant material accumulates on the ground than can be broken down completely by bacteria, and thus humic acids are leached by ground water movement, eventually reaching the lakes. This staining of the water by organic acids reduces the water's transparency by reflecting some light waves entering the water and absorbing others. The yellow color of the water shows that wavelengths of light in the yellow range are particularly limited. Therefore, water color can be an indicator of soil decomposition rates in the watershed.

Transparency and color can also reflect algal abundance, major inputs of silt and detritus, and the result of human impacts on the land surrounding the lake. As transparency and water color are measured from year to year, changes may be observed and correlated with specific events (for example, algal blooms, storm water inputs, or changing land use activities).

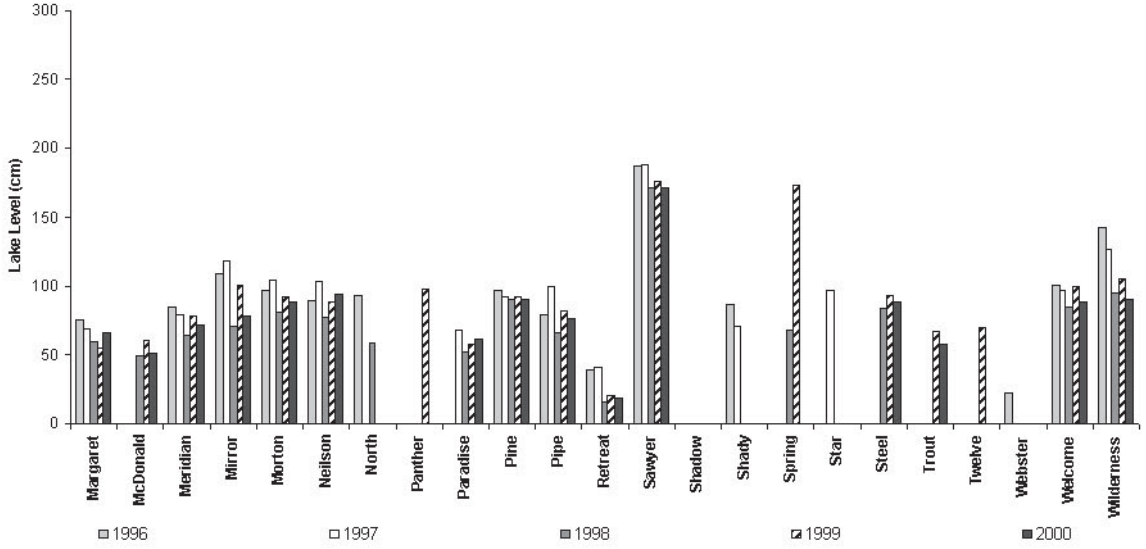
Color

Volunteers recorded the color of the lake water using a standardized color chart with assigned

Figure 14: Maximum Water Levels Recorded Over Five Years, Ending with 2000



*Lake Level went over gauge scale in 1999. See Chapter 3 text for lake Garrett.



colors and numerical ratings. Volunteers rated the water color on 41 lakes. The most frequently reported color ratings were golden to brown (4–5) through most of the year, which was the case for 28 lakes. The next most frequently reported colors were olive to gray (8–9) for five lakes. Three lakes reported colors closer to true green (3). Volunteers reported big changes for five lakes over time or varying greatly between sample dates. The data collected in 2000 was entered into the database, and is available upon request. However, specific correlation of the color data with other parameters was not carried out for the year, based upon the lack of close relationships observed in the past. Color rating was discontinued after water year 2000.

Secchi Depth Patterns

Average annual Secchi depths for lakes measured by Level I volunteers over the last five years can be divided into two groups: (1) lakes with average Secchi depth of four meters or less; and (2) lakes with average Secchi depth greater than four meters (Figure 15). A few lakes are right on the line, such as Morton, Pine and Sawyer. For many lakes, annual Secchi depth transparency has not changed significantly over the past five years. However, several possible trends can be observed by looking at lakes with five years of data. In particular, Lake Wilderness has shown an appreciable increase in clarity over the last five years, while Haller, Meridian, Paradise, and Beaver 2 lakes have also increased steadily, although at lower rates. The clarity in Lake Margaret has declined and needs careful monitoring to see if this will be a continuing trend, while the slight declines found for Mirror, Neilson (Holm), and Sawyer lakes may be within the range of annual variability.

In some cases, lower Secchi depths in lakes may be attributed to the input of storm water runoff. To evaluate this premise, Level I Secchi depths for 2000 were divided into two time periods (Figure 16) to see if potential influence of storm water runoff (November–February) could be separated from influences associated with summer algal blooms (July–August). Spring data was not included because both major storm events and large algae blooms can occur during that season, thus confusing the interpretation. Fall data was not included because although storm events are less likely before November, large algae blooms are also uncommon, thus the data is not likely to add information.

During the wet months, lower transparencies were observed for 10 of the 17 lakes in the program where comprehensive annual data exists for Secchi depth, indicating that storm water runoff may influence water clarity in these lakes to a greater degree than summer algal populations. In addition to storm water inputs, wave action (due to strong winds) and low light levels during the winter months may be an important factor influencing lower average Secchi depth measurements.

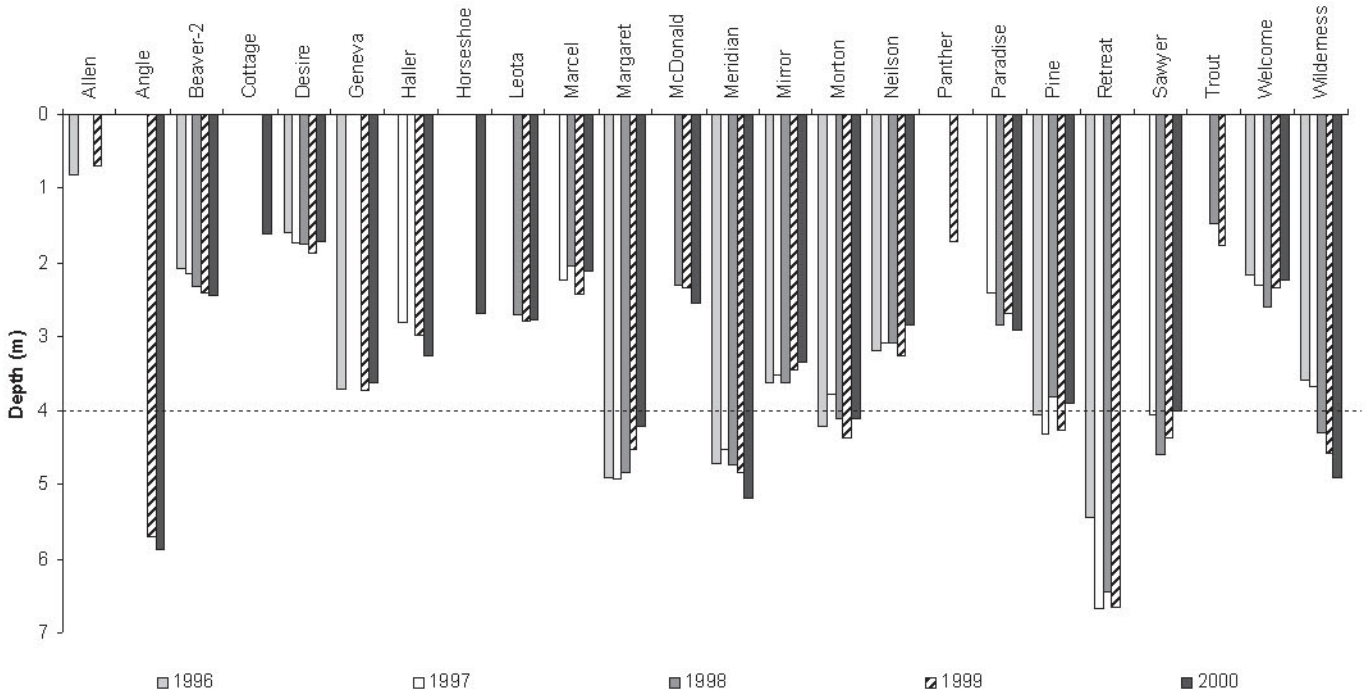
Conclusions

Average transparency values were similar to the previous year's values for many of the lakes with sufficient data for annual average calculations. Some lakes have shown a five-year increase in clarity, while others may have declined. Only Lake Margaret has a decline in transparency steady enough to warrant close attention, and it may not be a statistically verifiable trend. In our region, factors besides algal density influence the annual transparency measurements. Seasonal factors such as storm water inputs, lower light levels, and weather conditions can reduce water clarity during the wet winter months. Other factors, such as organic inputs, also influence water clarity. However, Secchi disk depth is a more accurate reflection of water clarity than the assigning of a water color number.

Lake Stratification

Seasonal changes in water chemistry in each lake relate to physical changes that occur with

Figure 15: Annual Secchi Range for Last Five Years, Ending with 2000



differences in water temperature. These chemistry changes are pronounced in thermally stratified lakes (see the water quality discussion and Figure 1 in Chapter 1). During spring and early summer, the combination of solar heating and mixing of the near surface water in the lake results in more warming of the upper portions of the water column than in the lower depths. This results in thermal "stratification" of a lake into stable layers of water with different temperatures and densities. Deeper lakes usually remain stratified throughout the summer, while shallow lakes exposed to wind tend to develop transient thermal stratification or none at all.

Effects of Stratification

Temperature patterns and thermal stratification influence fundamental processes and conditions in lakes such as dissolved oxygen concentrations, nutrient release, and algal growth. Since oxygen enters the water by contact with air, dissolved oxygen in deep water can be used up by bottom dwelling animals and bacteria, once stratification has occurred because there is no longer any contact between this layer of water and the air. Such anoxic (no oxygen) waters can stress fish like trout and salmon that require cool, oxygenated waters in order to survive.

In addition, if the hypolimnion becomes anoxic, chemical reactions can cause the sediments to release phosphorus into the water. When this water mixes with the surface waters as autumn cooling occurs, an algal bloom can result. Monitoring water chemistry differences between the epilimnion and hypolimnion provides a way to assess the role internal nutrient cycling plays in lake water chemistry.

2000 Profiles

Samples were taken at three depths for temperature, chlorophyll *a*, phosphorus, and nitrogen by Level II volunteer monitors (Table 3). The three depths were based on the depth measured at the sampling site and were placed at 1 meter from the surface, the middle of the water column, and one meter up from the bottom. These samples were collected in late June and again in late August, in order to characterize any changes in the water column over the summer. Lakes with stable stratification usually show the most dramatic differences in water chemistry between the top and bottom samples in late summer.

In the Pacific Northwest, most lakes that stratify have already done so by June and remain stratified in August; the temperatures will show this if comparisons are made between the top and bottom values. Shallow lakes such as Desire, Francis, Horseshoe, Jones, Killarney, and Marcel have very little difference between the temperatures at the top and bottom, or a larger difference on only one of the two dates, suggesting that stratification does not occur or is of short duration.

For many lakes, total phosphorus levels were typically larger in bottom water samples by August compared to surface (top) and mid-depth concentrations, suggesting that significant release of phosphorus from the sediments occurred over the summer months. The measurement of the total amount of phosphorus is not a direct measure of the phosphorus that is available for algal uptake, since the phosphorus contained in particles both organic and inorganic will be included in the assay. If any bottom sediments were disturbed during the sampling process and were incorporated in into the sample, measured levels might be very high indeed, but would not reflect what was actually present in the water in forms available for phytoplankton growth. However, it's likely that volunteers would have noticed excess sediment in the samples when taken and would have discarded the water if it included bottom sediments.

Very high concentrations of total phosphorus (> 200 µg/L) were found in the bottom samples of Lakes Allen, Beaver 1, Cottage, Geneva, Haller, McDonald, Paradise, and Star. Lakes Dolloff, Desire, and Meridian also had elevated

Figure 16: Wet/Dry Secchi Comparison

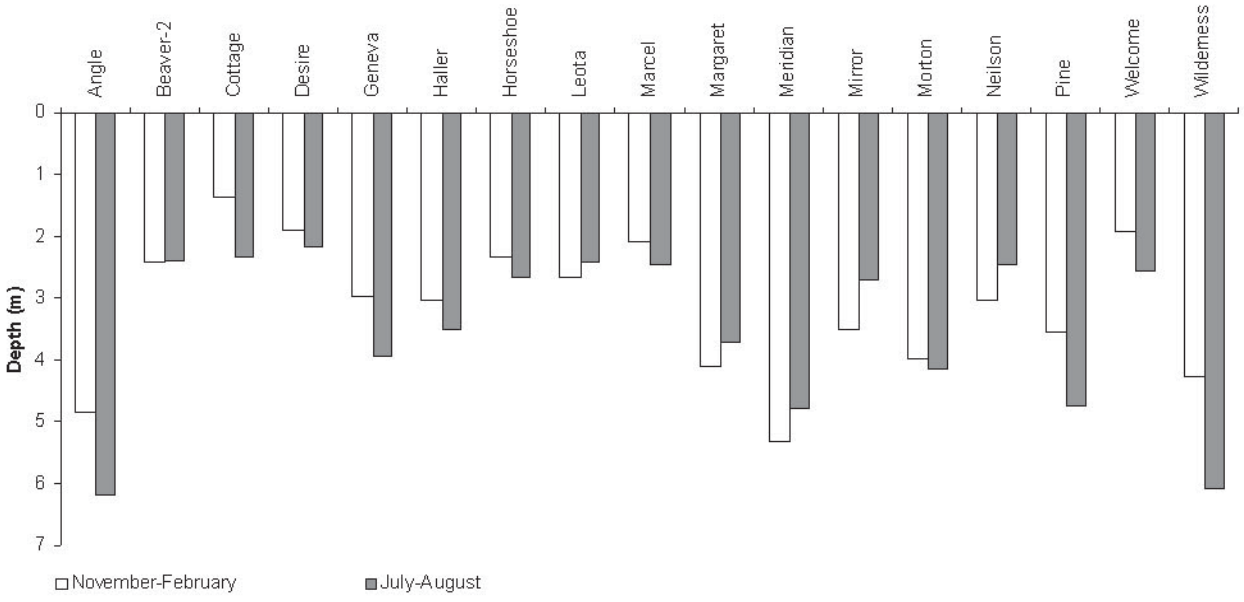


Table 3: Summer Profiles

LAKE	Date (2000	Depth	Secchi	Temp	Chlor-A	Total N	Total P
		m	m	deg C	µg/L	µg/L	µg/L
ALICE	26-Jun	1.0	4.00		1.7	278	8.2
		4.0			3.9	267	8.7
		8.0				489	32.5
	21-Aug	1.0	4.00	22.0	1.6	351	9.1
		4.0			2.1	380	13.1
		8.0				841	72.1
ALLEN	26-Jun	1.0	0.50	21.0	37.7	1010	38.0
		2.0		16.0	14.5	708	39.8
		3.5		10.0		746	208.0
	21-Aug	1.0	1.30	20.0	39.6	736	32.7
		2.0		18.0	38.2	756	42.2
		3.5		10.5		744	304.0
AMES	26-Jun	1.0	3.80	22.0	2.3	323	9.5
		4.0		16.0	5.1	426	15.5
		7.0		9.0		438	21.9
	21-Aug	1.0	3.80	22.0	1.2	280	10.7
		4.0		20.5	1.6	291	7.7
		7.0		11.0		1120	28.8
ANGLE	26-Jun	1.0	7.00	20.0	1.7	220	
		7.5		16.5	4.1	247	6.5
		15.0		8.0		665	24.5
	21-Aug	1.0		22.0	2.7	326	8.8
		8.0		20.0	5.0	346	12.1
		13.0		8.0		515	48.5
BEAVER 1	26-Jun	1.0	1.30	24.0	7.8	569	26.2
		7.0		5.5	0.5	552	25.2
		14.0		4.5		605	96.9
	21-Aug	1.0	1.30	20.5	5.1	603	27.7
		7.0		5.5	0.6	588	21.9
		14.0		5.0		1470	227.0
BEAVER 2	26-Jun	1.0	3.00	21.0	3.5	384	10.4
		7.0		8.0	5.0	496	9.4
		14.0		7.0		514	17.2
	21-Aug	1.0	3.00	21.0	3.0	348	9.3
		7.0		8.0	1.5	493	11.8
		14.0		7.0		653	41.0
BITTER	26-Jun	1.0	2.00	22.0	6.0	366	15.2
		4.0		17.0	7.8	336	14.0
		8.0		12.0		507	35.4
	21-Aug	1.0	3.00	21.0	3.2	345	10.7
		4.0		20.5	3.4	335	9.7
		8.0		12.0		939	91.7
BOREN	26-Jun	1.0	3.30	21.5	4.7	545	13.6
		5.0		13.0	9.2	668	11.9
		9.0		7.0		598	24.2
	21-Aug	1.0	3.30	20.5	4.2	316	11.5
		5.0		15.5	6.9	382	14.2
		9.0		7.0		940	53.1
BURIEN	26-Jun	1.0	3.80	22.0	3.0	373	10.6
		4.5			2.6	396	11.4
		8.0				423	26.1
	21-Aug	1.0	3.30	21.0	3.1	388	13.6
		4.0			3.0	429	16.5
		8.0		16.5		1080	51.2
COTTAGE	26-Jun	1.0	2.00	23.0	17.0	751	21.2
		3.5		15.0	19.7	799	26.6
		6.5		9.0		1940	373.0
	21-Aug	1.0	1.50	21.5	23.7	482	26.7
		3.5		20.0	120.0	592	45.3
		6.5		10.5		1290	410.0

LAKE	Date (2000	Depth	Secchi	Temp	Chlor-A	Total N	Total P
		m	m	deg C	µg/L	µg/L	µg/L
DESIRE	26-Jun	1.0	1.80	21.0	10.0	584	13.4
		6.2		11.0		903	142.0
	21-Aug	1.0	2.50		13.4	546	17.3
		3.0		20.5	19.7	566	21.0
		5.0		15.5		642	91.0
DOLLOFF	26-Jun			no sample			
	21-Aug	1.0	1.50	22.5	8.4	605	28.3
		3.0		18.0	6.9	799	58.5
		4.5		14.0		1080	105.0
FIVEMILE	26-Jun	1.0	1.00	25.0	6.3	1080	31.7
		5.0		9.0	0.9	998	18.4
		8.0		8.0		923	19.6
	21-Aug	1.0	1.00	21.5	4.8	681	17.9
		5.0		10.0	0.7	824	19.1
		9.0		6.5		788	47.7
FRANCIS	26-Jun	1.0	2.30	20.0	4.1	405	12.1
		2.0		17.5	16.5	527	24.4
	21-Aug	1.0	1.00	18.5	20.4	798	40.5
		2.0		17.0	7.4	749	34.2
GENEVA	26-Jun	1.0	4.00	20.5	1.7	362	9.0
		7.0		8.0	5.5	444	9.9
		13.0		6.0		704	210.0
	21-Aug	1.0	3.00	20.0	14.5	470	16.7
		7.0		9.5	7.7	422	20.9
		13.0		6.0		1410	377.0
HALLER	26-Jun	1.0	2.80	20.0	3.8	353	12.7
		5.0		11.0	12.3	547	30.1
		9.0		5.0		1900	299.0
	21-Aug	1.0	2.80	19.5	2.2	386	14.2
		5.0		11.0	13.7	958	59.2
		9.0		5.5		2290	317.0
HORSESHOE	26-Jun	1.0	3.50	22.0	2.1	610	11.0
		2.0		21.5	2.6	620	10.3
		3.0		21.0		583	11.2
	21-Aug	1.0	2.50	20.0	3.4	671	14.8
		2.0			4.1	622	14.6
		2.5				624	16.6
JONES	26-Jun	1.0	1.80	22.0	4.7	700	20.0
		1.5		22.0		635	19.8
	21-Aug	1.0	2.00	21.0	6.4	486	25.2
		5.0			5.7	498	25.6
JOY	26-Jun	1.0	4.00	24.0	3.2	374	8.3
	21-Aug	1.0	3.50	21.0	2.1	366	10.7
		7.0			34.4	441	15.3
		12.0				840	28.2
KATHLEEN	26-Jun	1.0	2.00	20.5	5.8	480	14.4
		3.0			18.9	568	22.2
		5.5				1090	47.5
	21-Aug	1.0	1.50	19.5	12.6	528	15.6
		3.0		19.0	4.0	562	21.9
		5.0		13.0		1690	35.2

LAKE	Date (2000	Depth	Secchi	Temp	Chlor-A	Total N	Total P
		m	m	deg C	µg/L	µg/L	µg/L
KILLARNEY	26-Jun	1.0	2.50	22.0	4.2	596	20.6
		2.0		20.0	7.0	612	31.1
		3.0		19.0		495	23.8
	21-Aug	1.0	3.00	21.0	10.8	590	27.1
		2.0		20.5	8.3	569	21.5
		2.8		20.0		586	19.2
LEOTA	26-Jun	1.0	2.50	22.0	13.7	459	20.2
		3.0		14.5	3.9	796	64.2
		6.0		6.5		703	44.9
	21-Aug	1.0	2.00	19.5	14.7	520	28.1
		3.0		17.5	11.4	549	37.4
		6.0		7.0		1140	44.9
LUCERNE	26-Jun	1.0	3.80	23.0	3.2	462	14.0
		3.0		20.0	3.0	346	8.9
		9.0		17.0		461	28.2
	21-Aug	1.0	4.00	22.5	2.4	330	8.6
		5.0		21.0	4.5	386	12.6
		9.0		9.0		652	43.0
MARCEL	26-Jun	1.0	2.50	23.0	7.7	839	14.4
		2.0		20.0	4.4	627	14.3
		3.2		16.5		1660	88.8
	21-Aug	1.0	2.20	21.0	8.1	436	18.0
		2.0		20.4	12.4	453	17.2
		3.5		19.3		553	21.7
MARGARET	26-Jun	1.0	3.80	20.0	4.0	302	10.3
		2.0		18.0	4.5	324	10.5
		4.0		15.5		308	9.3
	21-Aug	1.0	3.50	20.0	1.6	245	6.1
		6.0		12.0	4.5	368	11.2
		11.0		7.5		687	6.6
MCDONALD	26-Jun	1.0	4.00	22.5	5.0	522	23.9
		7.0		7.5	4.0	660	39.9
		12.0		5.0		1120	274.0
	21-Aug	no sample					
MERIDAN	26-Jun	1.0	4.80	20.0	1.5	274	7.5
		13.0		7.0	2.1	399	8.2
		25.0		6.0		588	86.5
	21-Aug	1.0	4.00	21.5	2.1	299	6.9
		13.0		7.5	1.0	410	6.9
		25.0		6.0		759	199.0
MIRROR	26-Jun	1.0	3.50	22.0	4.4	380	10.8
		3.3		20.0	7.8	450	20.3
		5.8		13.0		485	26.9
	21-Aug	1.0	2.80	23.0	5.0	452	20.5
		3.5			32.9	471	21.7
		6.0				830	21.8
MORTON	26-Jun	1.0	3.50	21.5	5.7	358	6.7
		2.5		20.5	1.8	375	8.7
		4.0		18.5		381	7.1
	21-Aug	1.0	3.00	21.5	2.1	392	6.7
		2.5		21.0	2.5	385	16.3
		4.0		21.0		377	6.2
NEILSON (HOLM)	26-Jun	1.0	2.80	23.0	2.2	403	8.9
		4.0		13.0	4.5	501	23.3
		8.0		5.5		639	27.0
	21-Aug	1.0	2.30	20.0	14.7	573	13.0
		4.0		13.0	9.4	558	23.0
		8.0		6.0		482	28.8

LAKE	Date (2000	Depth	Secchi	Temp	Chlor-A	Total N	Total P
		m	m	deg C	µg/L	µg/L	µg/L
PANTHER	21-Aug	1.0	0.25	17.0	5.5	718	24.1
		1.5		17.0	17.6	916	47.8
	26-Jun	1.0	2.00	17.0	3.1	730	22.5
		1.5			4.3	773	19.6
PARADISE	26-Jun	1.0	2.50	18.0	7.9	416	17.1
		4.0		8.0	60.4	528	19.5
		7.5		6.0		1190	431.0
	21-Aug	1.0	2.00	18.0	14.9	350	20.9
		4.0		13.5	34.4	747	59.8
		8.0		8.0		1870	523.0
PINE	26-Jun	1.0	4.50	20.5	4.7	309	13.9
		6.0		14.0	1.9	307	7.4
		10.0		8.0		648	51.8
	21-Aug	1.0	5.00	21.0	3.3	363	8.0
		6.0		19.0	3.3	382	10.1
		10.0		9.0		885	71.6
PIPE	26-Jun	1.0	4.80	22.5	1.2	330	7.4
		10.0		11.0	26.9	700	19.6
		19.0		6.5		622	7.6
	21-Aug	no sample					
RETREAT	26-Jun	1.0	7.00	19.5	1.6	440	
		7.0		17.0	4.4	523	
		11.5		12.0		205	9.8
	21-Aug	1.0	9.00	22.0	1.7	379	6.4
		7.0		20.5	2.1	406	
		11.0		15.0		371	15.2
SAWYER	26-Jun	1.0	7.30	19.5	3.7	239	5.1
		8.0		16.0	6.4	669	8.9
		16.5		15.5		782	30.0
	21-Aug	1.0	4.30	22.0	1.9	223	8.2
		8.0		18.0	5.5	632	19.4
		16.5		18.0		656	51.7
SHADOW	26-Jun	1.0	4.00	23.0	2.6	613	16.6
		6.0		8.0	2.6	803	10.8
		12.5		7.0		773	36.1
	21-Aug	1.0	2.50	22.5	3.7	484	14.7
		6.0		9.0	6.2	771	14.9
		12.0		6.0		788	80.8
SHADY	26-Jun	1.0	4.00	23.3	2.0	305	6.2
		6.0		9.0	12.2	612	11.9
		12.0		5.6		1340	9.6
	21-Aug	1.0	5.30	22.2	1.1	329	6.3
		6.0		14.0	6.6	361	11.4
		12.0		6.0		1370	14.7
SPRING	26-Jun	1.0	2.00	24.0	5.6	431	10.5
		4.0		14.5	4.7	562	9.9
		7.5		8.0		590	11.0
	21-Aug	1.0	2.50	21.0	1.9	370	8.1
		4.0		14.5	4.9	355	10.7
		8.0		8.0		829	75.5
STAR	26-Jun	1.0	3.30	22.0	1.3	352	9.8
		7.0		10.5	3.9	481	12.3
		14.0		5.5		1130	136.0
	21-Aug	1.0	5.80	21.5	2.8	295	9.4
		7.0		12.5	3.6	349	8.8
		14.0		6.0		1840	220.0

LAKE	Date (2000)	Depth	Secchi	Temp	Chlor-A	Total N	Total P
		m	m	deg C	µg/L	µg/L	µg/L
STEEL	26-Jun	1.0		23.0	3.4	370	8.6
		3.0		22.0	3.8	382	20.4
		6.0		18.5		335	18.0
	21-Aug	no sample					
TROUT	26-Jun	1.0	2.00	22.0	6.1	898	17.6
		4.0		9.0	3.6	1110	22.1
		7.0		7.0		1400	98.2
	21-Aug	1.0	2.00	21.0	8.8	717	52.2
		4.0		11.0	17.8	687	35.2
		7.0		7.0		1730	229.0
TWELVE	26-Jun	1.0	4.30	23.0	4.3	375	10.6
		4.0		21.0	5.5	361	9.4
		6.5		20.5		495	20.0
	21-Aug	1.0	2.40	22.0	4.7	475	14.9
		4.0			23.5	537	21.4
		7.0				510	13.3
WALKER	26-Jun	1.0	4.80	18.0	1.3	268	10.8
		8.0		6.0	2.9	498	15.4
		13.5		4.5		1080	204.0
	21-Aug	1.0	5.80	19.5	4.3	347	17.2
		8.0		7.0	2.4	506	13.2
		13.0		5.0		2130	343.0
WELCOME	26-Jun	1.0	2.70	21.0	4.1	420	10.3
		2.0		18.5	8.5	463	12.7
		3.5		13.7		440	13.0
	21-Aug	1.0	2.10	20.6	13.8	501	19.8
		2.0		20.0	34.7	568	19.4
		3.5		15.7		582	34.3
WILDERNESS	26-Jun	1.0	7.00	22.0	1.8	431	17.6
		4.0		17.0	2.4	425	13.7
		8.0		20.0		648	60.8
	21-Aug	1.0	6.50	22.0	2.1	289	16.0
		5.0		21.5	2.8	317	15.6
		8.5		11.5		3470	607.0

phosphorus levels, but at a lower level. For these lakes, phosphorus increases from internal cycling likely increases the potential for algal growth, which subsequently affects trophic status ratings. For most of the other lakes, internal phosphorus release due to anoxia probably does not contribute significantly to the phosphorus budget.

Total nitrogen showed very similar patterns, but not precisely the same relationships from lake to lake. The chemistry of nitrogen forms is more complex than phosphorus, and it is generally of less concern for management strategies because it is not often the nutrient in least supply for algae in the lakes of King County.

Conclusions

Many lakes in King County exhibit some degree of thermal stratification by the beginning of summer. Some of the shallow lakes remain unstratified, due to diffusion of heat through the water column and mixing actions by wind. In lakes with stable thermoclines, nutrient concentrations were higher in the bottom sample during one or both profile sampling dates. Phosphorus is of more concern than nitrogen for most of the lakes in our region.

Trophic State Index

Water quality of lakes can be classified based on parameters reputed to represent biological activity, by calculating the Trophic State Index (TSI). The TSI provides a standard measure to rate lakes on a scale of 0 to 100. Each major division (10, 20, 30, and so on) correlates with a doubling of algal biomass and is related to nutrient and transparency levels (Carlson 1977). TSI values are calculated from linear regression relationships established by Carlson (1977) for each parameter. The index is based on the summer mean values of three commonly measured lake parameters: Secchi depth, total phosphorus, and chlorophyll *a* (Table 4). Carlson points out that lakes that are highly colored from dissolved organic matter may give erroneously high TSI ratings for Secchi transparency.

Additionally, it is important to note that the total phosphorus measure is most reliable for lakes that are phosphorus limited in algal nutrition.

2000 TSI Ratings

TSI values were calculated for the three parameters on each sampling date for the 46 lakes monitored by Level II volunteers (Table 4), and an average was produced for the season to characterize each lake. The assigned trophic classifications were based on these averages. Where average TSI ratings were near the boundary between classifications (within 0.9 of the transition point), both categories were listed to show threshold status.

In general, lakes with TSI values less than 40 are considered oligotrophic, characterized as having low biological activity. Oligotrophic lakes typically have high transparency (large Secchi depths), and low chlorophyll *a* and total phosphorus concentrations. Fifteen lakes, including Alice, Ames, Angle, Joy, Lucerne, Margaret, Meridian, Morton, Pine, Retreat, Sawyer, Shady, Star, Steel, and Walker all had TSI values less than 40 and are rated oligotrophic.

Lakes on the threshold between oligotrophic and mesotrophic in 2000 included Geneva, Pipe, and Wilderness. Mesotrophic lakes have TSI ratings between 40 and 50. They are considered to be transitional between being relatively nonproductive and very productive biologically. In 2000, the ten lakes falling into this category included Beaver 2, Bitter, Boren, Burien, Haller, Horseshoe, Shadow, Spring, Twelve, and Welcome. Fivemile, Kathleen, and Panther Lakes were on the threshold between mesotrophy and eutrophy (the "very productive" category). Lakes that have TSI values greater than 50 are considered eutrophic, characterized by high biological productivity. Ten lakes were rated eutrophic in 2000, included were Allen, Beaver 1, Cottage, Desire, Dolloff, Francis, Marcel, McDonald, Paradise, and Trout. Lakes considered eutrophic generally have low transparencies and high chlorophyll *a* and total phosphorus concentrations.

If colored water is giving a lake a higher TSI rating than it deserves, the Secchi TSI values should be significantly higher than the chlorophyll *a* and total phosphorus TSI ratings for that lake. All TSI ratings for lakes with eutrophic and threshold eutrophic ratings were examined for inconsistencies between ratings in the three parameters. Only lakes with TSI ratings near the thesholds might have the average rating unduly influenced by water color. Both Beaver 1 and Fivemile lakes had trophic ratings potentially affected this way.

Conclusions

The TSI rating can be useful in the comparison of the water quality of particular lakes over time. It may also be used to assess potential sensitivity of each lake to additional nutrient inputs, such as might be caused by changes in land use within a watershed, although there are many other factors that need to be taken into account as well. Most lakes in the Lake Stewardship sampling program maintained relatively constant TSI ratings from year to year. This is because the calculation is not sensitive to minor variation in the average concentrations of the parameters used, and additionally, variations are often cancelled out when the three parameters are averaged to determine the overall rating.

Total Phosphorus

Twenty-nine of the 35 lakes with multiple years of Level II data yielded similar or lower total phosphorus concentrations when compared with the last two years (Figure 17). Most of these values were probably within the limits of interannual variability. However, total phosphorus has been dropping steadily over the last five years in several lakes, notably Boren, Dolloff, Killarney, McDonald, Trout, Welcome, and Wilderness. Cottage Lake and Lake Desire have also dropped, but in a step-wise fashion, with higher levels in 1996–1997, followed by lower

Table 4: TSI Portrait

Seasonal averages

year	# dates	(m) Secchi	N:P	TSI Secchi	TSI Chl-*a*	TSI Tot P	TSI mean	Trophic rating
	Alice							
1996								
1997								
1998								
1999								
2000	13	4.0	36.2	40.1	38.4	35.6	38.0	O
	Ames							
1996								
1997								
1998								
1999								
2000	13	3.6	46.9	41.6	39.1	33.7	38.1	O
	Beaver-1							
1996								
1997	12	1.4	18.0	55.6	57.8	54.3	55.9	E
1998	13	1.4	19.6	55.1	48.0	51.9	51.7	E
1999	13	1.4	25.3	54.8	50.9	47.6	51.1	E
2000	13	1.3	26.3	56.9	48.9	48.3	51.0	E
	Bitter							
1996								
1997	9	3.3	17.8	42.6	43.7	46.5	44.3	M
1998	11	3.5	23.8	42.1	44.3	42.9	43.1	M
1999	12	2.9	24.5	44.8	49.6	43.8	46.1	M
2000	13	3.2	30.9	43.3	42.7	40.1	41.9	M
	Burien							
1996								
1997								
1998	6	3.2	25.7	43.4	39.3	42.1	41.6	M
1999								
2000	11	2.9	31.4	45.2	43.2	40.8	43.1	M
	Desire							
1996	12	1.6	15.9	53.4	56.0	59.5	56.3	E
1997	12	1.6	12.9	52.8	56.7	58.4	56.0	E
1998	12	2.1	17.8	49.4	54.5	51.0	51.6	E
1999	13	1.7	21.3	52.7	60.1	51.4	54.7	E
2000	13	1.8	30.2	53.0	56.5	48.5	52.7	E
	Fivemile							
1996	12	1.1	38.4	58.3	49.2	50.5	52.6	E
1997	12	1.1	30.0	58.7	46.9	50.9	52.2	E
1998	13	1.0	47.2	59.7	49.6	45.0	51.4	E
1999	13	1.2	56.5	57.9	49.2	44.1	50.4	M-E
2000	12	1.0	47.3	59.9	45.9	46.0	50.6	M-E
	Geneva							
1996	12	4.4	32.5	38.6	44.7	42.5	41.9	M
1997	12	4.5	16.0	38.3	42.9	51.1	44.1	M
1998	11	4.7	29.4	37.8	39.0	41.8	39.5	O-M
1999	12	4.5	35.7	38.4	39.5	40.6	39.5	O-M
2000	13	4.0	36.0	40.4	41.4	39.5	40.4	O-M

year	# dates	(m) Secchi	N:P	TSI Secchi	TSI	TSI	TSI	Trophic rating
	Allen							
1996	12	0.8	17.1	63.0	67.1	60.8	63.6	E
1997	12	0.5	12.9	68.8	68.9	64.3	67.3	E
1998	13	0.7	18.6	64.5	65.6	59.3	63.1	E
1999	13	0.5	20.2	70.6	70.2	60.9	67.2	E
2000	13	0.8	24.9	64.4	58.3	54.2	58.7	E
	Angle							
1996								
1997	9	7.5	23.5	30.9	35.5	40.6	35.7	O
1998	13	6.6	34.9	32.9	38.6	33.7	35.1	O
1999	13	5.4	35.5	35.7	40.8	35.5	37.3	O
2000	13	5.5	40.0	35.9	37.7	34.1	35.9	O
	Beaver-2							
1996	9	2.6	22.9	46.0	44.6	47.8	46.1	M
1997	12	2.5	20.3	46.7	52.1	46.5	48.4	M
1998	13	2.3	25.7	48.2	56.2	42.6	49.0	M
1999	13	2.5	30.7	47.0	48.2	40.9	45.4	M
2000	13	2.8	43.0	45.2	44.6	36.0	41.9	M
	Boren							
1996								
1997	11	2.9	20.3	44.7	48.3	48.1	47.0	M
1998	13	3.3	28.2	42.7	48.6	42.8	44.7	M
1999	13	3.7	33.0	41.2	43.2	41.2	41.9	M
2000	12	3.5	39.2	42.2	43.2	39.3	41.6	M
	Cottage							
1996	12	2.4	16					E
1997	12	2.3	18.0	48.2	52.3	55.8	52.1	E
1998	12	2.9	27.2	44.7	47.5	51.4	47.9	M
1999	9	1.9	32.8	50.8	55.9	51.2	52.7	E
2000	12	1.7	33.7	53.4	55.6	49.9	53.0	E
	Dolloff							
1996	12	1.7	16.3	52.6	67.2	61.2	60.4	E
1997	11	1.3	16.2	56.0	61.8	59.8	59.2	E
1998	11	1.5	23.1	54.0	60.3	55.8	56.7	E
1999	11	1.6	26.6	53.0	56.4	50.9	53.4	E
2000	9	1.4	25.0	55.5	55.2	53.7	54.8	E
	Francis							
1996	12	2.0	20.2	50.3	47.5	50.9	49.6	M-E
1997	11	1.9	19.6	50.7	47.0	50.2	49.3	M-E
1998	13	1.9	21.1	50.4	57.9	51.2	53.2	E
1999	13	2.0	24.6	50.0	51.6	47.3	49.6	M-E
2000	12	1.8	23.8	52.8	56.2	50.9	53.3	E
	Haller							
1996								
1997	12	2.7	18.7	45.9	45.6	48.8	46.8	M
1998	13	3.1	20.8	43.6	42.6	45.3	43.8	M
1999	13	3.1	24.5	43.6	43.9	44.1	43.9	M
2000	13	2.9	24.3	45.0	44.6	44.5	44.7	M

TSI = trophic state index

O= oligotrophic

M= mesotrophic

E= eutrophic

Seasonal averages

year	# dates	(m) Secchi	N:P	TSI Secchi	TSI Chl-*a*	TSI Tot P	TSI mean	Trophic rating
Horseshoe								
1996								
1997								
1998								
1999								
2000	12	2.6	51.8	47.5	40.2	42.0	43.2	M
Joy								
1996								
1997								
1998								
1999								
2000	10	4.2	58.9	40.9	39.4	32.8	37.7	O
Killarney								
1996	12	2.6	13.8	46.2	48.1	58.1	50.8	M-E
1997	10	2.4	15.2	47.2	55.3	55.9	52.8	E
1998	12	2.1	17.2	49.1	56.5	53.9	53.2	E
1999	12	2.7	23.6	45.7	47.3	47.9	47.0	M
2000	11	2.6	24.9	46.4	49.5	49.9	48.6	M
Lucerne								
1996	7	5.3	26.9	35.9	36.6	41.5	38.0	O
1997	12	4.2	33.3	39.2	38.1	42.8	40.0	O-M
1998	13	5.6	38.9	35.1	32.1	35.9	34.4	O
1999	13	4.2	35.7	39.3	46.3	40.0	41.9	M
2000	12	4.1	45.3	40.0	39.7	36.1	38.6	O
Margaret								
1996								
1997								
1998								
1999								
2000	13	4.2	56.6	39.6	41.8	29.2	36.9	O
Meridian								
1996								
1997	10	4.7	22.4	37.8	37.2	43.8	39.6	O-M
1998	13	4.4	35.8	38.6	39.3	36.4	38.1	O
1999	13	4.5	34.1	38.2	41.6	36.7	38.9	O
2000	12	4.9	54.3	37.5	38.0	29.8	35.1	O
Morton								
1996	12	3.3	35.3	43.0	44.3	40.3	42.5	M
1997	12	3.4	32.5	42.3	42.5	43.3	42.7	M
1998	13	3.9	35.1	40.3	40.3	39.9	40.1	O-M
1999	12	3.3	43.0	42.6	43.0	35.9	40.5	O-M
2000	13	3.7	48.9	41.2	41.5	33.9	38.9	O
Panther								
1996	10	1.3	15.6	55.8	60.6	63.9	60.1	E
1997								
1998								
1999								
2000	11	0.9	29.5	41.9	42.3	38.7	40.9	E

year	# dates	(m) Secchi	N:P	TSI Secchi	TSI	TSI	TSI	Trophic rating
Jones								
1996								
1997								
1998								
1999								
2000	13	1.8	32.4	51.6	45.8	47.4	48.3	M
Kathleen								
1996	11	2.4	21.5	47.4	51.1	49.0	49.2	M-E
1997	7	2.2	20.8	48.4	51.8	49.2	49.8	M-E
1998	9	2.6	23.8	46.4	51.6	47.9	48.6	M
1999	7	2.3	31.5	48.3	53.0	42.5	47.9	M
2000	13	1.8	30.6	52.1	51.9	45.9	50.0	M-E
Leota								
1996								
1997								
1998	7	2.4	26.8	47.6	45.6	43.8	45.7	M
1999	11	3.0	31.4	44.4	52.8	48.3	48.5	M
2000	13	2.6	28.7	46.7	51.9	47.7	48.8	M
Marcel								
1996								
1997								
1998								
1999								
2000	13	2.0	44.3	51.0	57.2	44.6	51.0	E
McDonald								
1996	10	2.7	18.2	45.9	61.8	56.4	54.7	E
1997	9	2.0	17.5	50.1	59.9	55.3	55.1	E
1998	12	2.3	22.3	48.2	61.5	53.8	54.5	E
1999	13	2.3	24.7	48.3	59.2	54.5	54.0	E
2000	10	2.7	26.6	46.4	53.0	48.7	49.3	M-E
Mirror								
1996								
1997	12	2.9	14.4	44.8	46.6	52.7	48.0	M
1998	13	3.2	29.7	43.2	52.7	40.7	45.5	M
1999	13	3.2	24.8	43.3	58.3	44.4	48.7	M
2000	13	3.2	28.8	43.7	48.6	43.4	45.2	M
Neilson								
1996	4	3.8						
1997	12	2.9	27.2	44.5	51.3	45.8	47.2	M
1998	13	3.4	34.1	42.6	44.6	41.3	42.8	M
1999	13	3.1	35.8	43.6	47.0	41.9	44.1	M
2000	13	2.4	35.9	47.8	50.0	43.7	47.2	M
Paradise								
1996	12	2.5	13.9	46.9	52.9	56.8	52.2	E
	12	2.0	15.2	50.2	61.6	57.4	56.4	E
	13	2.6	19.1	46.3	56.0	53.1	51.8	E
	13	2.5	21.3	46.7	62.5	54.3	54.5	E
2000	12	2.5	19.4	47.5	61.2	53.3	54.0	E

Seasonal averages

year	# dates	(m) Secchi	N:P	TSI Secchi	TSI Chl-*a*	TSI Tot P	TSI mean	Trophic rating
	Pine							
1996	11	4.6	25.7	38.1	43.1	42.3	41.2	M
1997	12	5.0	26.0	36.7	39.0	43.3	39.7	O
1998	13	4.4	36.3	38.7	41.5	37.4	39.2	O
1999	13	4.6	43.3	38.0	41.4	33.5	37.6	O
2000	12	4.5	41.9	38.5	42.3	35.9	38.9	O
	Retreat							
1996	12	5.5	51.8	35.4	41.1	39.9	38.8	O
1997	12	6.0	32.0	34.1	42.7	43.7	40.1	O-M
1998	12	6.9	57.0	32.2	40.3	31.3	34.6	O
1999	11	7.4	92.1	31.1	39.3	26.5	32.3	O
2000	13	7.0	122	32.8	39.5	26.8	32.9	O
	Shadow							
1996								
1997	6	2.4	35.2	47.6	43.1	41.9	44.2	M
1998	12	2.7	29.6	45.7	43.3	45.8	45.0	M
1999								
2000	8	3.9	36.6	42.5	43.4	40.6	42.1	M
	Spring							
1996	12	2.5	34.6	46.7	42.4	42.9	44.0	M
1997	12	2.0	20.8	50.0	56.7	47.1	51.2	E
1998	13	2.8	32.8	45.0	44.0	41.0	43.3	M
1999	13	2.7	48.1	45.9	45.6	36.8	42.8	M
2000	12	2.4	43.6	47.4	43.4	37.7	42.9	M
	Steel							
1996	10	4.2	21.0	39.4	45.0	44.8	43.0	M
1997	11	3.5	17.5	41.8	49.4	48.7	46.7	M
1998	13	3.4	27.2	42.5	51.2	40.9	44.9	M
1999	12	3.7	26.2	41.2	46.6	40.4	42.7	M
2000	8	4.9	31.5	37.2	39.2	39.2	38.6	O
	Twelve							
1996	11	2.7	29.0	45.6	46.3	43.0	45.0	M
1997								
1998	11	3.9	42.2	40.3	43.6	33.4	39.1	O-M
1999								
2000	13	2.9	45.7	44.9	45.6	36.5	42.3	M
	Welcome							
1996	12	2.2	19.5	48.4	55.1	52.6	52.0	E
1997	12	2.5	23.1	46.8	47.1	50.7	48.2	M
1998	13	2.8	28.3	45.3	56.3	48.0	49.9	M
1999	13	2.6	35.7	46.5	53.5	43.8	47.9	M
2000	13	2.3	39.7	48.2	48.4	43.0	46.5	M

year	# dates	(m) Secchi	N : P	TSI Secchi	TSI Chl-*a*	TSI Tot P	TSI mean	Trophic rating
	Pipe							
1996	12	4.4	33.2	38.7	42.0	39.9	40.2	M
1997	12	4.3	20.5	39.1	37.6	47.4	41.4	M
1998	11	5.0	37.6	36.8	34.8	35.5	35.7	O
1999	10	4.5	44.8	38.5	46.5	38.6	41.2	M
2000	11	4.0	50.6	40.6	42.6	36.2	39.6	O-M
	Sawyer							
1996	12	4.3	27.0	39.1	44.3	43.9	42.4	M
1997	12	4.8	16.8	37.5	43.3	48.5	43.1	M
1998	13	4.8	30.6	37.5	45.6	36.9	40.0	O-M
1999	13	4.5	38.4	38.4	46.3	36.1	40.2	O-M
2000	13	5.4	35.6	37.3	43.7	36.1	38.8	O
	Shady							
1996	12	4.0	35.1	39.9	46.6	42.1	42.9	M
1997	12	4.3	29.8	39.1	41.9	44.0	41.7	M
1998	13	5.2	41.8	36.1	38.2	34.6	36.3	O
1999	13	4.8	56.0	37.3	41.6	31.1	36.7	O
2000	13	4.0	65.9	41.4	41.5	33.5	38.5	O
	Star							
1996	12	4.2	34.9	39.3	37.1	38.9	38.4	O
1997	10	5.0	18.8	36.7	40.4	48.4	41.8	M
1998	9	4.8	30.7	37.5	40.9	37.0	38.5	O
1999	11	5.5	44.1	35.3	38.7	34.1	36.0	O
2000	13	5.3	48.6	36.4	40.5	32.1	36.3	O
	Trout							
1996	12	1.9	19.6	50.8	47.0	62.6	53.5	E
1997	12	1.5	22.7	54.6	56.6	56.0	55.7	E
1998	13	1.7	32.6	52.3	55.5	51.0	52.9	E
1999	13	1.8	30.7	51.6	51.3	53.3	52.1	E
2000	13	1.8	38.5	51.7	52.0	49.3	51.0	E
	Walker							
1996								
1997								
1998								
1999								
2000	10	5.7	30.4	35.0	40.6	37.6	37.7	O
	Wilderness							
1996	12	4.9	16.6	37.2	45.1	49.7	44.0	M
1997	12	4.2	20.2	39.2	48.0	46.5	44.5	M
1998	12	5.4	19.9	35.7	39.6	45.7	40.3	0-M
1999	13	5.6	26.8	35.2	46.2	44.6	42.0	M
2000	13	5.6	25.3	35.4	42.6	44.0	40.7	0-M

TSI = trophic state index

O= oligotrophic

M= mesotrophic

E= eutrophic

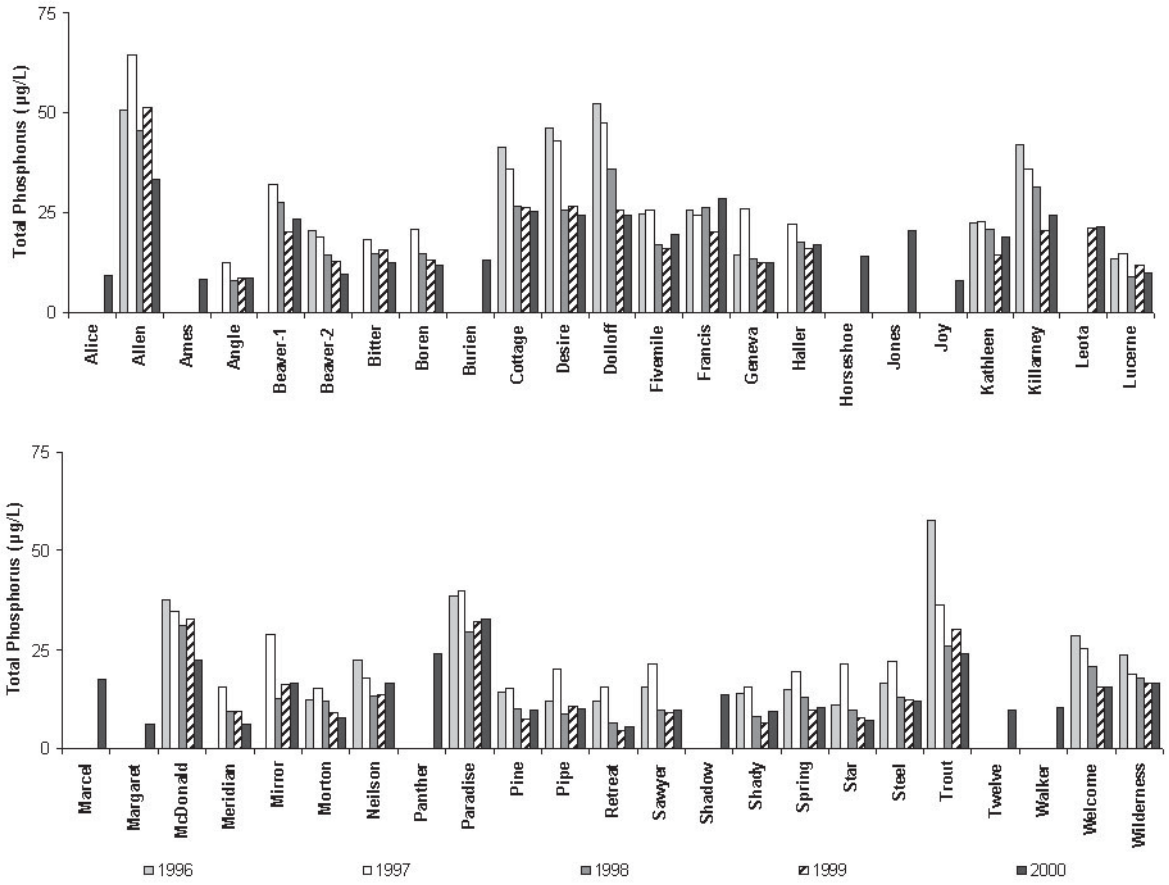
levels in 1998,1999, and 2000. Other lakes may also be declining in total phosphorus, but the record is clouded by one or more higher years. Twelve lakes were reporting Level II data for the first time and so will need several more years of data collection before patterns begin to emerge.

No lake is showing a steady increase over the last five years of data collection, which is very good news for citizen stewards and managers. Although five years is not a long enough period of time to document long term trends in a statistically significant way, it certainly can point to lakes that need careful attention paid to them.

Total Chlorophyll *a*

Variability is much greater between years in chlorophyll *a* concentrations than it is for total phosphorus. This is not surprising, since algal species in a lake can vary from year to year. Different species of algae often have differing amounts of chlorophyll per cell, and in addition, that amount can vary with the health and age of each as well. For example, large blooms of bluegreens (cyanobacteria) may yield less chlorophyll than equivalent blooms of green algae (chlorophytes) because many bluegreens have accessory pigments as well as chlorophyll that are used to capture light for photosynthesis.

Figure 17: Total Phosphorus Average May-October for Last Five Years, Ending in 2000



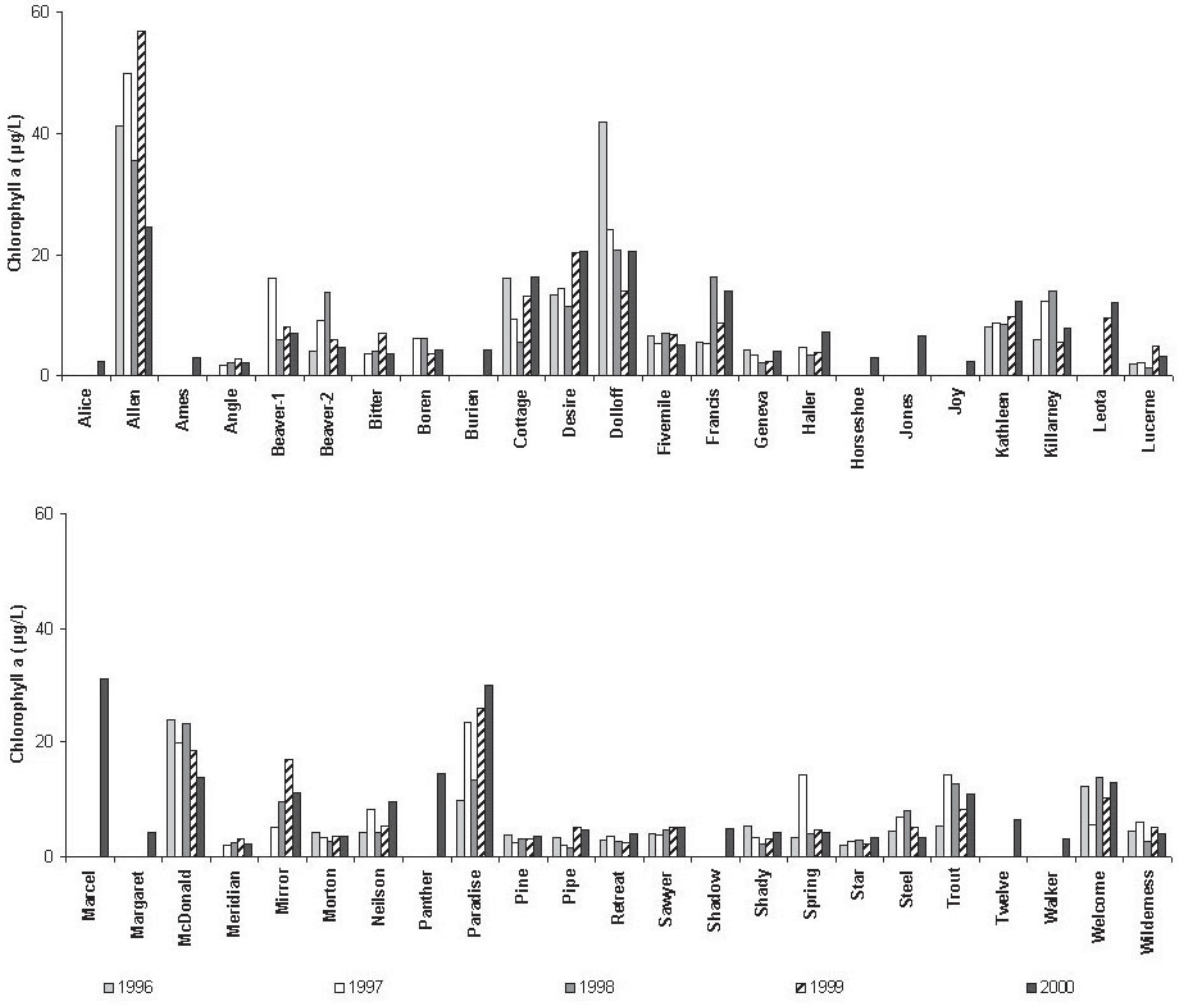
However, the annual May–October averages of chlorophyll (Figure 18) demonstrate that most of the lakes in the program have similar concentrations from year to year. Several lakes are consistently higher than others, such as Allen, Cottage, Desire, Dolloff, McDonald, and Paradise. Marcel, in its first year of data collection, may also be in this group. A few lakes have one or significantly higher year, such as Beaver 1, Beaver 2 (oddly enough, these are in different years), Mirror, and Spring. Such values can be anomalous and not repeated in the future, but also may be indications of ephemeral blooms that were sampled in a particular year, but missed in others because of the two week period in between sample collection dates.

Nitrogen: Phosphorus Ratios

Many water quality problems in lakes can be related to high concentrations of plant nutrients that stimulate the growth of algae and aquatic plants. In most fresh water systems in temperate climates, the nutrient that limits plant growth is most often phosphorus, although it can be nitrogen on occasion and rarely even silica or iron. Before trying to manage water quality problems, knowing which nutrient limits plant growth is important.

One easy nutrient assessment can be made by calculating the nitrogen to phosphorus ratio (N:P) for an individual lake. Generally, nitrogen

Figure 18: Chlorophyll *a* Average for Last Five Years, Ending in 2000



to phosphorus ratios of 17:1 or greater suggest that phosphorus limits algal growth (Carroll and Pelletier, 1991). This ratio varies throughout the growing season with some lakes being primarily phosphorus limited, but occasionally nitrogen limited.

Lower nitrogen to phosphorus ratios can favor bluegreens over other algal species, because many of the bluegreens can use nitrogen from the air, unlike other algae. Another biological wrinkle in using N:P ratios to assess the potential for algal growth is that some algae can take up phosphorus and store it for use later (so called "Luxury Uptake") when phosphorus concentrations have dropped in the epilimnion. Thus they are reflecting earlier conditions of phosphorus availability than the period during which they are actually growing.

2000 Ratios

All Level II lakes had average N:P ratios greater than 17 for the period of May–October in 2000 (Table 4). Several lakes have had ratios around 17 for at least part of the period in 2000, and are mentioned in the individual lake discussions in Chapter 3. In the past five years, quite a few lakes have had lower average ratios, often near 17 or less, suggesting algae in these lakes may have experienced nitrogen limitation during portions of the growing season, which would favor the growth of bluegreens. These lakes include Allen, Beaver 1, Bitter, Cottage, Desire, Dolloff, Francis, Geneva, Haller, Killarney, McDonald, Mirror, Panther, Paradise, Star, Steel, Trout, Welcome, and Wilderness.

Conclusions

In 2000, all 46 lakes with Level II data collection had ratios greater than 17, although some had ratios in the lower range at some point during the season of measurement. Nineteen lakes have had average N:P ratios near 17 or less in the past five years, indicating that some fluctuation between phosphorus and nitrogen limitation occurred through the growing season of that year.

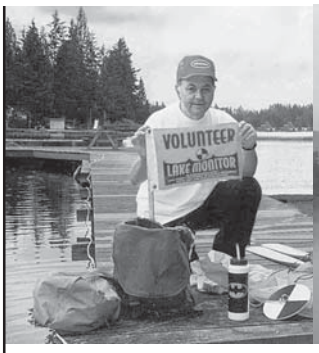
Program Summary and Outlook

The 2000 lake monitoring program, which ran from October 1999 through September 2000, represented the ongoing effort by King County to expand the information available on the smaller lakes within its boundaries. The program continued to be refined to make the most of limited resources and changing jurisdictions within King County. The program's staff also remained committed to making the most of the volunteer monitors' time and effort.

Changes will continue to occur on both the methods of collection and reporting as refinements are made in response to volunteer requests and staff observations. Some parameters may be discontinued, such as color rating, while others may be added to the program if the information gained is considered worth the investment of time and money.

The Lake Stewardship Program's website, http://dnr.metrokc.gov/wlr/watres/smlakes, continues to feature lake management information, as well as electronic copies of as many of our publications as possible. In addition, the site highlights the efforts of our volunteer monitors and provides information to people interested in joining the data collection program.

The Lake Stewardship Program staff continues to provide our volunteers with technical assistance and answers to questions relating to limnological processes or the conditions found at specific lakes. Please give us a call with concerns and feedback. We always enjoy hearing from you.




References

Carlson, R.E. 1977. A Trophic State Index for Lakes. Limnol. Oceangr. 22:361:368.

Carroll and Pelletier. 1991. Diagnostic Study of Lake Sawyer.

King County. 2000. Sampling Manual for Lake Volunteers, King County Lake Stewardship Program. King County Department of Natural Resources, Water and Land Resources Division. Seattle, WA.

Prescott, G.W. 1978. How to Know the Freshwater Algae. WCB/ McGraw:Hill, Inc. 293pp.

United States Geological Survey (USGS), 1976. Reconnaissance Data on Lakes in Washington, Volume 2, King and Snohomish Counties, USGS Water Supply Bulletin 43, Vol. 2.

Wolcott, E. E., 1961. Lakes of Washington. Volume 1: Western Washington. Water Supply Bulletin No. 14. Divisions of Water Resources, Washington State.

Conversion Units

The units used throughout this report are based on the International Systems of Units (the SI or metric system) which is standard for most scientific work. The exception to the use of these units is found in Table 1 where the summary of physical characteristics of the monitored lakes remains in English Units.

SI or Metric	English
1 kilometer (km)	0.62 miles
1 meter (m)	39 inches
1 centimeter (cm)	0.39 inches
1 millimeter (mm)	0.039 inches
1 micrometer (µm)	0.000039 inches
1 hectare (ha)	2.47 acres
1 square meter (m^2)	10.76 square feet
1 cubic meter (m^3)	1.3 cubic yards
1 cubic centimeter (cm^3)	0.061 cubic inches
1 liter (L)	1.04 quarts
1 milliliter (mL)	0.20 teaspoons
1 kilogram (kg)	35.4 ounces
1 gram (g)	0.0354 ounces
1 milligram (mg)	0.0000354 ounces
1 milligram/liter (mg/L)	0.0083 pounds/gallon
1 microgram/liter (µg/l)	0.0000083 pounds/gallon
1 degree Celsius (°C)	(°C x 9/5) + 32 degree Fahrenheit (°F)

Glossary

Aerobic: Living in the presence of oxygen. Most organisms are aerobic and must have oxygen available in order to survive.

Algae: Single celled nonvascular plants occurring singly or in groups (colonies). They contain chlorophyll *a*, producing their own food by means of photosynthesis. Algae form the base of the food chain in aquatic environments.

Algal Bloom: Heavy growth of algae in and on a body of water, usually as a result of high nutrient concentrations.

Alkalinity: The acid neutralizing capacity of a solution, usually related to the amount of carbonates present; buffering capacity.

Anaerobic: Living in the absence of oxygen. Some bacteria can survive and grow without oxygen present.

Anoxic: No oxygen present in the system; see anaerobic.

Average: (see "Mean") The sum of a group of numbers divided by the total number of values in the group.

Bathymetric Map: A map showing the bottom contours and depth of a lake.

Benthic: Bottom area of the lake which hosts the community of organisms (benthos) that live in or on the sediment.

Biomass: The total organic matter present.

Chlorophyll *a*: The green pigment in plants which is used to capture light energy and convert it, along with water and carbon dioxide, into food or organic material.

Concentration: The amount of specific substance in a unit amount of another substance such as a specific weight of a chemical in a given volume of water.

Conductivity: The measure of water's capacity to convey an electric current. The amount of dissolved ions affects the conductivity of water by increasing with increased amounts of ions.

Dissolved Oxygen: The oxygen gas that is dissolved in water.

Ecosystems: Any complex of living organisms together with all the other biotic and abiotic (non:living) factors that affect them and are affected by them.

Epilimnion: The warmer, less dense, upper layer of a lake lying above cooler water (metalimnion, hypolimnion).

Eutrophic: Waters with a large supply of nutrients and hence high growth rates by algae.

Eutrophication: The physical, chemical, and biological changes associated with enrichment of a body of freshwater due to increases in nutrients and sedimentation.

Fall Turnover: The mixing of thermally stratified waters that commonly occurs during early autumn. The sequence of events leading to a fall turnover includes: 1) cooling of surface waters, 2) density change in surface water that produces convection currents from top to bottom, and 3) circulation of the total water volume by wind action. The turnover generally results in a uniformity of the physical and chemical properties of the water.

Humic Substances: Organic substances incompletely broken down by decomposers such as bacteria, which occur in water mainly in a colloidal state (humus colloids). Humic acids are large molecule organic acids that are dissolved in water, often giving the water a yellow color.

Hypolimnion: The colder, dense, deep water layer in a thermally stratified lake, lying below the metalimnion and removed from surface influences.

Limiting Nutrient: Essential nutrient that is present in the smallest amount in the environment, relative to the needs of the organisms.

Limnology: The study of lakes and inland waters as ecosystems, usually but not always fresh waters.

Littoral: The shallow region of a body of water outward from the shoreline which can be inhabited by rooted aquatic plants; this is to some extent dependent on the ability of light to penetrate the water. Specific animal groups also inhabit this zone.

Loading: The total amount of material (sediment or nutrients) entering a water body via streams, overland flow, precipitation, direct discharge, or other means over a specific time period (usually considered annually). Recycling of nutrients within a body of water is sometimes referred to as "internal loading."

Mean: (see "Average') The sum of a group of numbers divided by the total number of values in the group.

Median: The datum in a set of numbers that represents the exact center of the group: half of the numbers are smaller and the other half are larger.

Metalimnion: The discrete vertical layer of water in a lake between the epilimnion and hypolimnion in which the temperature and density change rapidly over a short distance.

Monomictic: A water pattern of lakes in which thermal mixing and stable stratification alternate only once per year.

Nitrogen: One of the elements essential for the growth of organisms. Nitrogen is most abundant on the earth in the form of N_2, comprising 80% of the atmosphere, but is most commonly taken up by plants in the forms NO_3, NO_2 and NH_3.

Nonpoint Source Pollution: Pollution from a diverse set of sources difficult to identify as separate entities and to control or manage. Examples of "nonpoint sources" include general erosion (as opposed to landslides or mass wasting), failure of septic systems, a variety of farming practices, various forestry practices, and residential/urban land uses.

Nutrient: Any chemical element, ion, or compound required by an organism for growth and reproduction.

Oligotrophic: Waters that are nutrient poor and which, as a result, have little organic production.

pH: The negative logarithm of the hydrogen ion concentration in a solution. This is a measure of acidity.

Pheophytin: A pigment resulting from the degradation of chlorophyll *a*, usually found in algal remains, suspended organic matter, or bottom sediments.

Phosphorus: One of the elements essential for the growth and reproduction. Phosphorus is commonly the limiting or least available nutrient for plant growth in freshwater ecosystems. The primary original source of phosphorus is from the earth in the form of phosphate rock.

Photic Zone: The volume of water in a lake bounded by the depth to which light penetrates enough to enable plants to carry out photosynthesis.

Photosynthesis: The production of organic matter (carbohydrates) from inorganic carbon and water, utilizing the energy of light.

Phytoplankton: Free floating microscopic plants (algae).

Productivity: The rate of formation of organic matter averaged over a certain time period (day, week, or year).

Residence Time: The average length of time that water or a chemical within the water, such as phosphate, remains in a lake.

Secchi Disk: A 20:cm (8:inch) diameter disc painted white and black in alternating quadrants. It is used to measure the transparency of the water in lakes.

Sediment: Solid material deposited in the bottom of a basin over time.

Stratification: The separation of water into nearly discrete layers caused by differences in temperature and subsequent water density.

Thermocline: The zone of rapid temperature decrease in a vertical section of a lake. See metalimnion.

Transparency: Water clarity of a lake as measured using a Secchi disk.

Trophic State: A term used to describe the productivity of a lake ecosystem and classify it as one of three categories based on algal biomass: oligotrophic, mesotrophic, or eutrophic.

Turbidity: Cloudiness in water caused by the suspension of tiny materials (soil, algae, or pollen).

Turnover: The mixing of lake water from top to bottom after a period of stable stratification. This typically occurs in the fall and is caused by seasonal cooling of surface waters and pushing of water masses by wind.

Watershed: The geographical area that contributes surface and shallow subsurface flow to a stream, lake, or other body of water. This can also be referred to as the "catchment basin."

Watershed Management: The planning and carrying out of actions, legal requirements and protective measures taken by agencies and citizens to preserve and enhance the natural resources of a drainage basin for the production and protection of water supplies and water:based resources.

Water Year: A division of the earth year based on the general progression of wet and dry periods rather than on the basis of the calendar months. The US Geological Survey uses the water year of October 1 through September 30 for data publication.

Zooplankton: Very small animals found in the water column of lakes that possess limited powers of locomotion, and which feed on bacteria, algae, smaller animals, and organic detritus present in the water.

Appendix A

Introduction

Appendix A shows the values recorded by Level 1 volunteers on each lake during the 2000 water year. To accurately record values in a reasonable amount of space, we reported weekly totals of recorded precipitation and weekly averages of lake levels. Volunteers recorded Secchi depths, temperature, and comments once a week; these measurements and comments are reported in full, although some comments were abbreviated to fit in the available space.

Precipitation Reports

Level I precipitation totals reported in Appendix A may differ from the total Level I precipitation reported in the tables in Chapter 3. Chapter 3 tables show the sum of all precipitation the Level I volunteer reported during the 2000 water year. Appendix A reports weekly rainfall totals for weeks in which the volunteer missed only one day, or no days. If there were two or more days with no associated precipitation value, we considered the week incomplete and did not include the weekly total in the annual sum reported in Appendix A. Because precipitation amounts can vary dramatically from one day to the next, it could be very misleading to report a weekly total if the days missed were days of heavy rain.

Lake Level Reports

Incomplete lake levels records are less likely to produce misleading results because daily differences in lake levels are often much smaller than daily differences in precipitation. Weeks with four or more days missing are considered incomplete, but averages for the week are included, because of the slower fluctuation.

Source data are available upon request for any lake with data included in Appendix A.

Alice

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99									
10/3/99	—	I	37.67	I	10/8/99	11:25 AM	3.50	15.00	cool
10/10/99	—	I	40.75	*	10/14/99	9:37 AM	3.50	13.00	air 11°C, geese plentiful
10/17/99			41.00	I					
10/24/99	—	I	46.00	I					
10/31/99			46.57	C	10/31/99	12:49 PM	3.00	9.00	air 11°C, geese
11/7/99	—	I	56.86	C					
11/14/99	—	I	74.50	I					
11/21/99	—	I	78.67	I					
11/28/99									
12/5/99									
12/12/99									
12/19/99									
12/26/99									
1/2/00									
1/9/00									
1/16/00	60.00	C	76.50	*	1/16/00	9:48 AM	3.00	3.00	air 4°C
1/23/00	1.00	*	75.07	C	1/28/00	8:36 AM	3.00	3.00	ice on lake, air 4°C
1/30/00	—	I	78.30	*					
2/6/00	—	I	81.50	I	2/9/00	8:53 AM	3.00	5.00	air 8°C, fishing activity
2/13/00	—	I	69.00	I					
2/20/00	—	I	63.50	*	2/23/00	9:02 AM	3.00	6.00	air 9°C, geese are returning
2/27/00	—	I	60.00	I					
3/5/00	—	I	59.25	*	3/6/00	10:37 AM	3.00	8.00	can hear frogs
3/12/00	—	I	56.67	I					
3/19/00	—	I	61.69	C	3/25/00	10:40 AM	3.00	9.00	air 8°C, spring like weather yesterday
3/26/00	9.00	*	63.50	C					
4/2/00	—	I	62.50	*	4/2/00	6:16 PM	3.50	14.00	air 16°C clear past 3 days
4/9/00	—	I	66.83	I	4/8/00	7:51 PM	4.00	13.00	
4/16/00	—	I	66.50	C	4/14/00	5:00 PM	4.00		
4/23/00	22.00	C	65.57	C	4/22/00	11:00 AM	3.50	16.00	
4/30/00	25.00	C	67.29	C	4/30/00	12:30 PM	4.00	14.00	
5/7/00	44.00	C	69.43	C	5/7/00	6:00 PM	4.00	16.00	
5/14/00	12.00	C	69.00	C	5/14/00	4:07 PM	4.00	17.00	more weed growth in shallows
5/21/00	26.00	C	68.14	C					
5/28/00	4.00	C	67.86	C	5/29/00		3.50	18.00	
6/4/00	21.00	C	67.00	C					
6/11/00	53.00	C	72.71	C	6/12/00	5:00 PM	4.00	16.00	
6/18/00	4.00	C	70.14	C	6/18/00	4:30 PM	4.00	19.00	
6/25/00	2.00	C	65.29	C	6/25/00	5:00 PM	4.00	22.00	
7/2/00	0.00	*	63.43	C	7/2/00	1:30 PM	3.00	21.00	
7/9/00	0.00	C	59.33	I	7/9/00	6:00 PM	4.00	21.00	
7/16/00	5.00	C							
7/23/00	—	I			7/23/00	6:48 PM	3.00	26.00	
7/30/00	0.00	*	48.33	I					
8/6/00	0.00	C							
8/13/00	7.00	C	39.00	I					
8/20/00	7.00	C							
8/27/00	5.00	*	33.00	I					
9/3/00									
9/10/00	6.00	C	37.00	*					did not record data for Aug and part of
9/17/00	10.00	C	37.00	C	9/23/00	12:25 PM	3.50	17.00	Sept. as was on vacation.
9/24/00	40.00	C	37.14	C					
Min	0.00		33.00		**Min**		3.00	3.00	
Max	60.00		81.50		**Max**		4.00	26.00	
Total	363.00								

I = Insufficient data
C = Complete data set
* = Acceptable number of measurements during a given week, but less than ideal

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
1/1/00	—	I	64.00	I					
1/2/00	32.00	*	62.57	C	1/2/00	2:00 PM	0.50	7.00	
1/9/00	31.00	*	69.14	C	1/9/00	2:00 PM	0.50	6.00	
1/16/00	24.00	C	66.00	C	1/16/00	2:00 PM	0.50	4.00	
1/23/00	0.00	C	59.29	C	1/23/00				
1/30/00	36.00	*	64.57	C	1/30/00				
2/6/00	27.00	*	66.86	C	2/6/00	2:00 PM	1.00	6.00	
2/13/00	—	I	62.29	C	2/13/00	2:00 PM	1.00	6.50	
2/20/00	29.00	C	60.00	C	2/20/00	2:00 PM	1.00	7.00	
2/27/00	—	I	63.00	C	2/27/00	2:00 PM	1.00	8.00	
3/5/00	—	I	64.00	C	3/5/00	2:00 PM	1.00	9.00	
3/12/00	45.00	C	59.43	C	3/12/00	2:00 PM	1.00	9.50	
3/19/00	—	I	62.00	C	3/19/00	2:00 PM	1.00	9.00	
3/26/00	5.00	*	53.71	C	3/26/00	2:00 PM	1.00	7.50	
4/2/00	22.00	*	52.86	C	4/2/00	2:00 PM	1.00	15.00	algae clumps just starting to appear
4/9/00	20.00	*	51.29	C	4/9/00	2:00 PM	1.00	14.00	less algae; lillypads starting to surface
4/16/00	—	I	47.71	C	4/16/00	2:00 PM	1.00	18.00	
4/23/00	13.00	*	40.86	C	4/23/00	2:00 PM	1.00	13.00	
4/30/00	15.00	*	37.71	C	4/30/00	2:00 PM	1.00	14.00	
5/7/00	23.00	C	38.86	C	5/7/00	4:00 PM	1.00		
5/14/00	15.00	C	36.57	C	5/14/00	4:00 PM	0.50	15.00	clumps of Algae
5/21/00	13.00	C	37.29	C	5/21/00	4:00 AM	0.50	19.50	more grass in water than ever seen before
5/28/00	13.00	*	36.00	C	5/28/00	4:00 AM	0.50	18.00	
6/4/00	—	I	33.29	C	6/4/00	4:00 PM	0.50	21.00	
6/11/00	28.00	*	39.86	C	6/11/00	4:00 PM	0.75	17.00	
6/18/00	6.00	*	36.57	C	6/16/00	4:00 PM	0.75	19.50	
6/25/00	0.00	*	32.29	C	6/25/00	4:00 PM	0.50	21.00	
7/2/00	0.00	*	31.00	C	7/2/00	2:00 PM	0.50	17.50	geese gone
7/9/00	0.00	C	30.29	C	7/9/00	2:00 PM	0.50	19.50	
7/16/00	5.00	C	28.57	C	7/16/00	2:00 PM	0.50	21.00	
7/23/00	0.00	*	28.29	C	7/23/00	2:00 PM	0.50	20.50	
7/30/00	0.00	C	25.86	C	7/30/00	2:00 PM	0.50	24.00	
8/6/00	0.00	C	23.86	C	8/6/00	2:00 PM	0.75	24.50	
8/13/00	7.00	*	22.43	C	8/13/00	2:00 PM	0.75	22.50	
8/20/00	—	I	22.71	C	8/20/00	2:00 PM	0.75	20.00	
8/27/00	—	I	24.00	*	8/27/00	2:00 PM	1.00	19.00	
Min	0.00		22.43		**Min**		0.50	4.00	
Max	45.00		69.14		**Max**		1.00	24.50	
Total	409.00								

I = Insufficient data
C = Complete data set
* = Acceptable number of measurements during a given week, but less than ideal

Ames

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
4/16/00	—	I	82.00	I					
4/23/00	11.00	*	82.00	C					
4/30/00	17.00	*	82.00	C					
5/7/00	20.00	*	82.00	C	5/7/00	6:00 PM	2.75	15.00	
5/14/00	18.00	C	82.00	C	5/14/00	5:00 PM	2.75	17.50	
5/21/00	18.00	C	82.00	C	5/21/00	7:00 PM	2.75	18.00	flock of geese spotted
5/28/00	7.00	C	81.71	C	5/28/00	5:30 PM	3.50	18.00	5/28: dragonflies have hatched, fuzzy
6/4/00	7.00	*	81.00	C	6/4/00	8:00 PM	3.25	20.50	white seeds all over; 7 geese on 5/29
6/11/00	28.00	C	81.00	C	6/11/00	12:00 PM	3.50	18.00	
6/18/00	5.00	*	81.00	C	6/18/00	6:30 PM	4.00	19.00	
6/25/00	0.00	C	80.14	C	6/25/00	9:00 PM	3.75	22.00	
7/2/00	0.00	C	77.71	C	7/2/00	8:35 PM	3.25	21.00	54 geese; saw otter
7/9/00	0.00	C	76.00	C	7/6/00	4:15 PM	3.25	23.00	2 beavers
7/16/00	9.00	C	73.71	C	7/16/00	9:00 PM	2.00	23.00	
7/23/00	0.00	*	72.86	C	7/23/00	1:00 PM	3.80	23.00	
7/30/00	0.00	C	70.71	C	7/30/00	8:00 PM	3.80	24.50	
8/6/00	0.00	C	67.43	C	8/6/00	1:30 PM	4.25	25.00	some windblown sfc. stff (algae) this am
8/13/00	6.00	*	65.00	C	8/14/00	8:00 PM	3.75	22.00	a few large green blobs of algae
8/20/00	3.00	C	63.00	C	8/20/00	5:00 PM	3.75	22.00	
8/27/00	7.00	C	62.00	C	8/27/00	6:20 PM	3.75	21.00	
9/3/00	—	I	60.57	C	9/4/00	7:00 PM	3.75	20.00	
9/10/00	19.00	C	61.71	C	9/13/00	7:00 PM	3.75	20.00	9/13: surface of lake covered with small
9/17/00	7.00	C	61.86	C	9/17/00	2:00 PM	4.75	20.00	winged ants, many still alive, alg. vis.
9/24/00	23.00	*	60.29	C	9/25/00	5:15 PM	3.25	19.00	against Secci disk
Min	0.00		60.29		**Min**		2.00	15.00	
Max	28.00		82.00		**Max**		4.75	25.00	
Total	205.00								

I = Insufficient data
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	Daily Data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	-1.95	*					
10/3/99	21.50	C	-3.26	C	10/3/99	3:10 PM	4.25	17.00	
10/10/99	4.00	C	-3.96	C	10/10/99	11:45 AM	6.00	15.00	N wind
10/17/99	0.00	C	-6.87	C	10/18/99	12:05 PM	6.25	14.50	with haze, N wind
10/24/99	20.00	C	-8.40	C	10/25/99	12:10 PM	6.25	13.00	SW wind
10/31/99	31.50	C	-8.40	C	10/31/99	12:10 PM	6.00	12.00	SW wind
11/7/99	123.50	C	-0.76	C	11/8/99	3:15 PM	5.00	11.00	
11/14/99	38.50	C	11.13	C	11/14/99	12:45 PM	5.25	11.00	
11/21/99	75.00	C	18.67	C	11/21/99	11:50 AM	5.25	10.00	SSW wind
11/28/99	32.00	C	25.36	C	11/28/99	11:45 AM	5.25	9.50	E wind
12/5/99	30.00	C	28.30	C	12/5/99	11:55 AM	5.50	8.50	SSW wind
12/12/99	80.50	C	37.40	C	12/12/99	11:13 AM	4.75	8.00	SW wind
12/19/99	3.50	C	42.76	C	12/20/99	12:25 PM	4.50	7.50	NNE wind
12/26/99	15.50	C	41.36	C	12/26/99	2:45 PM	5.00	7.00	with haze (after fog), ESE wind
1/2/00	30.00	C	42.63	C	1/2/00	12:00 PM	5.00	6.50	wind 5kt SW, bald eagle
1/9/00	44.00	C	46.67	C	1/9/00	2:00 PM	3.50	5.50	wind 20kt WS, eagle
1/16/00	21.50	C	49.47	C	1/17/00	11:18 AM	4.00	5.50	eagle
1/23/00	3.50	C	49.30	C	1/23/00	1:20 PM	3.75	5.00	wind 5kt NNW, eagle
1/30/00	46.00	C	52.99	C	1/30/00	11:55 AM	4.00	5.00	wind 12kt E, eagle
2/6/00	38.50	C	57.94	C	2/7/00	12:00 PM	5.00	6.00	red tailed hawk
2/13/00	16.20	C	59.76	C	2/13/00	11:10 AM	4.75	5.50	wind 2 kt N
2/20/00	30.50	C	60.53	C	2/20/00	2:55 PM	6.25	6.00	2 kt SW
2/27/00	68.50	C	65.53	C	2/27/00	1:15 PM	5.75	7.00	2 kt SW
3/5/00	5.00	C	69.77	C	3/5/00	3:05 PM	5.75	7.00	5 kt N
3/12/00	25.00	C	70.19	C	3/14/00	11:45 AM	5.00	7.00	12 kt SW
3/19/00	15.00	C	70.93	C	3/19/00	11:10 AM	6.25	7.00	12 kt SW, eagle
3/26/00	2.50	C	69.66	C	3/26/00	1:45 PM	8.50	9.50	10 kt SW
4/2/00	5.50	C	67.29	C	4/2/00	2:15 PM	8.50	12.00	
4/9/00	17.00	C	65.04	C	4/9/00	11:57 AM	6.50	11.00	lots of fishing from boats and docks
4/16/00	3.00	C	63.81	C	4/16/00	2:52 PM	6.00	12.50	
4/23/00	11.00	C	61.21	C	4/24/00	11:10 AM	5.50	13.00	
4/30/00	18.50	C	59.66	C	4/30/00	2:25 PM	5.50	14.00	pair of bald eagles spotted
5/7/00	36.50	C	59.61	C	5/8/00	11:00 AM	6.00	14.00	20 boats yest. - fish derby; 3 fam.of geese
5/14/00	12.00	C	58.56	C	5/14/00	11:05 AM	7.50	14.50	
5/21/00	9.50	C	56.13	C	5/21/00	2:05 PM	6.00	16.50	
5/28/00	3.50	C	53.03	C	5/29/00	11:25 AM	8.00	17.00	lots of cottonwood seeds on surface
6/4/00	10.50	C	49.53	C	6/4/00	2:25 PM	9.25	19.50	
6/11/00	33.50	C	50.39	C	6/11/00	4:20 PM	7.75	17.00	
6/18/00	0.00	C	46.96	C	6/18/00	4:25 PM	8.75	18.50	
6/25/00	0.50	C	42.19	C	6/25/00	8:20 PM	7.75	20.50	
7/2/00	12.00	C	38.26	C	7/3/00	3:05 PM	6.50	21.00	Monday is a quiet day, fishing
7/9/00	0.00	C	33.27	C	7/9/00	3:25 PM	6.50	20.00	fishing and swimming
7/16/00	0.00	C	28.04	C	7/17/00	1:50 PM	7.00	22.00	activity at the pub bch, fishing, swimming
7/23/00	0.00	C	22.99	C	7/23/00	11:00 AM	6.25	23.00	fishing and swimming
7/30/00	0.00	C	17.90	C	7/30/00	5:45 PM	5.75	24.00	fishing and swimming
8/6/00	0.00	C	12.74	C	8/6/00	2:45 PM	7.50	24.00	fishing and swimming
8/13/00	7.50	C	7.40	C	8/13/00	6:40 PM	5.75	23.00	fishing,swimming
8/20/00	0.50	C	3.23	C	8/20/00	4:30 PM	5.25	22.00	fishing and swimming
8/27/00	1.50	C	-1.54	C	8/27/00	2:33 PM	5.25	21.00	swimming
9/3/00	3.00	C	-5.56	C	9/3/00	2:40 PM	4.25	20.00	fishing,waders at Angle Lake Park
9/10/00	14.00	C	-6.96	C	9/10/00	2:37 PM	4.50	18.00	fishing, osprey sitting atop weeping willow osbs Mon., out of town on Sun, winter coots have arrived gradually in the last couple weeks and now number 20+ (some away at
9/17/00	1.00	C	-10.30	C	9/18/00	11:37 AM	5.50	19.00	observation time), fishing
9/24/00	4.50	C	-13.77	C	9/24/00	11:25 AM	5.00	18.00	kingfisher atop flag pole, swim, fishing
Min	0.00		-13.77			**Min**	3.50	5.00	
Max	123.50		70.93			**Max**	9.25	24.00	
Total	1,026.70								

I = Insufficient data
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Beaver 2

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	24.50	I					
10/3/99	47.00	*	25.43	C	10/4/99	10:00 AM	3.25	16.00	
10/10/99	11.00	*	30.93	C	10/12/99	9:45 AM	2.75	14.00	
10/17/99	0.00	C	32.64	C	10/19/99	11:00 AM	3.00	12.00	
10/24/99	15.00	C	34.71	C	10/26/99	4:00 PM	2.75	11.50	
10/31/99	51.00	C	40.86	C	11/2/99	9:45 AM	2.50	10.00	
11/7/99	156.00	C	53.07	C	11/9/99	9:15 AM	2.50	9.00	
11/14/99	35.00	C	80.93	C	11/16/99	8:00 AM	2.25	10.00	
11/21/99	72.00	C	78.21	C	11/23/99	8:45 AM	2.50	8.50	no birds visible
11/28/99	42.00	C	80.64	C	11/30/99	9:00 AM	2.25	8.00	wind from SW
12/5/99	44.00	C	75.79	C	12/7/99	9:00 AM	2.25	7.00	
12/12/99	61.00	C	78.71	C	12/14/99	9:00 AM	2.50	6.00	wind from SW
12/19/99	6.00	C	76.29	C	12/21/99	8:00 AM	2.00	8.00	12/21: bloom in green strip blown up
12/26/99	14.00	C	67.86	C	12/28/99	8:00 AM	2.00	6.50	against dock 3'-5' wide, later in morning
1/2/00	28.00	C	66.86	C	1/4/00	8:00 AM	2.00	6.00	wind came up breaking up algae and
1/9/00	38.00	C	70.21	C	1/11/00	10:00 AM	2.50	5.00	changing to concentrated 1'-2' strip
1/16/00	21.00	C	69.93	C	1/18/00	8:00 AM	2.50	4.00	cold
1/23/00	6.00	C	66.07	C	1/25/00	8:45 AM	3.00	4.00	
1/30/00	50.00	*	68.86	C	2/1/00	8:00 AM	2.50	4.50	no waterfowl
2/6/00	33.00	C	71.57	C	2/8/00	10:00 AM	2.50	5.00	
2/13/00	21.00	C	69.36	C	2/15/00	9:30 AM	2.50	4.50	
2/20/00	34.00	C	67.14	C	2/22/00	8:20 AM	2.75	5.50	
2/27/00	52.00	C	68.43	C	2/29/00	9:45 AM	2.50	5.50	
3/5/00	9.00	C	70.29	C	3/7/00	9:45 AM	2.50	5.50	
3/12/00	34.00	C	66.07	C	3/14/00	9:00 AM	2.00	6.00	
3/19/00	19.00	C	67.07	C	3/21/00	9:45 AM	2.50	7.00	
3/26/00	6.00	*	64.07	C	3/28/00	9:45 AM	2.50	8.00	
4/2/00	19.00	C	61.00	C	4/5/00	8:00 AM	2.50	12.00	
4/9/00	17.00	C	59.29	C	4/11/00	9:00 AM	2.25	13.00	
4/16/00	8.00	C	58.57	C	4/18/00	8:15 AM	3.00	13.00	
4/23/00	20.00	C	56.57	C	4/25/00	8:10 AM	2.50	14.50	
4/30/00	22.00	C	55.00	C	4/30/00	9:00 AM	2.75	14.00	
5/7/00	25.00	C	54.14	C	5/7/00	8:45 AM	2.75	15.00	many ropy-shaped gray alg. floating in bay
5/14/00	17.00	C	52.71	C	5/14/00	8:00 AM	2.50	15.50	numerous goslings with their parents
5/21/00	18.00	C	51.71	C	5/21/00	8:00 AM	2.50	17.50	two bald eagles seen
5/28/00	—	I	51.14	C	5/28/00	8:00 AM	2.50	18.00	5 adult geese with goslings
6/4/00	15.00	*	49.00	C	6/4/00	6:00 AM	2.50	18.50	
6/11/00	8.00	*	51.57	C	6/14/00	10:00 AM	2.50	18.50	
6/18/00	8.00	C	49.71	C	6/18/00	8:00 AM	2.00	20.00	
6/25/00	0.00	*	46.14	C	6/25/00	8:00 AM	2.50	20.00	
7/2/00	2.50	C	45.86	C	7/2/00	8:15 AM	2.50	21.00	
7/9/00	0.00	C	37.57	C	7/9/00	7:40 AM	2.25	21.00	
7/16/00	0.00	*	33.29	C	7/16/00	8:00 AM	2.50	21.00	
7/23/00	6.00	*	29.71	C	7/23/00	8:20 AM	2.50	21.00	
7/30/00	0.00	C	25.57	C	7/30/00	8:30 AM	2.50	22.50	
8/6/00	0.00	C	21.00	C	8/6/00	8:30 AM	2.50	24.00	
8/13/00	7.00	C	17.71	C	8/13/00	8:10 AM	2.50	21.50	
8/20/00	8.00	C	14.00	C	8/20/00	7:30 AM	2.25	20.00	
8/27/00	8.00	C	12.14	C	8/27/00	7:30 AM	2.00	20.00	light algal bloom 8/22
9/3/00	14.00	*	9.43	C	9/3/00	8:00 AM	2.25	18.50	
9/10/00	13.00	C	9.00	C	9/10/00	8:30 AM	2.00	18.00	light grn bloom extends 20-60'frm E shr
9/17/00	11.00	C	7.43	C	9/17/00	8:30 AM	2.00	19.00	9/24: light bloom along W Shr, extends 20
9/24/00	15.00	*	4.57	C	9/24/00	8:30 AM	2.25	18.00	to 30' from shore, color:dark green
Min	0.00		4.57		**Min**		2.00	4.00	
Max	156.00		80.93		**Max**		3.00	24.00	
Total	1,166.50								

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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	—	I	30.00	I					
10/3/99	36.00	C	32.57	C					
10/10/99	10.00	C	36.00	C					
10/17/99	0.00	C	34.00	C					
10/24/99	18.00	C	37.14	C					
10/31/99	34.00	C	41.83	*					
11/7/99	138.00	C	56.14	C					
11/14/99	53.00	*							
11/21/99	53.00	C	57.33	*					
11/28/99	35.00	C	53.00	C					
12/5/99	23.00	C	47.14	C					
12/12/99	64.00	C	54.00	C					
12/19/99	2.00	C	46.14	C					
12/26/99	9.00	C	40.86	C					
1/2/00	30.00	C	49.57	C					
1/9/00	34.00	C	60.57	C					
1/16/00	19.00	C	59.86	C					
1/23/00	2.00	C	57.57	C					
1/30/00	42.00	C	48.71	C					
2/6/00	30.00	C	46.86	C					
2/13/00	14.00	C	43.43	C					
2/20/00	25.00	C	49.43	C					
2/27/00	48.00	C	47.43	C					
3/5/00	4.00	C	42.86	C					
3/12/00	32.00	C	43.86	C					
3/19/00	17.00	C	52.00	C					
3/26/00	0.00	C	44.29	C					
4/2/00	5.00	C	42.14	C					
4/9/00	19.00	C	46.00	C					
4/16/00	3.00	C	50.71	C					
4/23/00	10.00	C	54.00	C					
4/30/00	12.00	C	46.00	C					
5/7/00	21.00	C	52.71	C					
5/14/00	16.00	C	46.71	C					
5/21/00	—	I	50.43	C					
5/28/00	18.00	C	51.57	C					
6/4/00	8.00	C	45.29	C					
6/11/00	31.00	C	59.00	C					
6/18/00	0.00	C	58.43	C					
6/25/00	4.00	*	40.17	*					
Min	0.00		30.00		**Min**		0.00	0.00	
Max	138.00		60.57		**Max**		0.00	0.00	
Total	919.00								

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Cottage

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	C	31.50	C					
10/3/99	—	I	33.50	*					
10/10/99	44.00	C	43.29	C	10/11/99	3:40 PM	1.00	13.00	algae scum at shoreline
10/17/99	0.00	C	45.57	C					
10/24/99	—	I	40.80	*	10/27/99	11:30 AM	1.00	11.00	
10/31/99	38.00	C	31.86	C	11/5/99	10:00 AM	1.00	9.00	
11/7/99	138.20	C	39.00	C	11/13/99	2:00 PM	0.75	8.00	
11/14/99	32.00	C	51.57	C					
11/21/99	80.00	C	57.57	C	11/24/99	2:05 PM	1.50	9.00	
11/28/99	47.00	*	59.33	*					
12/6/99	—	I	61.75	*	12/8/99	1:15 PM	1.50	6.00	cold today
12/13/99	—	I	61.67	I	12/13/99	8:45 AM	1.25	6.00	
12/19/99	—	I	60.33	I	12/19/99	4:00 PM	1.75	6.00	foggy
12/26/99	—	I	60.50	*	12/26/99	2:00 PM	1.75	5.00	cold
1/2/00	35.00	*	53.29	C					
1/9/00	47.00	C	55.86	C	1/12/00	12:00 PM	1.50	5.00	snow
1/16/00	19.50	C	42.29	C					
1/23/00	4.50	*	35.83	*	1/26/00	2:00 PM	1.25	4.00	
1/30/00	32.00	C	44.00	C					
2/6/00	30.00	*	45.71	C	2/9/00	11:30 AM	1.25	5.00	cold
2/13/00	16.00	C	43.57	C					
2/20/00	28.00	C	45.71	C	2/20/00	2:30 PM	1.25	5.00	
2/27/00	58.00	C	48.86	C	3/3/00	9:45 AM	1.25	7.00	sun AM, rain PM
3/5/00	—	I	42.75	*					
3/12/00	40.00	*	34.67	*	3/15/00	2:10 PM	1.25	7.00	water is quite clear
3/19/00	—	I	28.00	I					
3/26/00			30.00	I					
4/2/00	28.00	C			4/2/00	2:00 PM	2.00	15.00	
4/9/00	—	I	20.75	*	4/9/00	3:00 PM	2.25	12.50	
4/16/00	—	I							
4/23/00	9.00	*	18.67	I					
4/30/00	—	I	13.33	I	4/30/00	11:45 AM	1.25	14.00	day of fishing season open
5/7/00	—	I	20.00	I					
5/14/00	—	I	18.00	I					
5/21/00			16.86	C					
5/28/00	—	I	17.33	*	5/30/00	1:30 PM	1.50	16.00	16°
6/4/00	4.50	C	17.29	C					
6/11/00	24.00	C	18.57	C					
6/18/00	4.00	C	25.57	C	6/19/00	1:45 PM	2.00	18.00	
6/25/00	0.00	C	29.00	C	6/26/00	2:00 PM	2.00	23.00	
7/2/00	0.00	C	27.71	C	7/3/00	1:00 PM	2.50	20.00	
7/9/00	0.00	C	25.43	C	7/10/00	1:00 PM	2.75	21.00	
7/16/00	11.00	C	22.14	C	7/17/00	1:00 PM	2.50		
7/23/00	0.00	C	22.29	C					
7/30/00	0.00	C	22.00	C	7/31/00	11:00 AM	3.00	24.00	
8/6/00	0.00	C	22.00	C	8/7/00	1:00 PM	2.75	24.00	
8/13/00	6.00	C	22.29	C	8/14/00	12:00 PM	2.25	21.00	
8/20/00	2.00	C	23.00	C	8/21/00	1:30 PM	1.50	21.50	
8/27/00	5.00	C	23.43	C	8/28/00	3:00 PM	1.50	21.00	
9/3/00	24.00	C	24.29	C	9/5/00	1:30 PM	1.25	18.00	
9/10/00	12.00	C	23.71	C	9/10/00	2:00 PM	1.25	17.00	
9/17/00	3.00	C	24.14	C	9/18/00	1:30 PM	0.75	20.00	
9/24/00	43.00	C	27.00	C	9/25/00	12:00 PM	1.25	16.50	
Min	0.00		13.33		**Min**		0.75	4.00	
Max	138.20		61.75		**Max**		3.00	24.00	
Total	864.70								

I = Insufficient data
C = Complete data set
* = Acceptable number of measurements during a given week, but less than ideal

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	—	I	-4.00	I	10/2/99	9:30 AM	0.75	15.00	
10/3/99	37.00	C	-2.57	C	10/10/99	4:00 PM	1.00	14.00	
10/10/99	12.00	C	0.43	C	10/16/99	9:30 AM	1.00	12.50	algae at shoreline
10/17/99	0.00	C	0.00	C	10/23/99	9:00 AM	1.75	12.00	
10/24/99	28.00	C	0.71	C	10/30/99	9:00 AM	2.00	10.50	small patches of bloom at shoreline
10/31/99	36.00	C	4.29	C	11/6/99	9:45 AM	2.25	9.00	
11/7/99	136.00	C	15.71	C	11/13/99	9:15 AM	2.50	9.00	lake up 6" in month
11/14/99	46.00	C	36.14	C	11/20/99	9:30 AM	2.00	9.00	
11/21/99	—	I	38.20	*	11/25/99	10:30 AM	2.00	5.00	
11/28/99	63.00	C	42.71	C	11/29/99	12:15 PM	2.00	7.50	extra day
12/5/99	43.00	C	36.57	C	12/4/99	8:45 AM	2.00	6.50	
12/12/99	81.00	C	51.71	C	12/11/99	9:15 AM	1.75	6.50	
12/19/99	4.00	*	48.29	C	12/18/99	9:00 AM	1.75	6.50	
12/26/99	6.00	*	32.83	*	12/31/99	9:15 AM	1.75	4.50	
1/2/00	34.00	*	44.33	*	1/8/00	9:15 AM	2.00	4.50	
1/9/00	48.00	C	57.14	C	1/15/00	8:15 AM	2.00	3.00	
1/16/00	20.00	C	42.14	C	1/22/00	10:00 AM	2.00	3.50	
1/23/00	4.00	C	27.57	C	1/29/00	9:00 AM	1.80	3.00	
1/30/00	49.00	C	31.29	C	2/5/00	8:30 AM	1.80	4.00	
2/6/00	36.00	*	34.86	C	2/12/00	8:30 AM	1.80	5.00	
2/13/00	—	I	38.43	C	2/19/00	9:00 AM	1.80	5.50	
2/20/00	31.00	C	39.00	C	2/26/00	8:40 AM	1.50	5.50	
2/27/00	67.00	C	42.00	C	3/4/00	7:45 AM	1.80	7.00	
3/5/00	6.00	C	36.14	C	3/11/00	9:30 AM	1.50	7.00	
3/12/00	33.00	*	27.14	C	3/18/00	10:30 AM	1.50	8.00	
3/19/00	24.00	*	27.00	C	3/25/00	8:15 AM	1.50	8.50	
3/26/00	9.00	C	24.29	C	4/1/00	9:00 AM	1.50	9.50	
4/2/00	11.00	C	23.00	C	4/8/00	10:30 AM	1.00	11.00	
4/9/00	31.00	C	22.43	C	4/15/00	7:00 AM	1.50	13.00	
4/16/00	8.00	C	24.57	C	4/22/00	8:30 AM	1.50	15.00	snails on underwater logs
4/23/00	21.00	C	27.86	C	4/29/00	7:30 AM	1.50	12.50	
4/30/00	29.00	C	32.14	C	5/6/00	7:30 AM	1.25	14.00	
5/7/00	39.00	C	29.57	C					
5/14/00	14.00	C	24.57	C	5/20/00	9:15 AM	2.00	17.00	
5/21/00	14.00	C	25.57	C	5/27/00	7:45 AM	2.00	17.00	
5/28/00	12.00	*	17.86	C	6/3/00	8:00 AM	1.75	17.00	
6/4/00	—	I	17.17	*	6/4/00	12:00 PM	2	19.5	
6/11/00	—	I	28.00	I	6/17/00	10:00 AM	1.50	19.00	
6/18/00	4.00	C	29.57	C	6/24/00	9:00 AM	1.50	20.00	
6/25/00	0.00	*	27.43	C	7/1/00	8:45 AM	1.75	21.50	
7/2/00	16.00	*	17.71	C	7/8/00	9:30 AM	2.00	20.50	7/8: water fairly clear; need a clarity chart;
7/9/00	0.00	C	16.00	C	7/15/00	6:45 AM	2.00	20.00	we have 50 + geese that have shown up.
7/16/00	0.00	C	14.57	C	7/22/00	9:30 AM	2.25	22.50	bird away tape seems to work
7/23/00	3.00	C	13.14	C	7/28/00	8:30 AM	2.75	22.00	
7/30/00	0.00	C	11.43	C	8/5/00	9:00 AM	2.75	23.00	
8/6/00	0.00	C	9.00	C	8/10/00	5:00 PM	2.75	23.00	
8/13/00	11.00	C	7.29	C	8/19/00	10:15 AM	1.75	19.50	
8/20/00	4.00	C	6.57	C	8/26/00	8:30 AM	1.75	20.50	
8/27/00	3.00	C	5.57	C	9/2/00	10:20 AM	1.50	18.50	
9/3/00	20.00	C	5.29	C	9/9/00	8:30 AM	1.00	17.00	
9/10/00	18.00	C	7.00	C	9/16/00	9:30 AM	0.50	19.00	heavy algae scum at shoreline
9/17/00	0.00	*	7.00	C	9/23/00	11:00 AM	1.00	17.00	
9/24/00	8.00	*	6.86	C	9/30/00	11:30 AM	0.75	16.50	
Min	0.00		-4.00		**Min**		0.50	3.00	
Max	136.00		57.14		**Max**		2.75	23.00	
Total	1,119.00								

I = Insufficient data
C = Complete data set
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Dolloff

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	14.00	I					
10/3/99	30.00	C	14.43	C					
10/10/99	6.00	C	17.71	C					
10/17/99	0.00	C	17.57	C					
10/24/99	30.00	C	19.00	C					
10/31/99	36.00	C	25.43	C					
11/7/99	145.00	C	49.86	C					
11/14/99	59.00	C	67.86	C					
11/21/99	102.00	C	75.86	C					
11/28/99	41.00	C	69.43	C					
12/5/99	38.00	C	60.29	C					
12/12/99	139.00	C	75.71	C					
12/19/99	2.00	C	57.57	C					
12/26/99	18.00	C	39.86	C					
1/2/00	19.00	C	44.00	C					
1/9/00	52.00	C	51.71	C					
1/16/00	23.00	C	50.29	C					
1/23/00	4.00	C	40.57	C					
1/30/00	57.00	C	53.57	C					
2/6/00	42.00	C	53.29	C					
2/13/00	18.00	C	44.71	C					
2/20/00	31.00	C	47.86	C					
2/27/00	78.00	C	56.86	C					
3/5/00	8.00	C	54.57	C					
3/12/00	32.00	C	47.57	C					
3/19/00	21.00	C	49.00	C					
3/26/00	6.00	C	46.29	C					
4/2/00	5.00	C	45.29	C					
4/9/00	32.00	C	47.00	C					
4/16/00	1.00	C	45.43	C					
4/23/00	18.00	C	41.00	C	4/23/00	4:00 PM	1.50	15.00	
4/30/00	26.00	C	41.86	C	4/30/00	5:30 PM	1.50	16.00	
5/7/00	29.00	C	50.86	C					
5/14/00	12.00	C	51.57	C	5/14/00	3:30 PM	1.25	17.00	
5/21/00	—	I	51.00	I					
5/28/00	4.00	C	47.00	C	5/28/00	3:30 PM	1.25	19.00	
6/4/00	18.00	C	44.00	C					
6/11/00	41.00	C	57.33	*					
Min	0.00		14.00		**Min**		1.25	15.00	
Max	145.00		75.86		**Max**		1.50	19.00	
Total	1,223.00								

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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	—	I	6.10	I					
10/3/99	30.00	C	6.56	C					
10/10/99	6.00	C	13.79	C					
10/17/99	0.00	C	10.64	C					
10/24/99	20.00	*	12.27	C					
11/2/99	—	I	21.68	*					
11/7/99	134.00	C	41.30	C					
11/14/99	40.00	*	59.91	C					
11/21/99	94.00	C	66.20	C					
11/28/99	38.00	C	64.87	C					
12/5/99	28.00	*	60.44	C					
12/12/99	92.00	C	69.59	C					
12/19/99	2.00	C	62.57	C					
12/26/99	16.00	C	56.21	C					
1/2/00	28.00	*	51.39	C					
1/9/00	—	I	54.58	*					
1/16/00	29.00	C	53.61	C					
1/23/00	0.00	C	50.80	C					
1/30/00	52.00	C	53.63	C					
2/6/00	40.00	*	53.93	*					
2/13/00	20.00	C	51.46	C					
2/20/00	34.00	*	49.14	C					
2/27/00	76.00	C	42.50	C					
3/5/00	—	I	37.30	*					
3/12/00	36.00	C	36.27	C					
3/19/00	24.00	*	35.57	C					
3/26/00	4.00	*	33.57	C					
4/2/00	—	I	31.97	*					
4/9/00	—	I	31.59	C					
4/16/00	0.00	*	33.50	*					
4/23/00	—	I	32.50	*					
4/30/00	28.00	*	33.83	*					
5/7/00	26.00	C	34.47	C					
5/14/00	10.00	*	32.93	C					
5/21/00	14.00	C	32.21	C					
5/28/00	6.00	*	29.56	C					
6/4/00	—	I	27.77	C					
6/11/00	38.00	*	35.30	*					
6/18/00	—	I	29.70	*					
6/25/00	0.00	*	27.65	*					
7/2/00	26.00	C	27.79	C					
7/9/00	0.00	*	25.97	C					
7/16/00	0.00	C	22.39	C					
7/23/00	0.00	C	19.16	C					
7/30/00	0.00	C	16.19	C					
8/6/00	0.00	C	11.77	C					
8/13/00	8.00	C	8.83	C					
8/20/00	0.00	C	7.03	C					
8/27/00	0.00	*	5.03	C					
9/3/00	8.00	*	2.00	C					
9/10/00	14.00	C	1.79	C					
9/17/00	2.00	C	0.11	C					
9/24/00	4.00	C	0.00	C					
Min	0.00		0.00		**Min**		0.00	0.00	
Max	134.00		69.59		**Max**		0.00	0.00	
Total	1,027.00								

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C = Complete data set
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Francis

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*							
10/3/99	—	I	30.00	I					
10/10/99	—	I							
10/17/99	2.00	C	34.00	I					
10/24/99	22.00	C	38.00	I					
10/31/99	20.00	C							
11/7/99	148.00	*							
11/14/99	40.00	C							
11/21/99	75.00	*	79.00	I					
11/28/99	36.00	*	85.00	I					
12/5/99	—	I							
12/12/99	77.00	*	90.00	I					
12/19/99	0.00	C							
12/26/99	16.00	C	59.67	I					
1/2/00	—	I	60.00	I					
1/9/00	46.00	*	67.67	I					
1/16/00	16.00	*	68.67	I					
1/23/00	6.00	C	58.00	I					
1/30/00	40.00	C	63.67	I					
2/6/00	—	I							
2/13/00	—	I	59.00	I					
2/20/00	—	I	58.00	I					
2/27/00	—	I	60.00	I					
3/5/00	4.50	C	71.00	I					
3/12/00	40.00	C	61.00	I					
3/19/00	23.00	C							
3/26/00	11.00	C	60.00	I					
4/2/00	7.00	C	59.00	I					
4/9/00	36.00	*							
4/16/00	—	I	51.00	I					
4/23/00	22.00	C	50.00	I					
4/30/00	—	I	50.00	I	5/1/00	6:30 PM	2.75	16.00	
5/7/00	54.00	C	59.00	I	5/7/00	1:00 PM	2.75	15.00	
5/14/00	0.00	*	58.00	I					
5/21/00	10.00	*							
5/28/00	20.00	C	50.00	I	5/29/00	7:00 PM	2.50	18.50	
6/4/00	23.00	C							
6/11/00	—	I	50.00	I	6/11/00	7:26 PM	2.25	16.50	
6/18/00	4.00	C							
6/25/00	0.00	*	48.00	I	6/25/00	12:00 PM	2.25	20.00	
7/2/00	10.00	*							
7/9/00	0.00	C	42.00	I	7/9/00	8:00 PM	1.00	19.50	
7/16/00	2.00	C							
7/23/00	0.00	C			7/25/00	7:00 PM	1.00	19.00	
7/30/00	0.00	C							
8/6/00	0.00	C			8/6/00	1:00 PM	1.00	22.00	
8/13/00	7.00	*							
8/20/00	—	I			8/20/00	8:15 PM	1.00	18.50	
8/27/00									
9/3/00	—	I							
9/10/00	21.00	C	27.00	I					
9/17/00	3.00	C	25.00	I	9/17/00	11:50 AM	1.50	17.00	
9/24/00	29.00	C	24.00	I					
Min	0.00		24.00		**Min**		1.00	15.00	
Max	148.00		90.00		**Max**		2.75	22.00	
Total	870.50								

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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	80.00	*					
10/3/99	28.00	*	79.14	C	10/3/99	11:30 AM	1.00	15.00	have photos of lake
10/10/99	2.00	*	90.57	C	10/10/99	1:00 PM	1.00	14.00	very green with algae
10/17/99	0.00	C	86.29	C	10/17/99	1:30 PM	1.50	12.00	heavy in spots, sml grn particles in water
10/24/99	22.00	C	88.29	C	10/24/99	1:30 PM	1.00	12.00	heavy in spots, sml grn particles in water
10/31/99	36.00	C	118.29	C	10/31/99	12:00 PM	0.50	11.00	
11/7/99	136.00	*	203.43	C	11/7/99	12:00 PM	0.50	10.00	pump turned on 11/9
11/14/99	32.00	*	269.14	C	11/14/99	12:00 PM			flooded, water lev. above dock hand rails
11/21/99	76.00	C	224.43	C	11/21/99				flooded
11/28/99	42.00	C	198.14	C	11/28/99				flooded
12/5/99	—	I	149.29	C	12/5/99	12:30 PM	1.00	7.00	
12/12/99	88.00	*	202.86	C	12/12/99	12:30 PM	0.75	7.00	
12/19/99	6.00	C	177.14	C	12/19/99	12:00 PM			pump turned off 12/24
12/26/99	14.00	C	146.57	C	12/26/99	12:00 PM	1.50	5.00	pier cov'd w/ bird droppings, have photos
1/2/00	—	I	149.71	C	1/2/00	1:00 PM	1.50	5.00	
1/9/00	42.00	C	147.43	C	1/9/00	12:30 PM	1.50	6.00	
1/16/00	30.00	C	147.14	C	1/16/00	12:30 PM	1.50	5.00	
1/23/00	4.00	C	146.00	C	1/23/00	1:00 PM	2.00	5.00	
1/30/00	56.00	*	200.29	C	1/30/00	12:30 PM	2.00	5.00	
2/6/00	36.00	*	160.00	*	2/6/00	11:00 AM	1.50	6.00	
2/13/00	14.00	C	146.57	C	2/13/00	12:00 PM	1.50	6.00	
2/20/00	32.00	*	148.86	C	2/20/00	11:30 AM	1.50	6.00	
2/27/00	70.00	C	155.43	C	2/27/00	12:00 PM	1.00	7.00	
3/5/00	8.00	C	156.00	C	3/5/00	11:30 AM	1.50	7.00	
3/12/00	30.00	*	150.86	C	3/12/00	12:00 PM	1.50	7.00	
3/19/00	14.00	*	146.29	C	3/19/00	12:00 PM	1.50	8.00	
3/26/00	0.00	C	140.86	C	3/26/00	12:00 PM	1.50	10.00	shopping carts been in the lake 6 months
4/2/00	—	I	135.71	C	4/2/00	1:00 PM	2.50	13.00	much tree debris; 2 shop carts at 1m
4/9/00	12.00	C	130.00	C	4/9/00	12:00 PM	2.50	14.00	
4/16/00	4.00	C	127.14	C	4/16/00	12:30 PM	2.50	14.00	
4/23/00	14.00	*	125.71	C	4/23/00	12:00 PM	2.50	14.00	dense algae along beachside underwater
4/30/00	20.00	C	128.57	C	4/30/00	12:00 PM	2.50	14.00	clean up? This lake is disgusting
5/7/00	38.00	C	137.14	C	5/7/00	12:00 PM	2.00	15.00	algae forming on bot. of the lk frm leaves
5/14/00	12.00	C	141.43	C	5/14/00	1:00 PM	3.00	17.00	water very clr despite algae; many gulls
5/21/00	12.00	C	144.29	C	5/21/00	1:00 PM	2.50	17.00	10 geese spotted
5/28/00	—	I	146.00	C	5/28/00	11:30 AM	3.00	19.00	
6/4/00	10.00	*	138.86	C	6/4/00	1:00 PM	3.00	21.00	
6/11/00	36.00	C	158.00	C	6/11/00	12:30 PM	3.00	20.00	
6/18/00	0.00	*	153.43	C	6/18/00	11:00 AM	2.50	20.00	
6/25/00	0.00	C	142.86	C	6/25/00	12:00 PM	2.00	21.00	
7/2/00	8.00	C	134.57	C	7/2/00	11:30 AM	2.50	20.00	dogs unleashed swimming
7/9/00	0.00	C	124.86	C	7/9/00	12:00 PM	2.00	20.00	
7/16/00	0.00	C	113.71	C	7/16/00	1:30 PM	2.00	23.00	weeds around pier, noted dense amount of
7/23/00	2.00	C	106.29	C	7/23/00	12:00 PM	2.00	23.00	
7/30/00	0.00	C	97.43	C	7/30/00	1:30 PM	2.00	24.00	particles in the water, over 30 geese
8/6/00	0.00	C	89.43	C	8/6/00	11:30 AM	1.50	24.00	weeds thick; water green; 40-50 geese
8/13/00	10.00	*	82.86	C	8/13/00	12:00 PM	1.00	22.00	>60 geese;water very green in color
8/20/00	2.00	C	82.00	I	8/20/00	11:30 AM	1.00	20.00	water green; logs, trash still not picked up
8/27/00	—	I	74.00	I	8/27/00	12:30 PM	1.00	20.00	junk still not picked up
Min	0.00		74.00		**Min**		0.50	5.00	
Max	136.00		269.14		**Max**		3.00	24.00	
Total	998.00								

I = Insufficient data
C = Complete data set
* = Acceptable number of measurements during a given week, but less than ideal

Geneva

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	37.00	*					
10/3/99	28.00	*	37.43	C	10/6/99	2:00 PM	4.00	15.00	
10/10/99	5.00	C	39.14	C	10/13/99	3:00 PM	3.50	14.00	
10/17/99	0.00	C	38.29	C	10/19/99	2:00 PM	4.00	13.00	
10/24/99	—	I	38.71	C	10/26/99	2:00 PM	4.00	11.00	
10/31/99	28.00	*	41.29	C	11/3/99	3:00 PM	3.50	10.00	
11/7/99	125.00	*	49.57	C	11/13/99	3:00 PM	3.50	10.00	
11/14/99	—	I	68.29	C	11/18/99	10:00 AM	4.00	9.00	
11/21/99	85.00	C	76.86	C	11/26/99	11:30 AM	3.00	8.00	
11/28/99	—	I	87.14	C	12/3/99	11:00 AM	3.00	7.00	
12/5/99	27.00	C	83.86	C	12/10/99	11:00 AM	2.50	7.00	
12/12/99	85.00	C	87.29	C	12/14/99	11:00 AM	2.50	7.00	
12/19/99	1.00	*	85.00	C	12/20/99	12:00 PM	3.00	7.00	
12/26/99	15.00	C	78.86	C	12/28/99	3:00 PM	3.00	7.00	
1/2/00	23.00	*	77.14	C	1/5/00	2:00 PM	3.00	7.00	
1/9/00	39.00	C	79.57	C	1/12/00	3:00 PM	3.00	5.00	
1/16/00	16.00	*	79.86	C	1/19/00	3:00 PM	3.00	6.00	
1/23/00	3.00	C	75.86	C	1/25/00	2:00 PM	3.00	7.00	
1/30/00	42.00	C	77.57	C	1/31/00	2:00 PM	3.00	7.00	
2/6/00	37.00	*	80.57	C	2/8/00	1:30 PM	3.00	7.00	
2/13/00	15.00	C	78.86	C	2/15/00	2:30 PM	3.00	7.00	
2/20/00	25.00	C	76.00	C	2/24/00	1:30 PM	3.00	7.00	
2/27/00	67.00	C	81.43	C	3/1/00	12:00 PM	2.00	7.00	
3/5/00	13.00	*	83.29	C	3/6/00	3:00 PM	1.50	7.00	
3/12/00	29.00	*	75.57	C	3/14/00	11:00 AM	2.50	7.00	
3/19/00	14.00	C	75.00	C	3/21/00	1:00 PM	3.50	9.00	
3/26/00	3.00	C	72.00	C	3/29/00	1:50 PM	3.50	9.00	
4/2/00	—	I	67.57	C	4/4/00	2:00 PM	3.00	12.00	
4/9/00	33.00	*	66.29	C	4/11/00	2:30 PM	3.00	14.00	
4/16/00	6.00	C	69.00	C	4/18/00	12:00 PM	3.00	14.00	
4/23/00	16.00	*	66.71	C	4/24/00	12:30 PM	3.00	14.00	
4/30/00	27.00	C	66.43	C	5/2/00	10:30 AM	4.00	15.00	
5/7/00	—	I	67.43	C	5/9/00	4:00 PM	5.00	14.00	
5/14/00	12.00	*	65.57	C	5/17/00	5:00 PM	5.50	17.00	
5/21/00	—	I	65.00	C	5/22/00	10:30 AM	5.00	17.00	
5/28/00	5.00	C	62.29	C	6/1/00	4:30 PM	5.00	17.00	
6/4/00	—	I	59.57	C	6/8/00	2:00 PM	4.50	18.00	
6/11/00	33.00	*	61.57	C	6/13/00	2:00 PM	4.50	18.00	
6/18/00	—	I	59.57	C	6/21/00	2:00 PM	4.50	20.00	
6/25/00	0.00	C	56.86	C	6/26/00	2:30 PM	4.00	24.00	
7/2/00	13.00	C	55.43	C	7/5/00	3:00 PM	4.00	21.00	
7/9/00	0.00	C	53.43	C	7/11/00	4:30 PM	4.00	21.00	
7/16/00	0.00	C	50.57	C	7/18/00	4:00 PM	4.00	22.00	
7/23/00	0.00	*	48.00	C	7/23/00	9:30 AM	4.50	22.00	
7/30/00	0.00	C	45.29	C	8/1/00	4:00 PM	4.00	24.00	
8/6/00	0.00	C	42.29	C	8/6/00	3:00 PM	3.50	23.00	
8/13/00	8.00	C	39.57	C	8/15/00	3:00 PM	3.50	21.00	
8/20/00	5.00	C	38.00	C	8/23/00	3:30 PM	4.00	22.00	
8/27/00	0.00	*	35.57	C	8/31/00	3:00 PM	4.00	20.00	
9/3/00	—	I	34.29	C	9/6/00	3:30 PM	4.50	19.00	
9/10/00	15.00	C	34.71	C	9/12/00	3:00 PM	4.50	18.00	
9/17/00	—	I	33.71	C	9/19/00	3:00 PM	4.50	19.00	
9/24/00	0.40	C	32.29	C	9/27/00	4:45 PM	4.00	17.00	
Min	0.00		32.29		**Min**		1.50	5.00	
Max	125.00		87.29		**Max**		5.50	24.00	
Total	898.40								

I = Insufficient data
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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	12.25	*					
10/3/99	32.00	C	12.64	C	10/3/99	9:50 AM	3.00	13.50	
10/10/99	5.00	C	17.07	C	10/10/99	9:50 AM	3.00	13.00	
10/17/99	0.00	C	16.29	C	10/17/99	10:30 AM	3.00	11.50	
10/24/99	24.00	C	17.21	C	10/24/99	9:40 AM	3.00	11.00	
10/31/99	31.00	C	22.07	C	10/31/99	9:40 AM	2.75	10.00	
11/7/99	130.00	C	34.36	C	11/7/99	9:40 AM	2.75	9.00	
11/14/99	31.00	C	40.79	C	11/14/99	9:50 AM	3.25	9.00	
11/21/99	59.00	C	37.79	C	11/24/99	9:45 AM	2.75	8.50	
11/28/99	31.00	C	35.79	C	11/28/99	10:15 AM	2.75		broke thermometer
12/5/99	47.00	C	36.36	C	12/5/99	9:30 AM	3.00	7.00	
12/12/99	52.00	C	40.21	C	12/12/99	2:45 PM	2.75	7.00	
12/19/99	4.00	C	37.64	C	12/19/99	9:40 AM	3.00	6.50	
12/26/99	11.00	C	32.93	C	12/26/99	10:50 AM	3.25	5.50	
1/2/00	23.00	C	35.14	C	1/2/00	9:40 AM	3.00	5.00	
1/9/00	48.00	C	41.11	C	1/9/00	10:45 AM	3.00	5.00	
1/16/00	13.00	C	49.86	C	1/16/00	9:40 AM	2.75	4.00	
1/23/00	6.00	C	52.50	C	1/22/00	4:00 PM	3.30	5.00	
1/30/00	34.00	*	55.36	C	1/31/00	1:30 PM	3.50	5.00	
2/6/00	38.00	C	59.43	C	2/6/00	9:55 AM	3.50	5.00	
2/13/00	13.00	C	57.79	C	2/13/00	10:15 AM	3.00	4.50	
2/20/00	26.00	C	57.86	C	2/20/00	10:00 AM	3.25	5.00	
2/27/00	48.00	C	60.93	C	2/27/00	9:50 AM	2.75	6.00	
3/5/00	6.00	C	58.93	C	3/5/00	9:45 AM	2.75	6.50	
3/12/00	28.00	C	58.21	C	3/12/00	9:35 AM	3.25	9.50	
3/19/00	9.00	C	57.50	C	3/19/00	9:35 AM	3.50	9.50	
3/26/00	8.00	C	57.00	C	3/26/00	9:35 AM	4.50	10.50	
4/2/00	13.00	C	56.59	C	4/2/00	11:00 AM	4.50	13.00	
4/9/00	13.00	C	55.79	C	4/9/00	10:00 AM	3.75	13.00	
4/16/00	2.00	C	55.14	C	4/16/00	9:45 AM	3.50	13.50	
4/23/00	10.00	C	53.86	C	4/23/00	9:50 AM	3.50	15.50	
4/30/00	10.00	C	52.21	C	4/30/00	10:10 AM	4.75	15.00	
5/7/00	21.00	C	44.64	C	5/7/00	9:40 AM	4.00	16.00	
5/14/00	11.00	C	51.29	C	5/14/00	10:00 AM	4.25	16.00	
5/21/00	14.00	C	50.79	C	5/21/00	10:05 AM	3.75	17.50	
5/28/00	8.00	C	49.64	C	5/29/00	10:45 AM	4.00	18.00	
6/4/00	4.00	C	46.86	C	6/4/00	9:40 AM	4.25	20.00	orange scum on lake 6/17/00
6/11/00	19.00	C	47.50	C	6/11/00	1:40 PM	2.75	18.00	
6/18/00	4.00	C	45.93	C	6/18/00	1:15 PM	2.25	20.00	
6/25/00	0.00	C	42.50	C	6/25/00	10:30 AM	2.75	21.00	
7/2/00	2.00	C	39.64	C	7/2/00	9:20 AM	2.75	20.00	
7/9/00	0.00	C	37.71	C	7/9/00	9:40 AM	3.00	20.50	
7/16/00	2.00	C	34.29	C	7/16/00	9:40 AM	2.75	21.00	
7/23/00	12.00	C	33.00	C					
7/30/00	0.00	C	29.86	C	7/30/00	9:40 AM	3.50	22.50	
8/6/00	0.00	C	26.00	C	8/6/00	10:00 AM	4.00	23.50	
8/13/00	7.00	C	23.36	C	8/13/00	9:40 AM	4.00	21.00	
8/20/00	2.00	C	21.07	C	8/20/00	10:00 AM	4.00	19.50	
8/27/00	5.00	*	19.33	*	8/27/00	9:40 AM	4.00	19.00	
9/3/00	10.00	C	19.00	C	9/3/00	10:00 AM	2.75	19.00	
9/10/00	8.00	C	18.86	C	9/10/00	9:45 AM	2.50	19.50	
9/17/00	1.00	C	14.29	C	9/17/00	10:00 AM	2.50	20.00	
9/24/00	22.00	C	10.86	C	9/24/00	4:00 PM	2.50	20.00	
Min	0.00		10.86		**Min**		2.25	4.00	
Max	130.00		60.93		**Max**		4.75	23.50	
Total	957.00								

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Horseshoe

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
11/14/99	42.00	C	52.57	C	11/14/99	11:00 AM	1.75	10.20	algae light green
11/21/99	94.00	C	69.29	C	11/21/99	12:45 PM	1.75	8.00	didn't see algae
11/28/99	21.00	C	104.71	C	11/28/99	2:00 PM	2.00	7.50	
12/5/99	26.50	C	122.57	C	12/5/99	3:30 PM	2.00	7.00	
12/12/99	88.00	C	138.29	C	12/12/99	1:00 PM	2.00	7.00	
12/19/99	0.00	C	168.57	C	12/19/99	1:00 PM	2.50	7.00	
12/26/99	4.00	C	182.29	C	12/26/99	1:30 PM	2.50	5.00	
1/2/00	29.00	C	190.43	C	1/2/00	12:00 PM	2.50	4.50	
1/9/00	45.00	C	199.43	C	1/9/00	12:30 PM	2.00	4.00	
1/16/00	16.00	C	207.43	C	1/16/00	10:30 AM	2.50	3.00	
1/23/00	0.00	C	211.00	C	1/23/00	12:30 PM	3.00	4.00	
1/30/00	10.00	C	218.86	C	1/30/00	3:00 PM	2.50	3.00	
2/6/00	28.00	C	228.57	C	2/6/00	12:30 PM	2.50	5.00	
2/13/00	23.00	C	235.00	C	2/13/00	1:00 PM	2.50	5.00	
2/20/00	26.00	C	241.00	C	2/20/00	1:00 PM	3.00	5.00	
2/27/00	71.00	C	248.71	C	2/27/00	2:30 PM	2.50	6.00	
3/5/00	0.00	C	260.57	C	3/5/00	2:30 PM	2.50	6.00	
3/12/00	39.00	C	270.00	C	3/12/00	1:30 PM	2.50	7.00	
3/19/00	17.00	C	277.00	C	3/19/00	12:00 PM	2.00	7.00	frogs croaking
3/26/00	3.00	C	282.29	C	3/26/00	12:30 PM	2.50	8.00	
4/2/00	0.00	C	283.00	C	4/2/00	12:30 PM	2.50	12.00	
4/9/00	28.00	C	281.43	C	4/9/00	4:30 PM	3.00	12.00	
4/16/00	0.00	C	282.00	C	4/16/00	11:30 AM	3.00	12.00	
4/23/00	36.00	C	280.29	C	4/23/00	3:30 PM	3.50	14.00	
4/30/00	18.00	C	278.57	C	4/30/00	1:30 PM	4.00	14.00	
5/7/00	24.00	C	278.29	C	5/7/00	1:30 PM	4.00	15.00	
5/14/00	16.00	C	280.00	C	5/15/00	4:30 PM	4.00	18.00	
5/21/00	10.00	C	277.14	C	5/21/00	4:30 PM	4.00	18.00	
5/28/00	14.00	C	270.43	C					
6/4/00	17.00	C	263.00	C	6/4/00	4:30 PM	4.00	22.00	
6/11/00	42.00	C	258.57	C	6/11/00	2:00 PM	4.00	18.00	plants growing 4 m deep; baby ducks not
6/18/00	0.00	C	251.43	C	6/18/00	1:00 PM	4.00	21.00	too many
6/25/00	0.00	C	241.57	C	6/24/00	8:00 PM	4.00	22.00	
7/2/00	20.00	C	230.29	C	7/2/00	12:30 PM	3.00	22.00	geese are back; little fish are near shore
7/9/00	0.00	C	217.29	C	7/9/00	1:30 PM	2.00	22.00	
7/16/00	0.00	C	204.00	C	7/16/00	12:30 PM	3.00	23.00	
7/23/00	0.00	C	190.00	C	7/23/00	2:00 PM	3.00	23.00	
7/30/00	0.00	C	174.43	C	7/30/00	9:30 AM	3.00	23.00	bunch of dead insects/fly/mosquitos floating
8/6/00	0.00	C	159.43	C	8/6/00	2:00 PM	2.50	22.00	on the lake.
8/13/00	3.00	C	145.86	C	8/13/00	1:30 PM	2.50	21.00	
8/20/00	1.00	C	132.00	C	8/20/00	8:00 PM	2.50	20.00	
8/27/00	0.00	C	118.00	C	8/27/00	2:30 PM	2.50	20.00	
9/3/00	48.00	C	104.14	C	9/4/00	8:00 PM	2.00	18.00	
9/10/00	0.00	C	93.00	C	9/10/00	3:30 PM	1.50	18.00	
9/17/00	0.00	C	78.43	C	9/17/00	7:00 PM	1.00	20.00	small, thick patches of algae, a small
9/24/00	24.00	C	64.43	C	9/24/00	2:30 PM	1.50	16.00	number seen.
Min	0.00		52.57		**Min**		1.00	3.00	
Max	94.00		283.00		**Max**		4.00	23.00	
Total	883.50								

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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
3/20/00	23.00	*	65.50	*					
3/26/00	6.00	C	61.57	C	3/26/00	7:00 PM	1.50	12.00	
4/2/00	22.00	C	59.29	C	4/2/00	7:30 AM	2.00	12.00	
4/9/00	47.00	C	58.14	C	4/9/00	10:35 AM	1.90	14.50	
4/16/00	15.00	C	62.00	C	4/16/00	9:45 AM	1.40	15.00	more alg than last wk; 1 big reed island
4/23/00	33.00	C	59.71	C	4/23/00	9:40 AM	1.90		algae clumps ~3' across
4/30/00	34.00	C	60.71	C	4/30/00	12:45 PM	2.00	14.00	
5/7/00	41.00	C	65.14	C	5/7/00	9:45 AM	1.70	13.50	more algae, lily pads putting on leaves,
5/14/00	12.00	C	58.43	C	5/14/00	10:05 AM	1.60	14.00	milfoil ~1' from sfc
5/21/00	8.00	C	54.43	C	5/21/00	10:20 AM	2.20	16.50	milfoil is on surface in many places.
5/28/00	22.00	C	51.00	C	5/29/00	10:15 AM	1.80	17.00	
6/4/00	19.00	C	44.57	C	6/4/00	10:30 AM	1.60	17.00	
6/11/00	10.00	C	44.43	C	6/11/00	12:00 PM	1.70	16.50	milfoil is spreading across surface
6/18/00	9.00	C	43.43	C	6/18/00	10:45 AM	1.70	17.00	
6/25/00	5.00	C	37.57	C	6/26/00	7:00 PM	1.80	22.00	
7/2/00	12.00	C	35.86	C	7/2/00	11:30 AM	1.30	21.00	milfoil continues to spread on Eside of lk
7/9/00	0.00	C	34.43	C	7/9/00	3:15 PM	1.00	20.00	
7/16/00	0.00	C	33.00	C	7/16/00	1:30 PM	1.20	21.00	lev.at 34-bottom of gauge in mud at 30
7/23/00	0.00	C	32.00	C	7/23/00	12:30 PM	1.10	21.50	edge of lake approx. 50 feet from shore.
7/30/00	0.00	C	32.71	C	7/30/00	11:30 AM	1.20	22.50	
8/6/00	0.00	C	33.00	C	8/6/00	1:15 PM	2.25	24.00	bottom (approximately 2.25 meters.)
8/13/00	2.00	*	33.00	C	8/13/00	2:00 PM	2.00	22.00	
8/20/00	0.00	C	33.00	C	8/20/00	3:30 PM	2.00	21.00	extra water sample day
8/27/00	0.00	C	33.00	C	8/27/00	1:30 PM	2.00	19.50	
9/3/00	9.00	*	34.29	C	9/4/00	1:15 PM	2.25	18.00	water still very clear, secchi vis on bot.
9/10/00	8.00	C	34.57	C	9/10/00	12:30 PM	2.25	19.00	
9/17/00	1.00	C	33.29	C	9/17/00	1:45 PM	2.25	19.50	approximately 20 Canada geese
9/24/00	29.00	C	34.00	C					
Min	0.00		32.00		**Min**		1.00	12.00	
Max	47.00		65.50		**Max**		2.25	24.00	
Total	367.00								

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Joy

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	5.00	*					
10/3/99	39.60	C	5.14	C					
10/10/99	15.30	C	8.43	C					
10/17/99	0.00	C	8.71	C					
10/24/99	60.90	C	9.29	C					
10/31/99	53.40	C	14.86	C					
11/7/99	176.10	C	26.71	C					
11/14/99	56.70	C	52.57	C					
11/21/99	165.00	*	59.50	*					
11/28/99	73.80	C	60.29	C					
12/5/99	—	I	56.40	*					
12/12/99	124.50	C	59.57	C					
12/19/99	7.60	C	56.43	C					
12/26/99	20.30	C	44.14	C					
1/2/00	45.80	C	43.14	C					
1/9/00	50.60	C	47.00	C					
1/16/00	15.10	C	44.71	C					
1/23/00	22.90	C	40.00	C					
1/30/00	38.10	C	38.29	C					
Min	0.00		5.00		**Min**		0.00	0.00	
Max	176.10		60.29		**Max**		0.00	0.00	
Total	965.70								

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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	7.00	*					
10/3/99	36.00	C	7.29	C	10/8/99	4:00 PM	1.25	15.00	
10/10/99	12.00	C	8.29	C					
10/17/99	0.00	C	8.29	C	10/17/99	3:00 PM	1.00	13.00	
10/24/99	27.00	C	7.71	C					
10/31/99	37.00	C	10.57	C					
11/7/99	137.00	C	20.43	C					
11/14/99	42.00	C	44.86	C	11/16/99	3:30 PM	1.25	10.00	
11/21/99	69.00	C	56.14	C					
11/28/99	46.00	C	62.71	C					
12/5/99	42.00	C	59.43	C					
12/12/99	62.00	C	64.29	C	12/17/99	2:30 PM	1.50	7.00	
12/19/99	0.00	C	61.00	C					
12/26/99	0.00	*	51.33	*					
1/2/00	43.00	C	50.00	C	1/2/00	3:00 PM	1.50	8.00	
1/9/00	53.00	C	53.86	C					
1/16/00	20.00	C	53.71	C					
1/23/00	0.00	C	49.71	C	1/29/00	2:00 PM	1.75	5.00	
1/30/00	51.00	C	51.71	C					
2/6/00	36.00	C	54.86	C	2/12/00	3:00 PM	1.75	5.00	
2/13/00	13.00	C	50.14	C					
2/20/00	30.00	C	47.00	C	2/24/00	3:30 PM	1.50	7.00	
2/27/00	64.00	C	49.71	C	3/3/00	2:00 PM	1.25	8.00	
3/5/00	6.00	C	52.00	C	3/11/00	4:30 PM	1.25	8.00	
3/12/00	32.00	C	47.14	C					
3/19/00	19.00	C	44.86	C	3/25/00	4:30 PM	1.75	10.00	
3/26/00	6.00	C	41.43	C					
4/2/00	5.00	C	37.29	C	4/2/00	3:45 PM	1.75	15.00	
4/9/00	27.00	C	33.71	C	4/11/00	6:45 PM	1.50	16.00	
4/16/00	1.00	C	33.00	C					
4/23/00	15.00	C	30.43	C	4/23/00	10:00 AM	1.25	15.00	lilly pads early. Lk unusally low; new
4/30/00	19.00	C	29.43	C	4/30/00	4:30 PM	1.75	17.00	islands @ S end exposed
5/7/00	33.00	C	29.71	C	5/7/00	2:00 PM	2.00	15.50	Physical measurements by K. Lanan
5/14/00	14.00	C	29.57	C	5/14/00	6:00 PM	1.50	18.00	
5/21/00	10.00	C	28.57	C	5/23/00	2:30 PM	2.00	18.00	
5/28/00	15.00	C	27.86	C	5/29/00	1:00 PM	2.50	19.00	
6/4/00	12.00	C	26.14	C	6/4/00	3:30 PM	2.75	21.00	4 fish, 4 swim, 88ºF, Imuch activity
6/11/00	40.00	C	29.57	C					
6/18/00	0.00	C	27.57	C	6/18/00	8:30 PM	1.75	23.00	2 fish, 4 swim, warm, much summer activ.
6/25/00	0.00	C	24.43	C					
7/2/00	12.00	C	22.14	C					
7/9/00	0.00	C	17.86	C					
7/16/00	0.00	C	15.14	C					
7/23/00	5.00	C	13.29	C					Precip Measurements by K. Lanan
7/30/00	0.00	C	10.71	C					
8/6/00	0.00	C	7.43	C	8/6/00	12:00 PM	1.75	23.50	Physical measurements by K. Lanan
8/13/00	8.00	C	5.43	C	8/19/00	5:30 PM	2.00	23.00	
8/20/00	0.00	C	3.71	C					
8/27/00	11.00	C	1.71	C	8/27/00	7:00 PM	1.50	22.00	
9/3/00	9.00	C	2.14	C	9/4/00	4:00 PM	1.25	18.50	Physical measurements by K. Lanan
9/10/00	12.00	C	5.57	C	9/12/00	3:30 PM	1.00	20.00	
9/17/00	2.00	C	13.43	C					
9/24/00	8.00	C	12.14	C	9/29/00	4:00 PM	1.25	17.00	
Min	0.00		1.71		**Min**		1.00	5.00	
Max	137.00		64.29		**Max**		2.75	23.50	
Total	1,133.00								

I = Insufficient data
C = Complete data set
* = Acceptable number of measurements during a given week, but less than ideal

Killarney

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	—	I	20.50	I	10/2/99	1:30 PM	3.25	15.50	
10/3/99	30.00	C	20.71	C					
10/10/99	1.00	C	20.57	C					
10/17/99	0.00	C	18.71	C	10/17/99	2:00 PM	3.00	13.00	
10/24/99	—	I	18.00	*					
10/31/99	—	I	20.00	*					
11/7/99	118.00	*	26.67	*					
11/14/99	—	I	44.00	I					
11/21/99	—	I	53.33	I					
11/28/99	—	I	61.25	*					
12/5/99	—	I	66.00	*					
12/12/99	—	I	76.50	*					
12/19/99	0.00	*	78.50	*					
12/26/99	8.00	*	75.50	I					
Min	0.00		18.00		**Min**		0.00	0.00	
Max	118.00		78.50		**Max**		0.00	0.00	
Total	157.00								

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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	47.00	*					
10/3/99	34.00	*	46.86	C	10/3/99	1:00 PM	2.00	14.50	
10/10/99	10.00	*	50.43	C	10/10/99	2:15 PM	2.00	13.50	
10/17/99	0.00	C	50.00	C	10/17/99	1:00 PM	2.75	11.50	
10/24/99	17.50	C	50.57	C	10/24/99	1:40 PM	2.60	11.50	
10/31/99	36.00	*	54.29	C	10/31/99	2:45 PM	2.20	10.50	lots of daphnia
11/7/99	137.00	*	71.71	C	11/7/99	12:35 PM	2.25	8.50	lots of daphnia
11/14/99	39.00	*	87.86	C	11/20/99	10:45 AM	2.10	8.50	lots of micro-organisms
11/21/99	80.00	*	92.43	C					
11/28/99	42.50	*	91.43	C	11/28/99	2:20 PM	2.10	8.00	lots of micro-organisms
12/5/99	63.50	*	94.14	C	12/5/99	2:00 PM	2.20	7.00	lots of micro-organisms
12/12/99	39.00	*	92.17	*	12/12/99	2:25 PM	2.25	7.00	lots of micro-organisms
12/19/99	4.00	*	83.86	C	12/19/99	3:15 PM	2.50	6.50	lots of micro-organisms
12/26/99	14.50	C	76.86	C	12/26/99	1:45 PM	2.60	5.00	lots of micro-organisms
1/2/00	33.00	C	80.43	C	1/2/00	11:15 AM	3.10	5.00	
1/9/00	47.50	C	85.29	C	1/9/00	9:30 AM	2.75	5.00	lots of micro-organisms
1/16/00	19.00	*	83.00	C	1/16/00	11:10 AM	3.00	4.00	lots of micro-organisms
1/23/00	0.00	*	79.14	C	1/23/00	1:40 PM	3.20	4.50	lots of micro-organisms
1/30/00	27.00	C	78.86	C	1/30/00	9:10 AM			obsv from house, ice over 70% of lake
2/6/00	29.50	*	80.57	C	2/6/00	1:30 PM	3.00	8.00	lots of micro-organisms
2/13/00	16.50	*	79.00	C	2/13/00	12:10 PM	3.00	4.50	
2/20/00	24.00	C	77.14	C	2/20/00	11:40 AM	3.25	4.50	
2/27/00	53.00	C	81.00	*	2/28/00	12:35 PM	2.75	7.00	
3/5/00	6.00	C	80.43	C	3/5/00	11:45 AM	3.50	7.50	
3/12/00	44.00	C	78.29	C	3/12/00	3:00 PM	3.50	8.00	
3/19/00	19.00	C	78.29	C	3/19/00	10:00 AM	3.50	6.50	
3/26/00	16.00	*	76.57	C	3/26/00	11:25 AM	3.25	9.00	
4/2/00	23.00	C	75.57	C	4/2/00	2:30 PM	2.75	12.50	exceptional # of micro-orgs, lake soupy
4/9/00	16.00	C	74.57	C	4/9/00	4:30 PM	2.90	7.50	lots of daphnia, bottom temperature 5°C
4/16/00	3.00	*	72.86	C	4/15/00	2:25 PM	3.00	13.50	lots of daphnia, bottom temperature 5°C
4/23/00	6.00	*	70.43	C	4/23/00	9:20 AM	3.25	14.50	lots of daphnia, bottom temperature 5°C
4/30/00	6.00	*	69.86	C	4/30/00	3:00 PM	3.25	14.50	lots of daphnia, bottom temperature 5.5°C
5/7/00	40.00	*	72.57	C	5/7/00	3:35 PM	3.25	16.00	lots of daphniaand other micro-organisms, bottom temperature 5.5°C
5/14/00	12.00	C	73.29	C	5/14/00	3:15 PM	4.10	16.50	microscopic soup; 2 geese adults, 4 yng
5/21/00	19.00	C	71.86	C	5/21/00	2:35 PM	3.25	17.50	
5/28/00	16.00	*	72.14	C	5/29/00	3:45 PM	3.50	18.50	
6/4/00	—	I	70.57	C	6/4/00	4:50 PM	4.10	20.00	
6/11/00	16.00	C	70.86	C	6/11/00	3:30 PM	3.75	17.00	
6/18/00	2.00	*	69.29	C	6/18/00	1:55 PM	3.90	19.00	6/25: daphnia have declined noticeably; single-cell (algea?) increased tremendously
6/25/00	0.00	C	65.43	C	6/25/00	4:25 PM	2.50	22.00	
7/2/00	0.00	*	62.57	C	7/2/00	2:40 PM	2.75	20.50	7/2: algae not visable on surface but in water
7/9/00	0.00	C	59.71	C	7/9/00	4:25 PM	3.75	21.00	lots of single free floating cells. No daphnia.
7/16/00	0.00	*	57.00	C	7/16/00	5:15 PM	3.25	22.00	
7/23/00	10.00	C	55.00	C	7/23/00	5:05 PM	3.25	21.50	
7/30/00	0.00	C	51.57	C	7/31/00	3:50 PM	1.75	24.00	
8/6/00	0.00	C	48.29	C	8/6/00	4:05 PM	1.50	24.00	
8/13/00	4.50	C	44.86	C	8/13/00	5:50 PM	1.80	21.00	8/13: lots of single-cell micro-organisms, probably algae observed on a different day.
8/20/00	0.00	*	42.29	C	8/20/00	11:50 AM	2.00	19.50	
8/27/00	4.00	C	40.71	C	8/27/00	10:40 AM	1.75	19.00	
9/3/00	—	I	39.71	C	9/4/00	12:00 PM	2.00	17.50	
9/10/00	11.00	C	40.29	C	9/10/00	12:00 PM	1.75	16.00	
9/17/00	1.10	C	39.00	C	9/17/00	3:18 PM	1.80	18.50	no waterfowl
9/24/00	26.00	*	37.86	C	9/24/00	3:40 PM	2.20	15.50	
Min	0.00		37.86		**Min**		1.50	4.00	
Max	137.00		94.14		**Max**		4.10	24.00	
Total	1,067.10								

I = Insufficient data
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Marcel

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99			60.95	I	10/2/99	2:00 PM	1.20	15.70	
10/3/99	—	I	61.81	C	10/9/99	1:45 PM	1.60	14.30	
10/10/99	—	I	61.91	C	10/16/99	2:30 PM	1.50	13.00	
10/17/99			61.41	C	10/23/99	1:40 PM	1.60	11.50	
10/24/99	—	I	61.77	C	10/30/99	2:00 PM	1.20	10.50	
10/31/99	—	I	62.69	C	11/6/99	2:00 PM	1.30	9.00	
11/7/99	156.70	C	69.37	C	11/13/99	3:00 PM	0.70	10.00	
11/14/99	44.80	C	67.93	C	11/20/99	2:00 PM	1.70	9.20	
11/21/99	93.30	C	71.73	C	11/27/99	2:10 PM	2.00	7.80	
11/28/99	47.40	C	69.09	C	12/4/99	3:00 PM	2.30	7.00	
12/5/99	59.80	C	67.17	C	12/11/99	2:00 PM	2.40	6.70	
12/12/99	68.80	C	69.24	C	12/18/99	2:30 PM	2.30	7.00	
12/19/99	—	I	63.57	C	12/25/99	2:30 PM	2.50	5.50	
12/26/99	—	I	56.93	C	1/1/00	1:30 PM	2.70	4.50	
1/2/00	42.70	*	61.31	C	1/8/00	1:00 PM	2.50	4.80	
1/9/00	45.60	C	64.20	C	1/15/00	3:24 PM	2.20	4.20	
1/16/00	—	I	61.13	C	1/22/00	12:15 PM	2.20	4.00	
1/23/00	—	I	58.71	C	1/29/00	1:15 PM	2.30	4.00	
1/30/00	—	I	58.57	C	2/5/00	12:15 PM	2.10	4.00	
2/6/00	38.60	*	62.09	C	2/12/00	2:45 PM	2.20	5.50	3 river otters
2/13/00	—	I	60.24	C	2/19/00	4:00 PM	2.00	5.50	
2/20/00	34.90	*	57.41	C	2/26/00	4:00 PM	2.00	6.50	1 river otter
2/27/00	68.10	C	62.47	C	3/4/00	1:15 PM	2.00	7.50	
3/5/00	—	I	61.87	C	3/11/00	11:15 AM	2.00	7.20	
3/12/00	51.60	C	60.93	C	3/18/00	1:05 PM	1.90	7.70	
3/19/00	21.30	*	61.31	C	3/25/00	1:30 PM	1.70	9.50	
3/26/00	—	I	53.91	C	4/1/00	1:30 PM	1.50	12.20	
4/2/00	33.50	C	59.94	C	4/3/00	2:30 PM	2.50	12.00	
4/9/00	34.00	C	63.61	C	4/15/00	2:00 PM	3.20	13.00	
4/16/00	7.70	C	63.26	C	4/22/00	1:30 PM	2.50	15.00	
4/23/00	18.80	C	62.71	C					
4/30/00	22.00	C	62.71	C	4/30/00	3:00 PM	3.00	15.00	beaver spotted walking on island; small
5/7/00	—	I	63.16	C	5/7/00	5:00 PM	2.70	16.00	amount of pollen floating on top of lake.
5/14/00	20.80	C	62.54	C	5/14/00	3:20 PM	1.70	17.30	
5/21/00	—	I	62.53	C	5/21/00	3:15 PM	2.50	17.80	cottonwood fuzz on the lake
5/28/00	—	I	62.59	C	5/29/00	2:30 PM	2.50	18.00	one otter; 40 large grass carp.
6/4/00	—	I	61.86	C	6/4/00	3:00 PM	2.80	20.00	otter still at lake
6/11/00	—	I	63.10	C	6/11/00	4:00 PM	2.00	17.30	
6/18/00	—	I	61.59	C	6/18/00	3:40 PM	2.30	19.70	otter still at lake
6/25/00	—	I	60.89	C	6/25/00	3:40 PM	2.50	23.00	beaver, otter and muskrat
7/2/00	4.30	C	60.60	C	7/2/00	3:00 PM	2.50	21.00	canada geese, muskrat, otter
7/9/00	0.00	C	60.57	C	7/9/00	2:50 PM	2.30	21.50	canada geese, muskrat, otter
7/16/00	10.70	C	60.59	C	7/16/00	1:00 PM	2.20	22.00	canada geese, muskrat, otter
7/23/00	0.50	C	60.54	C	7/23/00	2:30 PM	2.20	22.30	canada geese; one lump of floating brown-
7/30/00	0.00	*	59.28	*	7/30/00	1:00 PM	3.00	25.00	green algae that floats up from bottom.
8/6/00	0.00	C	58.37	C	8/6/00	3:05 PM	3.40	25.20	
8/13/00	7.10	C	57.70	C	8/13/00	2:00 PM	2.20	22.20	
8/20/00	4.60	C	59.31	C	8/20/00	3:40 PM	2.20	21.50	no Elodia or weeds in the water.
8/27/00	4.30	C	59.69	C	8/27/00	2:40 PM	2.20	21.00	very little weeds; only some on bottom
9/3/00	27.60	C	60.20	C	9/3/00	2:30 PM	1.20	19.50	
9/10/00	21.50	C	61.26	C	9/10/00	3:10 PM	1.20	17.30	
9/17/00	6.10	C	60.71	C	9/17/00	2:30 PM	1.60	20.00	lt grn stuff on surface; looks like pollen
9/24/00	36.60	C	60.56	C	9/24/00	2:55 PM	1.20	17.30	floating on top in blobs, but disintegrates
Min	0.00		53.91		**Min**		0.70	4.00	
Max	156.70		71.73		**Max**		3.40	25.20	
Total	1,033.70								

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C = Complete data set
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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	37.50	I	10/2/99	3:00 PM	3.00	15.00	
10/3/99	53.00	*	37.57	C	10/9/99	3:00 PM	3.25	14.00	
10/10/99	15.00	C	42.71	C	10/16/99	5:00 PM	3.00	12.00	
10/17/99	0.00	C	17.71	C	10/23/99	3:30 PM	3.50	11.00	
10/24/99	41.00	C	13.00	C	10/30/99	3:00 PM	2.75	10.00	
10/31/99	55.00	*	4.29	C	11/6/99	2:30 PM	2.50	9.00	
11/7/99	182.00	*	39.57	C	11/13/99	3:30 PM	2.50	8.00	
11/14/99	48.00	C	47.71	C	11/20/99	12:30 PM	2.75	7.00	
11/21/99	107.00	C	59.57	C	11/27/99	11:00 AM	3.25	7.00	
11/28/99	67.00	C	51.43	C	12/4/99	2:30 PM	3.25	6.00	
12/5/99	101.00	C	53.00	C	12/11/99	2:30 PM	3.50	5.00	
12/12/99	93.00	C	66.57	C	12/18/99	9:30 AM	4.00	5.00	
12/19/99	16.00	C	36.29	C	12/25/99	2:00 PM	4.75	5.00	
12/26/99	29.00	C	4.29	C	1/1/00	1:00 AM	4.75	4.00	
1/2/00	49.00	I	37.29	C	1/8/00	12:00 PM	4.75	3.00	
1/9/00	59.00	*	51.00	C	1/15/00	12:00 PM	5.24	3.00	
1/16/00	26.00	*	16.86	C	1/22/00	2:30 PM	5.00	3.00	
1/23/00	7.00	*	5.71	C	1/29/00	4:00 PM	5.00	3.00	
1/30/00	43.00	*	7.43	C	2/5/00	3:00 PM	4.75	4.00	
2/6/00	31.00	*	7.14	C	2/12/00	4:00 PM	4.50	4.00	
2/13/00	20.00	*	5.86	C	2/19/00	4:30 PM	4.75	4.00	
2/20/00	39.00	C	7.57	C	2/26/00	4:30 PM	4.75	5.00	
2/27/00	61.00	C	10.71	C	3/4/00	1:30 PM	5.25	5.00	
3/5/00	6.00	*	19.43	C	3/11/00	1:30 PM	5.00	6.00	
3/12/00	51.00	*	44.71	C	3/18/00	4:30 PM	5.00	6.00	
3/19/00	31.00	*	57.14	C	3/25/00	2:00 PM	5.25	7.00	
3/26/00	28.00	*	52.14	C	4/1/00	2:00 PM	6.00	10.00	
4/2/00	43.00	C	51.00	C	4/8/00	1:00 PM	6.00	10.00	
4/9/00	52.00	*	48.57	C	4/15/00	3:00 PM	5.75	11.00	
4/16/00	10.00	*	54.14	C	4/22/00	1:00 PM	5.75	13.00	
4/23/00	20.00	*	54.00	C	4/29/00	2:30 PM	5.50	13.00	
4/30/00	22.00	C	51.40	C	5/6/00	6:00 PM	5.25	15.00	
5/7/00	58.00	C	54.57	C	5/13/00	12:30 PM	4.50	15.00	Particulate matter apparent (turnover?)
5/14/00	21.00	C	51.00	C	5/20/00	4:00 PM	5.00	16.00	Particulate matter still
5/21/00	28.00	C	53.14	C	5/27/00	12:00 PM	5.00	16.00	Diminished particulate matter
5/28/00	28.00	C	54.86	C	6/3/00	2:00 PM	2.75	17.00	6/3: Great influx of Water from NE stream
6/4/00	10.00	*	53.00	C	6/10/00	1:00 PM	3.25	15.50	6/1 approx 10pm whole lake rose 15 mm by
6/11/00	48.00	*	54.86	C	6/17/00	6:00 PM	3.75	19.00	10am 6/2. (22 ac/ft)
6/18/00	6.00	C	52.14	C	6/24/00	2:00 PM	3.75	20.00	6/10: water clarity seeming to return after
6/25/00	0.00	C	51.43	C	7/1/00	4:15 PM	3.25	20.00	June 2nd incident.
7/2/00	10.00	C	49.43	C	7/8/00	12:30 PM	3.75	20.00	7/1: large particulate matter returned
7/9/00	0.00	C	47.43	C					
7/16/00	4.00	C	45.00	C	7/22/00	1:00 PM	4.00	20.00	
7/23/00	14.00	*	45.14	C					
7/30/00	0.00	C	37.86	C	8/5/00	1:00 PM	4.00	23.00	
8/6/00	0.00	C	38.29	C	8/12/00	11:00 AM	3.50	22.00	
8/13/00	8.00	*	33.86	C	8/19/00	1:00 PM	3.50	20.00	
8/20/00	7.00	C	31.86	C	8/26/00	4:00 PM	4.00	19.00	
8/27/00	6.00	*	29.14	C					
9/3/00	37.00	*	27.43	C	9/9/00	2:30 PM	4.00	16.00	
9/10/00	23.00	C	34.57	C	9/16/00	10:00 AM	4.50	18.00	
9/17/00	7.00	C	35.71	C	9/23/00	4:00 PM	3.75	17.00	
9/24/00	38.00	*	35.00	C					
Min	0.00		4.29		**Min**		2.50	3.00	
Max	182.00		66.57		**Max**		6.00	23.00	
Total	1,758.00								

I = Insufficient data
C = Complete data set
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McDonald

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	28.00	*					
10/3/99	39.00	C	29.43	C	10/3/99	1:30 PM	2.00	12.00	
10/10/99	10.00	C	32.43	C	10/10/99	3:20 PM	2.00	11.00	
10/17/99	4.00	C	33.00	C	10/18/99	4:00 PM	2.00	10.00	
10/24/99	23.00	C	34.14	C	10/25/99	4:15 PM	2.00	9.00	
10/31/99	43.00	C	38.29	C	11/1/99	4:15 PM	2.00	7.00	
11/7/99	150.00	C	45.29	C	11/8/99	4:10 PM	2.00	6.00	
11/14/99	53.00	C	49.29	C	11/14/99	1:00 PM	2.00	7.00	
11/21/99	92.00	C	50.21	C					
11/28/99	35.00	C	49.00	C					
12/5/99	60.00	C	46.57	C	12/5/99	3:00 PM	2.00	5.00	
12/12/99	78.00	C	50.71	C	12/12/99	2:30 PM	2.00	5.00	wind from SE
12/19/99	7.00	C	45.71	C	12/20/99	3:10 PM	1.50	4.00	
12/26/99	10.00	C	41.43	C	12/26/99	1:00 PM	1.50		
1/2/00	34.00	C	41.86	C	1/2/00	3:40 PM	1.75	5.00	
1/9/00	61.00	C	44.57	C	1/9/00	3:35 PM	2.00	5.00	
1/16/00	24.00	C	43.29	C	1/16/00				wind storm, unsafe to go out
1/23/00	1.00	C	40.43	C	1/23/00	12:40 PM	2.50	4.00	
1/30/00	53.00	C	44.14	C	1/30/00	11:30 AM	2.50	4.00	
2/6/00	27.00	C	44.86	C	2/7/00	11:30 AM	2.50	4.00	
2/13/00	2.00	*	42.86	C	2/13/00	1:00 PM	2.75	5.00	
2/20/00	36.00	C	42.00	C	2/20/00	12:00 PM	2.50	5.00	
2/27/00	57.00	*	44.57	C	2/27/00	3:00 PM	1.75	5.00	
3/5/00	3.00	C	46.29	C	3/5/00	4:10 PM	1.25	6.00	
3/12/00	25.00	C	42.14	C	3/12/00	4:30 PM	2.50	6.00	
3/19/00	6.00	*	42.57	C					
3/26/00	4.00	C	41.14	C	3/26/00	4:10 PM	3.00	7.00	
4/2/00	8.00	C	39.86	C	4/3/00	4:05 PM	3.00	12.00	algae is small specks floating in the water
4/9/00	35.00	C	39.43	C	4/9/00	12:24 PM	2.50	11.00	algae is denser than last week.
4/16/00	8.00	C	39.43	C	4/16/00	3:40 PM	3.00	12.00	algae is less dense.
4/23/00	17.00	C	36.29	C	4/25/00	4:05 PM	3.50	13.00	
4/30/00	28.00	C	36.00	C	4/30/00	4:05 PM	3.25	14.50	algae is small specks; few sunfish today;
5/7/00	40.00	C	37.71	C					lots of water bugs flying on surface.
5/14/00	17.00	C	36.57	C	5/15/00	4:15 PM	3.75	15.50	very little algae
5/21/00	20.00	C	34.86	C	5/22/00	4:05 PM	3.50	17.00	cottonwood fuzz on the lake
5/28/00	16.00	C	34.14	C	5/29/00	3:45 PM	3.00	17.50	cottonwood fuzz on the lake
6/4/00	19.00	C	33.14	C					
6/11/00	3.00	*	36.67	I	6/12/00	4:00 PM	3.00	16.00	algae denser than last time
6/18/00	5.00	C	34.71	C	6/19/00	4:40 PM	3.25	17.50	algae specks seem bigger.
6/25/00	0.00	C	32.29	C	6/26/00	4:15 PM	4.00	22.50	specks in water smaller.
7/2/00	16.00	C	31.57	C	7/3/00	4:30 PM	3.75	19.50	algae pieces were bigger.
7/9/00	0.00	C	30.71	C	7/10/00	4:00 PM	2.75	20.00	
7/16/00	1.00	C	28.86	C	7/17/00	4:00 PM	3.25	21.00	
7/23/00	4.00	C	27.43	C	7/24/00	4:30 PM	2.75	21.50	lots of green flecks of algae
7/30/00	—	I	26.00	I	7/30/00	4:05 PM	3.00	23.50	little green flecks became less dense.
8/6/00									
8/13/00									
8/20/00									
8/27/00	—	I	18.50	I					
9/3/00	22.00	C	19.43	C	9/5/00	4:00 PM	2.50	18.00	lake algae is a little denser than last week
9/10/00	18.00	C	20.43	C	9/11/00	3:10 PM	2.50	17.00	lake soupier than last week
9/17/00	4.00	C	20.71	C	9/18/00	3:00 PM	1.75	18.00	lake still green color
9/24/00	8.00	C	20.00	C					
Min	0.00		18.50		**Min**		1.25	4.00	
Max	150.00		50.71		**Max**		4.00	23.50	
Total	1,226.00								

I = Insufficient data
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	Daily data Summary		Weekly Data Summary				
Week of	Sum of Precip (mm)	Avg of Lake Level (cm)	Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0 *	27	10/2/99	10:30 AM	5.00	18.00	
10/9/99	24.00	26.5	10/9/99	12:00 PM	5.00	18.00	
10/16/99	4.00	26.25	10/16/99	4:00 PM	5.50	17.00	boaters
10/23/99	0.00	25	10/23/99	3:30 PM	5.50	16.00	fishing boats
10/30/99	25.00	26.5	10/30/99	11:30 AM	5.50	15.00	
11/6/99	22.00	28	11/6/99	2:00 PM	5.75	13.00	boating, fishing
11/13/99	116.00	39	11/13/99	10:30 AM	5.75	12.00	
11/20/99	34.00	49.5	11/20/99	2:30 PM	5.50	12.00	
11/27/99	80.00	61	11/27/99	10:30 AM	5.75	11.00	
12/4/99	23.00	66	12/4/99	2:30 PM	5.50	10.00	
12/11/99	27.00	68	12/11/99	2:50 PM	5.25	10.00	
12/18/99	50.00	72	12/18/99	2:30 PM	5.50	9.00	
12/24/99	6.00	69	12/25/99	11:30 AM	5.00	7.00	
12/31/99	16.00	64.5	12/31/99	10:30 AM	5.00	6.00	
1/8/00	18.00	62	1/8/00	11:30 AM	5.00	8.00	
1/15/00	38.00	62.5	1/15/00	11:30 AM	5.00	7.00	
1/22/00	12.00	61.3	1/22/00	2:30 PM	5.50	8.00	
1/29/00	4.00	59	1/29/00	10:00 AM	5.50	8.00	
2/5/00	31.00	59.5	2/5/00	1:30 PM	5.00	8.00	
2/11/00	32.00	61	2/11/00	11:30 AM	5.00	8.00	
2/19/00	12.00	60	2/19/00	11:00 AM	5.00	10.00	
2/26/00	24.00	61	2/26/00	2:00 PM	5.25	10.00	
3/4/00	58.00	64.5	3/4/00	1:00 PM	5.50	9.00	
3/11/00	2.00	63	3/11/00	1:30 PM	5.50	10.00	
3/18/00	28.00	62.5	3/18/00	4:00 PM	5.50	10.00	
3/25/00	16.00	61.3	3/25/00	2:30 PM	5.50	12.00	
4/1/00	5.00	60	4/1/00	1:00 PM	5.25	16.00	
4/8/00	9.00	59	4/8/00	5:30 PM	5.50	17.00	boats noted, but no number given
4/15/00	26.00	56.5	4/15/00	1:00 PM	5.50	16.00	boats noted, but no number given
4/22/00		54.3	4/22/00	1:00 PM	5.50	16.00	boats noted, but no number given
4/29/00		53	4/29/00	5:30 PM	5.50	16.00	boats noted, but no number given
5/6/00			5/6/00	12:30 PM	5.50	19.00	boats noted, but no number given
5/13/00	3.00	53	5/13/00	2:30 PM	5.25	18.00	
5/20/00	20.00	53	5/20/00	1:30 PM	5.00	19.00	
5/27/00	9.00	53	5/27/00	1:30 PM	5.00	20.00	
6/3/00			6/3/00	12:00 PM	5.25	22.00	
6/10/00	20.00	52	6/10/00	8:00 PM	5.00	19.00	stormy; lost power due to strong winds
6/17/00	32.00	52	6/17/00	1:30 PM	4.75	22.00	
6/24/00	0.00	52	6/24/00	9:30 AM	4.75	24.00	
7/1/00			7/1/00	4:00 PM	5.00	24.00	
7/8/00	10.00	50	7/8/00	1:30 PM	4.75	24.00	
7/15/00	0.00	44.5	7/15/00	1:30 PM	4.75	25.00	lake very busy
7/23/00	0.00	44.5	7/22/00	1:00 PM	5.00	25.00	
7/30/00	0.00	38	7/30/00	11:30 AM	4.75	27.00	active day on lake
8/5/00	0.00	36	8/5/00	12:00 PM	4.00	28.00	active day on lake
8/12/00	0.00	32.5	8/12/00	6:00 PM	4.75	25.00	
8/19/00	8.00	30.3	8/19/00	6:00 PM	5.00	23.00	lake this week.
8/26/00	0.00	29	8/26/00	1:30 PM	5.00	24.00	
9/2/00	2.00	26.5	9/2/00	1:30 PM	4.75	22.00	
9/9/00	0.00	25.8	9/9/00	11:30 AM	5.00	24.00	
9/16/00	28.00	24.5	9/16/00	12:30 PM	5.25	25.00	
9/23/00	0.00	24	9/23/00	12:30 PM	5.00	22.00	beautiful fall day
9/30/00	6.00	23	9/30/00	5:30 PM	5.00	19.00	1st rainy day for a long time
Min	0.00	23.00	**Min**		4.00	6.00	
Max	116.00	72.00	**Max**		5.75	28.00	
Total	880.00						

I = Insufficient data
C = Complete data set
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Mirror

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	18.00	*					
10/3/99	26.00	C	17.86	C	10/4/99	11:00 AM	2.00	16.00	
10/10/99	8.00	C	19.86	C	10/11/99	2:30 PM	1.50	15.00	
10/17/99	0.00	C	18.57	C	10/18/99	4:00 PM	1.75	16.00	
10/24/99	34.00	C	19.29	C	10/25/99	4:30 PM	1.75	15.00	
10/31/99	34.00	C	21.43	C	11/1/99	3:45 PM	1.75	15.00	
11/7/99	116.00	C	29.57	C	11/8/99	12:30 PM	1.75	10.50	
11/14/99	39.00	C	47.43	C	11/15/99	2:15 PM	2.50	11.50	
11/21/99	90.00	C	60.00	C	11/21/99	2:30 PM	2.75	10.00	
11/28/99	35.00	C	67.71	C	11/29/99	10:30 AM	3.50	9.00	
12/5/99	28.00	C	68.00	C	12/6/99	12:30 PM	3.25	8.00	
12/12/99	82.00	C	74.43	C	12/14/99	10:45 AM	3.50	7.00	back flow from Fisher's Bog
12/19/99	2.00	C	77.86	C	12/21/99	11:30 AM	3.75	7.50	
12/26/99	15.00	C	70.14	C	12/27/99	11:30 AM	4.50	6.50	
1/2/00	23.00	C	68.86	C	1/3/00	11:30 AM	4.00	6.00	
1/9/00	39.00	C	70.00	C	1/10/00	11:30 AM	4.00	6.00	
1/16/00	18.00	C	69.71	C	1/16/00	10:30 AM	4.25	5.00	
1/23/00	3.00	C	67.00	C	1/24/00	11:00 AM	4.00	5.00	
1/30/00	48.00	C	69.29	C	1/31/00	11:30 AM	4.25	5.00	
2/6/00	38.00	C	71.29	C	2/7/00	11:00 AM	4.00	4.00	
2/13/00	19.00	C	69.43	C	2/15/00	2:00 PM	4.00	6.50	
2/20/00	27.00	C	67.43	C	2/21/00	11:30 AM	4.00	7.00	
2/27/00	70.00	C	70.71	C	2/29/00	12:00 PM	3.50	8.00	
3/5/00	5.00	C	70.43	C	3/6/00	10:00 AM	3.25	7.50	
3/12/00	31.00	C	67.86	C	3/13/00	11:30 AM	3.50	9.00	
3/19/00	17.00	C	67.43	C	3/20/00	10:30 AM	4.00	8.50	
3/26/00	5.00	C	64.86	C	3/27/00	11:30 AM	3.00	11.00	
4/2/00	6.00	C	62.00	C	4/2/00	1:30 PM	5.00	14.00	water very clear
4/9/00	17.00	C	60.14	C	4/10/00	11:30 AM	6.00	13.00	clearest water ever measured
4/16/00	1.00	C	60.00	C	4/17/00	1:30 PM	5.00	14.00	like moss
4/23/00	14.00	C	58.57	C	4/24/00	12:30 PM	4.00	15.00	algae is on bottom
4/30/00	19.00	C	58.43	C	5/1/00	11:00 AM	5.00	16.00	
5/7/00	24.00	C	59.14	C	5/7/00	2:30 PM	4.50	16.00	
5/14/00	10.00	C	58.14	C	5/15/00	4:15 PM	4.50	19.00	
5/21/00	8.00	C	57.43	C	5/23/00	9:30 AM	4.25	19.00	
5/28/00	3.00	C	55.71	C	5/30/00	10:00 AM	3.75	18.50	
6/4/00	12.00	C	54.00	C	6/4/00	3:00 PM	3.75	22.50	
6/11/00	32.00	C	56.57	C	6/12/00	3:15 PM	3.00	18.00	
6/18/00	1.00	C	55.43	C	6/19/00	11:30 AM	3.00	19.50	
6/25/00	0.00	C	52.43	C	6/25/00	5:00 PM	3.50	23.50	
7/2/00	17.00	C	50.14	C	7/3/00	5:30 PM	3.25	22.00	
7/9/00	0.00	C	47.29	C	7/10/00	2:30 PM	2.75	22.50	
7/16/00	0.00	C	43.57	C	7/17/00	11:30 AM	2.50	23.50	
7/23/00	1.00	C	40.29	C	7/24/00	11:30 AM	2.50	23.00	
7/30/00	0.00	C	36.71	C	7/30/00	4:30 PM	3.00	25.50	
8/6/00	0.00	C	33.29	C	8/7/00	12:00 PM	2.75	24.00	in front of house, not at sampling site.
8/13/00	0.40	C	31.43	C	8/13/00	3:30 PM	2.50	23.00	
8/20/00	0.20	C	27.86	C	8/21/00	5:45 PM	2.75	23.00	
8/27/00	0.00	C	25.14	C	8/31/00	2:15 PM	2.25	20.50	
9/3/00	7.00	C	23.57	C	9/5/00	11:30 AM	2.00	20.00	
9/10/00	12.00	C	22.71	C	9/11/00	4:30 PM	2.25	21.00	9/25: few birds, but geese (30) arrive eves,
9/17/00	3.00	C	21.29	C	9/18/00	12:00 PM	3.00	20.00	fishing for planted trout reported good all
9/24/00	3.00	C	19.43	C	9/25/00	11:00 AM	3.00	18.00	sumer, fish appear in good cond
Min	0.00		17.86		**Min**		1.75	4.00	
Max	116.00		77.86		**Max**		6.00	25.50	
Total	1,042.60								

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C = Complete data set
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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	40.25	*	10/2/99	2:15 PM	3.50	17.50	
10/3/99	20.00	C	40.71	C					
10/10/99	6.00	*	42.71	C	10/10/99	2:00 PM	3.50	16.00	N wind, air 16ºC
10/17/99	2.00	C	41.57	C	10/16/99	2:00 PM	3.75	15.00	N wind, air 16ºC
10/24/99	26.00	C	42.21	C	10/23/99	2:30 PM	3.75	14.00	S wind, air 12°C
10/31/99	28.00	C	44.29	C	10/31/99	12:00 PM	3.75	12.00	
11/7/99	138.00	*	53.14	C	11/6/99	2:15 PM	4.00	11.00	air 16ºC
11/14/99	42.00	C	73.36	C	11/13/99				Sick with flu
11/21/99	83.00	*	83.64	C	11/21/99	2:00 PM	4.50	10.00	NW wind, air 11ºC
11/28/99	20.00	C	87.00	C	11/28/99	12:00 PM	5.00	10.00	N wind switch to S wind, air 15ºC
12/5/99	27.00	C	82.36	C	12/4/99	2:30 PM	4.50	9.00	N wind
12/12/99	68.00	*	87.57	C	12/11/99				unsafe, strong gusts
12/19/99	1.00	C	84.36	C	12/18/99	2:00 PM	4.50	8.00	W-SW wind
12/26/99	—	I	78.36	C	12/25/99				unsage
1/2/00	26.00	C	78.57	C	1/1/00				not home
1/9/00	38.00	*	81.50	C	1/8/00	2:00 PM	3.50	6.00	air 8°C, 1 red and 4 brown bits
1/16/00	13.00	*	81.07	C	1/15/00	2:00 PM	3.50	5.00	air 6.5ºC
1/23/00	4.00	*	78.79	C	1/22/00	2:00 PM	3.50	5.00	air 9ºC, 2 people on shore
1/30/00	43.00	*	81.07	C	1/29/00	2:00 PM	3.75	5.00	air 11ºC, 3 people on shore
2/6/00	28.00	*	81.93	C	2/5/00	2:00 PM	4.00	6.00	air 14ºC, 4 people on shore, 1 red bit
2/13/00	10.00	*	79.93	C	2/12/00	12:00 PM	3.75	6.00	air 14ºC, 6 people on shore
2/20/00	32.00	C	79.00	C	2/19/00	2:00 PM	3.75	6.00	air 13ºC, 6 people on shore
2/27/00	60.00	*	82.71	C	2/26/00	2:00 PM	3.50	7.00	air 11ºC, 6 ppl shore, 1 red, 1 brwn bit
3/5/00	6.00	C	82.79	C	3/4/00	2:00 PM	4.25	7.50	air 8°C, 4 people on shore
3/12/00	—	I	80.64	C	3/11/00	2:00 PM	4.25	8.00	air 7.5ºC, 4 ppl shr, 6 red, 10 green bits
3/19/00	20.00	*	80.71	C	3/18/00	2:00 PM	4.25	8.50	air 11ºC, 2 people on shore
3/26/00	7.00	*	79.00	C	3/25/00	2:00 PM	4.50	10.00	air 10ºC, 3 people on shore, 2 red bits
4/2/00	—	I	76.57	C	4/1/00	2:00 PM	5.25	12.50	air 19ºC, 15 ppl shr, 10 red,25 green bits
4/9/00	38.00	C	76.36	C	4/8/00	2:20 PM	4.50	13.00	20 °C air; small waves; Mt. Rainier visible.
4/16/00	5.00	C	77.79	C	4/15/00	2:00 PM	4.50	14.00	15.5 °C air; small waves; no Rainier
4/23/00	31.00	C	76.50	C	4/22/00	2:20 PM	4.75	16.00	15 °C air; dim waves; no Rainier
4/30/00	25.00	*	77.00	C	4/29/00	2:20 PM	5.00	15.50	20 °C air; small waves; Rainier visible
5/7/00	36.00	*	79.07	C	5/6/00	3:00 PM	4.50	15.50	17 °C air; small waves; Rainier not visible
5/14/00	11.00	C	77.21	C	5/13/00	2:20 PM	4.50	16.00	4 geese; no Mt. Rainier ; small waves
5/21/00	12.00	C	74.86	C	5/20/00	2:20 PM	5.00	18.50	no geese; no Mt. Rainier
5/28/00	6.00	C	72.07	C					
6/4/00	20.00	C	70.21	C	6/3/00	3:15 PM	4.25	20.00	very clear day; Mt. Rainier vis; 30 geese
6/11/00	30.00	C	73.43	C	6/10/00	2:20 PM	3.75	17.00	88 geese; moderate waves
6/18/00	0.00	*	71.71	C	6/17/00	3:30 PM	4.00	21.00	88 geese; small waves
6/25/00	0.00	*	68.14	C	6/25/00	2:20 PM	4.50	22.00	49 geese; moderate waves
7/2/00	20.00	C	66.29	C	7/1/00	2:00 PM	4.00	22.50	45 geese; moderate waves
7/9/00	0.00	*	63.79	C	7/8/00	12:00 PM	4.00	23.00	
7/16/00	2.00	C	60.43	C	7/17/00	8:00 AM	3.50	23.50	
7/23/00	0.00	*	57.64	C	7/23/00	12:00 PM	3.75	22.50	
7/30/00	0.00	C	54.57	C	7/29/00	3:00 PM	4.25	24.00	
8/6/00	0.00	C	51.21	C	8/5/00	2:30 PM	5.00	25.00	
8/13/00	7.00	C	48.07	C	8/12/00	3:00 PM	4.50	24.00	
8/20/00	0.00	C	45.86	C	8/19/00	12:00 PM	4.00	23.00	
8/27/00	4.00	*	43.50	C					
9/3/00	20.00	C	43.07	C					
9/10/00	24.00	C	43.07	C	9/9/00	12:00 PM	2.50	18.00	
9/17/00	5.00	C	41.79	C	9/17/00	1:00 PM	3.75	21.00	
9/24/00	14.00	C	40.00	C	9/23/00	11:00 AM	3.25	19.00	
Min	0.00		40.00		**Min**		2.50	5.00	
Max	138.00		87.57		**Max**		5.25	25.00	
Total	1,058.00								

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Neilson (Holm)

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	31.00	*					
10/3/99	30.00	C	30.86	C	10/3/99	6:30 PM	3.00	16.00	
10/10/99	8.00	C	32.71	C	10/10/99	4:00 PM	3.00	13.50	
10/17/99	0.00	C	31.43	C	10/17/99	2:00 PM	3.25	12.50	
10/24/99	20.00	C	32.14	C	10/24/99	1:30 PM	3.50	11.50	
10/31/99	34.00	C	34.57	C	10/31/99	12:00 PM	3.50	10.00	
11/7/99	141.00	C	43.00	C	11/7/99	12:00 PM	3.00	9.50	
11/14/99	31.00	C	64.14	C	11/14/99	3:00 PM	3.00	10.00	
11/21/99	59.00	C	74.57	C	11/21/99	12:30 PM	3.00	9.00	
11/28/99	17.00	*	84.00	C	11/28/99	2:15 PM	3.00	8.00	
12/5/99	18.00	*	81.00	C	12/5/99	1:00 PM	3.00	8.00	
12/12/99	82.00	C	91.29	C	12/12/99	2:45 PM	3.25	7.00	
12/19/99	0.00	C	94.14	C	12/19/99	1:15 PM	3.25	6.50	
12/26/99	11.00	C	82.00	C	12/26/99	3:00 PM	3.00	6.00	
1/2/00	18.00	C	79.00	C	1/2/00	11:45 AM	3.00	5.00	
1/9/00	53.00	C	84.86	C	1/9/00	2:15 PM	3.00	5.00	
1/16/00	11.00	C	81.57	C	1/16/00	2:00 PM	3.00	4.50	
1/23/00	5.00	C	79.71	C	1/23/00	1:00 PM	3.00	4.00	
1/30/00	42.00	C	81.71	C	1/30/00	1:00 PM	3.00	3.50	
2/6/00	32.00	C	84.29	C	2/6/00	1:30 PM	3.00	4.00	
2/13/00	13.00	C	81.00	C	2/13/00	2:00 PM	3.00	5.00	
2/20/00	30.00	C	79.43	C	2/20/00	12:30 PM	3.00	5.50	
2/27/00	39.00	C	82.86	C	2/27/00	2:00 PM	3.00	6.50	
3/5/00	3.00	C	82.14	C	3/5/00	2:30 PM	3.00	6.50	
3/12/00	27.00	C	80.29	C	3/12/00	4:00 PM	3.00	7.00	
3/19/00	20.00	C	80.71	C	3/19/00	1:00 PM	3.25	9.00	
3/26/00	7.00	C	77.57	C	3/26/00	2:00 PM	3.25	10.00	
4/2/00	14.00	C	75.00	C	4/2/00	12:00 PM	3.25	12.00	
4/9/00	40.00	C	74.29	C	4/9/00	6:00 PM	3.25	13.00	canada geese nest - remote parts of lake
4/16/00	8.00	C	75.14	C	4/16/00	11:45 AM	3.00	15.50	devlpmnt starts on lkfront prop ~300' of lake
4/23/00	—	I	73.86	C	4/23/00		3.25	15.00	clearing to 25' from shore.
4/30/00	26.00	*	74.00	C	4/30/00	1:30 PM	3.25	15.00	lots of young Canadian goslings
5/7/00	34.00	C	75.57	C	5/7/00	11:15 AM	3.00	15.50	lake level stable even when it doesn't rain
5/14/00	0.00	C	74.57	C	5/14/00	1:10 PM	3.25	17.00	
5/21/00	6.00	C	73.29	C	5/21/00	2:45 PM	3.00	17.50	
5/28/00	4.00	C	71.86	C	5/29/00	4:15 PM	2.50	18.50	lake draining appears to be blocked
6/4/00	12.00	C	70.00	C	6/4/00	7:00 PM	2.50	23.00	
6/11/00	45.00	C	73.86	C	6/11/00	5:45 PM	2.75	17.00	
6/18/00	0.00	C	71.57	C	6/18/00	4:00 PM	2.75	19.00	
6/25/00	0.00	C	67.86	C	6/25/00	3:00 PM	2.75	23.00	lake not draining properly; susupect priv
7/2/00	18.00	C	64.86	C	7/2/00	4:00 PM	2.75	22.00	landowner has blocked drainage where
7/9/00	0.00	C	62.00	C	7/9/00	1:30 PM	2.25	21.50	outlet water travels
7/16/00	2.00	C	59.29	C	7/16/00	3:00 PM	2.50	22.00	
7/23/00	0.00	C	55.86	C	7/23/00	4:45 PM	2.75	23.50	foul, fishy,rotten smell near water, seems to
7/30/00	0.00	C	52.29	C	7/30/00	4:00 PM	2.50	25.00	be all around lake.
8/6/00	0.00	C	49.29	C	8/6/00	3:45 PM	2.50	25.50	heavy lake use today; rained last night,
8/13/00	2.00	C	45.14	C	8/13/00	1:15 PM	2.50	22.00	some people saw 8" turtle on log today
8/20/00	0.00	C	42.29	C	8/20/00	1:45 PM	2.25	20.00	water smells foul, when swimming small
8/27/00	0.00	C	39.86	C	8/27/00	2:30 PM	2.25	21.00	brown particles collect on skin
9/3/00	21.00	C	38.86	C	9/4/00	4:30 PM	1.75	19.50	lake smells fishy
9/10/00	18.00	C	38.57	C	9/10/00		1.75	19.50	
9/17/00	0.00	*	36.29	C	9/17/00	3:45 PM	1.75	20.50	
9/24/00	14.00	C	35.29	C	9/24/00	3:30 PM	1.50	17.00	
Min	0.00		30.86		**Min**		1.50	3.50	
Max	141.00		94.14		**Max**		3.50	25.50	
Total	1,015.00								

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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	—	I	25.00	I					
10/3/99	30.00	C	23.86	C	10/3/99	2:00 PM	0.50	19.00	
10/10/99	3.00	C	24.00	C	10/10/99	3:00 PM	0.50	19.00	
10/17/99	9.00	C	23.14	C	10/17/99	1:00 PM	0.50	18.00	Cold out
10/24/99	37.00	C	25.00	C	10/24/99	2:00 PM	0.50	16.00	Cold out
10/31/99	9.00	C	27.14	C	11/1/99	4:00 PM	0.75	15.00	
11/7/99	123.00	C	42.43	C	11/7/99	1:00 PM	0.75	14.00	
11/14/99	40.00	C	61.71	C	11/14/99	4:00 PM	2.00	11.00	
11/21/99	103.00	C	73.29	C	11/21/99	1:00 PM	2.25	9.00	
11/28/99	7.00	C	79.71	C	11/28/99	2:00 PM	2.25	8.00	
12/5/99	71.00	C	82.00	C	12/5/99	12:00 PM	2.25	7.00	
12/12/99	46.00	C	86.14	C	12/12/99	1:00 PM	2.25	6.00	
12/19/99	0.00	C	81.00	C	12/18/99	2:00 PM	2.25	5.00	
12/26/99	10.00	*	73.17	*	12/27/99	1:00 PM	2.25	4.00	
Min	0.00		23.14		**Min**		0.75	4.00	
Max	123.00		86.14		**Max**		2.25	15.00	
Total	488.00								

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Paradise

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	24.25	*					
10/3/99	37.00	*	27.84	C					
10/10/99	60.00	*	30.30	C	10/11/99	2:30 PM	3.75	10.00	lots of brown particles in water
10/17/99	0.00	*	32.69	C	10/18/99	9:45 AM	3.75	8.50	
10/24/99	30.00	*	36.71	C	10/26/99	2:00 PM	4.25	8.50	
10/31/99	39.00	*	39.36	C	11/2/99	4:20 PM	3.50	7.00	
11/7/99	149.00	C	57.33	C	11/9/99	11:00 AM	3.50	7.00	
11/14/99	55.00	C	53.76	C	11/16/99	1:00 PM	2.75	8.00	
11/21/99	77.00	C	61.43	C					
11/28/99	46.00	C	56.43	C	12/2/99	2:30 PM	3.25	6.00	
12/5/99	86.00	C	59.17	C	12/8/99	10:30 AM	3.00	4.50	
12/12/99	53.50	C	57.75	*	12/16/99	11:00 AM	3.50	6.00	
12/19/99	6.00	C	42.01	C	12/23/99	2:00 PM	3.50	5.00	
12/26/99	22.00	C	33.93	C	12/29/99	3:43 PM	3.00	3.50	getting toward dusk
1/2/00	55.00	C	44.40	C	1/4/00	1:45 PM	3.50	3.00	
1/9/00	47.00	C	52.76	C	1/11/00	12:45 PM	3.50	3.00	
1/16/00	—	I	43.47	C	1/21/00	11:45 AM	3.50	2.00	lake frozen earlier in week
1/23/00	6.00	C	36.01	C	1/27/00	3:30 PM	3.50	3.00	
1/30/00	34.00	C	40.07	*	2/2/00	11:00 AM	3.75	3.50	
2/6/00	35.00	C	41.99	C	2/11/00	11:15 AM	3.50	3.50	
2/13/00	20.00	C	38.60	*	2/17/00	2:00 PM	3.75	4.00	
2/20/00	28.00	*	37.33	*	2/24/00	12:00 PM	3.25	5.00	
2/27/00	64.00	C	42.59	C	3/1/00	3:15 PM	2.50	6.00	
3/5/00	7.00	C	38.76	C	3/9/00	10:00 AM	2.75	5.50	
3/12/00	51.00	C	37.61	C	3/17/00	10:15 AM	2.75	6.00	
3/19/00	0.00	C	40.50	C	3/23/00	2:30 PM	3.00	7.00	
3/26/00	21.00	C	35.83	C	3/30/00	11:40 AM	3.25	7.00	warm
4/2/00	32.50	*	36.54	C					
4/9/00	28.00	C	34.21	C					
4/16/00	6.00	C	32.19	C	4/18/00	11:30 AM	2.25	11.00	water very murky; geese present
4/23/00	—	I	32.13	*	4/25/00	1:30 PM	2.00	11.50	
4/30/00	18.50	C	31.97	C	5/1/00	5:30 PM	3.25	13.00	
5/7/00	—	I	33.00	*	5/10/00	5:30 PM	2.75	10.50	
5/14/00	23.00	*	32.13	*	5/16/00	2:30 PM	2.50	14.00	
5/21/00	20.00	C	30.57	C	5/22/00	3:00 PM	1.75	13.50	
5/28/00	8.00	C	29.54	C	5/29/00	5:50 PM	1.50	14.00	
6/4/00	—	I	25.25	*	6/5/00	4:00 PM	2.50	18.00	
6/11/00	24.00	C	27.76	C	6/12/00	5:30 PM	2.25	14.00	
6/18/00	—	I	23.90	*					
6/25/00	0.00	C	22.86	C	6/25/00	5:00 PM	2.50	18.00	
7/2/00	3.00	*	30.66	C	7/4/00	8:30 PM	2.75	16.00	
7/9/00	0.00	C	32.83	C	7/9/00	7:00 PM	3.00	18.00	
7/16/00	0.00	C	32.56	C					
7/23/00	0.00	C	32.14	C	7/23/00	4:00 PM	3.25	18.00	
7/30/00	0.00	C	31.64	C					
8/6/00	0.00	C	32.66	C	8/7/00	9:00 AM	1.75	20.00	
8/13/00	11.00	C	35.86	C					
8/20/00	2.00	C	47.64	C					
8/27/00	10.00	C	50.88	*	8/27/00	5:30 PM	2.50	16.00	
9/3/00	25.00	C	36.57	C	9/4/00	4:45 PM	2.00	15.00	labor day, relatively heavy use of lake
9/10/00	9.00	C	35.04	C	9/13/00	4:00 PM	2.25	17.00	
9/17/00	9.00	*	32.52	*	9/18/00	3:00 PM	2.00	17.00	
9/24/00	—	I	32.00	*	9/26/00	2:00 PM	2.25	12.50	
Min	0.00		22.86		**Min**		1.50	2.00	
Max	149.00		61.43		**Max**		3.75	20.00	
Total	1,257.50								

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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	40.25	*					
10/3/99	41.00	C	39.60	*	10/3/99	1:15 PM	4.25	17.00	
10/10/99	14.00	*	42.00	*	10/10/99	1:45 PM	4.00	15.00	
10/17/99	0.00	C	40.86	C	10/17/99	11:30 AM	4.00	13.50	alg stringy blue-green in cove 10/16-17
10/24/99	16.00	*	39.63	*	10/24/99	10:00 AM	3.25	13.00	algae
10/31/99	45.00	C	42.57	C	10/31/99	12:30 PM	3.25	12.00	bloom on 11/2
11/7/99	—	I	53.64	C	11/7/99	12:30 PM	2.50	11.00	alg bloom in cove 11/7 - carpet kind, not
11/14/99	43.00	C	81.08	*	11/14/99	10:30 AM	3.25	11.00	strngy,11/10 outlt str start flw (level 50.5)
11/21/99	—	I	88.50	*	11/21/99	11:00 AM	2.75	10.00	11/14 entire lake covered with film of algae, 11/18 algae is forming streams
11/28/99	44.00	C	90.88	*					
12/5/99	43.00	C	89.75	*					11/21: wind has broken up algae
12/12/99	70.00	*	90.50	I	12/17/99				12/17 large blobs of algae
12/19/99	5.00	C	88.33	*	12/24/99	11:30 AM	5.00	7.00	
12/26/99	6.00	C	84.57	C	12/26/99	11:45 AM	5.00	6.00	12/29 many blobs of algae on surface
1/2/00	38.00	*	85.08	*	1/2/00	1:00 PM	4.75	6.00	
1/9/00	39.00	*	87.75	*	1/11/00	9:30 AM	4.50	5.00	
1/16/00	20.00	C	86.75	*	1/17/00	10:30 AM	4.25	5.00	algae clumps near shore
1/23/00	4.00	*	84.93	C	1/23/00	11:30 AM	4.25	5.00	
1/30/00	52.00	C	89.20	*	2/4/00	4:45 PM	3.25	5.00	late in day, Secchi reading may be off
2/6/00	29.00	*	88.40	C	2/6/00	10:45 AM	2.75	5.50	algae bloom 2/9
2/13/00	14.00	*	86.54	C	2/15/00	10:45 AM	2.75	5.00	
2/20/00	31.00	C	85.69	C	2/24/00	10:15 AM	2.25	6.00	oily streaks in cove
2/27/00	51.00	C	87.00	C	2/27/00	11:30 AM	2.25	6.50	
3/5/00	7.00	*	87.14	C	3/5/00	11:00 AM	2.00	6.50	
3/12/00	36.00	*	85.90	*	3/12/00	9:45 AM	2.00	7.00	algae in cove, outlet creek muddy for 4 days
3/19/00	24.00	*	86.78	*	3/24/00	4:00 PM	1.75	9.00	water clear 3-22, green again 3-24
3/26/00	5.00	C	84.41	C	3/26/00	10:30 AM	2.00	9.00	gunkiest blue green algae ever seen
4/2/00	18.00	C	82.60	C	4/2/00	1:30 PM	2.25	12.00	
4/9/00	41.00	C	81.71	C	4/11/00	10:30 AM	4.50	13.00	water has stratified= clear
4/16/00	5.00	C	81.43	C	4/19/00	10:00 AM	4.50	14.00	
4/23/00	14.00	C	79.93	C	4/25/00	9:30 AM	4.75	13.50	fish are jumping; recently stocked?
4/30/00	19.00	C	79.14	C	4/30/00	8:30 AM	5.00	13.50	opening day was yesterday
5/7/00	24.00	C	79.29	C	5/7/00	2:15 PM	5.00	15.00	
5/14/00	14.00	C	78.19	C	5/14/00	4:30 PM	3.50	17.00	
5/21/00	18.00	C	77.43	C					
5/28/00	15.00	C	76.29	C	5/29/00	11:30 AM	3.75	18.00	
6/4/00	8.00	*	74.14	C					
6/11/00	36.00	*	75.50	C	6/13/00	5:00 PM	3.25	17.00	
6/18/00	5.00	C	74.43	C	6/24/00	1:30 PM	4.50	21.00	7/4: water stopped flowing in outlet crk lst wk of June, when level was ~ 715 mm,
6/25/00	0.00	C	70.93	C	6/25/00	8:00 PM	4.50	20.50	(typical) but levels dropping rapidly, I think
7/2/00	0.00	C	66.67	*	7/4/00	9:00 AM	4.75	20.00	people are pumping for watering plants
7/9/00	0.00	C	63.08	*	7/10/00	9:45 AM	4.50	20.50	oil slick in our cove
7/16/00	0.00	C	59.67	*	7/17/00	9:45 AM	5.00	22.00	capturing mosquitoes, it's colorless/grey
7/23/00	0.00	C	55.79	C	7/23/00	2:30 PM	4.25	22.50	
7/30/00	0.00	C	52.07	C	8/1/00	9:40 AM	4.50	23.50	
8/6/00	0.00	C	47.64	C	8/6/00	10:00 AM	4.75	24.00	
8/13/00	7.00	C	43.57	C	8/13/00	10:00 AM	5.25	22.50	
8/20/00	7.00	C	40.36	C	8/21/00	10:00 AM	5.00	21.00	geese have been around; floating dock is
8/27/00	6.00	*	37.86	C	9/3/00	10:00 AM	5.00	20.00	full poop again, after cleaned only 5 days
9/3/00	—	I	35.83	*					
9/10/00	14.00	C	35.39	C	9/11/00	9:00 AM	4.50	18.00	foggy morning
9/17/00	—	I	33.50	C	9/17/00	11:00 AM	5.00	19.00	9-24:lots of gunk on srfc--possibly begin
9/24/00	12.00	C	31.75	*	9/26/00	9:30 AM	4.75	17.00	blue-green algae conglom, given pattern
Min	0.00		31.75		**Min**		1.75	5.00	
Max	70.00		90.88		**Max**		5.25	24.00	
Total	940.00								

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Pipe

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	28.00	*					
10/3/99	38.00	*	28.00	C					
10/10/99	7.00	C	32.43	C					
10/17/99	0.00	*	32.00	C					
10/24/99	27.00	*	33.14	C					
10/31/99	36.00	C	36.57	C					
11/7/99	—	I	49.71	C					
11/14/99	39.00	*	73.29	C					
11/21/99	90.00	C	76.29	C					
11/28/99	37.00	*	76.43	C					
12/5/99	34.00	C	67.43	C					
12/12/99	79.00	C	72.00	C					
12/19/99	2.00	*	68.71	C					
12/26/99	16.00	C	59.43	C					
1/2/00	—	I	58.29	C					
1/9/00	48.00	C	62.43	C					
1/16/00	—	I	62.29	C					
1/23/00	5.00	C	57.43	C					
1/30/00	43.00	C	59.57	C					
2/6/00	28.00	*	61.29	C					
2/13/00	11.00	C	58.14	C					
2/20/00	24.00	*	55.29	C					
2/27/00	54.00	*	58.00	C					
3/5/00	6.00	C	60.71	C					
3/12/00	29.00	C	56.86	C					
3/19/00	29.00	C	56.71	C					
3/26/00	11.00	C	54.57	C					
4/2/00	16.00	C	50.43	C					
4/9/00	49.00	*	51.43	C					
4/16/00	14.00	C	53.43	C					
4/23/00	19.00	*	49.43	C					
4/30/00	21.00	*	48.29	C					
5/7/00	46.00	*	52.14	C					
5/14/00	12.00	C	50.29	C					
5/21/00	13.00	C	47.29	C					
5/28/00	8.00	C	44.57	C					
6/4/00	26.00	C	42.71	C					
6/11/00	47.00	*	50.86	C					
6/18/00	0.00	C	47.29	C					
6/25/00	1.00	C	42.57	C					
7/2/00	11.00	C	40.14	C					
7/9/00	0.00	C	37.71	C					
7/16/00	0.00	C	35.00	C					
7/23/00	1.00	C	32.71	C					
7/30/00	0.00	C	30.86	C					
8/6/00	0.00	C	28.43	C					
8/13/00	6.00	C	26.14	C					
8/20/00	1.00	C	25.29	C					
8/27/00	4.00	C	23.43	C					
9/3/00	28.00	C	23.43	C					
9/10/00	8.00	*	25.29	C					
9/17/00	2.00	*	24.43	C					
9/24/00	6.00	C	23.57	C					
Min	0.00		23.43		**Min**		0.00	0.00	
Max	90.00		76.43		**Max**		0.00	0.00	
Total	1,032.00								

I = Insufficient data
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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	—	I	-0.50	I					
10/8/99	—	I	3.75	I					
10/10/99	22.00	C	3.07	C	10/10/99	3:00 PM	5.50	17.00	
10/17/99	0.00	C	0.93	C	10/17/99	3:00 PM	5.50	15.00	
10/24/99	38.00	C	0.79	C	10/24/99	2:30 PM	5.50	14.00	
10/31/99	43.00	C	0.36	C	10/31/99	3:00 PM	5.50	13.00	
11/7/99	162.00	C	4.14	C	11/7/99	3:00 PM	6.00	12.00	
11/14/99	55.00	C	10.36	C	11/14/99	2:30 PM	6.00	10.50	
11/21/99	120.00	C	11.07	C	11/21/99	2:00 PM	6.00	9.50	
11/28/99	45.00	C	13.14	C	11/28/99	1:00 PM	6.00	9.50	
12/5/99	50.00	C	11.93	C	12/5/99	12:00 PM	6.00	9.00	
12/12/99	100.00	C	16.07	C	12/12/99	12:00 PM	6.50	8.00	
12/19/99	7.00	C	18.36	C	12/19/99	2:30 PM	6.50	7.00	
12/26/99	18.00	C	15.86	C	12/26/99	1:00 PM	6.50	6.00	
1/2/00	27.00	*	13.00	C	1/2/00	2:30 PM	7.00	5.00	
1/9/00	53.00	C	12.57	C	1/9/00	1:00 PM	7.00	5.00	
1/16/00	21.00	C	11.14	C	1/16/00	2:00 PM	7.00	6.00	
1/23/00	12.00	C	9.93	C	1/23/00	12:30 PM	7.00	4.50	
1/30/00	48.00	C	10.79	C	1/30/00	3:00 PM	8.00	4.00	
2/6/00	34.00	C	10.93	C	2/6/00	2:30 PM	8.00	5.00	
2/13/00	16.00	C	9.50	C	2/13/00	3:00 PM	9.00	5.00	
2/20/00	37.00	C	9.00	C	2/20/00	2:00 PM	9.00	6.00	
2/27/00	64.00	C	10.57	C	2/27/00	1:00 PM	9.50	7.00	
3/5/00	9.00	C	10.86	C	3/5/00	3:30 PM	9.00	8.00	
3/12/00	43.00	C	13.00	C	3/12/00	1:30 PM	7.50	9.00	
3/19/00	41.00	C	11.71	C	3/19/00	2:00 PM	6.00	9.00	
3/26/00	12.00	*	9.67	*	3/26/00	3:30 PM	5.50	9.00	
7/1/00	—	I	5.50	I					
7/2/00	—	I	5.00	I					
7/9/00	0.00	C	4.86	C					
7/16/00	2.00	C	3.93	C					
7/23/00	0.00	C	3.21	C					
7/30/00	0.00	C	3.21	C					
8/6/00	0.00	C	2.21	C					
8/13/00	6.00	C	1.29	C					
8/20/00	11.00	C	1.43	C					
8/27/00	15.00	C	1.79	C					
9/3/00	26.00	C	1.71	C					
9/10/00	28.00	*	3.50	*					
9/17/00	8.00	C	2.21	C					
9/24/00	16.00	*	0.71	C					
Min	0.00		-0.50		**Min**		5.50	4.00	
Max	162.00		18.36		**Max**		9.50	13.00	
Total	1,189.00								

I = Insufficient data
C = Complete data set
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Sawyer

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0	C	134.0	C	10/2/99	10:30 AM	5.50	17.00	
10/3/99	46	C	131.9	C	10/9/99	2:00 PM	4.50	17.00	
10/10/99	16	C	133.6	C					
10/17/99	0	C	131.3	C	10/20/99	3:00 PM	5.00	16.00	
10/24/99	34	C	129.0	C	10/25/99	2:30 PM	4.65	13.30	
10/31/99	38	C	128.6	C	10/30/99	10:00 AM	4.00	12.00	
11/7/99	152	C	137.3	C	11/13/99	12:00 PM	5.00	11.00	algae on surface
11/14/99	49	C	167.0	C					
11/21/99	101	C	170.1	C	11/27/99	12:00 PM	3.50	10.00	
11/28/99	35	C	171.6	C	12/4/99	3:30 PM	3.00	9.00	
12/5/99	35	C	167.4	C					
12/12/99	89	C	170.7	C	12/18/99	3:30 PM	3.50	9.00	
12/19/99	3	C	170.0	C					
12/26/99	17	C	166.3	C	12/29/99	2:30 PM	3.50	8.00	
1/2/00	28.5	C	166.0	C					
1/9/00	46	C	166.7	C					
1/16/00	16	C	166.9	C	1/22/00	2:00 PM	4.00	6.00	
1/23/00	7	C	165.6	C	1/29/00	2:00 PM	4.00	6.00	
1/30/00	43	C	166.1	C	2/5/00	11:00 AM	4.00	6.00	
2/6/00	31	C	166.7	C					
2/13/00	15	C	165.7	C	2/19/00	12:00 PM	4.00	6.00	
2/20/00	31	C	165.1	C	2/26/00	10:30 AM	4.00	7.00	
2/27/00	63	C	167.0	C	3/4/00	10:30 AM	3.00	7.00	
3/5/00	11	C	167.3	C	3/11/00	11:00 AM	3.50	8.00	
3/12/00	32	C	166.0	C	3/18/00	3:00 PM	4.00	9.00	
3/19/00	32	C	166.0	C	3/25/00	4:00 PM	4.00	10.00	
3/26/00	10	C	165.6	C	4/1/00	2:00 PM	4.00	13.00	
4/2/00	19	C	164.1	C	4/8/00	3:00 PM	3.50	14.00	
4/9/00	38	C	164.1	C	4/13/00	4:00 PM	3.75	15.00	
4/16/00	11	C	166.1	C	4/15/00	3:00 PM	3.75	15.00	
4/23/00	33	C	164.3	C	4/29/00	10:30 AM	3.75	15.00	
4/30/00	33	C	164.3	C	5/6/00	4:00 PM	3.50	10.00	
5/7/00	38	C	165.3	C	5/13/00	3:30 PM	3.75	18.00	
5/14/00	13	C	164.9	C					
5/21/00	12	C	163.3	C	5/27/00	5:00 PM	3.25	19.00	
5/28/00	13	C	162.6	C	6/3/00	7:00 PM	3.75	20.00	
6/4/00	19.5	C	162.0	C					
6/11/00	48	C	163.6	C	6/12/00	7:30 PM	3.25	18.00	
6/18/00	0	C	161.9	C	6/24/00	4:00 PM	4.25	22.00	neighbor found a leech on leg
6/25/00	0	*	160.3	C	7/1/00	3:30 PM	3.25	23.00	
7/2/00	18	*	160.1	C					
7/9/00	0	C	159	C	7/15/00	4:00 PM	4.00	23.00	
7/16/00	0	C	158	C	7/22/00	3:30 PM	3.75	23.00	
7/23/00	0	C	157.1	C					
7/30/00	0	C	156.0	C					
8/6/00	0	C	153.3	C	8/12/00	3:30 PM	5.00	23.00	
8/13/00	7	C	149.9	C	8/19/00	5:00 PM	5.00	22.00	
8/20/00	10	C	147.6	C					
8/27/00	2	C	143.6	C	9/2/00	4:00 PM	5.00	19.00	
9/3/00	24	C	141.6	C					
9/10/00	24	C	141.1	C	9/10/00	5:00 PM	4.00	18.00	
9/17/00	6	C	138.6	C	9/23/00	6:00 PM	4.50	19.00	
9/24/00	9	C	134.6	C					
Min	0.00		128.57		**Min**		3.00	6.00	
Max	152.00		171.57		**Max**		5.00	23.00	
Total	1,358.00								

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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	—	I							
10/3/99	38.00	C							
10/10/99	11.00	C							
10/17/99	0.00	C							
10/24/99	42.00	C							
10/31/99	22.00	C							
11/7/99	147.00	C							
11/14/99	61.00	C							
11/21/99	75.00	C							
11/28/99	53.00	C							
12/5/99	55.00	C							
12/12/99	66.00	C							
12/19/99	22.00	C							
12/26/99	0.00	*							
					6/14/00	6:00 PM	1.75	17.00	
					6/18/00	6:00 PM	1.75	20.00	
					6/25/00	6:00 PM	4.00	23.00	
7/1/00	—	I	26.00	I					
7/2/00	10.00	C	25.50	C	7/4/00	6:00 PM	2.50	21.00	
7/9/00	0.00	C	22.71	C	7/9/00	6:00 PM	2.50	20.50	
7/16/00	0.00	C	29.43	C	7/16/00	6:00 PM	2.50	24.00	
7/23/00	0.00	*	28.71	C	7/23/00	12:00 PM	2.75	22.00	
7/30/00	0.00	C	25.71	C	7/30/00	6:00 PM	2.75	26.00	
8/6/00	0.00	C	22.64	C	8/6/00	12:00 PM	2.75	25.00	
8/13/00	6.00	*	20.00	C	8/13/00	3:00 PM	2.50	22.50	
8/20/00	0.00	*	19.21	C	8/20/00	3:00 PM	2.50	22.50	
8/27/00	6.00	*	16.29	C	8/27/00	3:00 PM	2.00	21.00	
9/3/00	—	I	16.07	C	9/4/00	3:00 PM	2.00	19.00	
9/10/00	20.00	*	17.93	C	9/10/00	4:00 PM	2.00	17.50	
9/17/00	0.00	C	16.64	C	9/17/00	4:00 PM	2.00	19.00	
9/24/00	14.00	*	16.07	C	9/24/00	4:00 PM	2.00	19.00	
Min	0.00		16.07		**Min**		1.75	17.00	
Max	147.00		29.43		**Max**		4.00	26.00	
Total	648.00								

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Shady

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
4/1/00	—	I	58.00	I					
4/2/00	10.00	*	58.50	I	4/2/00	6:00 PM	2.00	14.40	algae throughout the lake
4/9/00	35.00	*	58.25	I	4/9/00	5:20 PM	2.20	14.40	algae still through top water column
4/16/00	0.00	*	55.25	I	4/16/00	3:30 PM	2.70	13.30	algae not as dense
4/23/00	38.00	C	57.00	I	4/23/00	3:00 PM	3.40	14.50	
4/30/00	34.00	C	57.00	I	4/30/00	12:00 PM	3.90	15.50	water clearing; less runoff
5/7/00	50.00	*	54.00	I	5/7/00	5:30 PM	3.80	17.20	
5/14/00	14.00	*	55.00	I	5/14/00	5:00 PM	3.70	15.30	
5/21/00	12.00	*	57.00	I	5/21/00	4:00 PM	3.70	17.30	
5/28/00	—	I	60.00	I	5/29/00	3:30 PM	3.60	18.90	
7/1/00	—	I	64.00	I					
7/2/00	16.00	*	62.29	C	7/2/00	6:00 PM	4.00	21.10	geese nesting; two eagles, 2 osprey
7/9/00	0.00	C	64.00	C	7/9/00	6:00 PM	4.50	21.10	
7/16/00	0.00	C	65.71	C	7/16/00	6:00 PM	4.50	24.40	
7/23/00	0.00	C	67.57	C	7/23/00	2:00 PM	5.00	22.80	
7/30/00	0.00	C	69.33	I	7/30/00	6:00 PM	5.00	25.00	
8/6/00	0.00	C	72.00	I	8/6/00	7:00 PM	5.00	25.00	clear water
8/13/00	10.00	C			8/13/00	7:00 PM	5.50		
8/20/00	4.00	C	73.00	I	8/20/00	7:00 PM	5.30	22.20	
8/27/00	6.00	*	75.00	I	8/27/00	6:00 PM	5.50		
9/3/00	14.00	*	74.00	I	9/4/00	6:00 PM	5.50	21.10	
9/10/00	20.00	*	71.00	I	9/10/00	4:40 PM	4.70	18.30	
9/17/00	—	I	70.50	I	9/17/00	6:00 PM	4.50	20.00	
9/24/00	20.00	C	69.25	I	9/24/00	6:00 PM	4.50	21.10	
Min	0.00		54.00		**Min**		2.00	13.30	
Max	50.00		75.00		**Max**		5.50	25.00	
Total	283.00								

I = Insufficient data
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	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	45.00	*					
10/3/99	17.00	C	45.14	C					
10/10/99	5.00	C	45.57	C	10/10/99	12:00 PM	5.50		
10/17/99	0.00	C	44.29	C	10/17/99	1:00 AM	7.00		
10/24/99	20.00	C	44.29	C	10/30/99	2:30 PM	6.50		
10/31/99	20.00	C	48.50	I	11/14/99	1:30 PM	6.00		
11/7/99	126.00	C	72.00	I	11/21/99	2:00 PM	7.00	10.00	
11/14/99	36.00	C	70.50	I	11/28/99	3:00 PM	6.50	9.00	
11/21/99	81.00	C	72.50	I	12/12/99	1:30 PM	6.50	8.00	
11/28/99	34.00	C	71.00	I					
12/5/99	33.00	C	68.00	I					
12/12/99	70.00	C	73.50	I					
12/19/99	10.00	C	72.00	I					
12/26/99	2.00	*	75.00	I					
Min	0.00		44.29		**Min**		6.00	8.00	
Max	126.00		75.00		**Max**		7.00	10.00	
Total	454.00								

I = Insufficient data
C = Complete data set
* = Acceptable number of measurements during a given week, but less than ideal

Steel

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/6/99	—	I	28.00	I					
10/11/99	—	I	28.00	I					
10/20/99			27.00	I					
10/27/99	—	I							
10/31/99	—	I	30.50	I					
11/8/99	—	I	43.33	I					
11/14/99	—	I	59.50	*					
11/22/99	—	I	70.67	I					
11/28/99	—	I	80.33	I					
12/5/99	—	I	82.00	I					
12/13/99	—	I	87.60	*					
12/30/99	—	I	77.00	I					
1/4/00	—	I	79.00	I					
1/12/00	—	I	81.00	I					
1/16/00	—	I	82.00	I					
1/24/00	—	I	78.00	I					
2/3/00	—	I	80.00	I					
2/6/00	—	I	81.00	I					
2/15/00	—	I	78.00	I					
2/21/00	—	I	77.00	I					
2/28/00	—	I	80.00	*					
3/5/00	—	I	80.00	I					
3/15/00	—	I	77.00	I					
3/21/00			76.00	I					
3/26/00			73.50	I					
					6/12/00	2:00 PM	3.50	16.50	
7/1/00	—	I	57.00	I	6/26/00	1:00 PM	3.50	21.00	
7/2/00	13.00	C	56.40	*	7/3/00	2:00 PM	3.00	21.00	
7/9/00	0.00	C	53.29	C	7/10/00	2:00 PM	4.50	21.00	
7/16/00	0.00	C	49.71	C	7/17/00	1:30 PM	4.50	23.00	lots of Canada geese in am; none now
7/23/00	0.00	C	46.29	C	7/24/00	2:00 PM	5.00	22.50	about 70 geese on the lake now
7/30/00	0.00	C	42.57	C	8/1/00	3:00 PM	5.00	24.00	
					8/7/00	3:00 PM	5.00	23.50	
					8/14/00	2:30 PM	4.50	21.50	
					8/28/00	4:00 PM	3.50	20.50	
					9/4/00	1:30 PM	4.00	19.50	
					9/11/00	2:00 PM	4.50	18.00	AM fog
					9/18/00	3:00 PM	4.50	19.50	
					9/25/00	2:45 PM	4.50	18.00	
Min	0.00		27.00		**Min**		3.00	16.50	
Max	13.00		87.60		**Max**		5.00	24.00	
Total	13.00								

I = Insufficient data
C = Complete data set
* = Acceptable number of measurements during a given week, but less than ideal

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	20.00	*	10/1/99	11:00 AM	2.00	16.00	
10/3/99	32.00	C	20.86	C					
10/10/99	—	I	22.00	*	10/10/99	12:00 PM	2.25	15.00	
10/17/99	—	I	22.00	I					
10/24/99	—	I			10/24/99	12:00 PM	2.00	14.00	
10/31/99	18.00	*			10/31/99	1:00 PM	2.00	12.00	
11/7/99	126.00	C	33.14	C	11/7/99	1:00 PM	2.00	12.00	
11/14/99	59.00	C	42.29	C	11/14/99	2:00 PM	2.00	11.00	
11/21/99	72.00	C	53.29	C	11/21/99	1:00 PM	1.75	10.00	
11/28/99	35.00	C	57.14	C	11/28/99	2:00 PM	1.75	11.00	
12/5/99	—	I	49.86	C	12/5/99	1:00 PM	1.75	10.00	
12/12/99	91.00	C	58.57	C	12/12/99	2:00 PM	1.50	10.00	
12/19/99	0.00	*	56.57	C	12/19/99		1.50	9.00	
12/26/99	18.00	C	42.71	C	12/26/99	1:00 PM	1.50	9.00	
1/2/00	25.00	C	41.86	C	1/5/00	2:00 PM	1.50	8.00	
1/9/00	41.00	C	46.43	C	1/9/00	2:00 PM	1.50	8.00	
1/16/00	26.00	C	45.14	C	1/16/00	3:00 PM	1.50	8.00	
1/23/00	4.00	C	40.57	C	1/23/00	1:00 PM	1.50	8.00	
1/30/00	36.00	C	44.00	C	1/30/00	12:00 PM	1.50	8.00	
2/6/00	42.00	C	49.57	C	2/6/00	2:00 PM	1.50	9.00	
2/13/00	14.00	C	47.00	C	2/13/00	1:00 PM	1.50	9.00	
2/20/00	36.00	C	44.29	C	2/20/00	2:00 PM	1.50	10.00	
2/27/00	64.00	C	49.14	C	2/27/00	3:00 PM	1.50	10.00	
3/5/00	11.00	C	52.86	C	3/5/00	3:00 PM	1.50	10.00	
3/12/00	27.00	C	43.71	C	3/12/00	4:00 PM	1.50	11.00	
3/19/00	21.00	C	42.29	C	3/19/00	3:00 PM	1.50	11.00	
3/26/00	7.00	C	36.29	C	3/26/00	6:00 PM	1.50	12.00	
4/2/00	6.00	C	32.29	C	4/2/00	5:00 PM	1.50	14.00	
4/9/00	32.00	C	30.86	C	4/9/00	4:00 PM	1.50	15.00	
4/16/00	0.00	C	34.57	C	4/16/00	12:00 PM	1.50	15.00	
4/23/00	18.00	C	32.14	C	4/23/00	4:00 PM	1.50	15.00	
4/30/00	26.00	C	30.71	C	5/1/00	2:30 PM	1.50	17.00	
5/7/00	22.00	C	33.00	C	5/7/00	4:00 PM	1.50	15.00	
5/14/00	13.00	C	31.86	C	5/15/00	5:00 PM	1.50	18.00	
5/21/00	15.00	C	29.43	C	5/22/00	4:00 PM	1.50	18.00	
5/28/00	—	I	27.00	*	5/29/00	2:00 PM	1.50	18.00	
Min	0.00		20.00		**Min**		1.50	8.00	
Max	126.00		58.57		**Max**		2.00	18.00	
Total	937.00								

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Twelve

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
3/17/00	—	I	56.00	I					
3/19/00	37.00	C	57.00	C	3/20/00	2:30 PM	3.00	8.50	
3/26/00	9.00	C	55.43	C					
4/2/00	24.00	C	52.14	C	4/3/00	3:00 PM	2.40	14.50	
4/9/00	32.00	*	51.33	*	4/10/00	3:00 PM	2.20	13.50	
4/16/00	24.00	*	56.83	*	4/17/00	4:15 PM	1.80	14.50	
4/23/00	37.00	C	52.93	C	4/24/00	4:30 PM	1.40	15.00	
4/30/00	41.00	C	52.64	C	5/1/00	3:30 PM	2.50	15.50	
5/7/00	49.00	C	56.14	C	5/8/00	4:20 PM	2.50	15.00	
5/14/00	13.00	C	54.43	C	5/15/00	3:15 PM	3.50	18.00	
5/21/00	14.00	*	51.07	C	5/22/00	3:08 PM	2.70	18.50	
5/28/00	—	I	49.00	*	5/29/00	4:25 PM	2.75	18.00	
6/4/00	23.00	*	46.33	*	6/5/00	4:00 PM	2.75	20.50	
6/11/00	51.00	*	51.08	*	6/12/00	4:00 PM	3.00	17.00	
6/18/00	2.00	*	48.50	C	6/19/00	4:45 PM	3.60	19.00	
6/25/00	3.00	C	44.93	C	6/26/00	3:30 PM	4.30	22.00	
7/2/00	21.00	C	43.50	C	7/3/00	4:40 PM	2.80	20.50	
7/9/00	0.00	C	41.07	C	7/10/00	4:00 PM	2.60	21.00	
7/16/00	0.00	C	38.93	C	7/17/00	6:00 PM	3.80	23.00	
7/23/00	0.00	C	36.57	C	7/25/00	9:20 AM	3.33	25.00	
7/30/00	0.00	C	34.36	C	7/30/00	4:30 PM	3.00	25.00	
8/6/00	0.00	C	32.04	C					
8/13/00	8.00	C	29.71	C	8/14/00	6:30 PM	2.50	22.00	
8/20/00	5.00	C	27.64	C	8/20/00	3:30 PM	2.40	22.00	
8/27/00	7.00	C	26.21	C	8/27/00	3:30 PM	2.10	21.00	
9/3/00	29.50	C	26.57	C	9/4/00	4:00 PM	2.75	19.50	
9/10/00	27.00	*	28.93	C	9/11/00	5:15 PM	2.50	19.00	
9/17/00	8.00	C	28.43	C	9/18/00	4:20 PM	2.50	19.00	
9/24/00	12.00	*	27.36	C	9/25/00	4:30 PM	2.00	18.00	
Min	0.00		26.21		**Min**		1.40	14.50	
Max	51.00		57.00		**Max**		4.30	25.00	
Total	476.50								

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	Daily data Summary		Weekly Data Summary				
Week of	Sum of Precip (mm)	Avg of Lake Level (cm)	Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/3/99	0.00	27.00	10/3/99		2.80	15.00	
10/10/99	40.00	38.00	10/10/99		2.40	13.60	lots of zooplankton
10/17/99	12.00	40.00	10/17/99		2.30	12.00	lots of zooplankton
10/24/99	2.00	34.00	10/24/99		2.40	11.00	
10/31/99			10/31/99				
11/7/99	56.00	41.00	11/7/99		2.50	11.00	
11/14/99	140.00	83.00	11/14/99		1.50	9.80	Rain Gauge overflowed
11/21/99	64.00	87.50	11/21/99		1.80	8.40	
11/28/99	67.00	88.00	11/28/99		1.30	7.00	
12/5/99	41.00	77.00	12/5/99		1.60	6.00	
12/12/99	62.00	80.00	12/12/99		1.70	6.20	
12/19/99	38.00		12/19/99				
12/26/99			12/26/99				
1/2/00			1/2/00				
1/9/00	47.00	84.00	1/9/00		2.00	4.10	
1/16/00	35.00	71.00	1/16/00		2.00	3.80	
1/23/00	19.00	60.00	1/23/00		2.00	4.10	
1/30/00	4.00	60.00	1/30/00		2.20	3.20	
2/6/00	39.00	76.00	2/6/00		2.10	4.80	
2/13/00	31.00	78.00	2/13/00		2.00	5.20	
2/20/00	44.00		2/20/00				
2/27/00	38.00	60.00	2/27/00		2.20	5.80	
3/5/00	48.00	80.00	3/5/00		2.10	6.70	
3/12/00	6.00	80.00	3/12/00			7.20	
3/19/00	49.00	81.00	3/19/00		2.20	7.10	
3/26/00	17.00	75.00	3/26/00		2.40	8.00	zooplankton are back
4/2/00	19.00	75.00	4/2/00		2.35	10.90	
4/9/00	26.00	78.00	4/9/00		2.50	11.20	
4/16/00	26.00	58.00	4/16/00		2.50	11.80	
4/23/00	6.00	43.00	4/23/00		2.50	14.20	water thick with zooplankton
4/30/00	10.00	49.00	4/30/00		2.40	13.20	
5/7/00	12.00	42.00	5/7/00		2.70	16.10	algae in water column
5/14/00	37.00	48.00	5/14/00		2.50	15.00	
5/21/00	12.00	40.00	5/21/00		2.60	16.60	lots of zooplankton in water
5/28/00	21.00	41.00	5/28/00		2.50	17.00	
6/4/00	4.00	36.00	6/4/00		2.10	18.40	
6/11/00	5.00	40.00	6/11/00		2.20	16.20	
6/18/00	21.00	42.00	6/18/00		2.30	16.80	
6/25/00	0.00		6/25/00		2.70	21.00	
7/2/00	2.00		7/2/00		2.90	20.70	
7/9/00	0.00	41.00	7/9/00		2.70	21.00	
7/16/00	0.00	38.00	7/16/00		2.90	21.80	
7/23/00	12.00	38.00	7/23/00		2.50	21.60	1-5mm blue-green balls of algae
7/30/00	0.00		7/30/00		2.75	23.80	white pin-point dots in water
8/6/00	0.00		8/6/00		2.50	25.00	white pin-point dots in water
8/13/00			8/13/00				
8/20/00	9.00	30.00	8/20/00		2.10	20.60	
8/27/00	1.00	30.00	8/27/00		2.10	20.00	lots of algae and water fleas in water
9/3/00	5.00	25.00	9/3/00		1.80	18.90	
9/10/00	27.00	32.00	9/10/00		1.50	17.00	lots of brownish algae in water
9/17/00	0.00	33.00	9/17/00		1.10	19.60	lots of brownish algae in water
9/24/00	0.00	33.00	9/24/00		1.90	16.90	zooplankton and algae in water
Min	0.00	25.00	**Min**		1.10	3.20	
Max	140.00	88.00	**Max**		2.90	25.00	
Total	1,154.00						

I = Insufficient data
C = Complete data set
* = Acceptable number of measurements during a given week, but less than ideal

Wilderness

	Daily data Summary				Weekly Data Summary				
Week of	Sum of Precip (mm)		Avg of Lake Level (cm)		Sample Date	Sample Time	Secchi (m)	Temp (°C)	Notes
10/1/99	0.00	*	27.50	I					
10/3/99	42.00	C	25.86	C	10/3/99	10:30 AM	3.50	16.00	
10/10/99	14.00	C	25.43	C	10/10/99	2:30 PM	4.00	15.50	2 boats fishing
10/17/99	1.00	C	20.71	C	10/17/99	4:15 PM	5.00	14.00	1 boat fishing
10/24/99	28.00	C	18.57	C	10/24/99	2:45 PM	4.00	13.00	
10/31/99	33.00	C	18.57	C	10/31/99	1:45 PM	4.00	11.50	
11/7/99	144.00	C	26.43	C	11/7/99	1:50 PM	4.50	10.00	
11/14/99	43.00	C	49.14	C	11/14/99	1:30 PM	4.00	10.50	
11/21/99	81.00	C	64.86	C	11/21/99	1:30 PM	4.00	9.50	
11/28/99	30.00	C	81.43	C	11/28/99	10:30 AM	4.00	8.50	
12/5/99	29.00	C	84.57	C	12/5/99	10:30 AM	4.50	8.00	
12/12/99	86.00	C	89.57	C	12/12/99	4:30 PM	4.00	7.00	
12/19/99	4.00	C	90.71	C	12/19/99	3:30 PM	5.50	7.00	
12/26/99	17.00	C	87.57	C	12/26/99	1:45 PM	5.50	6.00	
1/2/00	26.00	C	85.71	C	1/1/00	2:45 PM	5.50	5.00	
1/9/00	54.00	C	85.71	C	1/9/00	10:45 AM	6.00	5.00	
1/16/00	19.00	C	85.00	C	1/16/00	12:00 PM	5.75	4.50	
1/23/00	6.00	C	82.86	C	1/26/00	12:10 PM	5.00	4.50	
1/30/00	47.00	C	84.00	C	1/30/00	12:05 PM	3.50	4.00	
2/6/00	30.00	C	84.71	C	2/6/00	2:30 PM	3.00	5.00	
2/13/00	12.00	C	83.14	C	2/13/00	12:00 PM	2.50	5.00	
2/20/00	28.00	C	82.29	C	2/20/00	10:45 AM	3.00	5.00	
2/27/00	66.00	C	83.00	C	2/27/00	12:00 PM	2.50	6.00	
3/5/00	9.00	C	84.43	C	3/5/00	1:50 PM	2.25	6.50	
3/12/00	35.00	C	84.71	C	3/12/00	11:45 AM	2.50	7.00	dark green algae growing on bottom
3/19/00	28.00	C	85.14	C	3/19/00	1:30 PM	2.50	7.00	
3/26/00	8.00	C	84.29	C	3/26/00	12:45 PM	2.75	8.50	
4/2/00	17.00	C	81.86	C	4/2/00	12:00 PM	3.00	11.00	
4/9/00	33.00	C	81.86	C	4/8/00	1:30 PM	3.50	12.00	
4/16/00	6.00	C	81.00	C	4/16/00	5:30 PM	8.00	12.00	
4/23/00	22.00	C	80.71	C	4/22/00	4:45 PM	8.00	14.00	
4/30/00	24.00	C	79.43	C	4/30/00	1:30 PM	5.00	14.50	
5/7/00	41.00	C	79.57	C	5/7/00	4:30 PM	5.50	16.00	
5/14/00	14.00	C	81.14	C	5/14/00	8:00 AM	5.25	14.50	
5/21/00	16.00	C	80.14	C	5/21/00	1:00 PM	5.50	17.50	
5/28/00	7.00	C	78.00	C	5/29/00	10:00 AM	5.50	17.00	
6/4/00	23.00	C	73.15	C	6/4/00	9:00 AM	6.00	18.30	22 geese on private beach
6/11/00	45.00	C	76.14	C	6/11/00	12:00 PM	6.50	17.00	27 geese
6/18/00	0.00	C	73.86	C	6/18/00	2:30 PM	6.50	19.00	
6/25/00	0.00	C	73.00	C	6/25/00	1:00 PM	7.00	22.00	
7/2/00	20.00	C	70.71	C	7/2/00	11:30 AM	6.00	21.00	
7/9/00	0.00	C	68.86	C	7/9/00	12:30 PM	5.00	20.50	
7/16/00	1.00	C	66.00	C	7/16/00	10:11 AM	4.50	21.00	
7/23/00	0.00	C	62.14	C	7/23/00	11:07 AM	5.75	22.00	
7/30/00	0.00	C	58.14	C	7/30/00	3:00 PM	6.50	24.00	one bald eagle
8/6/00	0.00	C	52.86	C	8/6/00	3:45 PM	7.50	24.00	
8/13/00	6.00	C	48.57	C	8/12/00	5:15 PM	7.00	23.00	
8/20/00	2.00	C	43.71	C	8/20/00	5:00 PM	6.50	21.50	
8/27/00	9.00	C	37.57	C	8/27/00	10:30 AM	6.00	21.00	
9/3/00	19.00	C	34.71	C	9/4/00	3:03 PM	5.50	20.00	
9/10/00	8.00	C	32.86	C	9/9/00	11:45 AM	5.25	18.00	
9/17/00	3.00	C	29.83	*	9/17/00	3:35 PM	5.50	20.00	
9/24/00	20.00	C	24.67	*	9/23/00	1:15 PM	5.00	18.00	
Min	0.00		18.57		**Min**		2.25	4.00	
Max	144.00		90.71		**Max**		8.00	24.00	
Total	1,256.00								

I = Insufficient data
C = Complete data set
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Appendix B

Appendix B contains data collected as part of the Level II volunteer monitoring program. This data includes total phosphorus, total nitrogen, chlorophyll *a*, phytoplankton, Secchi depth, water temperature, and color.

Alice

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/1/00	15.0	3.50	4.90	16.2	291	None	1	lots of tiny particles floating in water - plant or animal life?
5/15/00	18.0	4.00	1.90	7.5	251	Some	1	TP was <10.0 µg/L which is the reporting detection limit, fishermen, good visibility, waterlilies beginning to surface, gasoline motors on ~50% of the boats
5/29/00	19.0	4.25	1.70	9.3	315	Some	3	TP was <10.0 µg/L which is the reporting detection limit, many gasoline engines on the back of boats this weekend
6/12/00		4.25	3.00	8.7	254	Some	0	TP was <10.0 µg/L which is the reporting detection limit, stormy day
6/26/00		4.00	1.70	8.2	278	Some	1	TP was <10.0 µg/L which is the reporting detection limit
7/10/00	17.0	4.00	1.40	5.3	272	None	2	TP was <10.0 µg/L which is the reporting detection limit, 17°C air, more lilypads this year
7/24/00	21.0	5.00	1.50	6.5	300	None	1	TP was <10.0 µg/L which is the reporting detection limit, 26°C air temp, color lightest and Secchi deepest ever seen
8/7/00	24.5	4.00	2.10	14.8	379	None	1	20.5°C air temp, lots of feathers on lake
8/21/00	22.0	4.00	1.60	9.1	351	None	0	TP was <10.0 µg/L which is the reporting detection limit, 18°C air temp
9/5/00	18.5	3.75	2.40	6.9	356	None	1	TP was <10.0 µg/L which is the reporting detection limit, darkish sky, hard to see, 16°C air temp
9/18/00	20.0	3.50	3.30	12.3	365	None	0	17°C air temp, overcast
10/2/00	16.0	3.80	3.20	9.7	351	None	0	TP was <10.0 µg/L which is the reporting detection limit, 13°C air temp
10/16/00	13.0	4.00	2.30	6.7	292	None	0	TP was <10.0 µg/L which is the reporting detection limit, 14°C air temp
Minimum	13.0	3.50	1.40	5.3	251			
Maximum	24.5	5.00	4.90	16.2	379			
Average	18.5	4.00	2.38	9.3	312			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/1/00	14.0	1.00	4.00	27.1	705	None	1	
5/15/00	15.0		9.80	28.6	708	Some	1	
5/30/00	16.5	0.50	14.40	32.9	702	None	1	enclosed plant sample of rapidly growing plant, - was native large leaved pondweed *(Potamogeton amplifolius*)
6/12/00	16.5	0.75	10.20	38.7	677	None	1	
6/26/00	21.0	0.50	37.70	38.0	1010	None	1	
7/10/00	19.5	0.50	38.30	40.6	1130	None	1	
7/24/00	20.5	0.50	80.90	57.1	1170	None	1	
8/7/00	23.5	0.75	16.50	23.9	835	None	1	
8/21/00	20.0	1.25	39.60	32.7	736	None	1	Secchi 1.24m in sun, 0.75m in shade
9/5/00	18.0	1.00	10.60	21.0	658	None	2	boat with gas outboard
9/18/00	20.0	1.00	27.50	23.7	724	None	1	
10/2/00	15.5	0.75	26.10	28.8	721	None	1	
10/16/00	12.5	0.75	2.70	40.7	579	None	1	
Minimum	12.5	0.50	2.70	21.0	579			
Maximum	23.5	1.25	80.90	57.1	1170			
Average	17.9	0.77	24.48	33.4	797			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Ames

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	15.0	2.50	12.00	13.8	577	None	2	
5/14/00	17.5	2.75	6.30	9.0	544	None	2	TP was <10.0 µg/L which is the reporting detection limit
5/28/00	18.0	3.50	1.30	6.8	452	None	0	TP was <10.0 µg/L which is the reporting detection limit
6/11/00	18.0	3.50	4.10	5.7	435	None	0	TP was <10.0 µg/L which is the reporting detection limit
6/25/00	22.0	3.80	2.30	9.5	323	None	1	TP was <10.0 µg/L which is the reporting detection limit
7/7/00	23.0	3.30	2.10	6.6	329	None	2	TP was <10.0 µg/L which is the reporting detection limit, sample 1 day past holding time, swimmers
7/23/00	23.0	3.80	0.99	5.8	307	None	0	TP was <10.0 µg/L which is the reporting detection limit
8/6/00	25.0	4.25	1.50	5.5	265	None	3	TP was <10.0 µg/L which is the reporting detection limit, 6 swimmers, wind blown surface stuff - algae?
8/20/00	22.0	3.75	1.20	10.7	280	Some	3	saw blue-green algae clumps about the size of rice blown near shore, water yellowish in bottom sample
9/4/00	20.0	3.75	1.70	9.4	292	Some	3	TP was <10.0 µg/L which is the reporting detection limit, fishermen
9/17/00	20.0	4.80	2.00	8.0	276	Some	1	TP was <10.0 µg/L which is the reporting detection limit
10/1/00	17.5	3.80	2.90	8.9	297	None	0	TP was <10.0 µg/L which is the reporting detection limit
10/15/00	14.5	3.80	2.50	5.2	283	None	0	TP was <10.0 µg/L which is the reporting detection limit
Minimum	14.5	2.50	0.99	5.2	265			
Maximum	25.0	4.80	12.00	13.8	577			
Average	19.7	3.64	3.15	8.1	358			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	14.0	4.50	3.70	7.8	314	None	11	
5/14/00		6.50	1.80	7.1	294	None	10	TP was <10.0 µg/L which is the reporting detection limit
5/29/00	17.0	6.50	1.60	6.2	281	None	2	TP was <10.0 µg/L which is the reporting detection limit
6/11/00	17.0	9.00	1.30	11.4	291	Some	5	
6/25/00	20.0	7.00	1.70	2.5	220		12	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
7/9/00	22.0	5.00	1.10	11.8	356	None	4	
7/23/00	21.0	5.00	1.20	7.3	293	None	3	TP was <10.0 µg/L which is the reporting detection limit
8/6/00	23.0	5.50	1.30	5.3	245	None	6	TP was <10.0 µg/L which is the reporting detection limit, 2 air mattresses
8/20/00	22.0		2.70	8.8	326	None	1	TP was <10.0 µg/L which is the reporting detection limit
9/4/00	20.0	4.00	3.70	7.3	341	Some	3	TP was <10.0 µg/L which is the reporting detection limit
9/17/00	20.0	5.00	2.20	10.6	319	None	2	
10/1/00		4.00	3.40	13.3	314	None	3	
10/15/00	16.0	4.00	4.40	12.7	320	None	2	
Minimum	14.0	4.00	1.10	2.5	220			
Maximum	23.0	9.00	4.40	13.3	356			
Average	19.3	5.50	2.32	8.6	301			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Beaver 1

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	16.0	1.25	4.70	27.7	467	Some		
5/14/00	18.0	1.25	6.20	21.2	465	Some	8	
5/31/00	17.0	1.25	11.90	19.6	524	Some	0	
6/12/00	16.0	1.00	11.40	20.5	587	Some	0	
6/25/00	24.0	1.30	7.80	26.2	569	Some	10	
7/10/00	21.5	1.00	7.20	22.9	542	Some	3	
7/24/00	23.0	1.00	5.40	47.0	670		3	
8/6/00	25.0	1.50	4.20	39.4	614	Some	6	algae almost dense
8/20/00	20.5	1.25	5.10	27.7	603	Some	1	lots more pond weed
9/5/00	19.0	1.25	5.10	12.8	492	Some	0	
9/18/00	19.5		3.90	14.1	460	Some	0	
10/1/00	16.0	1.50	9.10	19.1	521	Some	0	
10/16/00	13.0	1.50	8.00	7.9	410	Some	0	TP was <10.0 µg/L which is the reporting detection limit
Minimum	13.0	1.00	3.90	7.9	410			
Maximum	25.0	1.50	11.90	47.0	670			
Average	19.1	1.25	6.92	23.5	533			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	13.0	3.00	2.70	11.6	453	Some	4	2 personal floaters
5/14/00	15.0	2.75	4.80	12.3	436	Some	1	
5/28/00	18.0	2.50	6.00	11.8	372	Some	3	sample 1 day past holding time
6/11/00	17.0	2.25	10.30	13.0	353	Some	2	
6/25/00	21.0	3.00	3.50	10.4	384	Some	26	
7/9/00	21.0	2.50	3.20	10.1	365	Some	6	
7/23/00	21.0	3.00	3.70	8.6	363	Some	10	TP was <10.0 µg/L which is the reporting detection limit, finally most of the canad geese are gone
8/6/00	34.0	2.50	1.50	6.5	317	None	3	TP was <10.0 µg/L which is the reporting detection limit, color and secchi hard to determine, it was getting dark out
8/20/00	21.0	3.00	3.00	9.3	348	Some	3	TP was <10.0 µg/L which is the reporting detection limit
9/4/00	19.0	3.00	5.20	9.3	367	Some	9	TP was <10.0 µg/L which is the reporting detection limit
9/17/00	18.5	3.30	4.20	7.5	311	Some	0	TP was <10.0 µg/L which is the reporting detection limit
10/1/00	17.0	3.00	5.90	14.0	375	Some	4	
10/15/00	14.0	2.75	6.20	2.5	292		1	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
Minimum	13.0	2.25	1.50	2.5	292			
Maximum	34.0	3.30	10.30	14.0	453			
Average	19.2	2.81	4.63	9.8	364			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Bitter

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	14.5	3.50	3.50	17.4	468		3	
5/14/00			1.40	13.5	435			
5/29/00	18.0	3.00	2.90	13.4	412	Some	2	
6/11/00	17.0	3.25	5.00	11.5	394		1	
6/25/00	22.0	2.00	6.00	15.2	366	Some	1	
7/9/00	21.5	3.00	4.70	12.7	332	None	2	
7/23/00	23.0	3.50	3.50	10.7	359	Some	5	swimming, fishing, paddle boats
8/6/00	27.0	3.50	3.60	8.1	314	Some	6	TP was <10.0 µg/L which is the reporting detection limit
8/20/00	21.0	3.00	3.20	10.7	345	None	2	
9/4/00	20.0	3.50	2.60	11.1	367		3	
9/17/00	20.5	4.50	2.40	11.1	286	None	3	
10/1/00	16.5	3.50	3.70	15.9	388	Some	1	
10/15/00	14.0	2.50	5.00	9.3	364		1	TP was <10.0 µg/L which is the reporting detection limit
Minimum	14.0	2.00	1.40	8.1	286			
Maximum	27.0	4.50	6.00	17.4	468			
Average	19.6	3.23	3.65	12.4	372			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/14/00	15.5	4.00	2.10	11.2	746	None	1	9 on public fishing dock
5/29/00	18.5	4.25	1.60	10.1	644	None	2	gas powered boat
6/11/00	17.0	3.25	4.20	12.8	642	None	1	
6/25/00	21.5	3.25	4.70	13.6	545	None	2	
7/10/00	21.5	2.00	12.90	20.5	463	Some	0	2 fishing on dock
7/23/00	22.0	2.00	6.30	12.6	362	Some	4	2 on public fishing dock
8/6/00	24.0	4.25	2.90	9.7	294	None	0	TP was <10.0 µg/L which is the reporting detection limit, sample 1 day past holding time, 3 on public fishing dock
8/20/00	20.5	3.25	4.20	11.5	316	None	1	5 on public fishing dock
9/4/00	20.0	4.25	1.40	10.2	297	None	2	3 fishing on public dock
9/17/00	19.5	4.50	3.20	8.1	293	None	1	TP was <10.0 µg/L which is the reporting detection limit, 2 on public fishing dock
10/1/00	17.0	3.75	3.90	12.0	322	None	1	2 fishing on public dock
10/15/00	14.0	3.50	6.30	9.3	261	None	0	TP was <10.0 µg/L which is the reporting detection limit
Minimum	14.0	2.00	1.40	8.1	261			
Maximum	24.0	4.50	12.90	20.5	746			
Average	19.3	3.53	4.48	11.8	432			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Burien

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/14/00	17.0	2.00	3.60	13.2	347	None	4	
5/29/00	18.5	3.00	2.30	11.6	344	None	3	more activity recently on lake, mostly fishing
6/11/00	17.5	3.00	4.90	13.2	364		0	
6/25/00	22.0	3.75	3.00	10.6	373	Some	2	
7/9/00	22.5	3.50	1.80	9.0	339	None	0	TP was <10.0 µg/L which is the reporting detection limit, recent July 4th fireworks on lake, quality change?
7/23/00	22.5	3.20	2.00	10.8	410	None	2	swimmers
8/6/00	22.5	3.25	1.70	10.3	352	Dense	3	clumps of algae for 7 days
8/21/00	16.5	3.25	3.10	13.6	388	None	2	water color consistent
9/17/00	20.5	2.25	5.40	14.2	443	Some	3	surface algae 'dusting' total lake
10/1/00	17.5	1.75	8.00	22.2	538	Some	0	
10/15/00	14.0		12.80	13.5	509			Secchi of 1.75 m taken at night with strong flashlight
Minimum	14.0	1.75	1.70	9.0	339			
Maximum	22.5	3.75	12.80	22.2	538			
Average	19.2	2.81	4.42	12.9	401			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	14.0	1.25	15.10	22.9	1270	None	7	sample 1 day past holding time, fishing in droves on docks, heavy particles in water
5/30/00	6.0	1.50	13.60	22.9	792	None	0	
6/12/00	7.0	1.00	9.50	18.8	767	Some	0	
6/26/00	23.0	2.00	17.00	21.2	751	None	5	
7/10/00	21.0	2.75	5.50	19.1	704	None	2	
7/24/00	24.0	3.00	3.90	16.4	655	Some	4	clearest color water this year, clumps and bright green globuals of algae floating
8/7/00	24.0	2.75	4.40	15.1	574	Some	4	
8/21/00	21.5	1.50	23.70	26.7	482	Some	3	
9/5/00	18.0	1.25	27.10	29.4	599	Dense	1	
9/18/00	20.0	0.75	43.80	52.8	1090	Dense	1	
10/2/00	15.5	1.50	16.60	35.2	689	Some	1	
Minimum	6.0	0.75	3.90	15.1	482			
Maximum	24.0	3.00	43.80	52.8	1270			
Average	17.6	1.75	16.38	25.5	761			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Desire

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	14.5	1.50	21.00	17.3	537	Some	5	
5/14/00	15.5	1.50	20.10	16.1	443	Some	3	
5/28/00	18.0	2.00	5.50	27.9	459			sample 1 day past holding time, too dark to tell about algae, fishing from docks
6/11/00		1.75	11.90	15.0	495	Some	6	
6/26/00	21.0	1.75	10.00	13.4	584	Dense	3	
7/9/00	20.5	2.50	6.40	23.0	599	Some	0	
7/23/00	22.0	3.00	5.10	13.4	506	Some	0	algae density getting better
8/6/00	24.5	3.25	4.00	11.6	408	Some	2	
8/20/00		2.50	13.40	17.3	546	Dense	4	
9/4/00	19.0	1.75	25.10	23.4	740	Dense	6	
9/17/00	19.5	0.50	87.40	42.6	1520	Dense	2	lake looks like pea soup with lots of water lilies left to decay
10/1/00	16.0	0.75	29.30	45.3	1130	Dense	1	
10/15/00	13.5	1.00	27.80	50.2	884	Dense	0	
Minimum	13.5	0.50	4.00	11.6	408			
Maximum	24.5	3.25	87.40	50.2	1520			
Average	18.5	1.84	20.54	24.3	681			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	16.0	1.50	4.40	24.0	904	Some	3	
5/14/00	17.0	1.25	11.80	23.2	707	Some	2	6 swimmers
5/29/00		1.25	25.70	34.4	864	Some	4	
6/12/00	16.5	1.25	31.80	36.4	876		2	
7/9/00	22.0	1.25	17.50	73.8	916	Some	2	
7/23/00	24.0	1.25	6.60	24.4	728	Some	3	
8/21/00	22.5	1.50	8.40	28.3	605	Some	4	
9/17/00	21.0	1.50	13.60	25.8	687	Dense	0	
Minimum	16.0	1.25	4.40	23.2	605			
Maximum	24.0	1.50	31.80	73.8	916			
Average	19.9	1.34	14.98	33.8	786			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Fivemile

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/1/00	18.0	1.50	2.20	13.6	994	None	0	
5/14/00	17.0	1.50	3.70	35.1	1070	None	0	
5/29/00	18.0	1.00	5.20	19.7	859	None	0	
6/12/00	17.0	1.00	6.90	17.7	851	None	0	No birds
6/26/00	25.0	1.00	6.30	31.7	1080	Some	1	
7/24/00	24.5	1.00	7.30	20.4	789	None	0	
8/7/00	23.5	0.50	5.50	17.3	814	None	2	
8/21/00	21.5	1.00	4.80	17.9	681	None	0	hit bottom at 10m
9/4/00	18.5	1.00	3.40	13.3	727	None	1	
9/18/00	20.0	1.00	5.60	14.4	745	Some	0	
10/2/00	17.0	1.00	4.00	16.8	762	Some	0	
10/16/00	13.0	1.00	3.80	8.8	650	None	0	TP was <10.0 µg/L which is the reporting detection limit
Minimum	13.0	0.50	2.20	8.8	650			
Maximum	25.0	1.50	7.30	35.1	1080			
Average	19.4	1.04	4.89	18.9	835			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/1/00	16.0	2.75	7.40	15.9	428	None	0	
5/14/00	15.0	2.75	1.60	13.6	414	None	1	
5/29/00	18.5	2.50	4.80	18.2	469	None	0	
6/11/00	16.5	2.25	13.00	27.1	535	None	1	
6/25/00	20.0	2.25	4.10	12.1	405	None	0	
7/9/00	19.5	1.00	21.20	27.7	585	None	0	
7/23/00	19.0	1.00	43.40	45.1	772	None	0	
8/6/00	22.0	1.00	10.10	43.7	779	None	5	
8/20/00	18.5	1.00	20.40	40.5	798	None	0	
9/17/00	17.0	1.50	95.20	41.9	711	None	0	
10/1/00	15.0	1.75	17.10	29.3	684	None		
10/15/00	12.0	2.00	11.10	13.9	546	None	0	
Minimum	12.0	1.00	1.60	12.1	405			
Maximum	22.0	2.75	95.20	45.1	798			
Average	17.4	1.82	20.78	27.4	594			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Geneva

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	13.0	2.75	7.30	15.1	487		24	yesterday was opening weekend of fishing season
5/14/00	16.5	5.50	1.20	10.1	429	Some	4	
5/29/00	18.0	5.00	2.60	9.5	374			TP was <10.0 µg/L which is the reporting detection limit
6/11/00	17.0	4.50	2.00	28.8	505	None	1	
6/25/00	20.5	4.00	1.70	9.0	362	Some	2	TP was <10.0 µg/L which is the reporting detection limit
7/9/00	21.0	3.50	1.10	8.3	355	Some	3	TP was <10.0 µg/L which is the reporting detection limit
7/23/00	21.5	3.50	2.10	9.1	385	Some	1	TP was <10.0 µg/L which is the reporting detection limit
8/6/00	24.0	3.50	2.90	10.0	347	Some	3	TP was <10.0 µg/L which is the reporting detection limit, 12 swimmers, 5 fishing
8/20/00	20.0	3.00	14.50	16.7	470	Some	1	
9/4/00	18.5	5.00	3.50	13.7	499	Some	4	
9/17/00	19.0	4.50	2.30	13.7	367	Some	2	
10/1/00	17.0	3.50	6.80	9.8	379	Some	2	TP was <10.0 µg/L which is the reporting detection limit, fishing
10/15/00	14.0	3.50	4.10	7.7	353	Some	2	TP was <10.0 µg/L which is the reporting detection limit, fishing from shore and boat
Minimum	13.0	2.75	1.10	7.7	347			
Maximum	24.0	5.50	14.50	28.8	505			
Average	18.5	3.98	4.01	12.4	409			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	15.0	4.75	3.10	19.4	515	Some	0	
5/14/00	16.0	4.25	3.60	17.2	407	Some	0	
5/29/00	18.0	4.00	2.70	16.2	343	None		
6/11/00	18.0	2.75	2.40	16.6	374	None	0	
6/25/00	20.0	2.75	3.80	12.7	353	None		
7/9/00	20.5	3.00	2.30	14.3	384	None	0	
7/23/00	21.0	2.25	7.70	16.9	394	None	0	
8/6/00	23.5	2.50	4.60	12.4	376	None	0	
8/20/00	19.5	2.75	2.20	14.2	386	None	0	
9/4/00	18.0	3.00	2.90	11.0	338	None	0	
9/18/00	20.0	1.50	49.50	27.9	471	None	0	
10/1/00	17.0	2.50	4.20	17.7	390	Some	0	
10/15/00	13.5	2.25	3.90	23.3	379	Some	0	
Minimum	13.5	1.50	2.20	11.0	338			
Maximum	23.5	4.75	49.50	27.9	515			
Average	18.5	2.95	7.15	16.9	393			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Horseshoe

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/15/00	18.0	4.00	2.40	17.4	961	None	0	
5/28/00	19.0	4.00	0.91	9.5	682	None	0	TP was <10.0 µg/L which is the reporting detection limit, 3 fishermen
6/11/00	18.0	4.00	1.50	10.8	677	None	0	
6/24/00	22.0	3.50	2.10	11.0	610	None	0	sample 1 day past hold time
7/10/00	22.0	2.00	8.10	11.5	567	None	1	
7/23/00	22.0	2.50	3.30	11.0	550	None	1	new water sampler, old one broke
8/6/00	25.0	1.50	5.60	14.6	593	None	2	lake level low
8/20/00	20.0	2.50	3.40	14.8	671	None	0	lake is only 2.5m deep
9/4/00	18.0	2.00	1.90	14.6	683	None	0	
9/17/00	20.0	1.00	3.70	19.5	853	Some	0	small island like patches of algae somewhat dense, lake level too low for accurate Secchi reading
10/1/00	16.0	1.50	4.10	18.5	784	None	0	
10/15/00	14.0	1.50	2.10	18.3	867	None	0	sampler keeps coming loose
Minimum	14.0	1.00	0.91	9.5	550			
Maximum	25.0	4.00	8.10	19.5	961			
Average	19.5	2.50	3.26	14.3	708			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	14.5	2.00	3.90	15.4	940	Some	0	
5/14/00	14.0	1.60	3.10	17.2	889	Some	0	
5/29/00	17.0	1.75	2.00	17.6	955	Some	0	
6/11/00	16.5	1.75	3.30	20.2	758	Some	0	
6/25/00	22.0	1.75	4.70	20.0	700	Some	0	
7/9/00	20.0	1.00	22.00	37.9	684	Some	0	much murkier than previously, milfoil is spreading on east side of lake, approximately 1 acre matted on surface
7/23/00	21.5	1.10	14.40	26.6	561	Some	0	
8/6/00	24.0	2.25	1.20	16.6	447	Some	0	water as clear as I've seen it, Secchi on lake bottom
8/20/00	21.0	2.00	6.40	25.2	486	Some	0	water has been very clear for past several weeks
9/4/00	18.0	2.25	2.70	18.4	428	Some	0	Secchi disk visible on bottom
9/17/00	19.5	2.25	2.90	20.0	417	Some	0	
10/1/00	16.0	2.00	7.20	19.4	455	Some	0	
10/15/00	13.0	2.25	11.60	14.7	413	Some	0	Secchi visible on lake bottom
Minimum	13.0	1.00	1.20	14.7	413			
Maximum	24.0	2.25	22.00	37.9	955			
Average	18.2	1.85	6.57	20.7	626			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Joy

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00			2.20	14.6	811			
5/15/00	5.0	8.50	3.60	10.2	663	Some	0	
6/25/00	24.0	4.00	3.20	8.3	374	Some	8	TP was <10.0 µg/L which is the reporting detection limit
7/9/00	20.0	3.00	2.10	6.9	333	Some	0	TP was <10.0 µg/L which is the reporting detection limit
7/23/00	23.0	1.00	1.90	5.2	329	Some	3	TP was <10.0 µg/L which is the reporting detection limit
8/6/00	26.0	3.50	1.20	2.5	320	Some	4	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
8/20/00	21.0	3.50	2.10	10.7	366	Some	4	
9/4/00	20.0	3.50	2.20	5.9	325	Some	2	TP was <10.0 µg/L which is the reporting detection limit
9/17/00	20.0	3.75	2.60	5.6	332	Some	1	TP was <10.0 µg/L which is the reporting detection limit
10/1/00	22.0	3.50	2.90	7.7	366	Some	1	TP was <10.0 µg/L which is the reporting detection limit, first large flock of canada geese
Minimum	5.0	1.00	1.20	2.5	320			
Maximum	26.0	8.50	3.60	14.6	811			
Average	20.1	3.81	2.40	7.8	422			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	14.5	1.50	15.30	30.5	542	None	3	
5/14/00	15.5	2.25	6.10	17.2	506	None	2	
5/29/00	18.5	2.50	6.20	19.5	532	Some		
6/11/00	16.0	2.25	10.30	16.9	529	None	2	
6/25/00	20.5	2.00	5.80	14.4	480	None	3	
7/9/00	20.0	2.00	3.50	12.1	486	None	1	
7/23/00	21.5	1.75	9.00	15.5	508	None	2	
8/6/00	23.5	1.75	2.80	14.6	463	None	3	barge race yesterday - 5 barges, 12 boats, 40 people
8/20/00	19.5	1.50	12.60	15.6	528	None	1	
9/4/00	18.5	1.25	36.10	23.9	646	None	3	
9/17/00	19.5	1.25	32.80	28.0	611	None	3	200 seagulls per hour on weekdays when landfill is open
10/1/00	15.0	1.25	18.80	21.6	658	None	1	lots of gulls
10/16/00	12.5	1.75	2.20	14.8	610	None	1	
Minimum	12.5	1.25	2.20	12.1	463			
Maximum	23.5	2.50	36.10	30.5	658			
Average	18.1	1.78	12.42	18.8	546			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Killarney

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	15.5	2.50	6.90	18.2	537	Some	2	
5/14/00	17.0	2.50	8.00	28.7	611	Some	2	
6/11/00	17.0	2.50	9.50	30.3	614	Some	1	
6/25/00	22.0	2.50	4.20	20.6	596	Some	6	
7/9/00	21.5	2.50	2.90	23.0	607	Some	2	
7/23/00	22.0	2.25	5.20	24.2	589	Some	1	
8/6/00	25.0	3.00	2.70	21.6	552	Some	1	
8/20/00	21.0	3.00	10.80	27.1	590	Some	2	
9/17/00	20.0	2.50	5.60	21.7	570	Some	1	
10/1/00	17.0	2.75	9.50	29.8	601	None	1	
10/15/00	13.0	2.30	20.40	16.5	564	None	2	
Minimum	13.0	2.25	2.70	16.5	537			
Maximum	25.0	3.00	20.40	30.3	614			
Average	19.2	2.58	7.79	23.8	585			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	14.5	3.25	2.90	15.4	823	None	0	lots of daphnia in water, a chaoborus larvae
5/14/00	16.5	4.10	2.40	14.9	735	None	1	lots of microorganisms
5/29/00	18.5	3.50	2.20	17.0	610	None		lots of microorganisms, stagnant smell at 6m
6/11/00	17.0	3.75	9.70	14.2	623	None	0	
6/25/00	22.0	2.50	13.70	20.2	459	None		
7/9/00	21.0	2.75	6.80	17.6	405		0	lots of single cell organisms - algae?, 1 muskrat, 2 raccoons and bullfrogs
7/23/00	21.5	2.25	37.00	32.6	564		0	water seems cloudy, lots of green rod like organisms at 6m
8/6/00	24.0	1.50	12.70	19.2	485	None	1	rubber raft, no daphnia, small single cell organisms - probably algae
8/20/00	19.5	2.00	14.70	28.1	520	Dense	0	color also 4 at 2m
9/4/00	17.5	2.00	17.60	34.0	557	None	0	
9/17/00	18.5	1.75	22.30	27.0	420	None	0	
10/1/00	15.0	2.50	9.00	24.2	635	None	0	increase in microorganisms
10/15/00	12.0	2.25	5.50	14.6	377	None	0	
Minimum	12.0	1.50	2.20	14.2	377			
Maximum	24.0	4.10	37.00	34.0	823			
Average	18.3	2.63	12.04	21.5	555			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Lucerne

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	15.0	4.00	3.50	7.9	515	None	2	TP was <10.0 µg/L which is the reporting detection limit
5/14/00	18.0	3.50	8.80	12.9	524	Some	2	5 swimmers, lake seems to be stirred up, almost cloudy
6/11/00	18.0	4.25	3.00	13.8	401	None	1	
6/25/00	23.0	3.75	3.20	14.0	462	Some	3	
7/9/00	22.5	4.50	2.00	11.8	383	None	3	2 fishing
7/23/00	27.0	4.50	1.40	7.5	313	None	3	TP was <10.0 µg/L which is the reporting detection limit, a few swimmers
8/6/00	25.5	4.00	1.40	7.9	344	None	1	TP was <10.0 µg/L which is the reporting detection limit
8/20/00	22.5	4.00	2.40	8.6	330	None	3	TP was <10.0 µg/L which is the reporting detection limit, swimmers, pair of eagles
9/4/00	20.0	2.00	0.52	7.6	344	None	0	TP was <10.0 µg/L which is the reporting detection limit, sample was 13 days past holding time,
9/17/00	20.0	5.25	1.10	11.9	468	None	1	
10/1/00	18.0	5.25	6.20	8.8	406	None	1	TP was <10.0 µg/L which is the reporting detection limit
10/15/00	15.0	4.50	2.90	2.5	247	None	2	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
Minimum	15.0	2.00	0.52	2.5	247			
Maximum	27.0	5.25	8.80	14.0	524			
Average	20.4	4.14	3.04	9.6	395			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	15.0	3.00	6.40	11.5	1110	None	4	conductivity 67µmhos/cm at 1m, 65µmhos/cm at 2m , 2 rubber rafts, 22 fisherman, 2 swimmers, pollen floating on top of lake, small amount of brown particls in water
5/14/00	17.3	1.70	6.20	15.0	995	None	9	conductivity 72µmhos/cm at 1m, 67µmhos/cm at 2m , 3 swimmers, 5 fishermen, brown particles floating in water
5/29/00	18.0	2.50	9.40	13.2	821	None	2	conductivity 77µmhos/cm at 1m, 77µmhos/cm at 2.3m , 3 girls swimming, cotton wood floating on lake surface
6/11/00	17.3	2.00	34.00	15.2	779	None	0	conductivity 97 @ 1m, 99 @ 2.7m,
6/25/00	23.0	2.50	7.70	14.4	839	None	4	conductivity 90 @ 1m, 82 @ 2m,
7/9/00	21.5	2.30	7.20	12.6	529	None	4	Conductivity 90 @ 1m, 88 @ 2.2m, 10 fishing, 1 swimming, 1 kayak
7/23/00	22.3	2.20	5.20	13.6	472	Some	2	conductivity 97 @ 1m, 97 @ 2.2m, 5 swimmers, brown green stuff floats from bottom
8/6/00	25.2	3.40	2.90	10.3	368	None	2	conductivity 105 @ 1m, 102 @ 2.2m, 12 swimmers, 2 paddle boards
8/20/00	21.0	2.20	8.10	18.0	436	None	3	3 fishing
9/4/00	19.5	1.20	39.70	36.4	582	None	2	
9/17/00	20.0	1.60	49.80	18.5	475	None	2	conductivity was 97@ 1m, and 93 @ 2.2m, light green stuff floating on surface, very sparse, probably pollen, 8 fisherman
10/1/00	16.2	1.00	126.00	28.7	844	Some	2	conductivity was 90@ 1m, and 90@ 2.2m, light green floating on surface for one week, 4 fishermen
10/15/00	13.2	0.70	104.00	23.1	772	Some		light green small specks floating for 3 weeks, 5 fishermen
Minimum	13.2	0.70	2.90	10.3	368			
Maximum	25.2	3.40	126.00	36.4	1110			
Average	19.2	2.02	31.28	17.7	694			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Margaret

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	13.0	5.50	2.20	6.8	468	None	45	TP was <10.0 µg/L which is the reporting detection limit
5/14/00	15.0	4.50	14.40	6.5	425	None	8	TP was <10.0 µg/L which is the reporting detection limit, noticeable amount of particulate matter
5/29/00	16.0	5.00	4.00	6.6	362	None	3	TP was <10.0 µg/L which is the reporting detection limit
6/11/00	16.0	3.25	9.20	7.7	347	None	4	TP was <10.0 µg/L which is the reporting detection limit
6/25/00	20.0	3.75	4.00	10.3	302	None	8	
7/9/00	20.0	3.75	2.00	10.0	275	None		
7/23/00	20.5	4.00	3.10	5.7	259	None	3	TP was <10.0 µg/L which is the reporting detection limit
8/6/00	23.0	3.75	1.80	2.5	219	None	1	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
8/20/00	20.0	3.50	1.60	6.1	245	None	3	TP was <10.0 µg/L which is the reporting detection limit, 12m was silty
9/4/00	18.0	4.00	2.20	6.7	270	None	0	TP was <10.0 µg/L which is the reporting detection limit
9/17/00	18.0	4.50	1.70	2.5	227	None	1	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
10/1/00	15.0	4.25	2.60	7.9	254	None	0	TP was <10.0 µg/L which is the reporting detection limit
10/15/00	13.0	4.25	3.70	2.5	271	None	0	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
Minimum	13.0	3.25	1.60	2.5	219			
Maximum	23.0	5.50	14.40	10.3	468			
Average	17.5	4.17	4.04	6.3	302			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	14.5	3.25	3.10	35.2	605	Some	5	sample 1 day past holding time, 8-10 fishing off docks
5/15/00	15.5	3.75	3.30	20.4	568	Some	0	
5/29/00	17.5	3.00	5.80	22.5	496	Some	3	
6/12/00	16.0	3.00	7.00	23.9	501	Some	1	
6/26/00	22.5	4.00	5.00	23.9	522	Some	3	
7/10/00	20.0	2.50	7.70	20.5	523	Some	1	
8/7/00	23.0	2.25	6.30	16.3	494	Some	0	
9/5/00	18.0	2.50	28.10	20.6	608	Dense	0	
9/18/00	18.0	1.75	22.10	20.9	690	Dense	1	
10/2/00	15.5	1.75	37.30	25.8	750	Dense	1	
Minimum	14.5	1.75	3.10	16.3	494			
Maximum	23.0	4.00	37.30	35.2	750			
Average	18.1	2.79	12.57	23.0	576			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Meridian

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	15.0	5.50	3.20	7.8	311	None	3	TP was <10.0 µg/L which is the reporting detection limit, paddle boat
5/14/00	15.0	6.00	3.80	7.8	273	Some	5	TP was <10.0 µg/L which is the reporting detection limit
5/29/00	18.0	7.00	2.70	5.5	268	None	13	TP was <10.0 µg/L which is the reporting detection limit, canoe, paddle boat
6/25/00	20.0	4.75	1.50	7.5	274	Some	4	TP was <10.0 µg/L which is the reporting detection limit
7/9/00	21.5	3.50	2.20	7.7	283	Some	5	TP was <10.0 µg/L which is the reporting detection limit
7/23/00	22.5	5.00	2.30	5.6	304	Some	5	TP was <10.0 µg/L which is the reporting detection limit
8/6/00	24.5	5.00	1.80	2.5	279	Some	5	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations, 3 jet skis
8/20/00	21.5	4.00	2.10	6.9	299	Some	7	TP was <10.0 µg/L which is the reporting detection limit, 4 jet skis
9/4/00	20.5	3.25	1.90	7.5	320	None	12	TP was <10.0 µg/L which is the reporting detection limit
9/17/00	20.0	4.50	1.80	6.2	297	None	5	TP was <10.0 µg/L which is the reporting detection limit
10/1/00	17.5	5.00	1.70	7.5	315	None	3	TP was <10.0 µg/L which is the reporting detection limit
10/15/00	15.5	4.00	1.70	2.5	311	None	2	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
Minimum	15.0	3.25	1.50	2.5	268			
Maximum	24.5	7.00	3.80	7.8	320			
Average	19.3	4.80	2.23	6.3	295			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/1/00	15.5	5.00	0.98	16.5	359	None	0	
5/15/00	19.0	4.50	2.10	10.4	347	None	0	
5/30/00	18.0	3.75	4.80	8.5	359	Some	0	TP was <10.0 µg/L which is the reporting detection limit
6/12/00	18.0	3.00	5.80	25.1	392	Some	0	
6/26/00	22.0	3.50	4.40	10.8	380	None	0	
7/10/00	21.5	2.75	8.00	17.1	409	None	1	
7/24/00	22.5	2.50	6.10	15.2	440	Some	0	
8/7/00	24.0	2.75	6.00	13.4	441	Some	1	small spots of persistent white foam in front of house near shore
8/21/00	23.0	2.75	5.00	20.5	452	None	0	
9/5/00	19.5	2.00	66.80	39.4	729	Some	0	
9/18/00	20.0	3.00	4.60	13.9	430	None	1	
10/2/00	16.5	3.00	10.20	16.2	452	None	0	
10/16/00	13.5	2.75	19.60	9.4	391	None	0	TP was <10.0 µg/L which is the reporting detection limit
Minimum	13.5	2.00	0.98	8.5	347			
Maximum	24.0	5.00	66.80	39.4	729			
Average	19.5	3.18	11.11	16.6	429			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Morton

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	14.5	4.50	3.30	7.5	452		2	TP was <10.0 µg/L which is the reporting detection limit
5/14/00	15.0	4.00	3.50	8.9	397		6	TP was <10.0 µg/L which is the reporting detection limit
5/29/00	18.0	4.00	4.40	8.5	371	None	8	TP was <10.0 µg/L which is the reporting detection limit, fishing
6/11/00	17.5	3.50	3.50	7.6	357		1	TP was <10.0 µg/L which is the reporting detection limit
6/25/00	21.5	3.50	5.70	6.7	358	None	7	TP was <10.0 µg/L which is the reporting detection limit
7/9/00	21.5	3.50	3.70	10.5	382	None	3	
7/23/00	22.5	3.75	1.50	6.1	353	None	1	TP was <10.0 µg/L which is the reporting detection limit
8/9/00	24.0	4.25	1.20	6.0	333	None	1	TP was <10.0 µg/L which is the reporting detection limit
8/20/00	21.5	3.00	2.10	6.7	392	None	2	TP was <10.0 µg/L which is the reporting detection limit
9/4/00	19.0	2.50	2.80	10.7	449	None	1	
9/17/00	19.5	3.50	2.80	8.8	358		2	TP was <10.0 µg/L which is the reporting detection limit
10/1/00	17.0	4.25	2.30	8.6	382		1	TP was <10.0 µg/L which is the reporting detection limit
10/15/00	14.5	4.00	7.50	7.0	360		1	TP was <10.0 µg/L which is the reporting detection limit
Minimum	14.5	2.50	1.20	6.0	333			
Maximum	24.0	4.50	7.50	10.7	452			
Average	18.9	3.72	3.41	8.0	380			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	15.0	3.25	3.20	14.5	547	Some	2	
5/14/00	17.5	3.25	4.10	12.4	511	Some	3	
5/29/00	18.5	2.00	21.90	23.9	559	Some	4	2 fishing from beach at public access
6/11/00	17.0	2.75	6.80	14.3	555	Some	0	
6/25/00	23.0	2.75	2.20	8.9	403	Some	4	TP was <10.0 µg/L which is the reporting detection limit
7/9/00	21.5	2.25	2.00	19.4	509	Some	4	
7/23/00	23.5	2.75	7.40	13.4	537	Some	2	8 swimmers
8/9/00	25.5	2.50	7.50	13.7	514	Dense	3	
8/20/00	20.0	2.25	14.70	13.0	573	Dense	3	
9/4/00	19.5	1.75	24.20	17.9	610	Dense	4	
9/17/00	20.5	1.75	9.70	37.0	689	Dense	2	
10/1/00	17.0	1.75	10.30	14.4	548	Some	0	
10/15/00	13.5	2.00	9.40	12.6	516	Some	0	
Minimum	13.5	1.75	2.00	8.9	403			
Maximum	25.5	3.25	24.20	37.0	689			
Average	19.4	2.40	9.49	16.6	544			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Panther

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/1/00	14.5	1.75	32.80	30.7	647	Some	0	the lake is ~70% covered with lilypads
5/15/00	19.0	1.75	27.30	27.6	671	None	0	no visible particles in water
5/30/00	18.0	1.50	4.80	29.8	595	None	0	
6/12/00	15.0	1.25	1.30	19.0	546	None	0	
6/25/00	17.0	2.00	3.10	22.5	730			
7/10/00	18.5	0.75	9.10	17.5	631	None	0	
7/24/00	19.0	0.50	10.20	22.3	760	None	0	water colored but clean
8/21/00	17.0	0.25	5.50	24.1	718	None	0	
9/5/00	15.0	0.25	47.80	34.5	865	Some	0	
9/18/00	17.0	0.25	246.00	80.7	1130	None	0	very dark water
10/3/00	13.0	0.25	12.80	24.3	787	None	0	water clear (no algae) but with dark brown organic color
10/16/00	11.0	0.50	10.40	11.0	583	None	0	
Minimum	11.0	0.25	1.30	11.0	546			
Maximum	19.0	2.00	246.00	80.7	1130			
Average	16.2	0.92	34.26	28.7	722			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/1/00	13.0	3.25	5.90	37.0	788	None	1	
5/29/00	14.0	1.50	17.30	20.5	534	None	1	motor boat
6/12/00	14.0	2.25	17.40	24.6	521	None	1	
6/25/00	18.0	2.50	7.90	17.1	416	None	1	
7/9/00	18.0	3.00	21.40	30.0	520	None	1	
7/23/00	18.0	3.25	21.50	17.0	473	Some	2	algae around edges of lake
8/7/00	20.0	1.75	87.60	33.8	534	None	1	
8/20/00	18.0	2.00	14.90	20.9	350		1	
9/4/00	15.0	2.00	48.80	36.7	625		4	2 motor craft, relatively heavy use
9/18/00	17.0	2.00	48.90	41.9	620	None	0	drizzle
10/1/00	12.0	2.75	52.70	73.8	820	None	1	
10/15/00	10.0	3.25	32.80	44.2	681		1	
Minimum	10.0	1.50	5.90	17.0	350			
Maximum	20.0	3.25	87.60	73.8	820			
Average	15.6	2.47	31.43	33.1	574			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Pine

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	13.5	5.00	4.40	9.0	251	None	5	TP was <10.0 µg/L which is the reporting detection limit, fishing from docks
5/14/00	17.0	3.50	3.50	12.9	338	None	11	Secchi hard because of choppy water, fishing from dock, swimming
5/29/00	18.0	3.75	3.20	11.1	324	None	15	fishing from public and private docks
6/25/00	20.5	4.50	4.70	13.9	309	None	12	
7/10/00	20.5	4.50	2.30	7.5	335	None	0	TP was <10.0 µg/L which is the reporting detection limit, fishing from dock, oil slick in little cove, motor boats yesterday
7/23/00	22.5	3.25	2.50	7.0	357	None	2	TP was <10.0 µg/L which is the reporting detection limit, fishing, swimming
8/7/00	24.0	4.75	1.80	16.6	401	None	0	fishing from dock
8/21/00	21.0	5.00	3.30	8.0	363	None	1	TP was <10.0 µg/L which is the reporting detection limit, fishing at public dock
9/4/00	20.0	5.00	3.10	8.5	392	None	4	TP was <10.0 µg/L which is the reporting detection limit, very small green particles
9/17/00	19.0	5.00	2.90	9.4	338	None	3	TP was <10.0 µg/L which is the reporting detection limit, small oil slick in cove from motor boat
10/1/00	17.0	5.00	3.80	8.7	365	None	0	TP was <10.0 µg/L which is the reporting detection limit, fishing from dock
10/15/00	15.0	4.75	5.10	2.5	310	None	1	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations, some fishing from dock
Minimum	13.5	3.25	1.80	2.5	251			
Maximum	24.0	5.00	5.10	16.6	401			
Average	19.0	4.50	3.38	9.6	340			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/1/00	16.0	4.50	11.60	8.4	598	None	0	TP was <10.0 µg/L which is the reporting detection limit
5/15/00	19.0	3.25	11.10	14.7	610	Some	0	Secchi "fuzzy" looking when doing color
5/30/00	16.5	4.25	10.90	10.7	493	None	0	
6/12/00	16.0	3.25	6.00	12.6	481	Some	0	
6/26/00	22.5	4.75	1.20	7.4	330	None	14	TP was <10.0 µg/L which is the reporting detection limit
7/10/00	20.5	3.75	2.60	11.9	491	None	12	
7/24/00	24.5	3.75	1.70	9.0	446	Some	6	TP was <10.0 µg/L which is the reporting detection limit
8/7/00	23.5	4.25	1.50	9.6	351	Some	8	TP was <10.0 µg/L which is the reporting detection limit
9/5/00	17.5	3.75	2.40	6.5	333	None	0	TP was <10.0 µg/L which is the reporting detection limit
9/18/00	17.5	3.75	2.50	14.6	471	None	1	
10/16/00	14.5	3.50	2.70	2.5	242	Some	2	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
Minimum	14.5	3.25	1.20	2.5	242			
Maximum	24.5	4.75	11.60	14.7	610			
Average	18.9	3.90	4.93	9.8	441			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Retreat

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	14.0	8.50	1.40	5.9	682	None	2	TP was <10.0 µg/L which is the reporting detection limit
5/14/00	17.0	9.50	1.30	2.5	588	Some	1	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
5/29/00	17.0	8.50	1.40	5.9	584	None	1	TP was <10.0 µg/L which is the reporting detection limit
6/11/00	17.0	7.50	1.80	2.5	515	Some	2	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
6/25/00	19.5	7.00	1.60	2.5	440	None	1	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
7/9/00	20.0	5.00	20.00	6.9	495	Some	1	TP was <10.0 µg/L which is the reporting detection limit
7/23/00	24.5	5.25	2.60	6.4	485	Some	5	TP was <10.0 µg/L which is the reporting detection limit
8/6/00	24.0	7.00	1.30	2.5	388	Some	8	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
8/20/00	22.0	9.00	1.70	6.4	379	Some	11	TP was <10.0 µg/L which is the reporting detection limit
9/4/00	20.0	8.50	1.60	6.0	371	None	1	TP was <10.0 µg/L which is the reporting detection limit
9/17/00	20.0	8.00	1.80	2.5	331	Some	5	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
10/1/00	17.0	6.00	4.00	7.3	354	Some	1	TP was <10.0 µg/L which is the reporting detection limit
10/15/00	15.0	6.50	2.10	2.5	366	Some	1	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
Minimum	14.0	5.00	1.30	2.5	331			
Maximum	24.5	9.50	20.00	7.3	682			
Average	19.0	7.40	3.28	4.6	460			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	15.0	4.00	6.60	8.5	625	None	7	TP was <10.0 µg/L which is the reporting detection limit
5/14/00	15.0	5.00	5.60	10.8	498	None	6	
5/29/00	17.0	6.00	6.30	10.6	475	None	7	some fishing
6/11/00	17.0	6.25	5.90	7.8	332	None	0	TP was <10.0 µg/L which is the reporting detection limit
6/25/00	19.5	7.25	3.70	5.1	239	None	4	TP was <10.0 µg/L which is the reporting detection limit
7/9/00	20.0	3.75	3.00	10.3	291	None	4	
7/23/00	21.5	3.75	1.90	6.3	261	None	9	TP was <10.0 µg/L which is the reporting detection limit
8/7/00	23.0	4.75	2.00	12.2	226	Some	3	fishing
8/20/00	22.0	4.25	1.90	8.2	223	None	9	TP was <10.0 µg/L which is the reporting detection limit, fishing, touring
9/4/00	18.5	5.25	2.50	14.5	335	Some	9	fishing and sightseeing
9/18/00	18.0	4.00	2.20	12.3	236	Some	2	aglal bloom at least three days, approaching dense, fishing on lake
10/1/00	16.0	5.50	3.30	7.8	220	Some	0	TP was <10.0 µg/L which is the reporting detection limit, lots of rain yesterday
10/15/00	14.5	4.75	5.20	9.3	215	Some	1	TP was <10.0 µg/L which is the reporting detection limit, fishing
Minimum	14.5	3.75	1.90	5.1	215			
Maximum	23.0	7.25	6.60	14.5	625			
Average	18.2	4.97	3.85	9.5	321			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Shadow

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
6/25/00	23.0	4.00	2.60	16.6	613	None	8	1 float tube fishing
7/23/00	22.0	2.75	3.20	17.8	586	None	1	
8/6/00	25.0	2.75	4.40	12.3	513	None	3	
8/20/00	22.5	2.50	3.70	14.7	484	None	0	
9/4/00	19.0	2.00	9.80	13.0	545	None	4	
9/17/00	18.0	2.00	2.30	12.8	467	None	3	
10/1/00	18.0	2.00	3.80	9.8	512	None	1	TP was <10.0 µg/L which is the reporting detection limit, fishing
10/15/00	14.0	2.00	2.70	26.1	499	None	0	
Minimum	14.0	2.00	2.30	9.8	467			
Maximum	25.0	4.00	9.80	26.1	613			
Average	19.9	2.44	4.01	15.3	524			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	15.5	3.90	5.80	9.0	574	Some	1	TP was <10.0 µg/L which is the reporting detection limit
5/14/00	18.3	3.70	5.60	12.0	394	Some	3	
5/29/00	18.9	3.60	3.80	11.7	393	Some	2	
6/11/00	17.8	3.75	3.00	6.7	335	Some	5	TP was <10.0 µg/L which is the reporting detection limit
6/25/00	23.3	4.00	2.00	6.2	305	Some	15	TP was <10.0 µg/L which is the reporting detection limit
7/9/00	21.1	4.50	3.20	5.1	296	None	6	TP was <10.0 µg/L which is the reporting detection limit
7/23/00	22.2	5.00	1.40	5.1	330	None	10	TP was <10.0 µg/L which is the reporting detection limit, swimming
8/6/00	25.0	5.00	0.99	2.5	286	None	15	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations, swimming, water clear
8/20/00	22.2	5.25	1.10	6.3	329	None	7	TP was <10.0 µg/L which is the reporting detection limit, fishing
9/4/00	21.1	5.50	1.10	5.4	333	None	8	TP was <10.0 µg/L which is the reporting detection limit
9/17/00	20.0	4.50	2.30	2.5	316	None	7	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations, 6 fishing
10/1/00	17.8	4.50	4.70	9.4	393	None	5	TP was <10.0 µg/L which is the reporting detection limit, fishing
10/15/00	15.5	4.20	3.20	2.5	270	None	3	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations, 2 fishing
Minimum	15.5	3.60	0.99	2.5	270			
Maximum	25.0	5.50	5.80	12.0	574			
Average	19.9	4.42	2.94	6.5	350			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Spring

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	17.0	2.25	3.00	12.4	752		6	2 lake groups
5/14/00		2.00	2.20	10.8	674			
5/29/00	19.0	2.25	7.10	13.6	572	Some	3	several fishing earlier
6/11/00	17.0	2.25	7.30	12.0	510	Some	1	
6/25/00	24.0	2.00	5.60	10.5	431	Some	6	
7/9/00	23.0	2.00	6.90	9.8	381	Some	4	TP was <10.0 µg/L which is the reporting detection limit
7/23/00	22.0	2.25	3.10	7.8	360	Some	5	TP was <10.0 µg/L which is the reporting detection limit
8/6/00	25.0	2.75	1.60	6.1	334	Some	0	TP was <10.0 µg/L which is the reporting detection limit, swmmers
8/20/00	21.0	2.50	1.90	8.1	370	Some	1	TP was <10.0 µg/L which is the reporting detection limit, bottom seems anaerobic
9/4/00	20.0	2.75	2.20	9.7	415	Some	2	TP was <10.0 µg/L which is the reporting detection limit
10/1/00	18.0	3.00	3.80	13.6	355		0	
10/15/00	15.0	2.50	7.60	10.6	311		1	
Minimum	15.0	2.00	1.60	6.1	311			
Maximum	25.0	3.00	7.60	13.6	752			
Average	20.1	2.38	4.36	10.4	455			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/1/00	15.0	6.50	1.70	6.4	433	None	1	TP was <10.0 µg/L which is the reporting detection limit
5/15/00	17.0	6.25	2.20	8.8	398	None	0	TP was <10.0 µg/L which is the reporting detection limit
5/31/00	17.0	4.50	4.30	6.0	331	None	0	TP was <10.0 µg/L which is the reporting detection limit
6/12/00	17.0	3.25	9.50	11.3	319	Some	1	rain hard at times
6/27/00	22.0	3.25	1.30	9.8	352	Some	0	TP was <10.0 µg/L which is the reporting detection limit
7/10/00		4.25	1.80	5.8	298	Some	0	TP was <10.0 µg/L which is the reporting detection limit
7/25/00	22.0	4.75	2.50	7.0	314	Some	1	TP was <10.0 µg/L which is the reporting detection limit
8/7/00	23.5	5.00	2.10	7.3	300	None	0	TP was <10.0 µg/L which is the reporting detection limit, water very clear, hard to distinguish color
8/21/00	21.5	5.75	2.80	9.4	295	Some	0	TP was <10.0 µg/L which is the reporting detection limit, swimmers
9/5/00	19.0	5.50	3.10	5.9	293	Some	0	TP was <10.0 µg/L which is the reporting detection limit
9/18/00	19.5	6.25	3.20	7.1	298	Some	0	TP was <10.0 µg/L which is the reporting detection limit
10/2/00	16.0	8.50	1.70	8.3	318	Some	0	TP was <10.0 µg/L which is the reporting detection limit, very still water
10/17/00	13.5		6.20	2.5	253	Some	0	TP was <5.0 µg/L which is the minimum analysis sensitivity, 2.5 µg/L was used for purposes of TSI calculations
Minimum	13.5	3.25	1.30	2.5	253			
Maximum	23.5	8.50	9.50	11.3	433			
Average	18.6	5.32	3.26	7.4	323			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Steel

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
6/26/00	23.0		3.40	8.6	370			TP was <10.0 µg/L which is the reporting detection limit
7/10/00	21.0	4.50	2.30	10.2	322	None	0	
7/24/00	22.5	5.00	0.16	8.7	324	None	7	TP was <10.0 µg/L which is the reporting detection limit
8/7/00	23.5	5.00	2.20	11.1	339	None	7	swimming at park, water very clear today
9/4/00	19.5	4.00	3.30	23.2	424	None	1	
9/18/00	19.5	4.50	3.40	10.2	319		0	
10/2/00	17.0	5.50	5.40	11.6	342	None	1	
10/16/00	15.0	6.00	5.90	7.7	287	None	1	TP was <10.0 µg/L which is the reporting detection limit
Minimum	15.0	4.00	0.16	7.7	287			
Maximum	23.5	6.00	5.90	23.2	424			
Average	20.1	4.93	3.26	11.4	341			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/1/00	17.0	1.50	5.00	27.9	1120	Some	1	
5/15/00	19.0	1.50	3.60	22.0	1050	Some	1	
5/29/00	18.0	1.50	3.60	21.9	1040	Some	3	
6/12/00	17.0	1.75	11.10	20.3	932	Some	0	
6/25/00	22.0	2.00	6.10	17.6	898	Some	5	
7/10/00	21.0	2.00	8.40	19.1	848	Some	0	
7/24/00	23.5	2.00	6.90	17.0	760	Some	3	
8/6/00	25.0	1.50	8.40	16.9	721	None	1	3 floats
8/22/00	21.0	2.00	8.80	52.2	717	Some	0	
9/4/00	20.0		13.10	26.7	755	Some	1	1 swimmer
9/16/00	20.5	2.00	22.10	20.4	714	Some	1	sample 1 day past hold time, 4 swimmers
10/1/00	16.0	2.00	12.40	21.9	769	None	1	
10/15/00	15.0	1.75	31.30	27.9	691	Some	1	
Minimum	15.0	1.50	3.60	16.9	691			
Maximum	25.0	2.00	31.30	52.2	1120			
Average	19.6	1.80	10.83	24.0	847			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Twelve

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	15.0	2.50	2.80	8.3	463	None	4	sample 1 day past holding time, TP was <10.0 µg/L which is the reporting detection limit
5/15/00	17.5	3.50	1.90	8.9	403	None	4	TP was <10.0 µg/L which is the reporting detection limit
5/29/00	18.0	3.75	8.10	7.9	379	None	7	TP was <10.0 µg/L which is the reporting detection limit, holiday
6/12/00	17.0	3.00	2.50	8.0	341	None	1	TP was <10.0 µg/L which is the reporting detection limit
6/26/00	23.0	4.25	4.30	10.6	375	None	1	
7/10/00	22.0	2.60	1.90	7.2	385	None	1	TP was <10.0 µg/L which is the reporting detection limit
7/24/00	25.0	3.25	2.70	7.3	379	None	0	TP was <10.0 µg/L which is the reporting detection limit, lake warm and pleasant for swimming
8/20/00	22.0	2.40	4.70	14.9	475	Some	4	no swimmers
9/5/00	19.5	2.75	4.70	8.2	515	None	4	TP was <10.0 µg/L which is the reporting detection limit, breezy day, drifted a bit
9/18/00	22.0	2.50	16.40	10.6	414	None	0	sampler thermometer 3°C higher than separate thermometer
10/2/00	17.0	2.00	23.80	16.4	467	None	0	color hasn't changed much since we started monitoring
10/16/00	13.0	2.50	6.00	7.4	421	None	0	TP was <10.0 µg/L which is the reporting detection limit, this week thought I saw algae, but when I put my hand in to collect some it was like green pollen and dispersed
Minimum	13.0	2.00	1.90	7.2	341			
Maximum	25.0	4.25	23.80	16.4	515			
Average	19.3	2.92	6.65	9.6	418			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
5/29/00	7.0	4.75	3.10	9.3	270	Some	2	TP was <10.0 µg/L which is the reporting detection limit
6/11/00	5.0	4.25	5.30	13.2	331	Some	0	
6/25/00	18.0	4.75	1.30	10.8	268	Some	7	
7/9/00	18.5	6.25	1.50	10.4	271	Some	1	
7/23/00	20.0	6.75	1.50	7.4	261	Some	1	TP was <10.0 µg/L which is the reporting detection limit, 2 boats earlier today, more algae than last reading
8/20/00	19.5	5.75	4.30	17.2	347	Some	0	
9/4/00	16.5	5.75	4.60	10.3	339	Some	1	
9/17/00	17.5	5.75	4.00	8.2	338	Some	1	TP was <10.0 µg/L which is the reporting detection limit
10/1/00	15.0	6.75	2.40	6.4	268	Some	1	TP was <10.0 µg/L which is the reporting detection limit
Minimum	5.0	4.25	1.30	6.4	261			
Maximum	20.0	6.75	5.30	17.2	347			
Average	15.2	5.66	3.11	10.4	299			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	13.2	2.40	2.50	13.5	645	None	1	
5/14/00	15.0	2.50	2.60	14.9	624	None	1	
5/29/00	17.0	2.50	3.60	18.1	621	Some	1	
6/11/00	16.1	2.20	12.50	15.5	590	Some	1	
6/25/00	21.0	2.70	4.10	10.3	420	Some	2	
7/9/00	21.0	2.70	3.60	11.9	465	None	1	
7/23/00	21.6	2.50	2.60	14.3	452	Some	1	1-5mm blue-green balls and strings
8/6/00	25.0	2.50	5.10	14.0	438	Some	0	very small white dots in the water
8/20/00	20.6	2.10	13.80	19.8	501	Some	1	
9/5/00	18.9	1.75	27.50	15.7	555	Some	2	
9/17/00	19.5	1.10	79.90	29.1	699	Some	1	lots of brownish algae in water for past two weeks
10/1/00	15.6	3.00	9.10	19.7	580	Some	1	brownish 1mm clumps in water
10/15/00	13.0	2.30	1.10	6.3	609	Some	1	TP was <10.0 µg/L which is the reporting detection limit
Minimum	13.0	1.10	1.10	6.3	420			
Maximum	25.0	3.00	79.90	29.1	699			
Average	18.3	2.33	12.92	15.6	554			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen

Sample Date	Temp (°C)	Secchi (m)	Chl *a* (µg/L)	TP (µg/L)	TN (µg/L)	Algae (observation)	Boat (count)	Notes
4/30/00	14.5	5.00	5.80	20.2	683	None	5	
5/14/00	14.5	5.25	4.50	15.6	513	Some	6	6 fishing off docks
5/29/00	17.0	5.50	2.30	19.4	520	Some	17	
6/11/00	17.0	6.50	3.80	13.4	492	Some	6	
6/25/00	22.0	7.00	1.80	17.6	431	None	10	
7/9/00	20.5	5.00	4.90	14.9	362	Some		algae for 5 weeks
7/23/00	22.0	5.75	2.40	10.2	292	Some	7	
8/6/00	24.0	7.50	2.00	8.9	273	Some	9	TP was <10.0 µg/L which is the reporting detection limit, 30+ people swimming at park, some algae for over 2 months
8/20/00	22.0	6.50	2.10	16.0	289	None	5	
9/4/00	20.0	5.50	3.00	23.2	315	None	6	
9/17/00	20.0	5.50	5.30	12.0	282	None	5	11 fishing
10/1/00	17.0	3.50	12.20	16.9	345	None	2	
10/15/00	14.5	4.25	2.00	27.7	408	None	1	
Minimum	14.5	3.50	1.80	8.9	273			
Maximum	24.0	7.50	12.20	27.7	683			
Average	18.8	5.60	4.01	16.6	400			

Note: Temp=temperature, chl *a*=chlorophyll *a*, TP=total phosphorus, TN=total nitrogen