King County Lake Monitoring Report

A Lake Stewardship Program

Volunteer Lake Monitoring Results for the Water Year 2001

December 2002

King County

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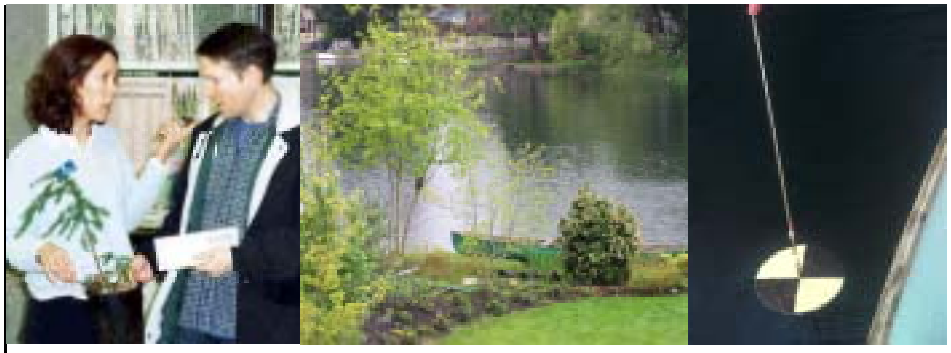
Volunteer Lake Monitoring Results for Water Year 2000–2001



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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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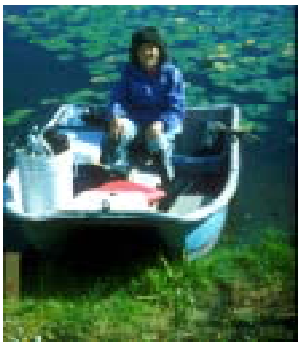
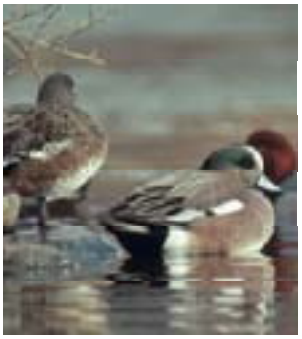
Many individuals have contributed to the collection of lake volunteer monitoring data. Special thanks to our dedicated volunteers, many of whom have participated for several years. The success of this program is dependent upon their diligent and dedicated efforts.

Volunteers participating in the 2001 program are as follows:

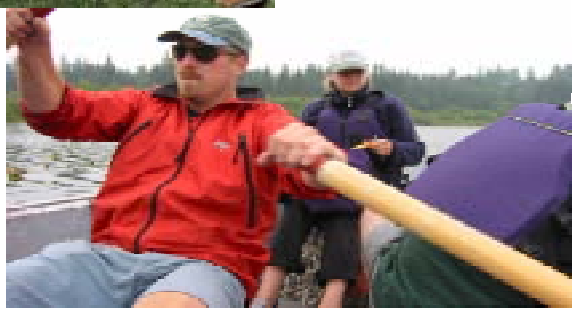
Alice	Jenny Emsky; Cheri Enevold
Allen	David and Betty Burton
Ames	Bob Young
Angle	Diane and Alden Chace; Taylor Evans-Race; Edward and Jeannie Montry
Beaver 1	Donna Carlson
Beaver 2	Al and Shirley Jokisch; Larry Miller; Ray Petit
Bitter	Tom Hollowed
Boren	Ray Clark; Mary Alice and Eric Root
Burien	Steve Locher
Cottage	Ed Grubbs
Desire	Jan Falkenhagen; Ed and Min Merrill
Dolloff	Jason Hesla
Easter	Mayetta E. Tiffany
Echo (in Shoreline)	Monica Carr; Sandy LaMontagne
Fenwick	Tom Hogan





Fivemile	Janet Gillies
Francis	Brian and Eirica Moriarty
Geneva	Laura Stiles and Bruce Harpham; Sue Yunker Jones and Thomas Jones
Haller	Rick Ehle; Barbara Gross; Rud Okeson
Horseshoe	Frank Douglas; Eric Olsgaard
Jones	Dale and Linda Anson
Joy	Bob and Sam Charles
Kathleen	Keith Lanan; Steve Thomas
Killarney	Kellan Patrick; Craig Rice
Langlois	Jasper Scott
Leota	David Mangels; Gunther and Rosalie Paulgen; Rick Sampson
Lucerne	Milo Dullum and Barbara Winter
Marcel	Chuck Willis; Andy Wones
Margaret	Douglas Johnston
McDonald	Dan Fulgencio and Brad Brennecke; 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

North	Barry James
Paradise	Kay and Nancy Doolittle; Shirley Egerdahl
Pine	Kate Bradley
Pipe	Ralph Beede; Bob Brenner
Sammamish	Bruce and Becky Beaulaurier; Reid Brockway; Dave Buecker; Joanna Buehler; Pam Monger; Mike Schmidt; Cecily Way
Sawyer	John Davies; Glenn Ross
Shadow	Billy Aliment; Jake Finlinson
Shady	Ray Konecke
Spring	Caren Adams; Bob Keller
Star	Mark Baughman
Steel	Susan Pearson
Trout	Brenda and Jim Sherwood
Twelve	Jan Delacy and Libby Moscardini; Cathy and Dean Voelker
Walker	Mike Baker
Welcome	Dave Hadley; Beth Hart
Wilderness	Ray Petit; John Vasboe



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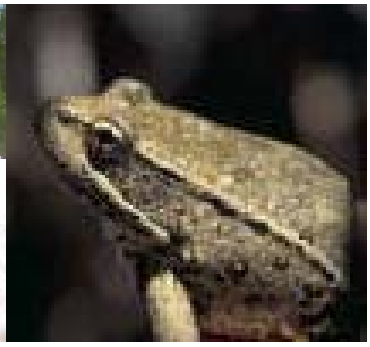

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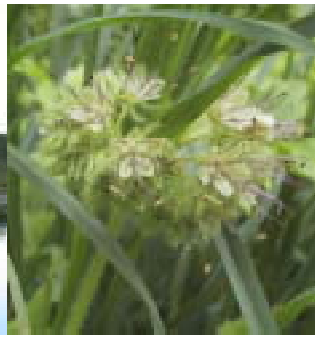

Figures and Tables

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Executive Summary

Purpose of the Program

The Lake Stewardship Program focuses on small lakes in King County, collaborating with volunteer monitors to build a database of reliable environmental information on individual lakes and to document trends as well as unusual events or situations. The intent of this annual report is to provide citizens, scientists, managers, and other interested individuals with current information on water quality and water level fluctuations for the monitored bodies of water. The data is available for assessment purposes and for use in addressing general questions regarding characteristics of specific lakes. The information presented in the report can help with guidance of protective management and stewardship activities at participating lakes. However, the data and accompanying analysis are not detailed enough to substitute for more specific limnological studies that may be needed to produce specific management recommendations for restoration activities on particular lakes.

Monitoring Program

Two levels of participation are offered to citizen volunteers. The Level I program measures daily precipitation and water levels of the lakes, in addition to surface water temperatures, and Secchi depths. 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 temperatures and Secchi depths.

Precipitation was very low in water year 2001; the only year lower over the past 50 recorded at Sea-Tac was 1978. Records of rainfall were kept for at least part of the year at 44 lakes, including Lake Sammamish. Of these, 23 were sufficient to estimate yearly accumulation totals. Water level data were collected for 44 lakes, of which 28 had enough data to evaluate seasonal variation and response to large-scale rainfall events. Most lakes followed a pattern of annual high winter levels, dropping through the summer to a minimum stand in early autumn, but there are several exceptions to this pattern. Many show quick response times 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 2001, all of the 45 lakes with level II monitors had sufficient data to rate their trophic states. Of these, seven lakes were rated oligotrophic, seven were borderline oligotrophic to mesotrophic, 17 were mesotrophic, 11 were borderline mesotrophic to eutrophic, and three were unequivocally eutrophic. Details on each lake participating in Level II monitoring can be found in Chapter 3 through Chapter 5. While many lakes have retained the same rating over the years, there appear to be more declines in productivity than increases over the last five years, thus suggesting a possible overall gain in water quality on a countywide basis.

Detailed phytoplankton analyses were completed for the second year, adding an additional source of information to the database and providing another way to assess the health and character of the ecosystems and water quality of the monitored lakes.

Program Thanks and Outlook

We want to emphasize our gratitude for the invaluable work done by the more than 100 volunteer lake monitors. They braved the cold, rain, and winds of winter (as well as the abnormal solar radiation of summer) to measure the properties of their lakes. These volunteers deserve continued grand moments of wildlife viewing and warmth on their backs.

A rough calculation of how much it would cost King County to pay staff to do all the work on lakes done by volunteer monitors is estimated to be in the range of $600,000. Thus, volunteer efforts are essential to the scope and success of this program; it simply could not be done without their hard work and dedication.

The Lake Stewardship Program at King County has undergone many changes over the past several years, involving major turnovers in staffing, cuts and reallocation of the program budget, and reorganization of the Water and Land Resources Division. As one result of the many changes, this report is being released behind its scheduled date of publication. However, current staff members are committed to speeding up production and bringing the publication schedule back in line with the end of the latest sampling year. This should happen with the 2001-2002 annual report.

More changes may occur as the King County budget situation continues to evolve. However, we are committed to keeping the primary goals of the program constant: to monitor as many small lakes in the county as possible within our budget; to summarize all 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 from as many groups and individuals as we can accommodate.

Heartfelt thanks to all our volunteers, and a happy welcome to all who would like to help out in the future.

CHAPTER 1

Introduction

Purpose of Report

This report is the seventh in a series that summarizes data collected by volunteer lake monitors annually. This volume, covering water year 2001 (October 2000 through September 2001), 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 and can be used to suggest further work that could be done to answer particular questions about the condition of a particular lake. These data and the accompanying analyses cannot substitute for detailed limnological studies that may be necessary to produce management recommendations and restoration plans for specific lakes.

Report Layout

The report includes a discussion of the methods followed in data collection and analysis, results compiled by individual lake, a section on algae and phytoplankton, and a general comparison of the lakes included in the program. 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 collection include: (1) gathering baseline data and assessing long-term

trends; (2) defining seasonal and water column variability; (3) identifying potential problems, proposing possible management solutions if possible, 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 foundation of knowledge that can be used for long term stewardship of King County lakes.

Every lake is a unique body of water, reflecting the characteristics and hydrology of the watershed. Water quality is affected by the sources and relative quantity of water inflows, including the amounts and types of nutrients originating from the watershed, in particular nitrogen and phosphorus. For example, when the surface area of a lake represents a relatively large percentage of the total watershed, much of the precipitation falling in the basin goes directly into the lake, not passing first through soils, wetlands or constructed drainage systems. Thus, in this case relatively pure water makes up a significant proportion of the total inflows to the lake. In other cases where direct precipitation makes up a smaller proportion of the water input, land use practices throughout the watershed become very important influences on conditions as well as changes within lakes.

Water chemistry and physical characteristics in lakes vary seasonally as well as by depth at certain times of the year. The most dynamic period for lakes is during the "growing season" of mid-spring through early autumn 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. Level II monitors measure temperature and clarity, and also collect samples for water chemistry from May through October. Level II sampling also coincides with much of the primary recreational period for lakes in the Pacific Northwest.

Most of the more than 700 lakes and ponds in King County have never been monitored, and only a few have long monitoring records. In 2001, the Lake Stewardship Program staff worked with volunteer monitors in the collection of Level I data on 44 lakes and Level II data on 45 lakes. Echo Lake in Shoreline had chemistry data collected for the first time, establishing a baseline for comparison in years to come. Volunteers on 32 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 2001, Level II samples were collected from the surface, middle, and one meter above the bottom in the deepest part of the lake to define changes found in the vertical profiles of the parameters.

Lake Classification and Eutrophication

Lakes can be classified by measurements of potential and actual biological activity, also known as "trophic state." Lakes with high concentrations of nutrients and algae, generally accompanied by low transparencies, are termed eutrophic or highly productive. Lakes with low concentrations of nutrients and algae, most often accompanied by high transparencies, are categorized as oligotrophic or low in productivity. Lakes intermediate between eutrophic and oligotrophic are termed mesotrophic. A commonly used index of water quality for lakes is the Trophic State Index (TSI) originally developed by Robert Carlson (1977), which separates lakes into the three categories by scoring water clarity and concentrations of phosphorus and chlorophyll *a*, relating them to a scale based on the amount of

phytoplankton biovolume present. 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 natural factors, including watershed size and geology, lake depth and surface area, climate, catastrophic events such as earthquakes and volcanic eruptions, 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 hastened 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. At any particular point in time, lakes in a region may naturally exhibit a variety of degrees of productivity without human induced impacts. However, the effects of human-induced (cultural) eutrophication can be seen in as little as a decade, speeding up substantially what is often a very slow natural process.

Land use activities, including home building, commercial and industrial development, agriculture, forestry, resource extraction, landscaping, gardening, and animal keeping all have the potential to contribute nutrients into surface and ground waters and change sediment movements. Increases in impervious surfaces associated with land development also result in distinct changes in surface water runoff patterns. This surface water, as it enters lakes and streams, can increase biological productivity by increasing concentrations of nutrients that stimulate plant growth. Additional sediment input associated with increased surface water runoff can also impact lakes in various other ways.

Lakes in various trophic states can also be

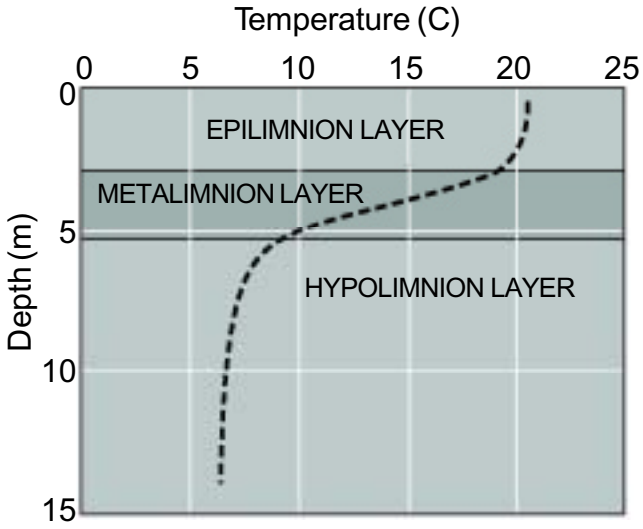


Figure 1-1: Typical Summer Temperature Profile

characterized by the frequency of algal blooms and the type of algae present. Large amounts of algae can affect 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 that have direct health impacts on animals as well as people. (See Chapter 4 for further discussion on algae identification.)

Excessive growth of rooted aquatic plants can also impact 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. A very important factor is the depth to which light can penetrate in the lake as well as 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.

Seasonal Patterns in Lake Water Quality

Lakes are complex ecosystems with many kinds of living organisms interacting with each other

and their environment. External factors such as solar radiation, wind, air temperature and water inflows combine with internal forces such as evaporation rates, currents, nutrient release from sediments, nutrient uptake by algae, and plant-animal interactions to produce an intricate web of relationships.

An annual process known as thermal stratification occurs when the water column, warmed by sunshine at the surface, separates into layers by temperature difference (Figure 1-1). In late fall and winter, water temperature is essentially uniform from top to bottom and water circulates evenly through the volume of the lake. As spring begins, the surface water warms faster than heat can conduct downward through the water column. This is aided by the density differences of water at differing temperatures. Cool water is denser than warm, so it tends to remain at depth. Eventually, the thermal differences stabilize into three layers: the upper warm epilimnion, the lower cool hypolimnion, and the zone of rapid temperature change in between them, termed the metalimnion.

Water does not readily move across the boundaries due to the density differences, and as a result overall water chemistry changes in each layer through the summer. The changes are related to the biological activities and physical processes 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 increase then occurs until cool air temperatures in the autumn cause the sharply defined thermal layers to begin mixing together, circulating the nutrients previously held in the hypolimnion back up to water near the surface. This sometimes stimulates an autumn 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 contained in the hypolimnion is affected by thermal stratification and productivity level of the lake. Oxygen enters the waters of a lake by mixing into the surface water from the air , given off as a by-product of photosynthesis by algae, and contained in water flowing into the lake. It disperses through water movements and diffusion.

Once thermal stratification is established, oxygen is no longer supplied to the hypolimnion as the lower water is cut off from contact with the atmosphere. There still is a demand for oxygen from the animals that live in deep waters such as fish, as well as from the bacterial decomposers that break down the organic material that has sunk, (e.g.: algal remains and organic detritus). If a lake is eutrophic, the algal remains will stimulate massive decomposition activity, and oxygen concentrations in the water may get very low and may even be totally used up by the bacteria before the end of summer. If this happens, it can have an enormous impact on fish such as salmonids, who need cool temperatures and prefer the safety of deep water, but who may be forced upwards by the lack of available oxygen. Warm surface water temperatures can force some fish into the depths between warm surface water and oxygen deprived bottom water. This area narrows through the summer, sometimes leading to die-offs. Heat and oxygen stressed fish are also more susceptible to disease.

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 otherwise occur if oxygen levels remained high. This means that more phosphorus is available in the water 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 some data that is useful in understanding the general nutrient cycling and water column relationships in individual lakes.

CHAPTER 2

Methods

Introduction

Volunteer monitors sampled 50 lakes for the Lake Stewardship Program in water year 2001 (Figure 2-1, Table 2-2). Aside from Lake Sammamish, lakes sampled ranged in surface area from 10 acres to 279 acres and in maximum depth from 7 feet to 98 feet (Table 2-1). Lake Sammamish has a maximum depth of 105 feet and a surface area of 4,893 acres. These lakes spanned 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 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 2001, 44 lakes participated in the Level I program (Table 2-2). For many lakes, volunteers were able to collect data for the entire year. For several lakes, volunteers were not able to complete this commitment or were recruited later in the year, so the data are incomplete. Gaps and anomalies are noted by lake in Chapter 3 and in 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) which is attached permanently to a rigid dock or other fixed structure 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 2-1: Location of Lakes Monitored in 2001

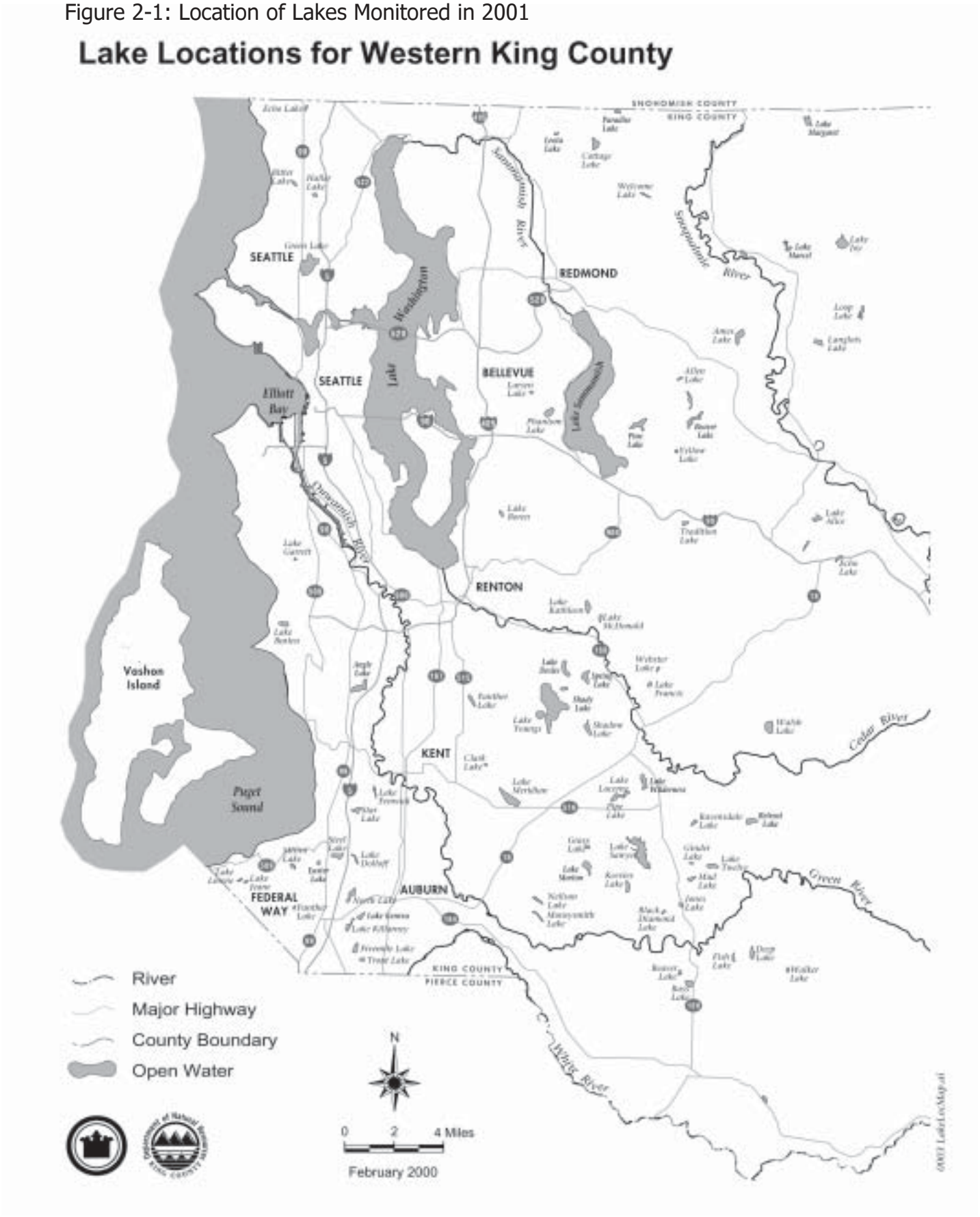


Table 2-1: Physical Characteristics of Monitored Lakes

Lake Name	Location	Watershed (Acres)	Lake Area (Acres)	Mean Depth (Feet)	Max Depth (Feet)	Public Park	Boat Launch	Fish Present
Alice	2.5 miles S of Fall City	154	32	8	30	n	**Y**	ST,B,O
Allen	NE border of Sammamish	441	11	---	---	n	n	---
Ames	1.5 miles W of Carnation	1178	80	18	28	n	n	---
Angle	SeaTac	512	102	25	52	**Y**	**Y**	ST,B,O
Beaver-1	Sammamish	324	12	22	55	n	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	1.5 miles E of Woodinville	4371	63	15	25	**Y**	ct	ST,B,O
Desire	4 miles NW of Maple Valley	875	72	13	21	**Y**	**Y**	ST,B,O
Dolloff	3 miles NW of Auburn	518	21	10	19	**Y**	n	ST,B,O
Easter	Federal Way	119	11	---	---	n	n	---
Echo	Shoreline	288	12	14	30	**Y**	n	---
Fenwick	Kent	563	17	13	31	**Y**	**Y**	---
Fivemile	1 mile E of Federal Way	640	38	18	32	**Y**	ct	ST,B
Francis	2 miles N of Maple Valley	390	20	4	9	n	n	---
Geneva	0.2 miles E of federal Way	224	29	19	46	**Y**	**Y**	ST,B
Haller	Seattle	280	15	---	36	n	ct	ST,B,O
Horseshoe	0.5 miles W of Black Diamond	---	10	---	---	n	n	---
Jones	Black Diamond	742	22	4	7	n	n	---
Joy	3 miles N of Carnation	486	105	23	50	n	n	---
Kathleen	2.2 miles E of Renton	314	39	7	22	n	n	---
Killarney	E border of Federal way	154	31	9	15	**Y**	**Y**	ST,B,O
Langlois	1.25 miles east of Carnation	236	39	53	98	n	**Y**	---
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	1824	44	18	43	n	**Y**	ST,B
McDonald	2.8 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	2 miles W of Black Diamond	256	66	15	23	n	**Y**	ST,B
Neilson (Holm)	2.5 miles E of Auburn	186	19	18	31	**Y**	**Y**	ST,B
North	E border of Federal Way	486	55	14	34	n	**Y**	ST,B,O
Paradise	2 miles E of Woodinville	2643	18	17	28	n	n	---
Pine	Sammamish	487	88	20	39	**Y**	**Y**	ST,B,O
Pipe	Maple Valley/Covington	314	52	27	65	n	n	---
Sammamish	Issaquah/Sammamish/Bellevue	62517	4893	58	105	**Y**	**Y**	ST,B,O
Sawyer	Black Diamond	8300	279	26	58	**Y**	**Y**	B,O
Shadow	1 mile N of Covington	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 (Otter)	3 miles NW of Maple Valley	450	68	19	32	**Y**	**Y**	ST,B,O
Star	0.1 mile E of Federal Way	378	34	25	50	n	**Y**	ST,B,O
Steel	Federal Way	243	46	13	24	**Y**	**Y**	ST,B
Trout	0.3 miles W of Pacific	979	18	17	27	n	**Y**	ST,B
Twelve	0.5 miles NE of Black Diamond	440	43	13	28	n	**Y**	ST,B,O
Walker	1.5 miles SE of Cumberland	314	12	34	54	n	**Y**	ST,O
Welcome	2.55 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

Water clarity (Secchi depth) 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 bringing it to the surface and 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 2001).

Daily data is reported by summation (precipitation) or averaged (water level) into weekly values where complete, while the parameters measured weekly are reported directly (Appendix A). All original data are available upon request to King County WLR Division.

Level II Data Collection

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

In water year 2001, 45 lakes participated in the Level II program (Table 2-2). 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 was measured using the same methods as described for Level I. Water samples were collected using a Van Dorn vertical water sampler at one meter. Temperature was read from a thermometer installed inside the sampler, after which water was saved in special containers for further analysis, generally total phosphorus, total nitrogen, chlorophyll *a*, and phytoplankton.

On dates where vertical profiles were sampled, samples were taken at one meter, mid-depth, and one meter from the lake bottom. Temperature was measured at each depth using the thermometer mounted inside the sampler, and water 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/quality control procedures. Phytoplankton (algae) identifications and enumerations were 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 2001).

Data Analysis

Minimum, maximum, and average values for temperature and Secchi depth were determined

Table 2-2: Volunteer Monitored Lakes and Level of Participation in 2001

LAKE NAME	LEVEL I Weekly (Oct. 2000 - Sept. 2001)	LEVEL I Daily (Oct. 2000 - Sept. 2001)	LEVEL II Biweekly (May - Oct. 2001)
Alice	X	X	X
Allen	3rd qtr. Only	3th qtr. Only	X
Ames	X	X	X
Angle	X (With Gaps)	X (With Gaps)	X
Beaver-1		1st, 2nd, & 3rd qtr.	X
Beaver-2	X	X	X
Bitter			X
Boren		X	X
Burien			X
Cottage	X	X	X
Desire	X	X	X
Dolloff	3rd qtr. Only		X
Easter		X	
Echo (Shoreline)			X
Fenwick			X
Fivemile	3rd & 4th qtr.	X	X
Francis	X	X	X
Geneva	X	X	X
Haller	X	X	X
Horseshoe	3rd qtr. Only	1st qtr. Only	
Jones			X
Joy	X	X	X
Kathleen	X	X	X
Killarney	June Only	June Only	X
Langlois	2nd, 3rd, & 4th qtr.	2nd, 3rd, & 4th qtr.	
Leota	X	X	X
Lucerne			X
Marcel	X	X	X
Margaret	X	X	X
McDonald	1st, 2nd Only	X (With Gaps)	X
Meridian	X	X	X
Mirror	X	X	X
Morton	1st, 2nd Only	X	X
Neilson (Holm)	X	X	X
North	May & July Only	May Only	X
Paradise	2nd, 3rd, & 4th qtr.	X	X
Pine	X	X	X
Pipe		X	X
Sammamish	X	X	
Sawyer	X	X	X
Shadow	1st, 3rd, & 4th qtr. (With Gaps)	1st, 3rd, & 4th qtr. (With Gaps)	X
Shady	X (With Gaps)	1st, 2nd, & 3rd qtr.	X
Spring		1st & 2nd qtr.	X
Star			X
Steel	X	X	X
Trout	2nd, 3rd, & 4th qtr.	2nd, 3rd, & 4th qtr. (With Gaps)	X
Twelve	X	X	X
Walker	1st, 2nd Only	1st, 2nd, & 4th qtr. (With Gaps)	
Welcome	1st, 2nd Only	1st, 2nd Only	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 that year for more than 1 date.

for the Level I volunteer monitoring data (Appendix A). Annual lake level range and total precipitation were determined for each participating lake with complete data sets. The data are illustrated in charts for each individual lake (Chapter 3).

For Level II water quality measurements, the minimum, maximum, and average values were determined for the sampling period (Appendix B). The values found throughout the sample season are charted for each lake, with total nitrogen and total phosphorus on the same chart for comparison (Chapter 3).

The Trophic State Index or TSI (Carlson 1977) and the nitrogen to phosphorus ratios were calculated for Level II volunteer monitoring data. TSI values are derived from a regression that compares values of a parameter such as total phosphorus, chlorophyll *a* or Secchi transparency to the algal biovolume of a suite of lakes and assigns a number from a scale of 0 to 100 based on the relationships found. This scale can be used to compare water quality over time and between lakes (see discussion in Chapters 1 and 5). If nutrient limitation of algal growth is likely to occur, the nitrogen to phosphorus ratio may be used to identify the nutrient that is in shortest supply. Generally lakes with an N:P ratio of less than 20 may be experiencing a limitation of nitrogen and phosphorus at times during the growing season. The results of these analyses for the lakes are presented in both Chapter 3 and Chapter 5.

CHAPTER 3

Lake Results

Introduction

Between October 2000 and October 2001 volunteers monitored 50 lakes, collecting data at either Level I, Level II, or for both levels. In this chapter the results are reported for each lake individually, assembled for the most part in alphabetical order. Several lakes with Level I data only were placed at the end of the series because of formatting constraints.

There are a number of volunteer monitors who have measured Level I parameters at different locations on Lake Sammamish for several years, and their data are being included in this report for the first time. It can be found in the closing pages of this chapter, as well as summarized in Appendix A.

For each lake, watershed and lake morphology data are summarized, and a bathymetric map has been included when available, with the sample site marked. Most of the maps were obtained from Wolcott (1964).

Level I data such as precipitation, water level, Secchi transparency, and surface temperature are presented as line plots over the water year. Precipitation events are plotted as bars on the line chart of water level to allow for direct comparisons between large-scale rainfall and short-term increases in water level. Level II measurements of Secchi depth and temperature are plotted with different symbols in the same charts with the Level I measurements.

Level II chemistry data, including chlorophyll *a*, total phosphorus, and total nitrogen, are plotted by date throughout the sampling season. Nitrogen and phosphorus are plotted on the same chart, but with different scales, to show their interrelationships. There were two dates on which many values for total phosphorus were exceptionally high, and this shows both in their relationship to values on other dates for each lake and to the values of total nitrogen for the same date. Although no agreed-upon explanation for these anomalous values was determined, the values should be viewed with caution. In particular, phosphorus data was anomalous for almost all of the samples taken on June 3.

The phytoplankton biovolume estimates for each date were separated into major groups and plotted in charts placed next to chlorophyll *a* for comparison. A discussion of the different groups of algae and their general significance in the phytoplankton is included in Chapter 4, along with the phytoplankton data from the two profile events. Chemistry data from the profile events are reported in Chapter 5, as part of the data synthesis and comparison among lakes.

Overview

Volunteer monitoring began at Lake Alice in 2000 and continued through 2001. The two years of data suggest that this lake is low in primary productivity (oligotrophic) with very good water quality. Since the watershed is relatively small with the lake surface making up 21% of the entire catchment area, direct rainfall makes up an important part of the water entering the lake and dilutes runoff from the surrounding land. This may protect the lake to some extent from development activities in the watershed.

Lake Alice has a public access boat ramp, and residents should keep a watchful eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds that can be introduced through boats moved from lake to lake.

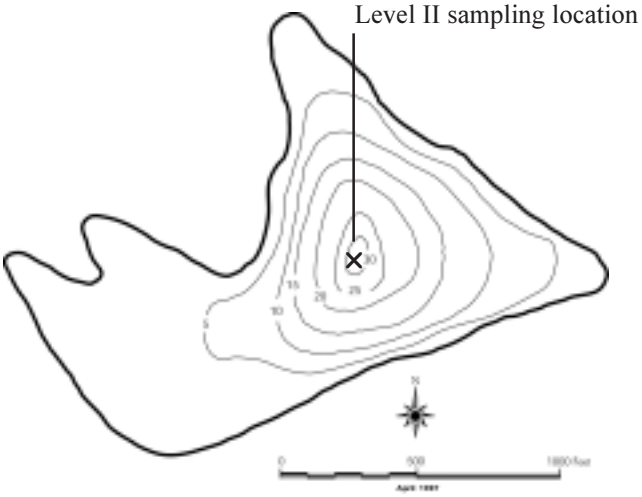
Lake Characteristics

Surface area:	33 acres
Watershed area:	154 acres
Max depth:	30 ft
Mean depth:	8 ft
Location:	2.5 mi south of Fall City

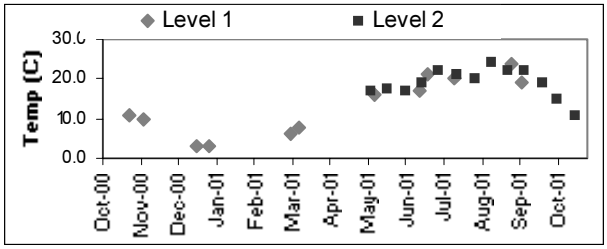
Volunteers

Level I :	Cheri Enevold
Level II:	Jenny Emsky, Cheri Enevold

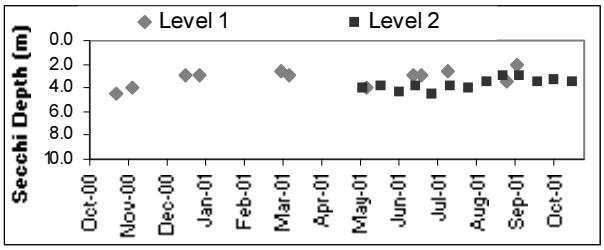
Level II samples collected: 13/13



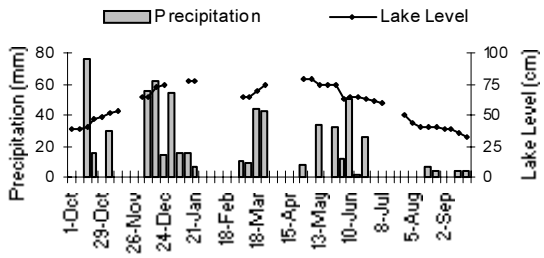
Lake Temperature



Secchi Depth

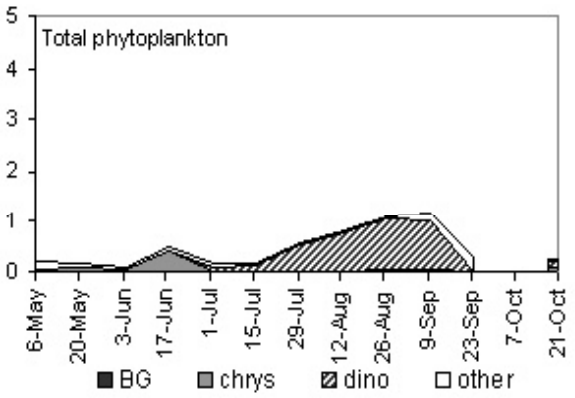


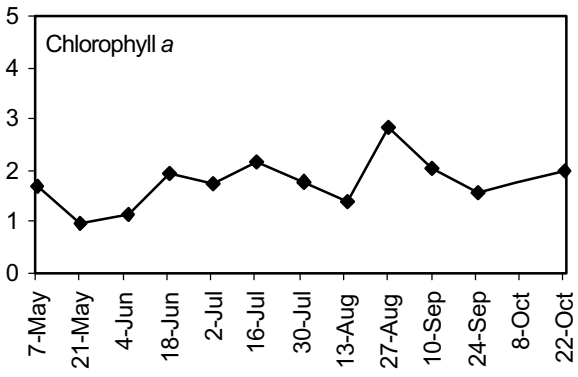
Lake Level and Precipitation



Secchi transparency was relatively stable through the year, varying around 4m. Precipitation and lake level readings had gaps during the year, but water levels followed a winter-high/ summer-low regime. Water temperatures were consistent with other small lakes monitored in 2001, including a short period of decrease marking the cool July air temperatures.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations (µg/L)

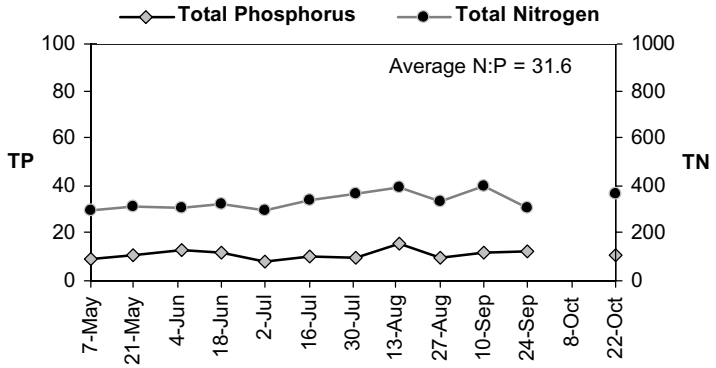


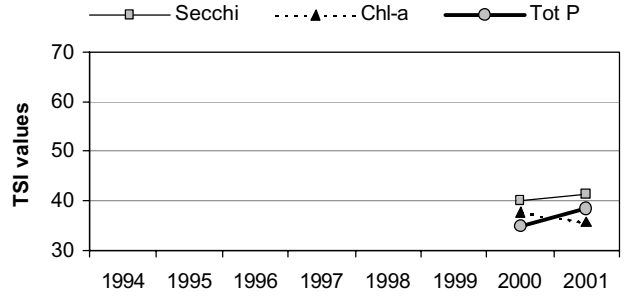


Phytoplankton populations in the lake remained at relatively low volumes through the sampling season, with the peak occurring in late summer. This is mirrored by the chlorophyll concentration data for the year, as well as the high transparency through the spring and summer. The algal group best represented was the dinoflagellates, with the genus *Ceratium* predominating. This is unlike 2000, when the largest concentrations were in spring, dominated by the chrysophyte *Dinobryon*. Other algae present in 2001 included *Botryococcus braunii* and *Rhodomonas* sp, as well as some colonial chlorophytes. Bluegreen algae were present only in trace amounts.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings





Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling season, the ratio ranging from 24 to 40. All ratios were outside the range considered advantageous to nuisance bluegreen algae. TSI values have been mostly below the threshold of 40 between oligotrophic and mesotrophic, but TSI-Secchi is slightly higher than chlorophyll or phosphorus.

Overview

Volunteer monitoring began at Allen Lake in 1996 and continued through 2001. The data consistently indicate that this lake is high in primary productivity (eutrophic) with fair water quality. Since the watershed is moderately sized with the lake surface making up about 2% of the entire catchment area, runoff and groundwater constitute most of the water entering the lake. Land use as well as internal recycling is important to water quality. The lake is likely to be naturally productive as part of a larger wetland system, but increases in productivity through human impacts may be occurring.

Allen Lake does not have a public access boat ramp. However, residents should keep a watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

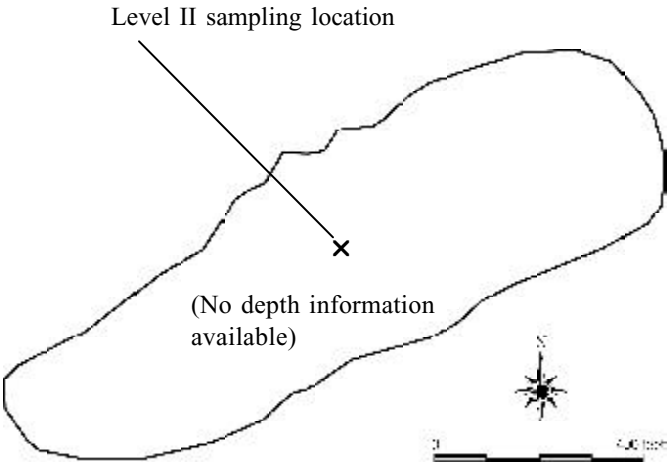
Lake Characteristics

Surface area:	11 acres
Watershed area:	441 acres
Max depth:	
Mean depth:	
Location:	Immediately northeast of Sammamish

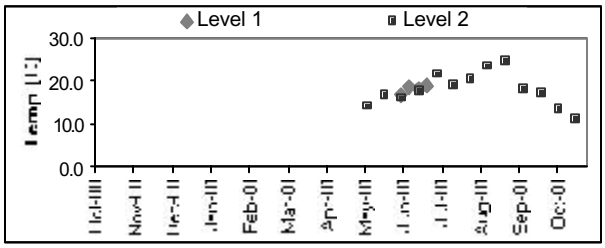
Volunteers

Level I :	David and Betty Burton
Level II:	David and Betty Burton

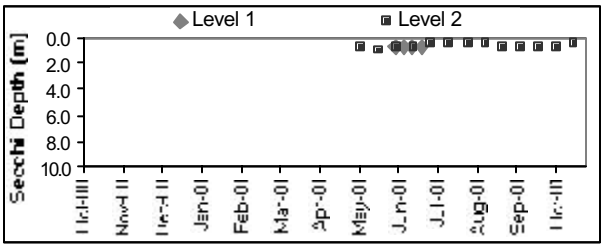
Level II samples collected: 13/13



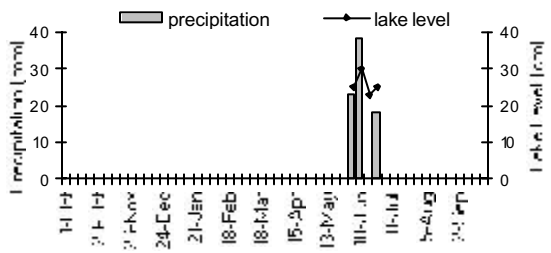
Lake Temperature



Secchi Depth

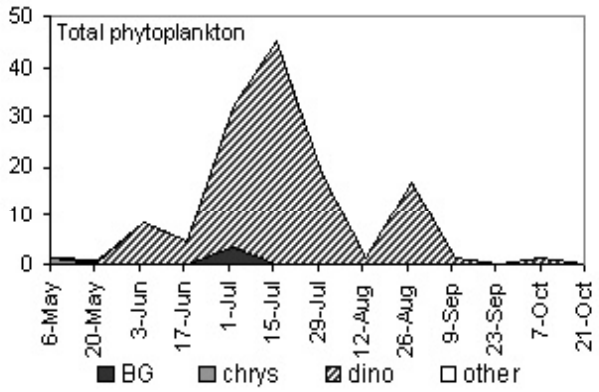


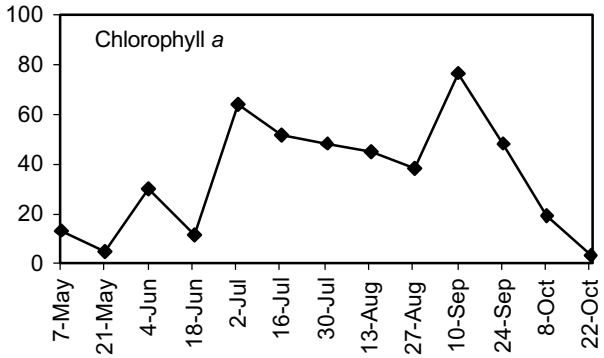
Lake Level and Precipitation



Secchi transparency was relatively stable through the year, staying near 1m. Both the surface temperature and the lake level readings were incomplete for the year, but temperatures through the Level II sampling season were similar to other small lakes monitored in 2001, with a short term decrease in July due to cool air temperatures.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations (µg/L)

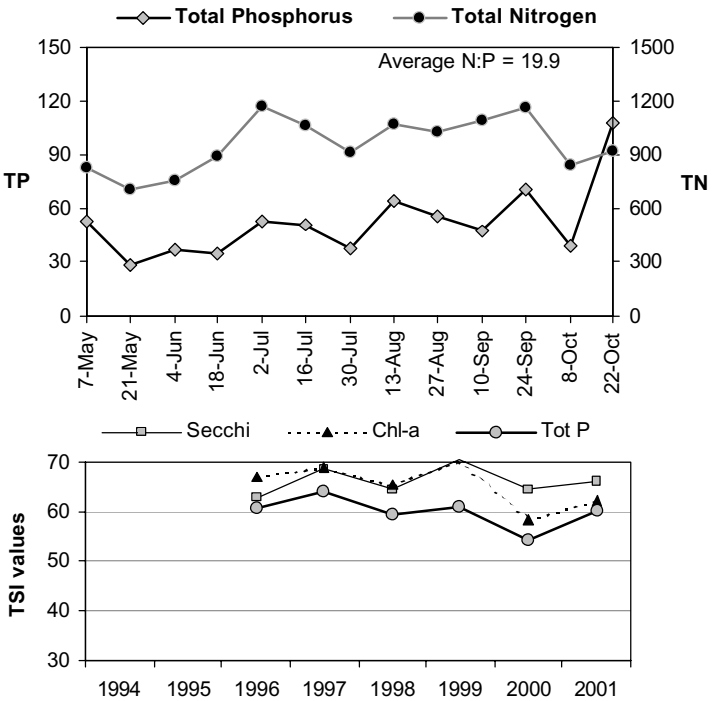




Phytoplankton populations in the lake reached a maximum in late summer. This was tracked by the chlorophyll concentration data until midsummer, when chlorophyll values remained high while the algal populations appeared to decrease, increase to a lower peak and then drop off quickly. Why there is a discrepancy is not clear, but may be due to fragments of rooted aquatic plants floating throughout the lake. The algal group best represented was the dinoflagellates, with the genus *Ceratium* predominating, similar to algae in 2000. Other algae present included small amounts of the bluegreens *Anabaena* and *Aphanizomenon* in early summer.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other until the last sample date, the ratio ranging from 9 to 26. This proportion is considered advantageous to bluegreens, but no large populations developed in the lake. TSI values over the last six years appear fairly stable. There may be a slow downward trend, indicating less productivity, but there are not yet enough years of data to complete a statistically meaningful trend analysis.

Overview

Volunteer monitoring began at Ames Lake in 2000 and continued through 2001. The two years of data collected indicate that this lake is low to moderate in primary productivity (oligotrophic, close to mesotrophic) with very good water quality. Since the watershed is moderately large with the lake surface making up only 7% of the drainage area, runoff and groundwater make up most of the water inputs. Therefore, land use and internal recycling are very important to water quality. The lake was probably naturally low in productivity since there are few wetlands in the basin, and the dominant natural vegetation was coniferous forest. Some increases in productivity through human impacts may be occurring.

Ames Lake does not have a public access boat ramp. However, residents should keep a close eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

Lake Characteristics

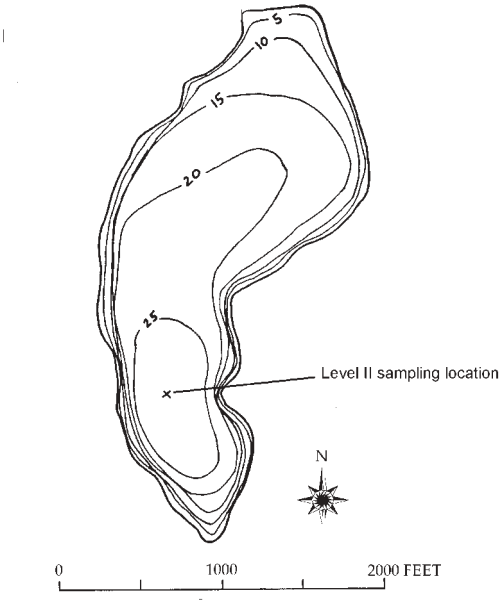
Surface area:	80 acres
Watershed area:	1178 acres
Max depth:	28 ft
Mean depth:	18 ft
Location:	1.5 mi west of Carnation

Volunteers

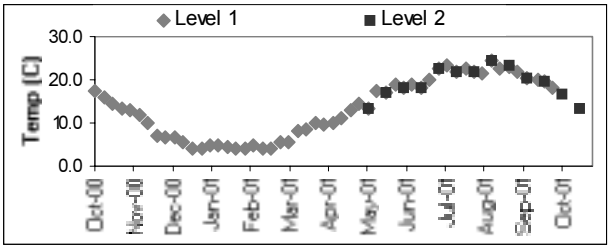
Level I : Bob Young

Level II: Bob Young

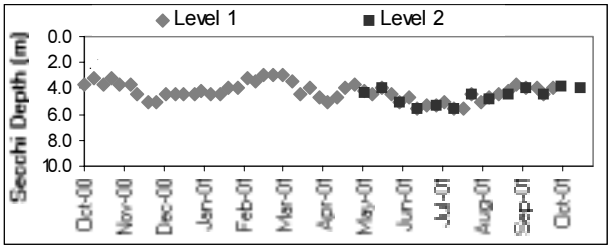
Level II samples collected: 13/13



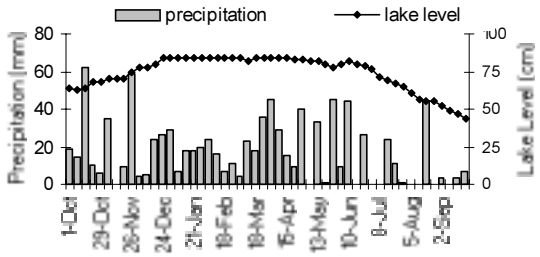
Lake Temperature



Secchi Depth

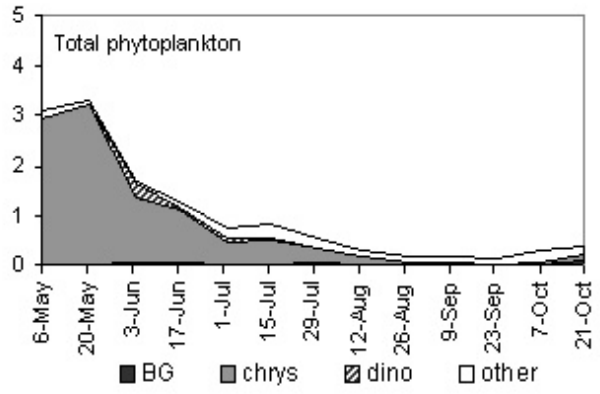


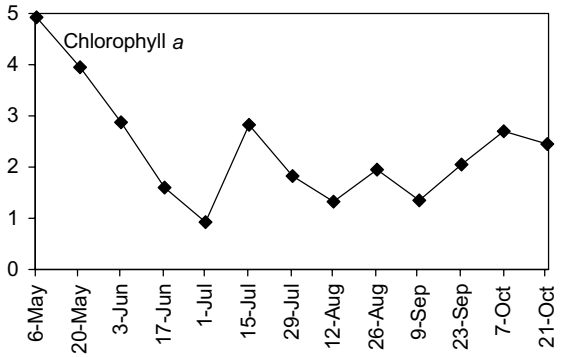
Lake Level and Precipitation



Secchi transparency ranged from 3 to 6 meters during the year. Water levels were stable through winter and decreased steadily through summer. Temperatures through the season were similar to other small lakes monitored in 2001, ranging from 5 to 25 degrees Celsius, with a short term decrease in July due to cool air temperatures.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations (µg/L)



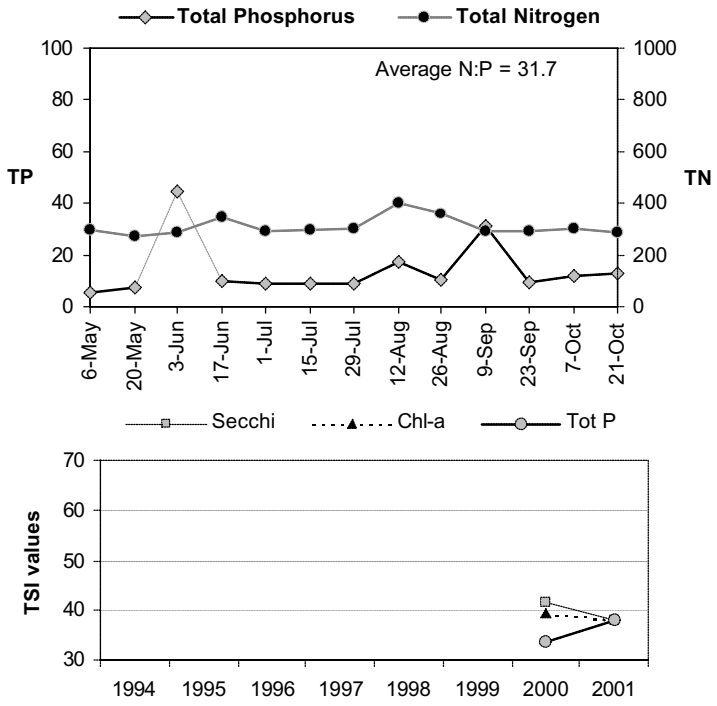


Algae populations in the lake reached their maximum in spring, dominated by the diatom *Cyclotella bodanica*. The chlorophyll concentration data showed the same pattern, although it did not drop as dramatically in summer as did algae biovolume. This may be because diatoms do not have as much chlorophyll per cell volume as some other algae, so larger biovolumes would be found relative to the amount of chlorophyll in the spring. The diatoms were replaced in summer and fall by chlorophyte species (known as "green algae") and the chrysophyte *Dinobryon*.

In late October the bluegreen *Oscillatoria* produced a small population, similar to 2000. This is not likely to produce problems since *Oscillatoria* is not known to produce toxic blooms and the volume was small.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other with the exception of two dates, which had very high Total P values (see chart). Aside from those dates, the ratio ranged from 22 to 54. In 2001, the average TSI values for Ames lake were in good agreement with each other, close but still below the threshold between oligotrophic and mesotrophic productivity.

Overview

Volunteer monitoring began at Angle Lake in the 1980s and continued through 2001. The data collected show that this lake is low in primary productivity (oligotrophic), with excellent water quality. The recent data suggest that productivity may be increasing slowly over time. Since the lake surface makes up 20% of the drainage area, direct precipitation is an important input, although stormwater runoff and groundwater also contribute. There are no significant wetlands in the basin, and land use is important to water quality since the area is urban. Increased productivity through human impacts is likely to be occurring.

Angle Lake has a public access boat ramp, so residents should keep a close eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

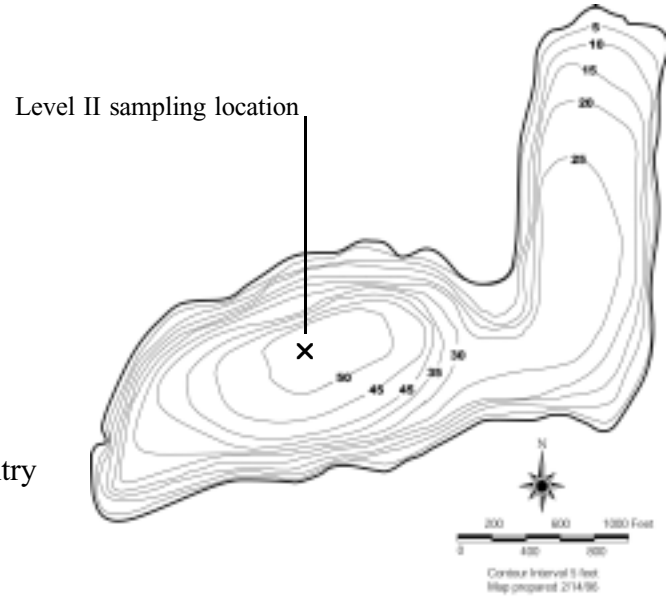
Lake Characteristics

Surface area:	102 acres
Watershed area:	512 acres
Max depth:	52 ft
Mean depth:	25 ft
Location:	SeaTac

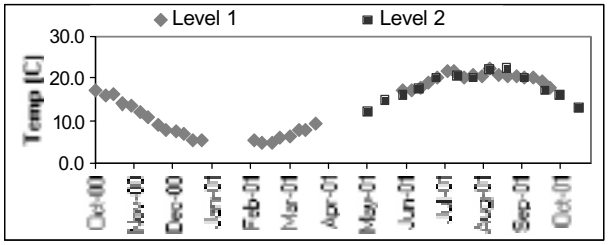
Volunteers

Level I :	Diane and Alden Chace; Taylor Evans-Race
Level II:	Edward and Jeannie Montry

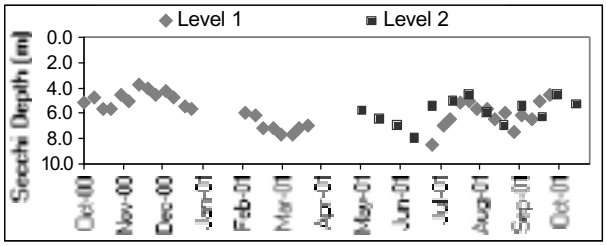
Level II samples collected: 13/13



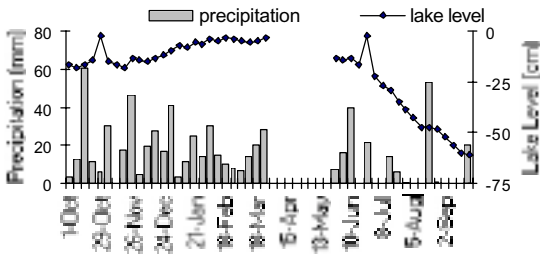
Lake Temperature



Secchi Depth

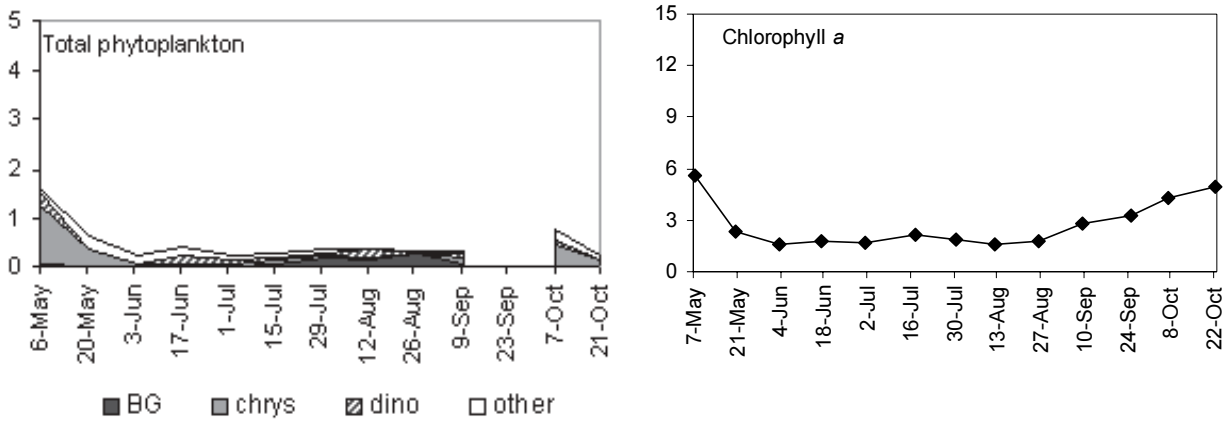


Lake Level and Precipitation



Secchi transparency ranged from 4 to 8 meters during the year. Both water level and precipitation readings were incomplete, but the levels followed the typical northwest pattern of winter-high/summer-low. Temperatures through the season were similar to other small lakes in 2001, ranging from 5 to 22 degrees Celsius, with the effect of the cool July air temperatures showing up as a flat spot on the temperature curve.

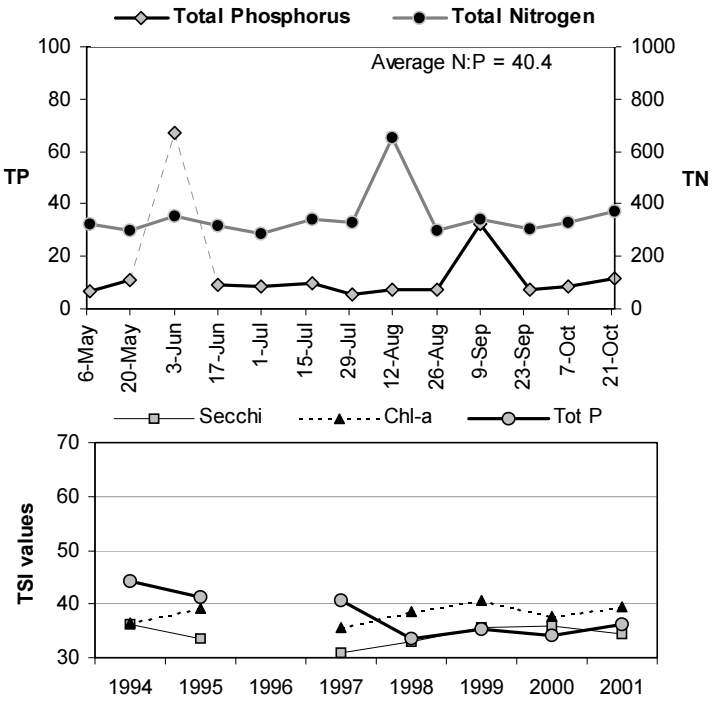
Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)



Phytoplankton populations were low through the entire sampling season. A small peak was recorded in the first sample, dominated by the colonial chrysophyte algae *Gloeobotrys*. Other important algae found in the lake over time included the dinoflagellate *Ceratium* in June and a small population of the bluegreen *Aphanizomenon* in July through August, followed by diatom species in the fall. Chlorophyll content tracked the phytoplankton closely until fall, when it rose higher than did the algal biovolume.

Phytoplankton Chart:
BG = Bluegreen; **chrys** = Chrysophytes; **dino** = Dinoflagellates

Nutrient Analysis and TSI Ratings

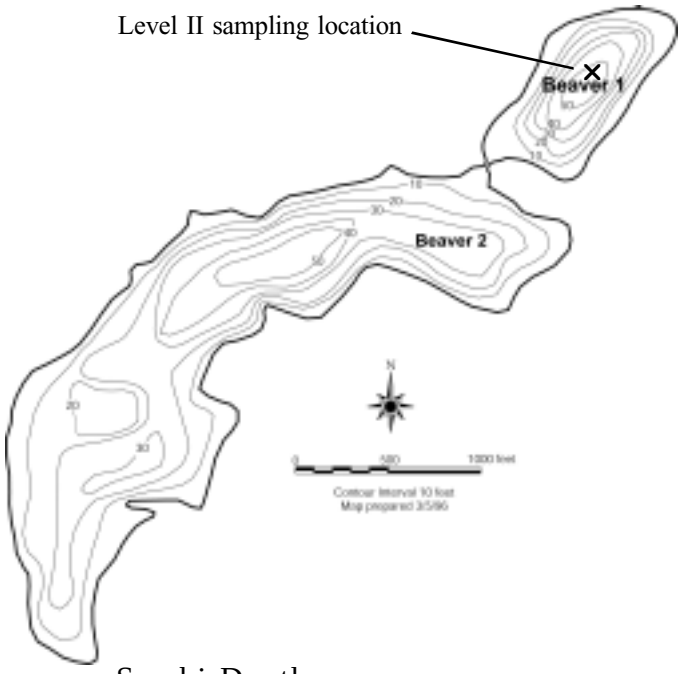


Total phosphorus and total nitrogen remained in fairly constant proportion to each other except for one nitrogen and two phosphorus values that were very high and may have been contaminated (see chart). Aside from those dates, ratios range from 27 to 57. In 2001, TSI-chlor was slightly higher than for TSI-Secchi or TSI-TP, similar to the three previous years. However, all three indicators fall within the oligotrophic range.

Overview

Volunteer monitoring began at Beaver Lake 1 in 1997 and continued through 2001. The data collected show that this city lake (Sammamish) is fairly high in primary productivity (eutrophic), with fair water quality, although productivity may be decreasing. Since the lake surface makes up only 4% of the drainage area, direct precipitation is less important than runoff, inlet streams and groundwater. Because of this, land use is very important to water quality. There are important wetlands in the basin, and the area is currently urbanizing. Increased productivity through human impacts is likely to occur, and a management plan is being implemented that includes a monitoring program and special drainage requirements for developments (King County, 1993, 2000).

Beaver Lake 1 has no public access boat ramp, but is connected to Beaver Lake 2 which does, so residents should keep a close eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.



Lake Characteristics

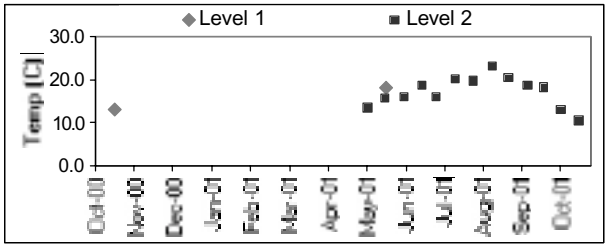
Surface area:	12 acres
Watershed area:	324 acres
Max depth:	50 ft
Mean depth:	7 ft
Location:	Sammamish

Volunteers

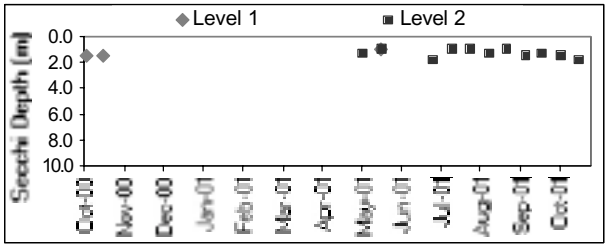
Level I :	Donna Carlson
Level II:	Donna Carlson

Level II samples collected: 13/13

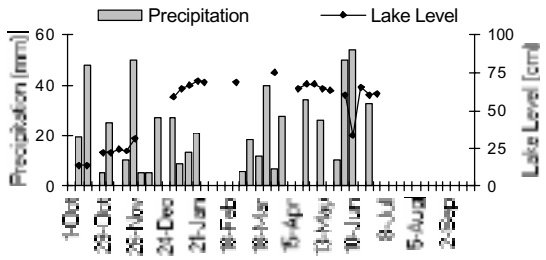
Lake Temperature



Secchi Depth

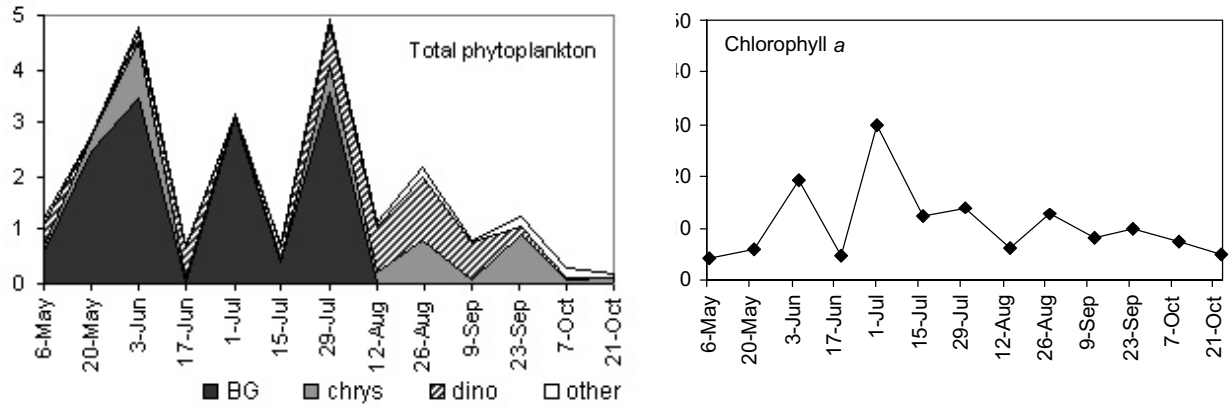


Lake Level and Precipitation



Secchi transparency remained steady, around 1 to 2 meters during the year, related to the tea color of the water. Both water level and precipitation readings were incomplete, but available data suggest the typical northwest pattern of winter-high/summer-low. Temperatures were similar to other small lakes in 2001, with a high of 24 degrees Celsius. The effect of cool July air temperatures show up as a flat spot on the temperature curve.

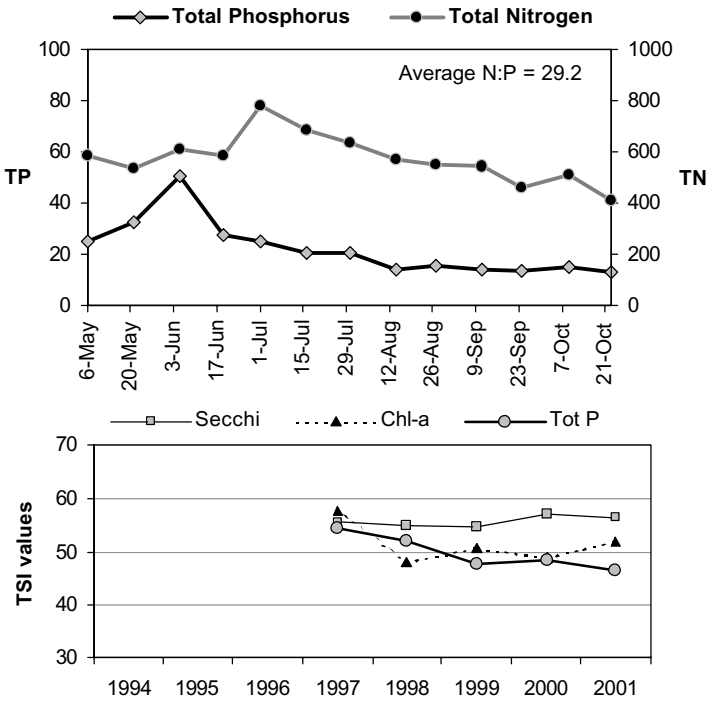
Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations (µg/L)



Phytoplankton populations made three sharp peaks through the sampling season. All were related to the abundance of the colonial bluegreen *Aphanizomenon*, which can concentrate at the water surface in calm weather rather than be mixed evenly through the water column. Other important algae found in the lake over time included the dinoflagellate *Ceratium* in June and the chrysophyte *Dinobryon*, both common in small lakes. Chlorophyll content tracked the phytoplankton only in a general way, which may confirm the irregular concentration of the colonies of *Aphanizomenon.*

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings

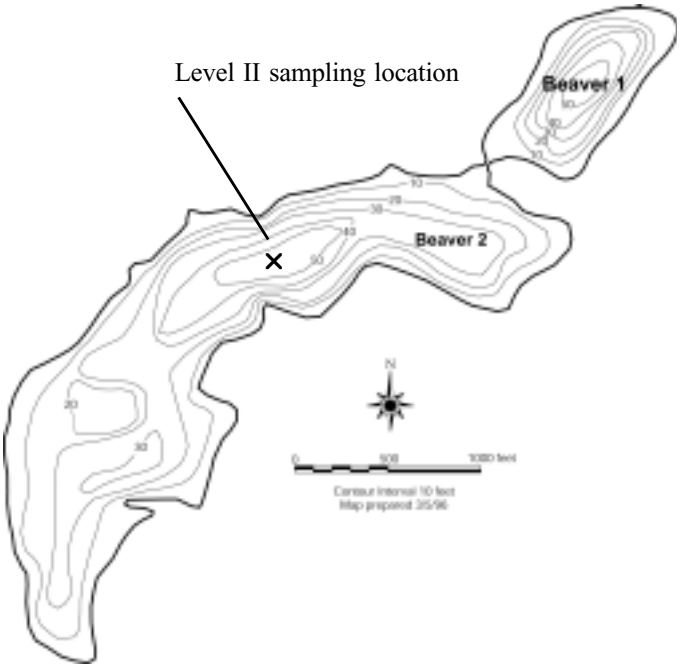


Total phosphorus and total nitrogen remained in fairly constant proportion to each other, except for one date, in which the Total P is very high (see chart). Aside from this date, the ratio ranged from 17 to 39. In 2001, the average TSI-Secchi was higher than the other two indicators, similar to the previous three years. This relates to the tea color of the water rather than the lake's algae and should be excluded from trophic assessment. Disregarding the TSI-Secchi, Beaver Lake 1 is on the threshold between mesotrophy and eutrophy.

Overview

Volunteer monitoring began at Beaver Lake 2 in the 1980s and continued through 2001. The data collected show that this lake is moderate in primary productivity (mesotrophic), with good water quality. Productivity appears to be decreasing in recent years. Since the surface area of the lake makes up only 6% of the drainage area, direct precipitation is less important than runoff, inlet streams and groundwater. Therefore land use is very important to water quality. There are significant wetlands in the basin, some of which have protection, and the area is urbanizing. Increased productivity through human impacts is likely to be occurring, and a management plan is being implemented that includes a monitoring program and special drainage requirements for developments (King County, 1993, 2000).

Beaver Lake 2 has a public access boat ramp, so residents should keep a watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.



Lake Characteristics

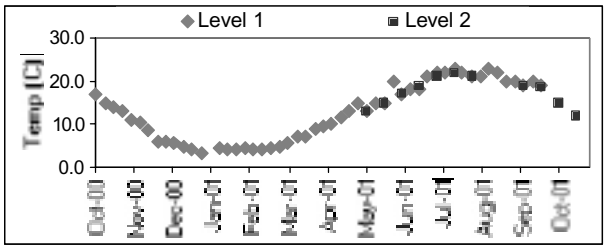
Surface area:	62 acres
Watershed area:	1,043 acres
Max depth:	50 ft
Mean depth:	6 ft
Location:	Sammamish

Volunteers

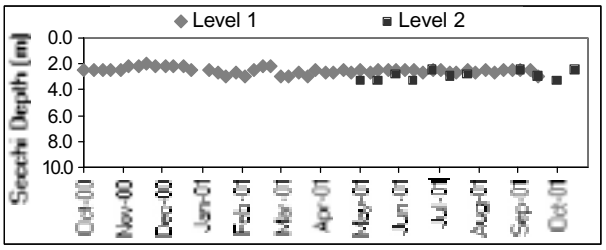
Level I :	Al and Shirley Jokisch; Ray Petit
Level II:	Larry Miller

Level II samples collected: 11/13

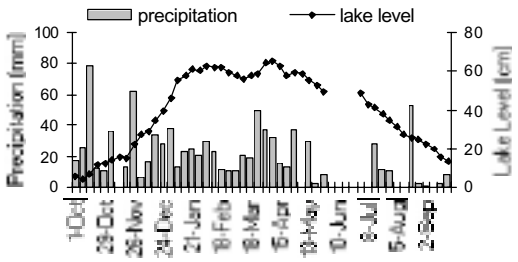
Lake Temperature



Secchi Depth

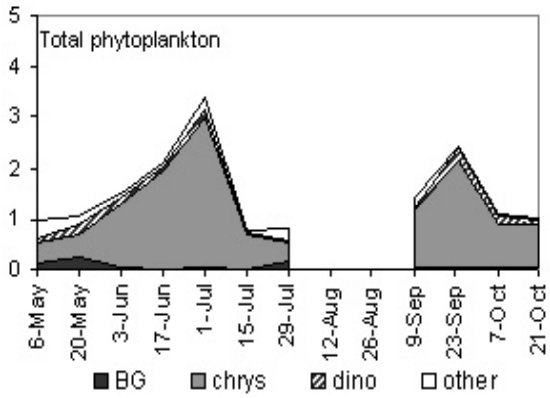


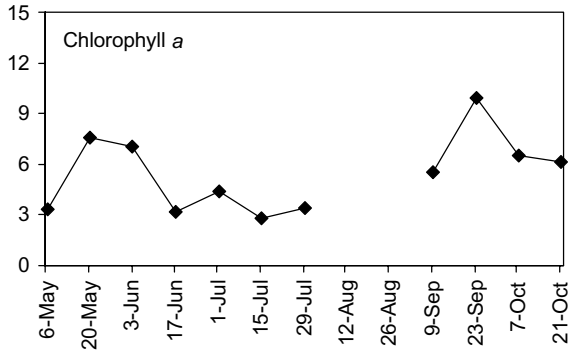
Lake Level and Precipitation



Secchi transparency remained steady, slightly deeper than 2 meters during the year, which is more than Beaver Lake 1 but is similarly related to the tea color of the water. Both water level and precipitation readings were nearly complete for the year. The data follow the typical northwest pattern of winter highs, decreasing in summer. Temperatures were similar to other small lakes in 2001, ranging from 4 to 23 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations (µg/L)

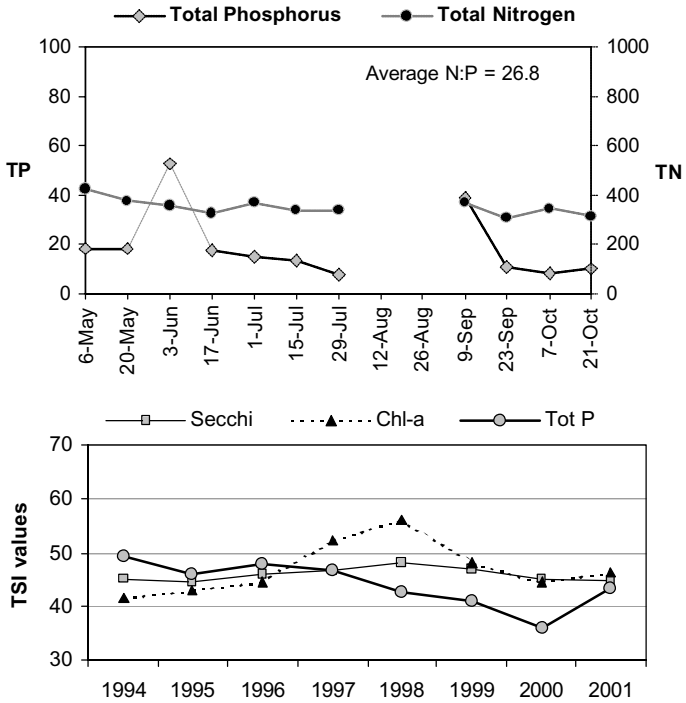




Phytoplankton populations made two sharp peaks through the sampling season, in early summer and again in early fall. The summer bloom was made by the diatom *Cyclotella bodanica*, while the fall bloom was the chrysophyte *Dinobryon*. Other important algae found in the lake over time included the bluegreen *Aphanizomenon*, which occurred in larger numbers in Beaver Lake 1. Chlorophyll content did not show the diatom bloom, but tracked the Dinobryon bloom very well. Diatoms often have less chlorophyll per cell than other algae, which may explain why the bloom was not well represented.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other, with the exception of two dates, in which Total P appeared to be exceptionally high (see chart). Aside from those dates, the ratio ranged from 13 to 42. In 2001, TSI values for the three indicators were close to each other, although in the previous three years, TSI-TP was lower than the other two. Both TSI-chlor and TSI-TP have been decreasing, while TSI-Secchi has remained steady, likely due to the color of the water.

Overview

Volunteer monitoring began at Bitter Lake in the 1980s and continued, with a few exceptions, through 2001. The data collected classify this lake as moderate in primary productivity (mesotrophic), with good water quality, and is remaining stable over time. Since the lake surface makes up only 6% of the drainage area, direct precipitation is less important than stormwater runoff and groundwater inputs. Therefore land use is very important to water quality. There are no significant wetlands in the basin, and the area is urban. Therefore, increased algal productivity through human impacts is likely to be occurring.

Bitter Lake has no public access boat ramp, but car topper boats can be launched. Residents should keep a close eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

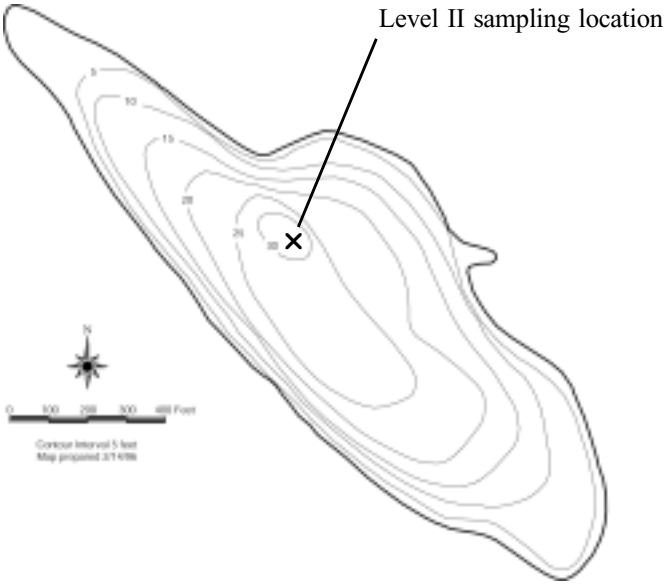
Lake Characteristics

Surface area:	19 acres
Watershed area:	326 acres
Max depth:	31 ft
Mean depth:	16 ft
Location:	Seattle

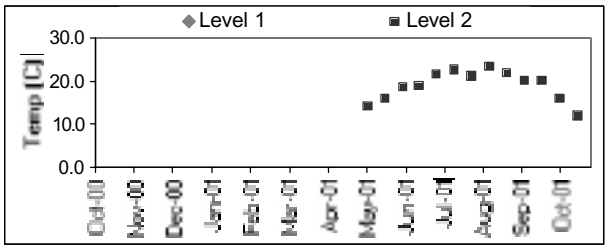
Volunteers

Level I :	None
Level II:	Tom Hollowed

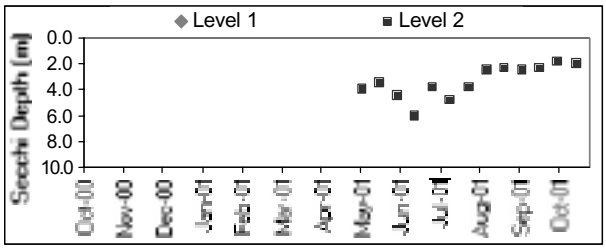
Level II samples collected: 13/13



Lake Temperature



Secchi Depth

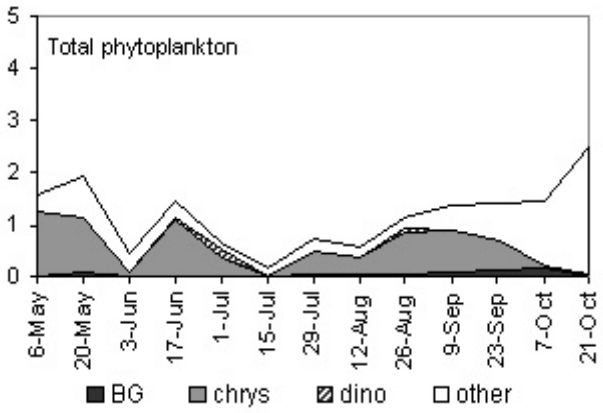


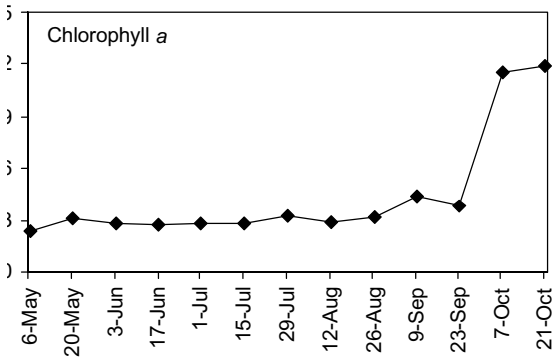
Lake Level and Precipitation

No data available

Secchi transparency ranged between 1.8 and 4.8m during the level II sampling season. No water levels or precipitation were recorded for the year. Summer temperatures were similar to other small lakes in 2001, reaching a maximum of 23 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations (µg/L)

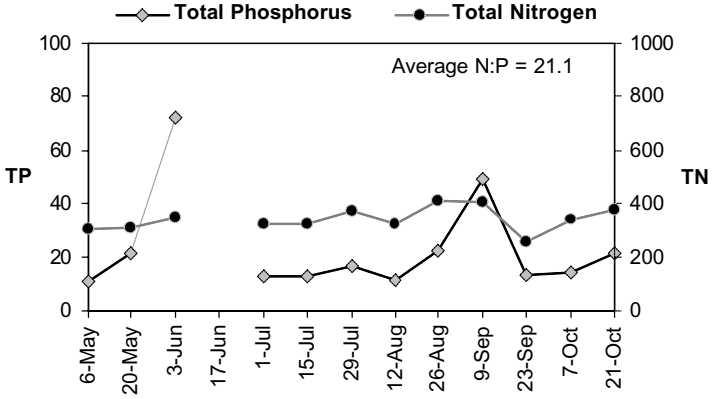


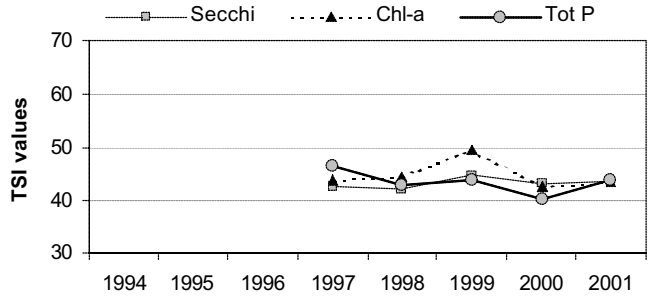


Phytoplankton populations remained relatively low through the sampling season, reaching maximum values in late October. The fall increase was made by the colonial chlorophyte *Oocystis*. Other important algae found in the lake over time included the chrysophyte *Dinobryon* and the large colonial chlorophyte *Botryococcus*. Chlorophyll content closely tracked the algae concentrations, showing a major increase in October.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings





Total phosphorus and total nitrogen remained in fairly constant proportion to each other, with the exception of two dates, in which Total P appeared to be exceptionally high (see chart). Aside from those dates, the ratio ranged from 18 to 28. In 2001, TSI values for the three indicators were very close to each other and are well within the mesotrophic range, similar to previous years.

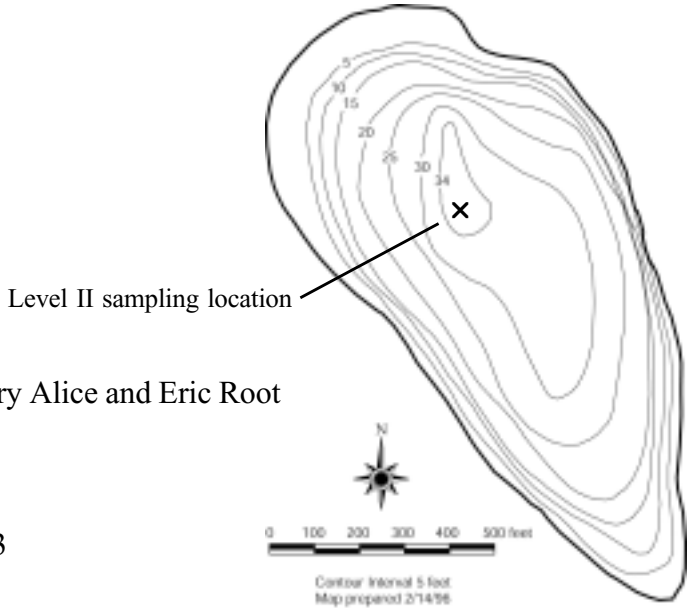
Overview

Volunteer monitoring began at Lake Boren in the 1980s and continued, with a several breaks, through 2001. The data collected classify this lake as moderate in primary productivity (mesotrophic) with good water quality and suggest productivity may be decreasing slightly over time. Since the lake surface makes up only 2% of the relatively large drainage area, direct precipitation is less important than the inlet stream, stormwater runoff and groundwater inputs. Land use is probably very important to water quality. There are significant wetlands in the basin, and the basin consists of urban, urbanizing, and undeveloped tracts. Increased algal productivity through human impacts is likely to be occurring, but may be modified by good drainage treatment.

Lake Boren has a public access boat ramp, so residents should keep a close eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

Lake Characteristics

Surface area:	15 acres
Watershed area:	685 acres
Max depth:	34 ft
Mean depth:	18 ft
Location:	Newcastle



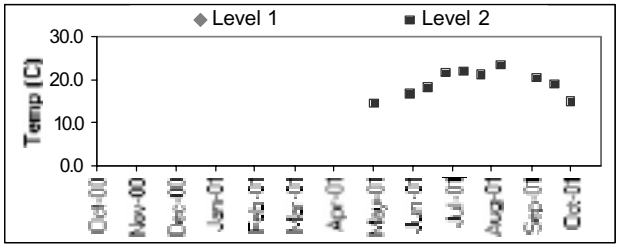
Volunteers

Level I : Ray Clark; Mary Alice and Eric Root

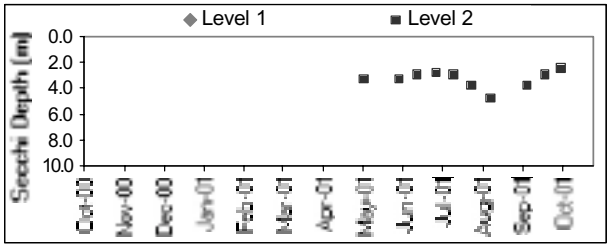
Level II: Ray Clark

Level II samples collected: 12/13

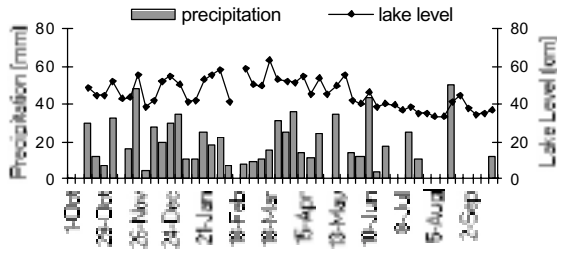
Lake Temperature



Secchi Depth

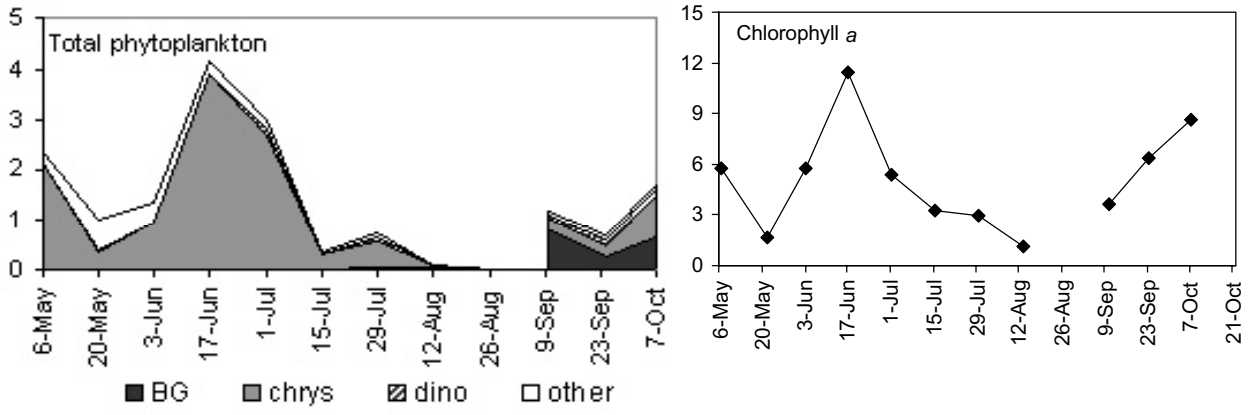


Lake Level and Precipitation



Secchi transparency ranged between 2.5 and 4.8m during the Level II sampling season. Good precipitation and water level records were available, showing that the lake level is fairly stable through the year. Level II water temperatures were similar to other small lakes in 2001, reaching a maximum of 23.5 degrees Celsius.

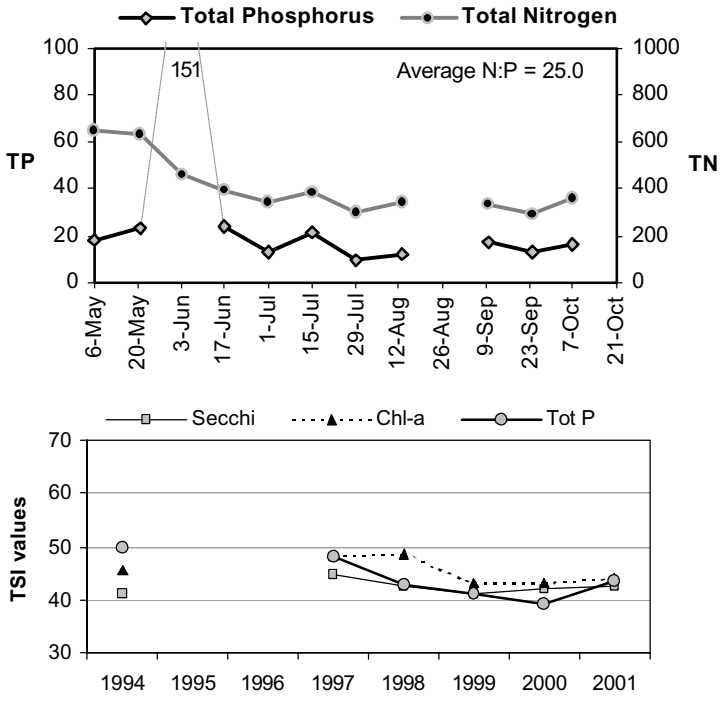
Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)



Phytoplankton populations reached a maximum early in the sampling season, followed by low values until October. The June bloom was made by the diatom *Cyclotella bodanica*. The increase in early October was due to the diatom *Fragilaria crotonensis*. Other important algae found in the lake over time included the chrysophyte *Dinobryon* and, in late summer, the bluegreens *Aphanizomenon* and *Anabaena*. Chlorophyll content closely tracked the algae concentrations through the sampling season.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other, with the exception of one date, in which Total P appeared to be exceptionally high (see chart). Aside from that date, the ratio ranged from 17 to 37. In 2001, TSI values for the three indicators were very close to each other and remained in the lower part of the mesotrophic range, similar to previous years.

Overview

Volunteer monitoring began at Lake Burien in 1998 and continued in 2000 through 2001. The data collected classify this lake at the low end of moderate in primary productivity (low mesotrophic) with very good water quality. Since the lake surface makes up 18% of the relatively large drainage area, direct precipitation is important, in addition to stormwater runoff and groundwater inputs. Land use is very important to water quality. There are no significant wetlands in the basin, and the basin use is mostly urban. Increased algal productivity through human impacts is likely to be occurring, but may be moderated by good drainage treatment.

Lake Burien has no public access boat ramp, but residents should still keep watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

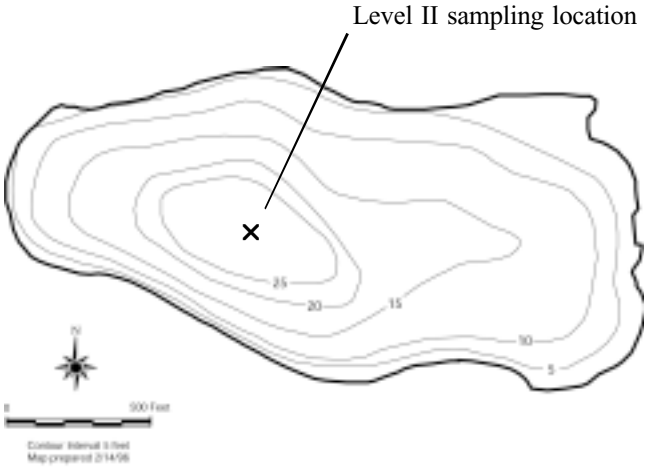
Lake Characteristics

Surface area:	44 acres
Watershed area:	250 acres
Max depth:	29 ft
Mean depth:	13 ft
Location:	Burien

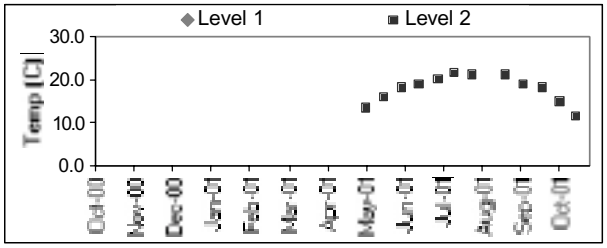
Volunteers

Level I :	None
Level II:	Steve Locher

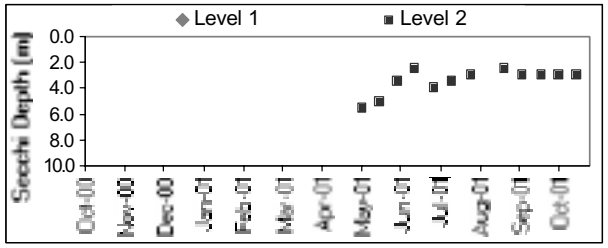
Level II samples collected: 12/13



Lake Temperature



Secchi Depth

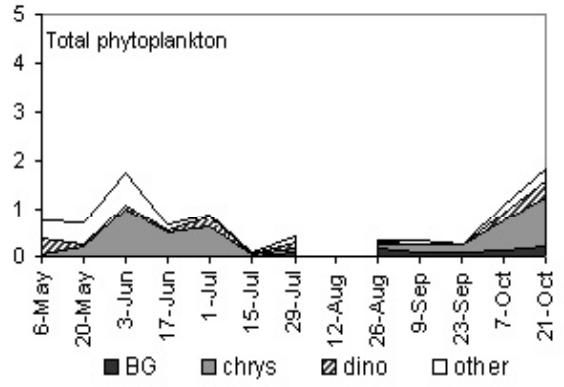


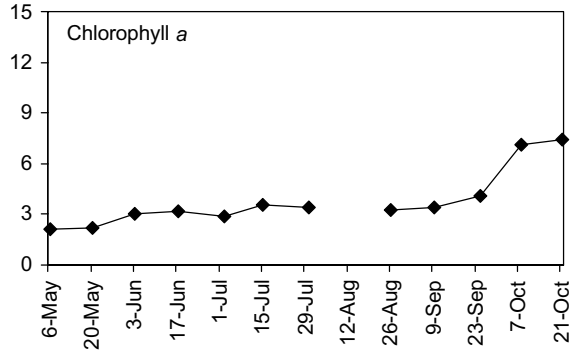
Lake Level and Precipitation

No data available

The Level II Secchi transparency ranged between 2.5 and 5.5m during the sampling season. No precipitation or water level records were available for the year. Level II water temperatures were slightly cooler than other small lakes in 2001, reaching a maximum of 21.5 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

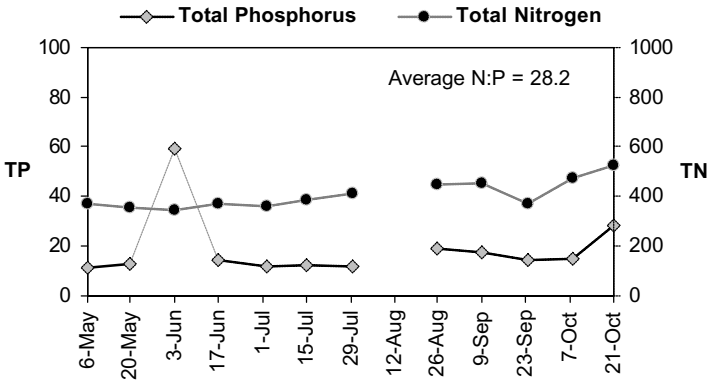


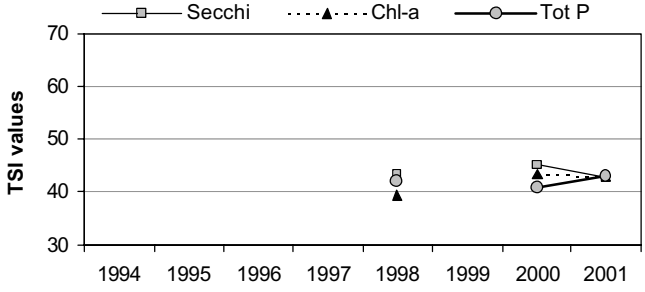


Phytoplankton populations remained low during the sampling season, with a small peak in early June and a climbing population in October. The June bloom was made by the chrysophyte *Dinobryon* with lesser amounts of the chlorophyte *Crucigenia*. The increase in early October was due to the diatom *Cyclotella*. Other important algae found in the lake over time included the dinoflagellate *Peridineum* and a late August appearance of the bluegreen *Anabaena*. Chlorophyll content did not show the small peak in June, but did track the increase at the end of the sampling season.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings





Total phosphorus and total nitrogen remained in fairly constant proportion to each other, with the exception of one date, in which Total P appeared to be exceptionally high (see chart). Aside from that date, the ratio ranged from 18 to 36. In 2001, TSI values for the three indicators were very close to each other and remained in the lower part of the mesotrophic range, similar to the previous year.

Overview

Volunteer monitoring began at Cottage Lake in 1995 and continued through 2001. The data collected classify this lake as high in primary productivity (eutrophic) with fair water quality. There may be a slight decrease recently in productivity. Since the lake surface makes up less than 2% of the large drainage area, direct precipitation is not as important as inlet streams, stormwater runoff and ground-water inputs. Therefore land use is very important to water quality. There is one large wetland in the basin, and basin use is largely rural, although parts are currently urbanizing. Increased productivity through human impacts was verified in the lake management plan (King County, 1996), but can be moderated by good agricultural and management practices, as well as careful drainage designs for new development.

Cottage Lake has no public access boat ramp, but car topper boats may be launched through the park. Residents should keep a close eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

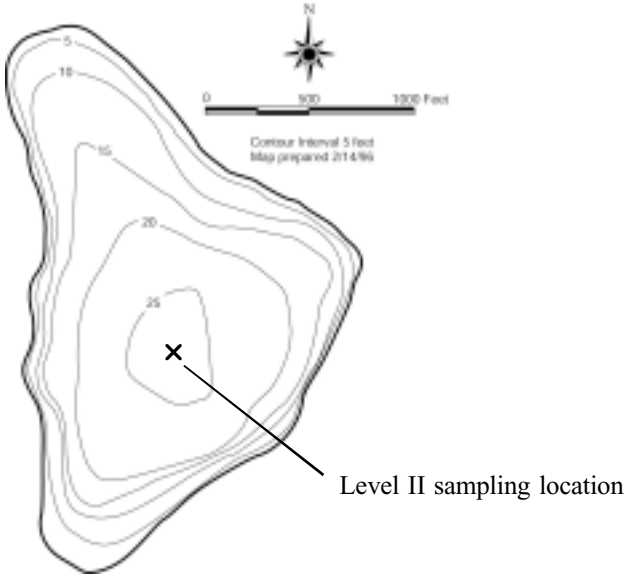
Lake Characteristics

Surface area:	63 acres
Watershed area:	4371 acres
Max depth:	25 ft
Mean depth:	15 ft
Location:	1.5 mi east of Woodinville

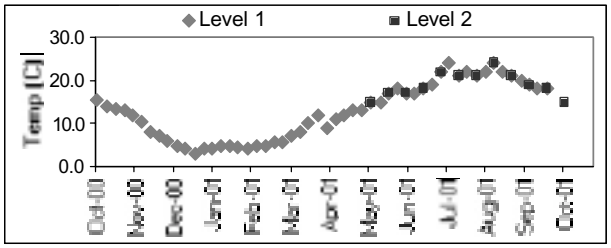
Volunteers

Level I :	Ed Grubbs
Level II:	Ed Grubbs

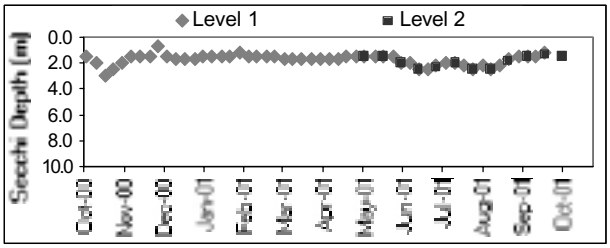
Level II samples collected: 12/13



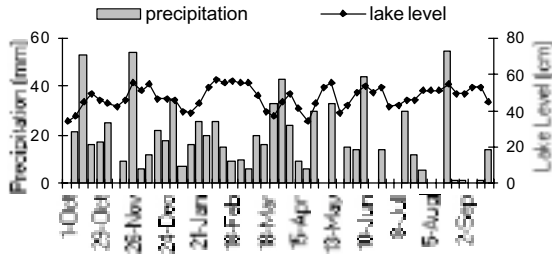
Lake Temperature



Secchi Depth

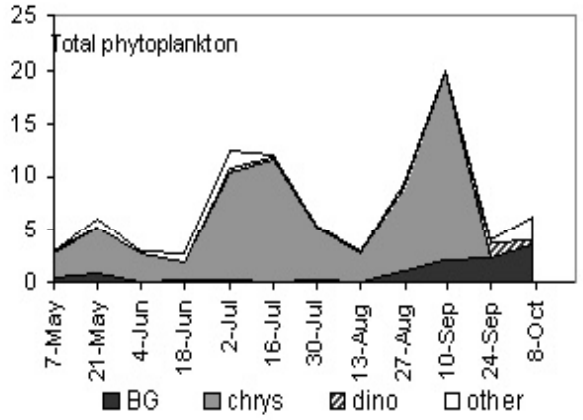


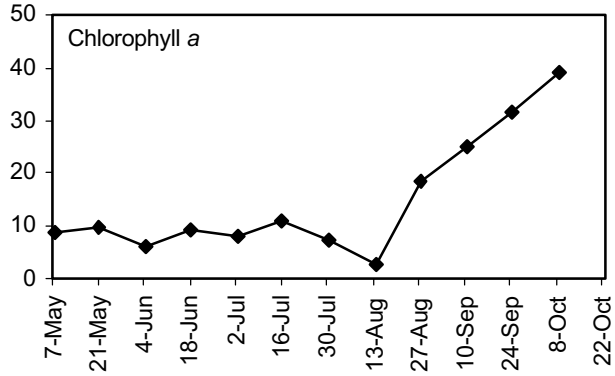
Lake Level and Precipitation



Secchi transparency ranged between 0.8 and 3.0m during the year. Good precipitation and water level records were available for the year, showing that the lake level varied around a mean through most of the year, rather than dropping in late summer. Water temperatures were similar to other small lakes in 2001 ranging from 3 to 24 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

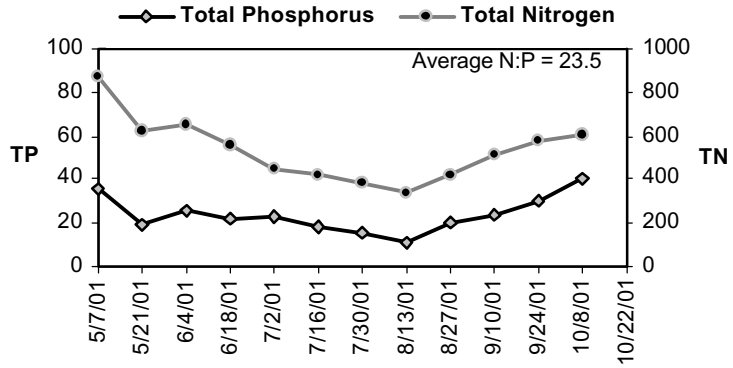


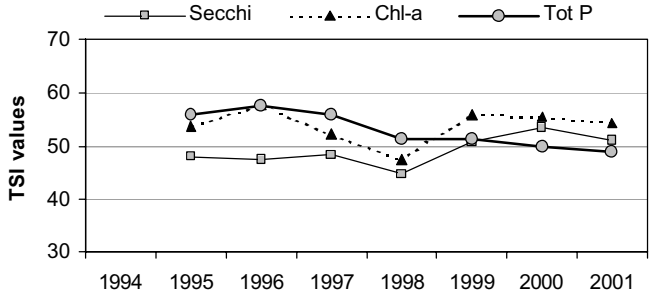


Phytoplankton populations reached two peaks during the sampling season and were climbing in late October. The July bloom was made by the diatom *Tabellaria* with lesser amounts of the chlorophyte *Crucigenia*. The increase in early October was due to the diatom *Cyclotella*. Other important algae found in the lake included the dinoflagellate *Peridineum* and a late August appearance of the bluegreen *Anabaena*. Chlorophyll content did not record the small peak in June, but did track the increase at the end of the sampling season.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings





Total phosphorus and total nitrogen remained in fairly constant proportion to each other over the season. The ratio ranged from 15 to 30. In 2001, TSI values for the three indicators were fairly close to each other and remained in the lower part of the eutrophic range, similar to the previous year.

Overview

Volunteer monitoring began at Lake Desire before 1985 and continued through 2001. The data collected previously classified this lake as high in primary productivity (eutrophic) with fair water quality, although productivity has decreased in recent years and in 2001 for the first time it is included in the mesotrophic range. Since the lake surface makes up about 8% of the moderately large drainage area, direct precipitation is not as important as inlet streams, stormwater runoff and groundwater inputs. Therefore land use is very important to water quality. There are several large wetlands in the basin, and the area is currently urbanizing. Increased productivity through human impacts was verified in the lake management plan (King County, 1995), but can be moderated by good management practices and good drainage designs for new development.

Lake Desire has a public access boat ramp, and residents should keep an eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

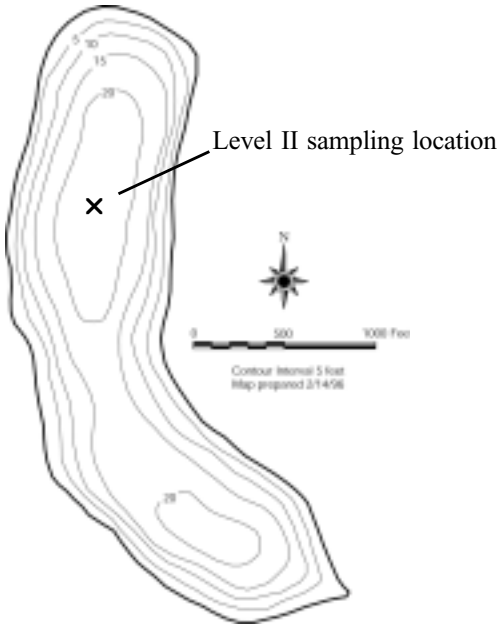
Lake Characteristics

Surface area:	72 acres
Watershed area:	875 acres
Max depth:	21 ft
Mean depth:	13 ft
Location:	4 mi northwest of Maple Valley

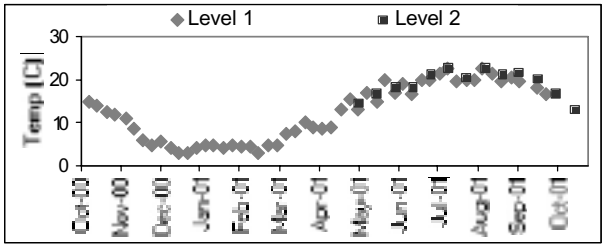
Volunteers

Level I :	Ed and Min Merrill
Level II:	Jan Falkenhagen; Ed and Min Merrill

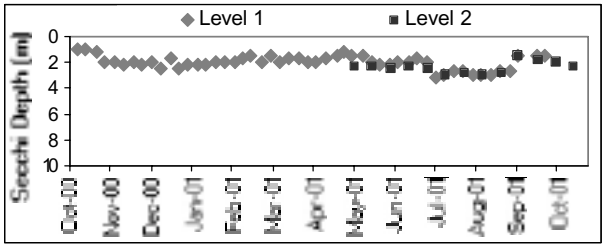
Level II samples collected: 13/13



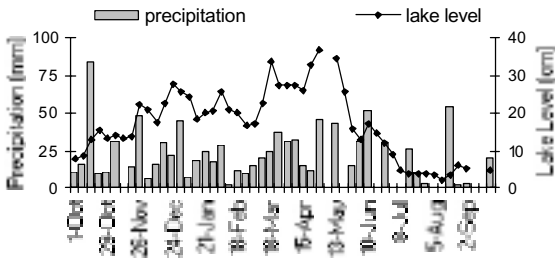
Lake Temperature



Secchi Depth

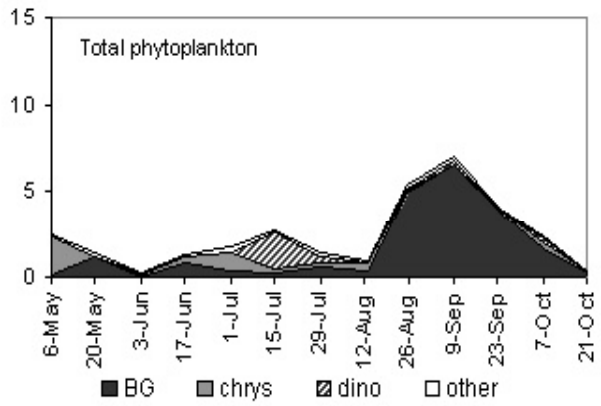


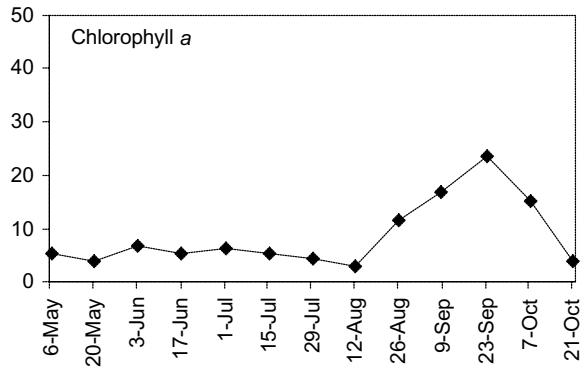
Lake Level and Precipitation



Secchi transparency ranged between 1.0 and 4.0m during the year. Good precipitation and water level records were available for the year, showing that the lake level followed the typical northwest pattern of winter-high/ summer-low. Water temperatures were similar to other small lakes in 2001 ranging from 3 to 22.5 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

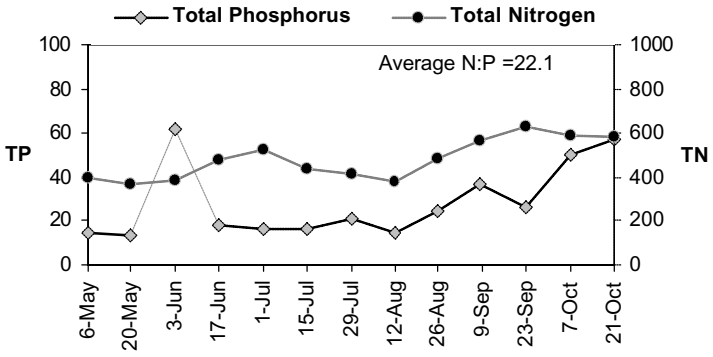


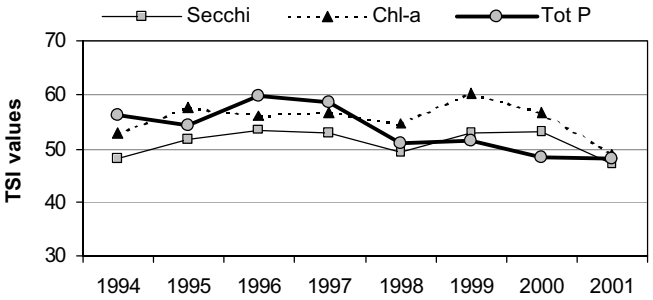


Phytoplankton populations stayed relatively low until September when a large bloom occurred. This consisted mostly of the bluegreens *Aphanizomenon* and *Anabaena*. Other important algae found in the lake included the dinoflagellate *Ceratium,* several species of chrysophytes, and the diatom *Tabellaria.* Chlorophyll content tracked the rise of the phytoplankton populations fairly closely, although the maximum was two weeks later in September.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings





Total phosphorus and total nitrogen remained in fairly constant proportion to each other until late in the season. There was one exceptionally high value in June (see chart). Aside from that date, the ratio ranged from 10 to 26. In 2001, TSI values for the three indicators were very close to each other, below the threshold for eutrophy for the first time since monitoring began.

Overview

Volunteer monitoring began at Lake Dolloff before 1985 and continued through 2001, with one short hiatus. The data collected classify this lake as high in primary productivity (eutrophic) with fair water quality. Since the lake surface makes up about 4% of the drainage area, direct precipitation is not as important as inlet streams, stormwater runoff and groundwater inputs. Therefore land use is very important to water quality. There are no significant wetlands in the basin, and use is mixed rural and residential. Increased algal productivity through human impacts is likely to be occurring, but may be moderated by good management practices.

Lake Dolloff has a public access boat ramp, and residents should keep a watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

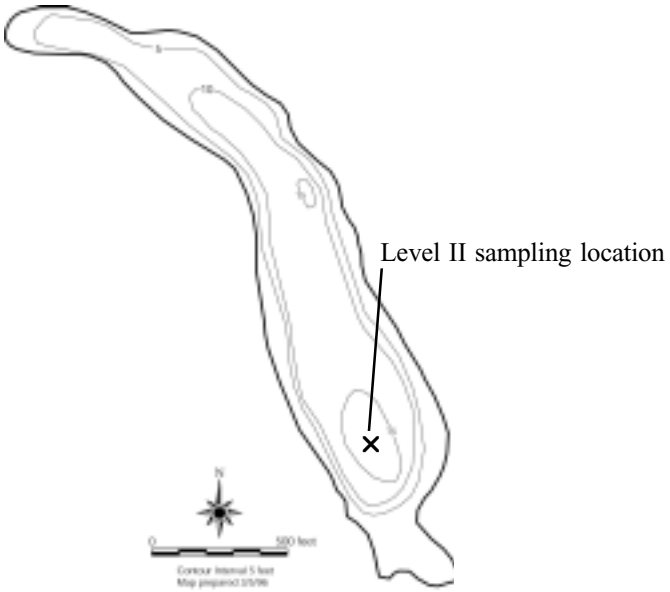
Lake Characteristics

Surface area:	21 acres
Watershed area:	518 acres
Max depth:	19 ft
Mean depth:	10 ft
Location:	3 mi northwest of Auburn

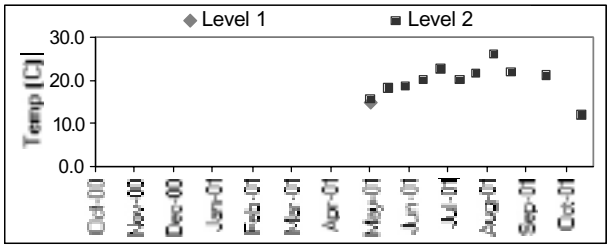
Volunteers

Level I :	Jason Hesla
Level II:	Jason Hesla

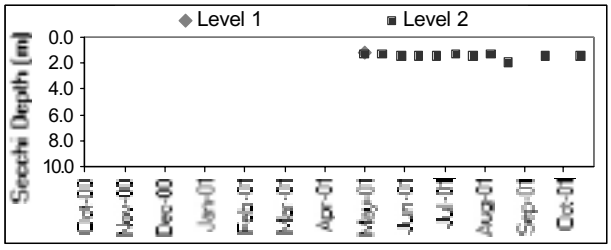
Level II samples collected: 11/13



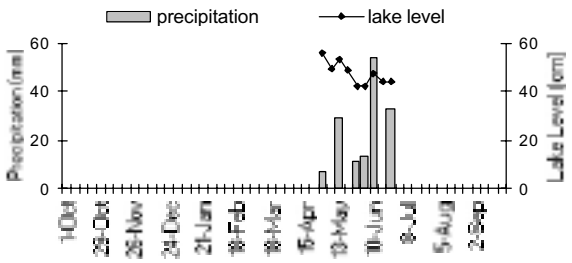
Lake Temperature



Secchi Depth

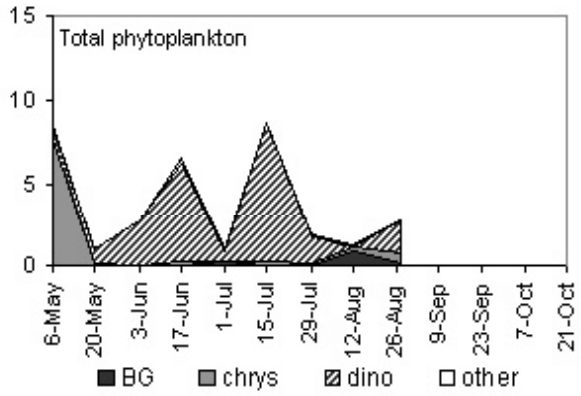


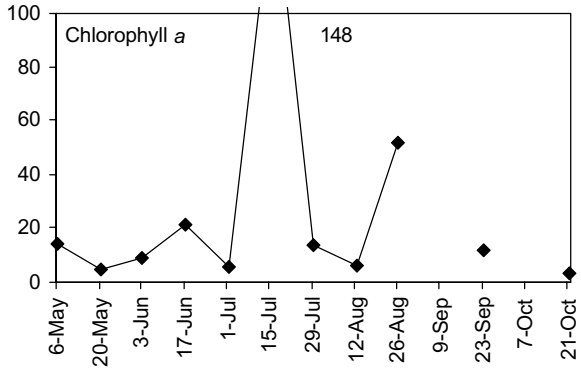
Lake Level and Precipitation



Level II Secchi transparency was stable, ranging between 1.3 and 2.0m during the sampling season. Precipitation and water level records were very limited for the year. Level II water temperatures were similar to other small lakes in 2001 reaching a high of 26 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

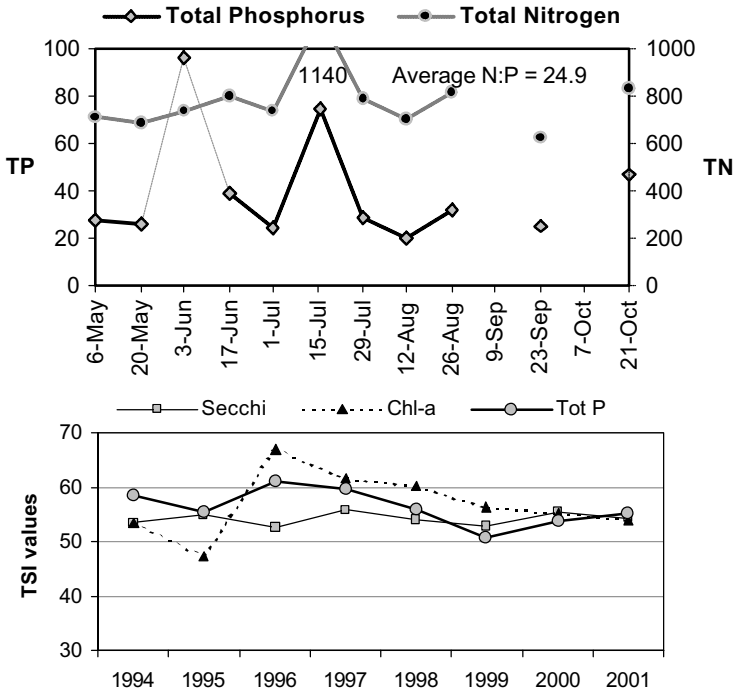




At least three peaks in phytoplankton were recorded, occurring in May, June and July. May was dominated by the chrysophyte *Dinobryon*, while the dinoflagellate *Ceratium* made up the majority of biovolume in June and July. Small populations of the bluegreens *Aphanizomenon* and *Anabaena* occurred in August. Only small amounts of algae were found in the lake in late September and October. Chlorophyll concentration values recorded peaks on the same dates as the phytoplankton, but the relative proportions were different.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other, with one exceptionally high value in June (see chart). Chlorophyll values, as well as Total P and Total N, were extremely high on July 15, which suggested possible contamination of the sample. Aside from those dates, the N:P ratio ranged from 18 to 35. In 2001, TSI values for the three indicators were very close to each other, well above the threshold for eutrophy.

Overview

Volunteer monitoring began at Echo Lake in Shoreline in 2001. The data collected suggest this city lake is moderately high in primary productivity (threshold eutrophic) with fair to good water quality. Since the lake surface makes up about 4% of the drainage area, direct precipitation is not as important as stormwater runoff and groundwater inputs. Therefore land use is very important to water quality. There are no significant wetlands in the basin, and use is mixed urban residential and commercial, as part of the new city of Shoreline. Increased algal productivity through human impacts is undoubtedly occurring, but may be moderated by good management practices.

Echo Lake has no public access boat ramp, although car topper boats may be launched through the park. Therefore, residents should still keep a close eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

Lake Characteristics

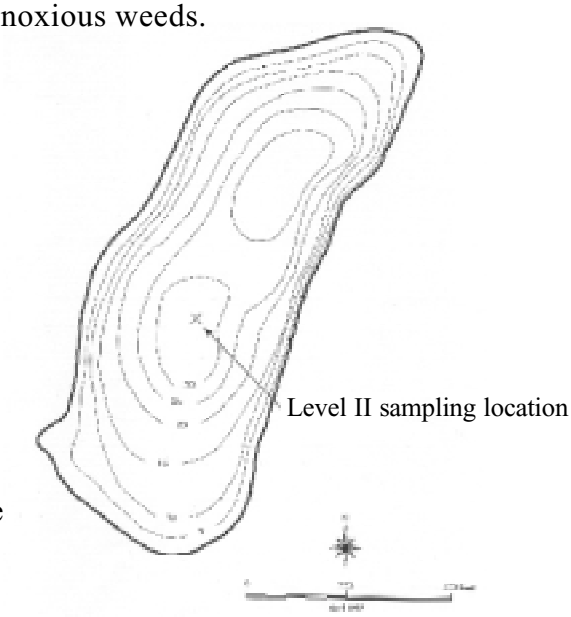
Surface area:	12 acres
Watershed area:	288 acres
Max depth:	30 ft
Mean depth:	14 ft
Location:	Shoreline

Volunteers

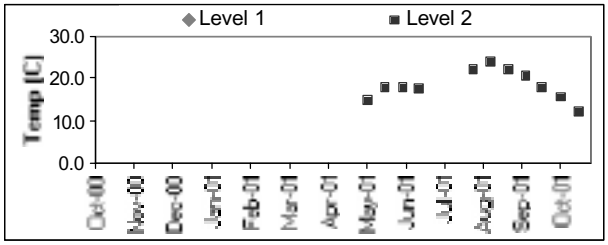
Level I : None

Level II: Monica Carr and Sandy LaMontagne

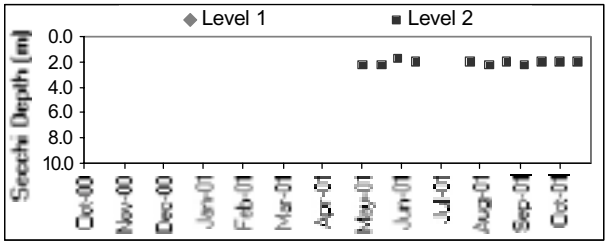
Level II samples collected: 11/13



Lake Temperature



Secchi Depth

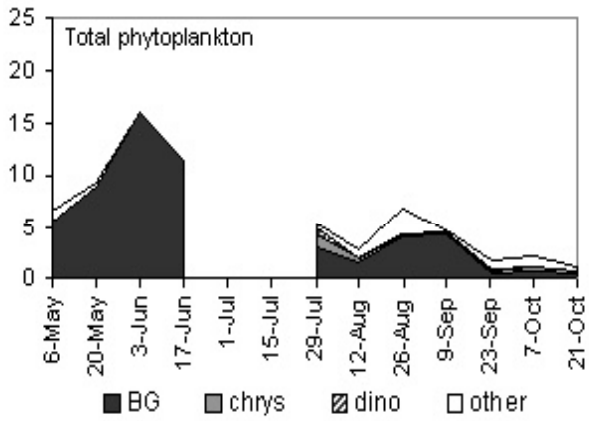


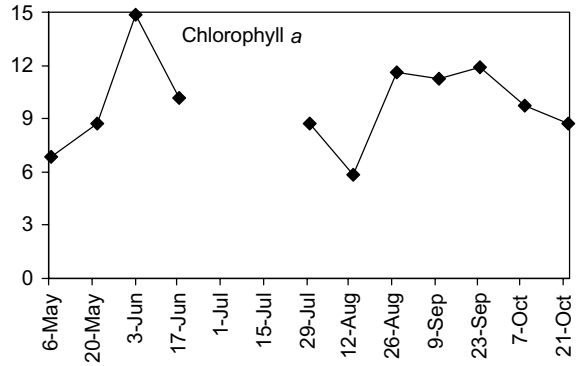
Lake Level and Precipitation

No data available

Level II Secchi transparency was stable, ranging between 1.8 and 2.3m during the sampling season. There were no precipitation or water level records for the year. Level II water temperatures were similar to other small lakes in 2001 reaching a high of 24 degrees Celsius in August.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations (µg/L)

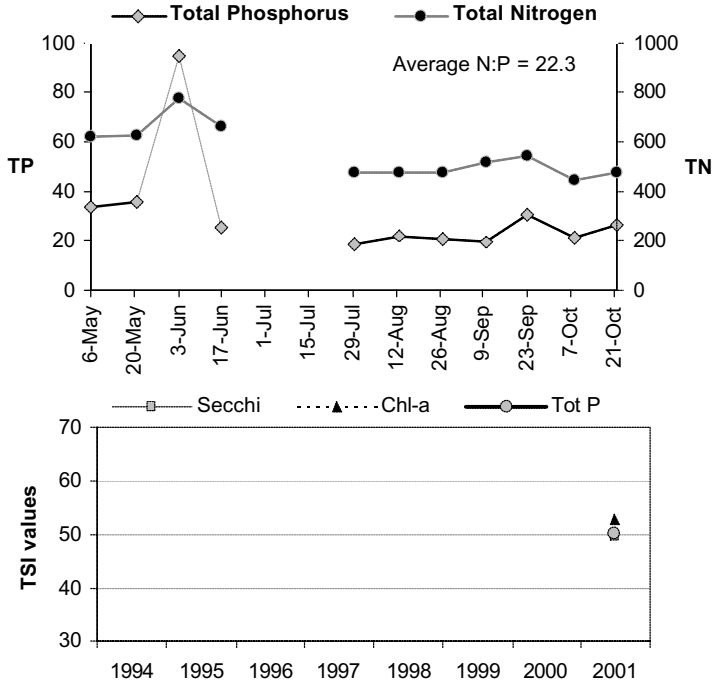




Phytoplankton populations reached a maximum in June and were lower for the rest of the summer, decreasing into fall. The dominant species was the bluegreen *Aphanizomenon,* with smaller amounts of several species of chlorophytes. In August, relatively smaller amounts of the bluegreen *Anabaena* were present. Chlorophyll content was also high through the season, and, although the maximum in June as well, it did not rise to the same extent as the biovolume.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other, with one exceptionally high value in June (see chart). Aside from that date, the N:P ratio ranged from 17 to 27, often near the threshold of 20 which signals advantageous conditions for bluegreen algae. In 2001, TSI values for the three indicators were very close to each other, just slightly above the threshold for eutrophy.

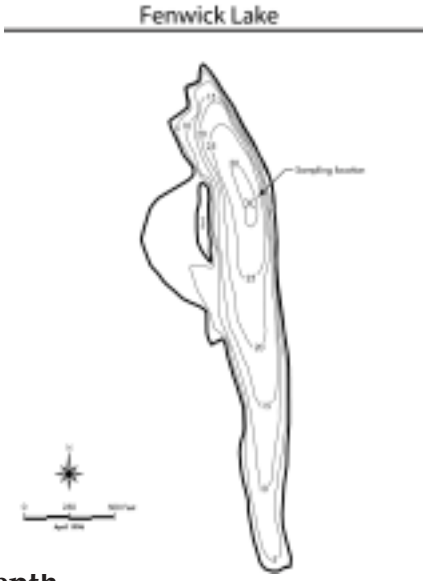
Overview

Volunteer monitoring began at Lake Fenwick in the 1980s, but was discontinued in the 1990s, beginning again in 2001. The data collected suggest this city lake (Kent) is moderate in primary productivity (mesotrophic) with good water quality. Since the lake surface makes up just under 4% of the drainage area, direct precipitation is not as important as inlet streams, stormwater runoff, and groundwater inputs. Therefore land use is very important to water quality. There are no significant wetlands in the basin and use is urban residential and rural. Increased algal productivity due to human impacts is occurring, but may be moderated by good management practices. Kent has had a program of artificial aeration of bottom waters for a number of years, which can significantly lower the amount of phosphorus recycled from bottom sediments.

Lake Fenwick has a public access boat ramp, and residents should keep a close eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds. Brazilian elodea, *Egeria densa*, has already established a very large population in the lake, displacing native aquatic plants.

Lake Characteristics

Surface area: 17 acres
Watershed area: 563 acres
Max depth: 31 ft
Mean depth: 13 ft
Location: Kent



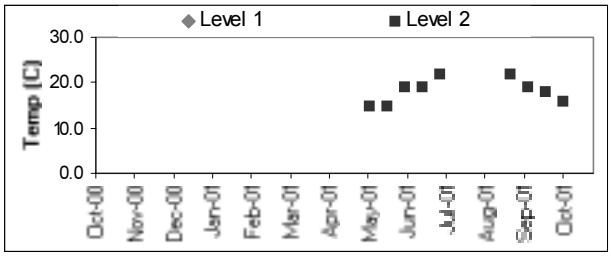
Volunteers

Level I : None

Level II: Tom Hogan

Level II samples collected: 9/13

Lake Temperature



Secchi Depth

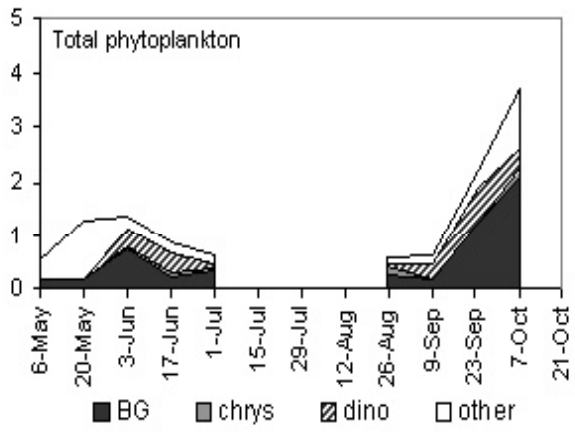
No data available

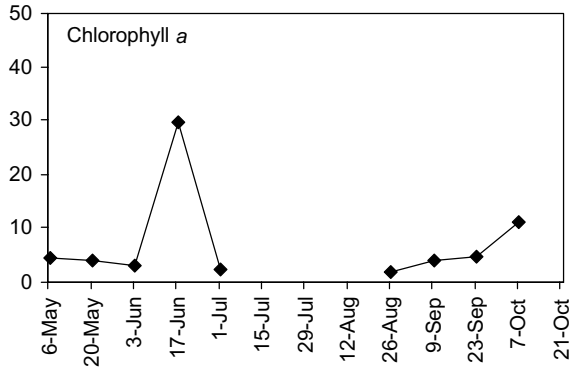
Lake Level and Precipitation

No data available

There were no precipitation or water level records for the year. Level II water temperatures were similar to other small lakes in 2001, but no samples were reported for August when the maximum temperatures were reached in other King County lakes.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

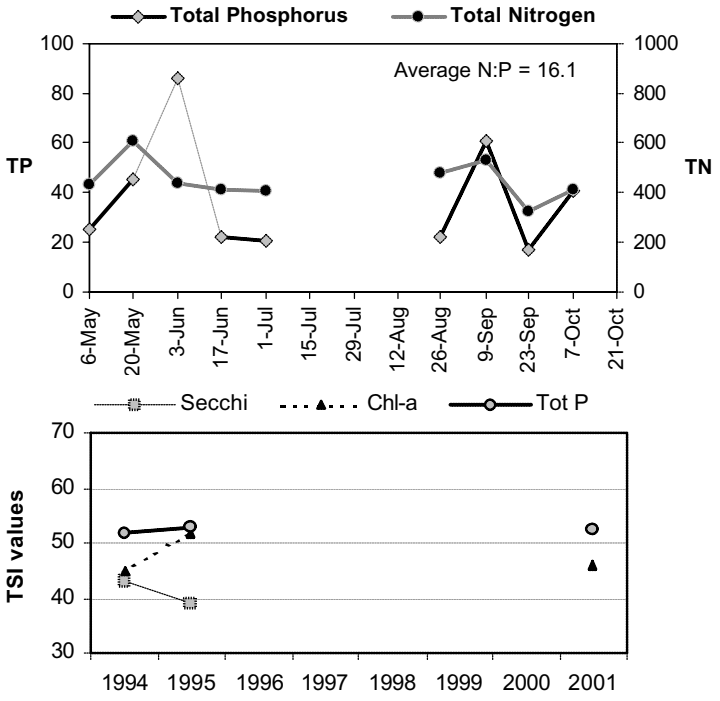




Phytoplankton populations were low in spring and early summer, growing rapidly in late September into October. The dominant species present was the bluegreen *Aphanizomenon* for most of the sampling season, with smaller amounts of several chlorophytes. In September the euglenophyte *Trachelomonas* was an important member of the phytoplankton. Chlorophyll content was extremely high on one date, June 17, which was not reflected in the phytoplankton count. It rose again in late summer concurrent with the rise in phytoplankton.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other, except for two dates with exceptionally high Total P values (see chart). Aside from those dates, the N:P ratio ranged from 10 to 22, suggesting advantageous conditions for bluegreen algae. In 2001, TSI values for the two indicators were somewhat spread out.

Overview

Volunteer monitoring began at Fivemile Lake in the 1980s and continued through 2001, with a four-year hiatus in the early 1990s. The data collected classify this lake as high in primary productivity (eutrophic) with fair water quality. However, the color of the water could affect clarity, making the TSI-Secchi considerably higher than the other indicators. If transparency is not included, Fivemile Lake appears to be mesotrophic, though close to eutrophy (see chart). Since the lake surface makes up only 6% of the drainage area, direct precipitation is not as important as inlet streams, stormwater runoff and groundwater inputs. There are no significant wetlands in the basin, and land use is mostly suburban residential and rural. Increased algal productivity through human impacts is probably occurring, but may be moderated by good management practices.

Fivemile Lake has no public access boat ramp, but car topper boats may be launched from the county park on the eastern shoreline. Residents should keep a watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

Lake Characteristics

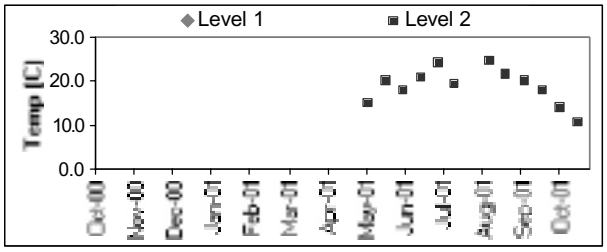
Surface area:	38 acres
Watershed area:	640 acres
Max depth:	32 ft
Mean depth:	18 ft
Location:	1 mi east of Federal Way

Volunteers

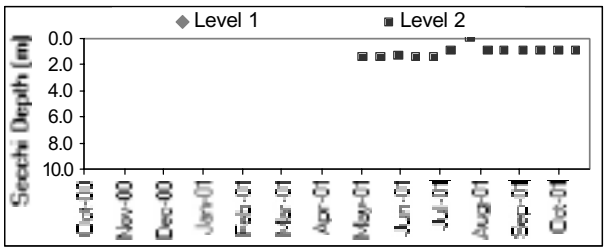
Level I :	None
Level II:	Janet Gillies

Level II samples collected: 12/13

Lake Temperature



Secchi Depth

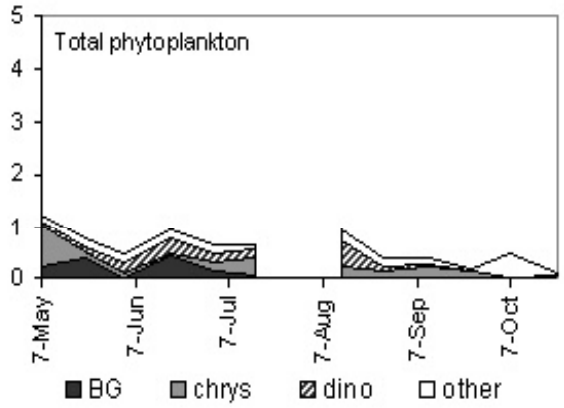


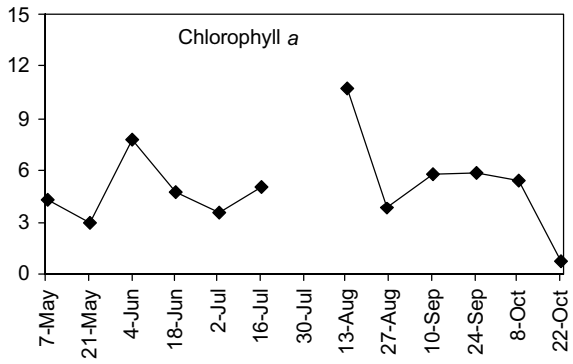
Lake Level and Precipitation

No data available

The Secchi transparency during the sampling season was very steady, between 1 and 1.5 m, consistent with the impact that the water color has on clarity. There were no precipitation or water level records for the year. Level II water temperatures reached 24.5 degrees Celsius in August, similar to other small lakes in 2001.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

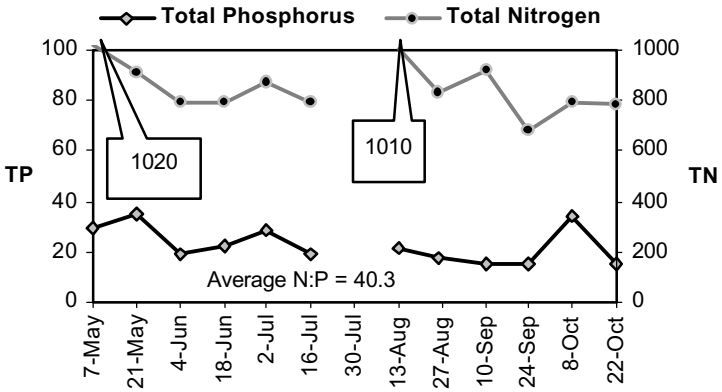


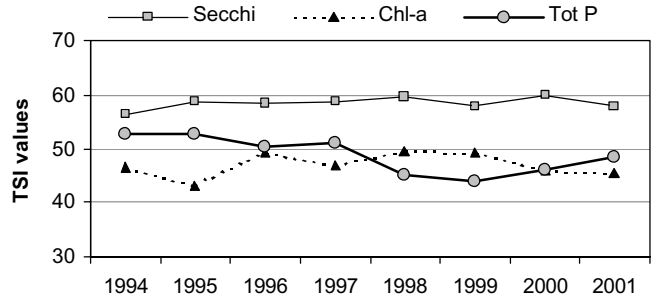


Phytoplankton populations were low throughout the year, and no major peaks were observed. The most common species present included the bluegreen *Aphanizomenon,* the dinoflagellate *Ceratium*, and several chrysophytes, such as *Dinobryon* and *Gloeobotrys*. In October, the cryptophyte *Rhodomonas* became important. Chlorophyll content was high relative to the phytoplankton counts, and the pattern was not particularly consistent with the algae found in the samples.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings





Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period. The N:P ratio ranged from 23 to 60. In 2001, TSI-Secchi was considerably higher than the other TSI values, suggesting it is affected by a factor rather than productivity, such as water color.

Overview

Volunteer monitoring began at Lake Francis in the 1996 and continued through 2001. The data collected suggest that this lake is fairly high in primary productivity (threshold eutrophic) with good to fair water quality. Since the lake surface makes up 5% of the drainage area, direct precipitation is not as important as inlet streams, stormwater runoff and groundwater inputs. There are several significant wetlands in the basin and much of the lake shoreline is classified as wetland. Webster Lake is also upstream. Current land use appears to be mostly as forest and rural residential/small farms. Increased algal productivity through human impacts is less likely to be occurring than in lakes located in more densely populated areas, but best management practices are still encouraged to avoid creating future problems.

Lake Francis has no public access, but residents may still want to keep an eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

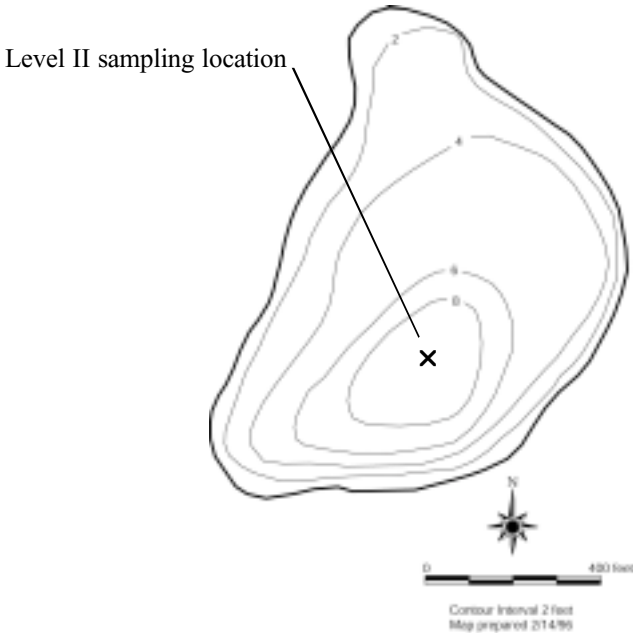
Lake Characteristics

Surface area:	20 acres
Watershed area:	390 acres
Max depth:	9 ft
Mean depth:	4 ft
Location:	2 mi north of Maple Valley

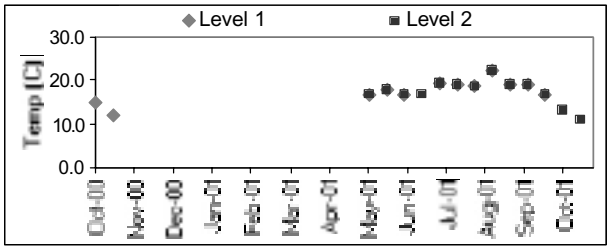
Volunteers

Level I :	Brian and Eirica Moriarty
Level II:	Brian and Eirica Moriarty

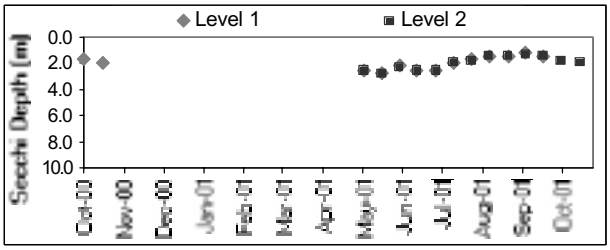
Level II samples collected: 13/13



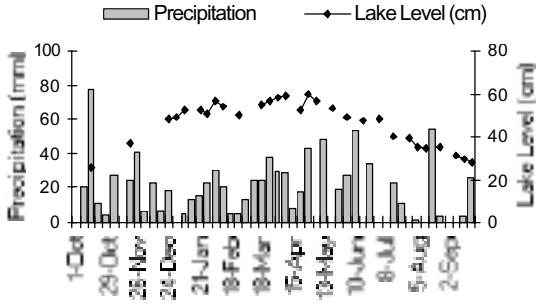
Lake Temperature



Secchi Depth

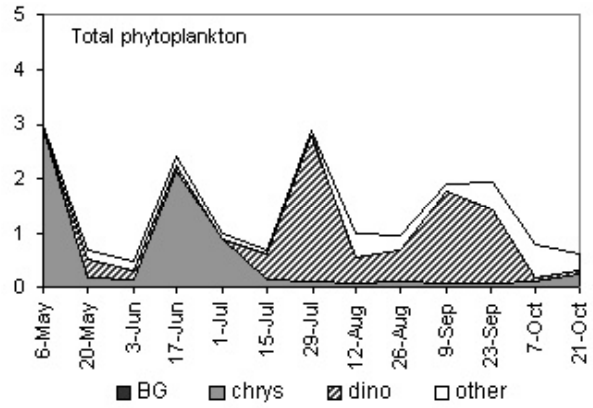


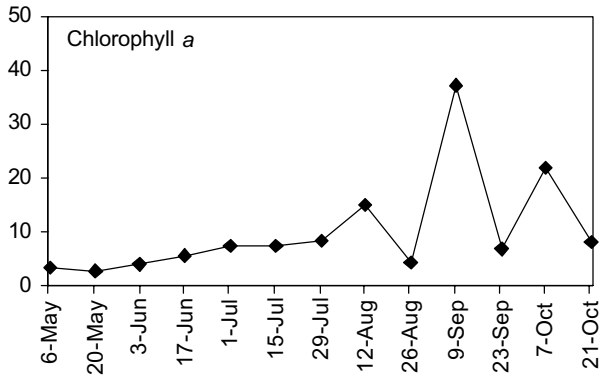
Lake Level and Precipitation



The Secchi transparency during the sampling season was fairly steady, ranging between 1.3 and 2.8m. Water level was recorded weekly for much of the year, appearing consistent with the general pattern of a late summer low stand. Level II water temperatures reached a maximum of 23 degrees Celsius in August, similar to other King County lakes in 2001.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

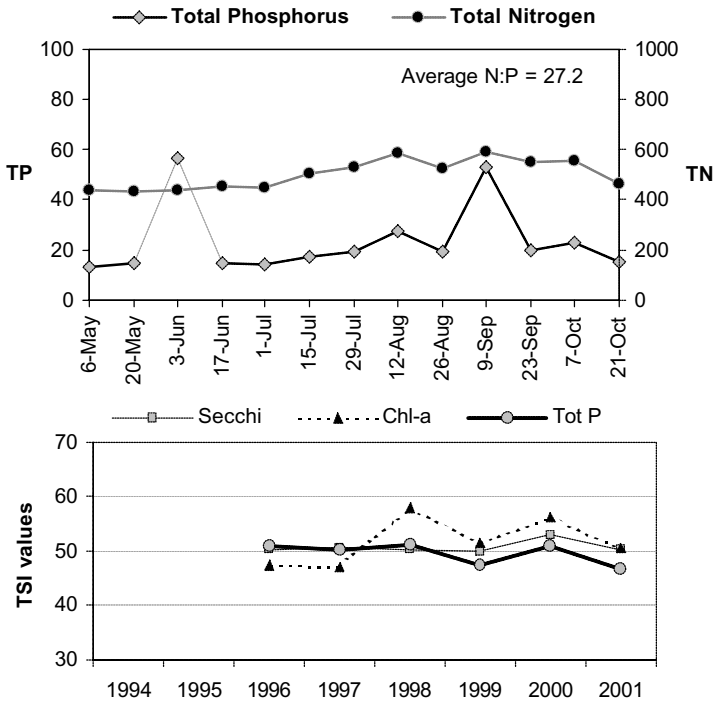




Phytoplankton populations made four separate peaks through the sampling season. The first two peaks were from large populations of the chrysophyte *Dinobryon,* the third was the dinoflagellate *Ceratium*, and the fall peak was caused by increases of the dinoflagellate *Peridineum*. Other important species included the chlorophytes *Asterococcus* and *Botryococcus*, as well as the diatom *Tabellaria*. Chlorophyll content was low through the first part of the season, rising approximately concurrently with the *Peridineum* peak, although the peaks were not entirely consistent with the algae found in the samples.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from two dates with exceptionally high Total P (see chart). Excluding those dates, the N:P ratio ranged from 22 to 33. In 2001, the three TSI indicators were close to each other, on the threshold between mesotrophy and eutrophy, similar to several other years of the record.

Overview

Volunteer monitoring began at Lake Geneva in the 1980s and continued through 2001, with a four-year hiatus in the early 1990s. The data collected suggest that this lake is moderate to low in primary productivity (threshold oligotrophic) with good to excellent water quality. Since the lake surface makes up nearly 13% of the drainage area, direct precipitation is important, in addition to stormwater runoff and groundwater inputs. There are no significant wetlands in the basin. Current land use appears to be mostly as rural residential/small farms, but is becoming more suburban in character. Increased algal productivity through human impacts is likely to occur, and good management practices are encouraged to avoid creating future problems.

Lake Geneva has a public access boat ramp, and residents have funded efforts to control water lilies in the past. A close eye should be kept on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

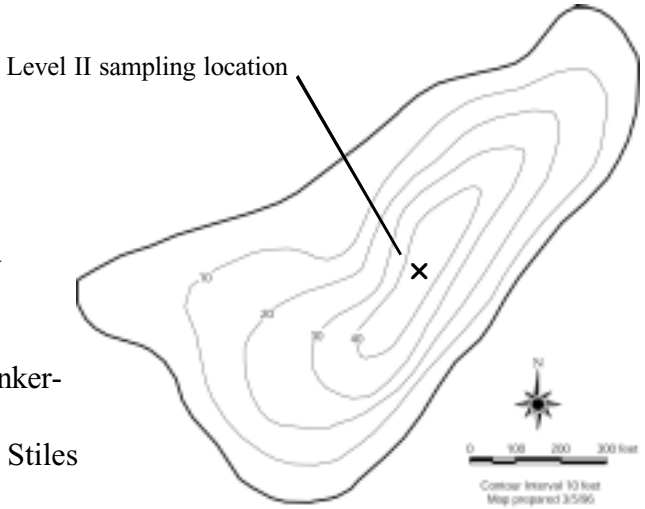
Lake Characteristics

Surface area:	29 acres
Watershed area:	224 acres
Max depth:	46 ft
Mean depth:	19 ft
Location:	0.2 mi east of Federal Way

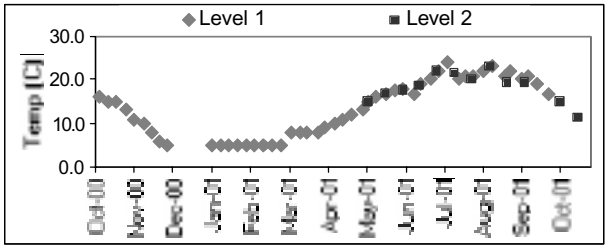
Volunteers

Level I :	Thomas Jones and Sue Yunker-Jones
Level II:	Bruce Harpham and Laura Stiles

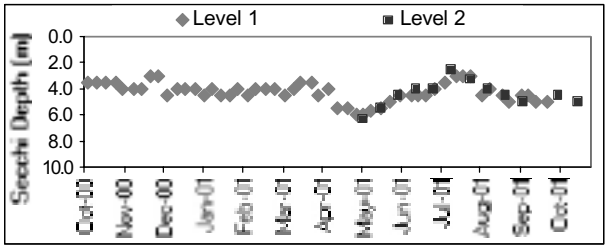
Level II samples collected: 12/13



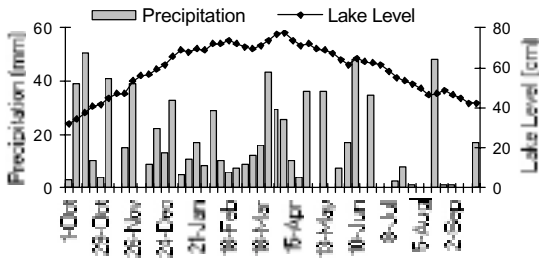
Lake Temperature



Secchi Depth

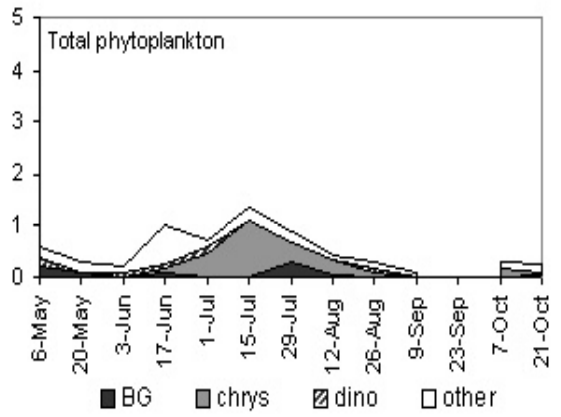


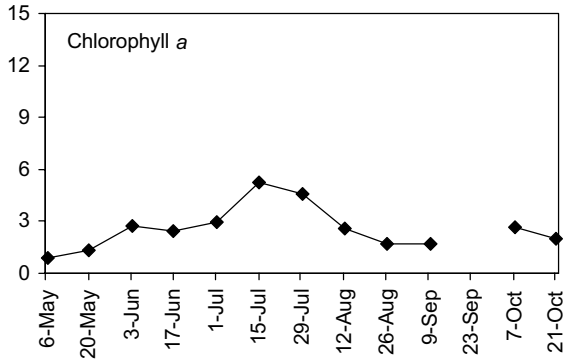
Lake Level and Precipitation



Secchi transparency ranged between 2.5 and 6.3m through the year. Water levels were consistent with the general pattern of an autumn low stand. Annual water temperatures ranged between 5 and 24 degrees Celsius, with a dip in the summer in response to cool July air temperatures.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

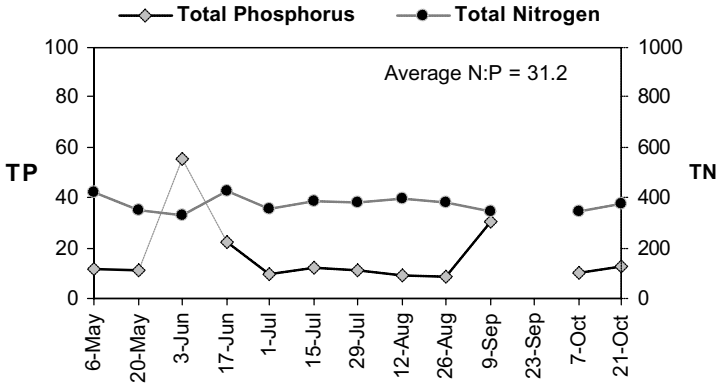


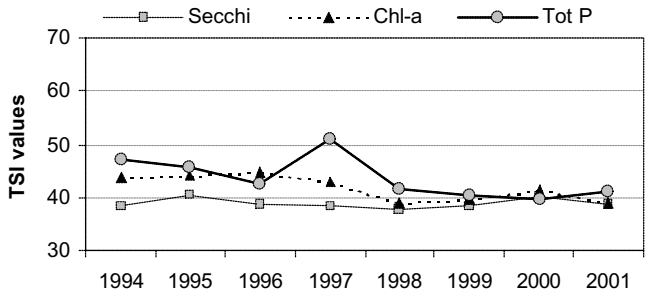


Phytoplankton populations were low through the sampling season, with two peaks. The first peak was in June, made by the chlorophyte *Botryococcus,* the second was made by the Chrysophyte *Gloeobotrys*. The bluegreens *Anabaena* and *Aphanizomenon* made smaller populations, as well as the chrysophytes *Dinobryon* and *Synura*. Chlorophyll content tracked the pattern of the phytoplankton populations reasonably well through the season.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings





Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from two dates with exceptionally high Total P (see chart). Excluding those dates, the N:P ratio ranged from 19 to 45. In 2001, the three TSI indicators were very close to each other, on the threshold between oligotrophy and mesotrophy, similar to the last three years of the record.

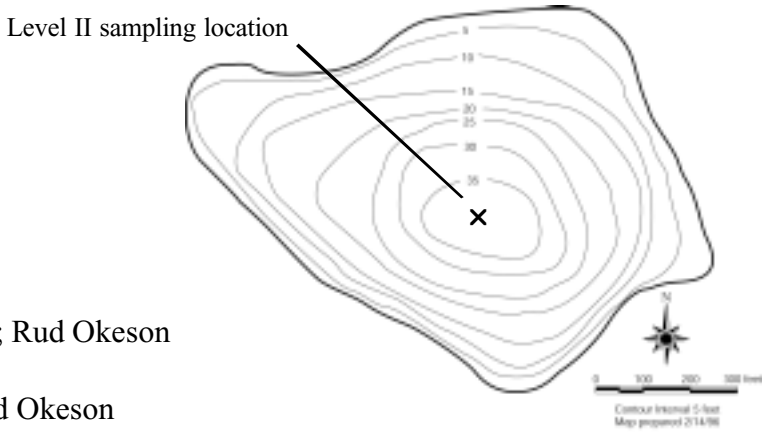
Overview

Volunteer monitoring began at Haller Lake in the 1997 and continued through 2001. The data collected suggest that this city lake (Seattle) is moderate in primary productivity (mesotrophic), with good water quality. Since the lake surface makes up approximately 5% of the drainage area, direct precipitation is less important than stormwater runoff and groundwater inputs. There are no significant wetlands in the basin. Current land use is mostly urban residential, with a high school property included in the basin. Increased algal productivity through human impacts is likely, and good management practices are encouraged to avoid creating future problems.

Haller Lake has two public access points from which car topper boats may be launched, and residents should keep a watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

Lake Characteristics

Surface area:	15 acres
Watershed area:	280 acres
Max depth:	36 ft
Mean depth:	
Location:	Seattle

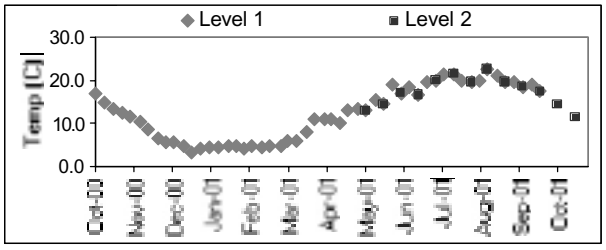


Volunteers

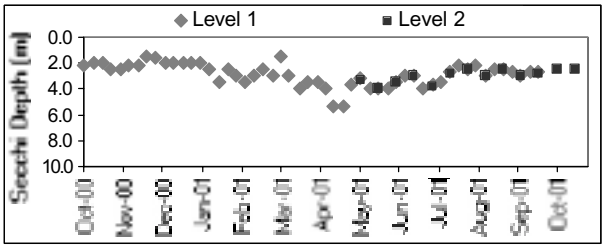
Level I :	Barbara Gross; Rud Okeson
Level II:	Rick Ehle; Rud Okeson

Level II samples collected: 13/13

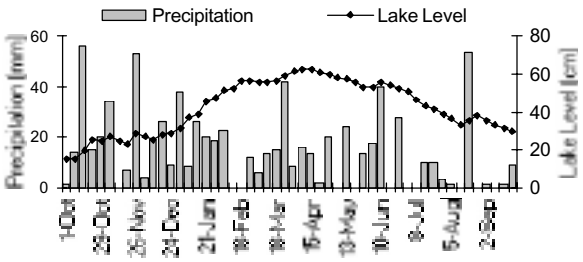
Lake Temperature



Secchi Depth

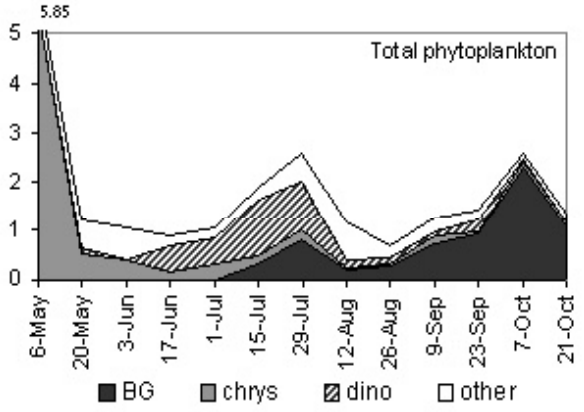


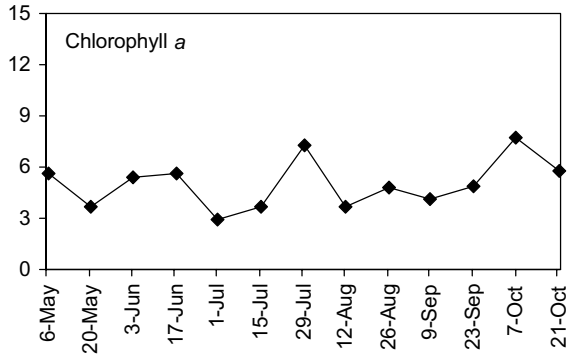
Lake Level and Precipitation



Secchi transparency ranged between 1.5 and 5.3m through the year. Water levels were consistent with the general regional pattern of high levels in winter, dropping to low stands in autumn. Annual water temperatures ranged between 3.5 and 22.5 degrees Celsius, with a dip during the cool weather of July 2001.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

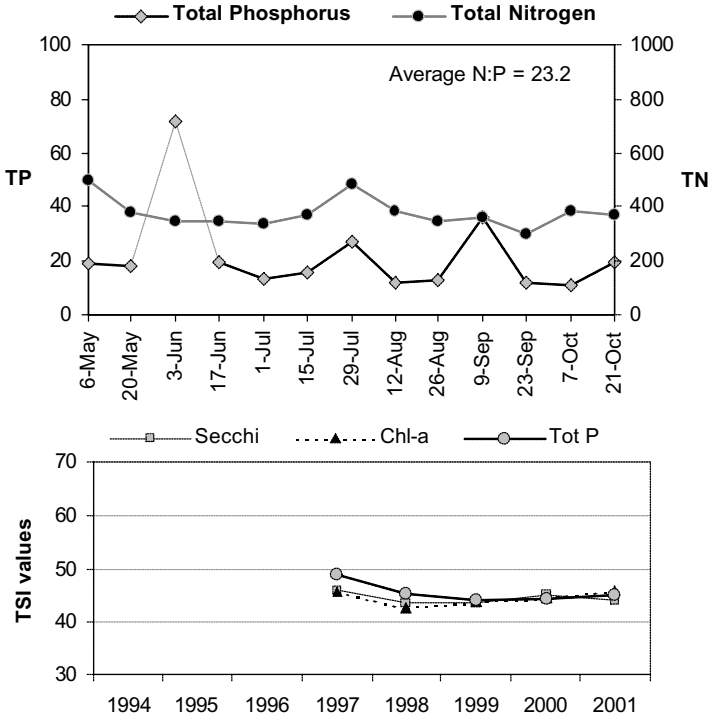




Phytoplankton populations began the sampling season with a peak, followed by two more in July and October. The first peak was of the chrysophyte *Dinobryon,* while the second was the dinoflagellate *Ceratium,* with a smaller amount of the bluegreen *Aphanizomenon,* which subsequently increased, achieving peak abundance in October. Another important species was the chlorophyte *Botryococcus*. Chlorophyll content tracked the pattern of the phytoplankton populations reasonably well through the season.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from two dates with exceptionally high Total P (see chart). Excluding those dates, the N:P ratio ranged from 18 to 34. In 2001, the three TSI indicators were very close to each other in the midrange for mesotrophy, similar to the other years in the record.

Overview

Volunteer monitoring began at Jones Lake in 2000 and continued through 2001. The data collected suggest that this city lake (Black Diamond) is relatively moderate in primary productivity (mesotrophic), with good water quality. Since the lake surface makes up only 3% of the drainage area, direct precipitation is less important than inlet streams, stormwater runoff and groundwater inputs. There are no significant wetlands in the basin. Current land use is mostly rural, with little urban development to date. Increased algal productivity through human impacts may be occurring from deforestation and agriculture. Good management practices are encouraged to avoid creating future problems.

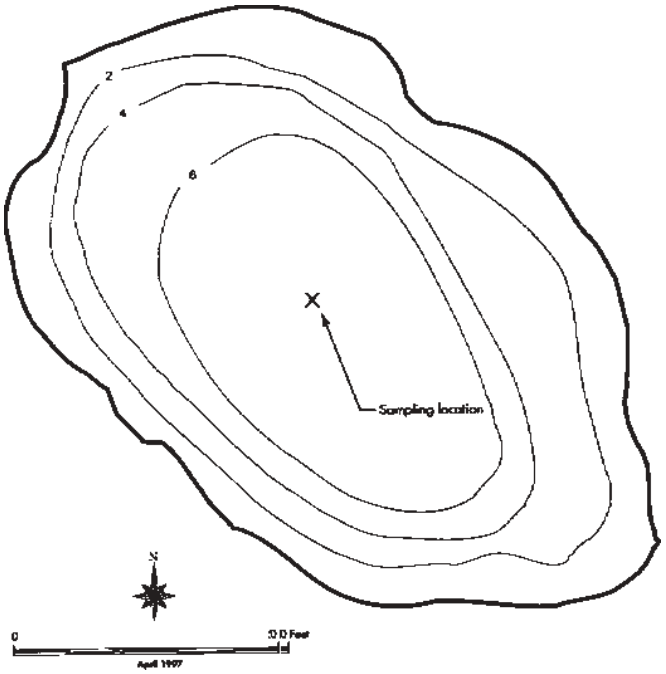
Jones Lake currently has no public access points, but residents should keep an eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

Lake Characteristics

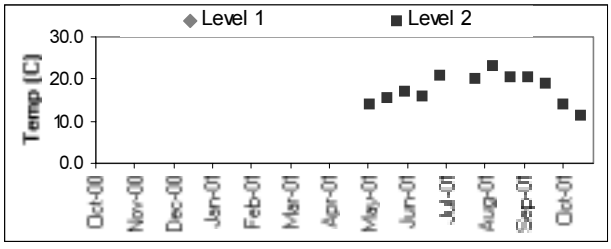
Surface area:	23 acres
Watershed area:	742 acres
Max depth:	7 ft
Mean depth:	4 ft
Location:	Black Diamond

Volunteers

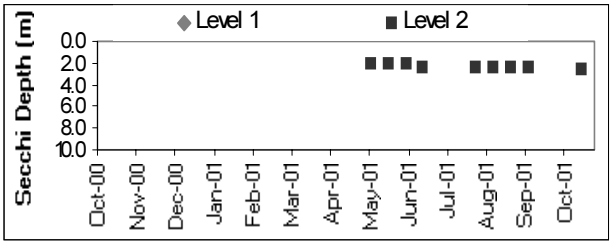
Level I :	None
Level II:	Dale and Linda Anson
Level II samples collected:	12/13



Lake Temperature



Secchi Depth

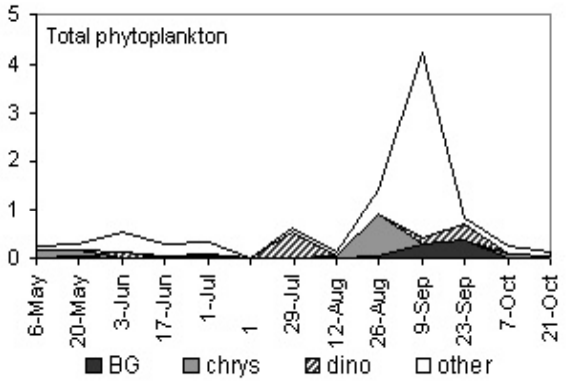


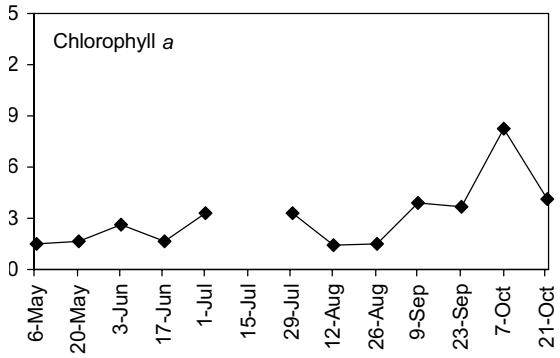
Lake Level and Precipitation

No data available

Secchi transparency ranged between 2.0 and 2.5m, but was noted as resting on the lake bottom in many cases, so it cannot be considered accurate. There were no precipitation or water levels records for the year. Level II water temperatures reached a maximum of 20.5 degrees Celsius, somewhat cooler than many other county lakes in 2001.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

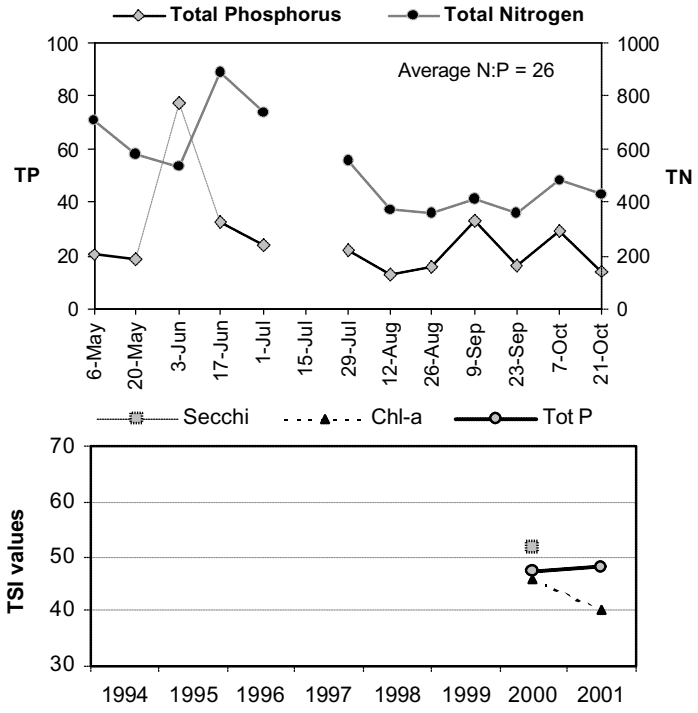




Phytoplankton populations remained low throughout the season, with the exception of one date in September, when the algae were dominated by a large colony of the chlorophyte *Volvox* found in the sample. Other important species included the euglenophyte *Trachelomonas*, the dinoflagellate *Ceratium*, and several other species of chlorophytes. Chlorophyll content remained low until mid-October, not reflecting the *Volvox* colony counted in September.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from one date with an exceptionally high Total P (see chart). Excluding that date, the N:P ratio ranged from 12 to 35. In 2001, TSI-chlor was significantly lower than TSI-TP. TSI-Secchi was not calculated since some Secchi readings were limited by the depth of the lake (see Appendix B).

Overview

Volunteer monitoring began at Lake Joy in 2000 and continued through 2001. The data collected suggest that this lake is low to moderate in primary productivity (oligotrophic to mesotrophic), with good to excellent water quality. Since the lake surface makes up 22% of the drainage area, direct precipitation is important, in addition to inlet streams, stormwater runoff and groundwater inputs. There are no significant wetlands in the basin. Current land use is mostly rural, with homes concentrated around the shoreline. Increased algal productivity through human impacts may be occurring from shoreline development, deforestation and agriculture. Good management practices are encouraged to avoid creating future problems.

Lake Joy currently has no public access points, but residents should keep an eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

Lake Characteristics

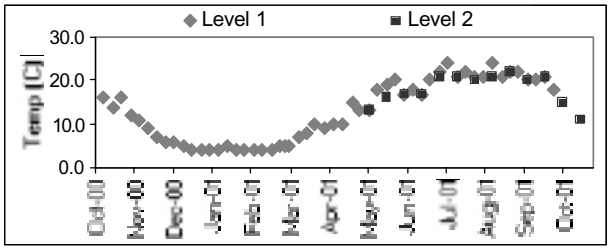
Surface area:	105 acres
Watershed area:	486 acres
Max depth:	50 ft
Mean depth:	23 ft
Location:	3.75 mi north of Carnation

Volunteers

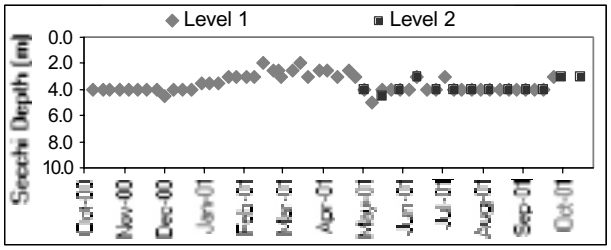
Level I :	Bob and Sam Charles
Level II:	Bob and Sam Charles

Level II samples collected: 13/13

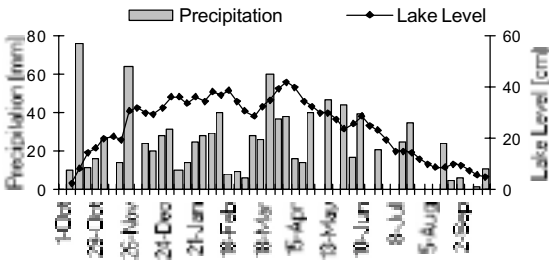
Lake Temperature



Secchi Depth

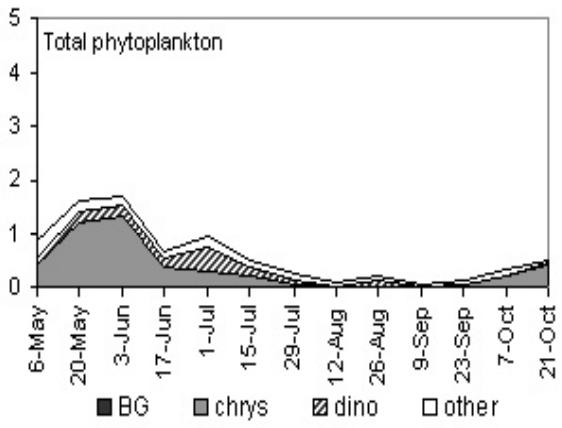


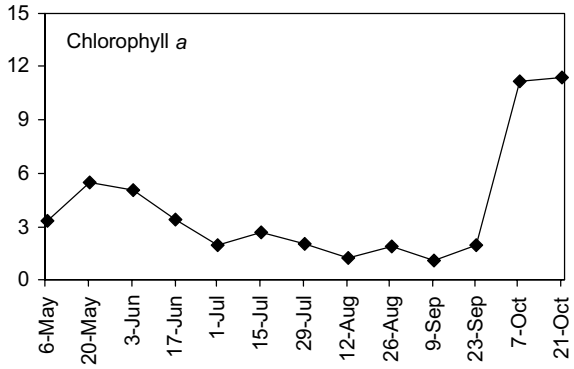
Lake Level and Precipitation



Secchi transparency was ranged between 2.0 and 5.0m through the year, generally close to 4.0m. Water levels followed the general pattern of winter-high/autumn-low. Annual water temperatures ranged between 4 and 24 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

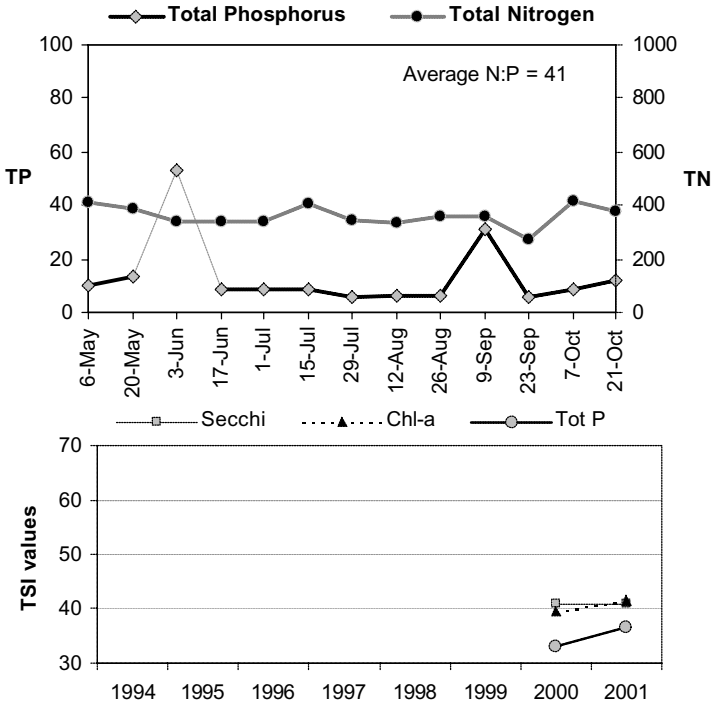




Phytoplankton populations remained relatively low throughout the season, with the peak populations occurring in late spring. The dominant species at that time was the diatom *Cyclotella bodanica*, followed by a smaller population of the dinoflagellate *Ceratium*. Other important species included the chlorophyte *Botryococcus* and several species of cryptophytes. Chlorophyll content followed the late spring bloom and then remained low until October. The rise in chlorophyll in fall was not matched by the phytoplankton data.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from two dates with exceptionally high Total P (see chart). Excluding those dates, the N:P ratio ranged from 28 to 59. In 2001, TSI-chlor was significantly lower than the other two indicators, which were at the high end of mesotrophy as they were in 2000 when chlorophyll was similar.

Overview

Volunteer monitoring began at Lake Kathleen in 1996 and continued through 2001. The data collected suggest that this lake is moderate to high in primary productivity (mesotrophic to eutrophic) with good to fair water quality. Since the lake surface makes up 12% of the drainage area, direct precipitation is somewhat less important than inlet streams, stormwater runoff, and groundwater inputs. There are several significant wetlands in the basin, including two along the lake shoreline. Current land use is mixed rural and suburban residential. Increased algal productivity through human impacts may be occurring from land development, clearing and agriculture. Good management practices are encouraged to avoid creating future problems.

Lake Kathleen has no public boat launch, but residents should keep a watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds. Purple loosestrife has been the focus of eradication efforts by the local community in recent years.

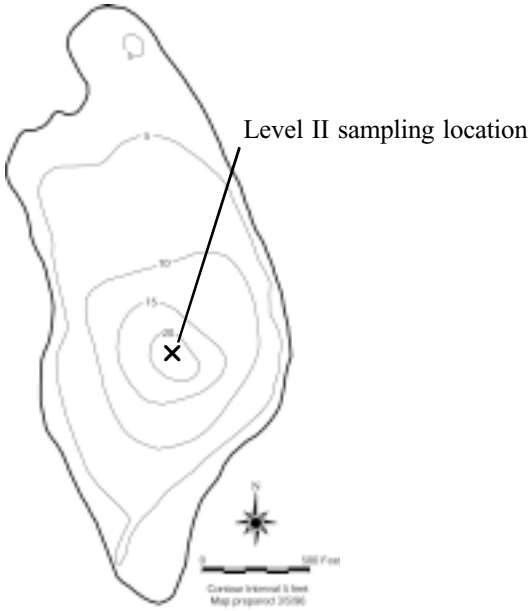
Lake Characteristics

Surface area:	39 acres
Watershed area:	314 acres
Max depth:	22 ft
Mean depth:	7 ft
Location:	2.2 mi east of Renton

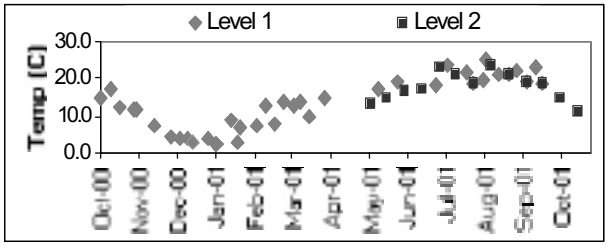
Volunteers

Level I :	Keith Lanan; Steve Thomas
Level II:	Keith Lanan

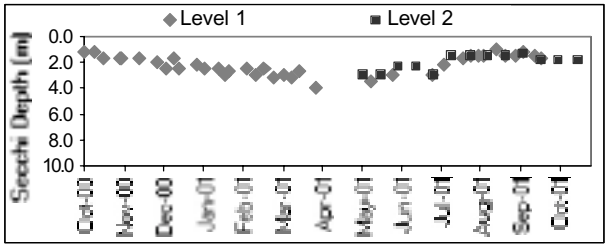
Level II samples collected: 13/13



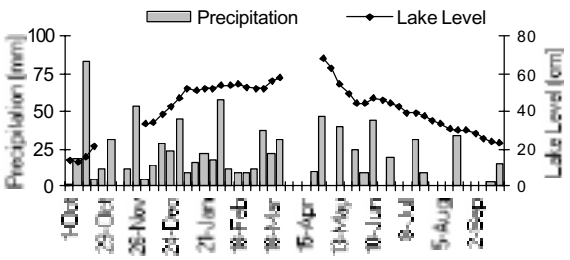
Lake Temperature



Secchi Depth

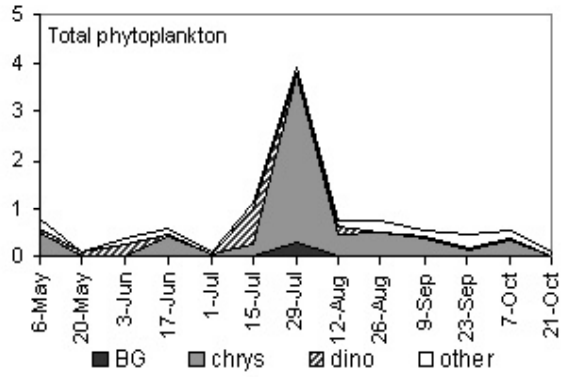


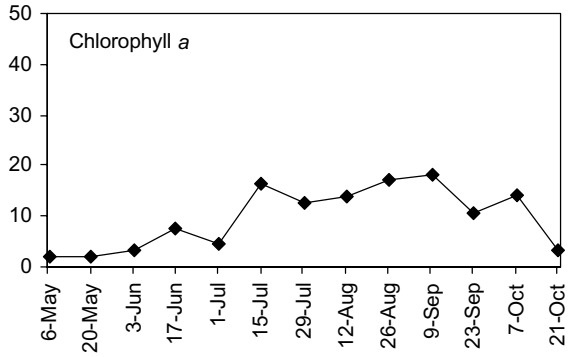
Lake Level and Precipitation



Secchi transparency ranged between 1.0 and 4.0m through the year. Water levels followed the general pattern of winter-high/autumn-low. Annual water temperatures ranged between 2 and 25 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

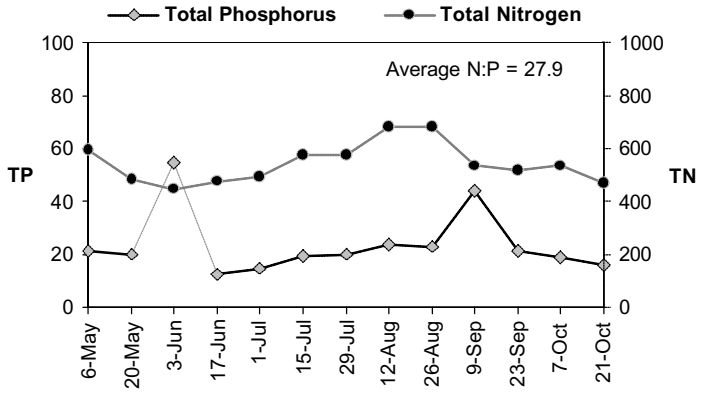


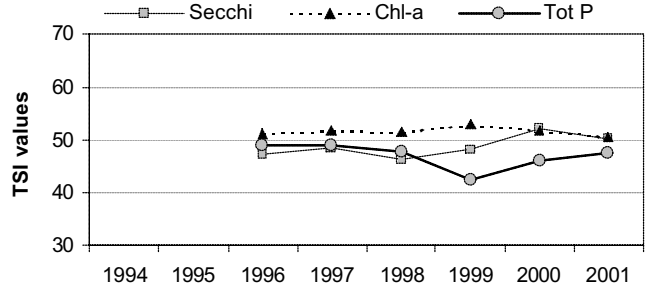


Phytoplankton populations remained low throughout the season, with the exception of a large peak caused by the chrysophyte *Dinobryon* found in late July. Other important species included the dinoflagellates *Ceratium* and *Peridineum*, as well as several species of cryptophytes. Chlorophyll content showed a general rise in summer and did not reflect the peak found in late July.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings





Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from two dates with exceptionally high Total P (see chart). Excluding those dates, the N:P ratio ranged from 24 to 38, remaining very stable. In 2001, the three TSI values were close to each other, at the threshold between mesotrophy and eutrophy.

Overview

Volunteer monitoring began at Lake Killarney in the late 1980s and continued through 2001. The data collected suggest that this lake, whose northwestern shoreline is in the city of Federal Way, is relatively high in primary productivity (borderline eutrophic) with fair to good water quality. Since the lake surface makes up 20% of the drainage area, direct precipitation is important, in addition to stormwater runoff and groundwater inputs. There are no significant wetlands in the basin, although the northern shoreline has some wetland functions (King County, 1997). Current land use is residential, with several large office complexes developed in the city portion of the basin. Increased algal productivity through human impacts may be occurring from land development. Good management practices are encouraged to avoid creating future problems.

Lake Killarney has a public boat launch and has been heavily infested with milfoil in the past. Though herbicide treatments were considered successful, residents should keep an eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

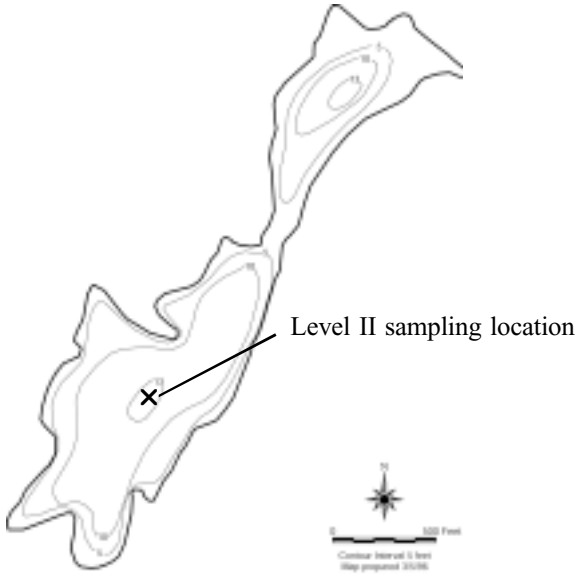
Lake Characteristics

Surface area:	31 acres
Watershed area:	154 acres
Max depth:	13 ft
Mean depth:	3 ft
Location:	Eastern border of Federal Way

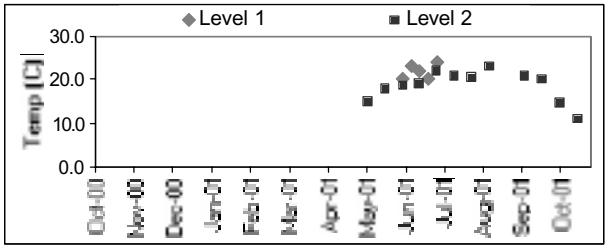
Volunteers

Level I :	Kellan Patrick
Level II:	Craig Rice

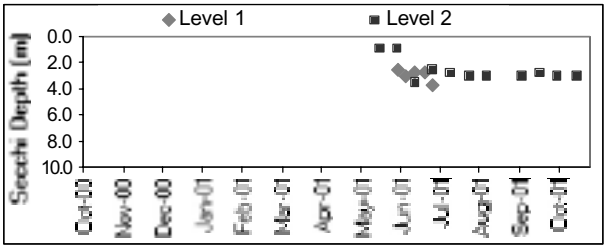
Level II samples collected: 12/13



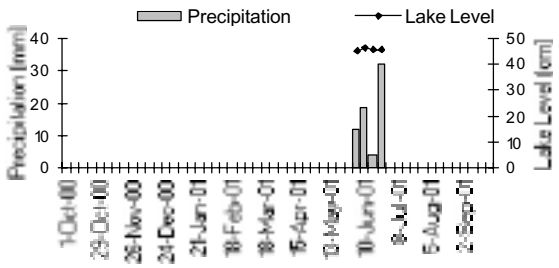
Lake Temperature



Secchi Depth

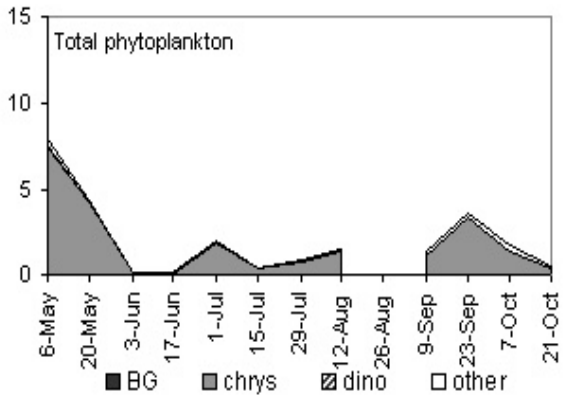


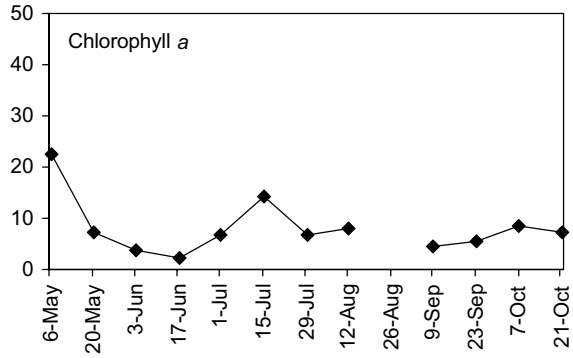
Lake Level and Precipitation



Secchi transparency ranged between 2.5 and 3.8m through the sample season. Water level and precipitation data was incomplete for the year. Level II water temperatures reached 24 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)



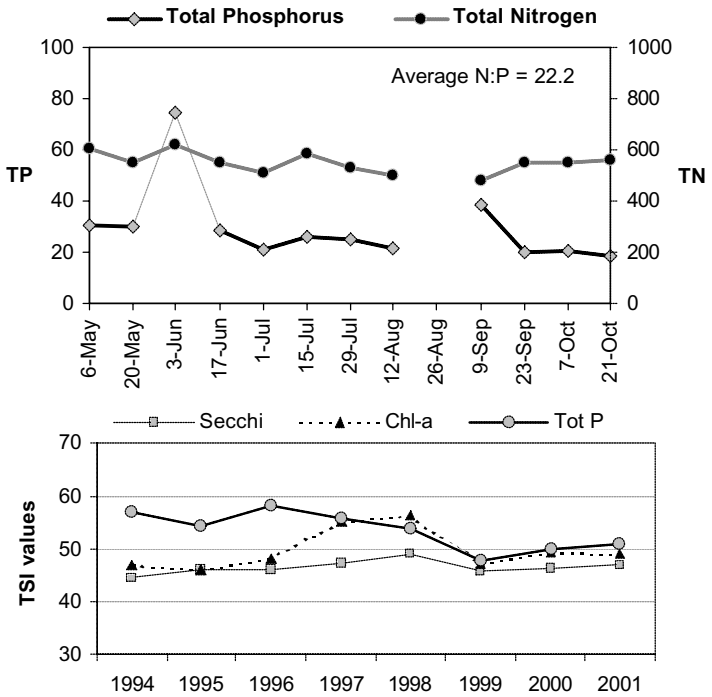


Phytoplankton populations were dominated by the chrysophyte *Dinobryon*, which made one large and two smaller peaks through the season. Other important species included the dinoflagellate *Ceratium* and several species of cryptophytes. Chlorophyll content generally followed the phytoplankton volumes, but did not rise as high in late summer as the phytoplankton.

Residents on Lake Killarney have been involved with algae control efforts in the past, including the use of copper sulfate to control blooms. Copper has been found in high concentrations in the bottom sediments (King County, 1997).

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings

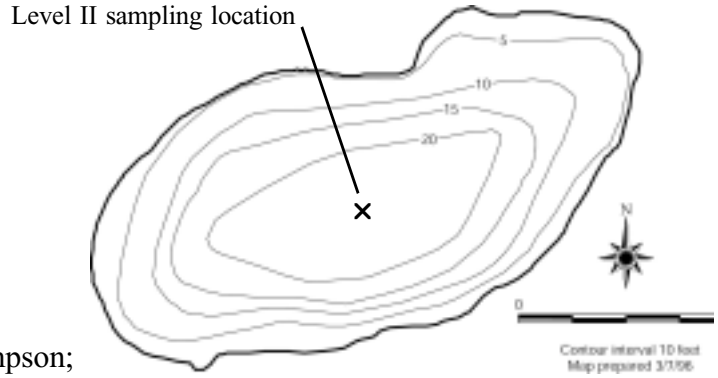


Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from two dates with exceptionally high Total P (see chart). Excluding those dates, the N:P ratio ranged from 16 to 27, potentially good conditions for bluegreens, though no populations developed. In 2001, the three TSI values were close to each other, at the threshold between mesotrophy and eutrophy.

Overview

Volunteer monitoring began at Lake Leota in 1998 and continued through 2001. The data collected suggest that this city lake (Woodinville) is relatively high in primary productivity (borderline eutrophic) with fair water quality. Productivity may be increasing over time (see chart), although there is not yet enough data for a statistically significant trend analysis. Since the lake surface makes up only 2% of the drainage area, direct precipitation is not as important as stormwater runoff and groundwater inputs. There are no significant wetlands in the basin. Current land use is suburban to urban residential, with one small commercial complex in the catchment. Increased algal productivity through human impacts may be occurring from land development. Good management practices are encouraged to avoid creating future problems.

Lake Leota has no public access points, though residents should keep a watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.



Lake Characteristics

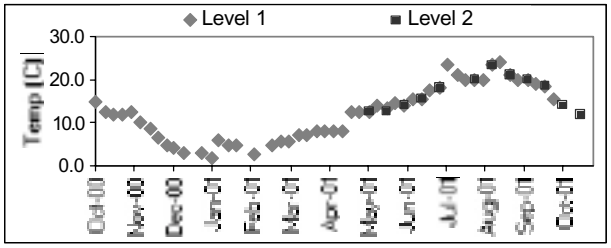
Surface area:	10 acres
Watershed area:	506 acres
Max depth:	24 ft
Mean depth:	12 ft
Location:	Woodinville

Volunteers

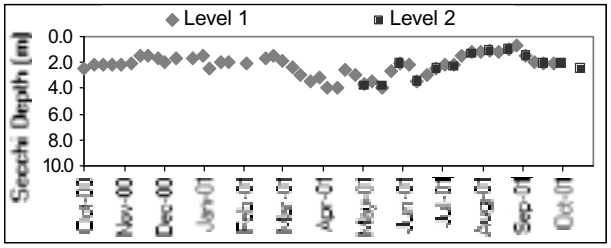
Level I :	David Mangels; Rick Sampson; Gunther and Rosalie Paulgen
Level II:	Gunther and Rosalie Paulgen; Rick Sampson

Level II samples collected: 13/13

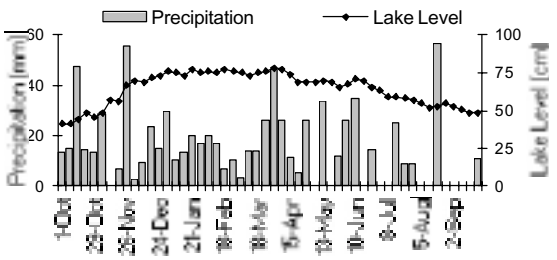
Lake Temperature



Secchi Depth

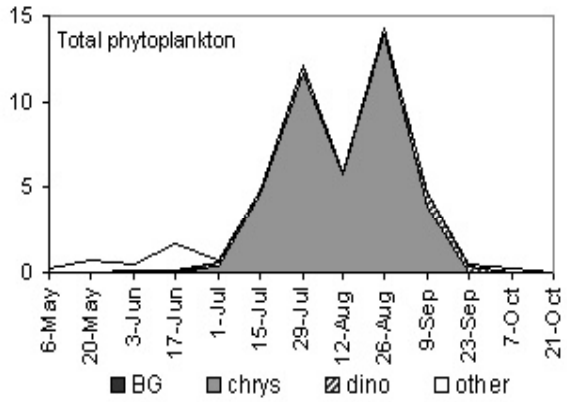


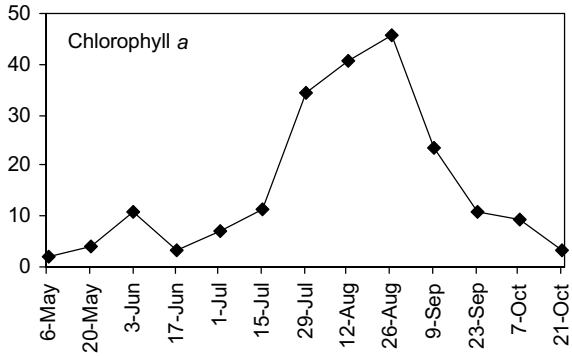
Lake Level and Precipitation



Secchi transparency ranged between 0.8 and 4.0m through the year. Water levels were relatively stable, but reached a low stand in early fall. Annual water temperatures ranged from 2 to 24 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

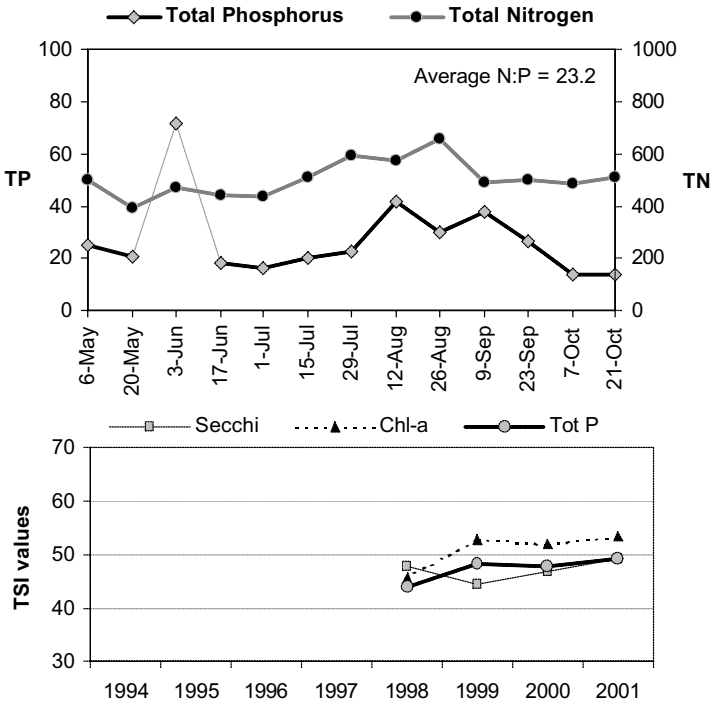




Phytoplankton populations were dominated by the chrysophyte *Dinobryon*, which made large peaks in abundance during the summer. Other important species included the dinoflagellate *Ceratium* and several species of chlorophytes and cryptophytes. Chlorophyll content closely followed the phytoplankton volumes.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from one date with exceptionally high Total P (see chart). Excluding that date, the N:P ratio ranged from 13 to 36. In 2001, TSI-Chlor was higher than the other two indicators and above the threshold for eutrophy, similar to the two previous years.

Overview

Volunteer monitoring began at Lake Lucerne in the 1980s and continued through 2001, with a four-year hiatus in the early 1990s. The data collected suggest that this city lake (Maple Valley) is relatively low in primary productivity (borderline oligotrophic) with good to excellent water quality. Since the lake surface makes up only 4% of the drainage area, direct precipitation is not as important as stormwater runoff and groundwater inputs. It shares water with Pipe Lake by a shallow canal, and the outlet stream from the lakes leaves from Lucerne. There are no significant wetlands in the basin. Current land use is suburban to urban residential, with an equestrian complex in the catchment. Increased algal productivity through human impacts may be occurring, and good management practices are encouraged to avoid creating future problems.

Lake Lucerne has no public access boat launch, but has a history of both milfoil and *Hydrilla* infestations. Washington State Dept of Ecology, Maple Valley, and Covington have funded eradication efforts since 1995. Residents should keep a close eye on aquatic plants growing nearshore to catch growing patches of these and other noxious weeds.

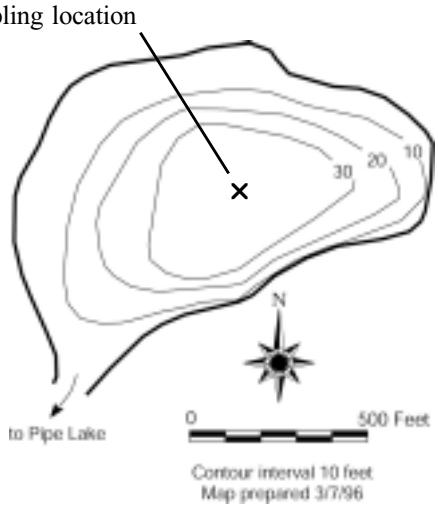
Lake Characteristics

Surface area:	16 acres
Watershed area:	403 acres
Max depth:	37 ft
Mean depth:	18 ft
Location:	Maple Valley

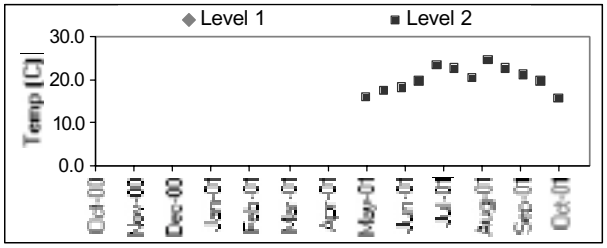
Volunteers

Level I :	None
Level II:	Barbara Winter and Milo Dullum

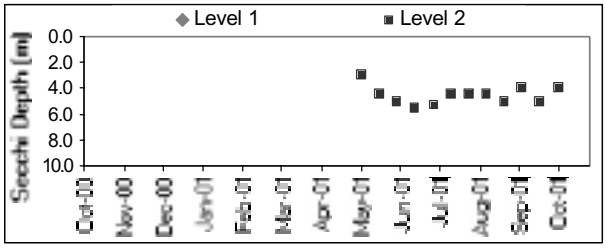
Level II samples collected: 13/13



Lake Temperature



Secchi Depth

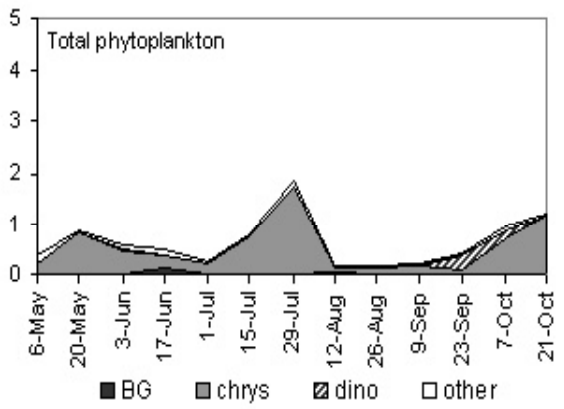


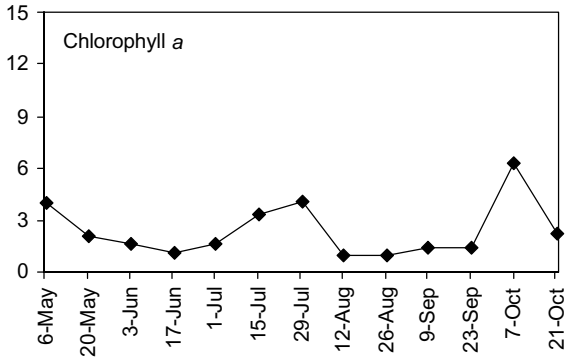
Lake Level and Precipitation

No data available

Secchi transparency ranged between 3 and 5.5m through the sample season. There were no precipitation or water level records, but conditions should be similar to those at Pipe Lake. Level II water temperatures reached 24 degrees Celsius in August.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

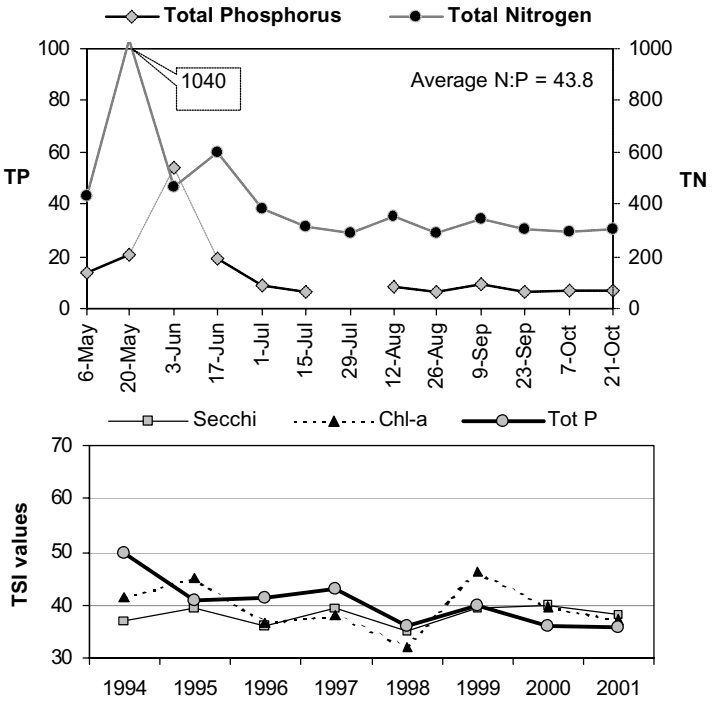




Phytoplankton populations were small, dominated by the chrysophyte *Dinobryon*, which made three peaks in abundance through the sample season. Other important species included the diatom *Cyclotella* and the chlorophyte *Botryococcus*. Chlorophyll content closely followed the phytoplankton volumes through the sample season until the last sampling date.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from one date with exceptionally high Total P and one with high Total N (see charts). Excluding those dates, the N:P ratio ranged from 32 to 49. In 2001, the three TSI values were close together, in the upper range of oligotrophy. Total P was the lowest of the three, similar to the two previous years.

Overview

Volunteer monitoring began at Lake Marcel in 2000 and continued through 2001. The data collected suggest that this rural lake is relatively high in primary productivity (eutrophic) with fair water quality. Since the lake surface makes up only 3% of the drainage area, direct precipitation is not as important as inlet streams, stormwater runoff and groundwater inputs. There are no significant wetlands in the basin, but there are several ponds upstream in the catchment. Current land use is predominantly rural, with a large development of suburban housing surrounding the lake. Increased algal productivity through human impacts may be occurring, and good management practices are encouraged to avoid creating future problems.

Lake Marcel has no public access boat launch, but has a history of aquatic weed control, including stocking with grass carp. Residents should keep an eye on aquatic plants growing nearshore to catch early infestations of noxious weeds.

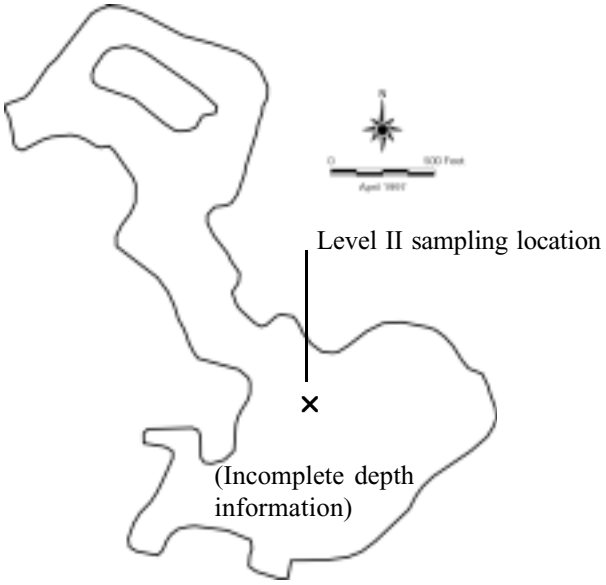
Lake Characteristics

Surface area:	33 acres
Watershed area:	960 acres
Max depth:	17 ft
Mean depth:	
Location:	3 mi north of Carnation

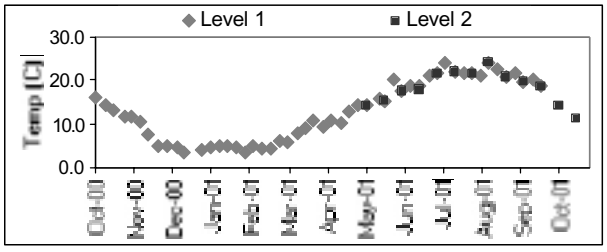
Volunteers

Level I :	Chuck Willis
Level II:	Chuck Willis; Andy Wones

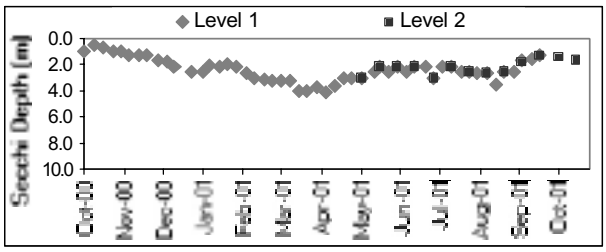
Level II samples collected: 13/13



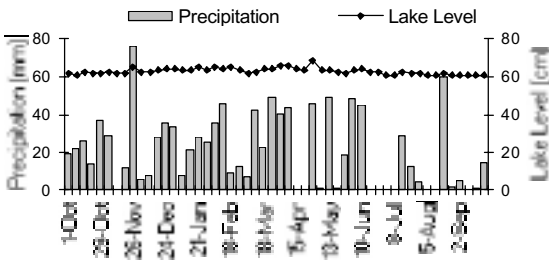
Lake Temperature



Secchi Depth

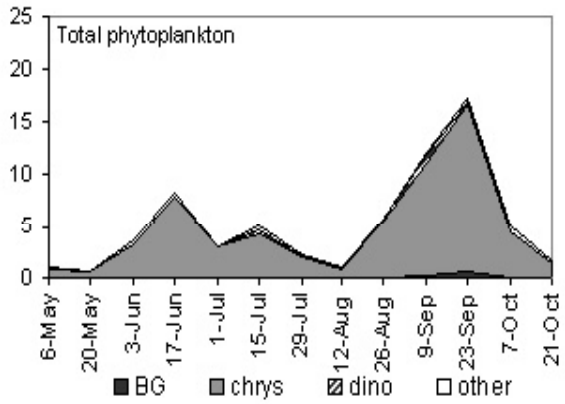


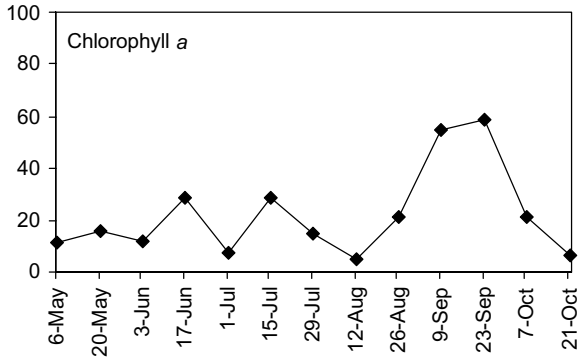
Lake Level and Precipitation



Secchi transparency ranged from 0.5 to 4.2m through the year. Water levels remained steady through the year without seasonal fluctuations due to an outlet control structure. Annual water temperatures ranged from 3.8 to 24 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations (µg/L)

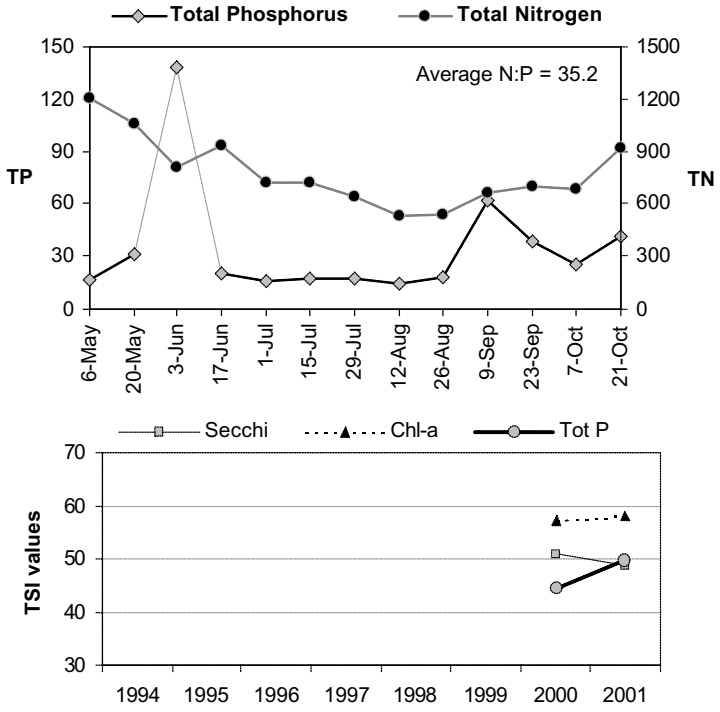




Phytoplankton populations were dominated by the chrysophyte *Dinobryon*, which made several peaks through the sample season, including one very large one in late September. Other important species included the diatom *Asterionella*, several species of dinoflagellates, the euglenophyte *Trachelomonas,* and the bluegreen *Anabaena*. Chlorophyll content followed the phytoplankton volumes fairly well through the sample season.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen changed proportion to each other slowly as Total N decreased through the sampling period, aside from two dates with exceptionally high Total P (see charts). Excluding those dates, the N:P ratio ranged from 18 to 72. In 2001, TSI-chlor was higher than the other two indicators, well into the eutrophic range, while TSI-Secchi and TSI-TP were near the threshold between mesotrophy and eutrophy.

Overview

Volunteer monitoring began at Lake Margaret in 2000 and continued through 2001. The data collected suggest that this rural lake is relatively low in primary productivity (oligotrophic to mesotrophic) with excellent to good water quality. Since the lake surface makes up only 3% of the drainage area, direct precipitation is not as important as inlet streams, stormwater runoff and groundwater inputs. There are many significant wetlands in the basin, in addition to several ponds. Current land use is predominantly rural forested, with a cluster of suburban housing surrounding the lake. Lake Margaret is a source of domestic water for homes nearby, and therefore water quality is of paramount concern. Significant increases in algal productivity through human impacts is unlikely at this time, but good management practices are encouraged to avoid creating future problems.

Lake Margaret has a public access boat launch, and residents should keep a watch on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

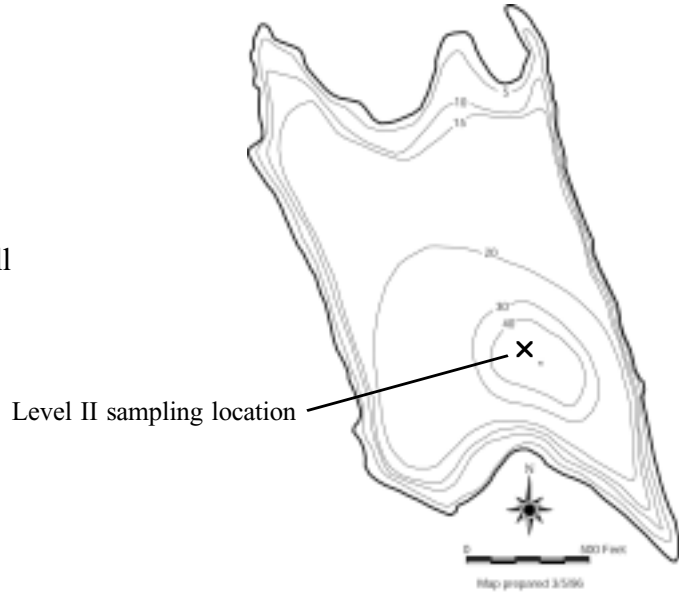
Lake Characteristics

Surface area:	44 acres
Watershed area:	1824 acres
Max depth:	43 ft
Mean depth:	18 ft
Location:	4.2 mi northeast of Duvall

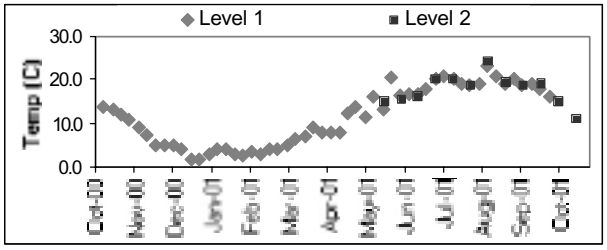
Volunteers

Level I :	Douglas Johnston
Level II:	Douglas Johnston

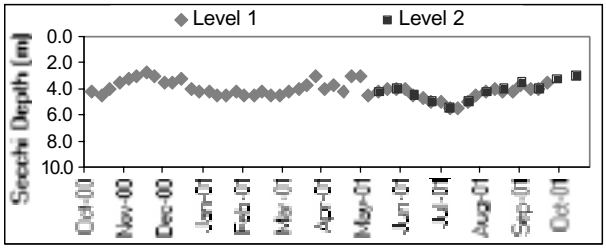
Level II samples collected: 12/13



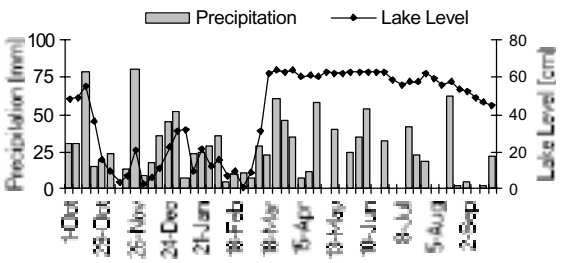
Lake Temperature



Secchi Depth

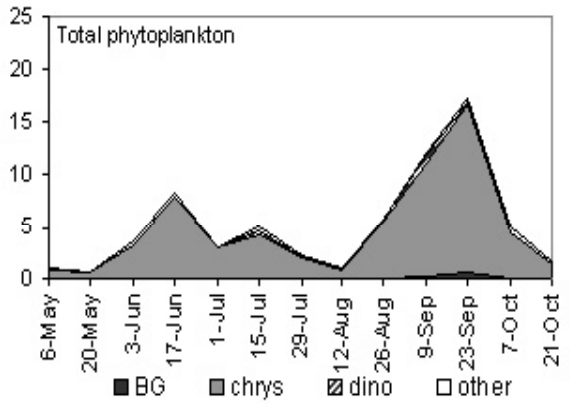


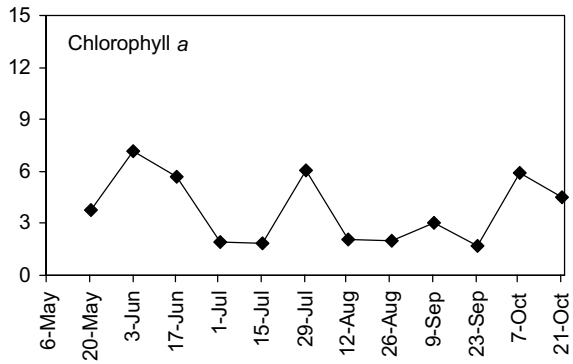
Lake Level and Precipitation



Secchi transparency ranged from 2.8 to 5.5m through the year. Water levels are controlled by the water district at the outlet, which lowers the lake in fall to receive stormwater, raising it in spring to hold water for summer use, and this activity was reflected in the data. Annual water temperatures ranged from 2 to 23 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

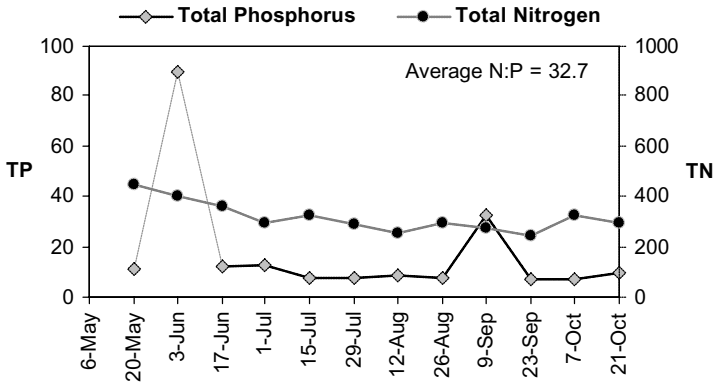


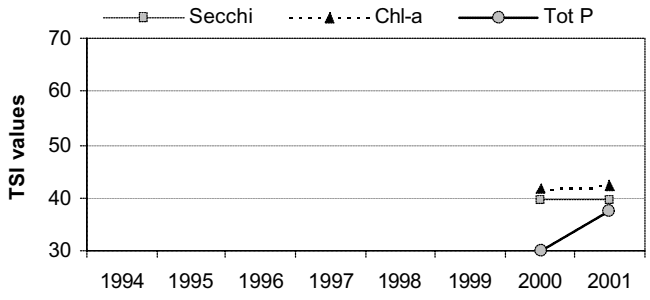


The late spring peak in phytoplankton populations was co-dominated by the diatom *Cyclotella* and an unidentified dinoflagellate, both of which remained prominent until mid-July when the chrysophyte *Dinobryon* made a small population. Other species present in late summer through fall included the dinoflagellate *Ceratium,* the diatom *Asterionella,* and several species of chlorophytes. Chlorophyll content followed phytoplankton volumes rather loosely through the season.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings





Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from two dates with exceptionally high Total P (see chart). Excluding those dates, the N:P ratio ranged from 23 to 44. In 2001, the TSI values were in closer agreement with each other than in 2000, all near the threshold between oligotrophic and mesotrophic.

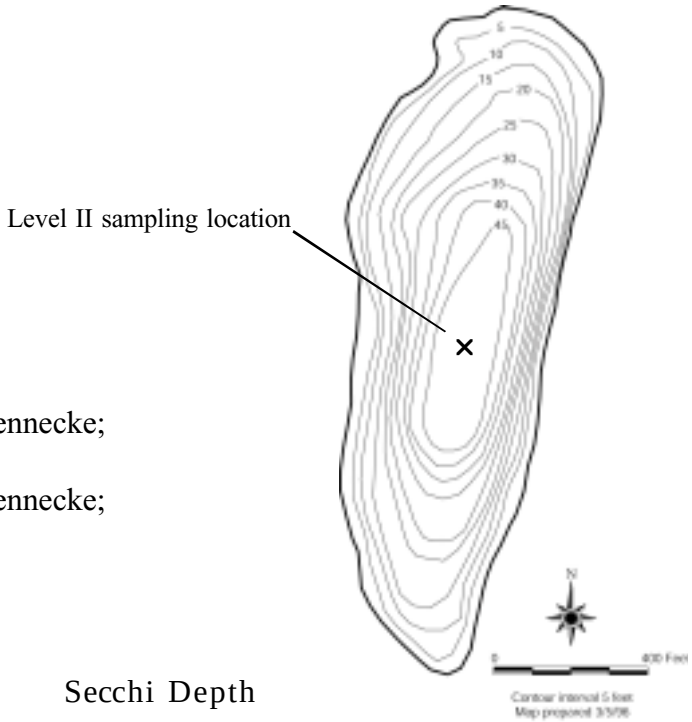
Overview

Volunteer monitoring began at Lake McDonald in 1996 and continued through 2001. The data collected suggest that this lake may have decreased recently in primary productivity (eutrophic to mesotrophic); currently it has good water quality. Since the lake surface makes up 19% of the drainage area, direct precipitation is important, in addition to stormwater runoff and groundwater inputs. There are no significant wetlands in the basin. Current land use is predominantly suburban to rural residential. King County's Cedar Hills Landfill is less than a mile away, and large seagull populations reported on the lake in the past may have contributed nutrients to the water, in addition to other human impacts. Good management practices are encouraged to avoid creating future problems.

Lake McDonald has no public access boat launch, but residents should keep an eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil or other noxious weeds.

Lake Characteristics

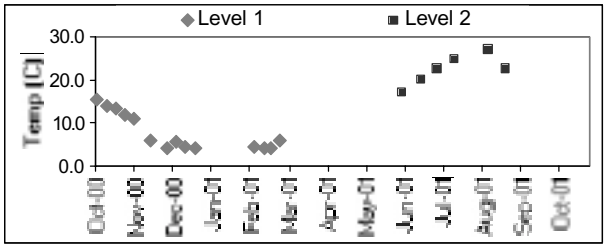
Surface area:	18 acres
Watershed area:	96 acres
Max depth:	47 ft
Mean depth:	23 ft
Location:	2.8 mi east of Renton



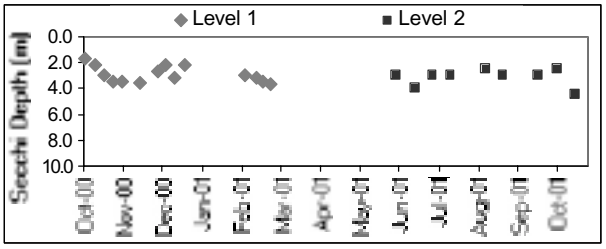
Volunteers

Level I :	Dan Fulgencio and Brad Brennecke; Suzanne Lowry
Level II:	Dan Fulgencio and Brad Brennecke; Suzanne Lowry
Level II samples collected:	11/13

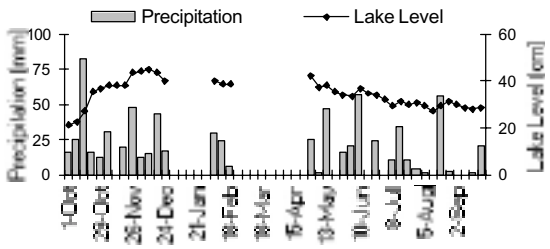
Lake Temperature



Secchi Depth

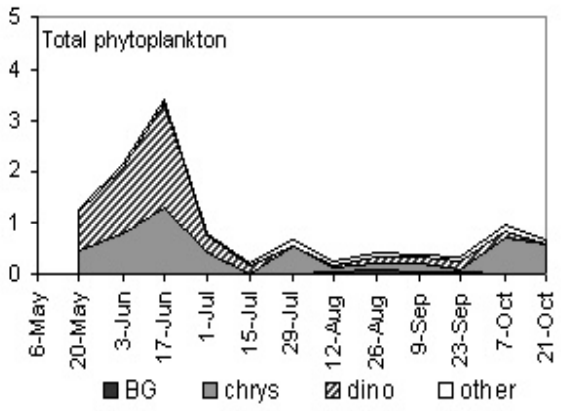


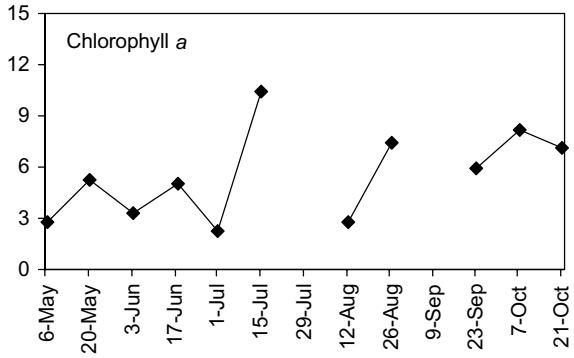
Lake Level and Precipitation



Secchi transparency data was incomplete, but ranged from 1.8 to 4.5m for the dates measured. Water levels were also incomplete, but suggest a modified winter-high/summer-low pattern similar to other small lakes in the region. Annual water temperatures ranged from 2 to 27 degrees Celsius, with some gaps in the record.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

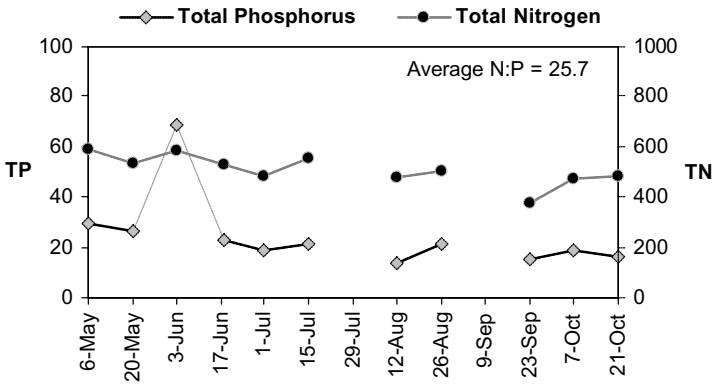


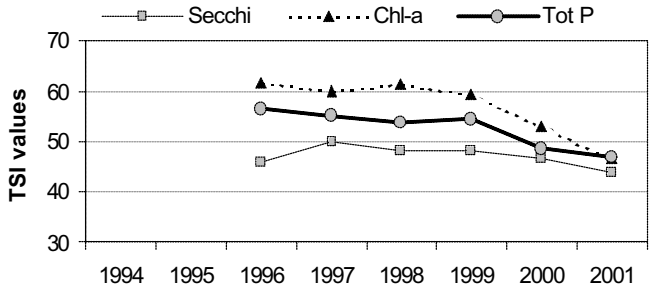


The phytoplankton populations were dominated by the very large colonial chlorophyte *Volvox* for the first part of the sample season, followed by a summer and fall increase in the bluegreen *Aphanizomenon*. Other species present included the dinoflagellate *Ceratium,* the chrysophyte *Dinobryon,* and the euglenophyte *Trachelomonas.* Chlorophyll content generally followed phytoplankton volumes through the season.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings





Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from one date with exceptionally high Total P (see chart). Excluding that date, the N:P ratio ranged from 20 to 35. In 2001, the TSI values were in close agreement with each other. In other years the indicators have diverged from each other systematically, although they were closer in 2000 than in previous years.

Overview

Volunteer monitoring began at Lake Meridian in the early 1980s and continued through 2001, missing only 1996. The data collected indicate this city lake (Kent) is low in primary productivity (oligotrophic) with excellent water quality. Since the lake surface makes up 20% of the drainage area, direct precipitation is important, in addition to an inlet stream, stormwater runoff and groundwater inputs. There is one small wetland near the lake, separated from the shoreline by the Kent-Kangley Road. Current land use is predominantly urban residential, with some open space. Increased algal productivity through human impacts may be occurring, and good management practices are encouraged to avoid creating future problems.

Lake Meridian has a public access boat launch. Eurasian milfoil is established in the lake, and plans are being made to control it. However, residents should watch for other noxious weeds.

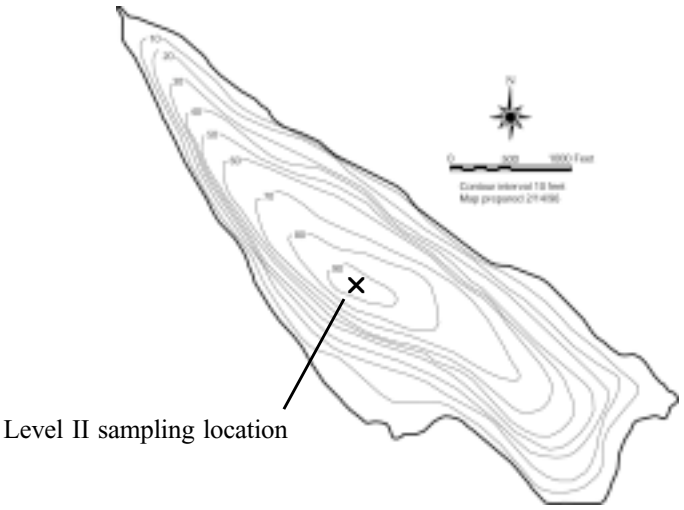
Lake Characteristics

Surface area:	150 acres
Watershed area:	742 acres
Max depth:	90 ft
Mean depth:	41 ft
Location:	Kent

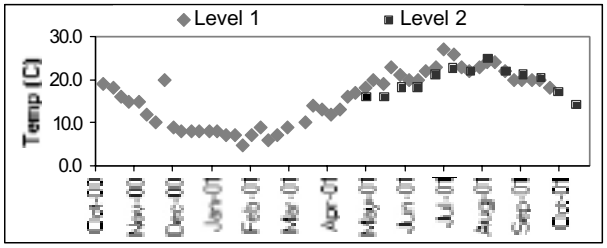
Volunteers

Level I :	Kathe Dizard
Level II:	Al Flores

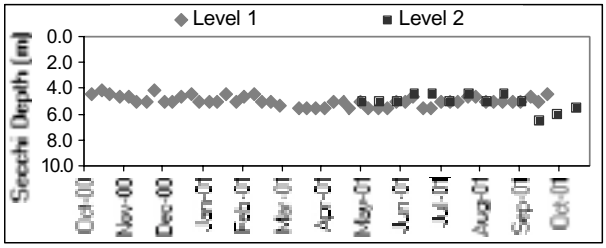
Level II samples collected: 13/13



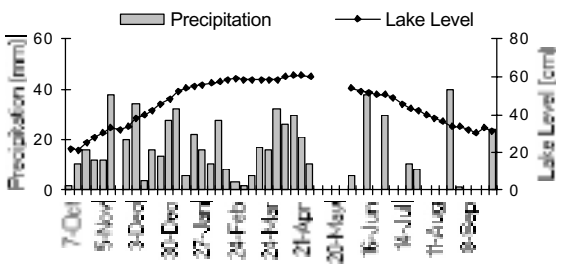
Lake Temperature



Secchi Depth

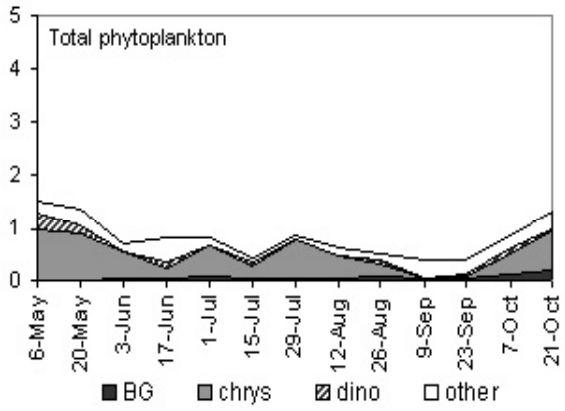


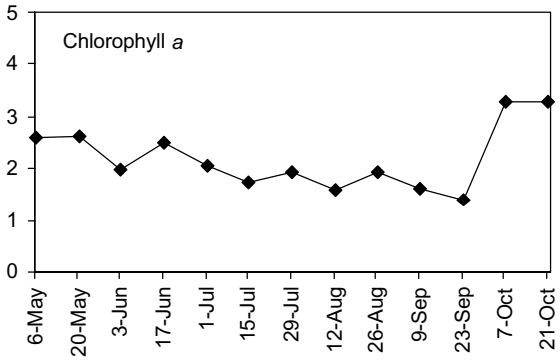
Lake Level and Precipitation



Secchi transparency ranged from 4.3 to 6.5m through the year. Water levels were nearly complete, detailing a winter-high/summer-low pattern similar to other small lakes in the region. Annual water temperatures ranged from 5 to 27 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

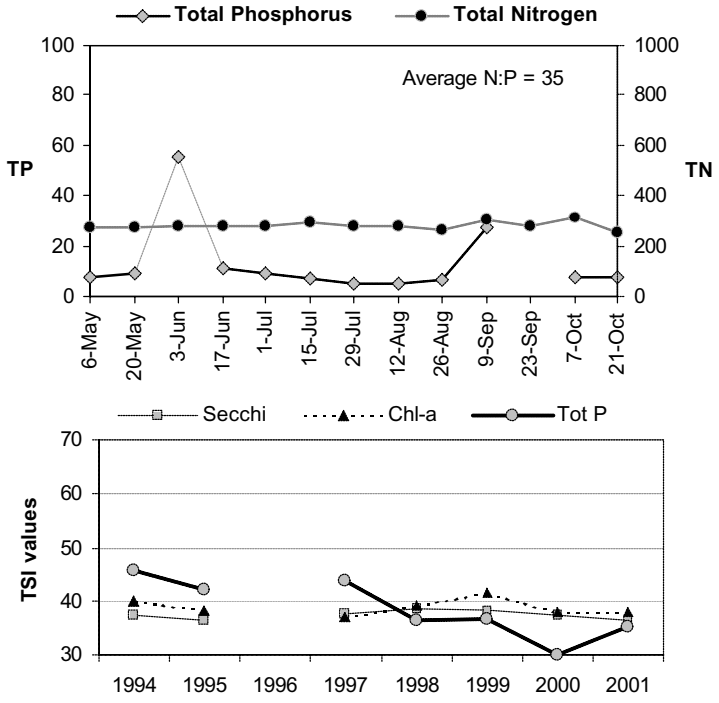




The phytoplankton populations remained low through the sample season, with the largest populations on the first and last sampling dates. The first part of the sample season was dominated by the diatom *Cyclotella*, followed in summer by an increase in the chrysophyte *Dinobryon* and a fall increase in the diatom *Tabellaria.* Other important algae included the chlorophyte *Botryococcus* and the dinoflagellate *Ceratium*. Chlorophyll content generally followed phytoplankton volumes through the season.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from two dates with exceptionally high Total P (see chart). Excluding those dates, the N:P ratio ranged from 16 to 54. In 2001, the TSI values were in close agreement with each other, which was very similar to the values in 1998. In other years TSI-TP has diverged from the other two indicators.

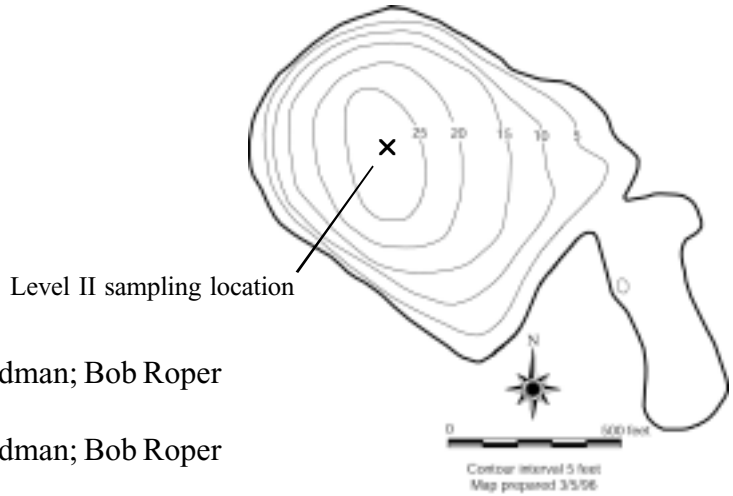
Overview

Volunteer monitoring began at Mirror Lake in 1997 and continued through 2001. The data collected indicate this city lake (Federal Way) is moderate in primary productivity (mesotrophic) with good water quality. Since the lake surface makes up 11% of the drainage area, direct precipitation is less important than stormwater runoff and groundwater inputs. There are no significant wetlands in the basin. Current land use is predominantly urban residential, with some commercial and open space. Increased algal productivity through human impacts may be occurring, and good management practices are encouraged to avoid creating future problems.

Mirror Lake has no public access boat launch, but residents should keep an eye out for Eurasian milfoil and other noxious weeds.

Lake Characteristics

Surface area:	19 acres
Watershed area:	166 acres
Max depth:	27 ft
Mean depth:	12 ft
Location:	Federal Way

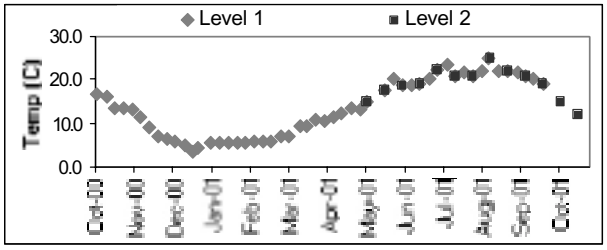


Volunteers

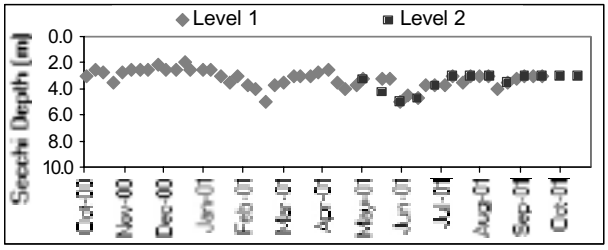
Level I :	John and Pat Hardman; Bob Roper
Level II:	John and Pat Hardman; Bob Roper

Level II samples collected: 13/13

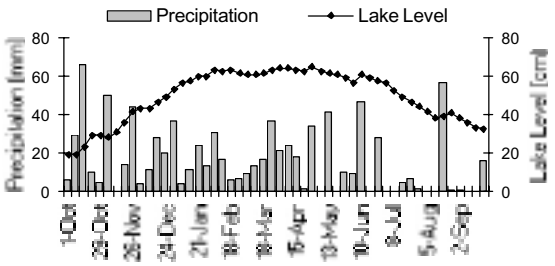
Lake Temperature



Secchi Depth

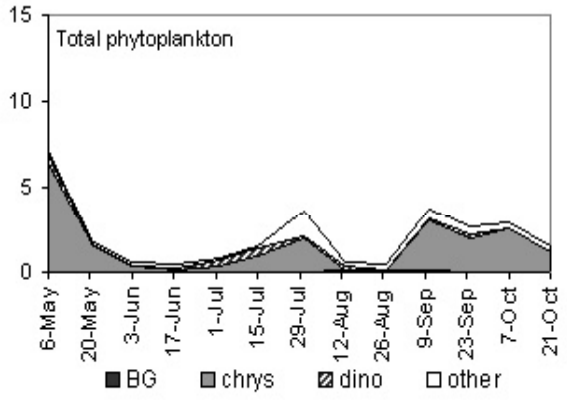


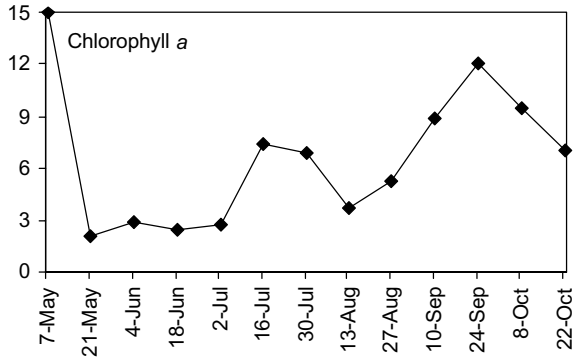
Lake Level and Precipitation



Secchi transparency ranged from 2.0 to 5.0m through the year. Water levels followed a winter-high/summer-low pattern consistent with other small lakes in the region. Annual water temperatures ranged from 3.5 to 25 degrees Celsius, with a level period in July due to cool weather.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

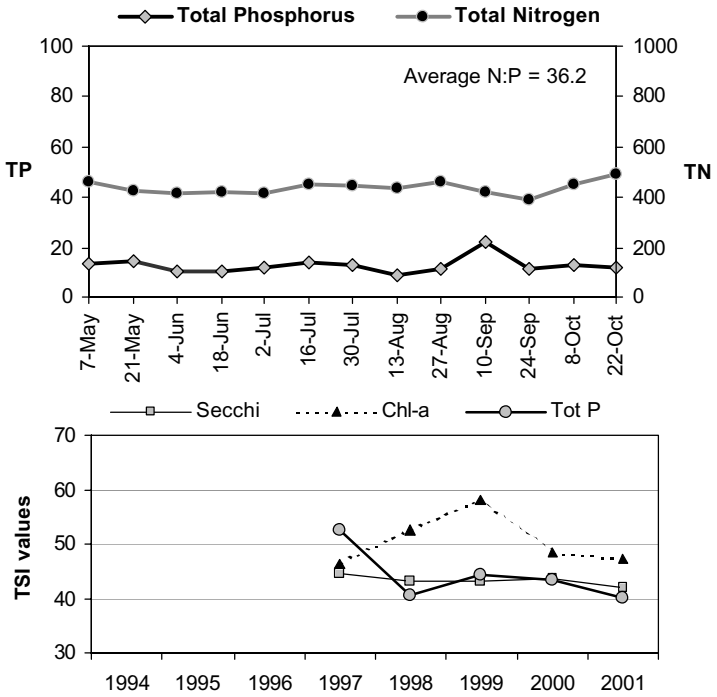




The phytoplankton populations were dominated by the chrysophyte *Dinobryon* for much of the year, with smaller amounts of the dinoflagellate *Ceratium* occurring at the same time. The colonial chlorophyte *Botryococcus* made a small population in midsummer, and several species of diatoms were important in the last sample of the season. Chlorophyll content generally followed phytoplankton volumes through the season, although the fall peak is not synchronous with the phytoplankton maximum.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from one moderately high Total P value (see chart). The N:P ratio ranged from 29 to 48. In 2001, TSI-chlor was higher than the other two indicators, similar to the pattern over the past three years. TSI values for Secchi and Total P have generally remained in the lower to mid range for mesotrophy through the study, while TSI-chlor has been variable.

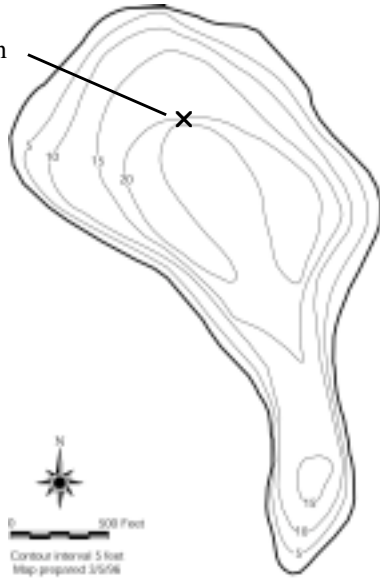
Overview

Volunteer monitoring began at Lake Morton in the early 1980s and has continued through 2001. The data collected indicate this lake is fairly low in primary productivity (mesotrophic to oligotrophic) with good to excellent water quality. Since the lake surface makes up 26% of the drainage area, direct precipitation is very important, in addition to stormwater runoff and groundwater inputs. There are no significant wetlands in the basin. Current land use is mixed rural and open space, with suburban lots along the shoreline of the lake. Increased algal productivity through human impacts could potentially be occurring, and good management practices are encouraged to avoid creating future problems.

Lake Morton has a public access boat launch, and residents should keep a watch for early infestations of Eurasian milfoil and other noxious weeds.

Lake Characteristics

Surface area:	66 acres
Watershed area:	256 acres
Max depth:	23 ft
Mean depth:	15 ft
Location:	2 mi west of Black Diamond

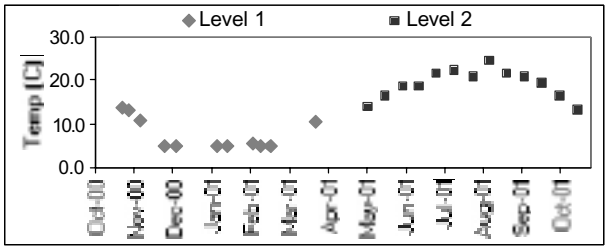


Volunteers

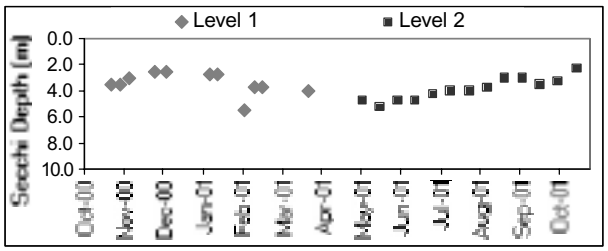
Level I :	Dick Balash; Laura and Paul Mueller
Level II:	Laura and Paul Mueller

Level II samples collected: 13/13

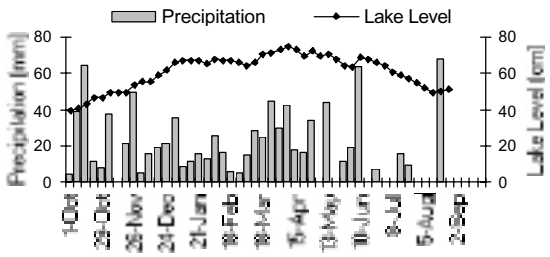
Lake Temperature



Secchi Depth

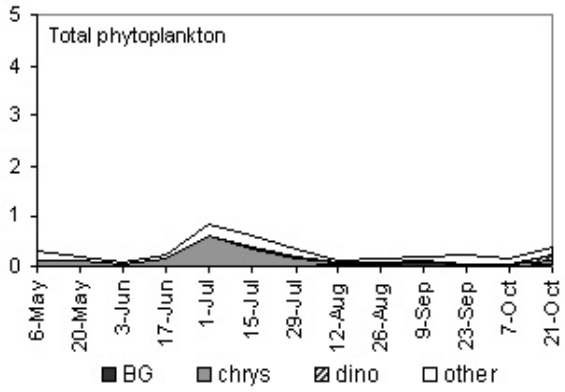


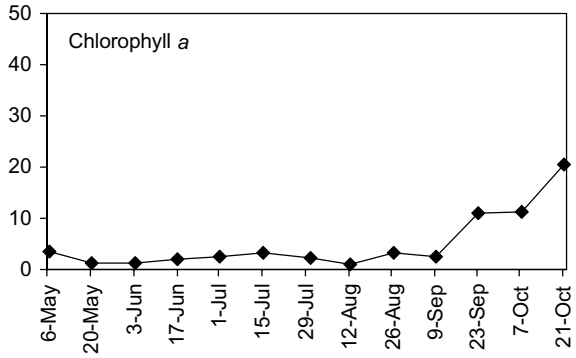
Lake Level and Precipitation



Secchi transparency ranged from 2.3 to 5.5m through the year. Water levels followed a winter-high/summer-low pattern consistent with other small lakes in the region, though with less vertical change over time than many others. Annual water temperatures ranged from 5 to 24.5 degrees Celsius, with a cool period in July due to the weather.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

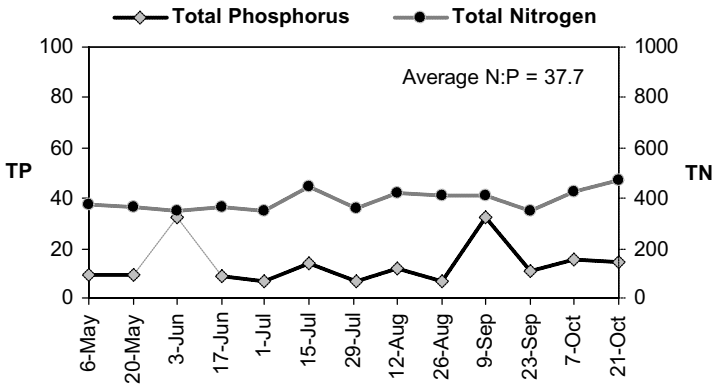


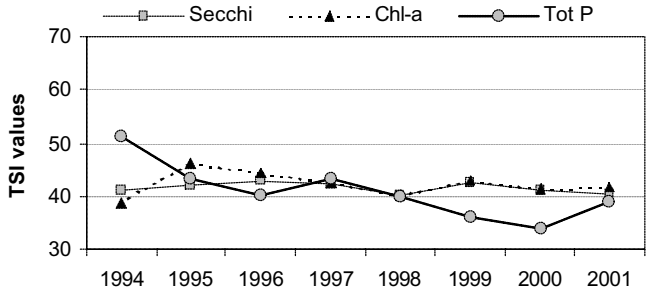


The phytoplankton populations remained very low through the sample season; the peak in July was dominated by the chrysophytes *Dinobryon* and *Gloeobotrys.* Other species found in the lake included the cryptophyte *Cryptomonas*, the diatom *Tabellaria*, and the colonial bluegreen *Aphanocapsa.* Chlorophyll content remained low until the last three samples of the season, when it rose much higher than the phytoplankton counts would suggest.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings





Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from two exceptionally high Total P values (see chart). Aside from those dates, the N:P ratio ranged from 28 to 58. In 2001, the TSI values were very close to each other, right on the threshold between oligotrophy and mesotrophy. This is different from the past two years in which TSI-TP was lower than the other two indicators.

Overview

Volunteer monitoring began at Neilson (Holm) Lake in 1997 and has continued through 2001. The data collected indicate this lake is moderate in primary productivity (mesotrophic) with good water quality. Since the lake surface makes up 10% of the drainage area, direct precipitation is less important than stormwater runoff and groundwater inputs. There are significant wetlands at each end of the lake. Current land use is mixed rural and open space, with some suburban development along the shoreline of the lake. Increased algal productivity through human impacts might be occurring, and good management practices are encouraged to avoid creating future problems.

Neilson Lake has a public access boat launch, and pioneering infestations of Eurasian milfoil were observed in the summer of 2001. Residents should keep a close eye on aquatic plants nearshore to catch growing patches of this and other noxious weeds.

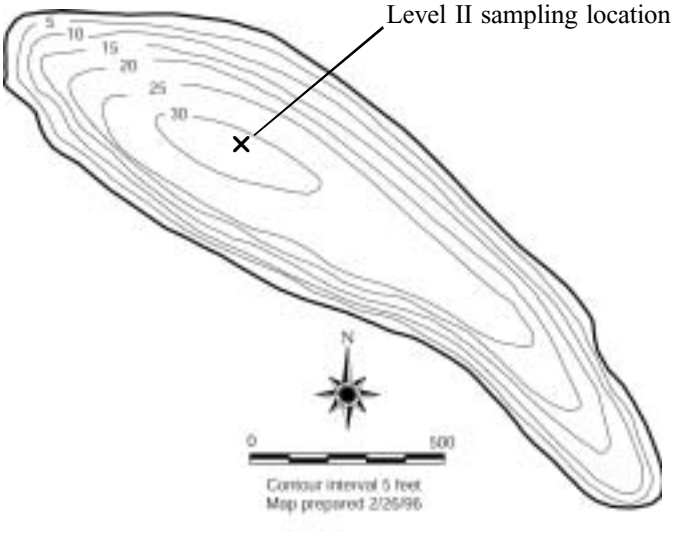
Lake Characteristics

Surface area:	19 acres
Watershed area:	186 acres
Max depth:	31 ft
Mean depth:	18 ft
Location:	2.5 mi east of Auburn

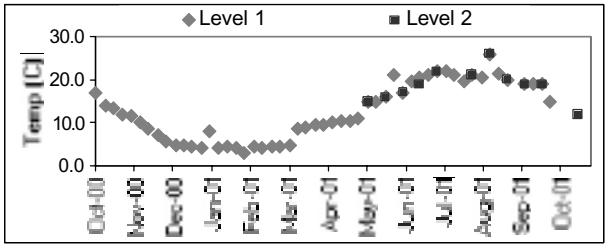
Volunteers

Level I :	Kevin and Kurtis Schultz
Level II:	Kevin and Kurtis Schultz

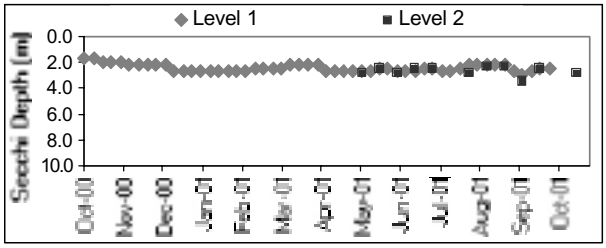
Level II samples collected: 11/13



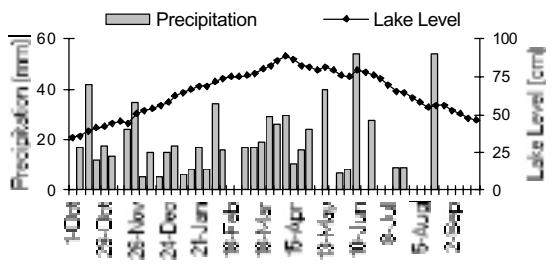
Lake Temperature



Secchi Depth

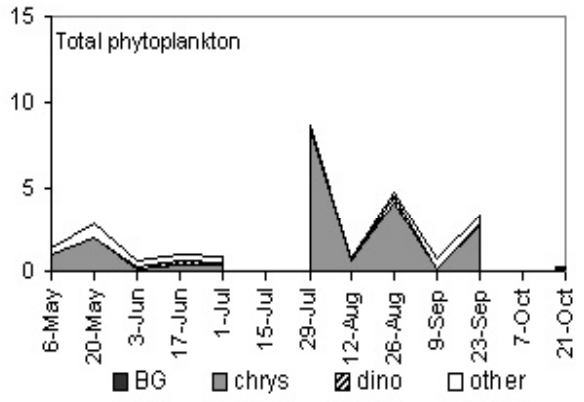


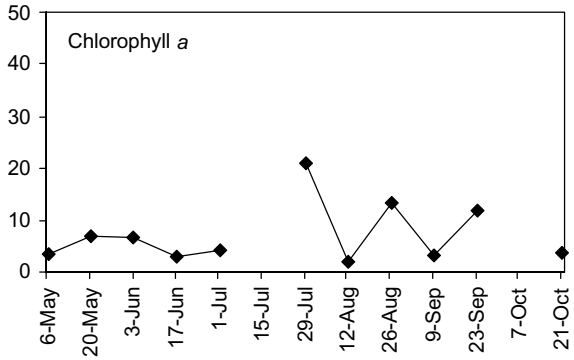
Lake Level and Precipitation



Secchi transparency was very stable, ranging from 1.8 to 3.0m through the year. Water levels followed a winter-high/summer-low pattern consistent with other small lakes in the region. Annual water temperatures ranged from 3 to 26 degrees Celsius, with a cool period in July due to the weather.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations (µg/L)

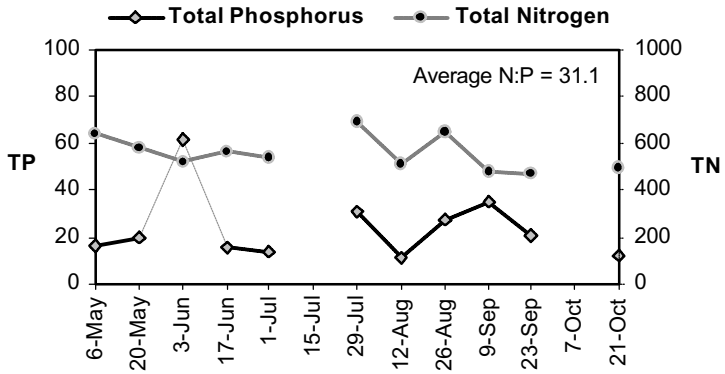


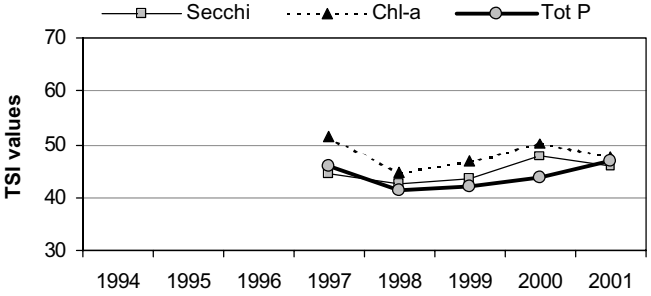


The phytoplankton population reached a maximum in late July, dominated by the chrysophyte *Dinobryon,* which remained prominent for the rest of the sample season. Other species found in the lake included the chlorophyte *Asterococcus* and the euglenophyte *Trachelomonas*. Chlorophyll content reflected the pattern of the phytoplankton counts fairly closely.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



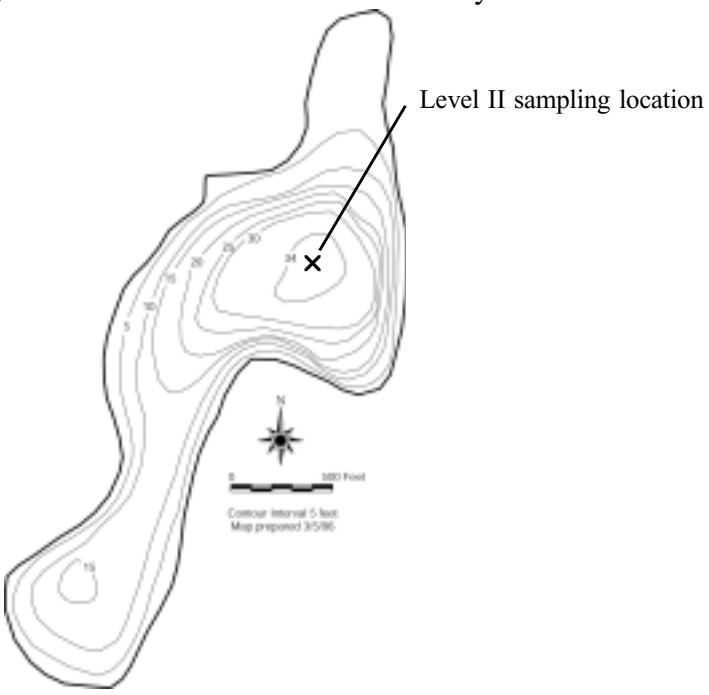


Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from one exceptionally high Total P value (see chart). Aside from that date, the N:P ratio ranged from 14 to 47. In 2001, the TSI values were very close to each other in the upper midrange for mesotrophy. In past years, the averages of the three indicators have been similar, although the individual values have not been as close to each other as in 2001.

Overview

Volunteer monitoring began at North Lake in the early 1980s, was resumed from 1995 through 1998 after a hiatus and has begun again in 2001. The data collected indicate this lake, whose western shoreline is in the city of Federal Way, is moderate in primary productivity (mesotrophic) with good water quality. Since the lake surface makes up 11% of the drainage area, direct precipitation is less important than stormwater runoff and groundwater inputs. There are no significant wetlands in the basin. Current land use is mixed, with suburban residential, rural, open space and office complexes all located within the catchment. Most of the western shoreline is currently in open space. Increased algal productivity through human impacts might be occurring, and good management practices are encouraged to avoid creating future problems.

North Lake has a public access boat launch, and residents should watch for early infestations of Eurasian milfoil and other noxious weeds.



Lake Characteristics

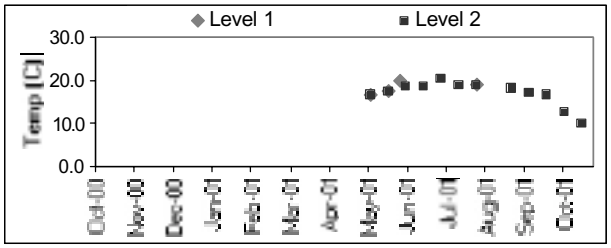
Surface area:	55 acres
Watershed area:	486 acres
Max depth:	34 ft
Mean depth:	14 ft
Location:	Eastern border of Federal Way

Volunteers

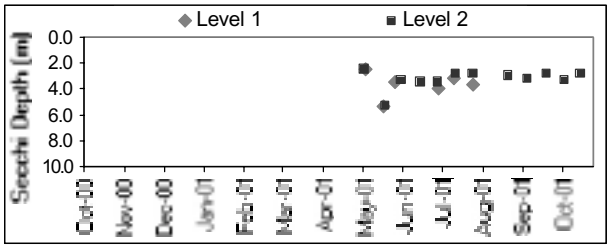
Level I :	Barry James
Level II:	Barry James

Level II samples collected: 12/13

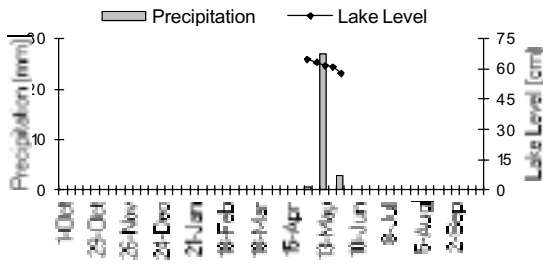
Lake Temperature



Secchi Depth

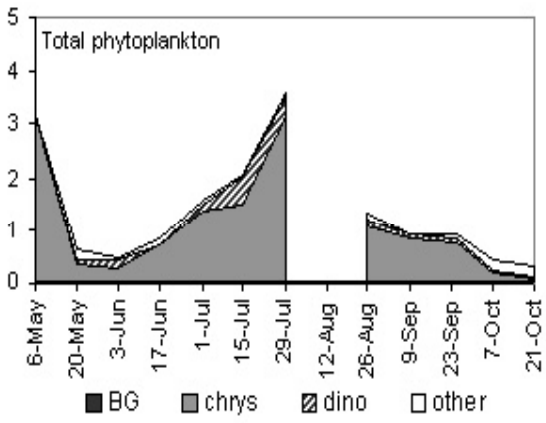


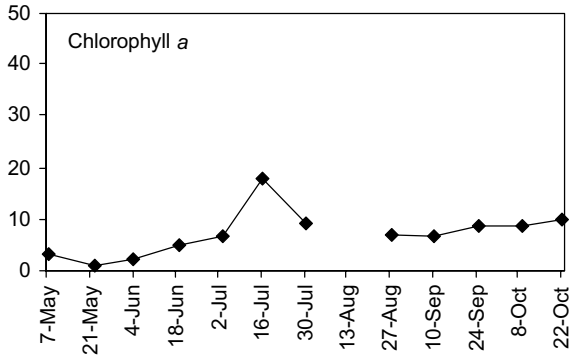
Lake Level and Precipitation



Secchi transparency ranged from 2.5 to 5.3m through the sample season, but was mostly close to 3m. Water level and precipitation records were incomplete. Level II water temperatures ranged from 10 to 20.5 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations (µg/L)

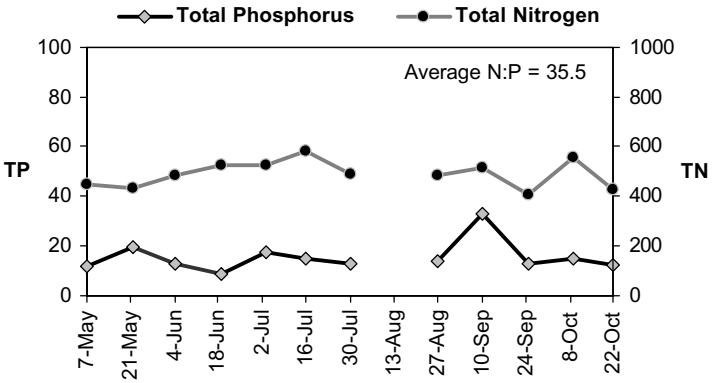


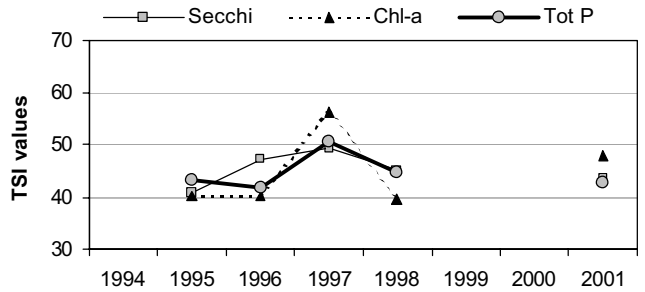


The phytoplankton population was dominated by the chrysophyte *Dinobryon* for most of the sample season, which made large populations at the beginning of the season and in late July. Other species found in the lake included the chrysophyte *Synura,* the dinoflagellat*e Peridineum,* and the euglenophyte *Trachelomonas.* Chlorophyll content reflected the pattern of the phytoplankton counts fairly closely.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings





Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from one exceptionally high Total P value (see chart). Aside from that date, the N:P ratio ranged from 22 to 62. In 2001, the TSI values were relatively close to each other in the mid-range for mesotrophy. Except for 1997, the averages of the three indicators have been similar, although the individual values have rarely been as close to each other.

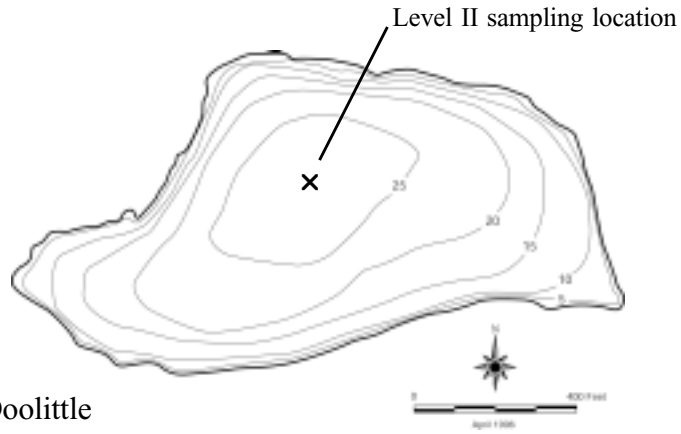
Overview

Volunteer monitoring began at Paradise Lake in 1996 and has continued through 2001. The data collected indicate this lake, whose watershed extends into Snohomish County, is high in primary productivity (eutrophic) with fair water quality. Since the lake surface makes up less than 1% of the drainage area, direct precipitation is not important; much more input comes from the inlet streams, stormwater runoff and groundwater. There are several significant wetlands in the basin and along the edges of the lake. Current land use is largely rural, agricultural, forested or open space, with several suburban developments in the southern catchment. Increased algal productivity through human impacts, particularly agricultural, might be occurring, and good management practices are encouraged to avoid creating future problems.

Paradise Lake has no public access boat launch, but residents should keep an eye out for early infestations of Eurasian milfoil and other noxious weeds.

Lake Characteristics

Surface area:	18 acres
Watershed area:	2643 acres
Max depth:	28 ft
Mean depth:	17 ft
Location:	2 mi east of Woodinville

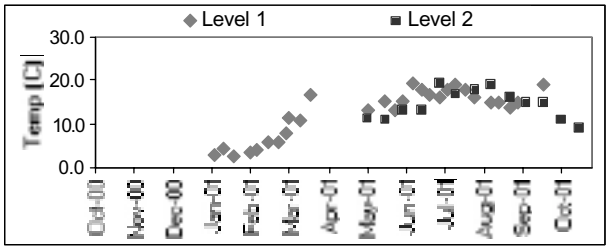


Volunteers

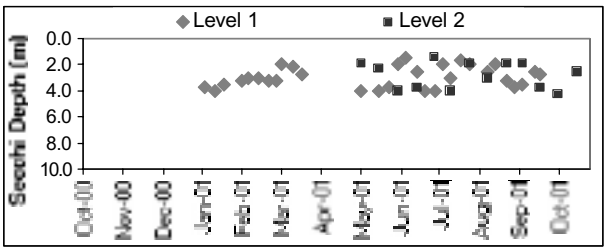
Level I :	Shirley Egerdahl; Kay Doolittle
Level II:	Shirley Egerdahl; Nancy Doolittle

Level II samples collected: 13/13

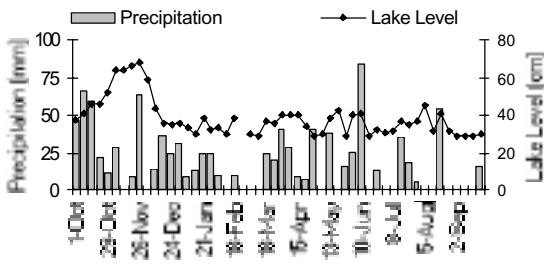
Lake Temperature



Secchi Depth

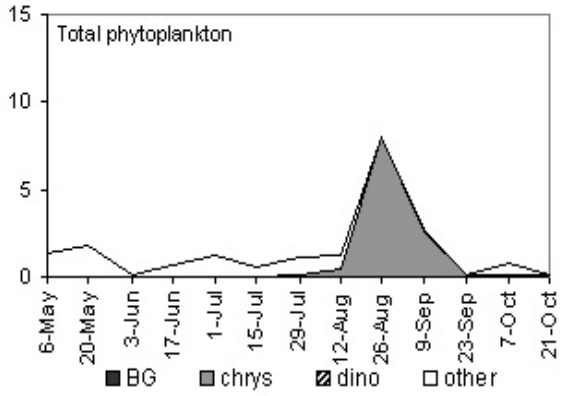


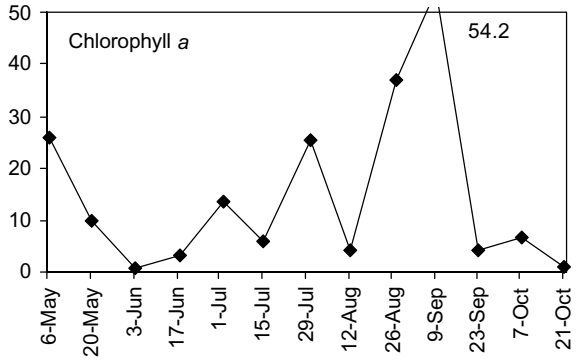
Lake Level and Precipitation



Secchi transparency ranged from 1.5 to 4.3m from January through October 2001, with one gap in the record. Water levels were stable, with the exception of a period of higher water in October-November of 2000. Water temperatures were recorded for the same interval as the Secchi. They ranged from 2.5 to 19.5 degrees Celsius.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

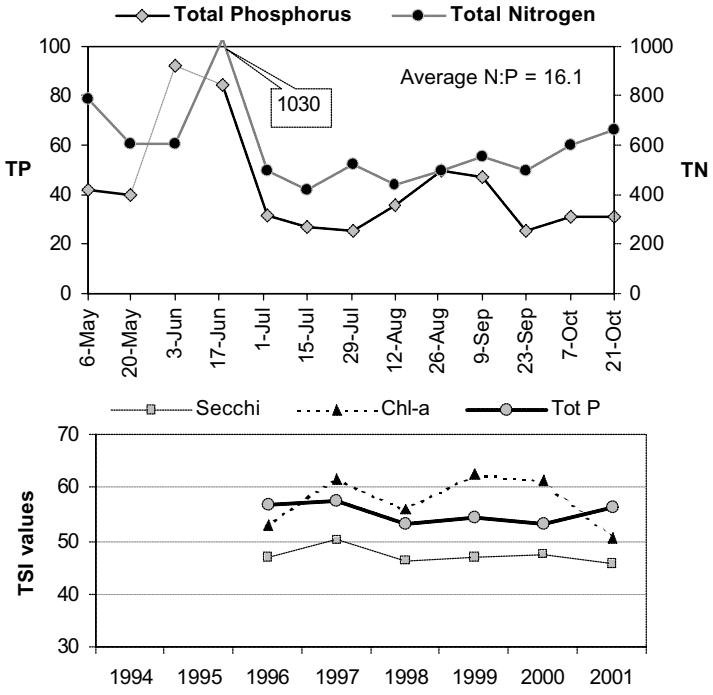




The phytoplankton population before late July was dominated by the cryptophytes *Rhodomonas* and *Cryptomonas*. At the end of July, a population of the chlorophyte *Asterococcus* dominated, but was replaced in August by the diatom *Asterionella*, which made a large maximum later in the month. This was followed by smaller populations of several chrysophytes, *Asterococcus*, and *Rhodomonas*. Chlorophyll content reflected the pattern of the phytoplankton counts, but the maximum was actually on the date following the peak in the phytoplankton counts.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from one high Total P value (see chart). Including all dates, the N:P ratio ranged from 7 to 21. In 2001, the TSI values for chlorophyll and TP indicated eutrophy, while the TSI-Secchi was in the mesotrophic range, similar to past years. None of the indicators were close to each other in value, which may relate to the particular species in the phytoplankton community living in the lake.

Overview

Volunteer monitoring began at Pine Lake in the 1980s and has continued through 2001, with a gap from 1990–1992 and in 1994. Diversion of wetland flow from the western catchment was completed in 1988 to decrease phosphorus input, reducing the functional drainage area from 640 acres to 487. The data collected indicate this city lake (Sammamish) is currently low to moderate in primary productivity (oligotrophic to mesotrophic) with excellent to good water quality. Since the lake surface makes up 18% of the current drainage area, direct precipitation is important, in addition to stormwater runoff and groundwater. Current land use is largely suburban residential and open space, but includes a portion of a shopping center. Increased algal productivity through human impacts is likely to be occurring, and good management practices are encouraged to avoid creating future problems.

Pine Lake has a public access boat launch, and residents should keep an eye out for early infestations of Eurasian milfoil and other noxious weeds.

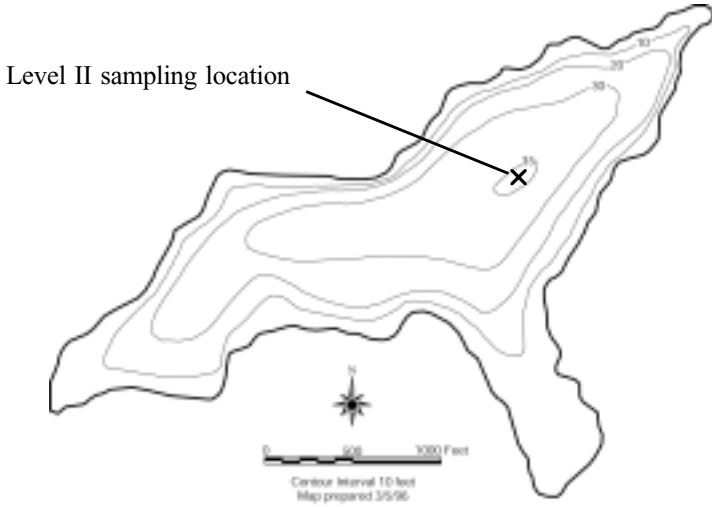
Lake Characteristics

Surface area:	88 acres
Watershed area:	487 acres
Max depth:	39 ft
Mean depth:	20 ft
Location:	Sammamish

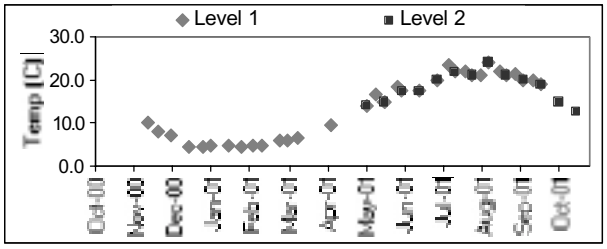
Volunteers

Level I :	Kate Bradley
Level II:	Kate Bradley

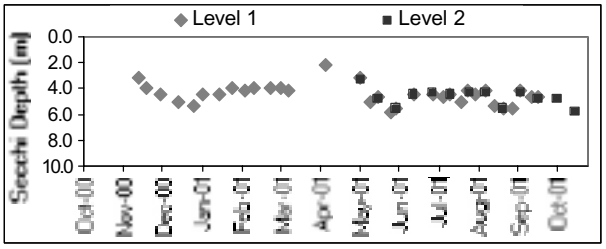
Level II samples collected: 13/13



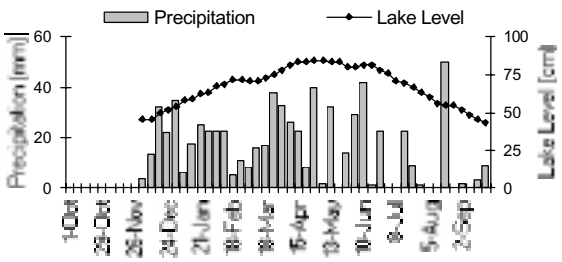
Lake Temperature



Secchi Depth

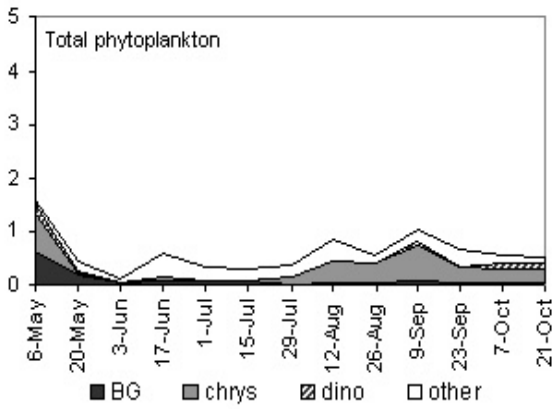


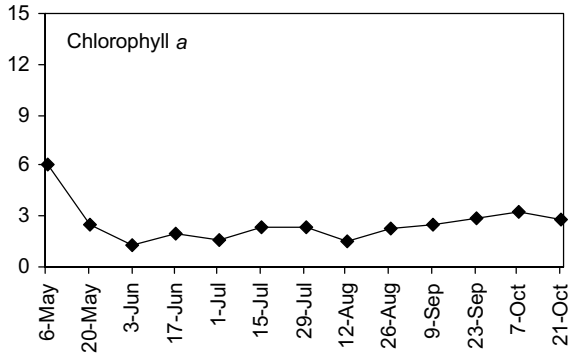
Lake Level and Precipitation



Secchi transparency ranged from 2.3 to 5.8m through the year. Water levels followed a winter-high/autumn-low pattern similar to many area lakes. Annual water temperatures ranged from 4.5 to 24.0 degrees Celsius, with a cool period in July likely related to the weather.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

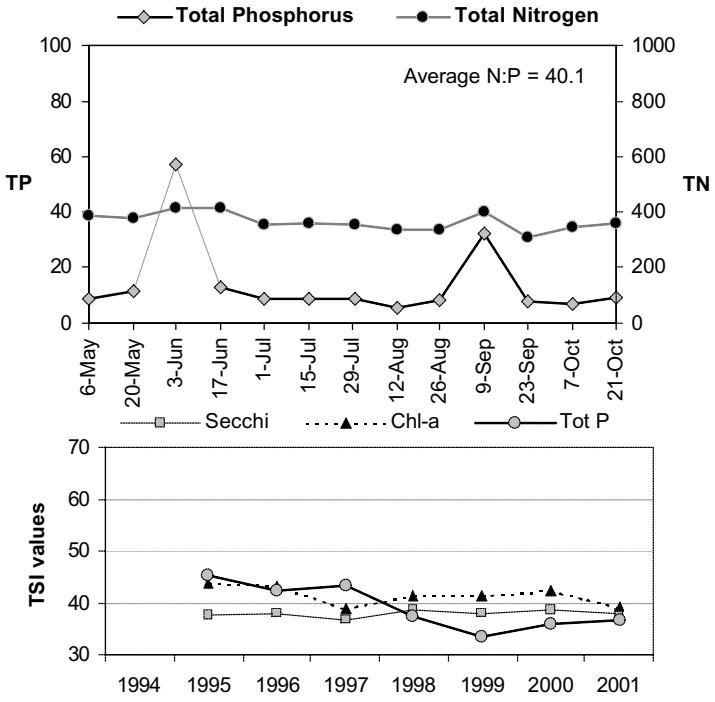




The phytoplankton population was low through the sampling period, with the maximum volume recorded on the first sample date. At that time, the diatom *Asterionella* and the bluegreen *Anabaena* were in approximately equal proportions and dominated the community. Several species of chlorophyte algae became prominent in June, followed in August by the chrysophyte *Dinobryon.* Chlorophyll content reflected the pattern of the phytoplankton counts quite closely.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period, aside from two exceptionally high Total P values (see chart). Aside from those dates, the N:P ratio ranged from 32 to 65. In 2001, the TSI values were close to each other at the high end of the oligotrophic range. This is most like 1998, which was slightly higher. In most other years, the indicators have not been in tight agreement with each other.

Overview

Volunteer monitoring began at Pipe Lake in the 1980s and has continued through 2001, with a gap from 1989–1992. The data collected indicate this city lake (Maple Valley–Covington) is currently low to moderate in primary productivity (oligotrophic to mesotrophic) with excellent to very good water quality. Since the lake surface makes up 17% of the drainage area, direct precipitation is important, in addition to stormwater runoff and groundwater. Current land use is largely residential and open space, but also includes an equestrian facility. Increased algal productivity through human impacts may occur, and good management practices are encouraged to avoid creating future problems.

Pipe Lake has no public access boat launch, but has a history of both milfoil and *Hydrilla* infestations for which eradication efforts have been funded by Washington State Dept of Ecology and the cities since 1995. Residents should watch aquatic plants nearshore to catch growing patches of these and other noxious weeds.

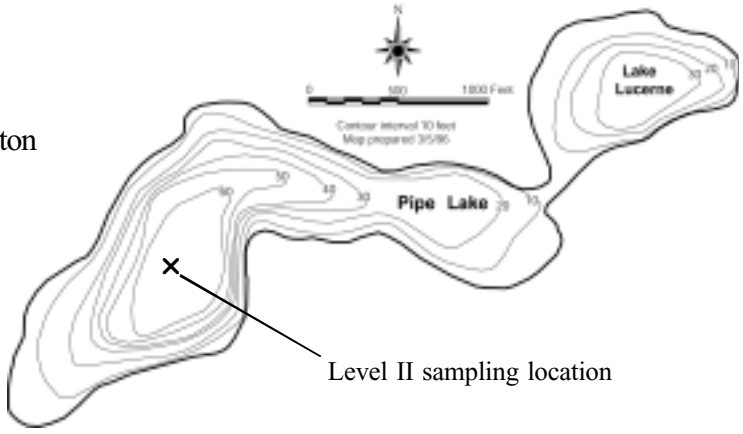
Lake Characteristics

Surface area:	52 acres
Watershed area:	314 acres
Max depth:	65 ft
Mean depth:	27 ft
Location:	Maple Valley-Covington

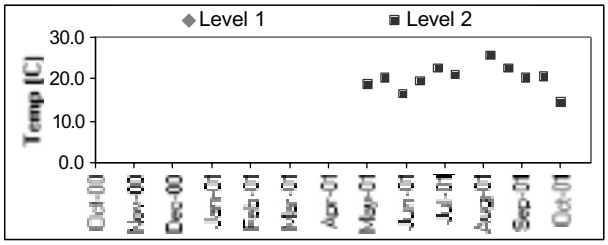
Volunteers

Level I :	Ralph Beede
Level II:	Bob Brenner

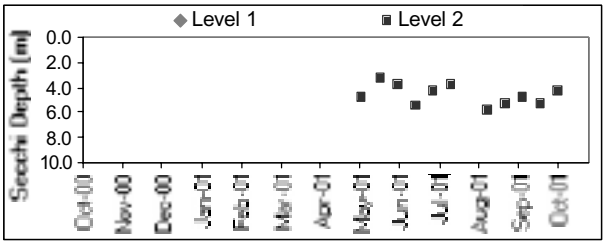
Level II samples collected: 11/13



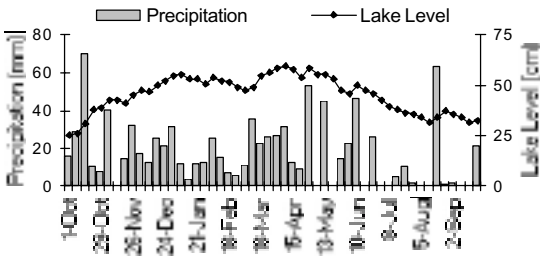
Lake Temperature



Secchi Depth

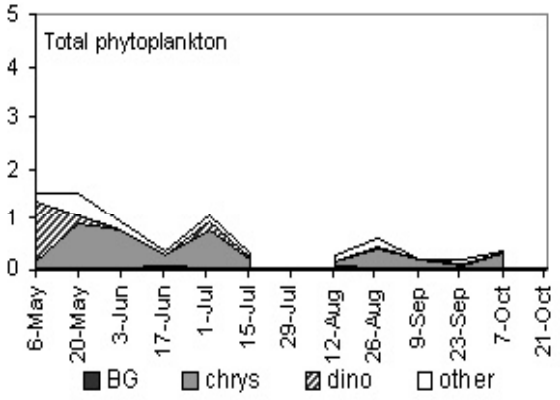


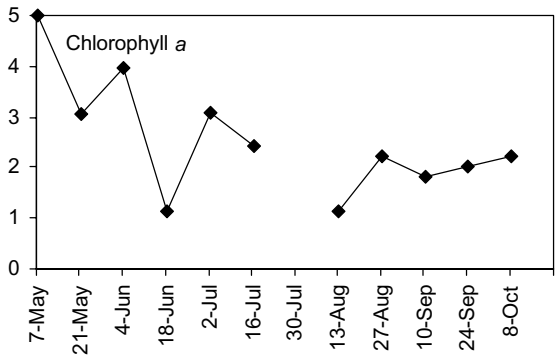
Lake Level and Precipitation



Secchi transparency ranged from 3.3 to 5.5m through the sample season. Annual water levels followed a winter-high/autumn-low pattern similar to many area lakes. Water temperatures ranged from 4.5 to 24.0 degrees Celsius through the sampling period.

Phytoplankton (mm 3/L) and Chlorophyll *a* Concentrations (µg/L)

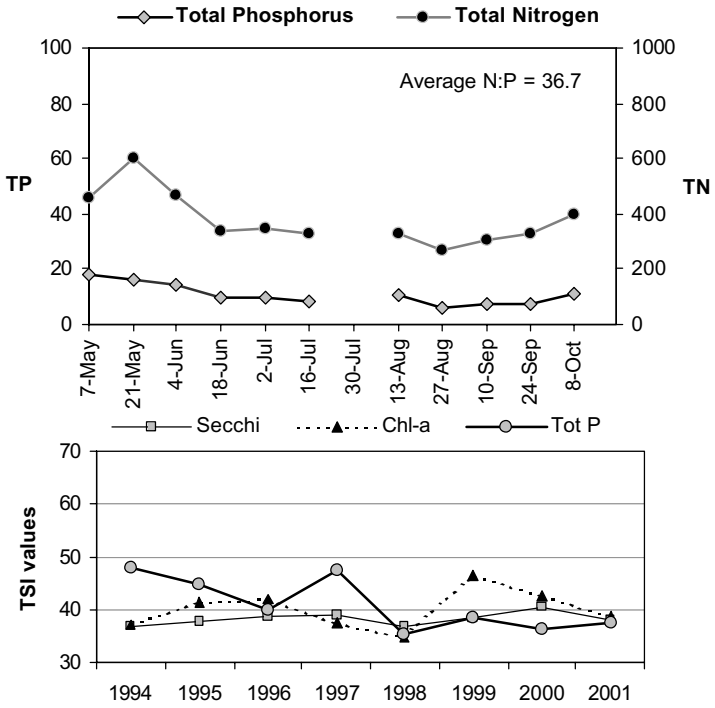




The phytoplankton population was at its highest point at the beginning of sampling and decreased over the rest of the period, with the exception of a small peak in early July. The dinoflagellate *Peridineum* was dominant in the first sample, replaced in importance by the diatom *Cyclotella* and the chlorophyte *Botryococcus*. These in turn were replaced by the chrysophyte *Dinobryon*, which maintained dominance for the rest of the sample period. The colonial bluegreen *Aphanocapsa* made a brief appearance in mid-August, but was never prominent. Chlorophyll content reflected the pattern of the phytoplankton counts fairly closely.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in fairly constant proportion to each other through the sampling period. The N:P ratio ranged from 25 to 45. In 2001, the TSI values were close to each other at the high end of the oligotrophic range. This is most like 1998, which was slightly lower. In most other years, the indicators have not been in close agreement with each other, but without a systematic pattern of divergence.

Overview

Volunteer monitoring began at Lake Sawyer in the 1980s and has continued through 2001. The data collected indicate this city lake (Black Diamond) is low to moderate in primary productivity (oligotrophic to mesotrophic) with excellent to good water quality. Since the lake surface makes up only 3% of the drainage area, direct precipitation is much less important than inlet streams, stormwater runoff and groundwater. There are numerous wetlands in the watershed as well as smaller lakes. Current land use is complex, with three jurisdictions within the catchment. Use ranges from urban and commercial to rural, forested, agricultural and open space. Treated sewage effluent was diverted from an upstream wetland in1992 after impacts to the lake were identified, and a lake management plan was prepared to detail further actions that could be taken to protect the water quality of the lake (King County, 2000).

Lake Sawyer has a popular public access boat launch, and supports a Eurasian milfoil infestation that might respond to management activities. Residents should keep a close eye on aquatic plants growing nearshore to catch growing patches of this and other noxious weeds.

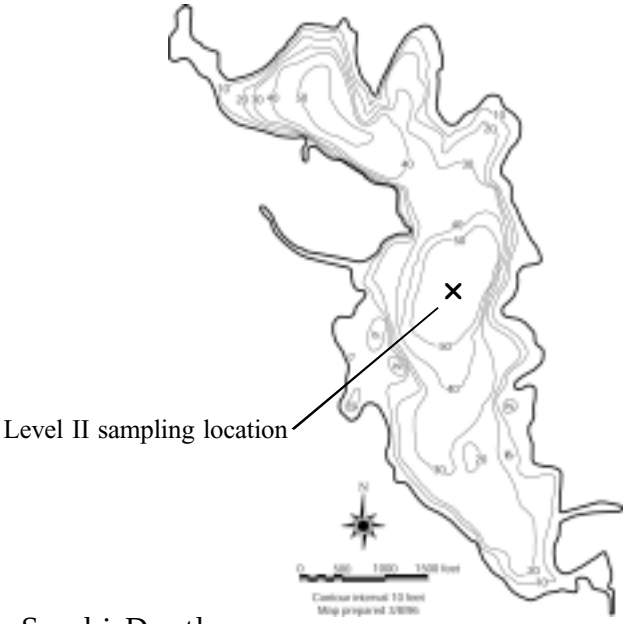
Lake Characteristics

Surface area:	279 acres
Watershed area:	8300 acres
Max depth:	58 ft
Mean depth:	26 ft
Location:	Black Diamond

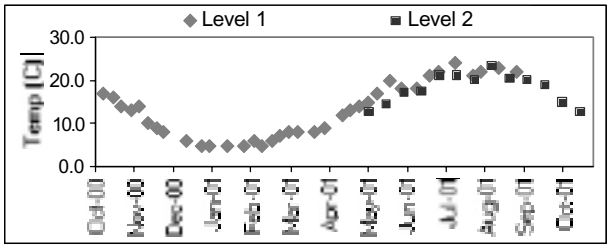
Volunteers

Level I :	John Davies
Level II:	Glenn Ross

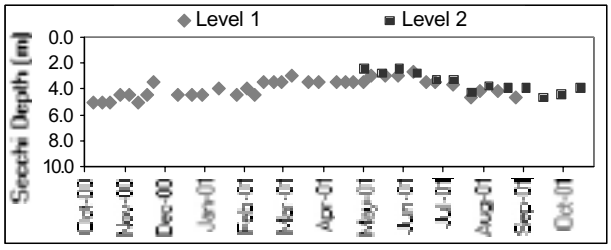
Level II samples collected: 13/13



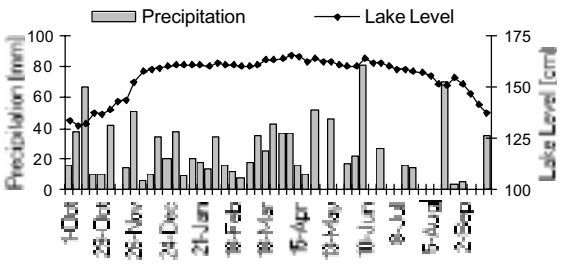
Lake Temperature



Secchi Depth

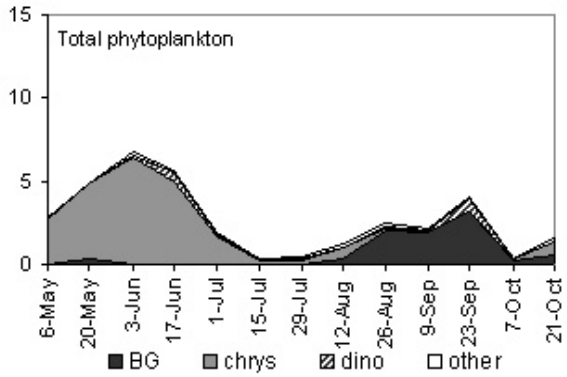


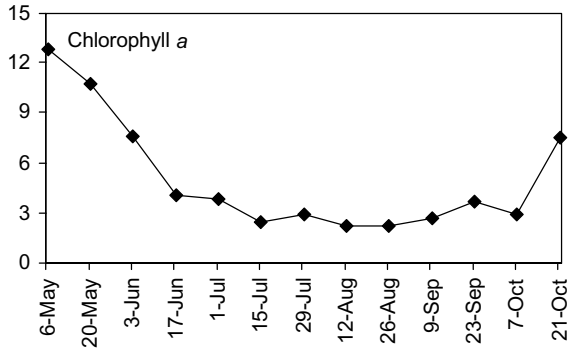
Lake Level and Precipitation



Secchi transparency ranged from 2.5 to 5.0m through the year. Water levels rose in December, remained high through the summer, and dropped in late August, making a slightly different pattern than that of smaller lakes in the region. Annual water temperatures ranged from 5.0 to 24.0 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

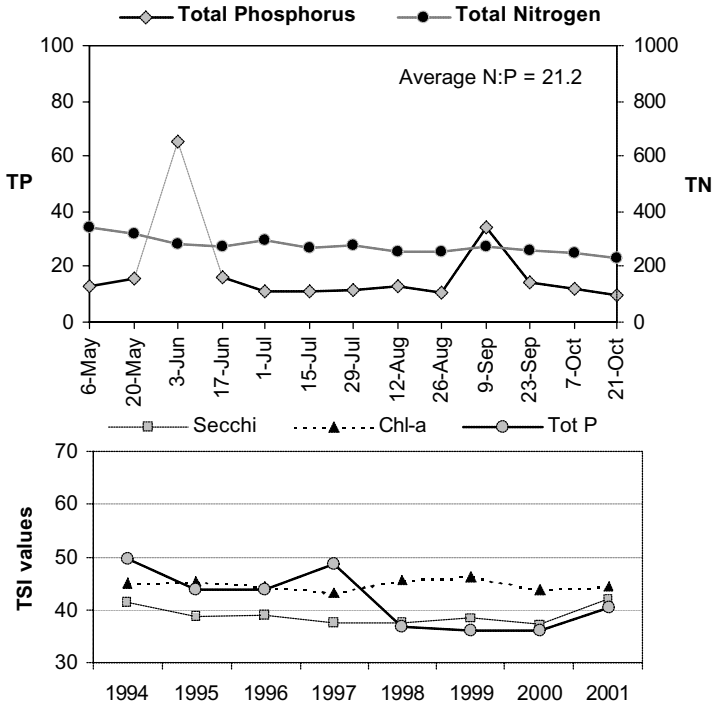




The phytoplankton populations reached two peaks during the sample season. The first was in June, when the diatoms *Cyclotella* and *Tabellaria* dominated the algae. A crash in July was followed by an increase in bluegreens, notably *Lyngbya*. By October, *Lyngbya* had decreased and the bluegreen *Aphanizomenon* increased. The diatom *Asterionella* became dominant in the last sample of the season. Chlorophyll content only generally reflected the pattern of the phytoplankton counts, not showing the peak in bluegreens during the summer and overestimating the first two samples relative to the populations found in the counts.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in constant proportion to each other through the sampling period, aside from two dates with exceptionally high Total P (see chart). Aside from those dates, the N:P ratio ranged from 17 to 27. In 2001, the TSI values were close to each other at the low end of mesotrophy. In other years, the indicators have not been in close agreement with each other, with TSI-chlor distinctly higher than the other two for the previous three years. The concurrent rise in TSI-TP and TSI-Secchi in 2001 is attention getting, but may not be sustained in future years.

Overview

Volunteer monitoring began at Shadow Lake in the 1980s and has continued through 2001, with some gaps over time. The data collected indicate this lake is moderate in primary productivity (mesotrophic) with good water quality. Since the lake surface makes up 11% of the drainage area, direct precipitation is less important than stormwater runoff and groundwater. There is one very large wetland in the watershed adjacent to the lake, from which a creek leaves the basin. Current land use is largely rural, with suburban housing concentrated to the north of the lake. Increased algal productivity through human impacts might be occurring, and good management practices are encouraged to avoid creating future problems.

Shadow Lake has a public access boat launch. Eurasian milfoil has been found in the lake since 1995, but does not appear to be invading. Residents should keep an eye on aquatic plants growing nearshore to catch any increases in patches of this and other noxious weeds.

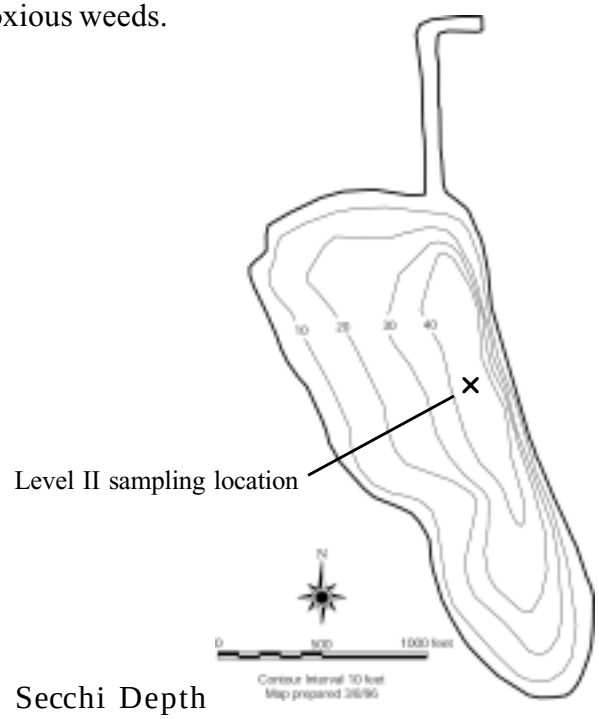
Lake Characteristics

Surface area:	50 acres
Watershed area:	450 acres
Max depth:	45 ft
Mean depth:	22 ft
Location:	1 mi north of Covington

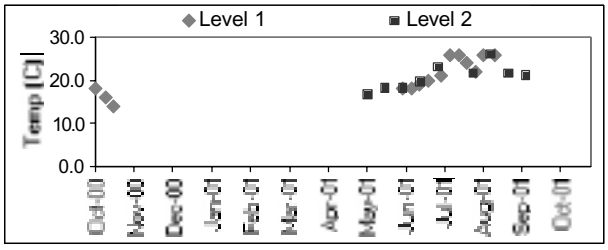
Volunteers

Level I :	Billy Aliment
Level II:	Jake Finlinson

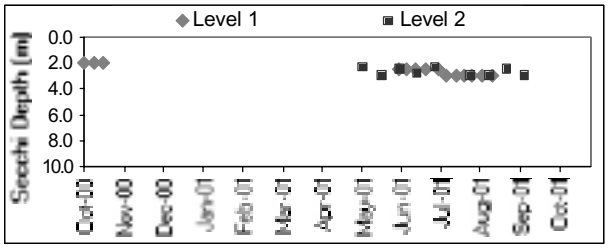
Level II samples collected: 9/13



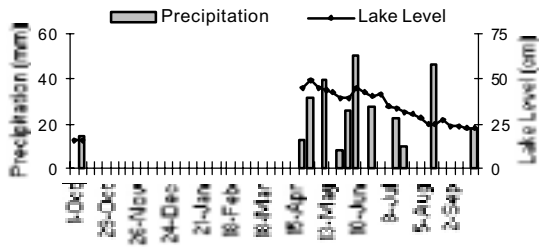
Lake Temperature



Secchi Depth

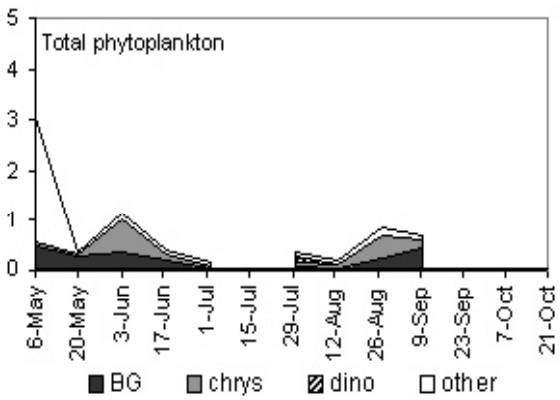


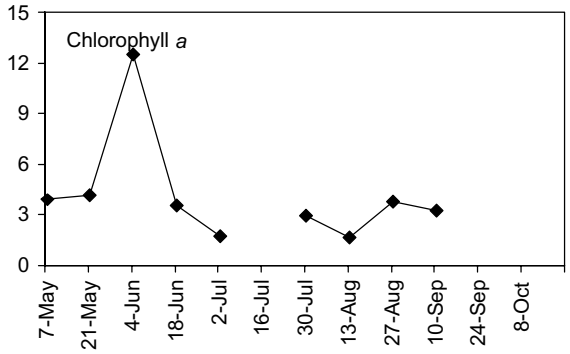
Lake Level and Precipitation



Secchi transparency ranged from 2.5 to 5.0m through the sample period. Water levels and precipitation records were incomplete, but the data showed that water level declined slowly through summer into fall. Water temperatures ranged from 14.0 to 26.0 degrees Celsius during the period measured.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

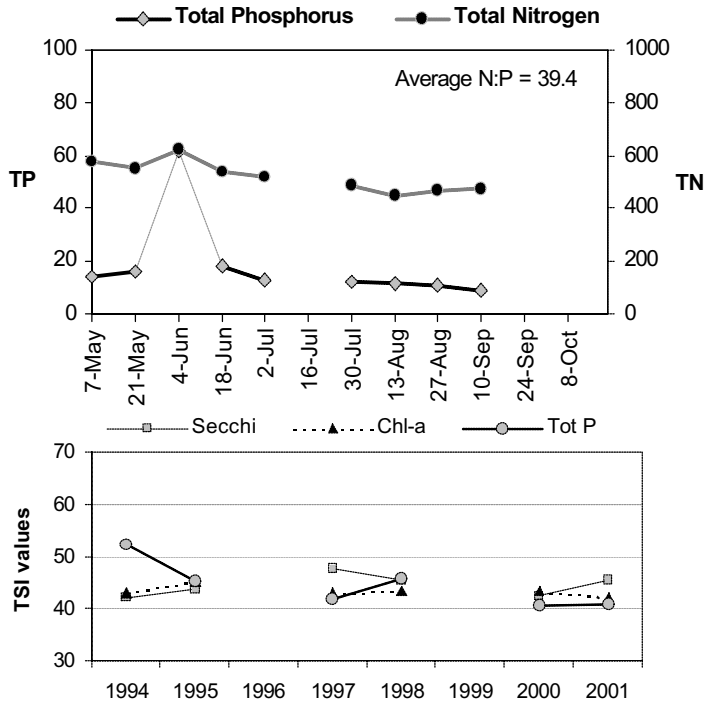




Maximum phytoplankton volume was found in the first sample, which was dominated by the large colonial chlorophyte *Volvox*. This was followed by a rise in the chrysophyte *Dinobryon* in June. The bluegreens *Aphanizomenon* and *Anabaena* were also present, declining slowly as the season progressed, and then increasing in late summer. No fall samples were taken. Chlorophyll content did not reflect the *Volvox* maximum, but did record the increase in *Dinobryon* in late spring.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in constant proportion to each other through the sampling period, aside from one date with exceptionally high Total P (see chart). Aside from that date, the N:P ratio ranged from 30 to 51. In 2001, the TSI values were in the low to midrange of mesotrophy, similar to recent years.

Overview

Volunteer monitoring began at Shady Lake in the 1980s and has continued through 2001, with no gaps. The data collected indicate this lake is low to moderate in primary productivity (oligotrophic to mesotrophic) with excellent to good water quality. Since the lake surface makes up about 10% of the drainage area, direct precipitation is less important than stormwater runoff and groundwater. There are no officially designated wetlands in the watershed. Current land use is largely rural, with suburban housing around the lake and a housing development straddling the northern boundary of the catchment. Increased algal productivity through human impacts could occur, and good management practices are encouraged to avoid creating future problems.

Shady Lake has a public access boat launch, and sparse patches of Eurasian milfoil were found in 2001. Residents should keep a close eye on aquatic plants growing nearshore to catch any increases in the patches of this, as well as other noxious weeds.

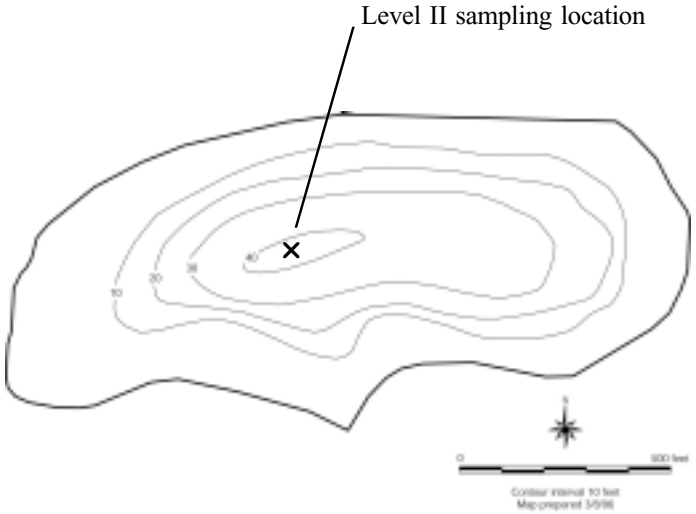
Lake Characteristics

Surface area:	21 acres
Watershed area:	220 acres
Max depth:	40 ft
Mean depth:	21 ft
Location:	3.5 mi northwest of Maple Valley

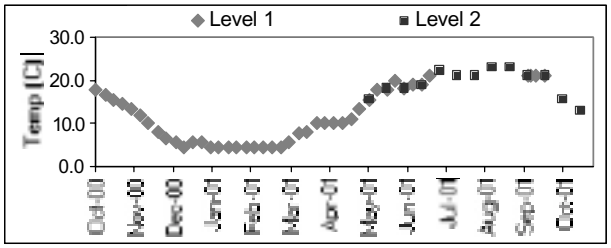
Volunteers

Level I :	Ray Konecke
Level II:	Ray Konecke

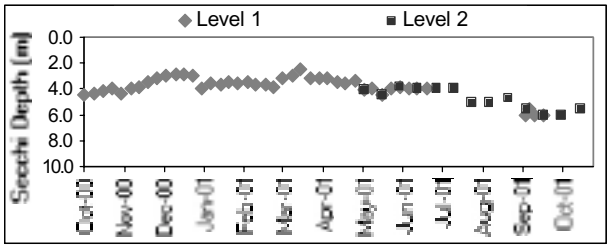
Level II samples collected: 13/13



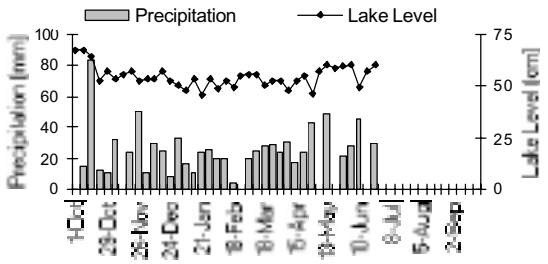
Lake Temperature



Secchi Depth

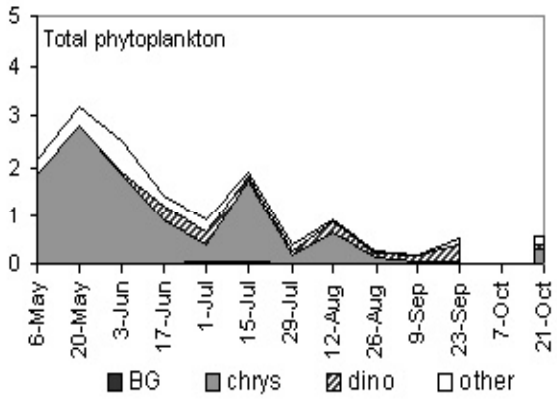


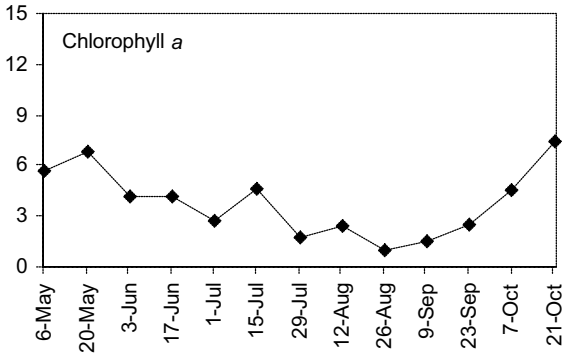
Lake Level and Precipitation



Secchi transparency ranged from 2.5 to 6.0m through the sample period. Water level records were incomplete, but suggested that water level remained relatively constant through winter into early summer. Annual water temperatures ranged from 4.4 to 23.0 degrees Celsius, with a cool period in July that corresponds to the weather at that time.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

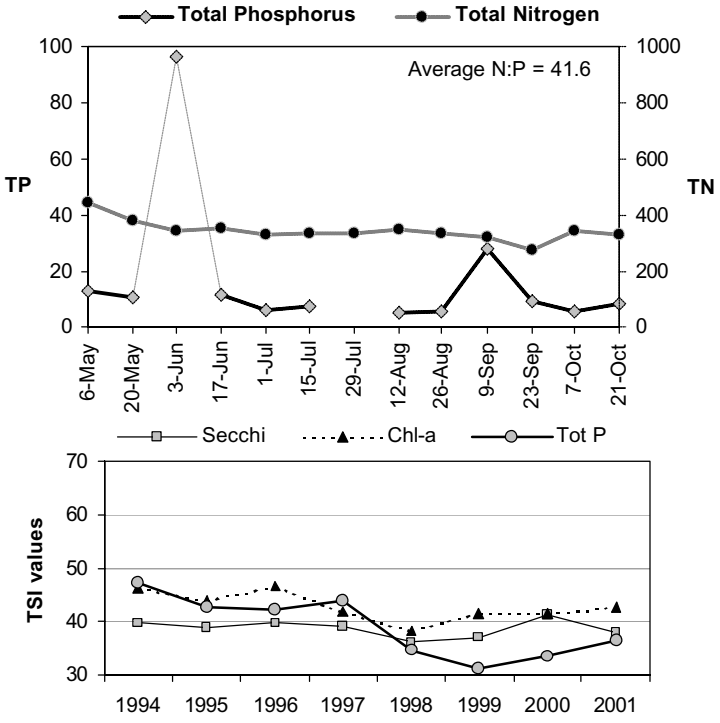




Maximum phytoplankton volume was found early in the sampling season, dominated by the diatom *Cyclotella* until mid-June. At that time, the chrysophyte *Dinobryon* became predominant, accompanied for a short time by the bluegreen *Anabaena.* The dinoflagellate *Ceratium* also became prominent later in the summer and fall. Chlorophyll content generally reflected the phytoplankton populations, but increased more in the fall than the phytoplankton counts suggested.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings

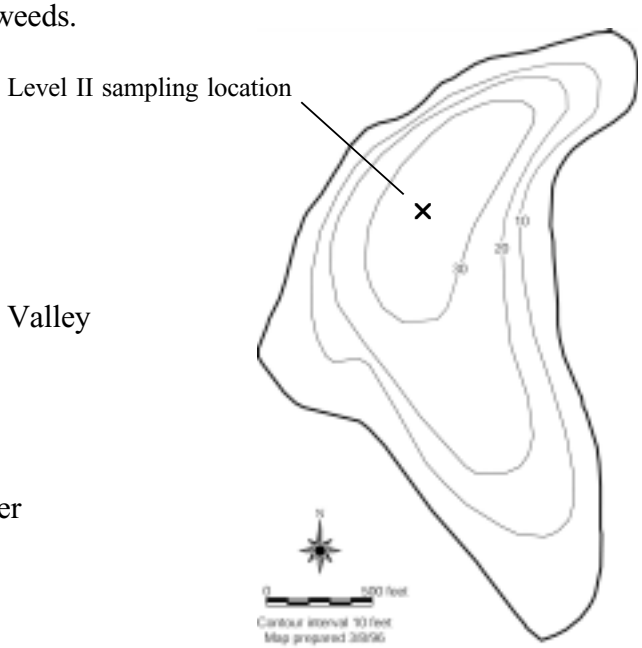


Total phosphorus and total nitrogen remained in constant proportion to each other through the sampling period, aside from two dates with exceptionally high Total P (see chart). Aside from those dates, the N:P ratio ranged from 31 to 66. In 2001, the TSI values straddled the border between oligotrophy and mesotrophy, with TSI-chlor giving the highest trophic estimate. TSI-TP has been consistently lower than the other indicators for the past four years.

Overview

Volunteer monitoring began at Spring Lake in the 1980s and has continued through 2001, with the exception of 1995. The data collected indicate this lake is moderate in primary productivity (mesotrophic) with good water quality. Since the lake surface makes up 15% of the drainage area, direct precipitation is fairly important, in addition to stormwater runoff and groundwater. There is one large, high-class wetland adjacent to the lake. Current land use is largely rural and undeveloped, with suburban housing around the north end of the lake and rural parcels to the east. Increased algal productivity through human impacts could be occuring, and good management practices are encouraged to avoid creating future problems.

Spring Lake has a public access boat launch, and a moderate infestation of Eurasian milfoil was found in 2001. Residents should keep a close eye on aquatic plants growing nearshore to catch any increases in the patches of this, as well as other noxious weeds.



Lake Characteristics

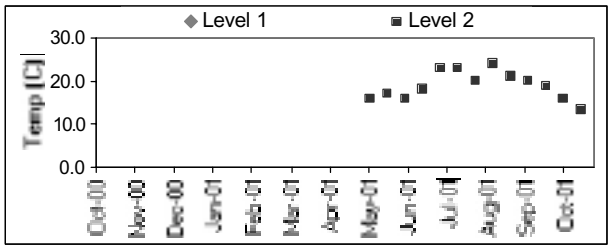
Surface area:	68 acres
Watershed area:	450 acres
Max depth:	32 ft
Mean depth:	19 ft
Location:	3 mi northwest of Maple Valley

Volunteers

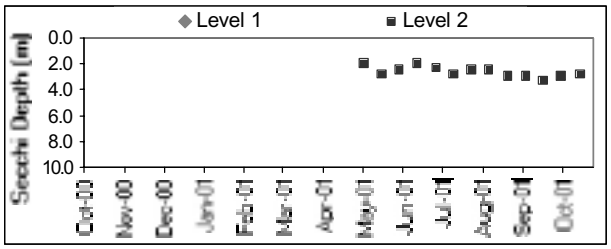
Level I :	Bob Keller
Level II:	Caren Adams; Bob Keller

Level II samples collected: 13/13

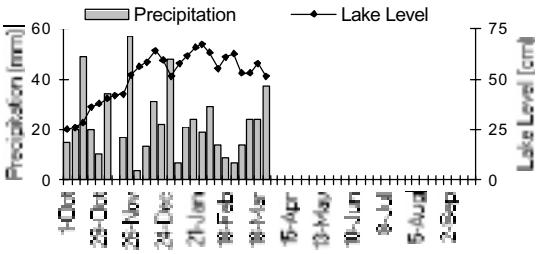
Lake Temperature



Secchi Depth

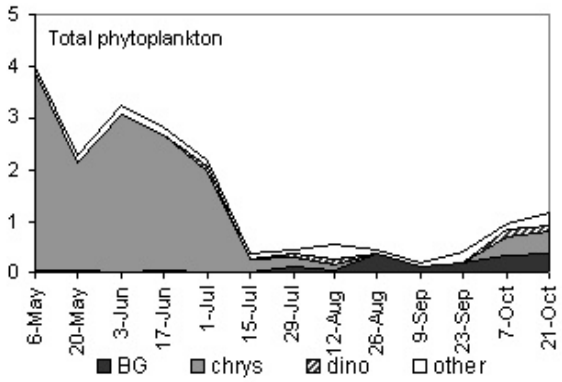


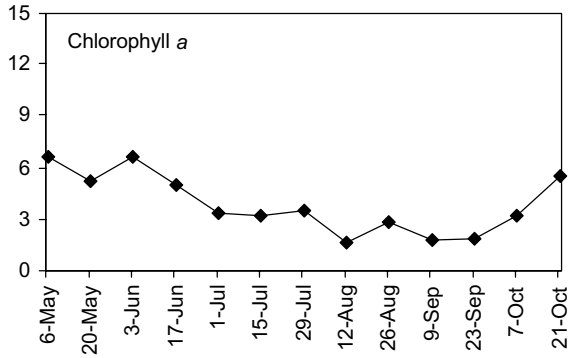
Lake Level and Precipitation



Secchi transparency ranged from 2.0 to 3.3m through the sample period. Water level records were incomplete, but showed that water levels were low in fall, rising quickly in early winter. Water temperatures ranged from 13.5 to 24.0 degrees Celsius during the sample season.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

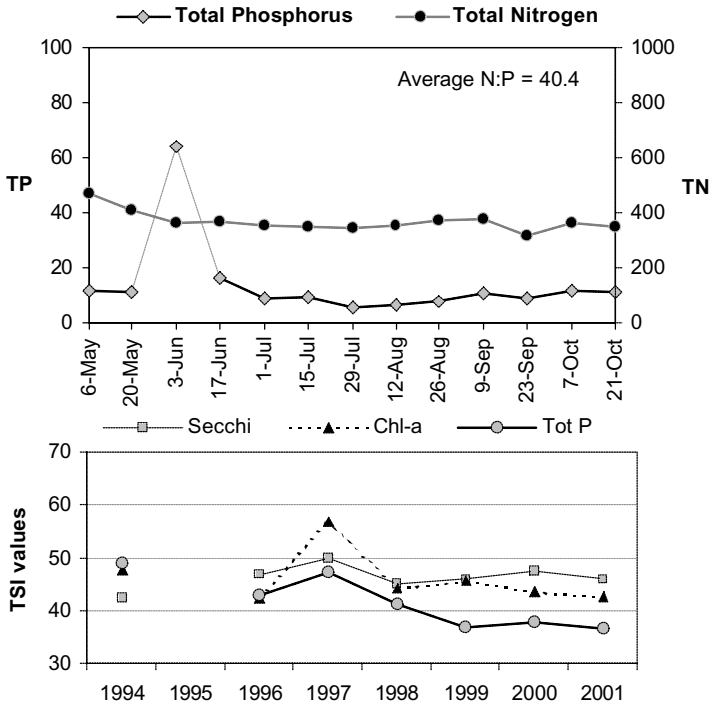




Maximum phytoplankton volumes were found early in the sampling season, dominated by the diatom *Cyclotella* and the chrysophytes *Dinobryon* and *Synura* until July when volumes decreased abruptly. Bluegreens such as *Anabaena and Aphanizomenon* increased in importance, persisting through the rest of the sample period. The dinoflagellate *Ceratium* also became prominent later in the summer and fall. Chlorophyll content generally reflected the phytoplankton populations, but did not show the magnitude of difference between spring and summer populations suggested by the phytoplankton analysis.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in constant proportion to each other through the sampling period, aside from one date with exceptionally high Total P (see chart). Aside from that date, the N:P ratio ranged from 22 to 66. In 2001, TSI-Secchi and TSI-chlor were in the mesotrophic range, while TSI-TP was lower, similar to the situation in the two previous years. Total phosphorus has given a lower trophic estimate than the other indicators for six out of the past seven years.

Overview

Volunteer monitoring began at Star Lake in the 1980s and has continued through 2001, with gaps in 1992 and 1994. The data collected indicate this lake is relatively low in primary productivity (oligotrophic, bordering on mesotrophic) with very good to excellent water quality. Since the lake surface makes up 19% of the drainage area, direct precipitation is important, in addition to stormwater runoff and groundwater. There are no designated wetlands in the watershed. Current land use is largely urban residential, with a section of freeway, school property, and small amounts of open space included in the catchment. Increased algal productivity through human impacts could easily occur, and good management practices are encouraged to avoid creating future problems.

Star Lake has a public access boat launch, and the lake has been recently treated for a Eurasian milfoil infestation. Residents should monitor aquatic plants growing nearshore to catch any remnant patches of this, as well as other noxious weeds.

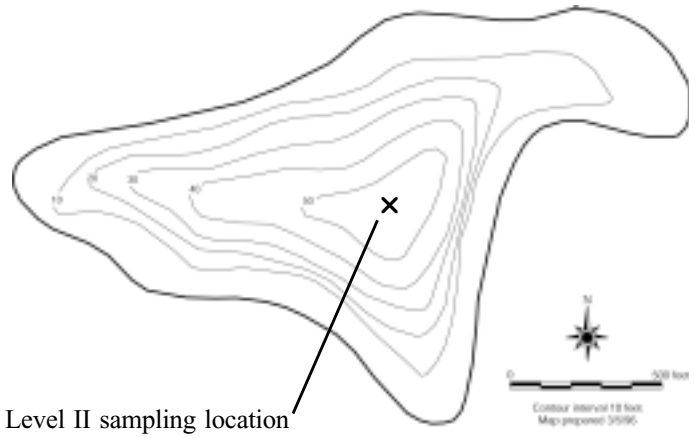
Lake Characteristics

Surface area:	34 acres
Watershed area:	378 acres
Max depth:	50 ft
Mean depth:	25 ft
Location:	0.1 mi south of Kent

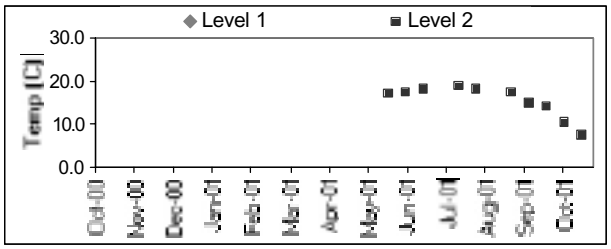
Volunteers

Level I :	None
Level II:	Mark Baughman

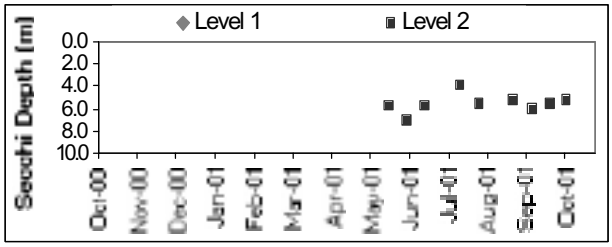
Level II samples collected: 10/13



Lake Temperature



Secchi Depth

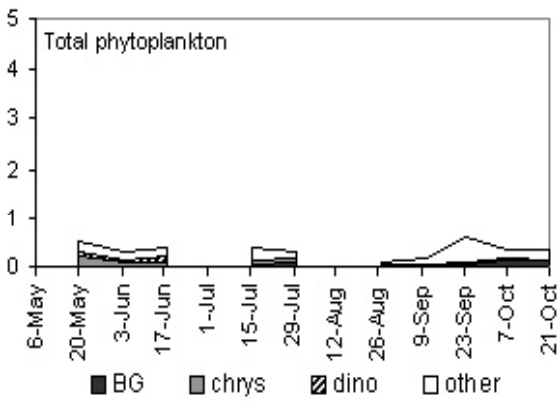


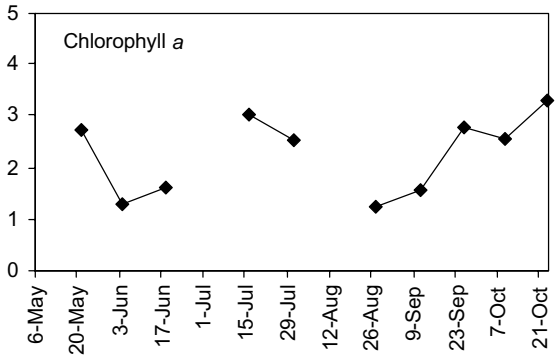
Lake Level and Precipitation

No data available

Secchi transparency ranged from 4.0 to 6.0m through the sample period. Water level and precipitation records were not available. Water temperatures ranged from 7.5 to 19.0 degrees Celsius during the sample season, somewhat cooler than many similar lakes in the region.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations (µg/L)

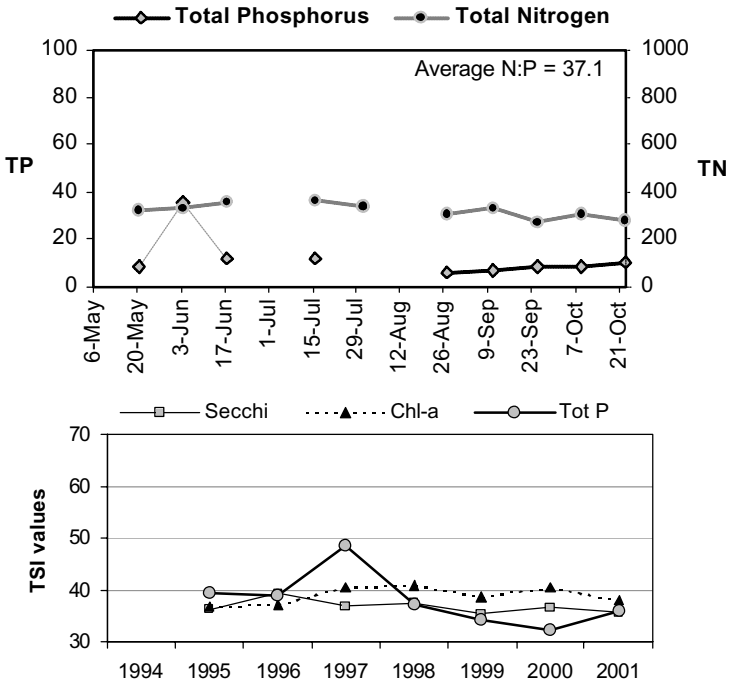




Phytoplankton volumes remained very low through the sampling season. No one species emerged as predominant, but important varieties found included the diatom *Cyclotella*, the chrysophytes *Dinobryon* and *Gloeobotrys,* the Cryptophyte *Rhodomonas,* and the bluegreen *Aphanizomenon.* Chlorophyll content related generally to the phytoplankton counts, remaining at lower levels through the sample season.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in proportion to each other through the sampling period, aside from one date with exceptionally high Total P (see chart). Aside from that date, the N:P ratio ranged from 28 to 51. In 2001, the TSI indicators were close together in the upper midrange for oligotrophy. While the indicators have been farther apart in recent years, they have been in approximately the same range since 1995, with only one exception, that of TSI-TP in 1997.

Overview

Volunteer monitoring began at Steel Lake in the 1980s and has continued through 2001, with a gap from1991 through 1993. The data collected indicate this city lake (Federal Way) is relatively low in primary productivity (borderline oligotrophic to mesotrophic) with very good water quality. Since the lake surface makes up 18% of the drainage area, direct precipitation is quite important, in addition to stormwater runoff and groundwater. There are no designated wetlands in the watershed. Current land use is largely urban residential, including a large city park and school property. Increased algal productivity through human impacts could be occurring, and good management practices are encouraged to avoid creating future problems.

Steel Lake has a public access boat launch, and the lake has been recently treated for a pioneering Eurasian milfoil infestation. Residents should keep a close eye on aquatic plants growing nearshore to catch any remnant patches of this, as well as other noxious weeds.

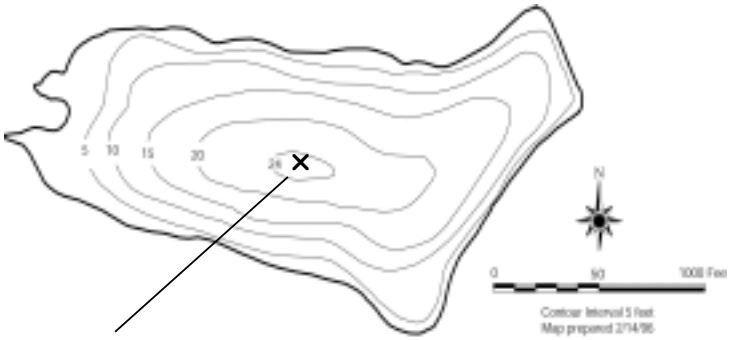
Lake Characteristics

Surface area:	46 acres
Watershed area:	243 acres
Max depth:	24 ft
Mean depth:	13 ft
Location:	Federal Way

Volunteers

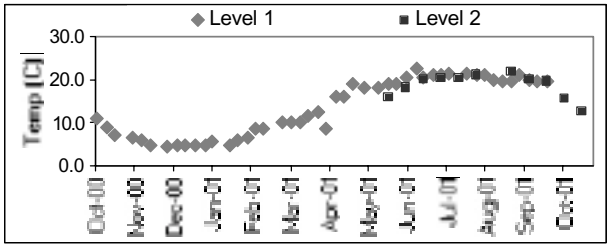
Level I :	Susan Pearson
Level II:	Susan Pearson

Level II samples collected: 11/13

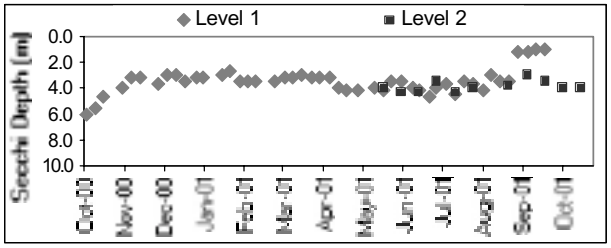


Level II sampling location

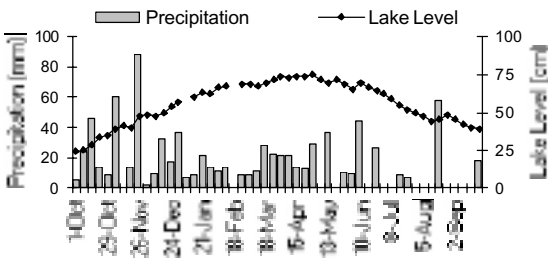
Lake Temperature



Secchi Depth

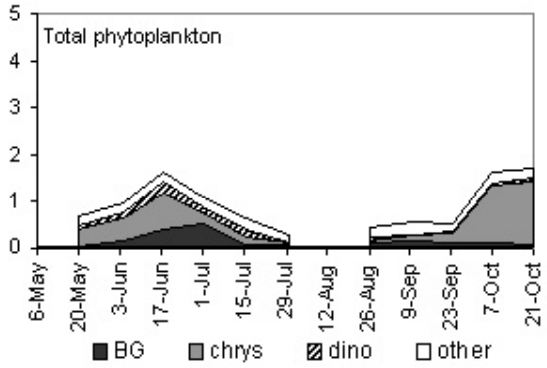


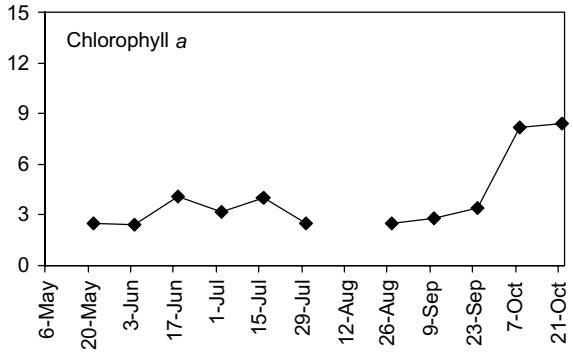
Lake Level and Precipitation



Secchi transparency ranged from 1.0 to 6.0m through the year based on both Level I and Level II records. Water levels rose steadily through winter and dropped steadily after April. Annual water temperatures ranged from 4.5 to 22.5 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

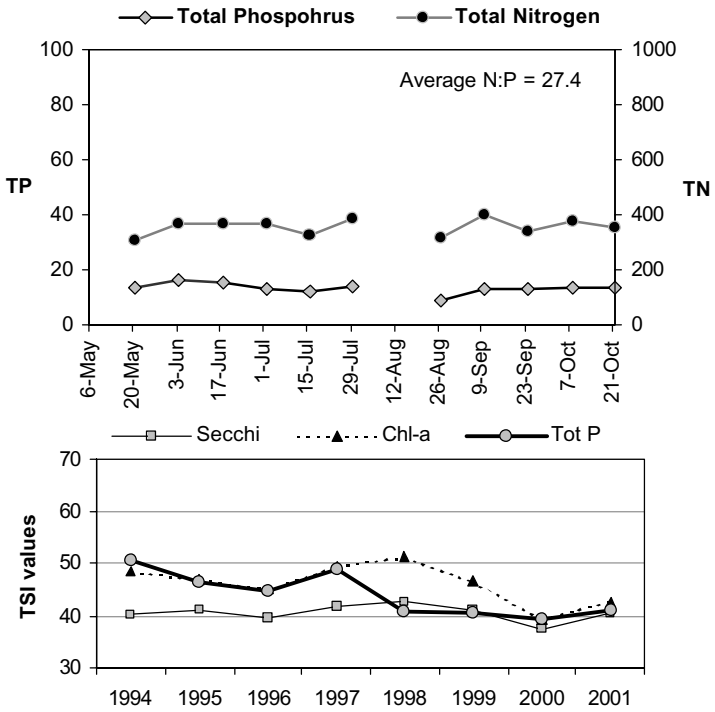




Phytoplankton made a peak in June, and the population was climbing at the end of the sampling season. Early populations of the diatom *Cyclotella* were replaced by the chrysophyte *Dinobryon* and the bluegreen *Anabaena* at peak volume in June. A variety of taxa were present over the summer, but none made a large population until October when another *Dinobryon* species began to increase rapidly. Chlorophyll content did not relate closely to the phytoplankton maximum in June, but did show the increase in October.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in proportion to each other through the sampling period, with the N:P ratio ranging from 23 to 35. In 2001, the TSI indicators were close together, just above the threshold between oligotrophy and mesotrophy. In 2000, the values were close together, but just below the threshold. Before 2000, relationships changed between the indicators, but all three values were never close together.

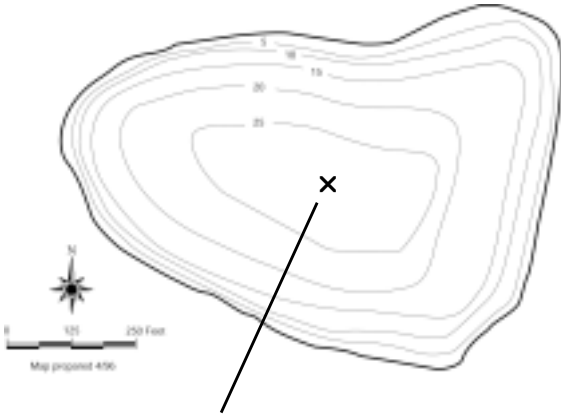
Overview

Volunteer monitoring began at Trout Lake in 1996 and has continued through 2001. The data collected indicate this lake is relatively high in primary productivity (borderline eutrophic) with good to fair water quality. Since the lake surface makes up less than 2% of the drainage area, direct precipitation is relatively unimportant compared to inlet streams, stormwater runoff and groundwater. Both Fivemile Lake and Spider Lake are upstream from Trout Lake. Current land use is largely suburban residential,but includes some open space as well as commercial properties. Increased algal productivity through human impacts could be occurring, and good management practices are encouraged to avoid creating future problems.

Trout Lake has a public access boat launch, and residents should keep a close eye on aquatic plants growing nearshore to catch early infestations of Eurasian milfoil, as well as other noxious weeds.

Lake Characteristics

Surface area:	18 acres
Watershed area:	979 acres
Max depth:	27 ft
Mean depth:	17 ft
Location:	0.3 mi west of Pacific



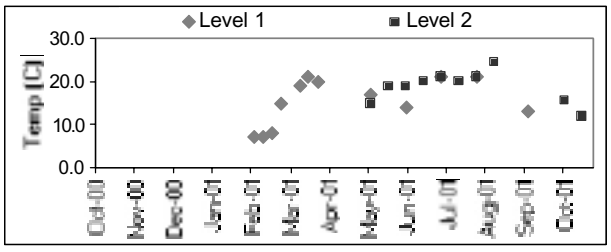
Level II sampling location

Volunteers

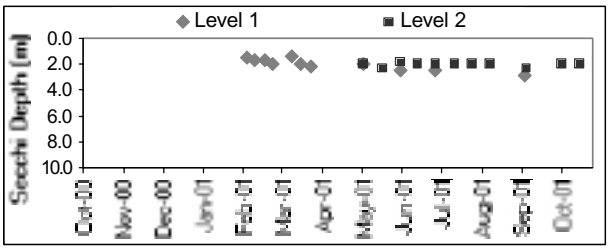
Level I :	Brenda and Jim Sherwood
Level II:	Brenda and Jim Sherwood

Level II samples collected: 11/13

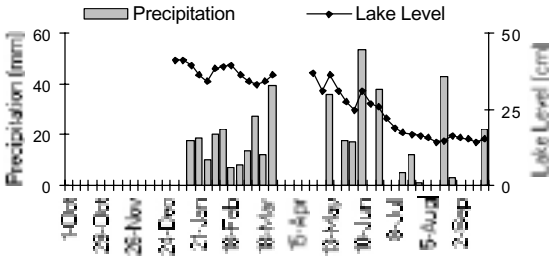
Lake Temperature



Secchi Depth

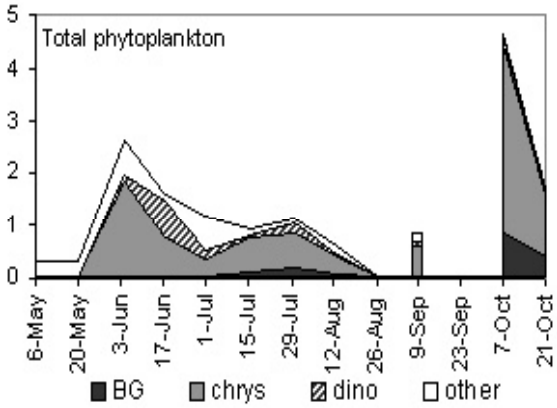


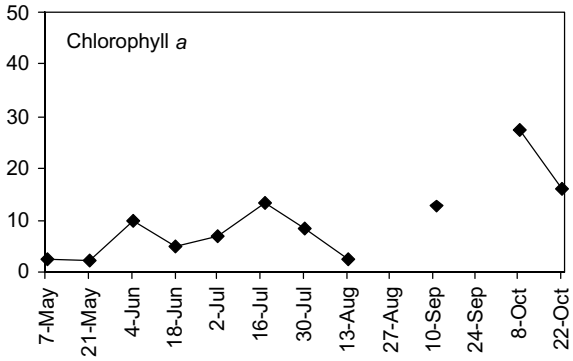
Lake Level and Precipitation



Secchi transparency ranged from 1.3 to 2.8m from February through October. Water level records were incomplete, but suggested a winter-high/summer-low pattern. Water temperatures ranged from 7.0 to 24.5 degrees Celsius from February through October, based on both Level I and Level II records.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

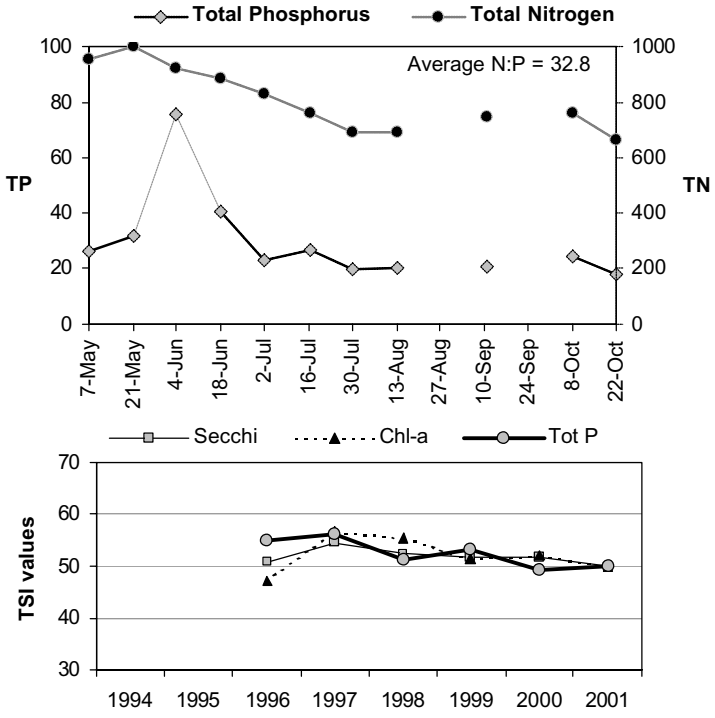




Phytoplankton made a peak in early June and another, larger peak in October. The June maximum was dominated by the chrysophytes *Synura* and *Dinobryon*, with a smaller amount of the dinoflagellate *Ceratium*. The October peak was made largely by an unidentified colonial chrysophyte, with a significant amount of the bluegreen *Aphanizomenon* as well. Chlorophyll content generally related to both phytoplankton maxima.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in proportion to each other through the sampling period, except for one date with exceptionally high Total P (see chart). Aside from that date, the N:P ratio ranged from 22 to 37. In 2001, the TSI indicators were close together on the borderline between mesotrophy and eutrophy. Since 1997, the values have been close together, but above the threshold. There may be a trend towards better water quality over time, but this has not been statistically validated.

Overview

Volunteer monitoring began at Lake Twelve in the early 1980s and has continued through 2001, missing only 1997 and 1999. The data collected indicate this lake is generally moderate in primary productivity (mesotrophic) with good water quality. Since the lake surface makes up 10% of the drainage area, direct precipitation is relatively unimportant compared to intermittent streams, stormwater runoff and groundwater, in addition to the large wetland along its eastern shoreline. Current land use is largely forests, many of which have recently been harvested, with a fringe of suburban and rural housing along the shoreline. There is an active surface mine to the west, and one side of a berm built to mitigate noise drains into the lake. Increased algal productivity through human impacts could be occurring, and good management practices are encouraged to avoid creating future problems.

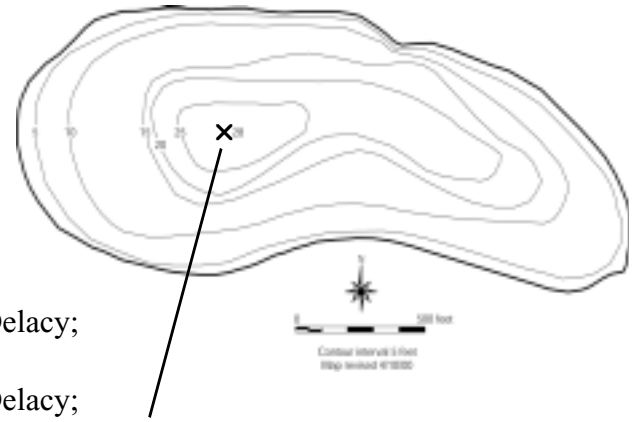
Lake Twelve has a public access boat launch and a Eurasian milfoil infestation, while controlled in the 1990s, has since reappeared. Residents should keep an eye on this and watch for other noxious weeds.

Lake Characteristics

Surface area:	43 acres
Watershed area:	440 acres
Max depth:	28 ft
Mean depth:	13 ft
Location:	0.5 mi northeast of Black Diamond

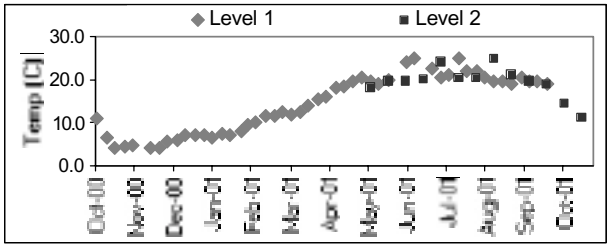
Volunteers

Level I :	Libby Moscardini and Jan Delacy; Cathy and Dean Voelker
Level II:	Libby Moscardini and Jan Delacy; Cathy and Dean Voelker
Level II samples collected:	13/13

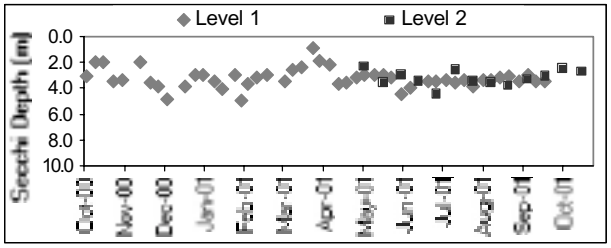


Level II sampling location

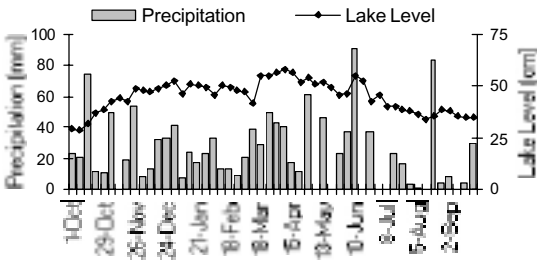
Lake Temperature



Secchi Depth

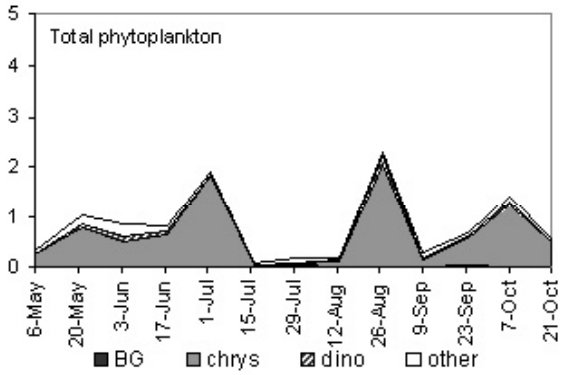


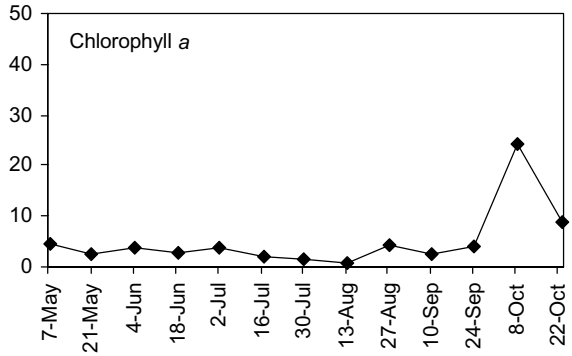
Lake Level and Precipitation



Secchi transparency ranged from 0.9 to 4.9m through the year. Water level records indicated a moderate winter-high/summer-low pattern. Water temperatures ranged from 4.0 to 25.0 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations (µg/L)

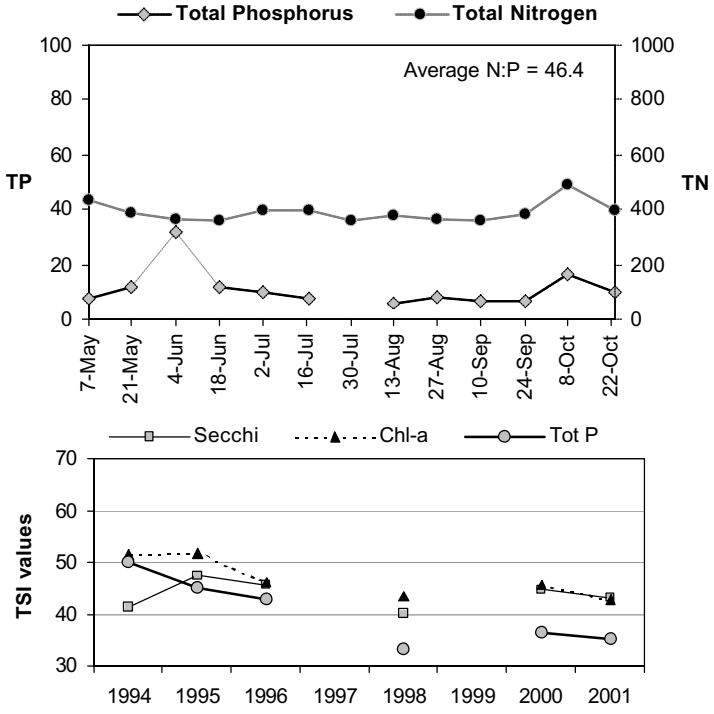




Phytoplankton made one peak in early July, another, larger peak in August, and a final peak in October. All were dominated by the chrysophyte *Dinobryon*, but with differing subdominant taxa. In July *Dinobryon* was accompanied by the diatom *Cyclotella*, while in August it was in tandem with several dinoflagellates. Chlorophyll content did not reflect the two summer peaks, although the October maximum was recorded.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in proportion to each other through the sampling period, except for one date with exceptionally high Total P (see chart). Aside from that date, the N:P ratio ranged from 30 to 62. In 2001, the TSI-TP was significantly less than the other two indicators, similar to 1998 and 2000. The other two indicators agree well with each other and have been in the midrange for mesotrophy, while the TSI-TP has been in the oligotrophic range for the last three years of sampling.

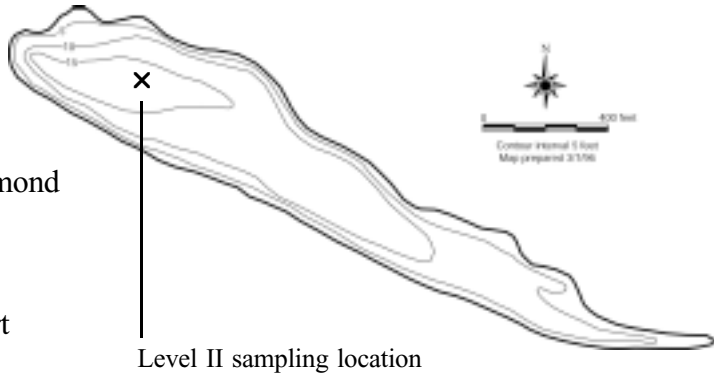
Overview

Volunteer monitoring began at Welcome Lake in 1996 and has continued through 2001. The data collected indicate this lake is moderate to high in primary productivity (mesotrophic to eutrophic) with relatively good water quality. Since the lake surface makes up only 2% of the drainage area, direct precipitation is unimportant compared to the inlet stream, stormwater runoff and groundwater. There are several large wetlands in the catchment. Current land use is largely forested lands, with a cluster of suburban houses around the lake. There is a portion of an urban planned development under construction at the southern end of the watershed that could potentially impact one of the wetlands. Increased algal productivity through human activities could be occurring, and good management practices are encouraged to avoid creating future problems.

Welcome Lake has no public access boat launch, but residents should watch for Eurasian milfoil, as well as other noxious weeds.

Lake Characteristics

Surface area:	17 acres
Watershed area:	588 acres
Max depth:	16 ft
Mean depth:	3 ft
Location:	2.5 mi northeast of Redmond



Level II sampling location

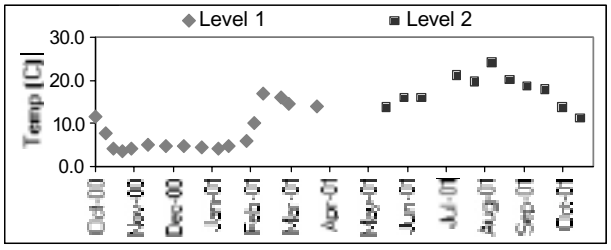
Volunteers

Level I : Dave Hadley; Beth Hart

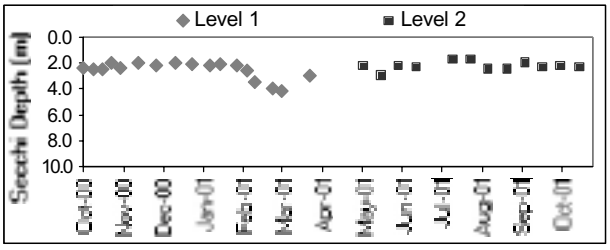
Level II: Dave Hadley

Level II samples collected: 12/13

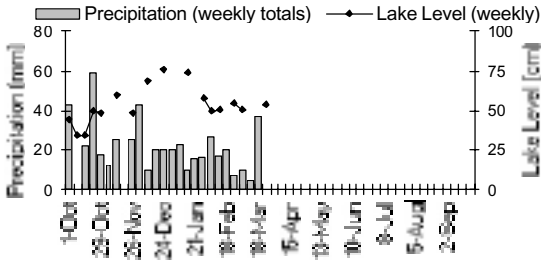
Lake Temperature



Secchi Depth

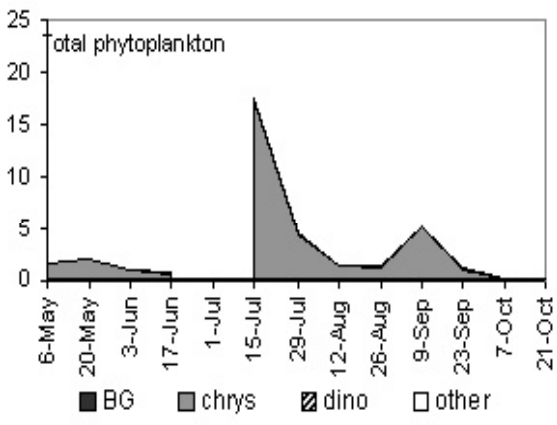


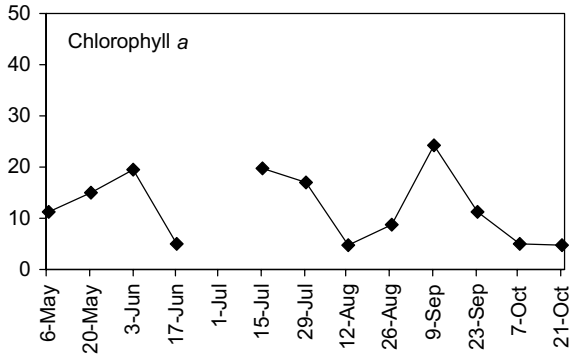
Lake Level and Precipitation



Secchi transparency ranged from 1.7 to 4.3m through the year, with a short gap in spring. Water level and precipitation records were incomplete for the year. Water temperatures ranged from 3.7 to 24.0 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations ($\mu g/L$)

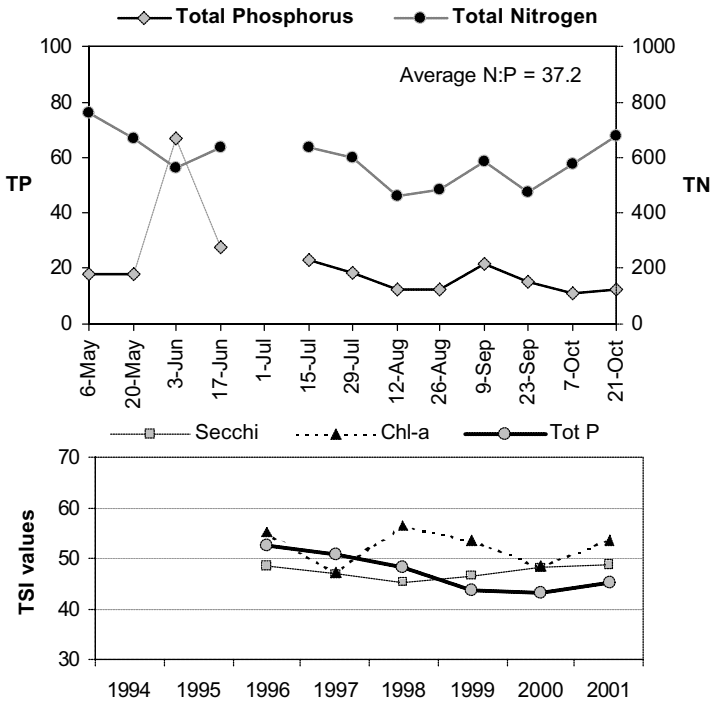




The phytoplankton community was dominated by the chrysophyte *Dinobryon* over the sampling season until October when the volume decreased drastically. Early in the season *Dinobryon* was accompanied by the diatom *Asterionella*, while in August it was in tandem with several cryptophytes and a small population of the bluegreen *Oscillatoria*. Chlorophyll content did not reflect the relative height of the summer peaks. There was a chlorophyll peak in early June that was not found in the phytoplankton.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings



Total phosphorus and total nitrogen remained in proportion to each other through the sampling period, except for one date with exceptionally high Total P (see chart). Aside from that date, the N:P ratio ranged from 23 to 57. In 2001, the TSI-Chlor was higher than the other two indicators, in the eutrophic range, while the other two indicators were in the upper range for mesotrophy. This was similar to 1998 and 1999. The TSI-TP value declined from 1996 through 1999, but has been steady since then, while TSI-Secchi has appeared to increase slightly.

Overview

Volunteer monitoring began at Lake Wilderness in the early 1980s and has continued through 2001. The data collected indicate this city lake (Maple Valley) is moderate in primary productivity (mesotrophic) with good water quality. Since the lake surface makes up 16% of the drainage area, direct precipitation is important, in addition to stormwater runoff and groundwater. Current land use is mixed residential and open space, with a large park along the western shoreline. Increased algal productivity through human impacts could be occurring, and good management practices are encouraged to avoid creating future problems.

Lake Wilderness has a public access boat launch. There is a history of Eurasian milfoil infestation and control efforts by the lake community and the city of Maple Valley. Residents should watch for new patches of Eurasian milfoil, as well as other noxious weeds.

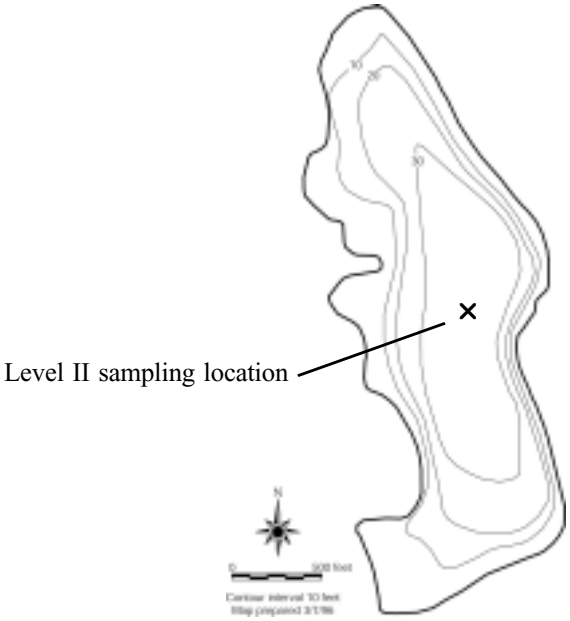
Lake Characteristics

Surface area:	67 acres
Watershed area:	420 acres
Max depth:	38 ft
Mean depth:	21 ft
Location:	Maple Valley

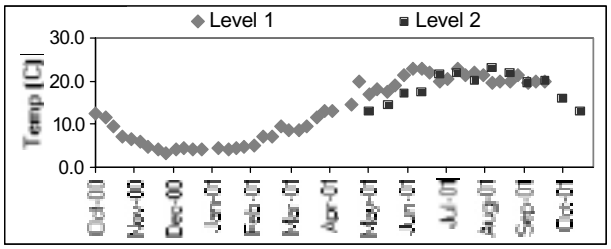
Volunteers

Level I :	Ray Petit
Level II:	Ray Petit; John Vasboe

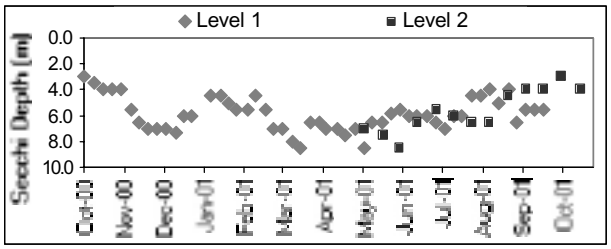
Level II samples collected: 13/13



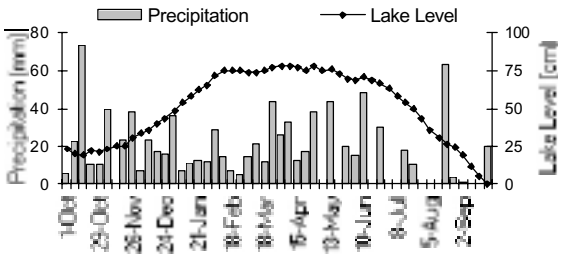
Lake Temperature



Secchi Depth

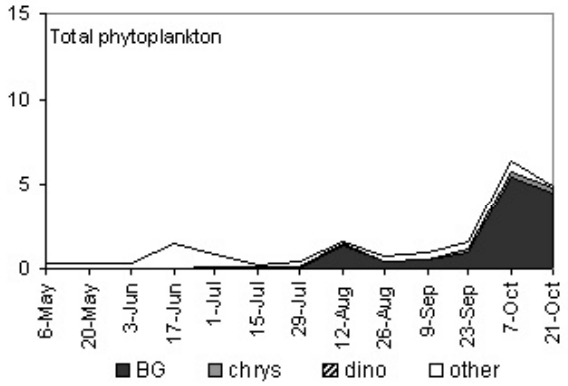


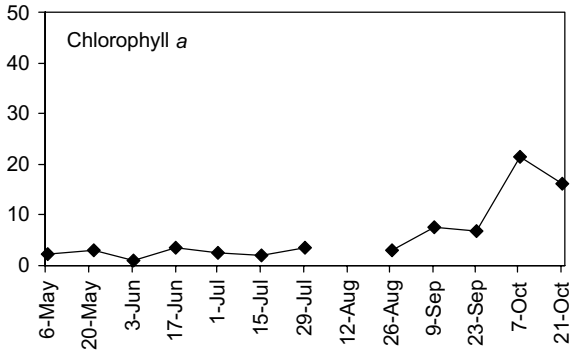
Lake Level and Precipitation



Secchi transparency ranged from 3.0 to 8.5m through the year. Water levels increased through February and then began decreasing in late June to a very low stand by the end of October. Annual water temperatures ranged from 3.5 to 23.0 degrees Celsius.

Phytoplankton (mm^3/L) and Chlorophyll *a* Concentrations (µg/L)

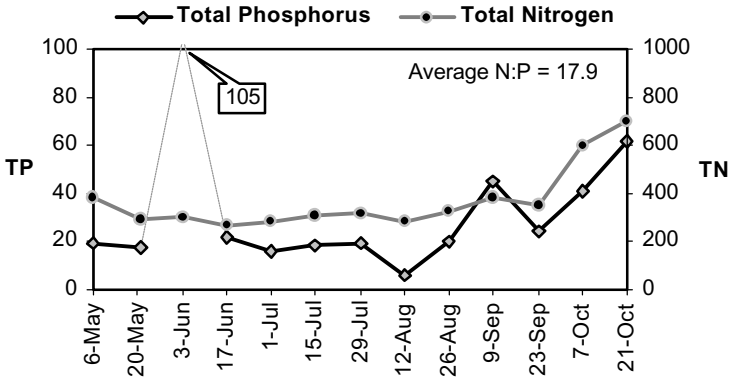


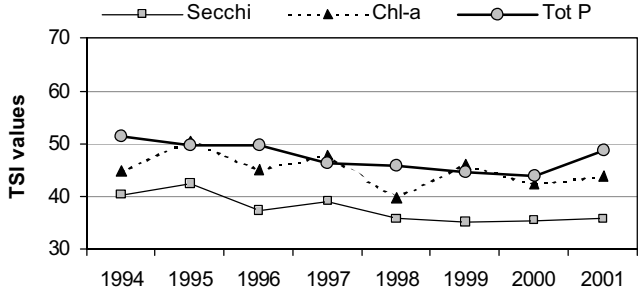


The phytoplankton community remained sparse, with two small peaks in June and August until late September when volume increased dramatically. In mid-June, the community was dominated by the dinoflagellate *Ceratium* and several species of chlorophytes. The peak in August was made by the bluegreen *Gloeotrichia,* and the bloom in fall was largely the bluegreen *Aphanizomenon*. Chlorophyll content did not reflect the summer peaks, but tracked the autumn bloom closely. The autumn bluegreen bloom happened during a time when N:P ratios were consistently below 15.

Phytoplankton Chart:
BG = Bluegreen; chrys = Chrysophytes; dino = Dinoflagellates

Nutrient Analysis and TSI Ratings





Total phosphorus and total nitrogen remained in proportion to each other through the sampling period, except for two dates with exceptionally high Total P (see chart). Aside from those dates, the N:P ratio ranged from 11 to 50. In 2001, the TSI-Secchi was in the oligotrophic range, unlike the other two indicators, which were in the mid to upper mesotrophic in value. TSI-Secchi has consistently given lower trophic estimates through the years of sampling.

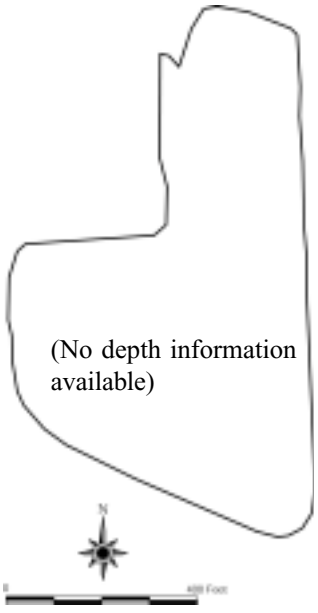
Overview

Volunteer monitoring began at Easter Lake in water year 1998 and has continued through 2001. Level I data only have been collected at this city lake (Federal Way). Since the lake surface makes up 9% of the drainage area, direct precipitation is less important than stormwater runoff and groundwater. Current land use is mixed urban residential and commercial. Increased algal productivity through human impacts could be occurring, and good management practices are encouraged to avoid creating future problems.

Easter Lake has no public access boat launch, but residents should watch for patches of Eurasian milfoil, as well as other noxious weeds.

Lake Characteristics

Surface area:	10.8 acres
Watershed area:	119 acres
Max depth:	
Mean depth:	
Location:	Federal Way



Volunteers

Level I : Mayetta E. Tiffany

Level II: None

Level II samples collected: None

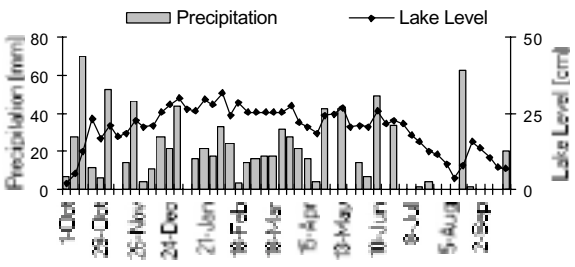
Lake Temperature

No data available

Secchi Depth

No data available

Lake Level and Precipitation



Water levels increased from October through January and then began decreasing slowly with some variation to a very low stand by August. A rise in early September was followed by another decrease.

Overview

Volunteer monitoring began at Horseshoe Lake in water year 1999 and has continued through 2001. Level I data (precipitation) only was collected at this lake in 2001 because the lack of standing water made Level II sampling impossible. The water level and volume of Horseshoe Lake varies greatly with seasonal precipitation. Current land use is mixed urban residential and commercial. Increased algal productivity through human impacts could be occurring, and good management practices are encouraged to avoid creating future problems.

Horseshoe Lake has no public access boat launch, and the widely fluctuating water level may make invasion by noxious aquatic weeds unlikely over the long term.

Lake Characteristics

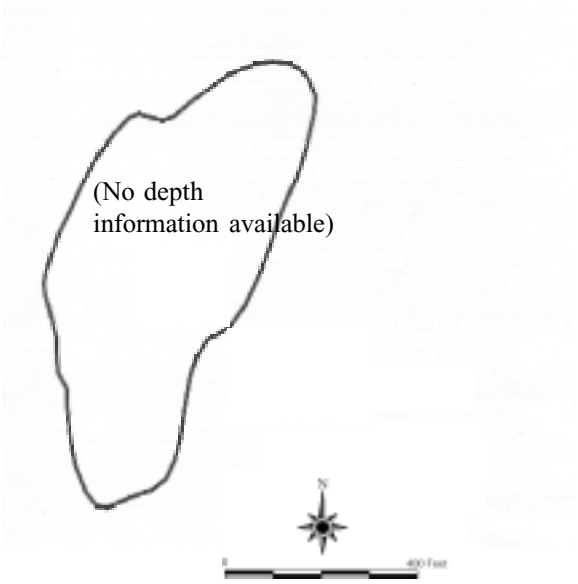
Surface area: 9.8 acres
Watershed area:
Max depth:
Mean depth:
Location: 0.5 mi west of Black Diamond

Volunteers

Level I : Frank Douglas; Eric Olsgaard

Level II: None

Level II samples collected: 0/13



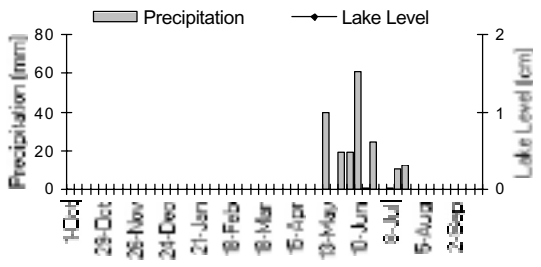
Lake Temperature

No data available

Secchi Depth

No data available

Lake Level and Precipitation

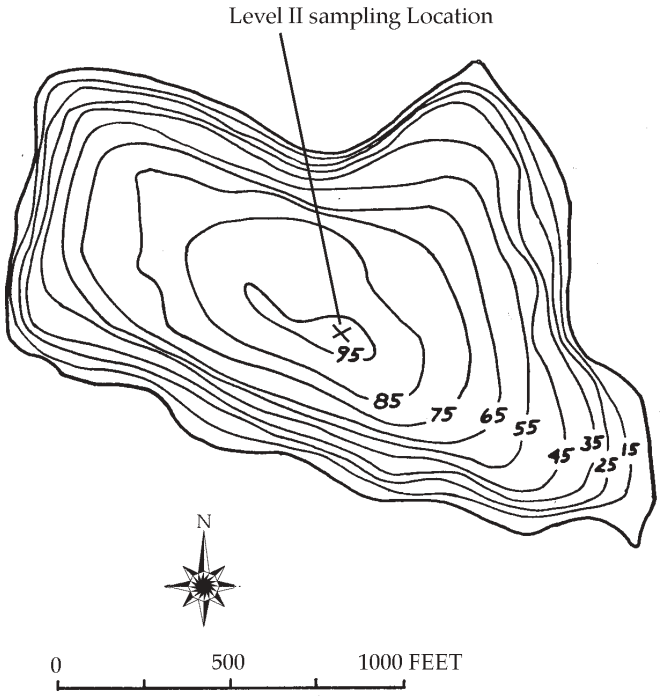


Precipitation records were only available for part of the 2001 water year. Water levels were too low through the 2001 sample season to allow for Level II or other monitoring.

Overview

Volunteer monitoring began at Lake Langlois in water year 2001. Level II data was collected once, and Level I data was collected for much of the water year. Since the lake surface makes up 17% of the drainage area, direct precipitation is important, in addition to stormwater runoff and groundwater. Current land use is mixed rural and forestry, with a Girl Scout camp occupying a large portion of the watershed and shoreline. Data from May 20, 2001 included Secchi transparency (5.3m), and chemistry from water at 1m depth: Chlorophyll *a* (5.51 µg/L), Total P (10.8 µg/L) and Total N (325 µg/L). The diatom *Cyclotella* dominated the phytoplankton on that date.

Lake Langlois has a public access boat launch, and residents should monitor the shallow areas for noxious aquatic weed invasions.



Lake Characteristics

Surface area:	40 acres
Watershed area:	236 acres
Max depth:	98 ft
Mean depth:	53 ft
Location:	1.25 mi southeast of Carnation

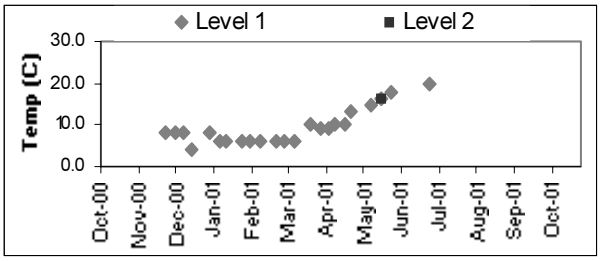
Volunteers

Level I : Jasper Scott

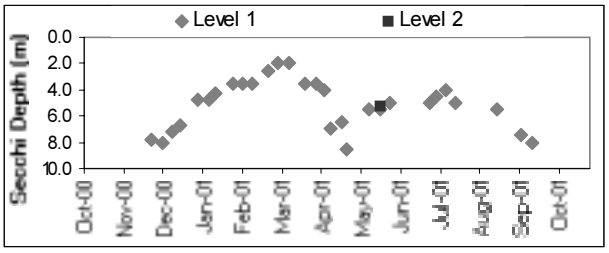
Level II: Jasper Scott

Level II samples collected: 1/13

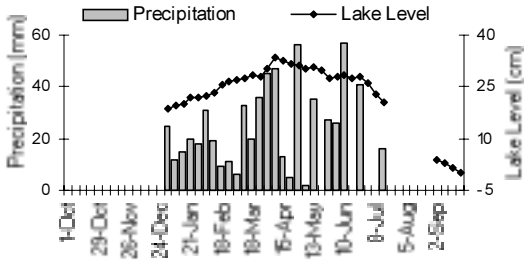
Lake Temperature



Secchi Depth



Lake Level and Precipitation



Secchi transparency ranged from 2.0 to 8.5m from December 2000 through September 2001. Water levels increased slowly to a maximum stand in April and then began decreasing to a low stand in autumn. Water temperatures ranged from 4.0 to 20.0 degrees Celsius, but were not measured after June 2001.

Overview

Volunteer monitoring began at Walker Lake in 2000, and sampling continued into 2001. Level II data was collected once, and Level I data was collected for part of the water year. Since the lake surface makes up 4% of the drainage area, direct precipitation is less important than stormwater runoff and groundwater. Current land use is mostly forestlands, with a fringe of suburban homes around the lake. Data from May 6, 2001 included Secchi transparency (4.5m), and chemistry from water at 1m depth: Chlorophyll-a (2.80 µg/L), Total P (7.3 µg/L) and Total N (235 µg/L). The diatom *Asterionella* dominated the phytoplankton, with a smaller amount of the chlorophyte *Cosmarium* on that date.

Walker Lake has a public access boat launch, and residents should monitor the shallow areas for noxious aquatic weed invasions.

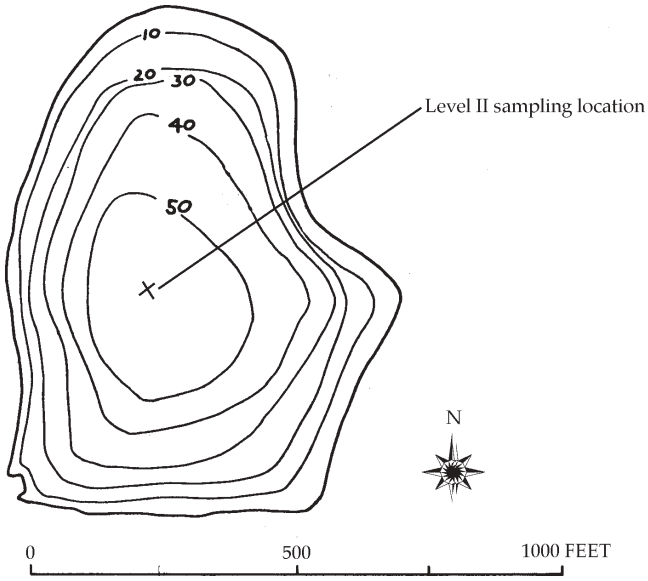
Lake Characteristics

Surface area:	12 acres
Watershed area:	314 acres
Max depth:	54 ft
Mean depth:	31 ft
Location:	1.5 mi southeast of Cumberland

Volunteers

Level I :	None
Level II:	Mike Baker

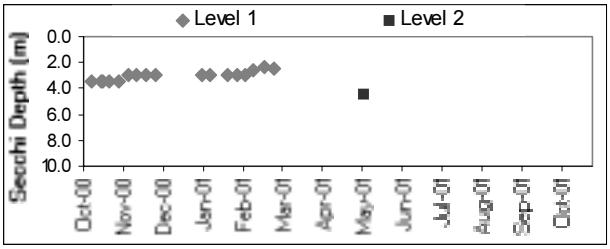
Level II samples collected: 1/13



Lake Temperature

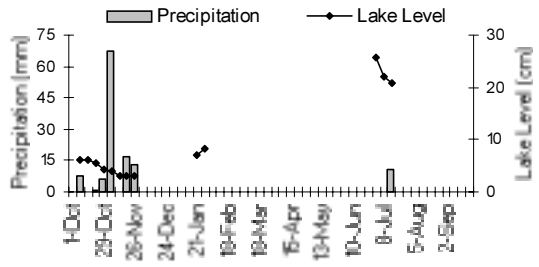
No data available

Secchi Depth



Secchi transparency ranged from 2.3 to 3.5m from October 2000 through March 2001. Water levels were at a very low stand in October 2000, and records were incomplete after that.

Lake Level and Precipitation



Overview

Volunteer monitoring for Level I began at Lake Sammamish in 1999 and has continued through 2001. The lake surface makes up less than 8% of the drainage area, so direct precipitation is less important than inlet streams, stormwater runoff and groundwater. There are multiple jurisdictions around the lake and in the watershed. Two major inlets (Issaquah and Tibbetts Creeks) run through the city of Issaquah, while the outlet exits through King County at Marymoor Park. Current land use is complex and mixed, but much of the watershed is currently experiencing suburban to urban development. Increased algal productivity through human impacts is occurring, and some management actions have been taken to limit phosphorus input to the lake.

Lake Sammamish has a public access boat launch and several large parks. There is a history of Eurasian milfoil infestation and control efforts in various locations. Residents should watch for new patches of Eurasian milfoil, as well as other listed noxious weeds.

Lake Temp, Secchi Depth, Lake Level and Precipitation

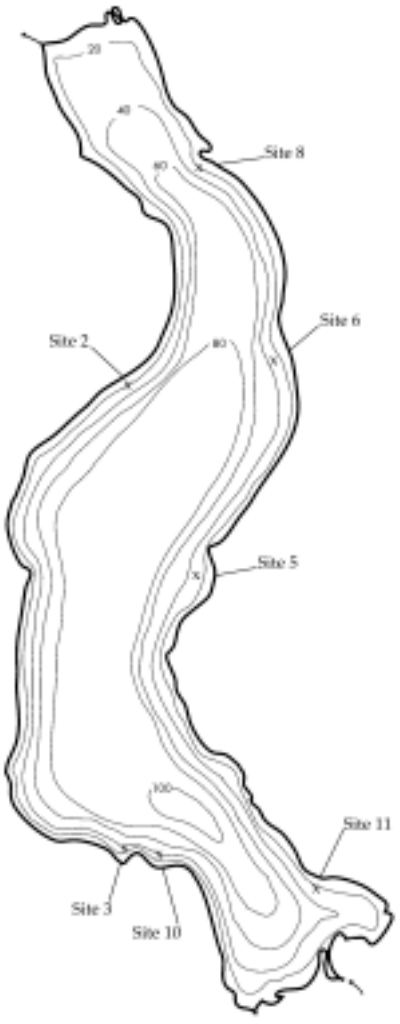
Secchi transparency ranged from 1.5 to 5.0m through the year among all volunteers, with an annual average of all data of 3.4m. Average daily water levels ranged between 26 to 27 feet above mean sea level, with abrupt increases apparently related closely to precipitation events. Annual water temperatures ranged from 6 to 25.0 degrees Celsius, with close agreement among the volunteer data.

Lake Characteristics

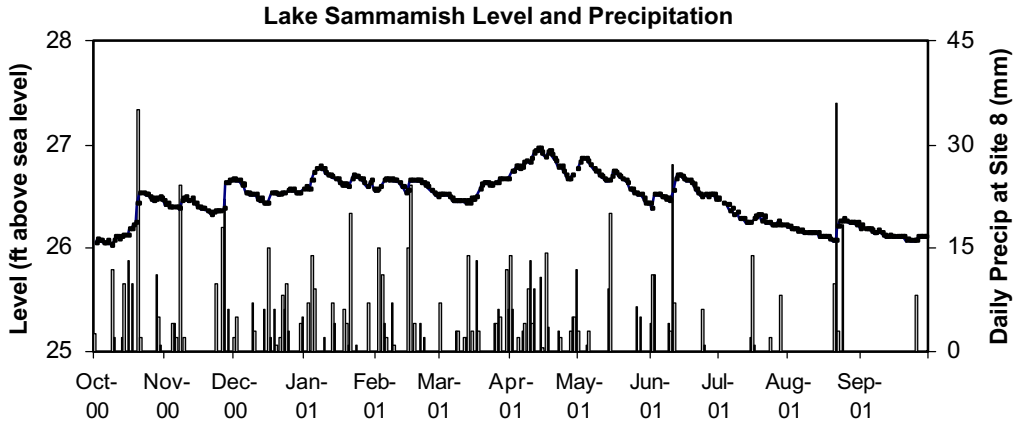
Surface area:	4893 acres
Watershed area:	62517 acres
Max depth:	105 feet
Mean depth:	58 feet
Location:	Issaquah/Sammamish

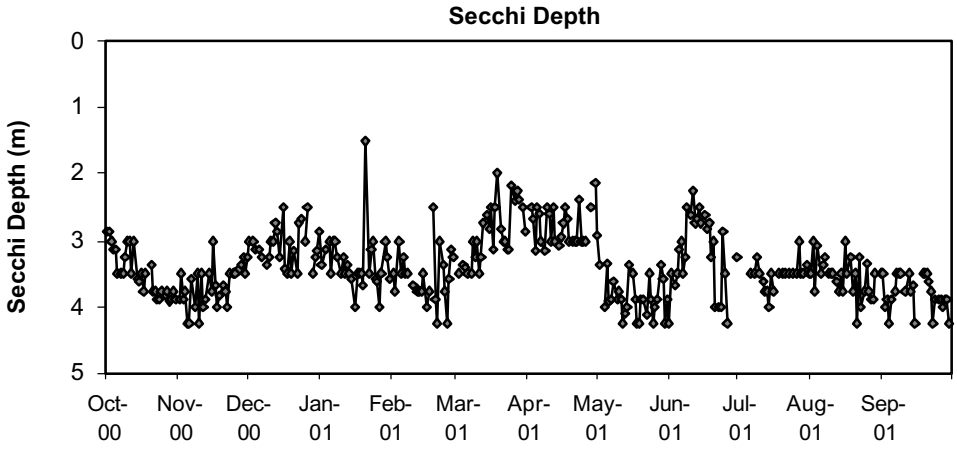
Volunteers

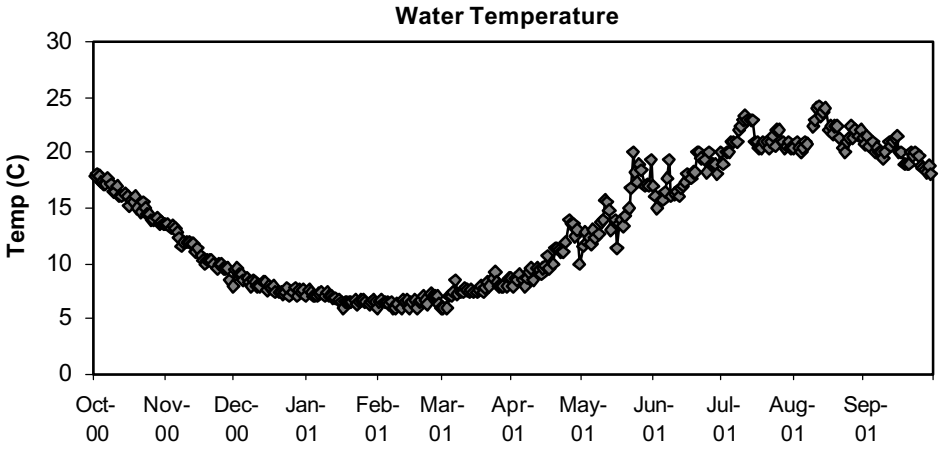
Bruce and Becky Beaulaurier;
Reid Brockway;
Dave Buecker;
Joanna Buehler;
Pam Monger;
Mike Schmidt;
Cecily Way



Lake Sammamish Data
All charts show the average of daily records from all volunteers.







Introduction

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. Others lay on the bottom sediments, and a third group floats 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.

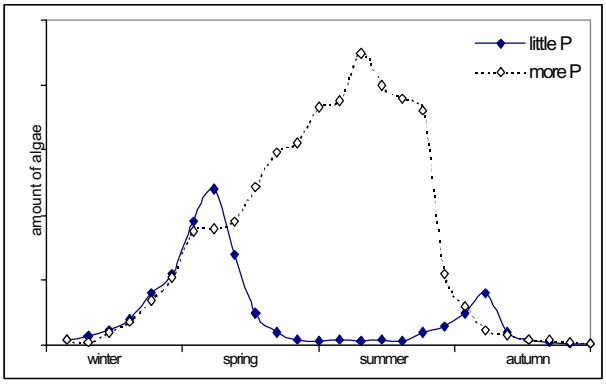
The interactions between phytoplankton and the environment within a lake can be quite complex and unpredictable, but there are some generalizations that can be made about changes in populations through the year and how those relate to seasonal changes in lakes in temperate climates, such as that of the Pacific Northwest. 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 in the water. Changing conditions allow different algal groups to become dominant (i.e.: high numbers relative to other algae) as time passes and seasons progress.

While most algae like the warmer temperatures and bright, long days of spring through fall, others can survive in cool temperatures and

short days. The general patterns of phytoplankton populations through the seasons ("succession") can be summarized for lakes situated in moderate climate areas like the Pacific Northwest. There are many 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 necessary for growth that will be exhausted first by the growing algae. When that nutrient is essentially gone from the lake, algal growth will be limited. Algal growth reaches a maximum in spring in lakes with smaller amounts of phosphorus and then drops in summer when the phosphorus has been used up in 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 algal peaks in spring will produce another peak in fall, when cool temperatures mix the phosphorus from the lower water (hypolimnion) of the lake upwards and enough light enters the water to stimulate the second period of growth.

Figure 4-1: Illustration of Typical Seasonal Abundance of Algae in Lakes



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.

Chlorophyll and Algae

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 contained in special organelles called chloroplasts, since it is a substance necessary for photosynthesis (food production). The determination can be used as an analogue for the volume of phytoplankton present. There are several problems with this method, but it can be a useful tool for classifying lakes.

Algae can have differing amounts of chlorophyll per volume of cell contents, depending on the species present as well as the time of year and the health of the cells. Sometimes quite a large volume of algae will have relatively little chlorophyll and vice versa. As a group, the diatoms tend to have less chlorophyll per volume because many have large vacuoles or inclusions inside the cells, which take up space but are not chloroplasts, so do not add to the amount of chlorophyll. Other algae, such as the bluegreens, have pigments in addition to chlorophyll that are used to capture light, so the amount of chlorophyll in each cell may be commensurately less. In addition, as algae age or senesce, they may lose chlorophyll, so older populations may have less chlorophyll than young, rapidly growing groups.

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. The chlorophyll data can be transformed into TSI values (trophic state indicators) in order to compare the data with that of Secchi transparency and total phosphorus to determine the primary productivity of the lake in relation to many other lakes that have been

studied.
Beginning in water year 2000, additional samples were collected for more complete analysis of the phytoplankton populations in the lakes, including not only identification of all the commonly found species, but enumeration and volume estimates as well. A more precise understanding of the processes going on in each lake can be gained by the increase in information, in particular the presence or absence of indicator species that could signal major changes in the lake ecosystems.

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 this area. Many 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 large amounts of humic substances 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 groups and some representative species of algae 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: 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 may not be appropriate. The bluegreens also share many of the environmental requirements of true algae and are important competitors for nutrients and light in the phytoplankton communities of lakes.

Bluegreens can actually be bluish-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 to complete the photosynthetic reactions, but they also can have a wide variety of other pigments that act as auxiliary light catchers for photosynthesis.

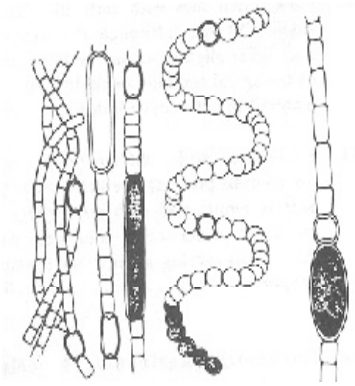
Bluegreens have become especially notorious in lake studies because several species can grow quickly in waters rich in phosphorus, which can be increased by land use changes or other human impacts. On occasion they can outnumber and exclude other naturally occurring species, leading to reduced water clarity, bad smells, and floating scums of decaying colonies, thus adding to their reputation as the algae of polluted waters. In addition, some species are known to release 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 colony 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.

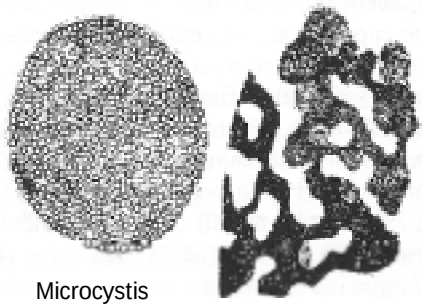
In general, bluegreens do very well in warm water and in high light levels, and therefore are considered to be summer algae. However, several species, such as *Aphanizomenon flos-aquae*, seem to be able to increase their population size in every season of the year in temperate lakes if other conditions are right, and they have been found making significant blooms in fall, winter and spring.

Common bluegreens found in King County lakes include *Aphanizomenon flos-aquae*,

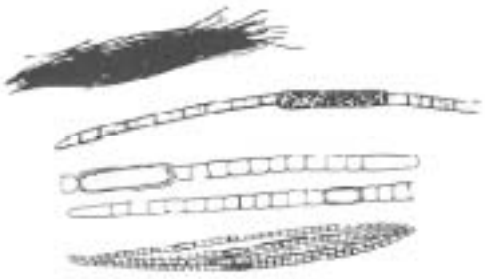
Figure 4-2: Common Bluegreen Algae



Anabaena



Microcystis



Aphanizomenon

Illustrations obtained from: How to Know the Freshwater Algae by G.W. Prescott, 1978.

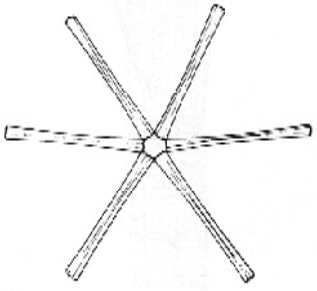
Microcystis aeruginosum and several species of *Anabaena* (Fig. 4-2). The last two named are most often implicated when toxic blooms are reported, but in fact most occurrences of these species are not toxic and should not cause concerns merely because of their identification in the phytoplankton of a particular lake.

Chrysophytes: Golden Brown Algae

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

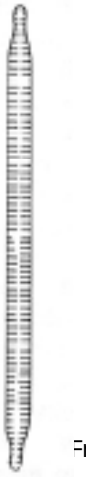
Diatoms are an important subgroup of the chrysophytes, often dominating spring phytoplankton since they can grow better than other algae in low light and cool temperatures, thus getting a head start on the growing season. Diatoms make hard siliceous coverings for their cells, known as "frustules" and this characteristic has two effects: their growth can be limited by the amount of silica present as

Figure 4-3: Common Diatom Algae



Asterionella

Cyclotella



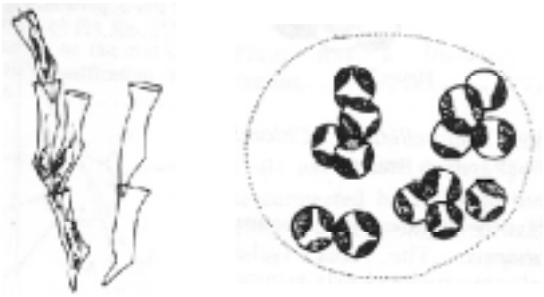
Fragilaria

Illustrations obtained from: How to Know the Freshwater Algae by G.W. Prescott, 1978.

well as the phosphorus that limits other algae, and the extra weight of the frustule makes it harder for some diatoms to stay near the surface of the water where light is available. Therefore, many diatom populations will be seen in spring before the beginning of thermal layering in area lakes, or in fall after it begins to break down, 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 a reputation as indicators of clean water or oligotrophic conditions. Others, such as *Fragilaria*, are known to be more common in mesotrophic lakes.

Figure 4-4:
Other Chrysophyte Algae



Dinobryon Gioeobotrys

Illustrations obtained from: How to Know the Freshwater Algae by G.W. Prescott, 1978.

Several other chrysophytes are quite common in lakes of our area. The colonial species *Dinobryon* does not make a frustule, but does make a thin protective covering shaped like a goblet or 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.

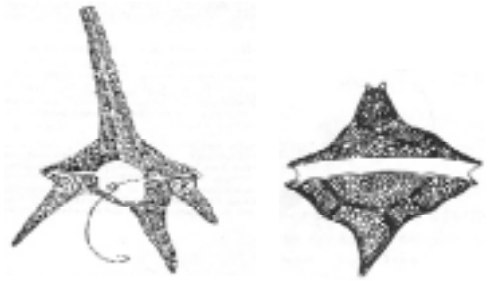
Chlorophytes: Green Algae

Green algae produce chlorophyll as their predominant pigment, hence their bright green coloration. They are a large and varied group, with some characteristics closer to the higher (vascular) plants than found in other groups of algae, and therefore some authorities have considered some chlorophytes as evolutionary links 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 they generally produce their biggest populations in summer.

Green algae can be solitary or colonial, and both single cells and colonies can take many different shapes from spherical to elaborately geometrical to filamentous. Most of the filamentous green algae grow attached to surfaces rather than floating in the water. Some cells have the means to be mobile, having from one to four whiplike tails called "flagella," which they use to move through the water. Colonial balls of green algae, when each member cell has flagella, can move in characteristic tumbling, rolling motions through the water as all the flagella beat the water. Typical colonial greens found in area lakes include *Volvox* and a rather peculiar large colonial form called *Botryococcus*, which makes large amounts of oils that keep it buoyant through the season (fig. 4-5). It often turns from green to bright orange as it gets old and dies off, in the same fashion as the changing color of leaves on deciduous trees.

Another specialized group of 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 one commonly found in our lakes.

Figure 4-6: Common Dinoflagellates



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 using two flagella. Their movements are vigorous, more characteristic of animals, but the dinoflagellates can also make food like plants. To confuse the issue, they can also ingest other foods as animals do.

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 generally occur in the summer, if at all, in our area. The most common forms seen are species of *Peridineum* and *Ceratium*.

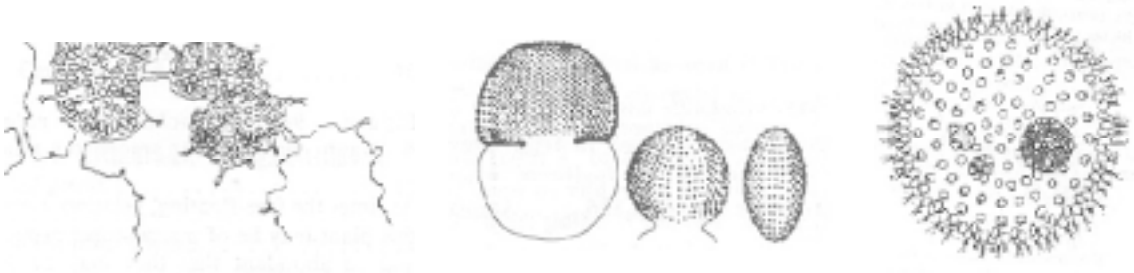
Two Lesser Known Groups of Algae

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 through 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 have been found in several of the lakes in the Lake Stewardship Program, such as Jones and Paradise. Examples of common euglenoids include *Euglena* and the unusual *Trachelomonas*, which makes an organic shell often colored golden or brown (Fig. 4-7).

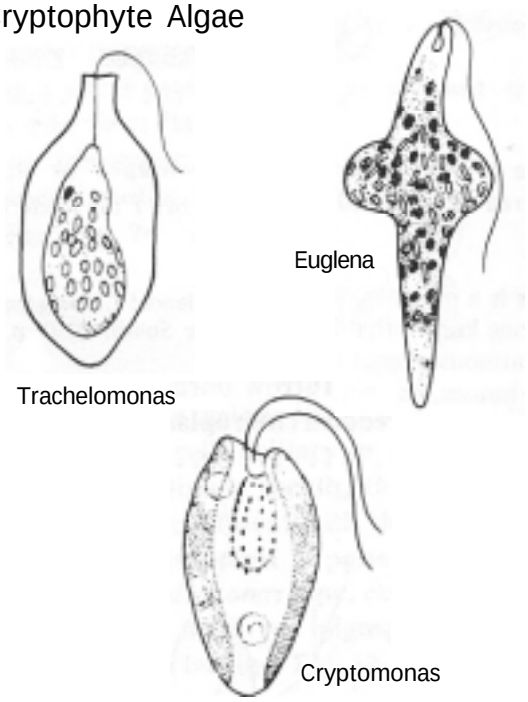
Figure 4-5: Common Chlorophyte Algae



Botryococcus Cosmarium Volvox

Illustrations obtained from: How to Know the Freshwater Algae by G.W. Prescott, 1978.

Figure 4-7: Common Euglenophyte and Cryptophyte Algae



Illustrations obtained from: How to Know the 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, solitary, and can move quickly using flagella. They are known as an excellent food source for many small planktonic animals. The amount present of these algal species 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 (Fig. 4-7).

Algae Patterns in Our Lakes

Each lake monitored by the Lake Stewardship volunteers has a characteristic suite of algae that do well in its waters. While the patterns of total phytoplankton abundance for any lake will be somewhat different from year to year, following the seasonal changes in light, temperature and nutrients, the actual species that dominate can also be different, due to the complexities of competition and changing circumstances. The relationships between different groups of algae, the animals that eat them, and the environment are far too complex to make major conclusions based on the sampling protocol of the program. However, 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. In addition, changes over time may also point to situations that must be considered when looking at management options for a lake.

Summaries of the phytoplankton found in the lakes have been included with individual lake descriptions in Chapter 3. In addition, each lake was also examined for algae distribution through the water column, concentrating on the possibility of deeper water algae production. Some lakes are clear enough for light to penetrate below the thermocline, and large amounts of algae can continue to grow slowly in the cool temperatures. They are cut off from the surface water, but can use the light to photosynthesize, feeding off the nutrients that are still available in the deep water after the epilimnetic concentrations are exhausted. The two profile measuring events done by the Lake Stewardship Program included a mid-depth phytoplankton sample to look for evidence of differing volumes of algae and changes in species present in the deeper water of each lake (Table 4-1). The phytoplankton communities are reported as dominant groups rather than as individual species.

When the phytoplankton in the deeper water was between 50% to 200% of the volume of the algae at the 1m depth, the values were considered to be essentially similar because of general patterns in variability that are present in the phytoplankton concentrations in many lakes. Lakes in which the profile surveys generally followed this

Table 4-1: Algae Patterns for 2001

Lake	(m) depth	6/18/2001 Volume	Major Groups	8/26/2001* Volume	Major Groups
Alice	1	474037	Chryso	1094273	Dino
	4	454857	Chryso	1011126	Dino
	ratio	1.042		1.082	
Allen	1	4797430	Dino	17000672	Dino
	2	261899	Dino	3756154	Euglen
	ratio	18.318		4.526	
Ames	1	1269387	Chryso	147972	Cyan
	4	1572244	Chryso	273887	Cyan-Euglen
	ratio	0.807		0.540	
Angle	1	427763	Cyan-Chlor	330830	Cyan
	8	348600	Chryso-Crypt	893346	Cyan
	ratio	1.227		0.370	
Beaver1	1	661454	Dino	2179414	Dino-Chryso
	7	221725	Cyan-Chlor	141832	Dino-Chryso
	ratio	2.983		15.366	
Beaver2	1	2114080	Chryso	no samples	
	7	385554	Chryso-Chlor		
	ratio	5.483			
Bitter	1	1448466	Chryso-Chlor	1117431	Chryso
	4	945030	Chryso-Chlor	2135584	Chryso-Dino
	ratio	1.533		0.523	
Boren	1	4153015	Chryso	1212135	Cyan
	5	4187057	Chryso	2297121	Chryso-Cyan
	ratio	0.992		0.528	
Burien	1	679044	Chryso	359272	Cyan-Chryso
	4	1323013	Chryso	374616	Dino-Cyan
	ratio	0.513		0.959	
Cottage	1	2784324	Chryso-Chlor	9482292	Chryso
	3.5	4635838	Chryso-Cyan	15849871	Chryso
	ratio	0.601		0.598	
Desire	1	1374820	Cyan-Chryso	5343840	Cyan
	3	4021775	Dino-Chryso	7459696	Cyan
	ratio	0.342		0.716	
Dolloff	1	6458447	Dino	2742968	Dino
	3	644079	Crypt-Cyan	2372848	Cyan
	ratio	10.027		1.156	
Echo (Shoreline)	1	11352774	Cyan	6841508	Cyan-Chlor
	4	20704825	Cyan	3176273	Chlor-Cyan
	ratio	0.548		2.154	
Fenwick	1	872509	Dino-Cyan	569962	Cyan-Chryso
	4	9710744	Cyan	21371785	Dino
	ratio	0.090		0.027	
Fivemile	1	934684	Cyan-Dino	372282	Chryso-Crypt
	5	373527	Cyan	166361	Chryso-Chlor
	ratio	2.502		2.238	
Francis	1	2415705	Chryso	948311	Dino
	2	3364361	Chryso	720731	Euglen-Chlor
	ratio	0.718		1.316	
Geneva	1	1004189	Chlor	286582	Crypt-Chryso
	7	2434871	Cyan	1181138	Cyan
	ratio	0.412		0.243	
Haller	1	895647	Dino	668258	Cyan-Chlor
	5	4278464	Dino	7339314	Cyan
	ratio	0.209		0.091	
Jones	1	294414	Chlor	1419216	Chryso
	1.5	1889244	Dino	391604	Euglen-Chryso
	ratio	0.156		3.624	
Joy	1	685537	Chryso-Dino	203735	Dino-Chlor
	5.5	1909899	Chryso-Dino	611547	Chryso-Chlor
	ratio	0.359		0.333	
Kathleen	1	559209	Chryso	744072	Chryso
	3	4360927	Dino	765199	Chryso-Euglen
	ratio	0.128		0.972	
Killarney	1	123222	Dino-Crypt		
	2	117273	Crypt		
	ratio	1.051			
Leota	1	1777739	Dino-Chryso	14339939	Chryso
	3	183340	Crypt-Chlor	1485527	Cyan
	ratio	9.696		9.653	
Lucerne	1	481187	Chryso-Cyan	169261	Chryso-Chlor
	5	1099565	Chryso	107783	Chryso-Crypt
	ratio	0.438		1.570	
Marcel	1	8190725	Chryso	5532161	Chryso
	2	2433394	Chryso	4530556	Chryso
	ratio	3.366		1.221	
Margaret	1	3395909	Dino-Chryso	401246	Other-Euglen
	5.5	1855673	Chryso-Dino	1199850	Chryso-Cyan
	ratio	1.830		0.334	
McDonald	1	2056737	Chryso	314960	Dino-Crypt
	7	857101	Euglen-Chlor	3515872	Dino-Chryso
	ratio	2.400		0.090	
Meridian	1	833034	Chlor-Chryso	524268	Chryso-Chlor
	13	668807	Chryso	596163	Chryso
	ratio	1.246		0.879	
Mirror	1	507286	Chlor-Chryso	453997	Chlor
	3.5	1384052	Chlor	986380	Dino-Chryso
	ratio	0.367		0.460	
Morton	1	235755	Chryso-Chlor	174924	Chlor-Cyan
	3	854726	Chlor-Chryso	148914	Chlor-Cyan
	ratio	0.276		1.175	

Table 4-1: Algae Patterns for 2001 (cont.)

Lake	(m) depth	6/18/2001 Volume	Major Groups	8/26/2001* Volume	Major Groups
Neilson (Holm)	1	985138	Chryso-Cyan	4707698	Chryso
	4	563042	Dino-Chryso	3416330	Cyan
	ratio	1.750		1.378	
North	1	829970	Chryso	1323463	Chryso
	5	433287	Chryso-Chlor	2256492	Cyan
	ratio	1.916		0.587	
Paradise	1	690351	Crypt-Chlor	8092172	Chryso
	4	71186	Crypt-Euglen	1456510	Chryso-Euglen
	ratio	9.698		5.556	
Pine	1	601918	Chlor	548921	Chryso
	6	1282738	Chryso	994972	Dino-Chryso
	ratio	0.469		0.552	
Pipe	1	322567	Chryso	574081	Chryso
	10	933197	Chryso	163772	Chryso-Cyan
	ratio	0.346		3.505	
Sawyer	1	5701028	Chryso	2552571	Cyan
	8	2534605	Chryso	2651371	Cyan
	ratio	2.249		0.963	
Shadow	1	358866	Cyan-Chryso	829254	Chryso-Cyan
	6	343653	Cyan-Chryso	229734	Cyan-Chlor
	ratio	1.044		3.610	
Shady	1	1431413	Chryso-Dino	270206	Chryso-Dino
	6	3236792	Chryso	8280574	Dino
	ratio	0.442		0.033	
Spring	1	2812983	Chryso	424014	Cyan
	4	1766044	Chryso-Cyan	1139475	Cyan
	ratio	1.593		0.372	
Star	1	393362	Chlor-Chryso	79297	Chlor-Crypt
	7	643974	Crypt-Cyan	856662	Crypt-Cyan
	ratio	0.611		0.093	
Steel	1	1623870	Chryso-Cyan	404653	Crypt-Cyan
	3	1827340	Chryso-Cyan	365306	Dino
	ratio	0.889		1.108	
Trout	1	1617301	Chryso-Dino		
	4	2216530	Chryso		
	ratio	0.730			
Twelve	1	820470	Chryso	2298361	Chryso
	4	581970	Chryso	3029359	Chryso
	ratio	1.410		0.759	
Welcome	1	555685	Chryso-Chlor	1277980	Chryso
	2	196705	Chlor-Crypt	6937260	Chryso
	ratio	2.825		0.184	
Wilderness	1	1537160	Chlor	733044	Cyan-Crypt
	5	1524099	Chlor	855481	Cyan-Crypt
	ratio	1.009		0.857	

guideline for both dates included Alice, Ames, Bitter, Boren, Burien, Cottage, Fivemile, Francis, Killarney, Lucerne, Meridian, Neilson (Holm), North, Pine, Steel, Trout, Twelve, and Wilderness. For these lakes, the majority of the dominant algae in the shallow samples were also dominant in the deeper samples.

Many lakes differed significantly from this relationship on one or both dates. As an example, in eutrophic Allen Lake, the phytoplankton in June was 18 times higher in the 1m sample than in the 2m sample, though both samples were dominated by dinoflagellates. In August, the volumes had increased greatly at both depths. The deeper sample was dominated by euglenophytes rather than dinoflagellates, but the same total phytoplankton volume relationship existed. Other lakes that exhibited much higher volumes in the surface water on both dates included Beaver 1, Leota, and Paradise. Lakes with more algae in the 1m sample in June only included Beaver 2 (no sample in August), Dolloff, Marcel, McDonald, and Welcome. Lakes with more algae in the 1m sample in August only included Echo (city of Shoreline), Jones, Pipe, and Shadow.

Lakes that exhibited a higher concentration of algae in the deeper sample on both dates included Fenwick, Geneva, Haller, and Joy. Those with more algae in the deeper sample in June only included Desire, Jones, Kathleen, Mirror, Morton, and Pipe. Those with more algae in the

deep water in August only included Angle, Margaret, McDonald, Shady, Spring, Star, and Welcome.

There were several cases where cyanobacteria (bluegreens) were the dominant or co-dominant algae in the deeper water, but were not important members of the phytoplankton community at the surface. Lakes where this pattern was found on at least one of the two dates included Beaver 1, Cottage, Dolloff, Geneva, Leota, Margaret, Neilson (Holm), and Star. This does not mean that bluegreens constitute a problem in these lakes, but merely points out that surface samples alone may not always completely characterize the importance of various phytoplankton that are present. By extension, it should also be kept in mind that, although very unlikely, lakes with this pattern do have the potential to host toxic blooms that have little or no representation in the surface water of the lake and so might not be readily detected.

It is difficult to draw regional conclusions from the various vertical patterns of phytoplankton distribution in King County lakes, although the pattern found at specific lakes should be helpful in putting together an integrated picture of that particular ecosystem. In lakes where algae in the surface water greatly outnumber the algae at depth, the surface population could be interfering with light transmission to the deeper water, thus limiting growth in the deep water by light availability instead of by nutrients (the "shading effect"). Lakes with water colored by humic acids may also have deep water light limitations. The outcome of shading or blocked light transmission is that nutrients in the deep water are not utilized during the summer months and will be mixed throughout the water in the fall, causing increased growth as the water cools. This pattern can be seen in many county lakes and probably is contributing to the winter blooms of the bluegreen species *Aphanizomenon* reported for several county lakes.

In contrast, situations where algae in the deep water outnumber surface algae imply that water conditions allow sufficient light for algae growth to occur in deep water. Nutrients are usually in higher concentrations in the hypolimnion during summer when stratification inhibits water mixing. They are sometimes even replenished by chemical releases from the sediments. It should be noted that since a by-product of photosynthesis is the release of oxygen, deep water algae growth could actually result in a decreased rate of nutrient recycling in some lakes.

Lakes with little or no stratification may have more homogeneous vertical distribution patterns of phytoplankton to match the homogeneous temperatures and nutrient concentrations, but this is not always true. Even if the water is the same temperature from top to bottom, the depth of light penetration in lakes with low transparencies can result in higher growth rates and larger populations of algae in the surface water.

Looking at the conditions of light penetration, water temperature, nutrient concentrations and the patterns of algae population growth may produce a great deal of insight into the important factors operating at a particular lake. However, there are situations where another influential factor appears to be operating, and in such cases, analyzing the community of animals that graze upon the algae, or even the animals that prey upon the grazers, can provide interesting links that might otherwise remain mysterious.

CHAPTER 5

Discussion

Introduction

A coherent picture of water quality in the lakes of the inhabited areas of King County can be produced by comparing the data from all the lakes in water year 2001, as well as examining data for each lake over time. Level I monitoring data on precipitation, water levels, and water clarity (Secchi transparency) are compared for all the lakes measured in 2001, including Lake Sammamish. The discussion of Level II monitoring covers the similar comparisons for average phosphorus and chlorophyll, trophic state indices, and nitrogen to phosphorus ratios.

Precipitation

While Level I volunteer monitors collected precipitation data at 43 lakes throughout King County in water year 2001, only 23 lakes had comprehensive rainfall records for the period. If the precipitation records for a lake had some gaps, but had data for at least 330 days, estimated values for the missing days were inserted by averaging all available data from the other sites in the county for that day. Discussion of the data set as a whole will be limited to the 23 lakes with the most complete data.

Water Year 2001 Precipitation Data

The sum of accumulated rainfall at Sea-Tac International Airport for the 2001 water year totaled 713 millimeters (mm), which is well below the 50-year average of 972 mm and is the second lowest total in the last 50 years, the only lower being water year 1978. This can be visualized by comparing it to the last four years and to the mean precipitation accumulation rate for the last 50 years at the Sea-Tac weather station (Figure 5-1). The steep increase in accumulation normally seen in the fall and winter months never materialized in 2001. In 2001 the rate of accumulation was nearly linear through the entire water year, unlike the other years when rainfall accrued rapidly until May, and then the rate of increase flattened out. The annual total was

Figure 5-1: Monthly Rain Accumulation Rate by Water Year

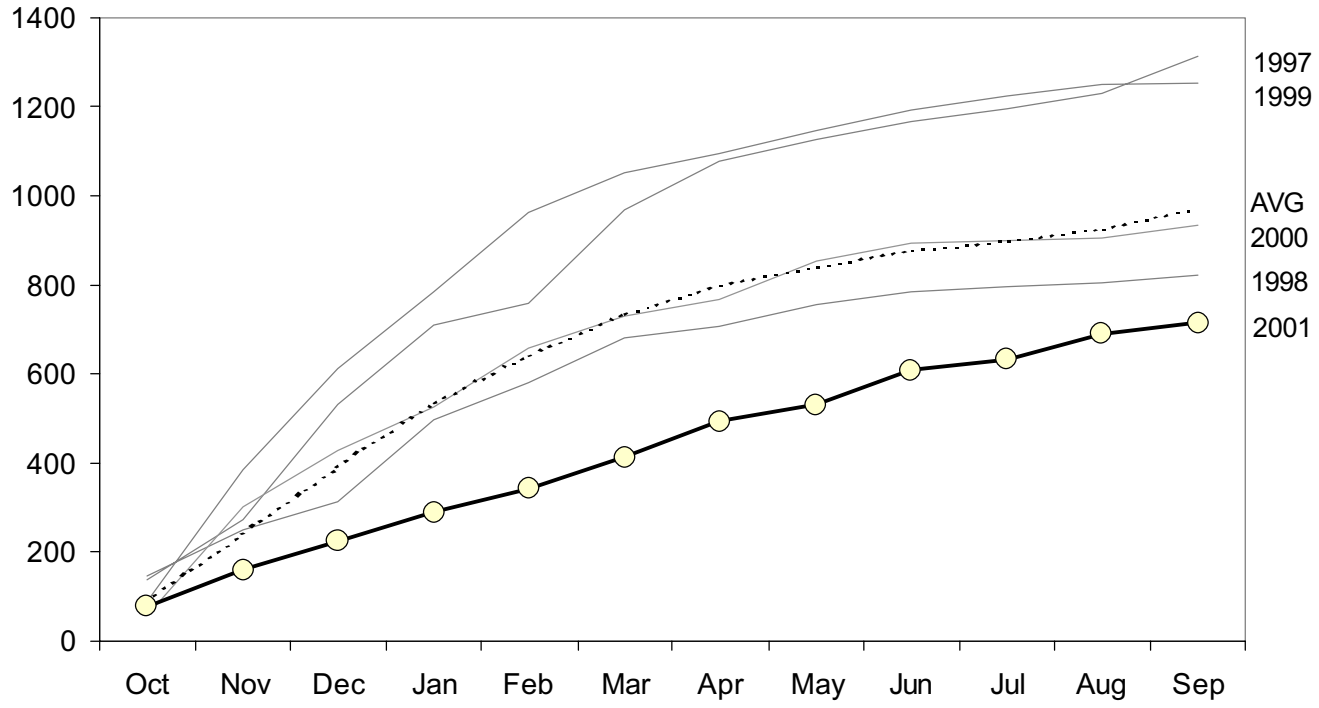
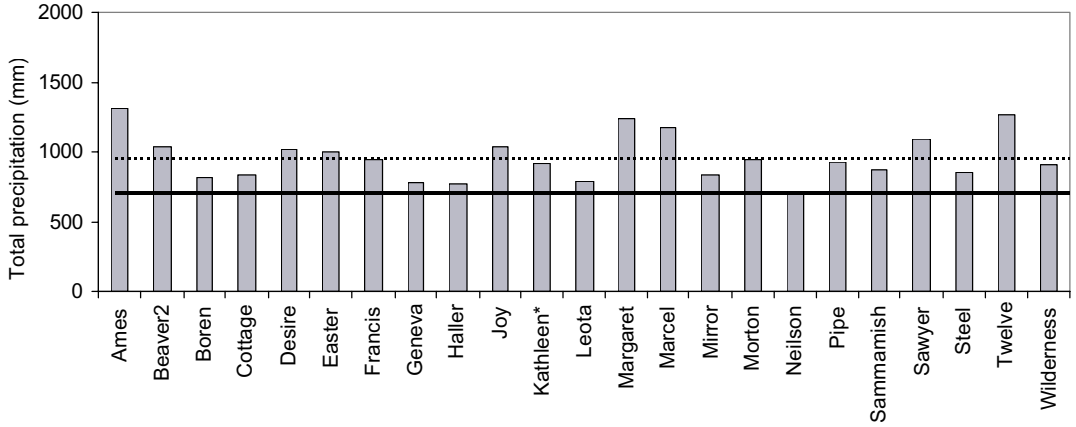


Figure 5-2: Total Precipitation at Individual Lakes for the 2001 Water Year



Dotted line refers to 50-year average at Sea-Tac; solid line refers to water year 2001 at Sea-Tac

a substantial decrease from the high values of 1997 and 1999, while even the low year of 1998 is significantly higher by the end of the year.

Precipitation totals for water year 2001 for the 23 Level I lakes with excellent precipitation records (Figure 5-2) show that nearly all the lake sites exceeded the total accumulation recorded at Sea-Tac (solid line), but fewer reached the 50-year average (dotted line). The differences between the totals recorded at the lake sites illustrate the influence of location on both daily and annual precipitation values. A variety of factors, including rain gauge placement, adherence to protocols, local topography and storm intensity, as well as patterns of cloud movement between Puget Sound and the Cascade Range, influence the precipitation recorded at each location.

If the monthly totals for each lake during the year are plotted together on a chart (Figure 5-3), it is clear that the Sea-Tac station ranked in the lower range of monthly precipitation accumulations recorded at the locations covered by King County volunteers in 2001.

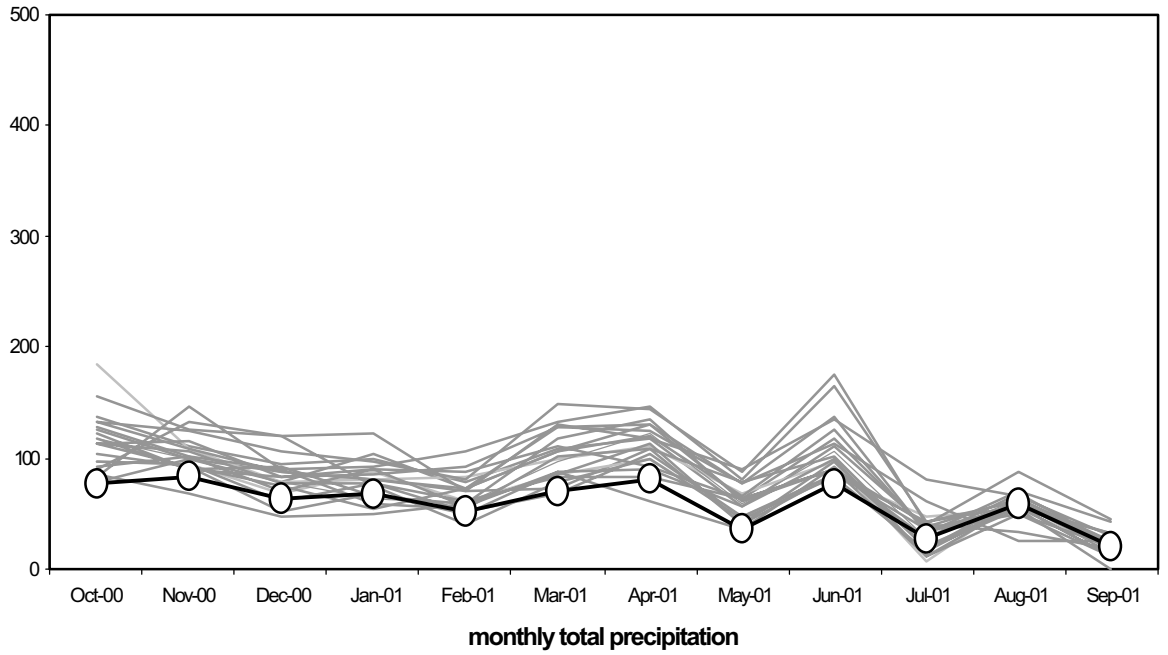
Conclusions

Volunteer monitoring is 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 2001 total at the Sea-Tac weather station was the second lowest in the last 50 years. However, at nearly all of the lake sites, volunteers recorded higher precipitation levels than what was observed at Sea-Tac. Most levels were still below the 50-year average for accumulated precipitation at the Sea-Tac weather station.

Lake Level

Fluctuations of water level in lakes are affected both directly and indirectly by precipitation. Some other major influences include: (1) watershed size (sometimes called the "catchment basin"); (2) land use within the watershed

Figure 5-3: Monthly Total Precipitation at Sea-Tac vs. All Lake Stations



This chart compares data from all the lake stations reporting data for water year 2001.

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; (6) surface and subterranean hydrology; (7) outlet type or structure, with or without management; and (8) the volume of water the lake holds relative to the size of the watershed. These factors combine to give each lake a pattern of water level change that is unique.

Nonetheless, some common fluctuation patterns can be found among 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 undeveloped watersheds. This is largely due to the increase in impervious surfaces, as well as the collection and channelization of surface run-off for quick removal from developed properties. Lakes with large watersheds may also respond more slowly to precipitation because the distance that runoff must travel before entering the lake. Lakes with large surface areas or volumes relative to the size of the watershed may be less responsive than other lakes in general because they do not receive very much more water from a storm event than the amount that comes in from direct precipitation.

Lake Level Fluctuations 2001

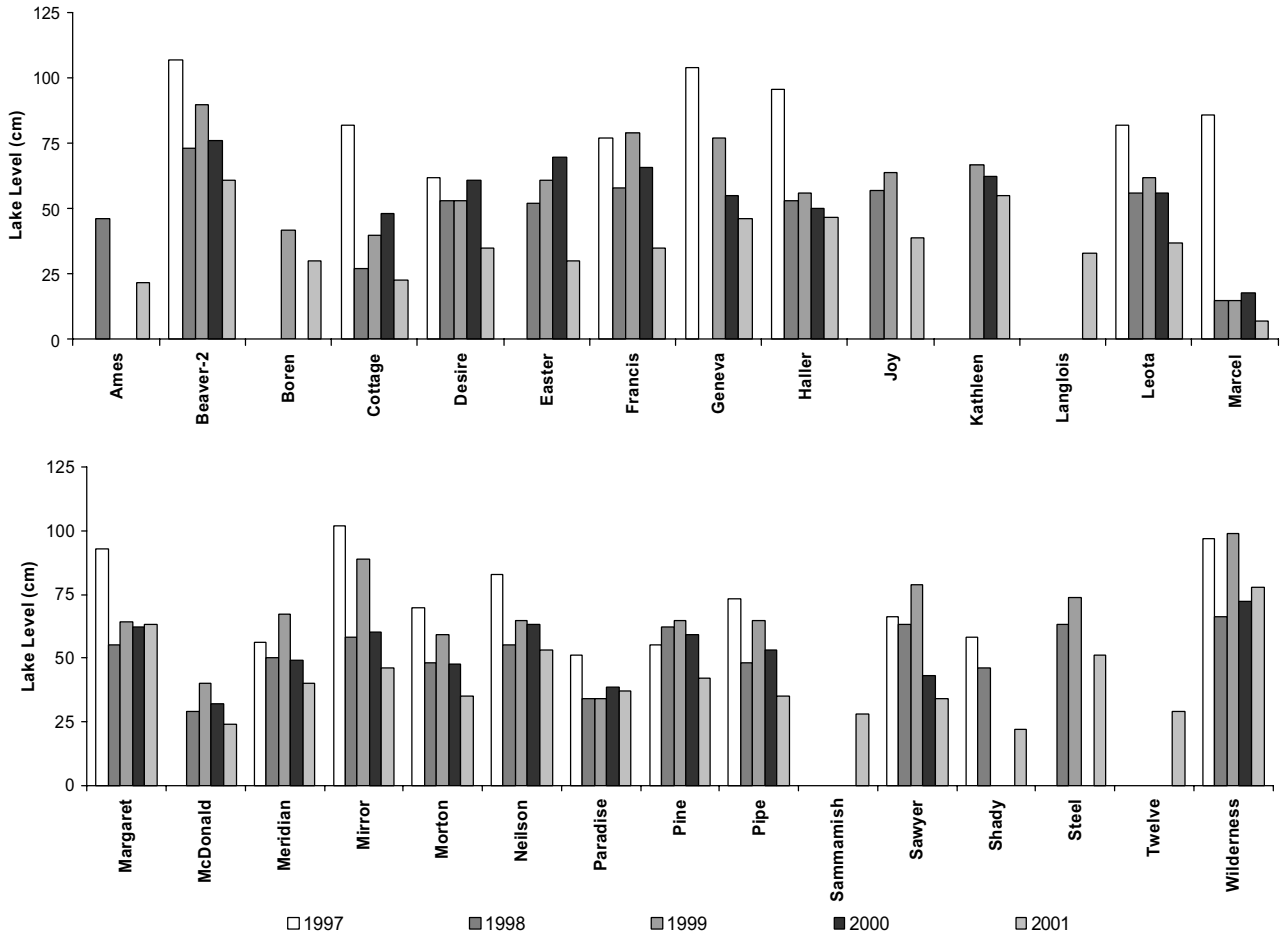
Seasonal fluctuations in lake levels were observed at most lakes with complete data sets. Water levels were typically at a low stand during fall and steadily increased during late fall/early winter as precipitation increased (see Chapter 3 for individual lake results). During the fall and winter, many lakes also showed the greatest fluctuation in daily lake level readings, as runoff from watersheds with saturated soils quickly flowed to the lakes instead of percolating through the soil horizon. This type of runoff pattern caused peaks in water levels to track large precipitation events closely (see Chapter 3).

The range in water level is the difference between the maximum and minimum stands over the entire year (Figure 5-4). Changes in a particular lake from year to year can be compared in addition to comparing the records between lakes. Lakes with large fluctuations show their high sensitivities to winter precipitation and run-off as well as to evaporation in summer. Lakes with small variations in water level may be more dependent on 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 levels 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.

Where essentially complete annual records were available for comparison, it was noted that lake level ranges in nearly every case were smaller in water year 2001 than in the previous four years, with the exception of Lake Wilderness. The largest ranges over the last five years are most often found in water year 1997, in particular during the winter months. The total precipitation at the Sea-Tac station for that year was the highest in the five year period (1312 mm, see Figure 5-1), so high water stands 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 water year 1999 had similar rainfall totals, but the range in lake levels were not generally as great.

Looking at records of annual maximum high water level can indicate whether or not a lake was at its capacity for water storage (at or above the threshold of the outlet) before the beginning of the dry season each year. It also indicates if a lake rose to unusual heights at any point during the wet season (Figure 5-5). It is not possible to compare levels from lake to lake because water level measurements for each lake

Figure 5-4: Annual Variation in Mean Weekly Lake Level, 1997-2001



are relative, based on the vertical placement of the fixed meter stick used to make the measurement. However, an idea can be gained 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 2001. As an example, Cottage Lake was relatively constant for most of the last five years, suggesting that inputs are balanced by water flowing through the outlet creek rapidly enough to maintain the winter level at a stable height. However, in 1997, there apparently was a period of much higher water inputs than the outlet could convey, and the lake level rose much higher. Pine Lake, on the other hand, varied little in its maximum water level over the past five years, so it was not overwhelmed by input in 1997. This kind of evidence can give clues regarding the unusually large water level ranges found for many lakes in 1997 and the impacts of their respective watersheds.

Conclusions

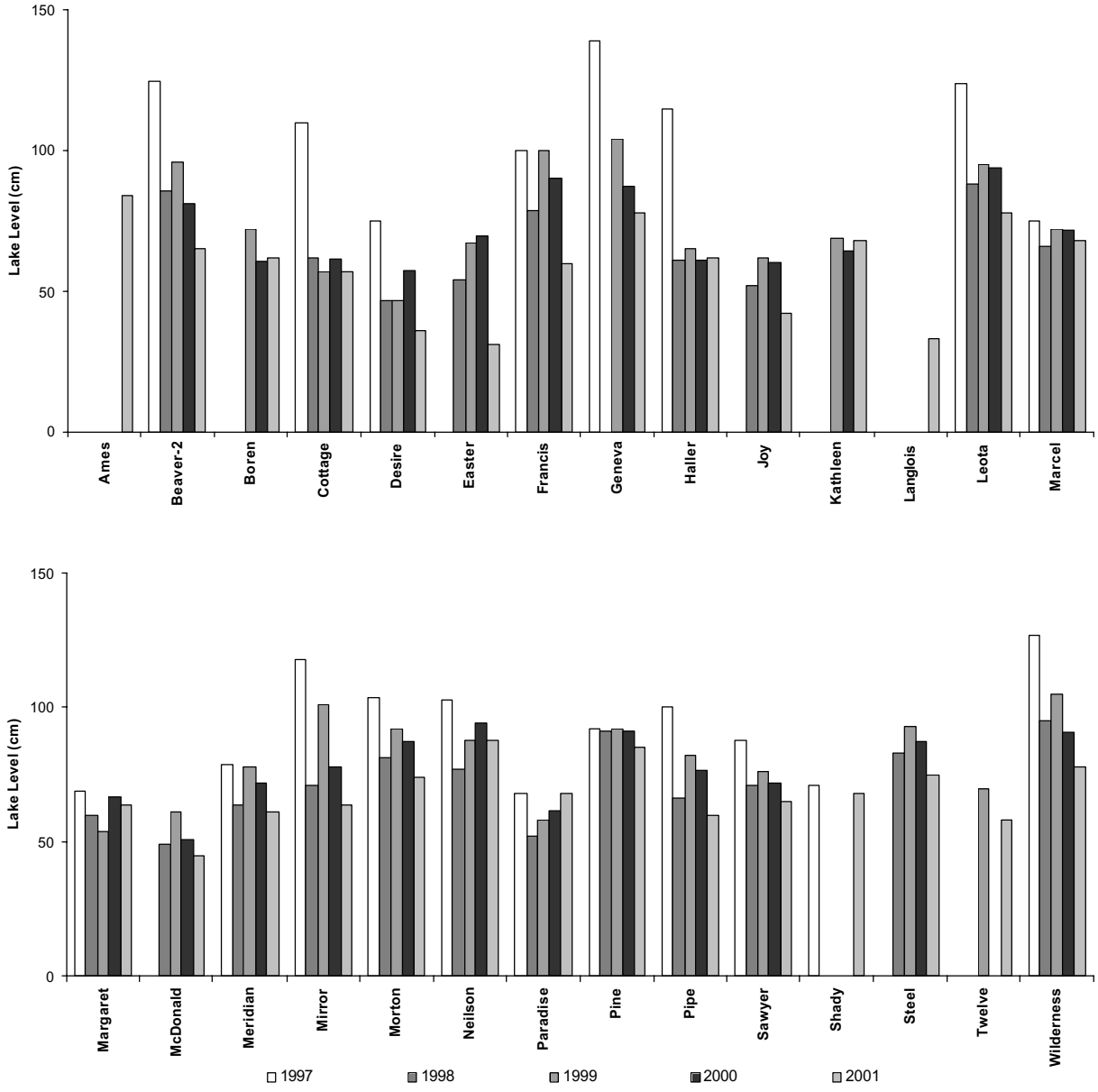
Most volunteers recorded smaller lake level fluctuations in 2001 than in the previous five years. Continued volunteer observation is important for determining how changes in natural conditions, management activities, or watershed development affect individual lake levels. Ongoing monitoring will help 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.

Secchi Transparency

The Secchi depth measures the relative transparency of water to an observer above the lake surface. Transparency can be affected by water color (concentrations of large organic molecules called "humic acids"), phytoplankton abundance and particular types of species present, and turbidity caused by suspended particles of other origins. Secchi transparency can be affected by wind and waves, as well as by light glare off the water surface. The protocol calls for measurement to be made in the same fashion each time, with records of wind and sun conditions, in order to evaluate the data.

Figure 5-5: Maximum Water Levels Recorded Over Five Years, Ending with 2001



Colored water can lower the transparency readings of a lake by the reflection of certain light frequencies, while allowing others to penetrate. In many King County lakes, the water is naturally stained yellow or brown from the presence of large organic molecules originating from decaying matter in wetlands and soils of the watershed. Area 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 decomposed rapidly by bacteria under prevailing conditions. Thus, some humic acids are leached out by ground water before they are totally broken down, eventually reaching lakes. The yellow color of the water indicates that wavelengths of light in the yellow range are particularly deflected. Therefore, the water color of a lake can give information about the rates of soil decomposition and relative saturation of soils in the watershed. Routine estimation of water color (separate from Secchi depth) was discontinued by the Lake Stewardship Program in 2001, but measurements could be added again in the future.

Transparency can also reflect changes in algal abundance, due either to changes in production or in grazing rates by zooplankton. It can also indicate major inputs of silt and detritus, such as soils dislodged by large storms or possibly moved into waters as a result of human activities. Transparency measurements compared across years can point to changes that may be correlated with specific events known to have occurred.

Secchi Depth 2001

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 5-6). Pine Lake and Lake Sawyer are right on the line. For some lakes, such as Desire, Haller, Leota, Marcel, Pine, or Welcome, annual Secchi depth transparency does not appear to have changed significantly over the past five years. However, several possible trends are suggested by the data. In particular, Lake Wilderness has shown an appreciable increase in clarity over the last five years, while lakes Meridian, Paradise and Beaver 2 have also increased, although at lower rates. The clarity in Lakes Margaret and Sawyer have declined and need careful monitoring to check for a continuing trend, while smaller declines are recorded for Mirror and Neilson (Holm) lakes.

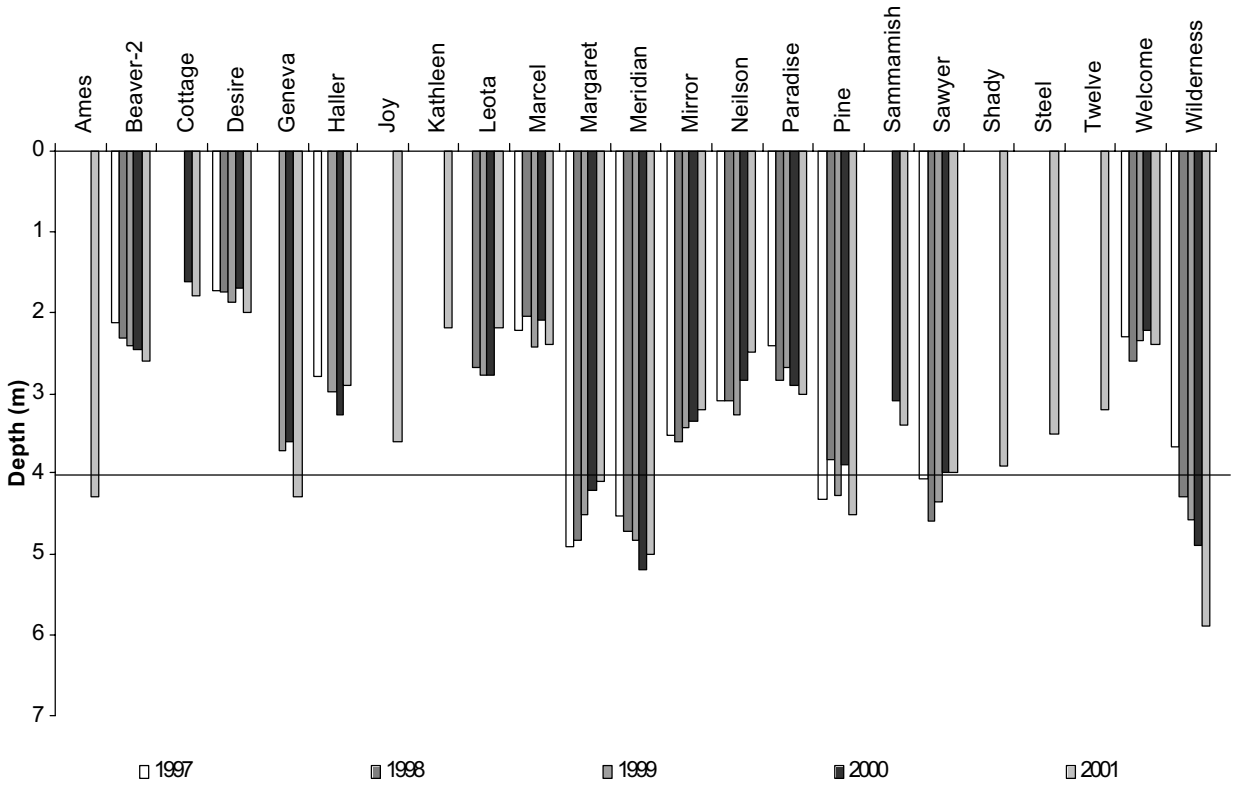
In some cases, lower Secchi depths may be attributed to the input of storm water runoff. To evaluate this possibility, Level I Secchi depths for 2001 were divided into two time periods (Figure 5-7) to see if the influence of storm water runoff (November-February) could be separated from influences associated with summer algal blooms (July-August). Spring and autumn data were not included because both major storm events and large phytoplankton blooms can occur during those seasons, thus confusing the interpretation.

During the wet months, lower transparencies were observed for 11 of the 23 lakes in the program with comprehensive annual data for Secchi depth, indicating that storm water runoff may influence water clarity in these lakes to a somewhat 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 lakes with sufficient data for annual average calculations. Some lakes have shown an increase in clarity over the past five years, while others may have declined. Lakes Margaret and Sawyer have

Figure 5-6: Annual Secchi Range, 1997–2001



declines in average annual transparency large enough to warrant close attention, but neither decline may be a statistically verifiable trend yet. In our geographic 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, measuring the Secchi depth is an easy, yet powerful, way to do a quick check on water quality and should always be included in lake monitoring programs in conjunction with other measurements.

Lake Stratification and Chemistry Profiles

Seasonal changes in the water chemistry of each lake relate in part to physical changes that occur with differences in water temperature. These chemistry changes are much more 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 causes 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 either develop transient thermal stratification that breaks down often or none at all.

Effects of Stratification

Temperature patterns and thermal stratification influence fundamental processes in lakes such

as changes in dissolved oxygen concentrations, nutrient release, and algal growth. Oxygen gas enters the water (dissolves) by contact with the atmosphere at the surface. Once a lake stratifies, deep water (hypolimnion) is no longer mixing with shallow water. This means that the dissolved oxygen in deeper water may be exhausted by the demands of bottom dwelling animals and bacteria at some time after stratification has occurred. Such anoxic (no oxygen) waters can greatly stress fish like trout and salmon that require cool, oxygenated waters in order to survive.

In addition, chemical reactions related to anoxia can cause the sediments to release phosphorus back into the water. When this water mixes with the surface waters in autumn as cooling occurs, an algal bloom can result from the sudden influx of nutrients into surface waters from the bottom. Monitoring water chemistry differences between the epilimnion and hypolimnion during summer provides a way to assess the role that internal nutrient cycling plays in lake water chemistry.

2001 Profiles

Samples were taken at two or three depths, depending on the maximum depth of each lake, for temperature, chlorophyll *a*, total phosphorus, and total nitrogen by Level II volunteer monitors (Table 5-1). The precise sampling depths were based on the actual depth measured at the sampling site, placed at 1m from the surface, the middle of the water column, and 1m above the measured bottom. These samples were collected in late June and again in late August, in order to characterize changes in the water column over the summer. Lakes with consistently stable stratification usually show the most dramatic differences in water chemistry between the top and bottom samples in late summer.

Figure 5-7: Wet/Dry Season Secchi Comparison

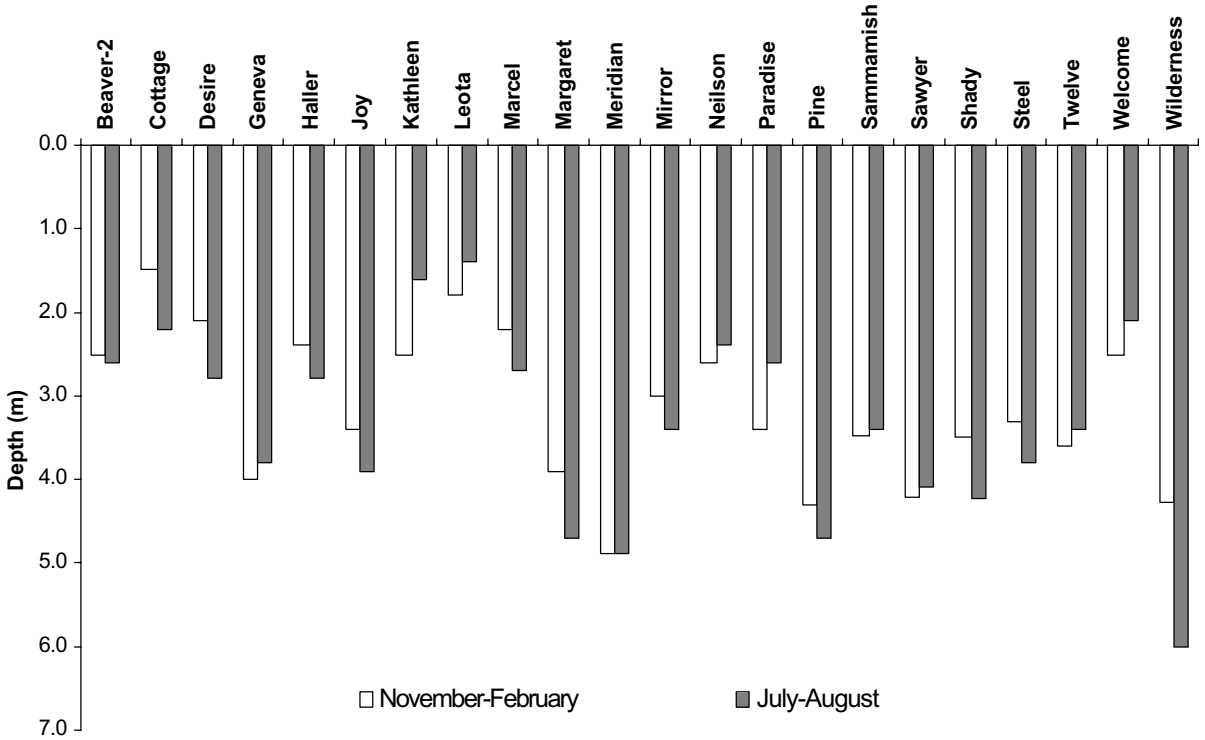


Table 5-1: Summer Profiles

Lake:	date	secchi (m)	sample depth (m)	temperature deg C	Chlor-a µg/L	Total P µg/L	Total N µg/L
Alice	6/18/2001	3.8	1	19	1.94	11.8	323
			4	17	1.7	9.4	311
			7.5	15		17.0	379
	8/27/2001	3.0	1	22	2.85	9.2	330
			2.8		2.66	8.5	369
			5	19		11.1	335
Allen	6/18/2001	0.8	1	17.5	11.9	34.7	892
			2	14	2.49	41.2	834
			3.5	10		148.0	834
	8/27/2001	0.8	1	24.5	38.2	55.1	1030
			2	22	37.4	47.8	979
			3.5	12		169.0	784
Ames	6/17/2001	5.5	1	18	1.58	9.6	345
			4	15	2.86	10.1	311
			7	9.5		25.8	363
	8/26/2001	4.5	1	23.5	1.95	10.2	359
			4	20	2.33	8.5	344
			7	14		33.2	540
Angle	6/17/2001	8.0	1	17.5	1.74	8.9	315
			5.8	17	1.66	10.7	260
			12	10		20.0	349
	8/26/2001	7.0	1	22.5	1.76	7.1	299
			8	21	2.5	9.1	353
			14	21		6.7	398
Beaver1	6/19/2001		1	18.5	4.6	27.2	588
			7	5	1.1	27.6	509
			14	4.5		103.0	732
	8/27/2001	1	1	20.5	12.7	15.6	551
			7	5.5	1.8	17.5	479
			14	5.5		184.0	963
Beaver2	6/17/2001	3.3	1	19	3.1	17.5	325
			7	9	2.5	18.4	501
			14	7		29.0	675
	8/26/2001		no sample				
Bitter	6/17/2001	6.0	1	19	2.71		
			4	18	4.5	11.6	256
			8	12		69.6	958
	8/26/2001	2.3	1	22	3.1	22.4	415
			4	20	6.1	18.4	348
			7.5	14.5		148.0	1800
Boren	6/17/2001	3.0	1	18	11.5	23.7	396
			5	13.5	17.5	25.6	574
			9	6		79.1	812
	8/26/2001		no sample				

Lake:	date	secchi (m)	sample depth (m)	temperature deg C	Chlor-a µg/L	Total P µg/L	Total N µg/L
Burien	6/17/2001	2.5	1	19	3.2	14.1	367
			4	18.5	5.8	14.3	379
			8	17.5		68.5	759
	8/26/2001	2.5	1	21	3.24	18.9	443
			4		4.3	13.1	421
			8			23.5	549
Cottage	6/18/2001	2.5	1	18	9.2	21.8	561
			3.5	15	22.3	29.3	771
			6.5	10		237.0	925
	8/27/2001	1.8	1	21	18.6	20.5	422
			3.5	19	21.7	32.4	419
			6.5	10		591.0	1930
Desire	6/17/2001	2.3	1	18	5.34	17.8	478
			3	17	56.9	33.3	543
			6	12		112.0	439
	8/26/2001	2.8	1	21	11.6	24.8	486
			3	20.5	116.0	46.0	736
			6	14.5		238.0	602
Dolloff	6/17/2001	1.5	1	20	21.5	39.0	801
			3		34.7	50.4	708
			4	11.5		116.0	983
	8/26/2001	2.0	1	22	51.7	31.9	817
			3	17.5	72.8	28.9	724
			4	13		118.0	950
Echo (in Shoreline)	6/17/2001	2.0	1	17.5	10.2	25.2	666
			4	15.5	18.5	41.3	869
			8.5	7		377.0	1750
	8/27/2001	2.0	1	22	11.7	20.6	480
			4	19.5	16.2	21.3	444
			8.5	8		566.0	2910
Fenwick	6/17/2001	9.0	1	19	29.7	22.1	412
			4	17	2.06	20.6	400
			8	15		30.5	487
	8/26/2001	5.0	1	22	1.86	21.7	475
			4	18	20.1	54.3	606
			8				
Fivemile	6/18/2001	1.5	1	21	4.73	22.6	790
			5	9.5	1.88	32.4	846
			9	6.5		34.8	881
	8/26/2001	1.0	1	21.5	3.84	17.6	835
			5	14	0.29	19.8	798
			8.5	5		49.3	1250
Francis	6/17/2001	2.5	1	17	5.7	14.4	454
			2	15.5	11.6	13.3	443
	8/26/2001	1.5	1	19	4.4	18.8	520
			2	17	6.5	13.4	484

Table 5-1: Summer Profiles (cont.)

Lake:	date	secchi (m)	sample depth (m)	temperature deg C	Chlor-a µg/L	Total P µg/L	Total N µg/L
Geneva	6/17/2001	4	1	18.5	2.5	22.1	424
			7	9.5	11.1	15.5	378
			14	5		353.0	943
	8/26/2001	4.5	1	19.5	1.7	8.5	383
			7	10	3.1	13.7	297
			13	5.5		355.0	1350
Haller	6/17/2001	3	1	16.5	5.7	19.8	352
			5	12	27.5	38.9	460
			9	4.5		109.0	1410
	8/26/2001	2.5	1	19.5	4.8	13.1	350
			5	14.5	129.0	39.6	503
			9	5.5		269.0	2130
Joy	6/17/2001	3	1	17	3.4	9.1	344
			5.5	10	17.3	13.8	448
			10	5		27.5	760
	8/26/2001	4	1	22	1.9	6.7	360
			7	10	22.3	17.3	380
			12	9.5		28.7	1800
Kathleen	6/17/2001	2.3	1	17	7.7	12.5	479
			3	16.5	25.8	27.3	517
			5.5	11		43.9	779
	8/26/2001	1.5	1	21	17.4	22.9	680
			3	17.5	25.2	32.5	644
			5	13.5		10.7	756
Killarney	6/17/2001	3.5	1	19	2.3	28.7	551
			2	18	4.3	28.5	630
			3	17.8		29.1	501
	8/26/2001		no sample				
Leota	6/17/2001	3.5	1	15.5	3.3	18.2	440
			3	12	4.3	24.4	480
			6	4		47.2	1580
	8/26/2001	1	1	21	45.6	30.0	659
			3	18	151.0	25.7	473
			6	8.5		54.7	1510
Lucerne	6/17/2001	5.5	1	19.5	1.12	19.1	597
			5	13.5	2.61	12.0	258
			9.5	7		42.6	1200
	8/26/2001	5.0	1	22.5	0.96	5.9	288
			5	20	1.51	7.6	308
			9	9		12.7	345
Margaret	6/17/2001	4.5	1	16	5.69	12.4	360
			5.5	10	6.41	19.0	474
			11	7		20.0	566
	8/26/2001	4.0	1	19.5	1.99	7.7	291
			5.5	14.5	14.1	14.0	353
			11	7		8.0	947
Marcel	6/17/2001	2.2	1	17.8	28.2	19.9	935
			2	16.4	8.67	22.1	855
			4	13.8		19.9	719
	8/26/2001	2.5	1	21	20.8	18.3	536
			2	20	19.9	17.6	470
			4	18		20.5	900
McDonald	6/18/2001	4.0	1	20	5	22.9	530
			7		2.1	17.1	462
			13	5		371.0	1380
	8/26/2001	3.0	1	22.5	7.4	20.9	503
			7	20	17.4	23.2	441
			13	5		136.0	721
Meridian	6/17/2001	4.5	1	18	2.5	10.6	280
			13	8	2.6	15.3	326
			23	6		39.5	512
	8/26/2001	4.5	1	22	1.9	6.1	263
			13	7	2.46	8.2	315
			23	6		116.0	620
Mirror	6/18/2001	4.8	1	19	2.4	9.9	423
			3.5	18.5	10.0	13.6	480
			6	12		24.3	627
	8/27/2001	3.5	1	22	5.3	11.2	456
			3.5	20.5	13.2	15.5	403
			6	17		26.0	974
Morton	6/17/2001	4.8	1	18.5	1.74	9.0	366
			3	18	3.0	5.2	375
			4.5	17.5		9.1	372
	8/26/2001	3	1	21.5	3.0	7.0	408
			3	21	2.9	7.7	426
			4	21		8.5	398
Neilson (Holm)	6/17/2001	2.5	1	19	2.76	15.8	562
			4	10.5	3.1	18.0	699
			8	5.5		46.8	807
	8/26/2001	2.3	1	20	13.3	27.2	647
			4	12	44.9	18.7	493
			8	6.5		89.6	1630
North	6/19/2001	3.5	1	18.5	5.0	8.4	525
			5	12.5	3.0	8.5	365
			8	8		105.0	1320
	8/27/2001	3.0	1	18	6.95	13.8	485
			5	10.5	7.3	12.6	818
			9	5		63.2	1660
Paradise	6/18/2001	3.8	1	13	3.2	84.2	1030
			4	8	1.3	26.6	494
			7.5	5.5		640.0	2150
	8/27/2001	2.0	1	16	37.1	49.8	500
			4	11	10.5	46.6	429
			7.5	6		752.0	3360

Table 5-1: Summer Profiles (cont.)

Lake:	date	secchi (m)	sample depth (m)	temperature deg C	Chlor-a µg/L	Total P µg/L	Total N µg/L
Pine	6/17/2001	4.5	1	17.5	2.02	12.6	417
			6	14	4.09	14.8	399
			10	9		36.0	522
	8/26/2001	5.5	1	21	2.28	8.1	337
			6	19.5	6.55	9.3	359
			10	9		53.7	871
Pipe	6/18/2001	5.5	1	19.5	1.12	9.8	334
			10	9	2.02	10.1	341
			17	7.5		9.1	451
	8/27/2001	5.3	1	22.5	2.24	6.0	268
			10	10	3.11	8.5	396
			17	8		11.2	592
Sawyer	6/17/2001	2.8	1	17.5	4.05	16.1	272
			8	14	7.55	27.0	470
			16	14		62.8	680
	8/26/2001	4.0	1	20.5	2.18	10.3	256
			8	17	8.84	27.6	316
			16	16.5		121.0	607
Shadow	6/18/2001	2.8	1	19.5	3.52	18.1	541
			5.3	18	3.28	17.1	671
			9.3	15.5		24.3	661
	8/27/2001	2.5	1	21.5	3.81	11.3	466
			6	8	4.52	16.7	471
			12.5	5.5		84.7	1030
Shady	6/17/2001	4	1	18.9	4.1	11.4	352
			6	10	13.8	18.5	536
			12	5		37.5	754
	8/26/2001	4.7	1	23	1.0	5.8	339
			6	15.5	13.0	11.3	364
			12	6		14.7	2040
Spring (Otter)	6/17/2001	2	1	18	5.0	16.3	364
			4	12.5	6.1	16.1	451
			8	8		48.6	490
	8/26/2001	3	1	21	2.8	7.5	370
			4	17.5	5.4	11.1	333
			8	8.6		189.0	1070
Star	6/18/2001	5.8	1	18	1.6	11.8	358
			7	9.5	3.3	14.9	564
			14	4		1090.0	4660
	8/27/2001	5.3	1	17.5	1.3	5.9	305
			7	9	5.1	7.8	329
			14	1		374.0	2470
Steel	6/18/2001	4.3	1	20	4.1	15.2	365
			3	20	4.4	11.9	351
			6	19		19.4	379
	8/27/2001	3.8	1	22	2.5	8.8	315
			3	21.5	2.1	9.3	329
			6	20.5		16.9	433

Lake:	date	secchi (m)	sample depth (m)	temperature deg C	Chlor-a µg/L	Total P µg/L	Total N µg/L
Trout	6/18/2001	2	1	20	5.0	40.5	884
			4	6.5	24.6	57.2	1010
			7	8.5		256.0	1340
	8/26/2001		no sample				
Twelve	6/18/2001	3.5	1	20	2.8	11.7	363
			3.8	18	3.1	14.3	395
			6.5	12.5		34.1	431
	8/27/2001	3.8	1	21	4.3	8.0	366
			3	20	7.6	7.1	371
			6.1	16.5		18.7	541
Welcome	6/17/01	2.3	1	16	4.99	27.7	635
			2	14.9	10.7	27.4	631
			3.5	12.9		27.9	598
	8/26/2001	2.5	1	20	8.76	12.3	488
			2	18.7	44.6	17.1	617
			3.5	15.5		21.2	612
Wilderness	6/17/2001	6.5	1	17.5	3.42	21.7	267
			5	16.5	5.81	27.3	283
			8	11		73.8	427
	8/26/2001	4.5	1	22	2.92	20.2	322
			5	20.5	4.74	30.6	398
			7	17		41.4	354

Did You Know:

More information about the lake monitoring program can be found on our website, **http://dnr.metrokc.gov/wlr/waterres/smlakes/** or by calling us at **(206) 296-8382** or **(206) 296-0516**.

In the Pacific Northwest, most lakes that stratify have already done so by June and retain the stratification until well after August. Water temperatures will reflect this if comparisons are made between the top and bottom values. Shallow lakes such as Bitter, Fenwick, Francis, Horseshoe, Jones, Killarney, Marcel, Morton, and Steel show very little difference between the temperatures at the top and bottom, or a difference on only one of the two dates, suggesting that stratification, if it occurs, is probably of short duration.

For many lakes, total phosphorus levels were typically larger in bottom water samples by August compared to 1m and mid-depth concentrations, suggesting that significant release of phosphorus from the sediments was occurring 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.

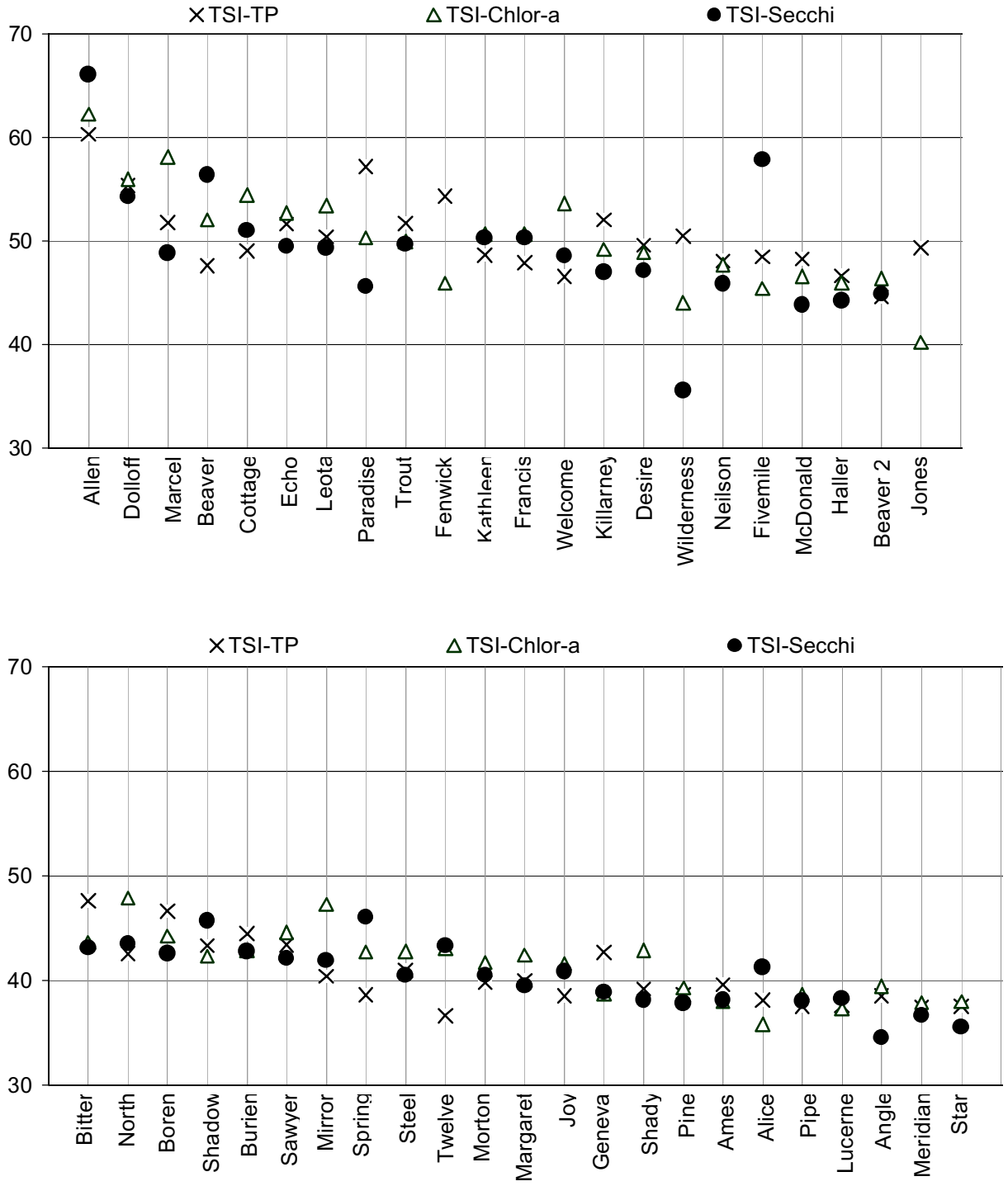
There are several possible sources of errors in phosphorus measurements of the bottom samples. If any bottom sediments were disturbed during sampling, they might be incorporated in the sample, and measured levels could be very high, but would not reflect what was actually present and available for phytoplankton growth. However, volunteers were instructed to discard the water if it included bottom sediments and collect another sample. Another potential source for error in shallow lakes might be incorporation of material from rooted aquatic plants in the deep sample. By August, several of the shallower lakes can have aquatic plants growing up from the bottom all across the lake, including the sample site. Material sinking from the shallow water can get caught in these plants and disturbed when the sampler is dropped through the water, thus incorporating extra particulate matter in the sample. This would then give a high reading that would not be at all related to chemical release of sedimentary phosphorus.

Very high concentrations of total phosphorus (> 200 µg/L) on one or both profile dates were found in the bottom samples of lakes Cottage, Desire, Echo, Geneva, Haller, McDonald, Paradise, Star, and Trout. Lakes Allen, Beaver 1, Bitter, Dolloff, Meridian, North, Sawyer, and Spring also had elevated phosphorus levels in the bottom sample on one or both dates. For these lakes, phosphorus release from the sediments likely increases the potential for algal growth in the future, and could be increasing the values of the Trophic State Indicators as well. For most of the other lakes, the process of internal phosphorus recycling 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. Nitrogen chemistry is more complex than phosphorus, and it is generally of less concern for management strategies in the Pacific Northwest because it is not often the nutrient in least supply for algae in the lakes of King County. However, it does affect the nitrogen to phosphorus ratio present in each lake, which gives some algae an advantage over other species.

Chlorophyll *a* was measured at the same depths as phytoplankton samples were taken (see Chapter 4). There were some lakes where chlorophyll was much greater at the surface than at mid-depth on one or both dates, including Allen, Beaver 1, Fenwick (in June), Marcel, and Paradise. More lakes showed the reverse pattern of greater chlorophyll *a* at mid-depth than at 1m, and for some of them the difference was quite large. Lakes with this pattern on one or both dates included Cottage, Desire, Dolloff, Fenwick (in August), Geneva, Haller, Joy, Kathleen, Leota, Margaret, McDonald, Mirror, Neilson (Holm), Shady, Trout, and Welcome.

Figure 5-8: Trophic State Indicators for Level II Lakes, 2001



Values less than 40 are called oligotrophic
Values between 40 and 50 are called mesotrophic
Values equal or greater than 50 are called eutrophic

Conclusions

Many lakes in King County exhibit some degree of thermal stratification by the beginning of summer. Some of the shallow lakes remain unstratified or stratify for brief periods only due to the diffusion of heat through the water column and mixing actions by wind. In most lakes with stable thermoclines, nutrient concentrations were higher in the bottom samples during one or both profile sampling dates. Many lakes had more chlorophyll in the mid-depth sample than in the 1m sample, and this can be compared to the phytoplankton counts.

Trophic State Index

The productivity of lakes can be classified using numbers that predict 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 the doubling of algal biovolume to various measurable parameters by linear regression and re-scaling (Carlson, 1977). The indices are based on the summer mean values of three commonly measured lake parameters: Secchi depth, total phosphorus, and chlorophyll *a*.

The relationships are not always straightforward. Carlson points out that lakes which are highly colored due to dissolved organic matter may produce erroneously high TSI ratings for Secchi transparency. The shape and size of phytoplankton species can also influence the Secchi and the chlorophyll ratings, since small, diffuse algae cloud the water more than large, dense algal colonies. Additionally, it is important to note that the total phosphorus measure is most reliable for lakes that are strictly phosphorus limited in algal nutrition, and the relationship falls apart when nitrogen is the limiting nutrient. Although no lakes in King County have been identified as solely governed by nitrogen limitation, there are several lakes in which nitrogen appears to be limiting at times through the season or where phosphorus and nitrogen limitations are occasionally combined.

2001 TSI Ratings

TSI values were calculated for the three parameters measured on each sampling date for the 45 lakes monitored by Level II volunteers (Figure 5-8), and the average for each was produced for the season. The lakes were arranged by the average of all three TSI values in descending order to show the range of values found for monitored lakes in the county, with a few exceptions noted below. TSI values over the past seven years for each lake are included in the individual lake descriptions (Chapter 3).

Carlson (1977) points out that if all the assumptions are correct, the TSI values produced from the three different parameters should be very close to each other. Many King County lakes follow this prediction, but several have values that are not very close, suggesting that some different conditions are in place at those lakes. When lakes have two close TSI values and one very different one, the outlying value could be excluded from consideration if a reasonable hypothesis is put forward to explain the differing value. For example, there are five King County lakes in 2001 whose trophic assignment could be reassessed, based on the difference between the TSI-Secchi and the other values: Alice, Beaver 1, Fivemile, Spring, and Wilderness. Fivemile is easy to evaluate because the TSI-TP and TSI-chlor are close together, while the TSI-Secchi is much higher. The color of the water in the lake is yellow, and that is likely to raise the TSI value higher than its productivity might merit. Fivemile can then be assessed on the basis of the other two indicators, and productivity appears to be in the high mesotrophic range rather than eutrophic.

In contrast, Lake Wilderness has three TSI values that range from oligotrophic (below 40) to eutrophic (above 50), with TSI-Secchi the lowest of the three. It is very difficult to determine the most appropriate trophic cat-

egory for this lake based only on TSI values, since the very large spread makes it less likely that a straight average will be representative. If the phytoplankton data are compared to the chlorophyll data, it is apparent that the bluegreen *Aphanizomenon* dominated the phytoplankton during the time of high chlorophyll in the fall. *Aphanizomenon* makes dense, long and narrow colonies resembling blades of grass. This shape does not interfere with clarity to the same extent as more diffuse colonies of algae. Thus, the Secchi readings might not reflect the higher productivity of the lake in the fall, and productivity would be better represented by the chlorophyll *a* and total phosphorus TSI values. This puts Lake Wilderness in the middle to high range of mesotrophy. A similar situation is found for Lake Fenwick, which also has a prominent population of *Aphanizomenon* through the sample season. Fenwick might be better represented as high mesotrophic to borderline eutrophic, if the low TSI-Secchi is not included.

Oligotrophic lakes with TSI values less than 40 are considered to have low biological activity, with high clarity and low concentrations of chlorophyll *a* and total phosphorus. Seven lakes met this criterion for all three calculations of TSI: Angle, Star, Meridian, Pine, Pipe, Ames, and Lucerne. Four other lakes had two out of three TSI values below 40: Shady, Geneva, Margaret, and Alice. Lake Margaret is borderline between oligotrophy and mesotrophy. Alice may be a case similar to Fivemile Lake since the TSI-Secchi is above the other two values, but the spread is not large.

Mesotrophic lakes have TSI ratings between 40 and 50. They are considered to be transitional between being relatively nonproductive and very productive biologically. In 2001, there were three lakes on the threshold between mesotrophy and oligotrophy, including Steel, Morton, and Joy. Other lakes in the lower range of mesotrophy included Mirror, Sawyer, Boren, Burien, Bitter, and North. Twelve had two TSI values in mid-mesotrophy, but a low TSI-TP.

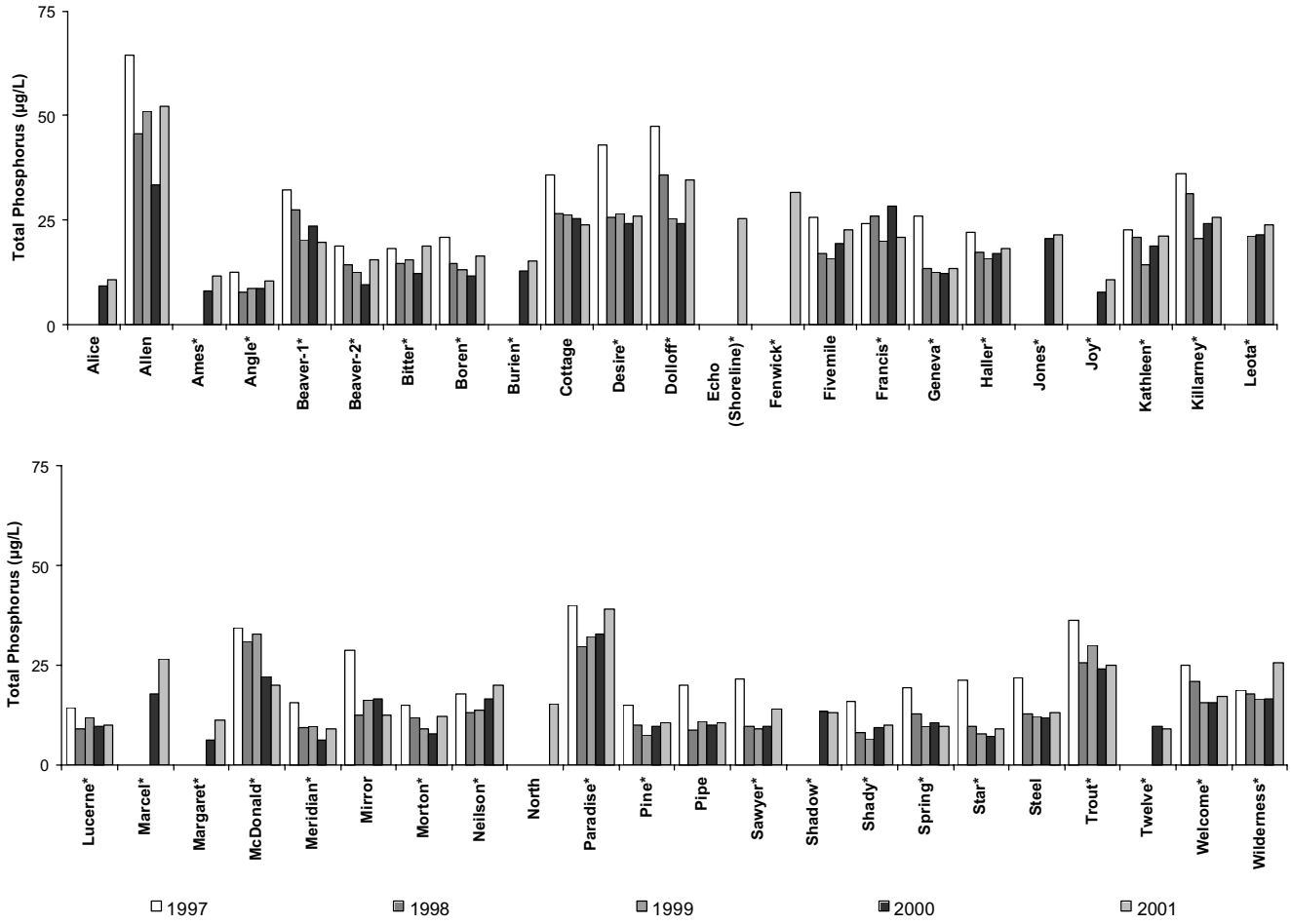
The middle to high range mesotrophic lakes included McDonald, Haller, Beaver-2, Shadow, Neilson, Spring, Desire, and Jones. Welcome had two TSI values in high mesotrophy, but the TSI-chlor was above 50. Killarney had the TSI-TP above 50, while the others were not far below the threshold and the spread was even, so it was borderline between mesotrophic and eutrophic. Beaver 1 had two TSI values well above the eutrophic threshold, but one of them was TSI-Secchi, and it is known as a yellow water lake. It might be reasonable to consider it as a high range mesotrophic lake. Paradise had a large spread among the three indicators. The low value was the TSI-Secchi, and the dominant algae were chlorophytes and cryptophytes whose morphologies do not readily explain why the TSI-Secchi should be lower than the other two TSI values. Perhaps Paradise should be considered borderline eutrophic in the absence of other information.

Lakes that have TSI values greater than 50 are considered eutrophic, characterized by high biological productivity. Only two lakes were rated eutrophic in 2001 by all three TSI values: Allen and Dolloff. Lakes with two out of three above 50 and a relatively small spread included Cottage, Echo, and Leota. Marcel had a larger spread, but might reasonably be considered eutrophic since the TSI-Secchi was just below the threshold. Other lakes that were borderline eutrophic included Trout, Kathleen and Francis.

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. Changes in land use within a watershed and other factors can add nutrients to the system. Many lakes in the Lake Stewardship sampling

Figure 5-9: Total Phosphorus Average May-October, 1997-2001



*These lakes do not include the unexplained high value on June 3, 2001

program maintain relatively constant TSI ratings from year to year, partially because the calculations are not sensitive to minor variations of the parameters used to calculate them. However, when directional changes are observed, these can be used as starting points for more detailed studies to determine if and how management activities might be implemented.

Total Phosphorus

Nineteen of the 33 lakes with three or more years of Level II data yielded similar total phosphorus concentrations when compared with past years (Figure 5-9), with the exception of 1997, the year of high winter precipitation (see Figure 5-1). Most of these values were probably within the limits of year to year variability. However, total phosphorus has been dropping steadily over the last five years in several lakes, notably Beaver 1, Cottage, and McDonald. Other lakes may also be declining in total phosphorus, but the record is clouded by one or more higher years, including Boren and Dolloff.

Nine lakes were reporting Level II data for the first or second time, while three reported one or two years of data after a hiatus. These will need several more years of data collection before patterns begin to emerge.

No lake showed a steady increase over the last five years of data collection, although Fivemile, Kathleen, Killarney, Leota, Neilson, and Paradise all have at least three years in a row of increased phosphorus. None have increased over a long enough period of time for trends to be considered statistically significant. The increases do point to lakes that should have careful attention paid to them over the next few years.

Nitrogen: Phosphorus Ratios

Many water quality problems in lakes can be related to high concentrations of nutrients that stimulate the growth of algae and aquatic plants. In many temperate freshwater systems, the nutrient that limits algae growth is most often phosphorus, although phytoplankton can be occasionally limited by nitrogen or even by silica or iron. Before trying to manage a water quality problem, it is important to know which nutrient limits plant growth most frequently.

To make a quick nutrient assessment, the nitrogen to phosphorus ratio (N:P) are calculated for individual lakes. Generally, nitrogen 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. Some lakes are primarily phosphorus limited, but occasionally may be nitrogen limited. Others are solely governed by the one nutrient in shortest supply through the season. Lower nitrogen to phosphorus ratios can favor bluegreens over other algal species, because some bluegreens are able to use nitrogen from the air, unlike other algae. A ratio of 20 or below is often indicative of potentially advantageous conditions for bluegreen growth.

A biological wrinkle in using N:P ratios to assess the potential for algal growth is that some algae can take up phosphorus (so-called "luxury uptake") and store it for use later in the season when phosphorus concentrations have become very low in the epilimnion. Thus, the population growth rates of such algae may be reflecting earlier conditions of phosphorus availability than the period during which they are being measured.

2001 Ratios

All of the Level II lakes had average N:P ratios greater than the threshold 17 for the period of May-October 2001 (Table 5-2), except for Paradise, which averaged 16. The seasonal averages of Allen, Fenwick and Wilderness were all below 20, which indicated that at least part of the season provided conditions congenial to bluegreen growth. Many of the lakes have had lower average ratios in the past than they have now, suggesting that algae in these lakes probably experienced nitrogen limitation during portions of the growing seasons in past years.

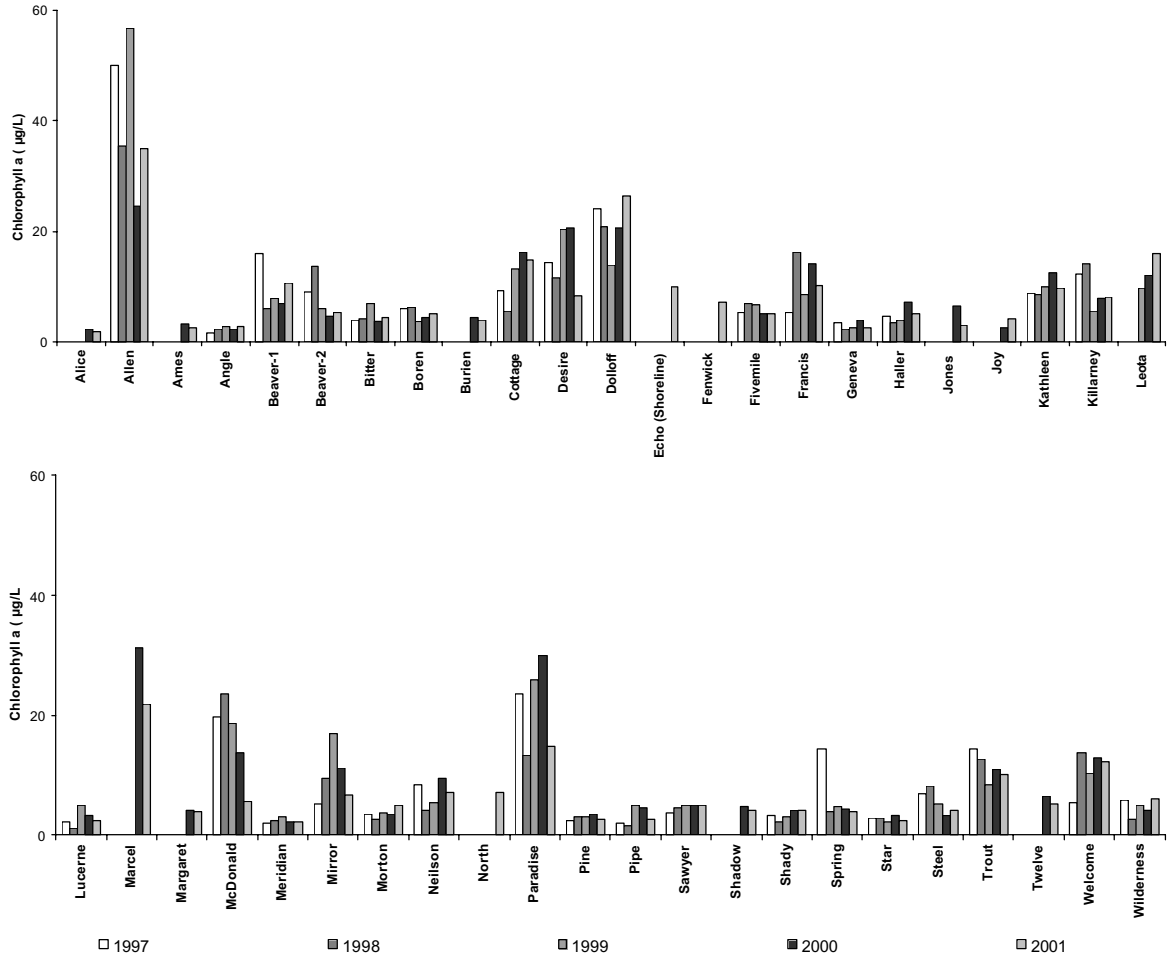
The oligotrophic lake ratios ranged from 32 at Alice to 44 at Joy and Lucerne. Angle, Geneva, Lucerne, Morton, Pipe, and Star have all had ratios below 20 in the past. However, in none of these cases did the low ratio persist for more than a year. Lucerne, Pipe, and Pine have all had generally increasing N:P ratios over the years.

The mesotrophic lakes ranged greatly in 2001, from a value of 19 at Wilderness to 47 at Twelve. Several lakes had averages in the mid-20s and below, which probably indicates some periods of good conditions for bluegreen growth. These include Bitter, Boren, Desire, Haller, Killarney, Sawyer, and Wilderness. Some lakes have had ratios that have been generally increasing over time, which could signal changes away from bluegreen populations in the future. These include Kathleen, Killarney, Mirror, Spring, and Welcome. Other lakes have ratios that change greatly from year to year, making any trend difficult or impossible to see.

Table 5-2: Average May–October Nitrogen to Phosphorus ratios, 1994–2001

	Lake	1994	1995	1996	1997	1998	1999	2000	2001
Oligotrophic Lakes	Alice							36	32
	Ames							47	34
	Angle	18	24		24	35	35	40	43
	Geneva	22	27	33	16	29	36	36	33
	Joy							59	44
	Lucerne	14	27	27	33	39	36	45	44
	Margaret							57	35
	Meridian	23	32		22	36	34	54	37
	Morton	15	36	35	33	35	43	49	40
	Pine		24	26	26	36	43	42	43
	Pipe	18	25	33	21	38	45	51	37
	Shady	42	46	35	30	42	56	66	41
	Star		34	35	19	31	44	49	36
Mesotrophic Lakes	Beaver-2	23	26	23	20	26	31	43	29
	Bitter				18	24	25	31	22
	Boren	20			20	28	33	39	25
	Burien					26		31	28
	Desire	20	21	16	13	18	21	30	24
	Fivemile	31	40	38	30	47	56	47	41
	Haller				19	21	25	24	24
	Jones							32	27
	Kathleen			22	21	24	31	31	29
	Killarney	15	16	14	15	17	24	25	23
	McDonald			18	18	22	25	27	26
	Mirror				14	30	25	29	36
	Neilson				27	34	36	36	33
	North		34	37	20	26			37
	Sawyer	17	34	27	17	31	38	36	21
	Shadow	24	45		35	30		37	40
	Spring	20		35	21	33	48	44	40
	Steel	16	21	21	18	27	26	31	28
	Twelve	19	28	29		42		46	47
	Welcome			20	23	28	36	40	36
	Wilderness	17	20	17	20	20	27	25	19
Eutrophic Lakes	Allen			17	13	19	20	25	20
	Beaver-1				18	20	25	26	31
	Cottage		20	16	18	27	33	34	24
	Dolloff	18	25	16	16	23	27	25	25
	Echo								22
	Fenwick	17	12						17
	Francis			20	20	21	25	24	29
	Leota					27	31	29	24
	Marcel							44	37
	Paradise			14	15	19	21	19	16
	Trout			20	23	33	31	39	33

Figure 5-10: Chlorophyll a Average, 1997-2001



The eutrophic lakes ranged from 16 at Paradise to 37 at Marcel. Most N:P values were significantly lower than for the oligotrophic or mesotrophic lakes. Only four of the oligotrophic lakes had average values above 25: Beaver 1, Francis, Marcel, and Trout. Both Beaver 1 and Francis started at lower ratios, but have been steadily increasing through the time of monitoring. Trout and Marcel have generally higher values than the other lakes in the eutrophic group. Both are lakes with high populations of the chrysophyte Dinobryon rather than bluegreens.

Conclusions

In 2001, lakes with Level II data ranged from 16 to 47 in average N:P ratio, with the oligotrophic lakes having generally the highest values and the eutrophic lakes having the lowest. Mesotrophic lakes had the widest range. While there are a number of lakes with ratios that have increased over time, none has steadily decreased.

Total Chlorophyll a

Variability is often much greater from year to year in chlorophyll *a* concentrations than it is for total phosphorus or the N:P ratio. This is not surprising, since the phytoplankton populations in a lake can be concentrated by wind and water movements and may not be evenly distributed. In addition, algal species in a lake can vary from year to year, and various species of algae often have differing amounts of chlorophyll per cell. The amount of chlorophyll *a* per cell can

vary with the health and age of the population 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 in addition to the chlorophyll that are used to capture light for photosynthesis. Lack of wind can cause bluegreens to float up to the surface, concentrating them at the top of the water column, while other species, such as chlorophytes and diatoms, may sink down towards the thermocline, out of the surface water.

Even with all the variables that come into play on each sampling date, the annual May-October averages of chlorophyll (Figure 5-10) demonstrate that most of the lakes in the program have generally similar average concentrations from year to year or vary within a certain range. This is particularly true of lakes with lower average concentrations, of which there are many: Alice, Ames, Angle, Bitter, Boren, Burien, Fivemile, Geneva, Haller, Joy, Lucerne, Margaret, Meridian, Morton, Pine, Pipe, Sawyer, Shadow, Shady, Star, Twelve, and Wilderness. Average chlorophyll concentrations in Allen Lake vary a great deal from year to year, but are always much higher than in the other lakes participating in the program. Several other lakes which are also consistently higher than others include Cottage, Desire, Dolloff, Francis, Kathleen, Killarney, Leota, Marcel, McDonald, Mirror, Paradise, Trout, and Welcome. Dolloff and Paradise have varied a great deal during the period of sample collection, while McDonald has decreased steadily since 1998. Mirror had a peak in 1999 and has decreased since then. Francis had two higher years, but the low years appear to be increasing in value over time. Both Trout and Welcome may be decreasing, as well as Steel Lake, but there are too few years to make statistically valid tests for decline. Leota appears to be increasing in chlorophyll over time, which is consistent with other lake water quality indicators measured there.

A few lakes have one or two significantly higher years, such as Beaver 1, Beaver 2 (oddly enough, these are in different years), Francis, Mirror, and Spring. Such values can be anomalous and not repeated in the future, or could also be indications of ephemeral blooms that coincided with a sampling date in a particular year, but was missed in others because of the two-week gap between sample collections.

Conclusion

Average concentrations of chlorophyll *a* can vary a great deal from year to year, particularly in lakes with large amounts of algae. Concentration of algae by wind and water movements can lead to samples that are not representative of the lake as a whole, being either too high or too low. However, chlorophyll concentrations are rarely high at lakes with low productivity and the yearly averages appear to be within a constant range. Chlorophyll tends to vary more at lakes with high phytoplankton abundances, such as at Allen. As a measure of productivity, chlorophyll may be subject to more variation than either secchi or TP.

Program Summary and Outlook

The 2001 monitoring program, which ran from October 2000 through September 2001, 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, while the program's staff also remained committed to making the most of the volunteer monitors' time and effort.

Changes will continue to occur for 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 to be important in assessing the condition of the lakes.

The Lake Stewardship Program's website, **http://dnr.metrokc.gov/wlr/waterres/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 provides our volunteers with technical assistance and answers to questions relating to limnological processes or conditions found at specific lakes. Please give us a call with concerns and feedback. We always enjoy hearing from you.

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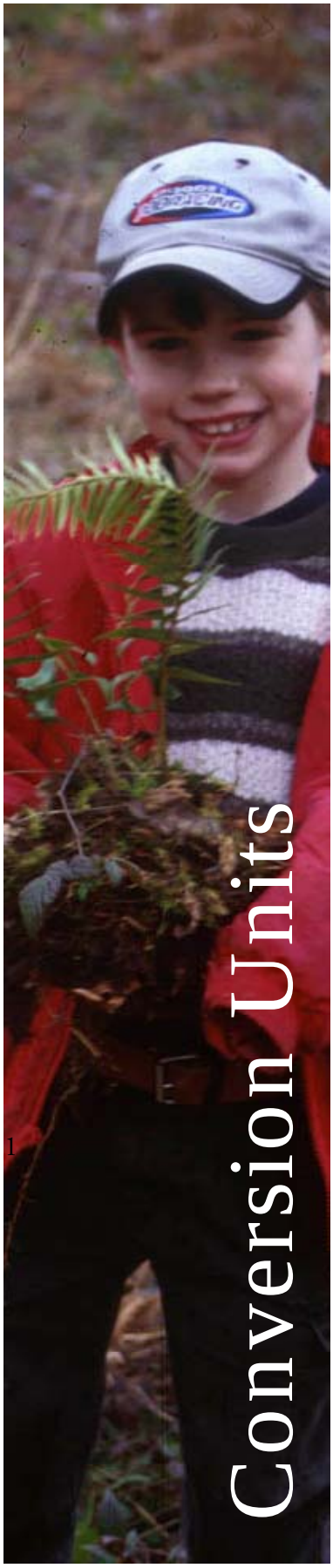


Conversion Units

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*, used to produce 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, often 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.

Biovolume: Space occupied by organic matter.

Catchment Basin: See "Watershed."

Chlorophyll *a*: A 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 one 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. Increasing the numbers of dissolved ions also increases the conductivity.

Dissolved Oxygen: The oxygen gas that is dissolved in water as O_2.

Ecosystem: Any complex of living organisms with all other factors that affect them and are affected by them.

Epilimnion: The warmer, less dense, upper layer of a lake lying above cooler water (metalimnion and hypolimnion) in some seasons of the year.

Eutrophic: Waters containing algae making large populations and biovolumes, generally related to nutrient supply.

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: cooling of surface waters leading to a density change in surface water that produces convection currents from top to bottom, and circulation of the total water volume by wind action. Turnover generally results in uniformity of the physical and chemical properties of the water.

Humic Substances: Organic substances incompletely broken down by decomposers such as bacteria. Humic acids are large molecular organic acids that are present in water, often giving the water a yellow or brown 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 available in the smallest amount in the environment, relative to the needs of the organisms.

Limnology: The study of lakes and inland waters as ecosystems.

Littoral: The shallow region in a body of water which can be inhabited by rooted aquatic plants. This is somewhat 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 time (usually considered annually). Recycling of nutrients among sediment, organisms and 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 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 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 usually 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 pinpoint as separate entities and thus to control or manage. Examples of "nonpoint sources" include area-wide erosion (as opposed to landslides or mass wasting), failure of septic systems, some farming practices or forestry practices, and residential/urban land uses (such as fertilizing or landscaping).

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 algal 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 growth and reproduction. Phosphorus is often the limiting or least available nutrient for plant growth in temperate freshwater ecosystems. The primary original source of phosphorus is from the earth in the form of phosphate rocks.

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 organisms that photosynthesize (algae and cyanobacteria).

Productivity: The production and accumulation of organic matter, usually measured over a certain period of time.

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 disk 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 lake over time.

Stratification: The separation of water into nearly discrete layers caused by differences

in temperature and subsequent water density differences.

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

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

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

Turbidity: Cloudiness in water caused by the suspension of tiny particles (algae or detritus).

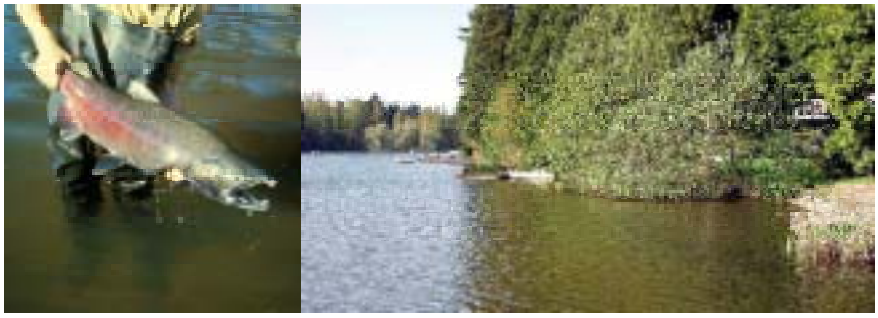
Turnover: The mixing of lake water from top to bottom after a period of stable stratification. This typically occurs in fall and is caused by wind and seasonal cooling of surface waters.

Watershed: The geographical area that contributes surface and groundwater flow to a stream, lake, or other body of water. This can also be referred to as the "catchment basin" or "drainage 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 generally perceived wet and dry periods rather than by calendar months. The U.S. Geological Survey uses the water year of October 1 through September 30 for data analysis.

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



Introduction

Appendix A reports the values recorded by Level I volunteers on each lake during the 2001 water year. To record the values accurately in a reasonable amount of space, we reported weekly totals of recorded precipitation and weekly averages of water 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. Bird and boat information is not presented here. However, the original data will be retained and made available by request.

Lakes Kathleen and Sawyer each had two active volunteers recording Level I data. These data sets are presented separately. In addition, this year we have added summaries of Lake Sammamish data. Lake Sammamish volunteers followed different protocols than the small lakes volunteers. The Lake Sammamish data are summarized first, then the datasets from each of the seven volunteers are presented separately.

Precipitation Reports

Level I precipitation totals reported in Appendix A may differ from the total Level I precipitation reported in Chapter 3 tables. These tables show the sum of all precipitation the Level I volunteer reported during the 2001 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. 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. Therefore averages are included for all weeks with at least one day of data reported.

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

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	Notes
1-Oct-00	0.0	7	38.0	7	22-Oct-00		4.5	11.0	
8-Oct-00	0.0	6	38.0	6	3-Nov-00	12:00	4.0	10.0	
15-Oct-00	76.0	7	40.0	7	16-Dec-00	11:35	3.0	3.0	
22-Oct-00	15.0	7	46.7	7	27-Dec-00	15:30	3.0	3.0	
29-Oct-00	0.0	7	48.0	3					
5-Nov-00	30.0	7	52.0	3					
12-Nov-00	0.0	7	53.0	5					
19-Nov-00	0.0	2							
26-Nov-00									
3-Dec-00	0.0	5	64.0	5					
10-Dec-00	56.0	7	65.0	7					
17-Dec-00	62.0	7	72.9	7					
24-Dec-00	14.0	7	74.0	7					
31-Dec-00	54.0	5	74.0	1					
7-Jan-01	16.0	6							
14-Jan-01	16.0	7	78.0	3					
21-Jan-01	6.0	7	78.0	7					
28-Jan-01	0.0	2	78.0	2					
4-Feb-01									
11-Feb-01									
18-Feb-01									
25-Feb-01	12.0	3	64.7	3					
4-Mar-01	10.0	7	63.7	7	3-Mar-01	15:30	2.5	6.0	Cold, not raining
11-Mar-01	9.0	7	64.7	7	10-Mar-01	14:00	3.0	8.0	Calm & peaceful, cold.
18-Mar-01	44.0	7	69.6	7					
25-Mar-01	42.0	7	74.4	7					
1-Apr-01									
8-Apr-01									
15-Apr-01									
22-Apr-01									
29-Apr-01	8.0	5	79.8	5					
6-May-01	0.0	7	78.5	6					
13-May-01	34.0	7	75.0	7	10-May-01	16:15	4.0	6.0	Beautiful
20-May-01	0.0	7	75.0	7					
27-May-01	32.0	7	73.9	7					
3-Jun-01	12.0	7	63.0	7					
10-Jun-01	50.0	7	64.3	7					
17-Jun-01	1.0	6	63.7	7	17-Jun-01	15:00	3.0	17.0	
24-Jun-01	26.0	7	62.4	7	23-Jun-01	17:30	3.0	21.0	
1-Jul-01	0.0	7	62.0	6					
8-Jul-01	0.0	6	59.8	6					
15-Jul-01	14.0	2	54.0	4	15-Jul-01		2.5	20.0	
22-Jul-01	51.0	1	51.0	1					
29-Jul-01	0.0	7	49.3	7					
5-Aug-01	0.0	7	44.3	7					
12-Aug-01	0.0	7	40.0	7					
19-Aug-01	6.0	7	40.1	7					
26-Aug-01	4.0	7	41.0	7					
2-Sep-01	0.0	7	39.3	7	31-Aug-01	18:00	3.4	24.0	
9-Sep-01	0.0	7	38.0	7	8-Sep-01	13:00	2.0	19.0	Very beautiful day
16-Sep-01	4.0	7	35.0	7					
23-Sep-01	4.0	7	31.5	7					
Min	0.0		31.5			**Min**	2.0	3.0	
Max	76.0		79.8			**Max**	4.5	24.0	
Total	708.0								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	Notes
1-Oct-00									
8-Oct-00									
15-Oct-00									
22-Oct-00									
29-Oct-00									
5-Nov-00									
12-Nov-00									
19-Nov-00									
26-Nov-00									
3-Dec-00									
10-Dec-00									
17-Dec-00									
24-Dec-00									
31-Dec-00									
7-Jan-01									
14-Jan-01									
21-Jan-01									
28-Jan-01									
4-Feb-01									
11-Feb-01									
18-Feb-01									
25-Feb-01									
4-Mar-01									
11-Mar-01									
18-Mar-01									
25-Mar-01									
1-Apr-01									
8-Apr-01									
15-Apr-01									
22-Apr-01									
29-Apr-01									
6-May-01									
13-May-01									
20-May-01									
27-May-01	22.0	2	17.0	2					
3-Jun-01	23.1	7	25.3	7	3-Jun-01	16:00	0.8	16.5	
10-Jun-01	38.1	7	30.0	7	10-Jun-01	16:00	0.8	18.5	
17-Jun-01	0.1	7	22.9	7	17-Jun-01	16:00	0.8	18.0	
24-Jun-01	18.1	7	25.3	7	24-Jun-01	16:00	0.8	19.0	
1-Jul-01									
8-Jul-01									
15-Jul-01									
22-Jul-01									
29-Jul-01									
5-Aug-01									
12-Aug-01									
19-Aug-01									
26-Aug-01									
2-Sep-01									
9-Sep-01									
16-Sep-01									
23-Sep-01									
Min	0.1		17.0		Min		0.8	16.5	
Max	38.1		30.0		Max		0.8	19.0	
Total	101.3								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	19.0	7	63.4	7
8-Oct-00	14.5	7	62.3	7
15-Oct-00	62.5	7	63.4	7
22-Oct-00	10.0	7	68.0	7
29-Oct-00	6.1	7	68.1	7
5-Nov-00	35.0	7	69.9	7
12-Nov-00	0.0	7	70.7	7
19-Nov-00	9.0	7	70.0	7
26-Nov-00	59.0	7	74.6	7
3-Dec-00	4.0	7	78.0	7
10-Dec-00	5.5	7	78.0	7
17-Dec-00	23.5	7	80.0	7
24-Dec-00	26.5	7	83.9	7
31-Dec-00	29.0	7	84.0	7
7-Jan-01	6.5	7	84.1	7
14-Jan-01	18.0	7	84.0	7
21-Jan-01	17.5	7	84.0	7
28-Jan-01	19.5	7	84.0	7
4-Feb-01	24.0	7	84.0	7
11-Feb-01	16.0	6	84.0	7
18-Feb-01	7.0	7	84.0	7
25-Feb-01	11.0	7	84.0	7
4-Mar-01	4.1	7	84.0	7
11-Mar-01	23.0	7	82.3	7
18-Mar-01	18.1	7	84.0	7
25-Mar-01	36.0	7	84.0	7
1-Apr-01	45.5	7	84.0	7
8-Apr-01	29.0	7	84.0	7
15-Apr-01	15.0	7	84.0	7
22-Apr-01	9.0	7	83.4	7
29-Apr-01	40.1	7	82.7	7
6-May-01	0.1	7	81.4	7
13-May-01	33.2	7	81.7	7
20-May-01	1.0	7	79.7	7
27-May-01	45.0	7	78.1	7
3-Jun-01	9.0	7	79.7	7
10-Jun-01	44.1	7	81.5	6
17-Jun-01	0.0	7	79.9	7
24-Jun-01	26.1	7	78.3	7
1-Jul-01	0.0	7	76.1	7
8-Jul-01	0.0	7	71.3	7
15-Jul-01	24.1	7	69.4	7
22-Jul-01	11.0	7	67.3	7
29-Jul-01	1.1	7	64.7	7
5-Aug-01	0.0	7	60.6	7
12-Aug-01	0.0	7	56.7	7
19-Aug-01	44.0	7	55.7	7
26-Aug-01	0.0	7	55.3	7
2-Sep-01	3.0	7	52.3	7
9-Sep-01	0.0	7	49.1	7
16-Sep-01	3.1	7	46.3	7
23-Sep-01	7.0	7	44.1	7
Min	0.0		44.1	
Max	62.5		84.1	
Total	894.2			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	9:50	3.8	17.5	
8-Oct-00	16:00	3.3	16.0	
15-Oct-00	18:00	3.8	14.5	13 geese
22-Oct-00	11:00	3.3	13.5	Geese at north end of lake.
28-Oct-00	17:00	3.8	13.0	
5-Nov-00	10:50	3.8	12.0	
11-Nov-00	16:00	4.5	10.0	
19-Nov-00	9:30	5.0	7.0	
26-Nov-00	10:45	5.0	6.5	
3-Dec-00	16:00	4.5	6.5	Otter spotted twice
10-Dec-00	15:15	4.5	5.5	15 geese counted
17-Dec-00	8:45	4.5	4.0	
25-Dec-00	11:45	4.5	4.0	Otter and Osprey spotted
31-Dec-00	15:45	4.3	5.0	Not many birds on the lake
7-Jan-01	15:00	4.5	5.0	
14-Jan-01	10:10	4.5	4.5	
21-Jan-01	10:20	4.0	4.0	
28-Jan-01	14:10	4.0	4.0	
4-Feb-01	16:30	3.3	5.0	
11-Feb-01	9:40	3.5	4.0	
17-Feb-01	11:40	3.0	4.0	
25-Feb-01	11:45	3.0	5.5	
4-Mar-01	9:50	3.0	5.5	
11-Mar-01	17:35	3.5	8.0	
18-Mar-01	16:35	4.5	8.5	
25-Mar-01	18:00	4.0	10.0	
1-Apr-01	16:40	4.8	9.5	
8-Apr-01	16:30	5.0	10.0	
15-Apr-01	15:10	4.8	11.0	
22-Apr-01	13:30	4.0	13.0	
29-Apr-01	11:55	3.8	14.5	
6-May-01	10:55	4.3	13.5	wind blown algae collected on shoreline this morning
13-May-01	17:30	4.5	17.5	
20-May-01	18:30	4.0	17.0	
28-May-01	17:10	4.5	19.0	
3-Jun-01	19:30	5.0	18.0	
10-Jun-01	18:15	4.8	19.0	
17-Jun-01	13:00	5.5	18.0	
24-Jun-01	16:00	5.3	20.0	
1-Jul-01	16:00	5.3	22.5	
8-Jul-01	20:30	5.0	23.5	
15-Jul-01	18:10	5.5	22.0	
23-Jul-01	18:00	5.5	22.5	
29-Jul-01	18:20	4.5	22.0	
5-Aug-01	17:00	5.0	21.5	
12-Aug-01	14:30	4.8	24.5	Cougar in the yard Thursday night!!
19-Aug-01	17:00	4.5	22.5	
27-Aug-01	18:40	4.3	23.0	
2-Sep-01	16:00	3.8	22.0	
9-Sep-01	16:00	4.0	20.5	
18-Sep-01	18:30	4.0	20.0	
23-Sep-01	11:30	4.5	19.5	
	Min	3.0	4.0	
	Max	5.5	24.5	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	3.0	7	-16.4	7	1-Oct-00	12:20	5.3	17.0	
8-Oct-00	13.0	7	-18.3	7	8-Oct-00	11:30	4.8	16.0	
15-Oct-00	61.0	7	-16.5	7	15-Oct-00	15:45	5.8	16.5	
22-Oct-00	12.0	7	-14.3	7	22-Oct-00	11:25	5.8	14.0	
29-Oct-00	6.1	7	-2.6	7	29-Oct-00	14:50	4.5	13.5	
5-Nov-00	30.1	7	-15.1	7	5-Nov-00	11:15	5.0	12.0	
12-Nov-00	0.0	7	-16.6	7	12-Nov-00	14:25	3.8	11.0	
19-Nov-00	18.0	7	-18.1	7	19-Nov-00	14:40	4.0	9.0	
26-Nov-00	46.1	7	-13.8	7	26-Nov-00	11:10	4.5	8.0	
3-Dec-00	5.1	7	-14.0	7	3-Dec-00	14:00	4.3	7.5	
10-Dec-00	19.1	7	-15.0	7	10-Dec-00	11:45	4.8	7.0	
17-Dec-00	28.1	7	-13.3	7	18-Dec-00	12:00	5.5	5.5	
24-Dec-00	17.1	7	-11.9	7	24-Dec-00	13:37	5.8	5.5	
31-Dec-00	41.1	7	-9.4	7					
7-Jan-01	3.1	7	-7.5	7					
14-Jan-01	12.2	7	-8.0	7					
21-Jan-01	25.1	7	-5.6	7					
28-Jan-01	14.1	7	-6.1	7					
4-Feb-01	30.0	7	-4.2	7	4-Feb-01	11:30	6.0	5.5	
11-Feb-01	15.0	7	-4.4	7	11-Feb-01	12:01	6.3	5.0	
18-Feb-01	10.1	7	-3.1	7	18-Feb-01	14:05	7.3	5.0	
25-Feb-01	8.1	7	-3.9	7	25-Feb-01	11:35	7.3	6.0	
4-Mar-01	7.1	7	-4.8	7	4-Mar-01	11:08	7.8	6.5	
11-Mar-01	14.1	7	-5.5	7	12-Mar-01	15:20	7.8	8.0	
18-Mar-01	20.0	7	-4.8	7	17-Mar-01	10:35	7.3	8.0	
25-Mar-01	29.1	7	-3.4	7	25-Mar-01	12:10	7.0	9.5	
1-Apr-01									
8-Apr-01									
15-Apr-01									
22-Apr-01									
29-Apr-01									
6-May-01									
13-May-01									
20-May-01									
27-May-01	8.0	2	-13.5	2					
3-Jun-01	16.0	7	-14.1	7	4-Jun-01	11:40	8.1	17.0	
10-Jun-01	40.0	7	-13.2	7	10-Jun-01	11:36	8.5	17.0	
17-Jun-01	0.0	7	-16.3	7	18-Jun-01	11:21	8.0	18.0	
24-Jun-01	22.0	7	-2.7	7	24-Jun-01	13:04	8.6	19.0	
1-Jul-01	0.0	7	-22.2	7	1-Jul-01	12:08	8.5	20.0	
8-Jul-01	0.0	7	-27.1	7	10-Jul-01	11:17	7.0	21.5	
15-Jul-01	14.0	7	-29.1	7	15-Jul-01	14:20	6.5	21.5	
22-Jul-01	6.0	7	-34.4	7	22-Jul-01	11:26	5.3	20.0	
29-Jul-01	1.1	7	-38.3	7	30-Jul-01	11:33	5.0	21.0	
5-Aug-01	0.0	7	-42.4	7	5-Aug-01	11:38	5.8	20.5	
12-Aug-01	0.0	7	-47.0	7	12-Aug-01	11:18	5.8	22.5	
19-Aug-01	53.0	7	-47.6	7	19-Aug-01	13:20	6.5	21.0	
26-Aug-01	1.0	7	-47.8	7	26-Aug-01	12:12	6.0	20.5	
2-Sep-01	0.1	7	-51.9	7	2-Sep-01	11:17	7.5	20.5	
9-Sep-01	0.0	7	-56.1	7	9-Sep-01	11:15	6.3	20.0	
16-Sep-01	0.1	7	-59.6	7	16-Sep-01	16:35	6.5	20.0	
23-Sep-01	20.0	7	-61.1	7	23-Sep-01	12:05	5.0	19.5	
Min	0.0		-61.1			**Min**	3.8	5.0	
Max	61.0		-2.6			**Max**	8.6	22.5	
Total	668.2								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	18.0	7	5.9	7
8-Oct-00	26.0	7	4.3	7
15-Oct-00	78.0	7	6.7	7
22-Oct-00	12.0	7	11.7	7
29-Oct-00	10.0	7	12.1	7
5-Nov-00	36.0	7	14.1	7
12-Nov-00	0.0	7	15.3	7
19-Nov-00	13.0	7	14.6	7
26-Nov-00	62.0	7	22.1	7
3-Dec-00	6.0	7	27.1	7
10-Dec-00	16.1	7	29.1	7
17-Dec-00	33.6	7	34.7	7
24-Dec-00	28.1	7	39.3	7
31-Dec-00	38.1	7	45.9	7
7-Jan-01	13.0	7	54.9	7
14-Jan-01	23.0	7	57.4	7
21-Jan-01	25.0	7	60.9	7
28-Jan-01	21.0	7	60.0	7
4-Feb-01	30.0	7	62.4	7
11-Feb-01	23.0	7	61.7	7
18-Feb-01	11.0	7	62.1	7
25-Feb-01	10.1	7	59.3	7
4-Mar-01	10.1	7	57.4	7
11-Mar-01	21.1	7	56.4	7
18-Mar-01	19.0	7	58.0	7
25-Mar-01	49.0	7	58.9	7
1-Apr-01	37.0	7	64.1	7
8-Apr-01	32.0	7	65.1	7
15-Apr-01	15.1	7	62.6	7
22-Apr-01	13.0	7	58.1	7
29-Apr-01	37.0	7	59.4	7
6-May-01	0.0	7	58.4	7
13-May-01	30.0	7	55.4	7
20-May-01	2.0	7	52.7	7
27-May-01	8.0	5	49.1	5
3-Jun-01				
10-Jun-01				
17-Jun-01				
24-Jun-01				
1-Jul-01	0.0	7	48.4	7
8-Jul-01	0.0	7	43.1	7
15-Jul-01	28.1	7	41.0	7
22-Jul-01	11.0	7	37.7	7
29-Jul-01	10.1	7	34.7	7
5-Aug-01	0.0	7	31.3	7
12-Aug-01	0.0	7	27.0	7
19-Aug-01	52.1	7	25.7	7
26-Aug-01	2.0	7	25.1	7
2-Sep-01	1.1	7	22.3	7
9-Sep-01	0.0	7	19.4	7
16-Sep-01	2.1	7	15.4	7
23-Sep-01	8.0	7	13.1	7
Min	0.0		4.3	
Max	78.0		65.1	
Total	920.3			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	9:00	2.5	17.0	
8-Oct-00	8:30	2.5	15.0	
15-Oct-00	8:45	2.5	14.0	
22-Oct-00	9:00	2.5	13.0	
29-Oct-00	8:30	2.5	11.0	
5-Nov-00	9:00	2.3	10.5	
12-Nov-00	9:00	2.3	8.5	
19-Nov-00	8:30	2.0	6.0	
26-Nov-00	9:00	2.3	6.0	
3-Dec-00	9:00	2.3	5.5	Some light green algae bloom on the west side of Beaver Lake.
10-Dec-00	8:00	2.3	5.0	
17-Dec-00	8:00	2.3	4.0	
24-Dec-00	10:00	2.5	3.5	
7-Jan-01	8:30	2.5	4.5	Considerable algal bloom along the NW shore of main Beaver Lake
14-Jan-01	9:00	2.8	4.0	
21-Jan-01	8:00	3.0	4.0	
28-Jan-01	8:30	2.8	4.5	Algal bloom west side of lake.
4-Feb-01	9:08	3.0	4.0	
11-Feb-01	8:15	2.5	4.0	
18-Feb-01	9:00	2.3	4.5	
25-Feb-01	7:17	2.3	5.0	
4-Mar-01	8:15	3.0	5.5	Algae bloom 30' out from west shore
11-Mar-01	0:00	3.0	7.0	Algae bloom 20' out from west shore
18-Mar-01	8:40	2.8	7.0	More algae bloom along west shore 20' out from shore.
25-Mar-01	8:30	3.0	9.0	Dozens of swallows have arrived on Beaver Lake.
1-Apr-01	8:00	2.5	9.5	
8-Apr-01	8:00	2.8	10.0	
15-Apr-01	7:30	2.8	11.5	
22-Apr-01	8:00	2.5	13.0	
29-Apr-01	8:15	2.8	15.0	
6-May-01	7:00	2.5	13.0	
13-May-01	7:30	2.8	15.0	
20-May-01	7:30	2.5	15.0	
27-May-01	7:00	2.5	20.0	
3-Jun-01	7:50	2.5	17.0	
10-Jun-01	7:15	2.5	18.0	
17-Jun-01	8:00	2.5	18.0	
24-Jun-01	6:30	2.8	21.0	
1-Jul-01	7:00	2.5	22.0	
8-Jul-01	7:00	2.5	22.0	
15-Jul-01	7:30	2.8	23.0	
21-Jul-01	7:00	2.8	22.0	
29-Jul-01	8:30	2.5	21.0	
5-Aug-01	9:00	2.8	21.0	Numerous fishermen
12-Aug-01	7:45	2.5	23.0	
19-Aug-01	8:00	2.8	22.0	
26-Aug-01	7:45	2.5	20.0	
2-Sep-01	8:10	2.5	20.0	Algae bloom east side mid lake to south end. Approx
9-Sep-01	8:05	2.5	19.0	half the width of the lake. (Volunteer noted algae
16-Sep-01	7:50	2.5	20.0	bloom for each sample day, but recorded "none" for
23-Sep-01	7:30	3.0	19.0	algae.
31-Dec-01	9:00	2.5	4.0	
Min		2.0	3.5	
Max		3.0	23.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00									
8-Oct-00									
15-Oct-00	30.0	7	48.3	7					
22-Oct-00	12.0	7	44.6	7					
29-Oct-00	7.0	7	44.4	7					
5-Nov-00	32.0	7	51.9	7					
12-Nov-00	0.0	7	42.1	7					
19-Nov-00	16.0	7	43.1	7					
26-Nov-00	48.0	7	55.7	7					
3-Dec-00	4.0	7	38.7	7					
10-Dec-00	27.0	7	42.0	7					
17-Dec-00	20.0	7	52.3	7					
24-Dec-00	30.0	7	54.6	7					
31-Dec-00	34.0	7	50.4	7					
7-Jan-01	10.0	7	41.1	7					
14-Jan-01	10.0	7	41.4	7					
21-Jan-01	25.0	7	52.6	7					
28-Jan-01	18.0	7	55.0	7					
4-Feb-01	22.0	7	58.3	7					
11-Feb-01	7.0	5	41.0	6					
18-Feb-01	15.0	4	53.3	3					
25-Feb-01	8.0	7	58.9	7					
4-Mar-01	9.0	7	50.3	7					
11-Mar-01	10.0	7	49.6	7					
18-Mar-01	15.0	7	62.6	7					
25-Mar-01	31.0	7	52.4	7					
1-Apr-01	25.0	7	52.0	7					
8-Apr-01	36.0	7	51.0	7					
15-Apr-01	14.0	7	54.9	7					
22-Apr-01	11.0	7	44.9	7					
29-Apr-01	24.0	7	53.3	7					
6-May-01	0.0	7	45.0	7					
13-May-01	34.0	7	49.3	7					
20-May-01	0.0	7	55.1	7					
27-May-01	14.0	7	42.0	7					
3-Jun-01	12.0	7	40.0	7					
10-Jun-01	43.0	7	45.6	7					
17-Jun-01	3.0	7	38.3	7					
24-Jun-01	17.0	7	39.7	7					
1-Jul-01	0.0	7	39.0	7					
8-Jul-01	0.0	7	36.3	7					
15-Jul-01	25.0	7	38.1	7					
22-Jul-01	10.0	7	35.0	7					
29-Jul-01	0.0	7	35.1	7					
5-Aug-01	0.0	7	33.4	7					
12-Aug-01	0.0	7	33.0	7					
19-Aug-01	50.0	7	40.6	7					
26-Aug-01	0.0	7	44.0	7					
2-Sep-01	0.0	7	37.1	7					
9-Sep-01	0.0	7	33.7	7					
16-Sep-01	0.0	7	34.9	7					
23-Sep-01	12.0	7	36.3	7					
Min	0.0		33.0			**Min**	0.0	0.0	
Max	50.0		62.6			**Max**	0.0	0.0	
Total	770.0								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	0.0	7	34.0	7
8-Oct-00	21.0	7	37.0	7
15-Oct-00	53.0	7	45.0	7
22-Oct-00	16.0	7	49.3	7
29-Oct-00	17.0	7	45.6	7
5-Nov-00	25.0	7	44.1	7
12-Nov-00	0.0	7	42.1	7
19-Nov-00	9.0	7	45.9	7
26-Nov-00	54.0	7	55.6	7
3-Dec-00	6.0	7	51.1	7
10-Dec-00	12.0	7	54.1	7
17-Dec-00	22.0	7	46.6	7
24-Dec-00	18.0	7	46.4	7
31-Dec-00	34.0	7	46.1	7
7-Jan-01	7.0	7	39.9	7
14-Jan-01	16.0	7	38.4	7
21-Jan-01	26.0	7	43.6	7
28-Jan-01	20.0	7	52.7	7
4-Feb-01	26.0	7	57.3	7
11-Feb-01	15.0	7	55.0	7
18-Feb-01	9.0	7	56.0	7
25-Feb-01	10.0	7	55.0	7
4-Mar-01	6.0	7	55.0	7
11-Mar-01	20.0	7	48.6	7
18-Mar-01	16.0	7	39.3	7
25-Mar-01	33.0	7	36.9	7
1-Apr-01	43.0	7	44.6	7
8-Apr-01	24.0	7	49.6	7
15-Apr-01	9.0	7	41.6	7
22-Apr-01	6.0	7	34.4	7
29-Apr-01	30.0	7	44.3	7
6-May-01	0.0	7	52.6	7
13-May-01	33.0	7	55.1	7
20-May-01	0.0	7	39.0	7
27-May-01	15.0	7	43.4	7
3-Jun-01	14.0	7	50.4	7
10-Jun-01	44.0	7	53.4	7
17-Jun-01	0.0	7	50.0	7
24-Jun-01	14.0	7	53.1	7
1-Jul-01	0.0	7	42.6	7
8-Jul-01	0.0	7	43.4	7
15-Jul-01	30.0	7	45.6	7
22-Jul-01	12.0	7	46.1	7
29-Jul-01	5.0	7	51.1	7
5-Aug-01	0.0	7	51.4	7
12-Aug-01	0.0	7	51.0	7
19-Aug-01	55.0	7	54.9	7
26-Aug-01	1.0	7	48.9	7
2-Sep-01	1.0	7	49.6	7
9-Sep-01	0.0	7	53.1	7
16-Sep-01	1.0	7	52.7	7
23-Sep-01	14.0	7	45.0	7
Min	0.0		34.0	
Max	55.0		57.3	
Total	842.0			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
2-Oct-00	13:30	1.5	15.5	
10-Oct-00	13:00	2.0	14.0	
17-Oct-00	14:30	3.0	13.5	
23-Oct-00	13:00	2.5	13.0	
30-Oct-00	13:00	2.0	12.0	
6-Nov-00	13:30	1.5	10.5	
13-Nov-00	13:30	1.5	8.0	
20-Nov-00	13:00	1.5	7.0	
27-Nov-00	13:00	0.8	6.0	
4-Dec-00	13:00	1.5	5.0	
11-Dec-00	14:00	1.8	4.0	
18-Dec-00	13:30	1.8	3.0	
26-Dec-00	13:00	1.8	4.0	
1-Jan-01	12:30	1.5	4.0	
8-Jan-01	12:30	1.5	5.0	
15-Jan-01	13:30	1.5	5.0	
22-Jan-01	13:30	1.5	4.5	
29-Jan-01	14:30	1.3	4.0	
6-Feb-01	13:30	1.5	5.0	
12-Feb-01	12:30	1.5	5.0	
20-Feb-01	14:00	1.5	5.5	
26-Feb-01	13:00	1.5	5.5	
5-Mar-01	14:00	1.8	7.0	
12-Mar-01		1.8	8.0	
19-Mar-01		1.8	10.0	
26-Mar-01		1.8	12.0	
3-Apr-01	12:30	1.8	9.0	
9-Apr-01	13:00	1.8	11.0	
16-Apr-01	13:00	1.8	12.0	
23-Apr-01	13:30	1.5	13.0	
30-Apr-01	13:30	1.5	13.0	
7-May-01	13:30	1.5	15.0	
15-May-01	13:30	1.5	15.0	
21-May-01	13:30	1.5	17.0	
29-May-01	12:30	1.5	18.0	
4-Jun-01	13:00	2.0	17.0	
11-Jun-01	13:30	2.0	17.0	
18-Jun-01	13:00	2.5	18.0	
25-Jun-01	13:30	2.5	19.0	
2-Jul-01	13:00	2.3	22.0	
9-Jul-01	13:30	2.0	24.0	
16-Jul-01	13:00	2.0	21.0	
23-Jul-01	13:00	2.3	22.0	
30-Jul-01	13:30	2.5	21.0	
7-Aug-01	13:30	2.3	22.0	
13-Aug-01	13:30	2.5	24.0	
20-Aug-01	13:00	2.3	22.0	
27-Aug-01	13:30	1.8	21.0	
4-Sep-01	13:00	1.5	20.0	
10-Sep-01	13:00	1.5	19.0	
17-Sep-01	13:00	1.5	18.0	
24-Sep-01	13:30	1.3	18.0	
	Min	0.8	3.0	
	Max	3.0	24.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	11.0	7	7.9	7					
8-Oct-00	16.1	7	8.6	7	7-Oct-00	11:00	1.0	15.0	
15-Oct-00	84.0	7	12.7	7	13-Oct-00	11:00	1.0	14.0	
22-Oct-00	10.1	7	15.3	7	21-Oct-00	10:30	1.3	12.5	
29-Oct-00	11.1	7	13.0	7	27-Oct-00	9:00	2.0	12.0	Water clear today; yesterday dense algae scum at the shorelines.
5-Nov-00	31.0	7	14.0	7	4-Nov-00	10:20	2.0	11.0	
12-Nov-00	0.0	7	13.1	7	11-Nov-00	9:30	2.3	8.5	
19-Nov-00	14.0	7	13.7	7	18-Nov-00	9:00	2.0	6.0	
26-Nov-00	48.1	7	22.0	7	25-Nov-00	8:30	2.3	5.0	
3-Dec-00	6.0	7	21.0	7	2-Dec-00	11:00	2.0	5.5	
10-Dec-00	16.0	7	17.3	7	9-Dec-00	10:00	2.5	4.0	
17-Dec-00	30.1	7	22.6	7	16-Dec-00	12:00	1.8	3.0	
24-Dec-00	21.1	7	27.6	7	23-Dec-00	13:00	2.5	3.0	
31-Dec-00	45.1	7	25.7	7	30-Dec-00	10:00	2.3	4.0	
7-Jan-01	7.0	5	24.2	5	6-Jan-01	9:30	2.3	5.0	
14-Jan-01	18.0	6	18.3	6	12-Jan-01	11:00	2.3	5.0	
21-Jan-01	24.0	7	19.9	7	20-Jan-01	10:30	2.0	4.0	
28-Jan-01	17.0	7	20.6	7	27-Jan-01	16:00	2.0	5.0	
4-Feb-01	29.0	7	25.6	7	3-Feb-01	10:15	2.0	4.5	
11-Feb-01	2.0	5	20.8	6	10-Feb-01	12:30	1.8	4.5	
18-Feb-01	12.0	6	20.0	6	16-Feb-01	10:30	1.5	3.0	Converted snow to water for recording
25-Feb-01	10.0	7	16.7	7	24-Feb-01	10:30	2.0	5.0	
4-Mar-01	15.0	7	17.0	7	3-Mar-01	9:30	1.5	5.0	
11-Mar-01	20.0	7	22.4	7	10-Mar-01	9:15	2.0	7.5	
18-Mar-01	24.0	7	33.4	7	17-Mar-01	12:30	1.8	8.0	
25-Mar-01	37.0	7	27.1	7	24-Mar-01	12:00	1.8	10.0	
1-Apr-01	31.0	7	27.0	7	31-Mar-01	10:00	2.0	9.0	
8-Apr-01	32.0	7	27.4	7	7-Apr-01	9:00	2.0	8.5	
15-Apr-01	15.0	7	26.1	7	14-Apr-01	10:45	1.8	9.0	
22-Apr-01	12.0	7	32.6	7	22-Apr-01	17:10	1.5	13.0	
29-Apr-01	46.0	6	36.5	6	28-Apr-01	9:00	1.3	15.5	
6-May-01	0.0	4	28.7	3	4-May-01	7:30	1.5	13.0	
13-May-01	43.0	7	34.6	7	12-May-01	9:30	1.5	17.0	Two new geese families each has three goslings
20-May-01	0.0	7	25.4	7	19-May-01	9:00	2.0	0.2	
27-May-01	15.1	7	15.6	7	26-May-01	10:00	2.3	20.0	
3-Jun-01	31.0	7	12.7	7	2-Jun-01	9:30	2.3	17.0	
10-Jun-01	51.0	7	17.0	7	8-Jun-01	10:30	2.0	19.0	
17-Jun-01	0.1	7	14.6	7	16-Jun-01	9:30	2.0	16.5	
24-Jun-01	30.0	7	12.0	7	23-Jun-01	9:15	1.8	20.0	
1-Jul-01	0.0	7	9.0	7	30-Jun-01	12:00	2.0	20.0	
8-Jul-01	0.0	7	4.7	7	7-Jul-01	9:30	3.3	21.5	71 Canada geese
15-Jul-01	26.1	7	4.0	7	14-Jul-01	9:30	3.0	22.5	
22-Jul-01	11.0	7	4.0	7	21-Jul-01	10:45	2.8	19.5	
29-Jul-01	3.1	7	3.9	7	28-Jul-01	10:30	2.8	20.0	
5-Aug-01	0.0	7	3.3	7	4-Aug-01	9:30	3.0	20.0	
12-Aug-01	0.0	7	2.0	7	10-Aug-01	7:15	3.0	22.5	
19-Aug-01	54.1	7	3.3	7	18-Aug-01	11:15	3.0	21.5	
26-Aug-01	2.0	7	5.9	7	25-Aug-01	10:00	2.8	19.5	
2-Sep-01	3.1	7	5.1	7	1-Sep-01	11:00	2.8	20.5	
9-Sep-01	0.0	1	5.0	1	8-Sep-01	13:00	1.5	19.5	
16-Sep-01	6.0	3	4.0	3	22-Sep-01	10:00	1.5	18.0	
23-Sep-01	20.1	7	4.6	7	29-Sep-01	9:45	1.5	16.5	
Min	0.0		2.0			**Min**	1.0	0.2	
Max	84.0		36.5			**Max**	3.3	22.5	
Total	989.8								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00									
8-Oct-00									
15-Oct-00									
22-Oct-00									
29-Oct-00									
5-Nov-00									
12-Nov-00									
19-Nov-00									
26-Nov-00									
3-Dec-00									
10-Dec-00									
17-Dec-00									
24-Dec-00									
31-Dec-00									
7-Jan-01									
14-Jan-01									
21-Jan-01									
28-Jan-01									
4-Feb-01									
11-Feb-01									
18-Feb-01									
25-Feb-01									
4-Mar-01									
11-Mar-01									
18-Mar-01									
25-Mar-01									
1-Apr-01									
8-Apr-01									
15-Apr-01									
22-Apr-01									
29-Apr-01	7.1	5	56.0	5					
6-May-01	0.0	7	49.6	7	6-May-01	14:45	1.3	15.0	
13-May-01	29.0	7	53.3	7					
20-May-01	0.0	7	48.6	7					
27-May-01	11.0	7	42.4	7					
3-Jun-01	13.5	6	42.2	6					
10-Jun-01	54.0	7	47.4	7					
17-Jun-01	0.0	7	44.0	7					
24-Jun-01	33.0	7	43.9	7					
1-Jul-01									
8-Jul-01									
15-Jul-01									
22-Jul-01									
29-Jul-01									
5-Aug-01									
12-Aug-01									
19-Aug-01									
26-Aug-01									
2-Sep-01									
9-Sep-01									
16-Sep-01									
23-Sep-01									
Min	0.0		42.2			**Min**	1.3	15.0	
Max	54.0		56.0			**Max**	1.3	15.0	
Total	147.6								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	7.0	7	2.0	1					
8-Oct-00	28.0	6	5.2	5					
15-Oct-00	70.0	6	12.8	6					
22-Oct-00	12.0	7	23.2	7					
29-Oct-00	6.1	7	16.9	7					
5-Nov-00	52.0	7	20.9	7					
12-Nov-00	0.0	7	17.4	7					
19-Nov-00	14.0	7	18.2	7					
26-Nov-00	46.0	7	22.5	7					
3-Dec-00	4.0	7	20.8	7					
10-Dec-00	11.0	7	21.0	7					
17-Dec-00	28.0	7	25.4	7					
24-Dec-00	22.2	7	27.9	7					
31-Dec-00	44.0	7	30.1	7					
7-Jan-01	0.2	7	26.2	7					
14-Jan-01	16.0	7	25.8	7					
21-Jan-01	22.0	7	29.4	7					
28-Jan-01	18.0	7	28.1	7					
4-Feb-01	33.0	7	31.6	7					
11-Feb-01	24.1	6	23.9	7					
18-Feb-01	3.5	7	28.3	7					
25-Feb-01	14.0	7	25.3	7					
4-Mar-01	16.0	7	25.4	7					
11-Mar-01	18.1	7	25.4	7					
18-Mar-01	18.1	7	25.4	7					
25-Mar-01	32.1	7	25.4	7					
1-Apr-01	28.0	7	27.2	7					
8-Apr-01	22.1	6	22.3	7					
15-Apr-01	16.0	5	20.5	7					
22-Apr-01	4.0	6	18.2	7					
29-Apr-01	42.1	6	24.1	7					
6-May-01	0.0	7	25.0	7					
13-May-01	42.0	7	26.8	7					
20-May-01	0.0	7	20.7	7					
27-May-01	14.1	7	21.3	7					
3-Jun-01	7.1	7	20.3	7					
10-Jun-01	49.1	7	25.8	7					
17-Jun-01	0.0	7	21.8	7					
24-Jun-01	34.0	7	22.5	7					
1-Jul-01	0.0	7	21.6	7					
8-Jul-01	0.0	7	17.7	7					
15-Jul-01	2.1	7	16.0	7					
22-Jul-01	4.1	7	12.7	7					
29-Jul-01	0.1	7	11.7	7					
5-Aug-01	0.0	7	8.2	7					
12-Aug-01	0.0	7	3.7	7					
19-Aug-01	62.0	7	8.1	7					
26-Aug-01	2.0	7	16.0	7					
2-Sep-01	0.0	7	13.6	7					
9-Sep-01	0.0	7	10.6	7					
16-Sep-01	0.2	7	7.3	7					
23-Sep-01	20.0	7	6.7	7					
Min	0.0		2.0			**Min**	0.0	0.0	
Max	70.0		31.6			**Max**	0.0	0.0	
Total	907.9								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	0.0	7			1-Oct-00	18:30	1.8	15.0	
8-Oct-00	20.0	7							
15-Oct-00	77.1	7	25.0	1	15-Oct-00	18:00	2.0	12.0	
22-Oct-00	11.1	7							
29-Oct-00	4.0	7							
5-Nov-00	28.0	7							
12-Nov-00	0.0	7							
19-Nov-00	25.0	7	37.0	1					
26-Nov-00	41.0	7							
3-Dec-00	6.0	7							
10-Dec-00	22.0	7							
17-Dec-00	6.1	6							
24-Dec-00	18.0	5	48.0	1					
31-Dec-00	0.0	4	49.0	1					
7-Jan-01	5.1	7	52.0	1					
14-Jan-01	13.1	7							
21-Jan-01	15.0	7	52.0	1					
28-Jan-01	22.1	7	51.0	1					
4-Feb-01	31.0	7	56.0	1					
11-Feb-01	20.0	7	54.0	1					
18-Feb-01	5.0	7							
25-Feb-01	5.0	7	50.0	1					
4-Mar-01	13.1	7							
11-Mar-01	24.1	7							
18-Mar-01	25.0	7	55.0	1					
25-Mar-01	38.1	7	56.0	1					
1-Apr-01	30.0	7	58.0	1					
8-Apr-01	29.1	7	59.0	1					
15-Apr-01	8.0	7							
22-Apr-01	17.0	7	52.0	1					
29-Apr-01	43.1	7	60.0	1					
6-May-01	0.0	7	56.0	1	6-May-01	19:00	2.5	17.0	
13-May-01	48.1	7							
20-May-01	0.0	7	53.0	1	20-May-01	17:30	2.8	18.0	
27-May-01	19.0	7							
3-Jun-01	28.1	7	49.0	1	3-Jun-01	20:30	2.3	17.0	
10-Jun-01	53.0	7							
17-Jun-01	0.0	7	47.5	1	17-Jun-01	19:45	2.5		
24-Jun-01	34.0	7							
1-Jul-01	0.0	7	48.0	1	1-Jul-01	19:45	2.5	19.5	
8-Jul-01	0.1	7							
15-Jul-01	22.1	7	40.0	1	15-Jul-01	18:30	2.0	19.0	
22-Jul-01	11.1	7							
29-Jul-01	0.1	7	39.0	1	29-Jul-01	21:00	1.8	18.5	
5-Aug-01	1.0	7	35.0	1					
12-Aug-01	0.0	7	34.0	1	12-Aug-01	18:45	1.5	22.5	
19-Aug-01	54.0	7							
26-Aug-01	3.0	7	35.0	1	26-Aug-01	18:50	1.5	19.0	
2-Sep-01	0.0	7							
9-Sep-01	0.1	7	31.0	1	9-Sep-01	18:00	1.3	19.0	
16-Sep-01	3.0	7	29.0	1					
23-Sep-01	26.0	7	28.0	1	23-Sep-01	18:45	1.5	17.0	
Min	0.0		25.0			**Min**	1.3	12.0	
Max	77.1		60.0			**Max**	2.8	22.5	
Total	904.2								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	3.1	7	32.0	7
8-Oct-00	39.1	7	34.1	7
15-Oct-00	50.2	7	38.0	7
22-Oct-00	10.0	7	41.1	7
29-Oct-00	4.1	7	42.0	7
5-Nov-00	41.0	7	45.0	7
12-Nov-00	0.0	7	47.0	7
19-Nov-00	15.1	7	47.4	7
26-Nov-00	39.0	7	54.0	7
3-Dec-00	0.1	7	56.0	7
10-Dec-00	9.1	7	56.7	7
17-Dec-00	22.1	7	59.4	7
24-Dec-00	13.2	7	61.7	7
31-Dec-00	33.1	7	65.3	7
7-Jan-01	5.1	7	68.9	7
14-Jan-01	11.1	7	68.1	7
21-Jan-01	17.0	7	69.7	7
28-Jan-01	8.2	7	69.0	7
4-Feb-01	29.1	7	72.1	7
11-Feb-01	10.1	7	72.1	7
18-Feb-01	6.0	7	73.3	7
25-Feb-01	7.0	7	71.9	7
4-Mar-01	9.0	7	70.6	7
11-Mar-01	12.1	7	70.0	7
18-Mar-01	16.1	7	71.4	7
25-Mar-01	43.1	7	73.4	7
1-Apr-01	29.2	7	77.1	7
8-Apr-01	26.1	7	77.7	7
15-Apr-01	10.0	7	73.7	7
22-Apr-01	4.0	7	70.9	7
29-Apr-01	36.1	7	72.1	7
6-May-01	0.1	7	69.4	7
13-May-01	36.1	7	69.1	7
20-May-01	0.0	7	67.3	7
27-May-01	7.0	7	63.9	7
3-Jun-01	17.1	7	61.4	7
10-Jun-01	48.1	7	65.0	7
17-Jun-01	0.0	7	63.1	7
24-Jun-01	35.0	7	62.7	7
1-Jul-01	0.0	7	61.7	7
8-Jul-01	0.0	7	58.3	7
15-Jul-01	2.1	7	55.1	7
22-Jul-01	8.0	7	53.3	7
29-Jul-01	1.1	7	51.7	7
5-Aug-01	0.1	7	49.3	7
12-Aug-01	0.0	7	46.7	7
19-Aug-01	48.0	7	47.4	7
26-Aug-01	1.0	7	48.4	7
2-Sep-01	1.1	7	46.4	7
9-Sep-01	0.0	7	44.7	7
16-Sep-01	0.1	6	42.7	7
23-Sep-01	17.0	7	42.6	7
Min	0.0		32.0	
Max	50.2		77.7	
Total	779.2			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
3-Oct-00	15:00	3.5	16.0	
11-Oct-00	15:00	3.5	15.0	
17-Oct-00	13:30	3.5	15.0	
25-Oct-00	11:30	3.5	13.0	
31-Oct-00	11:30	4.0	11.0	
8-Nov-00	13:50	4.0	10.0	
14-Nov-00	14:00	4.0	8.0	
21-Nov-00	12:30	3.0	6.0	Extensive algae bloom; defective thermometer.
27-Nov-00	13:00	3.0	5.0	Reduced algae bloom
5-Dec-00	11:00	4.5		Algae bloom mainly at south end
12-Dec-00	11:00	4.0		
19-Dec-00	11:30	4.0		
26-Dec-00	11:00	4.0		
2-Jan-01	15:00	4.5	5.0	
9-Jan-01	14:30	4.0	5.0	
15-Jan-01	14:00	4.5	5.0	
22-Jan-01	13:00	4.5	5.0	
29-Jan-01	14:00	4.0	5.0	
5-Feb-01	15:00	4.5	5.0	
12-Feb-01	12:30	4.0	5.0	
19-Feb-01	13:00	4.0	5.0	
26-Feb-01	14:00	4.0	5.0	
6-Mar-01	14:30	4.5	8.0	
14-Mar-01	10:30	4.0	8.0	
19-Mar-01	14:00	3.5	8.0	
27-Mar-01	14:30	3.5	8.0	
2-Apr-01	14:00	4.5	9.0	flocks (30-40) cormorants on lake
9-Apr-01	13:00	4.0	10.0	
16-Apr-01	11:30	5.5	11.0	
24-Apr-01	11:00	5.5	12.0	
2-May-01	14:00	6.0	13.0	
7-May-01	14:30	6.0	15.0	
13-May-01	15:00	5.8	16.0	
20-May-01	17:30	5.5	17.0	
28-May-01	15:30	5.0	17.5	
4-Jun-01	16:00	4.5	18.0	
13-Jun-01	11:30	4.5	17.0	
18-Jun-01	15:00	4.5	19.0	
25-Jun-01	13:30	4.5	20.0	
2-Jul-01	15:00	4.0	22.0	
9-Jul-01	15:00	3.5	24.0	
18-Jul-01	15:30	3.0	20.0	
23-Jul-01	15:00	3.0	21.0	
30-Jul-01	14:30	3.0	21.0	
7-Aug-01	15:00	4.5	22.0	
14-Aug-01	14:30	4.0	23.0	
24-Aug-01	15:00	4.5	21.0	
29-Aug-01	15:30	5.0	22.0	
7-Sep-01	15:30	4.5	20.0	
12-Sep-01	15:00	4.5	21.0	
19-Sep-01	15:30	5.0	19.0	
28-Sep-01	12:00	5.0	17.0	
	Min	3.0	5.0	
	Max	6.0	24.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	1.0	7	14.9	7	1-Oct-00	14:00	2.3	17.0	
8-Oct-00	14.0	7	15.5	7	8-Oct-00	12:00	2.0	15.0	
15-Oct-00	56.0	7	19.8	7	15-Oct-00	13:30	2.0	13.5	
22-Oct-00	15.0	7	25.3	7	22-Oct-00	9:50	2.5	12.5	Heavy green scum on water.
29-Oct-00	20.0	7	24.8	7	29-Oct-00	9:50	2.5	11.5	
5-Nov-00	34.0	7	26.9	7	5-Nov-00	9:45	2.3	10.5	Green scum on lake
12-Nov-00	0.0	7	24.6	7	12-Nov-00	9:30	2.3	8.5	Green scum on lake
19-Nov-00	7.0	7	22.6	7	19-Nov-00	10:35	1.5	6.5	Green scum on lake
26-Nov-00	53.0	7	28.2	7	26-Nov-00	10:15	1.7	5.5	
3-Dec-00	4.0	7	26.7	7	3-Dec-00	9:55	2.0	5.5	Green scum on surface.
10-Dec-00	19.0	7	25.6	7	10-Dec-00	9:50	2.0	5.0	
17-Dec-00	26.0	7	28.0	7	17-Dec-00	9:35	2.0	3.5	
24-Dec-00	9.0	7	28.4	7	24-Dec-00	10:55	2.0	4.0	
31-Dec-00	38.0	7	30.8	7	31-Dec-00	10:15	2.0	4.5	
7-Jan-01	8.0	7	37.1	7	7-Jan-01	9:50	2.5	4.5	
14-Jan-01	26.0	7	38.9	7	15-Jan-01	9:30	3.5	5.0	
21-Jan-01	20.1	7	45.1	7	22-Jan-01	15:00	2.5	5.0	
28-Jan-01	18.1	7	47.1	7	28-Jan-01	9:30	3.0	4.0	
4-Feb-01	23.0	7	51.6	7	4-Feb-01	14:00	3.5	5.0	
11-Feb-01	0.0	5	52.1	7	11-Feb-01	14:00	3.0	4.5	
18-Feb-01	0.0	6	56.4	7	18-Feb-01	11:30	2.5	5.0	
25-Feb-01	12.0	7	56.1	7	26-Feb-01	14:00	3.0	5.0	
4-Mar-01	6.0	7	55.8	7	4-Mar-01	16:00	1.5	6.0	
11-Mar-01	13.0	7	55.3	7	11-Mar-01	15:00	3.0	6.0	
18-Mar-01	15.0	7	56.7	7	19-Mar-01	9:00	4.0	8.0	
25-Mar-01	42.0	7	59.1	7	25-Mar-01	10:00	3.5	11.0	
1-Apr-01	8.1	6	61.4	6	2-Apr-01	10:00	3.5	11.0	
8-Apr-01	16.0	6	61.9	6	8-Apr-01	15:00	4.0	11.0	
15-Apr-01	13.0	7	62.1	7	15-Apr-01	9:50	5.3	10.0	
22-Apr-01	2.0	7	60.6	7	22-Apr-01	9:30	5.3	13.0	
29-Apr-01	20.0	7	60.0	7	29-Apr-01	10:45	3.8	13.5	
6-May-01	0.0	7	57.8	7	6-May-01	10:10	3.3	13.0	
13-May-01	24.0	7	57.4	7	13-May-01	10:35	4.0	15.5	
20-May-01	0.0	7	55.5	7	20-May-01	10:10	4.0	14.5	
27-May-01	13.0	7	52.9	7	27-May-01	10:10	4.0	19.0	
3-Jun-01	18.0	7	52.9	7	3-Jun-01	10:00	3.5	17.0	
10-Jun-01	40.0	7	55.6	7	10-Jun-01	9:30	3.0	18.5	
17-Jun-01	0.0	7	53.8	7	17-Jun-01	10:10	3.0	16.5	
24-Jun-01	28.0	7	52.1	7	24-Jun-01	9:30	4.0	19.5	
1-Jul-01	0.0	7	50.8	7	1-Jul-01	10:00	3.8	20.0	
8-Jul-01	0.0	7	46.5	7	8-Jul-01	9:50	3.5	21.5	
15-Jul-01	10.0	7	43.4	7	15-Jul-01	10:00	2.8	21.5	
22-Jul-01	10.0	7	40.9	7	22-Jul-01	10:15	2.3	20.0	
29-Jul-01	3.0	7	38.7	7	29-Jul-01	10:00	2.5	19.5	
5-Aug-01	1.0	7	36.0	7	5-Aug-01	10:00	2.3	20.0	
12-Aug-01	0.0	7	33.0	7	12-Aug-01	10:00	3.0	22.5	
19-Aug-01	54.0	7	35.2	7	19-Aug-01	10:05	2.5	21.0	green scum on lake
26-Aug-01	0.0	7	37.7	7	26-Aug-01	10:15	2.5	19.5	green clumps of bloom
2-Sep-01	1.0	7	35.7	7	2-Sep-01	9:50	2.8	19.5	Green scum on lake.
9-Sep-01	0.0	7	33.1	7	9-Sep-01	9:55	3.0	18.5	
16-Sep-01	1.0	7	31.1	7	16-Sep-01	10:45	2.8	19.0	
23-Sep-01	9.0	7	29.8	7	23-Sep-01	9:50	2.8	17.5	
Min	0.0		14.9			**Min**	1.5	3.5	
Max	56.0		62.1			**Max**	5.3	22.5	
Total	750.2								

* Daily data were only included in chapter 3 calculations if at least 5 days were reported in a week

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00				
8-Oct-00				
15-Oct-00				
22-Oct-00				
29-Oct-00				
5-Nov-00				
12-Nov-00				
19-Nov-00				
26-Nov-00				
3-Dec-00				
10-Dec-00				
17-Dec-00				
24-Dec-00				
31-Dec-00				
7-Jan-01				
14-Jan-01				
21-Jan-01				
28-Jan-01				
4-Feb-01				
11-Feb-01				
18-Feb-01				
25-Feb-01				
4-Mar-01				
11-Mar-01				
18-Mar-01				
25-Mar-01				
1-Apr-01				
8-Apr-01				
15-Apr-01				
22-Apr-01				
29-Apr-01				
6-May-01	0.0	4	2.0	4
13-May-01	40.0	7	2.0	7
20-May-01	0.0	7	2.0	7
27-May-01	19.0	7	2.0	7
3-Jun-01	19.0	7	2.0	7
10-Jun-01	61.0	7	2.0	7
17-Jun-01	1.0	7	2.0	7
24-Jun-01	25.0	7	2.0	7
1-Jul-01	0.0	7		
8-Jul-01	1.0	7		
15-Jul-01	11.0	7		
22-Jul-01	12.0	7		
29-Jul-01				
5-Aug-01				
12-Aug-01				
19-Aug-01				
26-Aug-01				
2-Sep-01				
9-Sep-01				
16-Sep-01				
23-Sep-01				
Min	0.0		2.0	
Max	61.0		2.0	
Total	189.0			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	14:00	1.5	15.0	
8-Oct-00	13:30	1.5	14.0	
15-Oct-00	14:30	1.5	14.0	
22-Oct-00	13:30	1.5	12.0	
29-Oct-00	13:00	1.0	10.0	
5-Nov-00	13:00	1.0	9.0	
26-Nov-00	14:30	1.0	4.0	Lake frozen on 11-12-00 and 11-19-00
3-Dec-00	13:30		0.0	Lake too low to do an accurate secchi reading
10-Dec-00	12:00		2.0	
17-Dec-00	14:30		2.0	
24-Dec-00	12:00		4.0	
Min		1.0	0.0	
Max		1.5	15.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	0.0	1			7-Oct-00	14:30	4.0	16.0	
8-Oct-00	10.0	7	2.7	7	15-Oct-00	17:30	4.0	14.0	
15-Oct-00	76.0	7	7.9	7	21-Oct-00	11:00	4.0	16.0	
22-Oct-00	12.0	7	14.3	7	28-Oct-00	13:30	4.0	12.0	
29-Oct-00	16.0	7	16.0	7	4-Nov-00	13:30	4.0	11.0	
5-Nov-00	27.0	7	20.1	7	11-Nov-00	14:00	4.0	9.0	
12-Nov-00	0.0	7	20.4	7	18-Nov-00	12:00	4.0	7.0	
19-Nov-00	14.0	7	19.4	7	25-Nov-00	13:00	4.0	6.0	
26-Nov-00	64.0	7	30.9	7	2-Dec-00	13:00	4.5	6.0	
3-Dec-00	0.0	7	31.8	7	9-Dec-00	15:00	4.0	5.0	
10-Dec-00	24.0	7	29.8	7	16-Dec-00	12:00	4.0	4.0	
17-Dec-00	20.0	7	29.1	7	23-Dec-00	12:00	4.0	4.0	
24-Dec-00	28.0	7	32.1	7	30-Dec-00	14:00	3.5	4.0	
31-Dec-00	32.0	7	36.0	7	6-Jan-01	11:00	3.5	4.0	
7-Jan-01	10.0	7	36.0	7	13-Jan-01	16:00	3.5	5.0	
14-Jan-01	14.0	7	33.7	7	20-Jan-01	13:00	3.0	4.0	
21-Jan-01	25.0	7	36.3	7	27-Jan-01	14:00	3.0	4.0	
28-Jan-01	28.0	7	34.1	7	3-Feb-01	12:00	3.0	4.0	
4-Feb-01	29.0	7	38.0	7	10-Feb-01	12:00	3.0	4.0	
11-Feb-01	40.0	7	36.7	7	17-Feb-01	16:30	2.0	4.0	
18-Feb-01	8.0	7	38.9	7	24-Feb-01	12:30	2.5	5.0	
25-Feb-01	9.0	7	34.6	7	28-Feb-01	12:00	2.5	5.0	
4-Mar-01	6.0	7	30.4	7	3-Mar-01	17:00	3.0	5.0	
11-Mar-01	28.0	7	28.6	7	11-Mar-01	15:00	2.5	7.0	
18-Mar-01	26.0	7	32.3	7	17-Mar-01	17:00	2.0	8.0	
25-Mar-01	60.0	7	35.0	7	24-Mar-01	11:00	3.0	10.0	
1-Apr-01	37.0	7	39.4	7	1-Apr-01	14:00	2.5	9.0	
8-Apr-01	38.0	7	42.0	7	8-Apr-01	15:00	2.5	10.0	
15-Apr-01	16.0	7	40.1	7	15-Apr-01	14:00	3.0	10.0	
22-Apr-01	14.0	7	34.1	7	24-Apr-01	18:00	2.5	15.0	lots of frogs and red-wing blackbirds
29-Apr-01	40.0	7	32.3	7	29-Apr-01	18:00	3.0	13.0	
6-May-01	0.0	7	29.9	7	6-May-01	12:00	4.0	13.0	eagle hunting coots on lake
13-May-01	47.0	7	30.0	7	13-May-01	17:00	5.0	18.0	seeing very few ducks on lake
20-May-01	0.0	7	27.7	7	20-May-01	16:00	4.0	19.0	one Canada goose has 6 newborns
27-May-01	44.0	7	24.0	7	27-May-01	16:00	4.0	20.0	now only 4 goslings
3-Jun-01	17.0	7	25.6	7	3-Jun-01	14:00	4.0	17.0	
10-Jun-01	39.0	7	28.9	7	10-Jun-01	20:00	4.0	18.0	
17-Jun-01	0.0	7	25.1	7	17-Jun-01	15:30	3.0	17.0	
24-Jun-01	21.0	7	22.9	7	24-Jun-01	17:00	4.0	20.0	
1-Jul-01	0.0	7	19.1	7	1-Jul-01	14:00	4.0	22.0	
8-Jul-01	0.0	7	15.1	7	8-Jul-01	15:00	3.0	24.0	
15-Jul-01	25.0	7	14.9	7	15-Jul-01	16:00	4.0	21.0	
22-Jul-01	35.0	7	14.4	7	22-Jul-01	17:00	4.0	22.0	
29-Jul-01	0.0	7	12.1	7	29-Jul-01	18:00	4.0	21.0	
5-Aug-01	0.0	7	10.0	7	5-Aug-01	19:00	4.0	21.0	
12-Aug-01	0.0	7	8.6	7	12-Aug-01	20:00	4.0	24.0	
19-Aug-01	24.0	7	9.0	7	20-Aug-01	21:00	4.0	21.0	
26-Aug-01	5.0	7	10.1	7	26-Aug-01	22:00	4.0	22.0	
2-Sep-01	6.0	7	9.1	7	2-Sep-01	23:00	4.0	22.0	
9-Sep-01	0.0	7	7.6	7	9-Sep-01	0:00	4.0	20.0	
16-Sep-01	2.0	7	5.7	7	16-Sep-01	1:00	4.0	20.0	
23-Sep-01	11.0	7	5.0	7	23-Sep-01	2:00	4.0	21.0	
Min	0.0		2.7		30-Sep-01	**3:00**	3.0	18.0	
Max	76.0		42.0			**Max**	5.0	24.0	
Total	1027.0								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	1.0	7	13.9	7
8-Oct-00	18.0	7	13.0	7
15-Oct-00	83.0	7	15.7	7
22-Oct-00	4.0	7	21.0	7
29-Oct-00	12.0	7	22.0	3
5-Nov-00				
12-Nov-00				
19-Nov-00				
26-Nov-00	7.0	2	33.0	2
3-Dec-00	4.0	7	33.3	7
10-Dec-00	14.0	7	34.4	7
17-Dec-00	29.0	7	38.4	7
24-Dec-00	23.0	7	42.3	7
31-Dec-00	45.0	7	47.0	7
7-Jan-01	8.0	7	52.0	7
14-Jan-01	16.0	7	51.4	7
21-Jan-01	21.0	7	51.9	7
28-Jan-01	17.0	7	52.0	7
4-Feb-01	57.0	7	53.6	7
11-Feb-01	12.0	7	53.4	7
18-Feb-01	9.0	7	54.4	7
25-Feb-01	9.0	7	53.0	7
4-Mar-01	12.0	7	52.0	7
11-Mar-01	37.0	7	52.3	7
18-Mar-01	21.0	7	56.3	7
25-Mar-01	31.0	7	57.6	7
1-Apr-01				
8-Apr-01				
15-Apr-01				
22-Apr-01	10.0	6	62.0	4
29-Apr-01	47.0	7	68.0	7
6-May-01	0.0	7	62.6	7
13-May-01	39.1	7	54.7	7
20-May-01	0.0	7	49.1	7
27-May-01	24.0	7	44.6	7
3-Jun-01	8.0	7	44.0	7
10-Jun-01	44.0	7	46.6	7
17-Jun-01	0.0	7	45.6	7
24-Jun-01	19.0	7	44.4	7
1-Jul-01	0.0	7	42.7	7
8-Jul-01	0.0	7	39.4	7
15-Jul-01	31.0	7	39.0	7
22-Jul-01	9.0	7	37.1	7
29-Jul-01	0.0	7	35.3	7
5-Aug-01	0.0	7	33.4	7
12-Aug-01	0.0	7	30.3	7
19-Aug-01	34.0	7	29.6	7
26-Aug-01	0.0	7	29.6	7
2-Sep-01	0.0	7	28.0	7
9-Sep-01	0.0	7	25.7	7
16-Sep-01	3.0	7	23.6	7
23-Sep-01	15.0	7	22.8	7
Min	0.0		13.0	
Max	83.0		68.0	
Total	773.1			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	10:30	1.3	15.0	
8-Oct-00	14:30	1.3	17.0	
16-Oct-00	12:00	1.8	12.5	
28-Oct-00	15:15	1.8	12.0	
29-Oct-00	15:00	1.8	12.0	
12-Nov-00	14:30	1.8	7.5	
26-Nov-00	15:30	2.0	4.5	
3-Dec-00	15:00	2.5	14.0	
10-Dec-00	14:00	1.8	4.0	Ice on lake Dec. 11-15
14-Dec-00	15:30	2.5	13.0	
14-Jan-01	13:00	2.5	9.0	
27-Dec-00	11:00	2.3	4.0	Ice on lake Dec. 18, 19, 20
2-Jan-01	16:30	2.5	2.5	
14-Jan-01	13:00	2.5	9.0	
19-Jan-01	14:30	3.0	3.0	
21-Jan-01	14:00	2.8	7.0	
4-Feb-01	12:00	2.5	7.5	
11-Feb-01	14:00	3.0	13.0	
18-Feb-01	14:00	2.5	8.0	
25-Feb-01	12:00	3.3	14.0	
5-Mar-01	15:00	3.0	13.0	
11-Mar-01	11:00	3.3	14.0	
18-Mar-01	14:30	2.8	10.0	
30-Mar-01	14:30	4.0	15.0	
13-May-01	19:00	3.5	17.0	
29-May-01	15:30	3.0	19.0	
29-Jun-01	16:30	3.0	18.0	
8-Jul-01	16:30	2.3	23.5	
23-Jul-01	19:00	1.8	21.5	
29-Jul-01	10:45	1.5	18.5	
5-Aug-01	9:00	1.5	19.5	
8-Aug-01		1.5	25.0	
19-Aug-01	12:30	1.0	21.0	
26-Aug-01	14:00	1.5	21.0	
2-Sep-01	18:00	1.5	22.0	
9-Sep-01	15:00	1.3	19.0	
18-Sep-01	9:30	1.5	23.0	
	Min	1.0	2.5	
	Max	4.0	25.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	10.0	7	11.9	7	1-Oct-00	10:30	3.3	14.0	
8-Oct-00	15.0	7	11.3	7					
15-Oct-00	85.0	7	14.3	7	16-Oct-00	12:00	3.0	13.0	
22-Oct-00	13.0	7	19.5	7					
29-Oct-00	3.0	7	20.4	7	29-Oct-00	15:00	3.3	14.0	
5-Nov-00	31.0	7	21.9	7					
12-Nov-00	0.0	7	23.4	7	12-Nov-00	14:30	2.8	10.0	
19-Nov-00	12.0	7	23.5	7					
26-Nov-00	52.0	7	29.4	7	26-Nov-00	15:30	4.0	15.0	
3-Dec-00	4.0	7	32.0	7					
10-Dec-00	12.0	6	33.2	7	10-Dec-00	14:00	3.5	17.0	
17-Dec-00	30.0	6	37.6	7					
24-Dec-00	18.0	6	40.8	7	27-Dec-00	11:00	3.0	19.0	
31-Dec-00	43.0	6	44.6	7					
7-Jan-01	6.0	7	49.0	7					
14-Jan-01	15.0	7	49.1	7	14-Jan-01	13:00	3.0	18.0	
21-Jan-01	23.0	7	50.9	7	21-Jan-01	14:00	2.3	23.5	
28-Jan-01	13.0	7	49.9	7					
4-Feb-01	23.0	6	52.0	7	4-Feb-01	12:00	1.8	21.5	
11-Feb-01	6.0	7	51.5	4					
18-Feb-01	8.0	7	52.5	7	18-Feb-01	14:00	1.5	18.5	
25-Feb-01			52.0	1					
4-Mar-01									
11-Mar-01									
18-Mar-01	20.0	7	54.1	7	18-Mar-01	14:30	1.5	19.5	
25-Mar-01	42.0	7	55.1	7					
1-Apr-01									
8-Apr-01									
15-Apr-01									
22-Apr-01									
29-Apr-01									
6-May-01									
13-May-01									
20-May-01									
27-May-01									
3-Jun-01									
10-Jun-01									
17-Jun-01									
24-Jun-01									
1-Jul-01	0.0	7	40.3	7					
8-Jul-01	0.0	7	36.0	7	8-Jul-01	16:30	1.5	25.0	
15-Jul-01	25.0	7	35.3	7					
22-Jul-01	10.0	7	33.5	7	23-Jul-01	19:00	1.0	21.0	
29-Jul-01	2.0	7	31.7	7	29-Jul-01	10:45	1.5	21.0	
5-Aug-01	0.0	7	29.3	2	5-Aug-01	9:00	1.5	22.0	
12-Aug-01	0.0	7	26.4	7					
19-Aug-01	50.0	7	25.9	7					
26-Aug-01	0.0	6	26.3	2	26-Aug-01	14:00	1.3	19.0	
2-Sep-01	0.0	3	23.5	3					
9-Sep-01	0.0	7	21.8	7	9-Sep-01	15:00	1.5	23.0	
16-Sep-01	4.0	7	20.1	7					
23-Sep-01	16.0	7	19.8	7	23-Sep-01	10:45	1.8	18.5	
Min	0.0		11.3			**Min**	1.0	10.0	
Max	85.0		55.1			**Max**	4.0	25.0	
Total	591.0								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00									
8-Oct-00									
15-Oct-00									
22-Oct-00									
29-Oct-00									
5-Nov-00									
12-Nov-00									
19-Nov-00									
26-Nov-00									
3-Dec-00									
10-Dec-00									
17-Dec-00									
24-Dec-00									
31-Dec-00									
7-Jan-01									
14-Jan-01									
21-Jan-01									
28-Jan-01									
4-Feb-01									
11-Feb-01									
18-Feb-01									
25-Feb-01									
4-Mar-01									
11-Mar-01									
18-Mar-01									
25-Mar-01									
1-Apr-01									
8-Apr-01									
15-Apr-01									
22-Apr-01									
29-Apr-01									
6-May-01									
13-May-01									
20-May-01									
27-May-01	2.0	2	46.3	2					
3-Jun-01	12.0	7	44.8	7	3-Jun-01	18:00	2.5	20.0	
10-Jun-01	19.0	7	46.4	7	10-Jun-01	19:00	3.0	23.0	
17-Jun-01	4.0	7	45.6	7	17-Jun-01	18:00	2.8	22.0	
24-Jun-01	32.0	5	45.7	5	24-Jun-01	19:00	2.8	20.0	
1-Jul-01					1-Jul-01	17:00	3.8	24.0	
8-Jul-01									
15-Jul-01									
22-Jul-01									
29-Jul-01									
5-Aug-01									
12-Aug-01									
19-Aug-01									
26-Aug-01									
2-Sep-01									
9-Sep-01									
16-Sep-01									
23-Sep-01									
Min	2.0		44.8			**Min**	2.5	20.0	
Max	32.0		46.4			**Max**	3.8	24.0	
Total	69.0								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00									
8-Oct-00									
15-Oct-00									
22-Oct-00									
29-Oct-00									
5-Nov-00									
12-Nov-00									
19-Nov-00									
26-Nov-00					22-Nov-00	13:30	7.8	8.0	
3-Dec-00					1-Dec-00	13:00	8.0	8.0	
10-Dec-00					8-Dec-00	14:00	7.3	8.0	
17-Dec-00					15-Dec-00	14:30	6.8	4.0	
24-Dec-00									
31-Dec-00	25.0	6	18.8	6	29-Dec-00	14:30	4.8	8.0	
7-Jan-01	12.0	7	19.6	7	6-Jan-01	13:00	4.8	6.0	
14-Jan-01	15.0	7	20.0	7	11-Jan-01	13:00	4.3	6.0	
21-Jan-01	20.0	7	22.0	7					
28-Jan-01	18.0	7	22.0	7	25-Jan-01	14:00	3.5	6.0	
4-Feb-01	31.0	7	22.6	7	1-Feb-01	15:00	3.5	6.0	
11-Feb-01	19.0	6	23.1	6	9-Feb-01	13:00	3.5	6.0	
18-Feb-01	9.0	7	25.4	7					
25-Feb-01	11.0	7	26.4	7	22-Feb-01	13:00	2.5	6.0	
4-Mar-01	6.0	7	27.0	7	1-Mar-01	13:00	2.0	6.0	Earthquake 2/28; lake looks very churned up and dirty.
11-Mar-01	33.0	7	27.4	7	10-Mar-01	12:00	2.0	6.0	
18-Mar-01	20.0	7	28.3	7	22-Mar-01	16:00	3.5	10.0	
25-Mar-01	36.0	7	28.0	7	31-Mar-01	13:00	3.5	9.0	
1-Apr-01	45.0	7	30.4	7					
8-Apr-01	47.0	7	33.3	7	7-Apr-01	13:00	4.0	9.0	
15-Apr-01	13.0	7	32.4	7	12-Apr-01	13:30	7.0	10.0	loon and river otter spotted; big jump in Secchi reading
22-Apr-01	5.0	7	31.4	7	20-Apr-01	13:00	6.5	10.0	
29-Apr-01	56.0	7	31.1	7	24-Apr-01	18:00	8.5	13.0	department of Fish and Wildlife stocked lake this week
6-May-01	2.0	7	30.4	7	11-May-01	18:00	5.5	15.0	
13-May-01	35.0	7	30.6	7	20-May-01	20:00	5.5	16.5	
20-May-01	0.0	7	29.7	7	28-May-01	17:30	5.0	18.0	
27-May-01	27.0	7	27.4	7					
3-Jun-01	26.0	7	28.0	7					
10-Jun-01	57.0	7	28.6	7					
17-Jun-01	0.0	7	27.4	7					
24-Jun-01	41.0	7	27.9	7	28-Jun-01	13:30	5.0	20.0	
1-Jul-01	0.0	7	25.9	7	3-Jul-01	13:00	4.5		
8-Jul-01	0.0	7	22.9	7	11-Jul-01	13:00	4.0		
15-Jul-01	16.0	7	20.6	7	18-Jul-01	17:00	5.0		
22-Jul-01	0.0	1	20.0	1					
29-Jul-01									
5-Aug-01									
12-Aug-01									
19-Aug-01					20-Aug-01	16:00	5.5		Temp. gauge broken; lake is at its lowest level in years
26-Aug-01	0.0	1	5.0	1					
2-Sep-01	0.0	7	3.9	7					
9-Sep-01	0.0	7	2.7	7	8-Sep-01	18:00	7.5		Temp. gauge broken
16-Sep-01	0.0	7	1.6	7	16-Sep-01	18:00	8.0		Temp. gauge broken
23-Sep-01	0.0	7	-0.1	7					
Min	0.0		-0.1			**Min**	2.0	4.0	
Max	57.0		33.3			**Max**	8.5	20.0	
Total	625.0								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	13.0	7	41.0	7
8-Oct-00	15.1	7	41.1	7
15-Oct-00	47.5	7	44.1	7
22-Oct-00	14.5	7	48.6	7
29-Oct-00	13.0	7	45.4	7
5-Nov-00	28.5	7	48.9	7
12-Nov-00	0.0	7	56.7	7
19-Nov-00	7.0	7	56.3	7
26-Nov-00	55.5	7	66.7	7
3-Dec-00	2.5	7	69.4	7
10-Dec-00	9.3	7	68.7	7
17-Dec-00	23.1	7	72.0	7
24-Dec-00	15.0	7	73.0	7
31-Dec-00	29.5	7	76.0	7
7-Jan-01	10.0	7	75.0	7
14-Jan-01	13.1	7	73.1	7
21-Jan-01	20.0	7	76.4	7
28-Jan-01	17.0	7	74.3	7
4-Feb-01	20.0	7	75.7	7
11-Feb-01	17.1	7	74.3	7
18-Feb-01	7.0	7	76.7	7
25-Feb-01	10.0	7	75.7	7
4-Mar-01	3.0	7	74.3	7
11-Mar-01	14.1	7	72.9	7
18-Mar-01	14.0	7	75.1	7
25-Mar-01	26.0	7	75.4	7
1-Apr-01	46.0	7	77.7	7
8-Apr-01	26.0	7	77.1	7
15-Apr-01	11.5	7	73.4	7
22-Apr-01	5.1	7	68.9	7
29-Apr-01	26.1	7	68.7	7
6-May-01	0.0	7	68.3	7
13-May-01	33.6	7	69.9	7
20-May-01	0.0	7	68.0	7
27-May-01	12.1	7	65.1	7
3-Jun-01	26.1	7	66.9	7
10-Jun-01	35.1	7	70.4	7
17-Jun-01	0.0	7	69.0	7
24-Jun-01	14.5	7	65.4	7
1-Jul-01	0.0	7	62.9	7
8-Jul-01	0.0	7	58.9	7
15-Jul-01	25.1	7	58.6	7
22-Jul-01	9.1	7	57.6	7
29-Jul-01	8.6	7	57.3	7
5-Aug-01	0.1	7	55.1	7
12-Aug-01	0.0	7	51.6	7
19-Aug-01	56.1	7	53.0	7
26-Aug-01	0.1	7	55.1	7
2-Sep-01	0.0	7	52.9	7
9-Sep-01	0.0	7	50.3	7
16-Sep-01	0.1	7	48.9	7
23-Sep-01	11.1	7	48.0	7
Min	0.0		41.0	
Max	56.1		77.7	
Total	790.6			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	13:31	2.5	15.0	
8-Oct-00	12:40	2.3	12.5	
15-Oct-00	13:04	2.3	12.0	
22-Oct-00	14:30	2.3	12.0	
29-Oct-00	14:35	2.3	12.5	
5-Nov-00	10:20	2.1	10.0	
13-Nov-00	14:50	1.5	8.5	
19-Nov-00	13:40	1.5	6.5	
27-Nov-00	10:15	1.8	5.0	
2-Dec-00	12:58	2.0	4.0	
10-Dec-00	11:20	1.8	3.0	
17-Dec-00	9:00			
24-Dec-00	13:10	1.8	3.0	
1-Jan-01	12:15	1.5	2.0	
6-Jan-01	12:00	2.5	6.0	
14-Jan-01	12:45	2.0	5.0	
21-Jan-01	13:30	2.0	5.0	
28-Jan-01				
3-Feb-01	11:25	2.1	2.5	
18-Feb-01	10:30	1.8	5.0	
25-Feb-01	9:25	1.5	5.5	
4-Mar-01	15:25	1.8	5.5	
11-Mar-01	10:40	2.4	7.0	Lots of *Daphnia*
17-Mar-01	15:35	3.0	7.0	Lots of *Daphnia* ; beaver made a lodge.
25-Mar-01	11:55	3.5	8.0	Lots of *Daphnia*
1-Apr-01	18:10	3.2	8.0	Lots of *Daphnia*
8-Apr-01	14:20	4.0	8.0	lots of *Daphnia;* more beaver signs
15-Apr-01	13:40	4.0	8.0	lots of *Daphnia*
22-Apr-01	13:00	2.6	12.5	lots of *Daphnia;* some floating algae near shore
29-Apr-01	15:25	3.0	12.5	lots of *Daphnia*
6-May-01	18:15	3.8	12.5	
13-May-01	14:12	3.5	14.0	lots of *Daphnia*
20-May-01	17:04	3.9	13.5	lots of *Daphnia;* coyote spotted during week
27-May-01	17:15	2.8	14.5	big increase in *Daphnia* and algae
3-Jun-01	17:30	2.1	14.0	
10-Jun-01	12:20	2.2	15.5	
17-Jun-01	17:30	3.5	15.5	
24-Jun-01	9:55	3.0	17.5	
1-Jul-01	13:25	2.5	18.0	
8-Jul-01	16:55	2.3	23.5	
15-Jul-01	14:40	2.3	21.0	
22-Jul-01	17:20	1.5	20.0	
29-Jul-01	16:05	1.3	20.0	
5-Aug-01	14:30	1.3	20.0	
12-Aug-01		1.1	23.5	
19-Aug-01	17:30	1.3	24.0	
26-Aug-01	16:05	1.0	21.0	
2-Sep-01	15:25	0.8	20.0	
9-Sep-01	18:11	1.5	20.0	
16-Sep-01	15:07	2.0	19.0	
23-Sep-01	14:43	2.1	18.5	
30-Sep-01	11:30	2.1	15.5	
	Min	0.8	2.0	
	Max	4.0	24.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	19.6	7	61.3	7	1-Oct-00	15:30	1.0	16.2	
8-Oct-00	22.1	7	61.0	7	8-Oct-00	14:30	0.5	14.3	
15-Oct-00	26.1	7	62.4	7	15-Oct-00	16:00	0.7	13.2	
22-Oct-00	13.7	7	61.7	7	23-Oct-00	17:30	1.0	11.8	
29-Oct-00	36.7	7	61.9	7	29-Oct-00	14:00	1.0	11.8	
5-Nov-00	29.0	7	62.4	7	5-Nov-00	14:00	1.3	10.5	
12-Nov-00	0.0	7	61.4	7	12-Nov-00	14:30	1.4	7.6	
19-Nov-00	11.5	7	61.5	7	19-Nov-00	15:55	1.4	5.0	
26-Nov-00	75.8	7	64.6	7	27-Nov-00	15:00	1.7	5.1	
3-Dec-00	5.6	7	62.1	7	5-Dec-00	15:50	1.8	4.7	
10-Dec-00	7.7	7	62.2	7	10-Dec-00	15:20	2.2	3.8	
17-Dec-00	27.8	7	62.8	7					Ice on lake for the Dec. 17th reading; volunteer couldn't take readings for that week.
24-Dec-00	35.3	7	63.8	7	24-Dec-00	14:45	2.5	4.2	
31-Dec-00	33.8	7	64.3	7	1-Jan-01	13:35	2.5	4.8	
7-Jan-01	7.9	7	63.1	7	7-Jan-01	15:30	2.1	5.0	
14-Jan-01	21.2	7	62.8	7	14-Jan-01	15:13	2.2	5.0	
21-Jan-01	27.9	7	64.4	7	21-Jan-01	14:30	2.0	4.6	River otter and beaver spotted
28-Jan-01	25.4	7	63.2	7	28-Jan-01	16:20	2.2	3.8	River otter and beaver spotted
4-Feb-01	35.0	7	64.8	7	4-Feb-01	15:00	2.7	5.2	
11-Feb-01	45.5	7	64.2	7	11-Feb-01	15:05	3.0	4.3	
18-Feb-01	9.6	7	64.7	7	18-Feb-01	14:50	3.2	4.4	
25-Feb-01	12.7	7	62.9	7	25-Feb-01	15:55	3.3	6.3	
4-Mar-01	6.7	7	61.8	7	4-Mar-01	15:00	3.3	6.0	beaver, otter spotted
11-Mar-01	42.2	7	62.5	7	11-Mar-01	15:30	3.3	8.0	
18-Mar-01	22.6	7	63.6	7	18-Mar-01	16:30	4.0	9.0	a few clumps of blue-green algae washed up at
25-Mar-01	48.8	7	64.2	7	24-Mar-01	14:15	4.0	11.0	Beach #1
1-Apr-01	40.8	6	65.5	7	1-Apr-01	18:20	3.8	9.5	algae only at north end of lake
8-Apr-01	43.7	7	66.0	7	8-Apr-01	15:00	4.2	10.8	
15-Apr-01	17.3	2	64.2	7	15-Apr-01	13:50	3.7	10.3	brown on top; tree pollen on lake
22-Apr-01	13.5	2	62.9	7	22-Apr-01	14:00	3.0	12.8	
29-Apr-01	45.5	7	68.0	7	29-Apr-01	17:30	3.1	14.2	
6-May-01	0.5	7	62.7	7	6-May-01	13:25	3.0	14.2	otter, muskrat spotted along with a variety of waterfow
13-May-01	48.7	7	63.4	7	16-May-01	13:35	2.6	15.8	mallards, wood ducks, Steller's jay, hummingbird
20-May-01	0.8	7	62.0	7	20-May-01	15:00	2.2	15.4	otter spotted along with a variety of waterfowl
27-May-01	18.8	6	61.6	7	27-May-01	16:00	2.5	20.3	variety of birds; cottonwood fuzz on lake
3-Jun-01	48.2	5	63.2	7	3-Jun-01	14:20	2.2	17.7	
10-Jun-01	44.6	5	63.9	7	10-Jun-01	15:10	2.5	18.8	
17-Jun-01			62.0	7	17-Jun-01	14:00	2.2	18.8	
24-Jun-01	27.3	2	61.9	7	25-Jun-01	16:30	2.2	21.3	
1-Jul-01	0.0	7	61.0	7	1-Jul-01	15:00	3.0	21.5	
8-Jul-01	0.0	7	60.8	7	8-Jul-01	14:15	2.2	24.0	
15-Jul-01	28.4	7	62.0	7	15-Jul-01	15:20	2.2	21.8	
22-Jul-01	12.7	7	61.3	7	23-Jul-01	14:20	2.6	21.5	
29-Jul-01	4.1	7	61.2	7	29-Jul-01	14:00	2.5	21.5	
5-Aug-01	0.0	7	60.7	7	5-Aug-01	15:15	2.7	21.4	
12-Aug-01	0.0	7	60.5	7	12-Aug-01	14:30	2.7	24.0	
19-Aug-01	59.9	7	61.8	7	19-Aug-01	14:30	3.5	22.7	
26-Aug-01	1.3	7	60.9	7	26-Aug-01	14:15	2.5	21.0	
2-Sep-01	5.0	7	60.8	7	2-Sep-01	15:15	2.5	21.5	
9-Sep-01	0.0	7	60.7	7	9-Sep-01	13:50	1.8	19.7	
16-Sep-01	1.0	7	60.6	7	16-Sep-01	16:00	1.6	20.1	
23-Sep-01	14.3	7	61.0	7	23-Sep-01	14:20	1.4	18.6	
Min	0.0		60.5			**Min**	0.5	3.8	
Max	75.8		68.0			**Max**	4.2	24.0	
Total	1126.5								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	30.1	7	48.4	7
8-Oct-00	30.1	7	48.9	7
15-Oct-00	78.1	7	55.3	7
22-Oct-00	15.1	7	36.4	7
29-Oct-00	18.1	7	15.4	7
5-Nov-00	24.2	7	9.1	7
12-Nov-00	0.0	7	3.4	7
19-Nov-00	13.0	7	7.1	7
26-Nov-00	81.1	7	20.4	7
3-Dec-00	9.0	7	2.7	7
10-Dec-00	17.1	7	5.9	7
17-Dec-00	35.2	7	11.0	7
24-Dec-00	45.1	7	22.6	7
31-Dec-00	52.0	7	30.6	7
7-Jan-01	8.1	7	32.0	7
14-Jan-01	24.0	7	9.6	7
21-Jan-01	25.0	7	21.6	7
28-Jan-01	29.1	7	11.9	7
4-Feb-01	35.1	7	15.6	7
11-Feb-01	4.0	7	7.0	5
18-Feb-01	10.1	7	9.3	7
25-Feb-01	11.0	7	1.1	7
4-Mar-01	8.0	7	8.6	7
11-Mar-01	29.1	7	31.1	7
18-Mar-01	23.1	7	61.7	7
25-Mar-01	60.0	7	64.0	7
1-Apr-01	46.0	7	63.1	7
8-Apr-01	34.1	7	63.3	7
15-Apr-01	7.0	7	60.6	7
22-Apr-01	12.1	7	60.9	7
29-Apr-01	58.0	7	60.3	7
6-May-01	0.1	7	62.7	7
13-May-01	40.1	7	62.3	7
20-May-01	0.0	7	62.3	7
27-May-01	25.0	7	63.1	7
3-Jun-01	34.1	7	62.7	7
10-Jun-01	54.1	7	63.0	7
17-Jun-01	0.0	7	63.0	7
24-Jun-01	32.0	7	62.9	7
1-Jul-01	0.0	7	58.7	7
8-Jul-01	0.0	7	55.7	7
15-Jul-01	42.1	7	57.4	7
22-Jul-01	23.0	7	58.0	7
29-Jul-01	18.1	7	61.9	7
5-Aug-01	0.0	7	59.1	7
12-Aug-01	0.0	7	56.0	7
19-Aug-01	62.0	7	57.3	7
26-Aug-01	2.0	7	53.6	7
2-Sep-01	4.0	7	52.4	7
9-Sep-01	0.0	7	49.3	7
16-Sep-01	2.1	7	46.7	7
23-Sep-01	21.1	7	45.1	7
Min	0.0		1.1	
Max	81.1		64.0	
Total	1230.8			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
7-Oct-00	13:00	4.3	14.0	
14-Oct-00	14:00	4.5	13.0	
21-Oct-00	13:00	4.0	12.0	
28-Oct-00	15:00	3.5	11.0	
4-Nov-00	13:00	3.3	9.0	
11-Nov-00	14:30	3.0	7.5	
18-Nov-00	13:00	2.8	5.0	
25-Nov-00	13:00	3.0	5.0	
2-Dec-00	13:00	3.5	5.0	
9-Dec-00	14:00	3.5	4.0	
16-Dec-00	14:00	3.3	2.0	12/16: Reading taken 25 yards north of normal monitoring site due to ice covering of the lake.
23-Dec-00	14:00	4.0	2.0	Still some thin ice on the lake.
30-Dec-00	13:00	4.3	3.0	All ice off of the lake.
6-Jan-01	13:00	4.3	4.0	
13-Jan-01	14:00	4.5	4.0	
20-Jan-01	14:00	4.5	3.0	
27-Jan-01	16:00	4.3	2.5	
3-Feb-01	16:30	4.5	3.5	
10-Feb-01	11:30	4.5	3.0	
17-Feb-01	12:30	4.3	4.0	
24-Feb-01	11:30	4.5	4.0	
3-Mar-01	16:30	4.5	5.0	
10-Mar-01	16:00	4.3	6.5	
17-Mar-01	16:30	4.0	7.0	
24-Mar-01	13:00	3.8	9.0	
31-Mar-01	16:00	3.0	8.0	
7-Apr-01	12:00	4.0	8.0	
14-Apr-01	14:00	3.8	8.0	
21-Apr-01	15:30	4.3	12.5	
28-Apr-01	16:00	3.0	14.0	opening day of fishing season
5-May-01	13:00	3.0	11.5	
12-May-01	18:00	4.5	16.0	
19-May-01	15:30	4.3	13.0	
26-May-01	17:30	4.0	20.5	
2-Jun-01	15:30	4.0	16.5	large number of Canada geese moved in
9-Jun-01	11:30	4.0	17.0	
16-Jun-01	13:00	4.5	17.0	
23-Jun-01	14:00	4.8	18.0	
30-Jun-01	13:00	5.0	20.0	
7-Jul-01	13:00	5.0	21.0	
14-Jul-01	14:00	5.5	20.0	
21-Jul-01	11:00	5.5	19.0	
28-Jul-01	9:30	5.0	18.5	
4-Aug-01	12:00	4.5	19.0	
11-Aug-01	17:00	4.3	23.0	
18-Aug-01	16:00	4.0	21.0	
25-Aug-01	12:00	4.3	19.0	
1-Sep-01	15:00	4.3	20.0	
8-Sep-01	12:00	3.8	18.5	
15-Sep-01	11:30	4.0	19.0	
22-Sep-01	12:00	4.0	18.0	
29-Sep-01	14:00	3.5	16.0	
Min		2.8	2.0	
Max		5.5	23.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	16.0	7	21.3	7	2-Oct-00	14:35	1.8	15.5	
8-Oct-00	25.0	7	22.6	7	9-Oct-00	16:05	2.3	14.0	Alge new on top; slight bloom
15-Oct-00	83.0	7	27.1	7	17-Oct-00	15:15	3.0	13.5	Lake looks much clearer
22-Oct-00	16.0	7	35.1	7	23-Oct-00	15:15	3.5	12.0	Water clear with specks of algae
29-Oct-00	13.0	7	37.0	7	31-Oct-00	15:00	3.5	11.0	Lake all clear
5-Nov-00	31.0	7	38.3	7					
12-Nov-00	0.0	7	38.3	7	13-Nov-00	16:00	3.5	6.0	
19-Nov-00	19.0	7	37.9	7					
26-Nov-00	48.0	7	43.9	7	27-Nov-00	15:15	2.8	4.0	
3-Dec-00	12.0	7	44.3	7	4-Dec-00	15:15	2.3	5.5	
10-Dec-00	15.0	7	45.0	7	11-Dec-00	15:05	3.3	4.5	
17-Dec-00	43.0	7	43.6	7	19-Dec-00	14:15	2.3	4.0	
24-Dec-00	17.0	7	40.4	7					
31-Dec-00	7.0	1	40.0	1					
7-Jan-01									
14-Jan-01									
21-Jan-01									
28-Jan-01	0.0	1	39.0	1					
4-Feb-01	30.0	7	40.3	7	5-Feb-01	15:10	3.0	4.5	
11-Feb-01	24.0	7	39.0	7	13-Feb-01	16:00	3.3	4.0	
18-Feb-01	6.0	7	39.1	7	18-Feb-01	13:55	3.5	4.0	
25-Feb-01	0.0	4	38.5	4	25-Feb-01	14:05	3.8	6.0	
4-Mar-01									
11-Mar-01									
18-Mar-01									
25-Mar-01									
1-Apr-01									
8-Apr-01									
15-Apr-01									
22-Apr-01									
29-Apr-01	25.0	5	42.0	5					
6-May-01	1.0	7	37.3	7					
13-May-01	47.0	7	38.1	7					
20-May-01	0.0	7	35.7	7					
27-May-01	16.0	7	34.3	7					
3-Jun-01	20.0	7	33.4	7					
10-Jun-01	57.0	7	37.0	7					
17-Jun-01	0.0	7	34.9	7					
24-Jun-01	24.0	7	34.3	7					
1-Jul-01	0.0	7	32.0	7					
8-Jul-01	10.0	7	29.4	7					
15-Jul-01	34.0	7	31.1	7					
22-Jul-01	10.0	7	30.3	7					
29-Jul-01	4.0	7	30.4	7					
5-Aug-01	1.0	7	29.3	7					
12-Aug-01	0.0	7	27.1	7					
19-Aug-01	56.0	7	29.0	7					
26-Aug-01	2.0	7	31.3	7					
2-Sep-01	0.0	7	30.1	7					
9-Sep-01	0.0	7	28.4	7					
16-Sep-01	1.0	7	28.0	7					
23-Sep-01	21.0	7	28.6	7					
Min	0.0		21.3			**Min**	1.8	4.0	
Max	83.0		45.0			**Max**	3.8	15.5	
Total	734.0								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of*	Sum of precip. (mm)	Avg of lake level (cm)
7-Oct-00	2.0	22.0
14-Oct-00	10.0	21.0
21-Oct-00	16.0	25.5
28-Oct-00	12.0	27.8
5-Nov-00	12.0	30.0
11-Nov-00	38.0	32.5
18-Nov-00	0.0	32.0
25-Nov-00	20.0	34.0
3-Dec-00	34.0	38.0
9-Dec-00	4.0	40.0
16-Dec-00	16.0	42.5
23-Dec-00	13.0	45.3
30-Dec-00	28.0	48.0
6-Jan-01	32.0	52.0
13-Jan-01	6.0	54.0
20-Jan-01	22.0	55.0
27-Jan-01	16.0	56.0
3-Feb-01	10.0	56.5
10-Feb-01	28.0	57.0
16-Feb-01	8.0	58.5
24-Feb-01	3.0	59.0
3-Mar-01	2.0	58.5
10-Mar-01	6.0	58.0
17-Mar-01	17.0	58.0
24-Mar-01	16.0	58.5
31-Mar-01	32.0	58.5
7-Apr-01	26.0	60.0
14-Apr-01	30.0	61.0
21-Apr-01	21.0	60.5
28-Apr-01	10.0	59.8
6-May-01		
13-May-01		
20-May-01		
27-May-01		
2-Jun-01	6.0	53.5
9-Jun-01	0.0	52.0
16-Jun-01	38.0	51.0
23-Jun-01	0.0	50.5
30-Jun-01	30.0	50.8
7-Jul-01	0.0	49.0
14-Jul-01	0.0	45.5
21-Jul-01	10.0	43.3
28-Jul-01	8.0	42.0
4-Aug-01	0.0	40.0
11-Aug-01	0.0	38.0
17-Aug-01	0.0	36.0
25-Aug-01	40.0	34.0
1-Sep-01	1.5	34.0
8-Sep-01	0.0	32.0
15-Sep-01	0.0	30.5
22-Sep-01	0.0	33.3
29-Sep-01	24.0	31.0
Min	0.0	21.0
Max	40.0	61.0
Total	647.5	

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
7-Oct-00	12:00	4.5	19.0	
14-Oct-00	13:30	4.3	18.0	
21-Oct-00	12:30	4.5	16.0	
28-Oct-00	16:00	4.8	15.0	Calm, fall day; little activity on the lake.
4-Nov-00	12:30	4.8	15.0	
11-Nov-00	12:30	5.0	12.0	
18-Nov-00	16:00	5.0	10.0	
25-Nov-00	15:30	4.3	20.0	
2-Dec-00	11:30	5.0	9.0	
9-Dec-00	14:30	5.0	8.0	
16-Dec-00	11:30	4.8	8.0	
23-Dec-00	14:30	4.5	8.0	
30-Dec-00	13:30	5.0	8.0	
6-Jan-01	10:30	5.0	8.0	
13-Jan-01	11:45	5.0	7.0	
20-Jan-01	10:30	4.5	7.0	
27-Jan-01	10:30	5.0	5.0	
3-Feb-01	13:30	4.8	7.0	
10-Feb-01	14:30	4.5	9.0	
16-Feb-01	11:30	5.0	6.0	
24-Feb-01	11:30	5.0	7.0	
3-Mar-01	13:30	5.3	9.0	
17-Mar-01	14:30	5.5	10.0	
24-Mar-01	14:30	5.5	14.0	
31-Mar-01	14:30	5.5	13.0	
7-Apr-01	14:30	5.5	12.0	
14-Apr-01	14:30	5.0	13.0	
21-Apr-01	14:30	5.0	16.0	
27-Apr-01	14:30	5.5	17.0	
5-May-01	14:30	5.0	18.0	
12-May-01	17:30	5.5	20.0	
19-May-01	11:30	5.5	19.0	
26-May-01	15:30	5.5	23.0	
2-Jun-01	15:30	5.0	21.0	
9-Jun-01	14:30	5.0	20.0	
16-Jun-01	13:30	4.8	20.0	
23-Jun-01	12:00	5.5	22.0	
30-Jun-01	12:00	5.5	23.0	
7-Jul-01	17:00	5.0	27.0	Lots of activity on the lake.
14-Jul-01	16:00	5.0	26.0	
21-Jul-01	16:00	5.0	23.0	
28-Jul-01	15:00	4.8	22.0	
4-Aug-01	15:00	4.8	23.0	
11-Aug-01	15:30	5.0	24.0	
17-Aug-01	13:30	5.0	24.0	
25-Aug-01	13:30	5.0	22.0	
1-Sep-01	11:00	5.0	20.0	
8-Sep-01	11:00	5.0	20.0	
15-Sep-01	14:30	4.8	20.0	
22-Sep-01	15:00	5.0	20.0	
29-Sep-01	15:30	4.5	18.0	
	Min	4.3	5.0	
	Max	5.5	27.0	

* Cumulative data were collected once a week

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	6.0	7	19.0	7
8-Oct-00	29.0	7	19.4	7
15-Oct-00	66.0	7	23.4	7
22-Oct-00	10.0	7	29.1	7
29-Oct-00	5.0	7	29.6	7
5-Nov-00	50.0	7	28.4	7
12-Nov-00	0.0	7	31.1	7
19-Nov-00	14.0	7	35.4	7
26-Nov-00	44.0	7	41.3	7
3-Dec-00	4.0	7	43.0	7
10-Dec-00	12.0	7	43.6	7
17-Dec-00	28.0	7	46.4	7
24-Dec-00	20.0	7	49.4	7
31-Dec-00	37.0	7	53.3	7
7-Jan-01	4.0	7	56.4	7
14-Jan-01	12.0	7	57.1	7
21-Jan-01	24.0	7	60.0	7
28-Jan-01	13.0	7	60.3	7
4-Feb-01	31.0	7	63.1	7
11-Feb-01	17.0	7	62.7	7
18-Feb-01	6.0	7	63.1	7
25-Feb-01	7.0	7	61.6	7
4-Mar-01	9.0	7	60.9	7
11-Mar-01	13.0	7	60.4	7
18-Mar-01	17.0	7	62.0	7
25-Mar-01	37.0	7	63.6	7
1-Apr-01	22.0	7	63.9	7
8-Apr-01	24.0	7	63.9	7
15-Apr-01	18.0	7	63.7	7
22-Apr-01	2.0	7	62.6	7
29-Apr-01	34.4	7	64.7	7
6-May-01	0.0	7	62.7	7
13-May-01	41.9	7	61.9	7
20-May-01	0.0	7	60.9	7
27-May-01	10.1	7	59.0	7
3-Jun-01	9.0	7	56.9	7
10-Jun-01	47.0	7	60.4	7
17-Jun-01	0.0	7	58.9	7
24-Jun-01	28.0	7	57.7	7
1-Jul-01	0.0	7	56.3	7
8-Jul-01	0.0	7	52.7	7
15-Jul-01	5.1	7	49.6	7
22-Jul-01	7.0	7	46.9	7
29-Jul-01	2.1	7	44.3	7
5-Aug-01	0.0	7	41.6	7
12-Aug-01	0.0	7	38.1	7
19-Aug-01	57.0	7	39.0	7
26-Aug-01	1.0	7	40.7	7
2-Sep-01	1.0	7	38.7	7
9-Sep-01	0.0	7	36.1	7
16-Sep-01	0.0	7	33.3	7
23-Sep-01	16.0	7	32.5	7
Min	0.0		19.0	
Max	66.0		64.7	
Total	840.5			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
2-Oct-00	11:00	3.0	17.0	
9-Oct-00	11:00	2.5	16.0	
16-Oct-00	11:00	2.8	13.5	
23-Oct-00	10:30	3.5	13.5	
30-Oct-00	13:30	2.8	13.0	
6-Nov-00	11:30	2.5	11.5	
13-Nov-00	10:00	2.5	9.0	
20-Nov-00	10:30	2.5	7.0	Dark green algae growth on bottom near shore.
27-Nov-00	11:00	2.3	6.5	
4-Dec-00	11:00	2.5	6.0	Mossy green algae near shore.
11-Dec-00	10:45	2.5	5.0	Canada geese seen
18-Dec-00	11:00	2.0	3.5	Thin ice on half of the lake.
22-Dec-00	11:30	2.5	4.5	
1-Jan-01	15:00	2.5	5.5	
8-Jan-01	12:00	2.5	5.5	
15-Jan-01	11:30	3.0	5.5	
22-Jan-01	11:15	3.5	5.5	
29-Jan-01	15:30	3.0	5.5	
5-Feb-01	13:30	3.8	6.0	
12-Feb-01	11:30	4.0	6.0	
19-Feb-01	12:00	5.0	6.0	
26-Feb-01	11:00	3.8	7.0	
5-Mar-01	11:00	3.5	7.0	
14-Mar-01	11:00	3.0	9.5	
19-Mar-01	10:45	3.0	9.5	
26-Mar-01	11:00	3.0	11.0	
2-Apr-01	11:00	2.8	10.5	
9-Apr-01	11:30	2.5	11.5	
16-Apr-01	10:30	3.5	12.5	swallows active
23-Apr-01	11:00	4.0	13.5	swallows active
1-May-01	11:30	3.8	13.0	swallows active
7-May-01	11:00	3.3	15.0	
21-May-01	16:30	3.3	17.5	
28-May-01	12:00	3.3	20.0	
4-Jun-01	12:00	5.0	18.5	
11-Jun-01	11:00	4.5	18.5	
18-Jun-01	10:30	4.8	19.0	
25-Jun-01	11:00	3.8	20.0	
2-Jul-01	15:00	3.8	22.5	
9-Jul-01	11:00	3.8	23.5	
16-Jul-01	11:30	3.0	21.0	
23-Jul-01	10:30	3.5	21.5	
30-Jul-01	11:00	3.0	21.0	
6-Aug-01	11:30	3.0	22.0	
12-Aug-01	14:30	3.0	25.0	
20-Aug-01	11:00	4.0	22.0	
27-Aug-01	15:30	3.5	22.0	
4-Sep-01	16:30	3.3	21.5	
10-Sep-01	16:15	3.0	21.0	
17-Sep-01	17:30	3.0	20.0	
24-Sep-01	15:30	3.0	19.0	
	Min	2.0	3.5	
	Max	5.0	25.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	18.0	7	5.9	7	1-Oct-00	9:00	2.5	17.0	
8-Oct-00	26.0	7	4.3	7	8-Oct-00	8:30	2.5	15.0	
15-Oct-00	78.0	7	6.7	7	15-Oct-00	8:45	2.5	14.0	
22-Oct-00	12.0	7	11.7	7	22-Oct-00	9:00	2.5	13.0	
29-Oct-00	10.0	7	12.1	7	29-Oct-00	8:30	2.5	11.0	
5-Nov-00	36.0	7	14.1	7	5-Nov-00	9:00	2.3	10.5	
12-Nov-00	0.0	7	15.3	7	12-Nov-00	9:00	2.3	8.5	
19-Nov-00	13.0	7	14.6	7	19-Nov-00	8:30	2.0	6.0	
26-Nov-00	62.0	7	22.1	7	26-Nov-00	9:00	2.3	6.0	
3-Dec-00	6.0	7	27.1	7	3-Dec-00	9:00	2.3	5.5	Some light green algae bloom on the west side of Beaver Lake.
10-Dec-00	16.1	7	29.1	7	10-Dec-00	8:00	2.3	5.0	
17-Dec-00	33.6	7	34.7	7	17-Dec-00	8:00	2.3	4.0	
24-Dec-00	28.1	7	39.3	7	24-Dec-00	10:00	2.5	3.5	
31-Dec-00	38.1	7	45.9	7	7-Jan-01	8:30	2.5	4.5	Considerable algal bloom along the NW shore of main Beaver Lake
7-Jan-01	13.0	7	54.9	7	14-Jan-01	9:00	2.8	4.0	
14-Jan-01	23.0	7	57.4	7	21-Jan-01	8:00	3.0	4.0	
21-Jan-01	25.0	7	60.9	7	28-Jan-01	8:30	2.8	4.5	Algal bloom west side of lake.
28-Jan-01	21.0	7	60.0	7	4-Feb-01	9:08	3.0	4.0	
4-Feb-01	30.0	7	62.4	7	11-Feb-01	8:15	2.5	4.0	
11-Feb-01	23.0	7	61.7	7	18-Feb-01	9:00	2.3	4.5	
18-Feb-01	11.0	7	62.1	7	25-Feb-01	7:17	2.3	5.0	
25-Feb-01	10.1	7	59.3	7	4-Mar-01	8:15	3.0	5.5	Algae bloom 30' out from west shore
4-Mar-01	10.1	7	57.4	7	11-Mar-01	0:00	3.0	7.0	Algae bloom 20' out from west shore
11-Mar-01	21.1	7	56.4	7	18-Mar-01	8:40	2.8	7.0	More algae along west shore 20' out from shore.
18-Mar-01	19.0	7	58.0	7	25-Mar-01	8:30	3.0	9.0	Dozens of swallows have arrived on Beaver Lake.
25-Mar-01	49.0	7	58.9	7	1-Apr-01	8:00	2.5	9.5	
1-Apr-01	37.0	7	64.1	7	8-Apr-01	8:00	2.8	10.0	
8-Apr-01	32.0	7	65.1	7	15-Apr-01	7:30	2.8	11.5	
15-Apr-01	15.1	7	62.6	7	22-Apr-01	8:00	2.5	13.0	
22-Apr-01	13.0	7	58.1	7	29-Apr-01	8:15	2.8	15.0	
29-Apr-01	37.0	7	59.4	7	6-May-01	7:00	2.5	13.0	
6-May-01	0.0	7	58.4	7	13-May-01	7:30	2.8	15.0	
13-May-01	30.0	7	55.4	7	20-May-01	7:30	2.5	15.0	
20-May-01	2.0	7	52.7	7	27-May-01	7:00	2.5	20.0	
27-May-01	8.0	5	49.1	5	3-Jun-01	7:50	2.5	17.0	
3-Jun-01					10-Jun-01	7:15	2.5	18.0	
10-Jun-01					17-Jun-01	8:00	2.5	18.0	
17-Jun-01					24-Jun-01	6:30	2.8	21.0	
24-Jun-01					1-Jul-01	7:00	2.5	22.0	
1-Jul-01	0.0	7	48.4	7	8-Jul-01	7:00	2.5	22.0	
8-Jul-01	0.0	7	43.1	7	15-Jul-01	7:30	2.8	23.0	
15-Jul-01	28.1	7	41.0	7	21-Jul-01	7:00	2.8	22.0	
22-Jul-01	11.0	7	37.7	7	29-Jul-01	8:30	2.5	21.0	
29-Jul-01	10.1	7	34.7	7	5-Aug-01	9:00	2.8	21.0	Numerous fishermen
5-Aug-01	0.0	7	31.3	7	12-Aug-01	7:45	2.5	23.0	
12-Aug-01	0.0	7	27.0	7	19-Aug-01	8:00	2.8	22.0	
19-Aug-01	52.1	7	25.7	7	26-Aug-01	7:45	2.5	20.0	
26-Aug-01	2.0	7	25.1	7	2-Sep-01	8:10	2.5	20.0	Algae bloom east side mid lake to south end. Approx half the width of the lake. (Volunteer noted algae bloom for each sample day, but recorded "none" for algae.
2-Sep-01	1.1	7	22.3	7	9-Sep-01	8:05	2.5	19.0	
9-Sep-01	0.0	7	19.4	7	16-Sep-01	7:50	2.5	20.0	
16-Sep-01	2.1	7	15.4	7	23-Sep-01	7:30	3.0	19.0	
23-Sep-01	8.0	7	13.1	7	31-Dec-01	9:00	2.5	4.0	
Min	0.0		4.3			**Min**	2.0	3.5	
Max	78.0		65.1			**Max**	3.0	23.0	
Total	920.3						2.6		

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	0.0	7	34.7	7
8-Oct-00	17.0	7	35.9	7
15-Oct-00	42.0	7	39.1	7
22-Oct-00	12.0	7	40.9	7
29-Oct-00	18.0	7	42.0	7
5-Nov-00	13.1	7	44.6	7
12-Nov-00	0.0	7	45.4	7
19-Nov-00	24.0	7	44.0	7
26-Nov-00	35.0	7	50.9	7
3-Dec-00	5.0	7	52.1	7
10-Dec-00	15.0	7	53.3	7
17-Dec-00	5.0	7	55.7	7
24-Dec-00	15.1	7	58.1	7
31-Dec-00	18.0	7	61.7	7
7-Jan-01	6.1	7	64.1	7
14-Jan-01	8.0	7	66.0	7
21-Jan-01	17.0	7	68.0	7
28-Jan-01	8.0	7	68.3	7
4-Feb-01	34.0	7	71.9	7
11-Feb-01	16.0	7	73.6	7
18-Feb-01	0.0	7	75.0	7
25-Feb-01	0.0	7	75.0	7
4-Mar-01	17.0	7	75.3	7
11-Mar-01	17.0	5	76.4	7
18-Mar-01	19.0	7	79.9	7
25-Mar-01	29.0	7	81.9	7
1-Apr-01	26.0	7	85.4	7
8-Apr-01	30.0	7	88.4	7
15-Apr-01	10.0	7	86.6	7
22-Apr-01	16.0	6	82.1	7
29-Apr-01	24.1	6	81.1	7
6-May-01	0.0	7	79.4	7
13-May-01	40.0	7	81.6	7
20-May-01	0.0	7	79.0	7
27-May-01	7.0	7	76.1	7
3-Jun-01	8.0	7	74.9	7
10-Jun-01	54.0	7	78.6	7
17-Jun-01	0.0	7	77.7	7
24-Jun-01	28.0	7	75.7	7
1-Jul-01	0.0	7	73.6	7
8-Jul-01	0.0	7	69.6	7
15-Jul-01	9.0	7	65.7	7
22-Jul-01	9.0	7	63.7	7
29-Jul-01	0.0	7	61.4	7
5-Aug-01	0.0	7	58.1	7
12-Aug-01	0.0	7	54.3	7
19-Aug-01	54.0	7	56.3	7
26-Aug-01	0.0	7	55.4	7
2-Sep-01	0.0	7	52.4	7
9-Sep-01	0.0	7	50.1	7
16-Sep-01	0.0	7	47.7	7
23-Sep-01	0.0	7	46.4	7
Min	0.0		34.7	
Max	54.0		88.4	
Total	705.2			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	18:30	1.8	17.0	
8-Oct-00	12:15	1.8	14.0	
15-Oct-00	13:15	2.0	13.5	
22-Oct-00	13:00	2.0	12.0	
29-Oct-00	12:30	2.0	11.5	
5-Nov-00	12:00	2.3	10.0	
12-Nov-00	12:15	2.3	8.5	
19-Nov-00	14:25	2.3	7.0	
26-Nov-00	16:00	2.3	5.5	
3-Dec-00	16:00	2.3	5.0	
10-Dec-00	14:45	2.8	5.0	
17-Dec-00	15:00	2.8	4.5	
24-Dec-00	13:30	2.8	4.0	
31-Dec-00	14:00	2.8	8.0	
7-Jan-01		2.8	4.0	
14-Jan-01		2.8	4.5	
21-Jan-01		2.8	4.0	
28-Jan-01		2.8	3.0	Thin film of ice on lake.
4-Feb-01		2.8	4.5	
11-Feb-01		2.5	4.0	
18-Feb-01	13:00	2.5	4.5	
25-Feb-01	14:30	2.5	4.5	
4-Mar-01	12:45	2.5	5.0	
11-Mar-01	15:45	2.3	8.5	
18-Mar-01	16:45	2.3	9.0	
25-Mar-01		2.3	9.5	
1-Apr-01	14:00	2.3	9.5	
8-Apr-01	16:00	2.8	10.0	outlet drainage restricted by vegetation and physical rock dam
15-Apr-01	14:25	2.8	10.5	
22-Apr-01	15:00	2.8	10.5	
29-Apr-01	14:30	2.8	11.0	
6-May-01	13:00	2.8	15.0	
13-May-01		2.8	15.0	
20-May-01		2.5	16.0	
27-May-01	16:00	2.5	21.0	
3-Jun-01	13:00	2.8	17.0	outflow of lake restricted somewhere on flow at culvert on 170th Ave SE
10-Jun-01	14:00	2.8	19.5	
17-Jun-01	15:15	2.8	20.5	
24-Jun-01	18:25	2.5	21.0	lake outlet restricted somewhere
1-Jul-01	16:30	2.5	22.0	
8-Jul-01	13:00	2.8	22.0	
15-Jul-01	12:30	2.8	21.0	
22-Jul-01	14:00	2.5	19.5	
29-Jul-01	14:30	2.3	21.0	
5-Aug-01	17:30	2.3	20.5	
12-Aug-01	18:00	2.3	26.0	
19-Aug-01	17:00	2.3	21.5	
26-Aug-01	12:39	2.3	20.0	
2-Sep-01		2.8		
9-Sep-01	18:00	3.0	19.0	
16-Sep-01	17:00	2.8	19.0	
23-Sep-01	15:00	2.5	19.0	
Min		1.8	3.0	
Max		3.0	26.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00									
8-Oct-00									
15-Oct-00									
22-Oct-00									
29-Oct-00									
5-Nov-00									
12-Nov-00									
19-Nov-00									
26-Nov-00									
3-Dec-00									
10-Dec-00									
17-Dec-00									
24-Dec-00									
31-Dec-00									
7-Jan-01									
14-Jan-01									
21-Jan-01									
28-Jan-01									
4-Feb-01									
11-Feb-01									
18-Feb-01									
25-Feb-01									
4-Mar-01									
11-Mar-01									
18-Mar-01									
25-Mar-01									
1-Apr-01									
8-Apr-01									
15-Apr-01									
22-Apr-01									
29-Apr-01	0.5	5	65.0	5					
6-May-01	0.0	7	62.9	7	8-May-01	20:00	2.5	16.5	
13-May-01	27.0	3	61.3	3	21-May-01	7:30	5.3	17.5	
20-May-01	0.0	5	60.4	5	21-May-01	7:30	5.3	17.5	
27-May-01	3.0	5	57.6	5	30-May-01	20:30	3.5	20.0	cottonwood (fluff) covering most of the lake; dense at south end
3-Jun-01									
10-Jun-01									
17-Jun-01									
24-Jun-01									
1-Jul-01					3-Jul-01	10:00	4.0	3.5	
8-Jul-01									
15-Jul-01					15-Jul-01		3.3	3.5	
22-Jul-01									
29-Jul-01					30-Jul-01	9:00	3.8	3.0	
5-Aug-01									
12-Aug-01									
19-Aug-01									
26-Aug-01									
2-Sep-01									
9-Sep-01									
16-Sep-01									
23-Sep-01									
Min	0.0		57.6			**Min**	2.5	3.0	
Max	27.0		65.0			**Max**	5.3	20.0	
Total	30.5								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	46.0	6	37.4	6
8-Oct-00	66.1	7	40.6	7
15-Oct-00	59.1	7	45.9	7
22-Oct-00	21.0	7	46.1	7
29-Oct-00	12.0	7	52.1	7
5-Nov-00	29.0	7	63.8	6
12-Nov-00	0.0	7	63.4	7
19-Nov-00	8.0	7	66.3	7
26-Nov-00	64.0	7	68.3	7
3-Dec-00	0.0	7	58.7	7
10-Dec-00	14.0	7	43.7	3
17-Dec-00	36.0	7	36.1	7
24-Dec-00	24.5	7	34.6	7
31-Dec-00	31.0	4	35.5	6
7-Jan-01	8.0	1	33.0	2
14-Jan-01	13.0	2	30.0	2
21-Jan-01	24.1	3	37.9	4
28-Jan-01	25.0	3	32.1	4
4-Feb-01	10.0	1	33.0	1
11-Feb-01			30.0	2
18-Feb-01	10.0	1	38.0	2
25-Feb-01				
4-Mar-01			30.0	1
11-Mar-01			29.0	1
18-Mar-01	25.0	1	37.0	1
25-Mar-01	20.0	1	36.0	3
1-Apr-01	40.0	3	40.0	7
8-Apr-01	29.0	3	39.6	7
15-Apr-01	8.0	1	40.0	7
22-Apr-01	7.0	1	33.7	7
29-Apr-01	40.0	2	28.6	7
6-May-01			29.4	7
13-May-01	38.0	2	38.1	7
20-May-01			42.7	7
27-May-01	16.1	3	29.0	5
3-Jun-01	26.0	2	40.0	7
10-Jun-01	84.3	3	40.4	7
17-Jun-01			29.0	7
24-Jun-01	13.1	2	32.4	7
1-Jul-01			30.9	7
8-Jul-01	0.0	2	31.9	7
15-Jul-01	35.0	2	36.9	7
22-Jul-01	18.1	2	35.3	7
29-Jul-01	5.1	2	37.0	7
5-Aug-01			45.3	7
12-Aug-01			31.9	7
19-Aug-01	54.0	2	41.0	7
26-Aug-01			31.1	7
2-Sep-01	0.1	1	29.3	7
9-Sep-01			29.1	7
16-Sep-01			29.0	7
23-Sep-01	16.1	2	29.8	7
Min	0.0		28.6	
Max	84.3		68.3	
Total	975.2			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
3-Jan-01	13:00	3.8	3.0	
11-Jan-01	16:15	4.0	4.5	
18-Jan-01	13:30	3.5	2.5	
1-Feb-01	14:30	3.3	3.5	
6-Feb-01	13:30	3.0	4.0	
15-Feb-01	9:45	3.0	6.0	Lots of suspended particles in water column
23-Feb-01	12:30	3.3	6.0	
1-Mar-01	12:15	3.3	8.0	
4-Mar-01	14:00	2.0	11.5	
13-Mar-01	13:50	2.3	11.0	
21-Mar-01	16:00	2.8	17.0	lots of fish jumping
6-May-01	15:00	4.0	13.0	Lots of fish jumping
20-May-01	13:15	4.0	15.5	
27-May-01	18:30	3.8	13.0	
3-Jun-01	16:45	2.0	15.5	
10-Jun-01	14:10	1.5	19.5	
18-Jun-01	12:30	2.5	18.0	
25-Jun-01	15:45	4.0	17.0	
2-Jul-01	15:00	4.0	16.0	
8-Jul-01	20:00	2.0	18.0	
15-Jul-01	18:30	3.0	19.0	
22-Jul-01	18:15	1.8	18.0	
30-Jul-01	20:30	2.0	16.0	
12-Aug-01	20:15	2.5	15.0	
19-Aug-01	18:30	2.0	15.0	
27-Aug-01	17:00	3.3	14.0	
3-Sep-01	15:45	3.8	15.0	
9-Sep-01	18:30	3.5		
19-Sep-01	11:00	2.5		Raining at time of monitoring
23-Sep-01	16:30	2.8	19.0	
	Min	1.5	2.5	
	Max	4.0	19.5	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00				
8-Oct-00				
15-Oct-00				
22-Oct-00				
29-Oct-00				
5-Nov-00				
12-Nov-00				
19-Nov-00				
26-Nov-00	14.0	2	45.5	2
3-Dec-00	4.0	7	45.7	7
10-Dec-00	13.0	7	45.5	4
17-Dec-00	32.1	7	49.6	7
24-Dec-00	22.1	7	51.6	7
31-Dec-00	35.1	7	53.8	6
7-Jan-01	6.1	7	57.8	6
14-Jan-01	18.0	7	58.5	7
21-Jan-01	25.0	7	62.1	6
28-Jan-01	23.1	7	63.3	5
4-Feb-01	23.1	7	66.9	7
11-Feb-01	23.0	7	68.4	7
18-Feb-01	5.0	7	71.6	7
25-Feb-01	11.0	7	71.1	7
4-Mar-01	8.0	7	70.9	7
11-Mar-01	16.1	7	70.6	6
18-Mar-01	17.1	7	72.7	7
25-Mar-01	38.0	7	74.4	7
1-Apr-01	33.0	7	77.6	7
8-Apr-01	26.1	7	81.0	7
15-Apr-01	23.0	7	83.3	7
22-Apr-01	8.0	7	83.1	7
29-Apr-01	40.0	7	84.7	7
6-May-01	2.0	7	83.7	7
13-May-01	32.1	7	83.6	6
20-May-01	0.0	7	82.8	7
27-May-01	14.1	7	79.8	6
3-Jun-01	29.0	7	80.1	6
10-Jun-01	42.0	7	81.0	7
17-Jun-01	1.0	7	80.9	7
24-Jun-01	23.0	7	77.9	6
1-Jul-01	0.0	7	75.4	7
8-Jul-01	0.0	7	71.0	7
15-Jul-01	23.1	7	69.1	7
22-Jul-01	9.0	7	66.3	7
29-Jul-01	1.1	7	63.0	7
5-Aug-01	0.0	7	59.5	7
12-Aug-01	0.0	7	55.6	7
19-Aug-01	50.0	7	54.5	7
26-Aug-01	0.0	7	54.4	7
2-Sep-01	2.0	7	51.1	7
9-Sep-01	0.0	7	47.9	7
16-Sep-01	3.1	7	45.1	7
23-Sep-01	9.1	7	42.7	7
Min	0.0		42.7	
Max	50.0		84.7	
Total	703.9			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
12-Nov-00	10:30	3.3	10.0	Lots of scummy algae all across the lake.
19-Nov-00	14:30	4.0	8.0	
30-Nov-00	9:30	4.5	7.0	
14-Dec-00	9:30	5.0	4.5	Counted a flock of 70 waterfowl--geese and ducks.
26-Dec-00	10:30	5.3	4.5	Outlet stream is flowing.
1-Jan-01	10:15	4.5	5.0	A band of algae is in our cove. Lake is so low for this time of year!
15-Jan-01	12:30	4.5	5.0	
25-Jan-01	15:00	4.0	4.5	
4-Feb-01	10:30	4.3	5.0	
11-Feb-01	12:30	4.0	5.0	
25-Feb-01	11:00	4.0	6.0	
4-Mar-01	11:30	4.0	6.0	
11-Mar-01	11:30	4.3	6.5	Algae blooms--streaks in our cove.
8-Apr-01	11:45	2.3	19.5	
6-May-01	14:30	3.3	14.0	Fewer birds than I have ever seen. People are catching lots of fish from the lake
13-May-01	12:15	5.0	16.5	Oily film in cove
20-May-01	13:45	4.8	15.0	
30-May-01	16:45	5.8	18.5	Cottonwood wool in clumps; oily film in cove--motorboats?
3-Jun-01	11:00	5.5	17.5	
17-Jun-01	13:30	4.5	17.5	
1-Jul-01	11:00	4.5	20.0	
10-Jul-01	8:30	4.8	23.5	
15-Jul-01	13:30	4.5	22.0	
24-Jul-01	9:30	5.0	22.0	
29-Jul-01	13:00	4.3	21.0	
5-Aug-01	10:00	4.5	21.0	
12-Aug-01	12:15	4.3	24.0	
20-Aug-01	11:00	5.3	22.0	early in the morning seemed to be a film of something over about 1/8th of the lake's center
26-Aug-01	12:30	5.5	21.0	
2-Sep-01	12:30	5.5	21.5	
9-Sep-01	12:15	4.3	20.0	flecks of algae all across surface of lake
17-Sep-01	13:30	4.8	20.0	
23-Sep-01	14:00	4.8	19.0	
	Min	2.3	4.5	
	Max	5.8	24.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	16.0	7	25.3	7					
8-Oct-00	29.0	7	25.7	7					
15-Oct-00	70.0	7	30.9	7					
22-Oct-00	10.0	7	38.1	7					
29-Oct-00	8.0	7	38.6	7					
5-Nov-00	40.1	7	42.6	7					
12-Nov-00	0.0	7	42.7	7					
19-Nov-00	14.0	7	41.1	7					
26-Nov-00	32.0	2	45.0	2					
3-Dec-00	17.0	4	47.3	4					
10-Dec-00	13.0	7	46.4	7					
17-Dec-00	25.1	7	49.9	7					
24-Dec-00	21.0	7	52.1	7					
31-Dec-00	31.1	7	54.7	7					
7-Jan-01	12.1	7	55.3	7					
14-Jan-01	3.1	7	53.3	7					
21-Jan-01	12.0	7	52.7	7					
28-Jan-01	13.1	7	50.6	7					
4-Feb-01	25.1	7	53.9	7					
11-Feb-01	15.1	7	52.0	7					
18-Feb-01	7.0	7	51.0	7					
25-Feb-01	6.0	7	49.1	7					
4-Mar-01	11.1	7	47.4	7					
11-Mar-01	35.0	7	49.3	7					
18-Mar-01	23.0	7	54.4	7					
25-Mar-01	26.0	7	55.7	7					
1-Apr-01	27.0	7	58.3	7					
8-Apr-01	31.1	7	59.6	7					
15-Apr-01	13.0	7	57.9	7					
22-Apr-01	9.1	7	53.4	7					
29-Apr-01	53.0	7	58.1	7					
6-May-01	0.0	7	55.4	7					
13-May-01	45.1	7	55.4	7					
20-May-01	0.0	7	52.6	7					
27-May-01	14.0	7	47.4	7					
3-Jun-01	23.1	7	45.7	7					
10-Jun-01	46.0	7	50.0	7					
17-Jun-01	0.1	7	47.1	7					
24-Jun-01	26.1	7	45.4	7					
1-Jul-01	0.0	7	42.7	7					
8-Jul-01	0.0	7	39.1	7					
15-Jul-01	5.1	7	38.0	7					
22-Jul-01	10.0	7	36.6	7					
29-Jul-01	2.1	7	35.4	7					
5-Aug-01	0.0	7	33.9	7					
12-Aug-01	0.0	7	31.7	7					
19-Aug-01	63.0	7	33.7	7					
26-Aug-01	1.0	7	37.3	7					
2-Sep-01	2.1	7	35.4	7					
9-Sep-01	0.0	7	33.6	7					
16-Sep-01	0.1	7	31.9	7					
23-Sep-01	21.0	7	32.3	7					
Min	0.0		25.3			**Min**	0.0	0.0	
Max	70.0		59.6			**Max**	0.0	0.0	
Total	906.2								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

All Sammamish Sites Combined Data Summary*

Week of	Sum of precip. (mm)	Avg of lake level (ft)	Avg of Secchi (m)	Avg of Temp (°C)
1-Oct-00	11.1	26.1	3.5	17.9
8-Oct-00	21.8	26.1	3.5	16.5
15-Oct-00	65.0	26.3	3.7	15.2
22-Oct-00	32.0	26.4	3.9	14.4
29-Oct-00	6.2	26.4	3.9	13.5
5-Nov-00	28.3	26.4	3.8	12.3
12-Nov-00	5.5	26.4	3.7	11.3
19-Nov-00	10.6	26.3	3.8	10.5
26-Nov-00	55.3	26.6	3.5	9.8
3-Dec-00	7.5	26.6	3.2	8.8
10-Dec-00	15.3	26.4	2.9	8.6
17-Dec-00	27.3	26.5	3.3	8.1
24-Dec-00	14.3	26.5	2.9	7.8
31-Dec-00	22.3	26.6	3.3	7.6
7-Jan-01	19.8	26.7	3.3	7.3
14-Jan-01	12.8	26.6	3.8	7.0
21-Jan-01	25.3	26.7	3.4	7.0
28-Jan-01	21.8	26.5	3.7	7.0
4-Feb-01	20.8	26.6	3.6	6.7
11-Feb-01	28.3	26.6	3.9	7.3
18-Feb-01	7.3	26.6	3.7	8.0
25-Feb-01	8.5	26.5	3.5	7.7
4-Mar-01	11.8	26.5	3.2	7.7
11-Mar-01	17.5	26.5	3.0	7.9
18-Mar-01	12.8	26.3	2.9	8.6
25-Mar-01	26.3	26.3	2.5	8.5
1-Apr-01	20.2	26.3	2.7	8.9
8-Apr-01	24.2	26.6	2.9	9.1
15-Apr-01	11.0	26.3	2.8	10.6
22-Apr-01	7.6	26.3	2.9	11.6
29-Apr-01	35.0	26.4	3.2	12.3
6-May-01	5.5	26.5	3.8	13.9
13-May-01	26.8	26.3	3.9	14.6
20-May-01	2.8	26.3	3.9	17.1
27-May-01	8.6	26.1	3.5	17.5
3-Jun-01	23.4	26.3	3.3	16.1
10-Jun-01	28.3	26.3	2.7	16.5
17-Jun-01	5.6	26.3	3.6	18.6
24-Jun-01	9.8	26.3	3.5	19.1
1-Jul-01	0.0	26.3	3.5	21.0
8-Jul-01	0.0	26.3	3.5	23.4
15-Jul-01	20.5	26.2	3.5	20.8
22-Jul-01	4.8	26.2	3.3	20.8
29-Jul-01	2.8	26.0	3.2	20.4
5-Aug-01	0.0	26.1	3.4	22.1
12-Aug-01	0.0	26.1	3.3	23.4
19-Aug-01	53.5	26.2	3.4	21.4
26-Aug-01	1.7	26.2	3.5	21.5
2-Sep-01	0.0	26.2	3.8	20.5
9-Sep-01	0.0	26.1	3.7	20.9
16-Sep-01	0.5	26.1	3.6	19.6
23-Sep-01	8.0	26.1	3.7	18.6
Min	0.0	26.0	2.5	6.7
Max	65.0	26.7	3.9	23.4
Total	835.3			

Site 2 Data Summary*

Week of	Sum of precip. (mm)	Avg of lake level (ft)	Avg of Secchi (m)	Avg of Temp (°C)
1-Oct-00	14.0	26.1	3.5	18.0
8-Oct-00	31.0	26.1	3.5	16.3
15-Oct-00	70.0	26.3	3.5	15.2
22-Oct-00	19.0	26.5	3.5	14.2
29-Oct-00	5.0	26.4	3.5	13.0
5-Nov-00	31.0	26.4	3.5	12.0
12-Nov-00	0.0	26.4	3.5	11.5
19-Nov-00	0.0	26.3	3.5	11.0
26-Nov-00	63.0	26.6	3.5	10.0
3-Dec-00	5.0	26.5	3.0	
10-Dec-00	14.0	26.5	2.8	9.0
17-Dec-00	22.0	26.5	3.3	8.4
24-Dec-00	28.0	26.5	3.4	8.0
31-Dec-00	35.0	26.6	3.4	7.5
7-Jan-01	8.0	26.7	3.1	7.5
14-Jan-01	14.0	26.6	3.5	7.0
21-Jan-01	27.0	26.7	3.4	7.0
28-Jan-01	25.0	26.6	3.3	7.0
4-Feb-01	24.0	26.6	3.5	7.0
11-Feb-01	15.0	26.6	3.5	6.8
18-Feb-01				
25-Feb-01	27.0	26.5	3.2	7.3
4-Mar-01	16.0	26.5	2.8	7.3
11-Mar-01	17.0	26.5	2.9	7.8
18-Mar-01	15.0	26.6	2.8	8.3
25-Mar-01	31.0	26.6	2.3	8.7
1-Apr-01	30.0	26.8	2.8	8.8
8-Apr-01	30.0	26.9	2.8	8.8
15-Apr-01	16.0	26.9	2.6	10.7
22-Apr-01	20.0	26.7	2.8	12.3
29-Apr-01	27.0	26.8	3.0	11.3
6-May-01	0.0	26.7	3.5	14.2
13-May-01	32.0	26.7	3.5	13.7
20-May-01	0.0	26.6	3.5	16.4
27-May-01	11.0	26.5	3.5	18.2
3-Jun-01	31.0	26.5	3.1	17.0
10-Jun-01	32.0	26.6	2.5	16.8
17-Jun-01	0.0	26.6	2.8	18.3
24-Jun-01	11.0	26.5	3.4	19.5
1-Jul-01	0.0	26.3	3.5	21.0
8-Jul-01	0.0	26.3	3.5	22.6
15-Jul-01	29.0	26.3	3.5	21.0
22-Jul-01	9.0	26.2	3.5	20.8
29-Jul-01	2.0	26.2	3.3	20.3
5-Aug-01	0.0	26.1	3.5	21.4
12-Aug-01	0.0	26.1	3.5	23.5
19-Aug-01	48.0	26.3	3.5	21.5
26-Aug-01	3.0	26.2	3.5	21.5
2-Sep-01	0.0	26.2	3.5	20.4
9-Sep-01	0.0	26.1	3.5	21.0
16-Sep-01	0.0	26.1	3.5	19.3
23-Sep-01	10.0	26.1	3.5	18.3
Min	0.0	26.1	2.3	6.8
Max	70.0	26.9	3.5	23.5
Total	897.0			

* Sammamish volunteers followed a variety of schedules. These tables reflect weekly summaries of all data collected.

Site 3 Data Summary*

Week of	Sum of precip. (mm)	Avg of lake level (ft)	Avg of Secchi (m)	Avg of Temp (°C)
1-Oct-00	14.0	26.1	3.5	18.0
8-Oct-00	12.0	26.1	3.1	16.6
15-Oct-00	74.0	26.0	3.9	15.5
22-Oct-00	16.0	26.5	4.3	
29-Oct-00	8.0	26.4	4.2	13.0
5-Nov-00	29.0	26.4	4.1	12.4
12-Nov-00	0.0	26.4	3.9	11.0
19-Nov-00	16.0	26.3	3.9	10.0
26-Nov-00	60.0	26.6	3.2	10.0
3-Dec-00	4.0	26.6	3.1	9.0
10-Dec-00	23.0	26.5	2.9	8.2
17-Dec-00	28.0	26.5	2.8	8.0
24-Dec-00	14.0	26.6	2.6	8.0
31-Dec-00	6.0	26.6	2.9	7.8
7-Jan-01	39.0	26.7	3.3	7.0
14-Jan-01	4.0	26.6	3.8	7.0
21-Jan-01	33.0	26.7	2.9	7.0
28-Jan-01	23.0	26.3	3.7	7.0
4-Feb-01	14.0	26.7	3.2	6.7
11-Feb-01	26.0	26.6	4.1	7.0
18-Feb-01	10.0	26.6	3.5	7.4
25-Feb-01	0.0	26.5	3.8	8.0
4-Mar-01	17.0	26.5	3.4	7.8
11-Mar-01	15.0	26.5	2.7	7.3
18-Mar-01	16.0	26.6	2.8	8.8
25-Mar-01	29.0	26.6	2.0	7.8
1-Apr-01	36.0	26.8	2.8	9.0
8-Apr-01	21.0	26.9	2.6	9.3
15-Apr-01	20.0	26.9	2.9	10.6
22-Apr-01	5.0	26.8	2.5	10.7
29-Apr-01	66.0	26.8	2.9	11.8
6-May-01	0.5	26.7	4.2	14.7
13-May-01	31.0	26.7	4.0	13.1
20-May-01	0.0	26.6	4.3	18.5
27-May-01	12.0	26.5	4.1	17.2
3-Jun-01	24.0	26.5	3.5	16.3
10-Jun-01	42.0	26.6	2.5	16.8
17-Jun-01	0.0	26.6	3.4	20.1
24-Jun-01	6.0	26.5	2.8	18.0
1-Jul-01				
8-Jul-01	0.0	26.3	3.9	24.0
15-Jul-01	25.0	26.3	3.8	21.0
22-Jul-01				
29-Jul-01	6.5	26.2	3.5	20.5
5-Aug-01	0.0	26.2	3.4	22.8
12-Aug-01	0.0	26.1	3.5	23.4
19-Aug-01	78.0	26.2	3.8	21.3
26-Aug-01	2.0	26.2	4.0	22.0
2-Sep-01	0.0	26.2	4.2	20.6
9-Sep-01	0.0	26.1	4.0	22.0
16-Sep-01	2.0	26.0	3.9	20.0
23-Sep-01	10.0	26.1	4.2	19.1
Min	0.0	26.0	2.0	6.7
Max	78.0	26.9	4.3	24.0
Total	917.0			

Site 5 Data Summary*

Week of	Sum of precip. (mm)	Avg of lake level (ft)	Avg of Secchi (m)	Avg of Temp (°C)
1-Oct-00	14.0	26.1	3.5	18.0
8-Oct-00	26.0	26.1	3.8	16.0
15-Oct-00	56.0	26.5	3.8	15.0
22-Oct-00	0.0	26.5	3.8	14.0
29-Oct-00				
5-Nov-00	21.0	26.4	3.8	12.5
12-Nov-00	22.0	26.5	3.8	11.5
19-Nov-00	0.0	26.4	3.8	10.0
26-Nov-00	45.0	26.6	3.8	9.5
3-Dec-00	14.0	26.5	3.5	8.5
10-Dec-00				
17-Dec-00	34.0	26.5	3.6	7.8
24-Dec-00	8.0	26.6	2.8	7.5
31-Dec-00	13.0	26.6	3.5	7.5
7-Jan-01	23.0	26.8	3.5	7.5
14-Jan-01	18.0	26.6	4.0	7.0
21-Jan-01	20.0	26.6	4.0	7.0
28-Jan-01	17.0	26.6	4.0	7.0
4-Feb-01	20.0	26.7	4.0	6.5
11-Feb-01	33.0	26.6	4.0	8.0
18-Feb-01	2.0	26.6	4.0	8.5
25-Feb-01				
4-Mar-01	8.0	26.5	3.5	8.0
11-Mar-01	4.0	26.5	3.5	8.5
18-Mar-01	17.0	26.6	3.3	9.5
25-Mar-01	26.0	26.7	3.0	9.0
1-Apr-01				
8-Apr-01	32.0	27.0	3.0	9.0
15-Apr-01				
22-Apr-01				
29-Apr-01	32.0	26.9	3.5	13.0
6-May-01	1.0	26.8	4.0	13.0
13-May-01	0.0	26.6	4.0	15.0
20-May-01	13.0	26.5	3.8	18.0
27-May-01				
3-Jun-01	24.0	26.5	3.5	15.0
10-Jun-01	2.0	26.5	3.0	16.5
17-Jun-01	28.0	26.6	3.0	17.0
24-Jun-01	8.0	26.5	3.0	20.0
1-Jul-01				
8-Jul-01	0.0	26.4	3.0	23.5
15-Jul-01	11.0	26.3	3.3	20.5
22-Jul-01	0.0	26.3	3.0	
29-Jul-01	0.0	25.2	3.0	
5-Aug-01				
12-Aug-01	0.0	26.1	3.0	
19-Aug-01	39.0	26.3	3.0	
26-Aug-01	0.0	26.3	3.0	21.0
2-Sep-01				
9-Sep-01	0.0	26.2	3.5	19.8
16-Sep-01	0.0	26.1	3.5	19.5
23-Sep-01	4.0	26.1	3.5	18.5
Min	0.0	25.2	2.8	6.5
Max	56.0	27.0	4.0	23.5
Total	635.0			

* Sammamish volunteers followed a variety of schedules. These tables reflect weekly summaries of all data collected.

Site 6 Data Summary*

Week of	Sum of precip. (mm)	Avg of lake level (ft)	Avg of Secchi (m)	Avg of Temp (°C)
1-Oct-00		26.1		
8-Oct-00				
15-Oct-00		26.4		
22-Oct-00		26.5		
29-Oct-00		26.4		
5-Nov-00		26.4		
12-Nov-00		26.4		
19-Nov-00		26.3		
26-Nov-00		26.6		
3-Dec-00		26.6		
10-Dec-00		26.5		
17-Dec-00		26.5		
24-Dec-00		26.6		
31-Dec-00		26.6		
7-Jan-01		26.7		
14-Jan-01		26.6		
21-Jan-01		26.7		
28-Jan-01		26.6		
4-Feb-01		26.7		
11-Feb-01		26.6		
18-Feb-01		26.6		
25-Feb-01		26.5		
4-Mar-01		26.5		
11-Mar-01		26.5		
18-Mar-01		26.6		
25-Mar-01		26.6		
1-Apr-01		26.8		
8-Apr-01		26.9		
15-Apr-01		26.9		
22-Apr-01		26.7		
29-Apr-01		26.9		
6-May-01		26.8		
13-May-01		26.7		
20-May-01		26.6		
27-May-01		26.5		
3-Jun-01		26.5		
10-Jun-01		26.6		
17-Jun-01		26.6		
24-Jun-01		26.5		
1-Jul-01		26.5		
8-Jul-01		26.3		
15-Jul-01		26.3		
22-Jul-01		26.2		
29-Jul-01		26.2		
5-Aug-01		26.1		
12-Aug-01		26.1		
19-Aug-01		26.1		
26-Aug-01		26.2		
2-Sep-01		26.2		
9-Sep-01		26.1		
16-Sep-01		26.1		
23-Sep-01		26.1		
Min	0.0	26.1	0.0	0.0
Max	0.0	26.9	0.0	0.0
Total	0.0			

Site 8 Data Summary*

Week of	Sum of precip. (mm)	Avg of lake level (ft)	Avg of Secchi (m)	Avg of Temp (°C)
1-Oct-00	2.5	26.1		
8-Oct-00	26.0	26.1		
15-Oct-00	60.0	26.3		
22-Oct-00	11.0	26.1		
29-Oct-00	10.0	26.4		
5-Nov-00	32.0	26.4		
12-Nov-00	0.0	26.4		
19-Nov-00	10.0	26.4		
26-Nov-00	53.0	26.4		
3-Dec-00	7.0	26.6		
10-Dec-00	24.0	26.3		
17-Dec-00	25.0	26.5		
24-Dec-00	7.0	26.5		
31-Dec-00	35.0	26.6		
7-Jan-01	9.0	26.7		
14-Jan-01	15.0	26.6		
21-Jan-01	21.0	26.7		
28-Jan-01	22.0	26.4		
4-Feb-01	25.0	26.4		
11-Feb-01	39.0	26.6		
18-Feb-01	10.0	26.6		
25-Feb-01	7.0	26.5		
4-Mar-01	6.0	26.5		
11-Mar-01	34.0	26.5		
18-Mar-01	3.0	26.6		
25-Mar-01	37.0	26.2		
1-Apr-01	29.0	26.3		
8-Apr-01	35.0	26.9		
15-Apr-01	0.0	25.7		
22-Apr-01	13.0	26.3		
29-Apr-01	24.0	25.8		
6-May-01	0.0	26.7		
13-May-01	29.0	26.2		
20-May-01	0.0	26.6		
27-May-01	20.0	26.0		
3-Jun-01	11.0	26.5		
10-Jun-01	37.0	26.6		
17-Jun-01	0.0	26.6		
24-Jun-01	6.0	26.5		
1-Jul-01	0.0	26.2		
8-Jul-01	0.0	26.3		
15-Jul-01	17.0	26.1		
22-Jul-01	10.0	26.2		
29-Jul-01	0.0	26.2		
5-Aug-01	0.0	26.0		
12-Aug-01	0.0	26.1		
19-Aug-01	49.0	26.0		
26-Aug-01	0.0	26.2		
2-Sep-01	0.0	26.2		
9-Sep-01	0.0	26.1		
16-Sep-01	0.0	26.1		
23-Sep-01	8.0	26.1		
Min	0.0	25.7	0.0	0.0
Max	60.0	26.9	0.0	0.0
Total	818.5			

* Sammamish volunteers followed a variety of schedules. These tables reflect weekly summaries of all data collected.

Site 10 Data Summary

Week of	Sum of precip. (mm)	Avg of lake level (ft)	Avg of Secchi (m)	Avg of Temp (°C)
1-Oct-00	0.0	26.0	3.4	17.5
8-Oct-00	14.0	26.0	3.5	17.0
15-Oct-00				
22-Oct-00	82.0	26.5	4.0	15.0
29-Oct-00	8.0	26.4	4.0	14.5
5-Nov-00				
12-Nov-00				
19-Nov-00	27.0	26.3	4.0	11.0
26-Nov-00				
3-Dec-00				
10-Dec-00				
17-Dec-00				
24-Dec-00				
31-Dec-00				
7-Jan-01				
14-Jan-01				
21-Jan-01				
28-Jan-01				
4-Feb-01				
11-Feb-01				
18-Feb-01				
25-Feb-01				
4-Mar-01				
11-Mar-01				
18-Mar-01				
25-Mar-01				
1-Apr-01				
8-Apr-01				
15-Apr-01				
22-Apr-01				
29-Apr-01				
6-May-01				
13-May-01				
20-May-01				
27-May-01				
3-Jun-01				
10-Jun-01				
17-Jun-01				
24-Jun-01				
1-Jul-01				
8-Jul-01				
15-Jul-01				
22-Jul-01				
29-Jul-01				
5-Aug-01				
12-Aug-01				
19-Aug-01				
26-Aug-01				
2-Sep-01				
9-Sep-01				
16-Sep-01				
23-Sep-01				
Min	0.0	26.0	3.4	11.0
Max	82.0	26.5	4.0	17.5
Total	131.0			

Site 11 Data Summary*

Week of	Sum of precip. (mm)	Avg of lake level (ft)	Avg of Secchi (m)	Avg of Temp (°C)
1-Oct-00				
8-Oct-00				
15-Oct-00				
22-Oct-00				
29-Oct-00				
5-Nov-00				
12-Nov-00				
19-Nov-00				
26-Nov-00				
3-Dec-00				
10-Dec-00				
17-Dec-00				
24-Dec-00				
31-Dec-00				
7-Jan-01				
14-Jan-01				
21-Jan-01				
28-Jan-01				
4-Feb-01				
11-Feb-01				
18-Feb-01				
25-Feb-01				
4-Mar-01				
11-Mar-01				
18-Mar-01	0.0	25.1	2.8	7.8
25-Mar-01	8.5	25.1	2.7	8.8
1-Apr-01	6.0	25.1	2.5	9.0
8-Apr-01	3.0	25.1	3.0	9.3
15-Apr-01	19.0	25.1	2.8	10.4
22-Apr-01	0.0	25.1	3.5	12.0
29-Apr-01	26.0	25.1	3.5	13.0
6-May-01	26.0	25.1	3.5	13.5
13-May-01	15.0	25.1	4.0	16.5
20-May-01	0.9	25.1	4.0	15.5
27-May-01	0.0	25.1	3.0	17.0
3-Jun-01	27.0	25.1	3.0	16.0
10-Jun-01	0.0	25.1	2.8	15.8
17-Jun-01	0.0	25.1	5.0	19.0
24-Jun-01	18.0	25.1	5.0	19.0
1-Jul-01				
8-Jul-01				
15-Jul-01				
22-Jul-01				
29-Jul-01				
5-Aug-01				
12-Aug-01				
19-Aug-01				
26-Aug-01				
2-Sep-01				
9-Sep-01				
16-Sep-01				
23-Sep-01				
Min	0.0	25.1	2.5	7.8
Max	27.0	25.1	5.0	19.0
Total	149.4			

* Sammamish volunteers followed a varietv of schedules. These tables reflect weeklv summaries of all data collected.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	16.0	7	133.4	7
8-Oct-00	37.0	7	131.0	7
15-Oct-00	67.0	7	131.9	7
22-Oct-00	10.1	7	137.1	7
29-Oct-00	10.6	7	137.0	7
5-Nov-00	42.1	7	138.9	7
12-Nov-00	0.0	7	143.0	7
19-Nov-00	15.1	7	143.6	7
26-Nov-00	51.1	7	152.3	7
3-Dec-00	6.1	7	157.9	7
10-Dec-00	10.0	7	158.6	7
17-Dec-00	34.0	7	159.7	7
24-Dec-00	20.1	7	160.0	7
31-Dec-00	38.0	7	161.1	7
7-Jan-01	9.0	7	160.9	7
14-Jan-01	20.0	7	160.7	7
21-Jan-01	18.0	7	160.9	7
28-Jan-01	14.1	7	160.1	7
4-Feb-01	34.0	7	161.7	7
11-Feb-01	16.0	7	160.7	7
18-Feb-01	11.1	7	161.0	7
25-Feb-01	7.1	7	160.3	7
4-Mar-01	18.0	7	160.0	7
11-Mar-01	35.0	7	160.6	7
18-Mar-01	25.1	7	163.4	7
25-Mar-01	43.0	7	163.0	7
1-Apr-01	36.0	7	163.9	7
8-Apr-01	36.1	7	165.3	7
15-Apr-01	16.0	7	164.7	7
22-Apr-01	10.0	7	162.7	7
29-Apr-01	52.0	7	164.1	7
6-May-01	0.0	7	162.6	7
13-May-01	46.1	7	162.9	7
20-May-01	0.0	7	161.3	7
27-May-01	17.0	7	160.1	7
3-Jun-01	22.1	7	160.0	7
10-Jun-01	81.0	7	164.1	7
17-Jun-01	0.0	7	162.0	7
24-Jun-01	27.1	7	161.4	7
1-Jul-01	0.0	7	160.1	7
8-Jul-01	0.0	7	158.6	7
15-Jul-01	16.1	7	158.6	7
22-Jul-01	15.1	7	157.9	7
29-Jul-01	0.1	7	157.0	7
5-Aug-01	0.0	7	155.1	7
12-Aug-01	0.0	7	151.4	7
19-Aug-01	70.0	7	150.4	7
26-Aug-01	3.1	7	154.4	7
2-Sep-01	5.0	7	151.6	7
9-Sep-01	0.0	7	146.9	7
16-Sep-01	0.1	7	141.6	7
23-Sep-01	35.0	7	137.3	7
Min	0.0		131.0	
Max	81.0		165.3	
Total	1094.6			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
7-Oct-00	16:00	5.0	17.0	
14-Oct-00	17:00	5.0	16.0	
21-Oct-00	11:00	5.0	14.0	
28-Oct-00	15:00	4.5	13.0	
4-Nov-00	10:00	4.5	14.0	
11-Nov-00	13:00	5.0	10.0	
18-Nov-00	12:00	4.5	9.0	
23-Nov-00	12:00	3.5	8.0	
12-Dec-00	15:00	4.5	6.0	
23-Dec-00	12:00	4.5	5.0	
30-Dec-00	15:00	4.5	5.0	
13-Jan-01	14:00	4.0	5.0	
27-Jan-01	15:00	4.5	5.0	
3-Feb-01	15:00	4.0	6.0	
10-Feb-01	15:00	4.5	5.0	
17-Feb-01	16:00	3.5	6.0	
24-Feb-01	16:00	3.5	7.0	
3-Mar-01	16:00	3.5	8.0	
10-Mar-01	11:00	3.0	8.0	
24-Mar-01	15:00	3.5	8.0	
31-Mar-01	15:00	3.5	9.0	
14-Apr-01	11:00	3.5	12.0	
21-Apr-01	17:00	3.5	13.0	
28-Apr-01	11:00	3.5	14.0	
5-May-01	14:00	3.5	15.0	
12-May-01	10:00	3.0	17.0	
23-May-01	19:30	3.0	20.0	
1-Jun-01	15:30	3.0	18.0	
13-Jun-01	19:00	2.8	18.0	
23-Jun-01	17:00	3.5	21.0	
30-Jun-01	17:00	3.5	22.0	
14-Jul-01	17:00	3.8	24.0	
28-Jul-01	16:00	4.8	21.0	
4-Aug-01	15:00	4.3	22.0	
18-Aug-01	17:00	4.3	23.0	
1-Sep-01	11:00	4.8	22.0	
	Min	2.8	5.0	
	Max	5.0	24.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	0.0	7	43.1	7					
8-Oct-00	37.0	7	42.0	7	7-Oct-00	16:00	4.5	5.0	
15-Oct-00	60.0	6	43.6	7	14-Oct-00	17:00	3.5	6.0	
22-Oct-00	16.0	7	48.3	7	21-Oct-00	11:00	3.5	7.0	
29-Oct-00	9.1	7	48.4	7	28-Oct-00	15:00	3.5	8.0	
5-Nov-00	44.0	7	51.0	7	4-Nov-00	10:00	3.0	8.0	
12-Nov-00	0.0	7	52.0	7	11-Nov-00	13:00	3.5	8.0	
19-Nov-00	33.0	7	53.1	7	18-Nov-00	12:00	3.5	9.0	
26-Nov-00	33.0	7	62.6	7	23-Nov-00	12:00	3.5	12.0	
3-Dec-00	6.0	7	69.0	7					
10-Dec-00	10.0	7	69.0	7	12-Dec-00	15:00	3.5	13.0	
17-Dec-00	42.0	7	70.0	7					
24-Dec-00	19.0	7	71.3	7	23-Dec-00	12:00	3.5	14.0	
31-Dec-00	35.0	7	72.3	7	30-Dec-00	15:00	3.5	15.0	
7-Jan-01	20.0	7	72.7	7					
14-Jan-01	22.0	7	72.3	7	13-Jan-01	14:00	3.0	17.0	
21-Jan-01	16.0	7	71.9	7					
28-Jan-01	34.0	7	71.3	7	27-Jan-01	15:00	3.0	20.0	
4-Feb-01	12.0	7	72.9	7	3-Feb-01	15:00	3.0	18.0	
11-Feb-01	17.0	7	72.0	7	10-Feb-01	15:00	2.8	18.0	
18-Feb-01	12.0	7	72.0	7	17-Feb-01	16:00	3.5	21.0	
25-Feb-01	8.0	7	71.3	7	24-Feb-01	16:00	3.5	22.0	
4-Mar-01	20.0	7	71.4	7	3-Mar-01	16:00	3.8	24.0	
11-Mar-01	37.2	7	72.4	7	10-Mar-01	11:00	4.8	21.0	
18-Mar-01	29.0	7	74.9	7					
25-Mar-01	53.0	7	74.0	7	24-Mar-01	15:00	4.3	22.0	
1-Apr-01	35.1	7	75.0	7	31-Mar-01	15:00	4.3	23.0	
8-Apr-01	39.0	7	76.3	7					
15-Apr-01	24.0	7	75.4	7	14-Apr-01	11:00	4.8	22.0	
22-Apr-01	22.0	7	74.4	7	21-Apr-01	17:00	5.0	17.0	
29-Apr-01	51.0	7	72.6	7	28-Apr-01	11:00	5.0	16.0	
6-May-01	0.0	7	74.3	7	5-May-01	14:00	5.0	14.0	
13-May-01	57.0	7	75.9	7	12-May-01	10:00	4.5	13.0	
20-May-01	0.0	7	72.0	7	23-May-01	19:30	4.5	14.0	
27-May-01	31.0	7	71.6	7					
3-Jun-01	27.0	7	70.9	7	1-Jun-01	15:30	5.0	10.0	
10-Jun-01	89.0	7	70.0	7	13-Jun-01	19:00	4.5	9.0	
17-Jun-01	0.0	7	69.9	7					
24-Jun-01	39.0	7	68.7	7	23-Jun-01	17:00	3.5	8.0	
1-Jul-01	0.0	7	67.6	7	30-Jun-01	17:00	4.5	6.0	
8-Jul-01	0.0	7	64.6	7					
15-Jul-01	24.0	7	61.3	7	14-Jul-01	17:00	4.5	5.0	
22-Jul-01	20.0	7	64.1	7					
29-Jul-01	1.0	7	70.7	7	28-Jul-01	16:00	4.5	5.0	
5-Aug-01	0.0	7	74.0	7	4-Aug-01	15:00	4.0	5.0	
12-Aug-01	0.0	7	74.0	7					
19-Aug-01	83.0	7	72.9	7	18-Aug-01	17:00	4.5	5.0	
26-Aug-01	3.0	6	71.5	6					
2-Sep-01					1-Sep-01	11:00	4.0	6.0	
9-Sep-01									
16-Sep-01									
23-Sep-01									
Min	0.0		42.0			**Min**	2.8	5.0	
Max	89.0		76.3			**Max**	5.0	24.0	
Total	1169.3								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	0.1	7	16.0	7
8-Oct-00	14.0	7	16.0	7
15-Oct-00	0.0	2	16.0	2
22-Oct-00				
29-Oct-00				
5-Nov-00				
12-Nov-00				
19-Nov-00				
26-Nov-00				
3-Dec-00				
10-Dec-00				
17-Dec-00				
24-Dec-00				
31-Dec-00				
7-Jan-01				
14-Jan-01				
21-Jan-01				
28-Jan-01				
4-Feb-01				
11-Feb-01				
18-Feb-01				
25-Feb-01				
4-Mar-01				
11-Mar-01				
18-Mar-01				
25-Mar-01				
1-Apr-01				
8-Apr-01				
15-Apr-01	0.0	1	45.0	1
22-Apr-01	12.1	7	45.3	7
29-Apr-01	31.1	7	49.7	7
6-May-01	0.0	7	44.7	7
13-May-01	39.1	7	43.7	7
20-May-01	0.0	7	42.9	7
27-May-01	8.1	7	39.3	7
3-Jun-01	26.0	7	38.9	7
10-Jun-01	50.0	7	44.6	7
17-Jun-01	0.0	7	42.0	7
24-Jun-01	28.0	7	39.9	7
1-Jul-01	0.0	7	41.4	7
8-Jul-01	0.0	7	34.7	7
15-Jul-01	22.1	7	34.0	7
22-Jul-01	10.1	7	31.4	7
29-Jul-01	0.2	7	30.2	6
5-Aug-01	0.0	7	27.7	7
12-Aug-01	0.0	7	24.9	7
19-Aug-01	47.0	7	24.6	7
26-Aug-01	0.0	7	26.9	7
2-Sep-01	0.0	7	24.0	7
9-Sep-01	0.0	7	23.0	7
16-Sep-01	0.0	7	22.0	7
23-Sep-01	18.1	7	22.4	7
Min	0.0		16.0	
Max	50.0		49.7	
Total	305.6			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	15:00	2.0	18.0	
8-Oct-00	16:00	2.0	16.0	
15-Oct-00	14:00	2.0	14.0	
3-Jun-01	17:00	2.5	18.0	
10-Jun-01	18:00	2.5	18.0	
17-Jun-01	18:00	2.5	19.0	
24-Jun-01	18:30	2.5	20.0	
4-Jul-01	18:00	2.5	21.0	
11-Jul-01	17:30	3.0	26.0	
18-Jul-01	18:00	3.0	26.0	
25-Jul-01	18:30	3.0	24.0	
31-Jul-01	17:30	3.0	22.0	
7-Aug-01	18:00	3.0	26.0	
16-Aug-01	17:30	3.0	26.0	
	Min	2.0	14.0	
	Max	3.0	26.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	0.0	7	67.5	7
8-Oct-00	14.0	7	67.5	7
15-Oct-00	83.1	7	63.9	7
22-Oct-00	12.1	7	52.3	6
29-Oct-00	10.1	7	57.5	6
5-Nov-00	32.0	7	53.0	7
12-Nov-00	0.0	7	56.0	7
19-Nov-00	24.0	7	56.9	7
26-Nov-00	50.1	7	52.7	7
3-Dec-00	10.1	7	53.0	7
10-Dec-00	30.0	7	53.6	7
17-Dec-00	25.0	7	57.0	7
24-Dec-00	8.1	7	52.6	7
31-Dec-00	33.0	7	50.4	7
7-Jan-01	16.1	7	47.9	7
14-Jan-01	10.1	7	53.5	7
21-Jan-01	24.0	7	46.0	7
28-Jan-01	26.1	7	53.3	7
4-Feb-01	20.1	7	49.0	7
11-Feb-01	20.0	7	52.5	7
18-Feb-01	4.1	7	49.5	7
25-Feb-01	0.0	7	55.0	7
4-Mar-01	20.0	7	55.3	7
11-Mar-01	25.0	7	56.0	7
18-Mar-01	28.0	7	50.4	7
25-Mar-01	29.1	7	52.9	7
1-Apr-01	24.0	7	52.3	7
8-Apr-01	31.1	7	47.8	7
15-Apr-01	18.0	7	52.5	7
22-Apr-01	24.0	7	55.1	7
29-Apr-01	43.0	7	46.5	5
6-May-01	0.0	7	57.0	2
13-May-01	48.1	7	60.5	1
20-May-01	0.0	7	58.8	2
27-May-01	22.0	7	59.3	5
3-Jun-01	28.1	7	60.3	7
10-Jun-01	45.1	7	49.8	7
17-Jun-01	0.0	7	57.0	7
24-Jun-01	30.0	7	60.4	7
1-Jul-01				
8-Jul-01				
15-Jul-01				
22-Jul-01				
29-Jul-01				
5-Aug-01				
12-Aug-01				
19-Aug-01				
26-Aug-01				
2-Sep-01				
9-Sep-01				
16-Sep-01				
23-Sep-01				
Min	0.0		46.0	
Max	83.1		67.5	
Total	867.0			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	17:00	4.5	17.8	
8-Oct-00	17:00	4.3	16.7	
15-Oct-00	15:00	4.2	15.5	
22-Oct-00	14:30	3.9	14.4	Lots of mud with rain; new road.
29-Oct-00	12:45	4.3	13.3	More geese than in summer; two new batches.
5-Nov-00	14:00	4.0	12.0	
12-Nov-00	13:00	3.8	10.0	
19-Nov-00	13:00	3.5	8.0	
26-Nov-00	14:00	3.2	6.5	
3-Dec-00	15:20	3.0	5.6	
10-Dec-00	14:30	2.8	4.5	
17-Dec-00	16:00	2.8	5.6	
24-Dec-00	15:00	3.0	5.6	
31-Dec-00	15:00	4.0	4.4	
7-Jan-01	14:00	3.6	4.4	
14-Jan-01	14:30	3.7	4.4	
21-Jan-01	14:00	3.5	4.4	
28-Jan-01	12:56	3.6	4.4	
4-Feb-01	12:00	3.5	4.4	
11-Feb-01	14:15	3.7	4.4	
18-Feb-01	15:00	3.7	4.4	
25-Feb-01	14:00	3.8	4.4	
4-Mar-01	14:00	3.2	5.6	
11-Mar-01	12:00	3.0	7.8	
18-Mar-01	13:00	2.5	8.3	Mud in water from runoff.
25-Mar-01	15:30	3.2	10.0	
1-Apr-01	15:30	3.2	10.0	
8-Apr-01	16:00	3.2	10.0	the Canada geese are hiding and nesting at this time
15-Apr-01	11:00	3.5	10.0	
22-Apr-01	11:00	3.6	11.0	
29-Apr-01	16:00	3.3	13.3	
6-May-01	17:00	4.1	15.5	
13-May-01	17:18	4.0	17.8	
20-May-01	15:30	4.5	17.8	
27-May-01	15:14	4.0	20.0	
3-Jun-01	13:10	3.8	18.3	
10-Jun-01	14:00	4.0	18.9	
17-Jun-01	17:00	4.0	18.9	
24-Jun-01	17:00	4.0	21.1	lots of curly leaf pond weed
9-Sep-01	15:00	5.5	17.0	Saw two flocks of geese this am before noon
12-Sep-01	10:30	6.0	15.5	I wonder if the visibility in the water is better on
16-Sep-01	12:30	6.0	14.0	cloudy, more windy days?
23-Sep-01	15:00	6.0	12.0	Sunny AM then dense clouds
	Min	2.5	4.4	
	Max	6.0	21.1	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	15.0	7	25.4	7					
8-Oct-00	20.0	7	25.7	7					
15-Oct-00	48.9	7	28.6	7					
22-Oct-00	20.1	7	36.1	7					
29-Oct-00	10.0	7	38.0	7					
5-Nov-00	34.0	7	40.4	7					
12-Nov-00	0.0	7	42.0	7					
19-Nov-00	17.0	7	42.7	7					
26-Nov-00	57.1	7	51.7	7					
3-Dec-00	4.1	7	56.3	7					
10-Dec-00	13.1	7	58.6	7					
17-Dec-00	31.1	6	63.6	7					
24-Dec-00	22.1	7	58.9	7					
31-Dec-00	48.1	7	51.5	6					
7-Jan-01	7.0	7	57.3	7					
14-Jan-01	21.0	7	61.4	7					
21-Jan-01	24.0	7	65.9	7					
28-Jan-01	19.0	7	66.9	7					
4-Feb-01	29.0	6	63.1	7					
11-Feb-01	14.0	6	55.1	7					
18-Feb-01	9.1	7	61.0	7					
25-Feb-01	7.0	7	62.3	7					
4-Mar-01	14.0	7	53.3	7					
11-Mar-01	24.1	7	52.6	7					
18-Mar-01	24.0	7	57.3	7					
25-Mar-01	37.0	7	51.1	7					
1-Apr-01									
8-Apr-01									
15-Apr-01									
22-Apr-01									
29-Apr-01									
6-May-01									
13-May-01									
20-May-01									
27-May-01									
3-Jun-01									
10-Jun-01									
17-Jun-01									
24-Jun-01									
1-Jul-01									
8-Jul-01									
15-Jul-01									
22-Jul-01									
29-Jul-01									
5-Aug-01									
12-Aug-01									
19-Aug-01									
26-Aug-01									
2-Sep-01									
9-Sep-01									
16-Sep-01									
23-Sep-01									
Min	0.0		25.4			**Min**	0.0	0.0	
Max	57.1		66.9			**Max**	0.0	0.0	
Total	569.4								

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	5.0	7	24.0	7	2-Oct-00	12:00	6.0	11.0	
8-Oct-00	24.0	7	24.9	7	9-Oct-00	12:00	5.5	9.0	
15-Oct-00	46.0	7	28.1	7	16-Oct-00	11:00	4.8	7.0	
22-Oct-00	14.0	7	34.0	7					
29-Oct-00	8.0	4	34.8	4	30-Oct-00	11:30	4.0	6.5	
5-Nov-00	60.0	5	38.8	4	6-Nov-00	12:00	3.3	6.0	
12-Nov-00	0.0	5	40.8	2	13-Nov-00	13:00	3.3	5.0	
19-Nov-00	13.2	4	40.0	3	20-Nov-00	12:30			
26-Nov-00	88.0	5	47.3	4	27-Nov-00	13:30	3.8	4.5	
3-Dec-00	2.0	7	48.0	2	4-Dec-00	12:15	3.0	5.0	
10-Dec-00	10.0	7	47.0	1	11-Dec-00	3:00	3.0	5.0	
17-Dec-00	33.0	7	50.0	1	18-Dec-00	12:00	3.5	5.0	Great blue heron in wetland at lake's west end
24-Dec-00	17.0	7	53.5	4	27-Dec-00	12:00	3.3	5.0	
31-Dec-00	37.0	7	56.3	3	1-Jan-01	14:30	3.3	5.5	
7-Jan-01	7.0	7							
14-Jan-01	8.0	7	59.5	1	15-Jan-01	12:00	3.0	5.0	
21-Jan-01	21.0	7	63.0	1	22-Jan-01	15:00	2.8	6.0	
28-Jan-01	14.0	5	62.5	1	29-Jan-01	14:30	3.5	6.5	
4-Feb-01	12.0	7	66.0	1	5-Feb-01	12:30	3.5	8.5	
11-Feb-01	14.0	7	67.0	1	11-Feb-01	14:00	3.5	8.5	
18-Feb-01	0.0	1							
25-Feb-01	8.0	7	68.0	2	26-Feb-01	14:30	3.5	10.0	
4-Mar-01	8.0	7	68.0	1	5-Mar-01	12:00	3.3	10.0	
11-Mar-01	12.0	7	67.5	1	12-Mar-01	12:30	3.3	10.0	
18-Mar-01	28.0	7	70.0	1	19-Mar-01	14:00	3.0	11.5	
25-Mar-01	22.0	7	72.0	2	26-Mar-01	12:00	3.3	12.5	uncertain if particles seen are algae
1-Apr-01	21.0	7	74.0	1	2-Apr-01	13:30	3.3	8.5	lake is stocked for opening of fishing day
8-Apr-01	21.0	7	73.0	1	9-Apr-01	14:00	3.3	16.0	
15-Apr-01	14.1	7	73.5	1	16-Apr-01	12:00	4.0	16.0	
22-Apr-01	13.0	7	73.5	1	23-Apr-01	13:00	4.3	19.0	
29-Apr-01	30.0	7	75.0	1	2-May-01	14:00	4.3	18.0	
6-May-01	0.0	7	72.0	1					
13-May-01	37.1	7	70.0	1	14-May-01	12:30	4.0	18.0	
20-May-01	0.0	7	72.0	1	21-May-01	12:30	4.3	19.0	
27-May-01	11.0	7	68.0	3	28-May-01	16:00	3.5	19.0	lake may have been stirred up by heavy rains on Sunday
3-Jun-01	9.0	7	65.3	4	4-Jun-01	13:00	3.5	20.5	
10-Jun-01	44.0	7	69.0	2	13-Jun-01	15:00	4.0	22.5	
17-Jun-01	0.0	7	66.0	3	18-Jun-01	15:00	4.3	20.5	
24-Jun-01	26.0	7	64.0	2	26-Jun-01	12:00	4.8	21.0	
1-Jul-01	0.0	7	62.0	2	2-Jul-01	12:00	4.0	21.0	
8-Jul-01	0.0	7	59.0	1	9-Jul-01	13:30	3.8	21.5	
15-Jul-01	8.1	7	55.0	1	16-Jul-01	15:00	4.5		
22-Jul-01	7.1	7	52.0	3	23-Jul-01	14:00	3.5	21.5	
29-Jul-01	0.1	6	49.8	4	30-Jul-01	14:00	3.8	21.0	
5-Aug-01	0.0	7	47.0	3	6-Aug-01	14:30	4.3	21.0	
12-Aug-01	0.0	7	44.0	3	13-Aug-01	12:45	3.0	20.0	
19-Aug-01	58.0	7	45.5	2	20-Aug-01	15:45	3.5	19.5	
26-Aug-01	0.0	7	48.0	2	27-Aug-01	13:00	3.5	19.5	
2-Sep-01	0.0	7	45.0	2	3-Sep-01	12:30	1.3	6.0	
9-Sep-01	0.0	7	42.5	1	10-Sep-01	14:45	1.3	6.0	
16-Sep-01	0.1	7	40.0	2	17-Sep-01	12:45	1.0	6.0	
23-Sep-01	18.0	7	39.0	3	24-Sep-01	16:30	1.0	6.0	
Min	0.0		24.0			**Min**	1.0	4.5	
Max	88.0		75.0			**Max**	6.0	22.5	
Total	828.6								

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Daily Data Summary					Weekly Data Summary				
Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*	Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00									
8-Oct-00									
15-Oct-00									
22-Oct-00									
29-Oct-00									
5-Nov-00									
12-Nov-00									
19-Nov-00									
26-Nov-00									
3-Dec-00									
10-Dec-00									
17-Dec-00									
24-Dec-00									
31-Dec-00	31.0	3	41.2	6					
7-Jan-01	0.0	7	41.1	7					
14-Jan-01	18.0	7	39.3	7					
21-Jan-01	19.0	7	36.4	7					
28-Jan-01	10.0	5	34.0	5					
4-Feb-01	20.0	7	38.3	7	4-Feb-01	13:00	1.5	7.0	
11-Feb-01	22.0	7	38.9	7	11-Feb-01	12:00	1.8	7.0	
18-Feb-01	7.0	7	39.4	7	18-Feb-01	16:00	1.8	8.0	
25-Feb-01	8.0	7	36.4	7	25-Feb-01	11:00	2.0	15.0	
4-Mar-01	14.0	7	34.1	7					
11-Mar-01	27.0	7	33.1	7	12-Mar-01	14:00	1.3	19.0	
18-Mar-01	12.0	7	34.0	7	19-Mar-01	13:00	2.0	21.0	
25-Mar-01	39.0	7	36.3	7	26-Mar-01	13:00	2.3	20.0	
1-Apr-01									
8-Apr-01									
15-Apr-01									
22-Apr-01									
29-Apr-01	0.0	5	37.0	5					
6-May-01	0.0	7	31.1	7	7-May-01	11:00	2.0	17.0	
13-May-01	36.0	7	36.1	7					
20-May-01	0.0	7	31.1	7					
27-May-01	18.0	7	27.1	7					
3-Jun-01	17.0	7	24.9	7	4-Jun-01	13:00	2.5	14.0	
10-Jun-01	54.0	7	30.9	7					
17-Jun-01	0.0	7	26.9	7					
24-Jun-01	38.0	7	25.6	7					
1-Jul-01	0.0	7	22.3	7	2-Jul-01	15:00	2.5	13.0	
8-Jul-01	0.0	7	18.9	7					
15-Jul-01	5.0	7	17.1	7					
22-Jul-01	12.0	7	16.7	7					
29-Jul-01	1.0	7	16.1	7					
5-Aug-01	0.0	7	15.7	7					
12-Aug-01	0.0	7	14.0	7					
19-Aug-01	43.0	7	14.9	7					
26-Aug-01	3.0	7	16.1	7					
2-Sep-01	0.0	7	16.0	7					
9-Sep-01	0.0	7	15.4	7	9-Sep-01	10:00	2.8	13.0	
16-Sep-01	0.0	7	14.3	7					
23-Sep-01	22.0	7	15.3	7					
Min	0.0		14.0			**Min**	1.3	7.0	
Max	54.0		41.2			**Max**	2.8	21.0	
Total	476.0								

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Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	23.0	7	29.4	7
8-Oct-00	20.5	7	28.9	7
15-Oct-00	74.1	7	31.9	7
22-Oct-00	11.0	7	37.4	6
29-Oct-00	10.0	7	38.6	7
5-Nov-00	49.0	6	42.8	5
12-Nov-00	0.0	7	43.8	6
19-Nov-00	19.0	7	42.9	7
26-Nov-00	54.0	7	48.5	7
3-Dec-00	8.0	7	48.1	7
10-Dec-00	13.0	6	47.3	6
17-Dec-00	32.1	7	48.7	7
24-Dec-00	33.1	7	49.9	7
31-Dec-00	41.0	7	52.5	7
7-Jan-01	7.1	6	46.2	7
14-Jan-01	24.0	7	51.1	7
21-Jan-01	18.0	7	50.6	7
28-Jan-01	23.0	7	49.2	7
4-Feb-01	33.0	6	45.6	7
11-Feb-01	13.0	7	50.5	7
18-Feb-01	13.0	6	49.4	6
25-Feb-01	9.0	7	48.0	7
4-Mar-01	21.0	7	47.4	7
11-Mar-01	39.1	7	41.7	7
18-Mar-01	29.0	7	54.6	7
25-Mar-01	50.0	7	54.6	7
1-Apr-01	43.0	7	56.7	7
8-Apr-01	40.0	7	58.3	7
15-Apr-01	17.1	7	56.1	7
22-Apr-01	11.0	7	51.7	7
29-Apr-01	61.0	7	54.0	7
6-May-01	0.1	7	51.3	7
13-May-01	46.1	7	51.9	7
20-May-01	0.0	7	49.3	7
27-May-01	23.1	6	45.8	6
3-Jun-01	37.1	7	46.4	7
10-Jun-01	91.0	7	54.9	7
17-Jun-01	0.0	7	52.6	7
24-Jun-01	37.1	7	42.5	7
1-Jul-01	0.0	7	45.6	7
8-Jul-01	0.0	7	40.4	7
15-Jul-01	23.1	7	40.0	7
22-Jul-01	16.2	7	38.4	7
29-Jul-01	3.1	7	37.8	7
5-Aug-01	1.0	7	36.3	7
12-Aug-01	0.1	7	33.9	7
19-Aug-01	83.0	7	35.8	7
26-Aug-01	4.0	7	38.9	7
2-Sep-01	8.1	7	37.6	7
9-Sep-01	0.0	7	35.9	7
16-Sep-01	4.1	7	34.6	7
23-Sep-01	30.1	7	35.1	7
Min	0.0		28.9	
Max	91.0		58.3	
Total	1245.7			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
2-Oct-00	16:45	3.1	11.0	
9-Oct-00	17:20	2.0	6.5	
16-Oct-00	17:10	2.0	4.0	
23-Oct-00	17:00	3.4	4.5	
30-Oct-00	15:50	3.3	5.0	
13-Nov-00	15:00	2.0	4.0	
21-Nov-00	8:30	3.6	4.0	
27-Nov-00	15:15	3.8	5.5	
4-Dec-00	15:20	4.8	6.0	
11-Dec-00	15:00		7.0	
18-Dec-00	15:00	3.8	7.0	
26-Dec-00	13:40	3.0	7.0	
1-Jan-01	11:20	3.0	6.5	
9-Jan-01	13:15	3.4	7.5	
15-Jan-01	16:15	4.1	7.0	
25-Jan-01	10:00	3*	8.0	Too windy for Secchi disk to sink--it got caught in current. Couldn't get an accurate reading.
30-Jan-01	14:10	4.9	9.5	
5-Feb-01	15:05	3.7	10.0	
12-Feb-01	15:50	3.2	11.5	
20-Feb-01	16:15	3.0	11.5	
26-Feb-01	15:30		12.5	
5-Mar-01	16:00	3.4	12.0	
12-Mar-01	15:25	2.6	12.5	
19-Mar-01	16:20	2.3	14.0	
27-Mar-01	16:30	0.9	15.5	the lake is filled with floating particles that make it murky
2-Apr-01	14:30	1.8	16.0	the lake is still murky with algae although clearer than last week
9-Apr-01	18:15	2.3	18.0	
16-Apr-01	16:30	3.7	18.5	
23-Apr-01	17:05	3.6	19.5	
30-Apr-01	16:05	3.3	20.5	
7-May-01	16:15	3.0	19.5	
14-May-01	14:30	3.0	19.0	About 2 inches of rain in last 24 hours--particles in water may be algae?
21-May-01	15:45	3.0	20.0	lots of weeds in lake
28-May-01	19:15	3.2	21.0	lake is full of pondweed and milfoil; very aggressive this year
4-Jun-01	16:10	4.5	24.0	
11-Jun-01	17:30	4.0	25.0	
18-Jun-01	16:30			Forgot to record data from this day for Secchi depth
25-Jun-01	16:45	3.5	22.5	
2-Jul-01	10:45	3.5	20.5	
9-Jul-01	16:00	3.3	21.0	
17-Jul-01	10:00	3.6	25.0	
23-Jul-01	18:00	3.3	22.0	
30-Jul-01	16:00	3.8	22.0	
6-Aug-01	15:30	3.3	20.5	seeing more and more scum on the lake either coming from or trapped by the milfoil at the lake's surface
13-Aug-01	16:00	3.3	19.5	
20-Aug-01	17:15	3.2	19.5	
27-Aug-01	16:45	3.1	19.0	
4-Sep-01	17:00	3.5	14.0	Lake is clear.
10-Sep-01	17:10	3.0	14.0	
17-Sep-01	16:45	3.5	14.0	
24-Sep-01	17:50	3.5	14.0	
Min		0.9	4.0	
Max		4.9	25.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	0.0	1	6.0	1
8-Oct-00	8.0	7	6.0	7
15-Oct-00	3.0	4	6.0	4
22-Oct-00	1.0	7	5.4	7
29-Oct-00	6.5	6	4.3	6
5-Nov-00	67.0	7	4.0	7
12-Nov-00	0.0	7	3.0	7
19-Nov-00	17.0	7	3.0	7
26-Nov-00	13.0	5	3.0	5
3-Dec-00				
10-Dec-00				
17-Dec-00				
24-Dec-00				
31-Dec-00	0.0	1	7.0	1
7-Jan-01	0.0	3	7.0	3
14-Jan-01	0.0	3	7.0	3
21-Jan-01	0.0	5	7.0	5
28-Jan-01	68.0	4	8.3	4
4-Feb-01	37.0	1	9.0	3
11-Feb-01	0.0	2		
18-Feb-01			12.0	1
25-Feb-01			13.0	3
4-Mar-01				
11-Mar-01				
18-Mar-01				
25-Mar-01				
1-Apr-01				
8-Apr-01				
15-Apr-01				
22-Apr-01				
29-Apr-01				
6-May-01				
13-May-01				
20-May-01				
27-May-01				
3-Jun-01				
10-Jun-01				
17-Jun-01				
24-Jun-01				
1-Jul-01	0.0	7	25.7	7
8-Jul-01	0.0	7	22.1	7
15-Jul-01	11.0	7	20.9	7
22-Jul-01	16.0	5	19.2	5
29-Jul-01	0.0	2	17.0	2
5-Aug-01				
12-Aug-01				
19-Aug-01				
26-Aug-01				
2-Sep-01				
9-Sep-01				
16-Sep-01				
23-Sep-01				
Min	0.0		3.0	
Max	68.0		25.7	
Total	247.5			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
7-Oct-00	14:00	3.5	14.0	
14-Oct-00	14:10	3.5		
15-Oct-00	14:00	3.5		Lake is low
21-Oct-00	14:40	3.5		
28-Oct-00	14:30	3.5		This is the driest November I have ever seen up here and the lowest lake has been in November.
4-Nov-00	14:10	3.0		Water level got so low had no water on yardstick;
11-Nov-00	14:00	3.0		The yardstick was moved so it would be in the water; depth measurements will be different.
18-Nov-00	14:15	3.0		
25-Nov-00	14:30	3.0		
1-Jan-01	12:00	3.0		Lake has been frozen on and off
7-Jan-01	14:30	3.0		Thermometer is broken; Murph to replace.
14-Jan-01	16:00			
21-Jan-01	14:30	3.0		
28-Jan-01	14:10	3.0		
3-Feb-01	14:00	3.0	15.6	
10-Feb-01	13:50	2.6	14.0	
18-Feb-01	14:10	2.3	13.0	
26-Feb-01	15:00	2.5	11.1	
Min		2.3	11.1	
Max		3.5	15.6	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

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-Oct-00	43.0	44.0	1-Oct-00		2.4	11.3	
8-Oct-00	0.0	34.0	8-Oct-00		2.5	7.6	
15-Oct-00	22.0	34.0	15-Oct-00		2.5	4.1	
22-Oct-00	59.0	50.0	22-Oct-00		2.0	3.7	
29-Oct-00	18.0	48.0	29-Oct-00		2.4	4.0	
5-Nov-00	12.0						
12-Nov-00	25.0	60.0	12-Nov-00		2.0	5.1	
19-Nov-00							
26-Nov-00	25.0	48.0	26-Nov-00		2.2	4.7	
3-Dec-00	43.0						
10-Dec-00	10.0	69.0	10-Dec-00		2.0	4.7	
17-Dec-00	20.0						
24-Dec-00	20.0	76.0	24-Dec-00		2.1	4.5	
31-Dec-00	20.0						
7-Jan-01	23.0		7-Jan-01		2.2	3.9	
14-Jan-01	10.0	74.0	14-Jan-01		2.1	5.0	
21-Jan-01	15.0						
28-Jan-01	16.0	58.0	28-Jan-01		2.2	5.9	
4-Feb-01	27.0	50.0	4-Feb-01		2.6	10.0	
11-Feb-01	17.0	51.0	11-Feb-01		3.5	17.0	
18-Feb-01	20.0						
25-Feb-01	7.0	55.0	25-Feb-01		4.0	16.0	
4-Mar-01	10.0	51.0	4-Mar-01		4.3	14.5	
11-Mar-01	5.0						
18-Mar-01	37.0						
25-Mar-01		54.0	25-Mar-01		3.0	14.0	
1-Apr-01							
8-Apr-01							
15-Apr-01							
22-Apr-01							
29-Apr-01							
6-May-01							
13-May-01							
20-May-01							
27-May-01							
3-Jun-01							
10-Jun-01							
17-Jun-01							
24-Jun-01							
1-Jul-01							
8-Jul-01							
15-Jul-01							
22-Jul-01							
29-Jul-01							
5-Aug-01							
12-Aug-01							
19-Aug-01							
26-Aug-01							
2-Sep-01							
9-Sep-01							
16-Sep-01							
23-Sep-01							
Min	0.0	34.0		**Min**	2.0	3.7	
Max	59.0	76.0		**Max**	4.3	17.0	
Total	504.0						

* Cumulative data were collected once a week

Daily Data Summary

Week of	Sum of precip. (mm)	# of days*	Avg of lake level (cm)	# of days*
1-Oct-00	6.0	7	23.0	7
8-Oct-00	23.0	7	20.4	7
15-Oct-00	73.0	7	19.1	7
22-Oct-00	10.0	7	22.3	7
29-Oct-00	10.0	7	21.0	7
5-Nov-00	40.0	7	23.1	7
12-Nov-00	0.0	7	25.0	7
19-Nov-00	24.0	7	25.4	7
26-Nov-00	38.0	7	30.6	7
3-Dec-00	7.0	7	33.9	7
10-Dec-00	24.0	7	36.1	7
17-Dec-00	17.0	7	39.7	7
24-Dec-00	16.0	7	43.4	7
31-Dec-00	36.0	7	48.4	7
7-Jan-01	7.0	7	54.1	7
14-Jan-01	11.0	7	58.1	7
21-Jan-01	13.0	7	62.4	7
28-Jan-01	12.0	7	65.4	7
4-Feb-01	29.0	7	71.3	7
11-Feb-01	14.0	7	74.4	7
18-Feb-01	7.0	7	75.1	7
25-Feb-01	5.0	7	74.4	7
4-Mar-01	14.0	7	73.7	7
11-Mar-01	21.0	7	73.6	7
18-Mar-01	12.0	7	75.1	7
25-Mar-01	44.0	7	76.6	7
1-Apr-01	26.0	7	77.9	7
8-Apr-01	33.0	7	78.1	7
15-Apr-01	13.0	7	76.4	7
22-Apr-01	17.0	7	74.7	7
29-Apr-01	38.1	7	77.4	7
6-May-01	0.0	7	75.0	7
13-May-01	44.0	7	75.4	7
20-May-01	0.0	7	72.7	7
27-May-01	20.0	7	69.4	7
3-Jun-01	15.1	7	68.1	7
10-Jun-01	48.0	7	70.1	7
17-Jun-01	0.0	7	68.3	7
24-Jun-01	30.1	7	66.4	7
1-Jul-01	0.0	7	63.3	7
8-Jul-01	0.0	7	58.3	7
15-Jul-01	18.0	7	53.7	7
22-Jul-01	10.0	7	49.1	7
29-Jul-01	0.1	7	42.9	7
5-Aug-01	0.0	7	36.1	7
12-Aug-01	0.0	7	30.3	7
19-Aug-01	63.0	7	26.0	7
26-Aug-01	3.1	7	24.1	7
2-Sep-01	1.0	7	19.0	7
9-Sep-01	0.0	7	12.0	7
16-Sep-01	0.1	7	5.4	7
23-Sep-01	20.0	7	0.1	7
Min	0.0		0.1	
Max	73.0		78.1	
Total	912.4			

Weekly Data Summary

Sample date	Sample time	Secchi (m)	Temp (°C)	notes
1-Oct-00	10:30	3.0	12.5	algae bloom
8-Oct-00	16:30	3.5	11.5	algae bloom
15-Oct-00	12:15	4.0	9.5	algae bloom
22-Oct-00	13:45	4.0	7.0	
29-Oct-00	9:30	4.0	6.5	
5-Nov-00	11:30	5.5	6.0	
12-Nov-00	10:30	6.5	5.0	
19-Nov-00	14:00	7.0	4.0	
26-Nov-00	15:30	7.0	3.5	
3-Dec-00	10:00	7.0	4.0	
10-Dec-00	10:00	7.3	4.5	
17-Dec-00	14:45	6.0	4.0	
23-Dec-00	11:15	6.0	4.0	
31-Dec-00	13:45	4.5	4.5	
7-Jan-01	9:30	4.5	4.0	
14-Jan-01	13:30	5.0	4.5	
21-Jan-01	11:30	5.5	5.0	
27-Jan-01	13:30	5.5	5.3	
4-Feb-01	13:30	4.5	7.0	
11-Feb-01	10:30	5.5	7.0	
18-Feb-01	12:30	7.0	9.5	
25-Feb-01	12:10	7.0	8.5	
4-Mar-01		8.0	8.5	
11-Mar-01		8.5	9.5	
17-Mar-01		6.5	11.5	
25-Mar-01		6.5	13.0	
1-Apr-01	11:15	7.0	13.0	
7-Apr-01	9:30	7.0		
15-Apr-01	11:30	7.5	14.5	
22-Apr-01	11:25	7.0	20.0	
29-Apr-01	10:35	8.5	17.0	
6-May-01	11:15	6.5	18.0	water column clear; algae on surface in clumps,
13-May-01	10:35	6.5	17.5	around shore, logs, docks
20-May-01	9:30	5.8	19.0	
27-May-01	16:30	5.5	21.5	
3-Jun-01	9:30	6.0	23.0	
10-Jun-01	12:40	6.0	23.0	
17-Jun-01	10:15	6.0	22.0	
24-Jun-01	16:30	6.5	20.0	
1-Jul-01	18:20	7.0	20.5	
8-Jul-01	15:00	6.0	23.0	
15-Jul-01	14:00	6.0	21.5	
22-Jul-01	14:00	4.5	22.0	
29-Jul-01	10:00	4.5	21.5	algae bloom has peaked and is going down now
5-Aug-01	10:00	4.0	19.5	
12-Aug-01	14:00	5.0	20.0	
19-Aug-01	11:45	4.0	20.0	
26-Aug-01	19:10	6.5	4.0	
2-Sep-01	13:03	5.5	21.1	
9-Sep-01	9:01	5.6	21.1	
16-Sep-01	2:30	5.6	21.1	
23-Sep-01	17:00	6.0	21.1	
	Min	3.0	3.5	
	Max	8.5	23.0	

* Precipitation data were only included in Chapter 3 calculations if at least five days were reported in a week. Lake level data were included even when incomplete.

Appendix B

Appendix B shows the analytical results of water samples collected by Level 2 volunteers from April through October 2001.

The total phosphorus (TP) values for all of the samples collected on June 3rd and many collected on June 4, 2001 were found to be exceptionally high relative to other samples collected from the lakes. A similar situation was found for some values on September 9th, but there were fewer in number on those dates. Such high values will decrease the calculated nitrogen to phosphorus (N:P) ratio and increase the total phosphorus trophic state index (TSI) value.

No persuasive explanation was found for why there were so many excessively high values for these sample collection dates, so the values will remain in the lakes database. They have been included in the reported averages of TP, N:P, and the TSI calculation in this appendix. However, the fact that so many values were high on those particular dates, as well as the deviations they represent from other collections through the year, suggest that the data probably represents undiscovered errors somewhere in the chain of sample collection through analysis. They should be viewed skeptically, and used only with extreme caution, because of the anomalies they represent.

Comments by volunteer monitors are reported in full where possible, although some comments had to be abbreviated to fit in the available space. Bird and boat information is not presented here; however the original data will be retained and can be made available by request.

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
7-May	17.0	4.0	1.70	8.5	294	None	35	40.0	35.8	35.0	Pollen in water; recent lk front prop flooding; dead beaver 2 wks ago
21-May	17.5	3.8	0.96	10.8	309	None	29	40.7	30.2	38.5	
5-Jun	17.0	4.3	1.13	12.8	304	None	24	39.0	31.8	40.9	
18-Jun	19.0	3.8	1.94	11.8	323	None	27	40.7	37.1	39.8	*Profile sample*
2-Jul	22.0	4.5	1.72	8.3	298	Some	36	38.3	35.9	34.7	
16-Jul	21.0	3.8	2.16	10.3	340	Some	33	40.7	38.1	37.8	Small brownish bloom on N shore on 7/14/01
31-Jul	20.0	4.0	1.78	9.2	367	None	40	40.0	36.2	36.2	
14-Aug	24.5	3.5	1.40	15.4	395	Some	26	41.9	33.9	43.6	Blackish algae by the slow-moving water areas
27-Aug	22.0	3.0	2.85	9.2	330	Some	36	44.1	40.8	36.2	*Profile sample*
10-Sep	22.0	3.0	2.02	11.4	396	None	35	44.1	37.5	39.3	
24-Sep	19.0	3.5	1.55	11.9	306	None	26	41.9	34.9	39.9	Lake level dropping quickly (at 30.5cm)
7-Oct	15.0	3.3				None		42.8			Lake level = 27.5cm
22-Oct	11.0	3.5	2.00	10.7	366	None	34	41.9	37.4	38.3	Lake level = 37cm. Very difficult time getting samples, very stormy & windy.
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	19.0	3.7	1.77	10.9	336		32	41.3	35.8	38.3	**TSI Average = 38.5**
Median	19.0	3.8	1.75	10.8	327		33	40.7	36.1	38.4	
Min	11.0	3.0	0.96	8.3	294		24	38.3	30.2	34.7	
Max	24.5	4.5	2.85	15.4	396		40	44.1	40.8	43.6	
Count	13	13	12	12	12		12	13	12	12	

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
7-May	14.0	0.8	13.70	52.8	830	None	16	64.2	56.2	61.4	
21-May	16.5	1.0	5.37	28.9	703	None	24	60.0	47.1	52.7	
4-Jun	16.0	0.8	30.10	36.6	756	None	21	64.2	64.0	56.1	
18-Jun	17.5	0.8	11.90	34.7	892	None	26	64.2	54.9	55.3	*Profile sample*
2-Jul	21.5	0.5	64.30	53.1	1170	None	22	70.0	71.4	61.5	
16-Jul	19.0	0.5	51.90	50.5	1060	None	21	70.0	69.3	60.7	
30-Jul	20.5	0.5	48.30	37.7	914	None	24	70.0	68.6	56.5	
13-Aug	23.5	0.5	44.80	64.2	1070	None	17	70.0	67.9	64.2	
27-Aug	24.5	0.8	38.20	55.1	1030	None	19	64.2	66.3	62.0	*Profile sample*
10-Sep	18.0	0.8	76.60	47.6	1090	None	23	64.2	73.1	59.9	
24-Sep	17.0	0.8	48.10	70.5	1160	None	16	64.2	68.6	65.5	
8-Oct	13.5	0.8	18.90	39.1	838	None	21	64.2	59.4	57.0	
22-Oct	11.0	0.5	3.37	108	924	None	9	70.0	42.5	71.7	Beaver and muskrat
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	17.9	0.7	35.04	52.2	957		20	66.1	62.2	60.3	**TSI Average = 62.9**
Median	17.5	0.8	38.20	50.5	924		21	64.2	66.3	60.7	
Min	11.0	0.5	3.37	28.9	703		9	60.0	42.5	52.7	
Max	24.5	1.0	76.60	108	1170		26	70.0	73.1	71.7	
Count	13	13	13	13	13		13	13	13	13	

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	13.5	4.3	4.90	5.5	294	Some	53	39.0	46.2	28.7	Algae windblown. Collected along shore this am
20-May	17.0	4.0	3.94	7.2	272	None	38	40.0	44.0	32.6	
3-Jun	18.0	5.0	2.86	44.4*	286	None	6	36.8	40.9	58.9	
17-Jun	18.0	5.5	1.58	9.6	345	None	36	35.4	35.1	36.8	*Profile sample*
1-Jul	22.5	5.3	0.90	8.6	293	None	34	35.9	29.5	35.2	
15-Jul	22.0	5.5	2.82	8.4	296	Some	35	35.4	40.7	34.8	
29-Jul	22.0	4.5	1.82	8.5	300	Some	35	38.3	36.4	35.0	
12-Aug	24.5	4.8	1.30	17.2	399	Some	23	37.4	33.1	45.2	
26-Aug	23.5	4.5	1.95	10.2	359	Some	35	38.3	37.1	37.7	*Profile sample*
9-Sep	20.5	4.0	1.33	30.6*	292	Some	10	40.0	33.4	53.5	
23-Sep	19.5	4.5	2.04	9	293	Some	33	38.3	37.6	35.8	
7-Oct	16.5	3.8	2.68	11.5	304	Some	26	40.7	40.2	39.4	
21-Oct	13.5	4.0	2.44	13.1	284	None	22	40.0	39.3	41.3	
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	19.3	4.6	2.35	14.1	309		30	38.1	38.0	39.6	**TSI Average = 38.6**
Median	19.5	4.5	2.04	9.6	294		34	38.3	37.6	36.8	
Min	13.5	3.8	0.90	5.5	272		6	35.4	29.5	28.7	
Max	24.5	5.5	4.90	44.4	399		53	40.7	46.2	58.9	
Count	13	13	13	13	13		13	13	13	13	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
7-May	12.0	5.8	5.60	7	322	None	46	34.6	47.5	32.2	
20-May	15.0	6.5	2.29	11.2	297	None	27	33.0	38.7	39.0	
3-Jun	16.0	7.0	1.56	67.2*	351	None	5	31.9	34.9	64.9	
17-Jun	17.5	8.0	1.74	8.9	315		35	30.0	36.0	35.7	*Profile sample*
1-Jul	20.0	5.5	1.66	8.5	284	None	33	35.4	35.5	35.0	
17-Jul	20.5	5.0	2.16	9.8	341	None	35	36.8	38.1	37.1	
30-Jul	20.0	4.5	1.84	5.7	327	None	57	38.3	36.6	29.3	
12-Aug	22.0	6.0	1.56	7.6	655	None	86	34.1	34.9	33.4	
26-Aug	22.5	7.0	1.76	7.1	299	None	42	31.9	36.1	32.4	*Profile sample*
9-Sep	20.0	5.5	2.82	32.3*	343	None	11	35.4	40.7	54.3	
25-Sep	17.0	6.3	3.30	7.2	305	None	42	33.4	42.3	32.6	
7-Oct	16.0	4.5	4.31	8.6	329	None	38	38.3	44.9	35.2	
22-Oct	13.0	5.3	4.97	11.6	369	None	32	35.9	46.3	39.5	
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	17.8	5.9	2.74	14.8	349		38	34.5	39.4	38.5	**TSI Average = 37.5**
Median	17.5	5.8	2.16	8.6	327		35	34.6	38.1	35.2	
Min	12.0	4.5	1.56	5.7	284		5	30.0	34.9	29.3	
Max	22.5	8.0	5.60	67.2	655		86	38.3	47.5	64.9	
Count	13	13	13	13	13		13	13	13	13	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI Secc	Calculated TSI chl-a	Calculated TSI TP	Notes
6-May	13.5	1.3	4.00	24.7	590	Some	24	56.2	44.2	50.4	Algae was dense last week.
21-May	15.5	1.0	5.85	32.5	539	Some	17	60.0	47.9	54.4	
5-Jun	16.0		19.00	50.5*	614	Some	12		59.5	60.7	
19-Jun	18.5		4.57	27.2	588	Some	22		45.5	51.8	*Profile sample*
1-Jul	16.0	1.8	29.90	24.8	780	Some	31	51.5	63.9	50.5	
16-Jul	20.0	1.0	12.30	20.4	687	Some	34	60.0	55.2	47.7	
30-Jul	19.5	1.0	13.80	20.7	635	Some	31	60.0	56.3	47.9	
14-Aug	23.0	1.3	6.03	14.6	568	Some	39	56.2	48.2	42.8	
27-Aug	20.5	1.0	12.70	15.6	551	Some	35	60.0	55.5	43.8	*Profile sample*
11-Sep	18.5	1.5	7.95	14.4	542	Some	38	54.1	50.9	42.6	
24-Sep	18.0	1.3	9.73	13.8	461	Some	33	56.2	52.9	42.0	
9-Oct	13.0	1.5	7.53	15.3	511	Some	33	54.1	50.4	43.5	
23-Oct	10.5	1.8	4.89	13.1	411	Some	31	51.5	46.1	41.3	

	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	N:P	Calculated TSI Secc	Calculated TSI chl-a	Calculated TSI TP	Notes
Mean	17.1	1.3	10.63	22.1	575	29	56.4	52.0	47.6	**TSI Average = 52.0**
Median	18.0	1.3	7.95	20.4	568	31	56.2	50.9	47.7	
Min	10.5	1.0	4.00	13.1	411	12	51.5	44.2	41.3	
Max	23.0	1.8	29.90	50.5	780	39	60.0	63.9	60.7	
Count	13	11	13	13	13	13	11	13	13	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	13.0	3.3	3.30	18.3	422	Some	23	42.8	42.3	46.1	
20-May	15.0	3.3	7.63	17.9	373	Some	21	42.8	50.5	45.8	
3-Jun	17.0	2.8	7.00	52.8*	356	Some	7	45.1	49.7	61.4	
17-Jun	19.0	3.3	3.12	17.5	325	Some	19	42.8	41.7	45.4	*Profile sample*
1-Jul	21.0	2.5	4.33	14.8	366	Some	25	46.8	44.9	43.0	
15-Jul	22.0	3.0	2.76	13.1	339	Some	26	44.1	40.5	41.3	
29-Jul	21.0	2.8	3.40	7.7	337	Some	44	45.1	42.6	33.6	
14-Aug											
27-Aug											
9-Sep	19.0	2.5	5.53	38.8*	369	Some	10	46.8	47.3	56.9	
23-Sep	18.5	3.0	9.99	10.8	304	Some	28	44.1	53.1	38.5	
7-Oct	15.0	3.3	6.55	8.3	346	Some	42	42.8	49.0	34.7	
21-Oct	12.0	2.5	6.17	9.9	315	Some	32	46.8	48.4	37.2	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	17.5	2.9	5.43	19.1	350		25	44.5	46.4	44.0	**TSI Average = 45.0**
Median	18.5	3.0	5.53	14.8	346		25	44.1	47.3	43.0	
Min	12.0	2.5	2.76	7.7	304		7	42.8	40.5	33.6	
Max	22.0	3.3	9.99	52.8	422		44	46.8	53.1	61.4	
Count	11	11	11	11	11		11	11	11	11	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	14.0	4.0	2.30	11	307	None	28	40.0	38.7	38.7	
20-May	16.0	3.5	3.03	21.7	314	None	14	41.9	41.4	48.5	
3-Jun	18.5	4.5	2.80	72.7*	350		5	38.3	40.7	66.0	
17-Jun	19.0	6.0	2.71			None		34.1	40.3		*Profile sample*
1-Jul	21.5	3.8	2.77	12.7	325		26	40.7	40.6	40.8	
15-Jul	22.5	4.8	2.82	12.3	322		26	37.4	40.7	40.4	
29-Jul	21.0	3.8	3.24	16.6	372	Some	22	40.7	42.1	44.7	
12-Aug	23.5	2.5	2.90	11.6	321	None	28	46.8	41.0	39.5	
26-Aug	22.0	2.3	3.11	22.4	415	Some	19	48.0	41.7	49.0	*Profile sample*
9-Sep	20.0	2.5	4.37	49.2*	409		8	46.8	45.0	60.4	White soapy debris floating on surface
23-Sep	20.0	2.3	3.80	13.1	260		20	48.0	43.7	41.3	White scum on surface of lake. Residue from oil boom?
7-Oct	16.0	1.8	11.60	14.5	341	None	24	51.5	54.6	42.7	
21-Oct	12.0	2.0	11.90	21.5	379		18	50.0	54.9	48.4	
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	18.9	3.4	4.41	23.3	343		20	43.4	43.5	46.7	**TSI Average = 44.5**
Median	20.0	3.5	3.03	15.6	333		21	41.9	41.4	43.7	
Min	12.0	1.8	2.30	11	260		5	34.1	38.7	38.7	
Max	23.5	6.0	11.90	72.7	415		28	51.5	54.9	66.0	
Count	13	13	13	12	12		12	13	13	12	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	14.5	3.3	5.80	17.6	650	None	37	42.8	47.8	45.5	
21-May			1.64	23.5	630		27		35.4	49.7	
3-Jun	16.5	3.3	5.75	151*	463	None	3	42.8	47.7	76.5	
17-Jun	18.0	3.0	11.50	23.7	396	Some	17	44.1	54.5	49.8	*Profile sample*
1-Jul	21.5	2.8	5.43	12.4	345	Some	28	45.1	47.2	40.5	
15-Jul	22.0	3.0	3.20	21.5	385	None	18	44.1	42.0	48.4	
29-Jul	21.0	3.8	2.94	9.4	299	Some	32	40.7	41.1	36.5	
13-Aug	23.5	4.8	1.18	11.6	344	None	30	37.4	32.2	39.5	
26-Aug											
10-Sep	20.5	3.8	3.58	16.9	331	None	20	40.7	43.1	44.9	Sulphur smell!
24-Sep	19.0	3.0	6.35	13	291	None	22	44.1	48.7	41.2	
7-Oct	15.0	2.5	8.68	16.3	360	None	22	46.8	51.8	44.4	
21-Oct											
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	19.2	3.3	5.10	28.8	409		23	42.9	44.7	47.0	**TSI Average = 44.9**
Median	19.8	3.2	5.43	16.9	360		22	43.5	47.2	44.9	
Min	14.5	2.5	1.18	9.4	291		3	37.4	32.2	36.5	
Max	23.5	4.8	11.50	151	650		37	46.8	54.5	76.5	
Count	10	10	11	11	11		11	10	11	11	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	13.5	5.5	2.10	10.9	367	None	34	35.4	37.8	38.6	Lake level high; water very clear
20-May	16.0	5.0	2.22	13.2	352	Some	27	36.8	38.4	41.4	
3-Jun	18.0	3.5	3.00	59.4*	342	None	6	41.9	41.3	63.1	
17-Jun	19.0	2.5	3.18	14.1	367	None	26	46.8	41.9	42.3	*Profile sample*
2-Jul	20.0	4.0	2.82	11.4	364	Some	32	40.0	40.7	39.3	
15-Jul	21.5	3.5	3.54	12.5	389	None	31	41.9	43.0	40.6	
30-Jul	21.0	3.0	3.44	11.5	416	Some	36	44.1	42.7	39.4	
13-Aug											
26-Aug	21.0	2.5	3.24	18.9	443	None	23	46.8	42.1	46.6	*Profile sample*
9-Sep	19.0	3.0	3.42	17.1	452	None	26	44.1	42.6	45.1	
24-Sep	18.0	3.0	4.09	14.4	365	Some	25	44.1	44.4	42.6	
8-Oct	15.0	3.0	7.11	15.1	474	None	31	44.1	49.8	43.3	
21-Oct	11.5	3.0	7.41	28.7	521	None	18	44.1	50.2	52.6	

	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	N:P	Calculated TSI			Notes
							Secc	chl-a	TP	
Mean	17.8	3.5	3.80	18.9	404	26	42.5	42.9	44.6	**TSI Average = 43.3**
Median	18.5	3.0	3.33	14.3	378	27	44.1	42.4	42.5	
Min	11.5	2.5	2.10	10.9	342	6	35.4	37.8	38.6	
Max	21.5	5.5	7.41	59.4	521	36	46.8	50.2	63.1	
Count	12	12	12	12	12	12	12	12	12	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
7-May	15.0	1.5	8.90	35.7	876	Some	25	54.1	52.0	55.7	
21-May	17.0	1.5	9.69	19.1	625	Some	33	54.1	52.8	46.7	
4-Jun	17.0	2.0	6.09	25.8	654	Some	25	50.0	48.3	51.0	
18-Jun	18.0	2.5	9.15	21.8	561	Some	26	46.8	52.3	48.6	*Profile sample*
2-Jul	22.0	2.3	8.23	23.1	448	Some	19	48.0	51.2	49.4	
16-Jul	21.0	2.0	10.80	18	420	Some	23	50.0	53.9	45.8	
30-Jul	21.0	2.5	7.27	15.6	382	Some	24	46.8	50.0	43.8	
13-Aug	24.0	2.5	2.72	11.1	338	Some	30	46.8	40.4	38.9	
27-Aug	21.0	1.8	18.60	20.5	422	Some	21	51.5	59.2	47.7	*Profile sample*
10-Sep	19.0	1.5	24.90	24.1	516	Some	21	54.1	62.1	50.1	
24-Sep	18.0	1.3	31.60	30.6	575	Dense	19	56.2	64.4	53.5	
8-Oct	15.0	1.5	39.00	40.1	607	Some	15	54.1	66.5	57.4	
21-Oct											
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	19.0	1.9	14.75	23.8	535		23	51.1	54.4	49.1	**TSI Average = 51.5**
Median	18.5	1.9	9.42	22.5	539		24	50.8	52.6	49.0	
Min	15.0	1.3	2.72	11.1	338		15	46.8	40.4	38.9	
Max	24.0	2.5	39.00	40.1	876		33	56.2	66.5	57.4	
Count	12	12	12	12	12		12	12	12	12	

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	14.5	2.3	5.40	14.5	396	Some	27	48.0	47.1	42.7	
20-May	16.5	2.3	4.01	13.6	367	Some	27	48.0	44.2	41.8	
3-Jun	18.0	2.5	6.79	61.9*	386	Some	6	46.8	49.4	63.7	
17-Jun	18.0	2.3	5.34	17.8	478	Some	27	48.0	47.0	45.7	*Profile sample*
1-Jul	21.0	2.5	6.33	16.4	521	Some	32	46.8	48.7	44.5	
15-Jul	22.5	3.0	5.25	16.7	437	None	26	44.1	46.8	44.8	
29-Jul	20.5	2.8	4.51	21.3	416	Some	20	45.1	45.3	48.3	
12-Aug	22.5	3.0	2.97	14.8	379	Some	26	44.1	41.2	43.0	
26-Aug	21.0	2.8	11.60	24.8	486	Some	20	45.1	54.6	50.5	*Profile sample*
8-Sep	21.5	1.5	16.70	37.2	566	Some	15	54.1	58.2	56.3	
23-Sep	20.0	1.8	23.80	26.2	634	Dense	24	51.5	61.7	51.3	
7-Oct	16.5	2.0	15.20	50	589	Some	12	50.0	57.3	60.6	
21-Oct	13.0	2.3	3.86	57.2	583	Some	10	48.0	43.8	62.5	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	19.0	2.5	8.32	27.9	465		21	47.7	49.6	50.4	**TSI Average = 49.2**
Median	20.0	2.3	5.34	21.3	437		24	48.0	47.1	48.3	
Min	13.0	1.5	2.70	6.5	332		6	40.0	40.3	31.1	
Max	22.5	4.0	23.80	61.9	634		51	54.1	61.7	63.7	
Count	13	13	13	13	13		13	13	13	13	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	15.5	1.3	14.50	27.7	714	None	26	56.2	56.8	52.1	
20-May	18.0	1.3	4.79	26.1	686	None	26	56.2	45.9	51.2	
3-Jun	18.5	1.5	9.09	96.5*	738	None	8	54.1	52.2	70.1	
17-Jun	20.0	1.5	21.50	39	801	Some	21	54.1	60.7	57.0	*Profile sample*
1-Jul	22.5	1.5	5.63	24	740	None	31	54.1	47.5	50.0	
16-Jul	20.0	1.3	148.00	74.6	1140	Some	15	56.2	79.6	66.4	
29-Jul	21.5	1.5	13.90	28.7	794	Some	28	54.1	56.4	52.6	
12-Aug	26.0	1.3	6.11	20.2	701	Some	35	56.2	48.3	47.5	
26-Aug	22.0	2.0	51.70	31.9	817	Some	26	50.0	69.3	54.1	*Profile sample*
8-Sep											
23-Sep	21.0	1.5	11.90	25.6	626	Some	24	54.1	54.9	50.9	
7-Oct											
21-Oct	12.0	1.5	3.07	46.7	839	Some	18	54.1	41.6	59.6	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	19.7	1.5	26.38	40.1	781		23	54.5	55.7	55.6	**TSI Average = 55.3**
Median	20.0	1.5	11.90	28.7	740		26	54.1	54.9	52.6	
Min	12.0	1.3	3.07	20.2	626		8	50.0	41.6	47.5	
Max	26.0	2.0	148.00	96.5	1140		35	56.2	79.6	70.1	
Count	11	11	11	11	11		11	11	11	11	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	15.0	2.3	6.90	33.3	619	Some	19	48.0	49.5	54.7	
21-May	18.0	2.3	8.73	35.8	623	Some	17	48.0	51.8	55.8	
3-Jun	18.0	1.8	14.90	94.8*	772	Some	8	51.5	57.1	69.8	
17-Jun	17.5	2.0	10.20	25.2	666	Some	26	50.0	53.4	50.7	*Profile sample*
2-Jul											
16-Jul											
30-Jul	22.0	2.0	8.75	18.9	478	Some	25	50.0	51.8	46.6	
13-Aug	24.0	2.3	5.89	22.2	480	Some	22	48.0	48.0	48.9	Very little algae
27-Aug	22.0	2.0	11.70	20.6	480	Some	23	50.0	54.7	47.8	*Profile sample*
10-Sep	20.5	2.3	11.30	19.3	513	Some	27	48.0	54.4	46.9	
24-Sep	18.0	2.0	11.90	30.4	540	Some	18	50.0	54.9	53.4	
8-Oct	15.5	2.0	9.75	21.3	448	Some	21	50.0	52.9	48.3	
22-Oct	12.0	2.0	8.72	26.4	477	Some	18	50.0	51.8	51.4	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	18.4	2.1	9.89	31.7	554		20	49.4	52.7	52.2	**TSI Average = 51.4**
Median	18.0	2.0	9.75	25.2	513		21	50.0	52.9	50.7	
Min	12.0	1.8	5.89	18.9	448		8	48.0	48.0	46.6	
Max	24.0	2.3	14.90	94.8	772		27	51.5	57.1	69.8	
Count	11	11	11	11	11		11	11	11	11	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	15.0	4.0	4.40	24.9	435	None	17	40.0	45.1	50.5	
20-May	15.0	6.0	3.80	45.2	604	None	13	34.1	43.7	59.1	
3-Jun	19.0	4.0	2.94	86*	441	Some	5	40.0	41.1	68.4	
17-Jun	19.0	4.5	29.70	22.1	412	None	19	38.3	63.8	48.8	*Profile sample*
1-Jul	22.0	4.5	2.42	20.4	404	Some	20	38.3	39.2	47.7	
15-Jul	21.1										
29-Jul	20.6										
12-Aug	23.4										
26-Aug	22.0	2.5	1.86	21.7	475	Some	22	46.8	36.7	48.5	*Profile sample*
9-Sep	19.0	2.0	3.86	60.8*	531	Some	9	50.0	43.8	63.4	
23-Sep	18.0	2.0	4.79	17	322	Some	19	50.0	45.9	45.0	
7-Oct	16.0	4.0	10.90	40.5	411	Dense	10	40.0	54.0	57.5	
21-Oct	11.7										
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	18.6	3.7	7.19	37.6	448		15	41.9	45.9	54.3	**TSI Average = 47.4**
Median	19.0	4.0	3.86	24.9	435		17	40.0	43.8	50.5	
Min	11.7	2.0	1.86	17	322		5	34.1	36.7	45.0	
Max	23.4	6.0	29.70	86	604		22	50.0	63.8	68.4	
Count	13	9	9	9000	9000		9	9	9	9	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
7-May	15.0	1.5	4.30	29.7	1020	Some	34	54.1	44.9	53.1	Very little algae.
21-May	20.0	1.5	2.94	35	914	Some	26	54.1	41.1	55.4	
4-Jun	18.0	1.3	7.81	19	791	None	42	56.2	50.7	46.6	
18-Jun	21.0	1.5	4.73	22.6	790	None	35	54.1	45.8	49.1	*Profile sample*
2-Jul	24.0	1.5	3.52	28.7	871	None	30	54.1	42.9	52.6	
16-Jul	19.5	1.0	4.97	18.9	792	None	42	60.0	46.3	46.6	
30-Jul											
13-Aug	24.5	1.0	10.70	21.3	1010		47	60.0	53.8	48.3	
26-Aug	21.5	1.0	3.84	17.6	835	None	47	60.0	43.8	45.5	*Profile sample*
10-Sep	20.0	1.0	5.72	15.4	923	Some	60	60.0	47.7	43.6	
24-Sep	18.0	1.0	5.85	15	680	None	45	60.0	47.9	43.2	
8-Oct	14.0	1.0	5.37	34.5	792	None	23	60.0	47.1	55.2	
22-Oct	10.5	1.0	0.76	15.3	784	None	51	60.0	27.9	43.5	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	18.8	1.2	5.04	22.8	850		40	57.7	45.0	48.6	**TSI Average = 50.4**
Median	19.8	1.0	4.85	20.2	814		42	60.0	46.1	47.5	
Min	10.5	1.0	0.76	15	680		23	54.1	27.9	43.2	
Max	24.5	1.5	10.70	35	1020		60	60.0	53.8	55.4	
Count	12	12	12	12	12		12	12	12	12	

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	17.0	2.5	3.40	13.2	441	None	33	46.8	42.6	41.4	
20-May	18.0	2.8	2.96	14.6	433	None	30	45.1	41.2	42.8	
3-Jun	17.0	2.3	3.92	56.9*	442	None	8	48.0	44.0	62.5	
17-Jun	17.0	2.5	5.65	14.4	454	None	32	46.8	47.6	42.6	*Profile sample*
1-Jul	19.5	2.5	7.59	13.9	444	None	32	46.8	50.5	42.1	
15-Jul	19.0	2.0	7.55	17.3	501	None	29	50.0	50.4	45.3	
29-Jul	18.5	1.8	8.46	18.9	527	None	28	51.5	51.5	46.6	
12-Aug	22.5	1.5	14.90	27.3	589	None	22	54.1	57.1	51.9	
26-Aug	19.0	1.5	4.39	18.8	520	None	28	54.1	45.1	46.5	*Profile sample*
9-Sep	19.0	1.3	37.30	52.7*	594	None	11	56.2	66.1	61.3	
23-Sep	17.0	1.5	6.87	19.9	549	None	28	54.1	49.5	47.3	
7-Oct	13.0	1.8	21.90	22.9	557	None	24	51.5	60.8	49.3	
21-Oct	11.0	2.0	8.25	15.2	462	None	30	50.0	51.3	43.4	
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	17.5	2.0	10.24	23.5	501		26	50.4	50.6	47.9	**TSI Average = 49.6**
Median	18.0	2.0	7.55	18.8	501		28	50.0	50.4	46.5	
Min	11.0	1.3	2.96	13.2	433		8	45.1	41.2	41.4	
Max	22.5	2.8	37.30	56.9	594		33	56.2	66.1	62.5	
Count	13	13	13	13	13		13	13	13	13	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI Secc	Calculated TSI chl-a	Calculated TSI TP	Notes
6-May	15.0	6.3	0.96	11.2	420	Some	38	33.4	30.2	39.0	Clearest I've seen lake!
20-May	17.0	5.5	1.36	10.7	353	Some	33	35.4	33.6	38.3	
3-Jun	17.5	4.5	2.76	55.6*	332	Some	6	38.3	40.5	62.1	
17-Jun	18.5	4.0	2.52	22.1	424	Some	19	40.0	39.6	48.8	*Profile sample*
1-Jul	22.0	4.0	2.92	9.6	358	Some	37	40.0	41.1	36.8	
15-Jul	21.5	2.5	5.27	12.4	390	Some	31	46.8	46.9	40.5	
29-Jul	20.0	3.3	4.57	11.1	383	Some	35	42.8	45.5	38.9	
12-Aug	23.0	4.0	2.60	9	392	Some	44	40.0	39.9	35.8	
26-Aug	19.5	4.5	1.73	8.5	383	Some	45	38.3	35.9	35.0	*Profile sample*
9-Sep	19.5	5.0	1.76	30.8	346	Some	11	36.8	36.1	53.6	
24-Sep											
7-Oct	15.0	4.5	2.64	10	347	Some	35	38.3	40.1	37.4	
21-Oct	11.5	5.0	2.06	12.7	377	Some	30	36.8	37.7	40.8	

	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	N:P	Calculated TSI Secc	Calculated TSI chl-a	Calculated TSI TP	
Mean	18.3	4.4	2.60	17.0	375	30	38.9	38.9	42.3	**TSI Average = 40.0**
Median	19.0	4.5	2.56	11.2	380	34	38.3	39.8	38.9	
Min	11.5	2.5	0.96	8.5	332	6	33.4	30.2	35.0	
Max	23.0	6.3	5.27	55.6	424	45	46.8	46.9	62.1	
Count	12	12	12	12	12	12	12	12	12	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	13.0	3.3	5.60	19	498	None	26	42.8	47.5	46.6	
20-May	14.5	4.0	3.68	18.4	381	None	21	40.0	43.4	46.2	
3-Jun	17.0	3.5	5.37	71.6*	351	None	5	41.9	47.1	65.8	
17-Jun	16.5	3.0	5.67	19.8	352	None	18	44.1	47.6	47.2	*Profile sample*
1-Jul	20.0	3.8	2.89	13.9	337	None	24	40.7	41.0	42.1	
15-Jul	21.5	2.8	3.66	15.7	373	Some	24	45.1	43.3	43.9	
29-Jul	19.5	2.5	7.19	27.5	485	Some	18	46.8	49.9	52.0	
12-Aug	22.5	3.0	3.68	11.6	385	Dense	33	44.1	43.4	39.5	
26-Aug	19.5	2.5	4.81	13.1	350	Dense	27	46.8	46.0	41.3	*Profile sample.* Green clumps of bloom
9-Sep	18.5	3.0	4.13	36.1*	359	Dense	10	44.1	44.5	55.9	Green scum on lake, bloom present for 5 days
23-Sep	17.5	2.8	4.83	12.1	303	Dense	25	45.1	46.0	40.1	
7-Oct	14.5	2.5	7.67	11.3	387	Some	34	46.8	50.6	39.1	Green scum on lake
21-Oct	11.5	2.5	5.75	19.6	375	Some	19	46.8	47.7	47.1	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	17.4	3.0	4.99	22.3	380		22	44.3	46.0	46.7	**TSI Average = 45.6**
Median	17.5	3.0	4.83	18.4	373		24	44.1	46.0	46.2	
Min	11.5	2.5	2.89	11.3	303		5	40.0	41.0	39.1	
Max	22.5	4.0	7.67	71.6	498		34	46.8	50.6	65.8	
Count	13	13	13	13	13		13	13	13	13	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	14.0	2.0	1.50	20.3	708	None	35	50.0	34.5	47.6	
20-May	15.5	2.0	1.62	18.7	584	Some	31	50.0	35.3	46.4	
3-Jun	17.0	2.0	2.58	77.3*	537	Some	7	50.0	39.9	66.9	Secchi on bottom
17-Jun	16.0	2.3	1.58	32.5	887	Some	27	48.0	35.1	54.4	*Profile sample.* Secchi on bottom
1-Jul	21.0		3.24	23.9	739	Some	31		42.1	49.9	Secchi on bottom
15-Jul											
29-Jul	20.0	2.3	3.30	22	556	Some	25	48.0	42.3	48.7	
12-Aug	23.0	2.3	1.40	12.9	375	Some	29	48.0	33.9	41.0	
26-Aug	20.5	2.3	1.54	15.9	360	Some	23	48.0	34.8	44.1	Secchi disk on bottom
9-Sep	20.5	2.3	3.82	33	413	Some	13	48.0	43.7	54.6	
23-Sep	19.0		3.66	16.1	358	Some	22		43.3	44.2	Secchi disk visible on lake bottom at 2.25m
7-Oct	14.0		8.27	28.8	481	Some	17		51.3	52.6	Secchi disk visible on lake bottom at 2.25m
21-Oct	11.5	2.5	4.09	13.8	430	None	31	46.8	44.4	42.0	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	17.7	2.2	3.05	26.3	536		24	48.5	40.0	49.4	**TSI Average = 46.0**
Median	18.0	2.3	2.91	21.2	509		26	48.0	41.0	48.2	
Min	11.5	2.0	1.40	12.9	358		7	46.8	33.9	41.0	
Max	23.0	2.5	8.27	77.3	887		35	50.0	51.3	66.9	
Count	12	9	12	12	12		12	9	12	12	

* Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	13.0	4.0	3.30	10.2	416	None	41	40.0	42.3	37.7	
20-May	16.0	4.5	5.51	14	390	None	28	38.3	47.3	42.2	
3-Jun	17.0	4.0	5.01	53.1*	341	None	6	40.0	46.4	61.5	
17-Jun	17.0	3.0	3.42	9.1	344	None	38	44.1	42.6	36.0	Leeches in water for first time in memory
1-Jul	21.0	4.0	2.00	8.7	343	None	39	40.0	37.4	35.4	
15-Jul	21.0	4.0	2.68	8.8	409	Some	46	40.0	40.2	35.5	
29-Jul	20.0	4.0	2.04	5.9	346	Some	59	40.0	37.6	29.8	
12-Aug	21.0	4.0	1.30	6.3	336	None	53	40.0	33.1	30.7	
26-Aug	22.0	4.0	1.85	6.7	360	None	54	40.0	36.6	31.6	*Profile sample*
9-Sep	20.0	4.0	1.06	31.1*	362	None	12	40.0	31.1	53.7	
23-Sep	21.0	4.0	2.02	6.2	278	None	45	40.0	37.5	30.5	Lake is incredibly clear
7-Oct	15.0	3.0	11.10	9.2	421	None	46	44.1	54.2	36.2	
21-Oct	11.0	3.0	11.40	12	380	Some	32	44.1	54.4	40.0	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	18.1	3.8	4.05	13.9	364		38	40.8	41.6	38.5	**TSI Average = 40.3**
Median	20.0	4.0	2.68	9.1	360		41	40.0	40.2	36.0	
Min	11.0	3.0	1.06	5.9	278		6	38.3	31.1	29.8	
Max	22.0	4.5	11.40	53.1	421		59	44.1	54.4	61.5	
Count	13	13	13	13	13		13	13	13	13	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	13.5	3.0	2.20	21.1	594	None	28	44.1	38.3	48.1	
20-May	15.0	3.0	2.32	20.2	484	None	24	44.1	38.8	47.5	
3-Jun	16.5	2.3	3.36	54.6*	448	None	8	48.0	42.5	61.9	
17-Jun	17.0	2.3	7.67	12.5	479	Some	38	48.0	50.6	40.6	*Profile sample*
1-Jul	23.0	3.0	4.79	14.5	493	Some	34	44.1	45.9	42.7	
15-Jul	21.0	1.5	16.40	19.6	577	None	29	54.1	58.0	47.1	
29-Jul	18.5	1.5	12.50	20	575	None	29	54.1	55.3	47.4	
12-Aug	23.5	1.5	13.90	23.7	680	None	29	54.1	56.4	49.8	
26-Aug	21.0	1.5	17.40	22.9	680	Some	30	54.1	58.6	49.3	*Profile sample*
9-Sep	19.0	1.3	18.30	44*	535	Some	12	56.2	59.1	58.7	
23-Sep	18.5	1.8	10.60	21.2	516	Some	24	51.5	53.7	48.2	
7-Oct	15.0	1.8	14.30	19.1	538	None	28	51.5	56.7	46.7	
21-Oct	11.5	1.8	3.36	16.1	471	None	29	51.5	42.5	44.2	
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	17.9	2.0	9.78	23.8	544		26	50.4	50.5	48.6	**TSI Average = 49.9**
Median	18.5	1.8	10.60	20.2	535		29	51.5	53.7	47.5	
Min	11.5	1.3	2.20	12.5	448		8	44.1	38.3	40.6	
Max	23.5	3.0	18.30	54.6	680		38	56.2	59.1	61.9	
Count	13	13	13	13	13		13	13	13	13	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI Secc	Calculated TSI chl-a	Calculated TSI TP	Notes
6-May	15.0		22.40	30.9	609	None	20		61.1	53.6	
20-May	18.0	1.0	7.34	29.8	552	Some	19	60.0	50.1	53.1	
3-Jun	18.5	1.0	3.66	74.4*	616	Some	8	60.0	43.3	66.3	
17-Jun	19.0	3.5	2.30	28.7	551	Some	19	41.9	38.7	52.6	*Profile sample*
1-Jul	22.0	2.5	6.55	21.2	515	Some	24	46.8	49.0	48.2	
15-Jul	21.0	2.8	14.10	26.3	590	Some	22	45.1	56.5	51.3	
29-Jul	20.5	3.0	6.65	25	529	Some	21	44.1	49.2	50.6	
12-Aug	23.0	3.0	7.79	22	501	Some	23	44.1	50.7	48.7	
26-Aug											*Profile sample*
9-Sep	21.0	3.0	4.31	38.6*	482	Some	12	44.1	44.9	56.9	
23-Sep	20.0	2.8	5.21	20.3	548	Some	27	45.1	46.8	47.6	Algae at the south end
7-Oct	14.5	3.0	8.45	20.4	549	Some	27	44.1	51.5	47.7	
21-Oct	11.0	3.0	7.12	19	563	None	30	44.1	49.8	46.6	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI Secc**	**Calculated TSI chl-a**	**Calculated TSI TP**	
Mean	18.6	2.6	7.99	29.7	550		21	47.2	49.3	51.9	**TSI Average = 49.5**
Median	19.5	3.0	6.89	25.7	550		22	44.1	49.5	51.0	
Min	11.0	1.0	2.30	19	482		8	41.9	38.7	46.6	
Max	23.0	3.5	22.40	74.4	616		30	60.0	61.1	66.3	
Count	12	11	12	12	12		12	11	12	12	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	12.5	3.8	2.20	25.2	501	None	20	40.7	38.3	50.7	Bright sun may have increased secchi transparency.
20-May	12.5	3.8	4.15	20.6	394	Some	19	40.7	44.5	47.8	Small blue algae scum near downwind edge of lake most mornings.
3-Jun	14.0	2.1	11.10	72*	470	Some	7	49.3	54.2	65.9	
17-Jun	15.5	3.5	3.32	18.2	440	Some	24	41.9	42.3	46.0	*Profile sample.* Blue algae on sfc in early am. Less algae in water than last wk.
1-Jul	18.0	2.5	7.08	16.7	436	Some	26	46.8	49.8	44.8	Lots of algae in water, but not on surface. Is not clumping.
15-Jul		2.3	11.30	20.2	508	Some	25	48.0	54.4	47.5	
29-Jul	20.0	1.3	34.30	22.9	594	Some	26	56.2	65.2	49.3	Single cell algae dist. evenly throughout water column
12-Aug	23.5	1.1	40.60	41.9	578	Some	14	58.6	66.9	58.0	
26-Aug	21.0	1.0	45.60	30	659	Some	22	60.0	68.0	53.2	*Profile sample*
9-Sep	20.0	1.5	23.70	37.8	489	Some	13	54.1	61.6	56.6	More Daphnia
23-Sep	18.5	2.1	10.90	26.4	501	Some	19	49.3	54.0	51.4	Lots of Daphnia
7-Oct	14.0	2.1	9.30	13.9	482	None	35	49.3	52.4	42.1	
21-Oct	12.0	2.5	3.57	14.2	508	None	36	46.8	43.1	42.4	

	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	16.8	2.3	15.93	27.7	505		22	49.4	53.4	50.4	**TSI Average = 51.1**
Median	16.8	2.1	10.90	22.9	501		22	49.3	54.0	49.3	
Min	12.0	1.0	2.20	13.9	394		7	40.7	38.3	42.1	
Max	23.5	3.8	45.60	72	659		36	60.0	68.0	65.9	
Count	12	13	13	13	13		13	13	13	13	

* Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI Secc	chl-a	TP	Notes
6-May	16.0	3.0	4.00	13.7	431	Some	31	44.1	44.2	41.9	
20-May	17.5	4.5	2.02	20.4	1040	None	51	38.3	37.5	47.7	
3-Jun	18.0	5.0	1.56	54.4*	469	Some	9	36.8	34.9	61.8	
17-Jun	19.5	5.5	1.12	19.1	597	None	31	35.4	31.7	46.7	*Profile sample*
1-Jul	23.5	5.3	1.56	8.5	384	None	45	35.9	34.9	35.0	
15-Jul	22.5	4.5	3.36	6.3	312	None	50	38.3	42.5	30.7	
29-Jul	20.5	4.5	4.05		288	None		38.3	44.3		
12-Aug	24.5	4.5	0.92	7.9	353	None	45	38.3	29.8	34.0	
26-Aug	22.5	5.0	0.96	5.9	288	None	49	36.8	30.2	29.8	*Profile sample*
9-Sep	21.0	4.0	1.36	9.3	346	Some	37	40.0	33.6	36.3	Bloom present 2-3 days
23-Sep	19.5	5.0	1.40	6	303	None	51	36.8	33.9	30.0	
7-Oct	15.5	4.0	6.27	6.5	298	None	46	40.0	48.6	31.1	
21-Oct	11.7		2.24	6.5	301		46		38.5	31.1	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI Secc**	**chl-a**	**TP**	
Mean	19.4	4.6	2.37	13.7	416		41	38.2	37.3	38.0	**TSI Average = 37.8**
Median	19.5	4.5	1.56	8.2	346		46	38.3	34.9	34.5	
Min	11.7	3.0	0.92	5.9	288		9	35.4	29.8	29.8	
Max	24.5	5.5	6.27	54.4	1040		51	44.1	48.6	61.8	
Count	13	12	13	12	13		12	12	13	12	

* Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI Secc	chl-a	TP	Notes
6-May	14.2	3.0	11.20	16.9	1210	None	72	44.1	54.3	44.9	
20-May	15.4	2.2	15.40	30.9	1060	Some	34	48.6	57.4	53.6	10' x 3' area has light grn look at 1m depth (for 2 days)
3-Jun	17.7	2.2	12.00	138*	818		6	48.6	54.9	75.2	
17-Jun	17.8	2.2	28.20	19.9	935	None	47	48.6	63.3	47.3	*Profile sample*
1-Jul	21.5	3.0	7.13	15.3	720	None	47	44.1	49.8	43.5	
15-Jul	21.8	2.2	28.30	17.1	719	None	42	48.6	63.4	45.1	
29-Jul	21.5	2.5	14.70	17.5	636	None	36	46.8	56.9	45.4	
12-Aug	24.0	2.7	4.85	14.2	526	Some	37	45.7	46.1	42.4	Black green clump from bottom. Fine green particles in water for 2 wks.
26-Aug	21.0	2.5	20.80	18.3	536	Some	29	46.8	60.3	46.1	*Profile sample.* Green brown clumps from bottom. Present 2 weeks.
9-Sep	19.7	1.8	55.10	62*	667	Some	11	51.5	69.9	63.7	Black green globs from bottom. Small particles floating (1m) in lake giving it a brownish-green look
23-Sep	18.6	1.4	58.60	38.6	705	Some	18	55.1	70.5	56.9	light green small particles floating down in depth. Some globs of black to brown-green on bottom.
7-Oct	14.2	1.5	20.90	25.6	684	Some	27	54.1	60.4	50.9	Some very fine light green [particles] in some spots
21-Oct	11.5	1.7	6.17	41.6	923	None	22	52.3	48.4	57.9	

	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	N:P	Calculated TSI Secc	chl-a	TP	Notes
Mean	18.4	2.2	21.80	35.1	780	33	48.9	58.1	51.8	**TSI Average = 52.9**
Median	18.6	2.2	15.40	19.9	719	34	48.6	57.4	47.3	
Min	11.5	1.4	4.85	14.2	526	6	44.1	46.1	42.4	
Max	24.0	3.0	58.60	138	1210	72	55.1	70.5	75.2	
Count	13	13	13	13	13	13	13	13	13	

* Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	14.4										
20-May	15.0	4.3	3.76	10.7	443	None	41	39.0	43.6	38.3	
3-Jun	15.5	4.0	7.21	89.6*	403	Some	4	40.0	49.9	69.0	
17-Jun	16.0	4.5	5.69	12.4	360	None	29	38.3	47.6	40.5	*Profile sample*
1-Jul	20.0	5.0	1.96	12.8	291	Some	23	36.8	37.2	40.9	
15-Jul	20.0	5.5	1.84	7.8	325	Some	42	35.4	36.6	33.8	
29-Jul	18.5	5.0	6.05	7.5	288	Some	38	36.8	48.2	33.2	
12-Aug	24.0	4.3	2.08	8.5	257	Some	30	39.0	37.8	35.0	
26-Aug	19.5	4.0	1.99	7.7	291	Some	38	40.0	37.3	33.6	*Profile sample*
9-Sep	18.5	3.5	3.00	32.6*	272	Some	8	41.9	41.3	54.4	
23-Sep	19.0	4.0	1.78	6.8	239	Some	35	40.0	36.2	31.8	
7-Oct	15.0	3.3	5.89	7.3	323	Some	44	42.8	48.0	32.8	
21-Oct	11.0	3.0	4.53	9.5	295	Some	31	44.1	45.4	36.6	
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	17.4	4.2	3.82	17.8	316		30	39.5	42.4	40.0	**TSI Average = 40.6**
Median	18.5	4.2	3.38	9.0	293		33	39.5	42.5	35.8	
Min	11.0	3.0	1.78	6.8	239		4	35.4	36.2	31.8	
Max	24.0	5.5	7.21	89.6	443		44	44.1	49.9	69.0	
Count	13	12	12	12	12		12	12	12	12	

* Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	14.4		2.70	29.2	594		20		40.3	52.8	
20-May	16.4		5.23	25.9	534		21		46.8	51.1	
3-Jun	17.0	3.0	3.26	69.1*	584	Some	8	44.1	42.2	65.3	
18-Jun	20.0	4.0	5.00	22.9	530	None	23	40.0	46.4	49.3	*Profile sample*
1-Jul	22.5	3.0	2.29	18.5	486	None	26	44.1	38.7	46.2	
15-Jul	25.0	3.0	10.40	21.3	557	Some	26	44.1	53.5	48.3	
29-Jul											
12-Aug	27.0	2.5	2.72	13.5	476	Some	35	46.8	40.4	41.7	
26-Aug	22.5	3.0	7.40	20.9	503	None	24	44.1	50.2	48.0	*Profile sample*
9-Sep	19.7										
23-Sep	18.6	3.0	5.90	15.3	378	Some	25	44.1	48.0	43.5	
7-Oct	14.7	2.5	8.19	18.3	473	None	26	46.8	51.2	46.1	
21-Oct	11.7	4.5	7.11	15.9	487	Some	31	38.3	49.8	44.1	
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	17.4	3.2	5.47	24.6	509		24	43.6	46.1	48.8	**TSI Average = 46.2**
Median	17.8	3.0	5.23	20.9	503		25	44.1	46.8	48.0	
Min	2.5	2.5	2.29	13.5	378		8	38.3	38.7	41.7	
Max	27.0	4.5	10.40	69.1	594		35	46.8	53.5	65.3	
Count	12	9	11	11	11		11	9	11	11	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	6.0	5.0	2.60	7.4	272	Some	37	36.8	39.9	33.0	
20-May	16.0	5.0	2.62	8.7	273		31	36.8	40.0	35.4	
3-Jun	18.0	5.0	1.96	55.4*	278	Some	5	36.8	37.2	62.1	
17-Jun	18.0	4.5	2.50	10.6	280	Some	26	38.3	39.6	38.2	*Profile sample*
1-Jul	21.0	4.5	2.04	8.7	280	Some	32	38.3	37.6	35.4	
15-Jul	22.5	5.0	1.74	6.8	292	Some	43	36.8	36.0	31.8	
29-Jul	22.0	4.5	1.92	5.2	280	None	54	38.3	37.0	27.9	
12-Aug	25.0	5.0	1.58	5.2	278	None	53	36.8	35.1	27.9	
26-Aug	22.0	4.5	1.90	6.1	263	Some	43	38.3	36.9	30.2	*Profile sample*
9-Sep	21.0	5.0	1.60	27.2*	305	None	11	36.8	35.2	51.8	
23-Sep	20.5	6.5	1.38		279	None		33.0	33.7		
7-Oct	17.0	6.0	3.28	7.6	311	None	41	34.1	42.2	33.4	
21-Oct	14.0	5.5	3.26	7.9	254	None	32	35.4	42.2	34.0	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	18.7	5.1	2.18	13.1	280		34	36.6	37.9	36.8	**TSI Average = 37.1**
Median	20.5	5.0	1.96	7.8	279		34	36.8	37.2	33.7	
Min	6.0	4.5	1.38	5.2	254		5	33.0	33.7	27.9	
Max	25.0	6.5	3.28	55.4	311		54	38.3	42.2	62.1	
Count	13	13	13	12	13		12	13	13	12	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
7-May	15.0	3.3	15.00	13.3	460	Some	35	42.8	57.1	41.5	
21-May	17.5	4.3	2.08	14.6	425	None	29	39.0	37.8	42.8	
4-Jun	18.5	5.0	2.88	9.9	414	None	42	36.8	40.9	37.2	
18-Jun	19.0	4.8	2.38	9.9	423	None	43	37.4	39.1	37.2	*Profile sample*
2-Jul	22.5	3.8	2.66	11.9	416	None	35	40.7	40.2	39.9	
16-Jul	21.0	3.0	7.43	13.9	451	None	32	44.1	50.2	42.1	
30-Jul	21.0	3.0	6.83	12.7	447	Some	35	44.1	49.4	40.8	
13-Aug	25.0	3.0	3.72	9	434	None	48	44.1	43.5	35.8	
27-Aug	22.0	3.5	5.29	11.2	456	None	41	41.9	46.9	39.0	*Profile sample*
10-Sep	21.0	3.0	8.93	22.6	419	Some	19	44.1	52.0	49.1	
24-Sep	19.0	3.0	12.00	11.2	387	Some	35	44.1	54.9	39.0	
8-Oct	15.0	3.0	9.45	12.6	453	Some	36	44.1	52.6	40.7	
22-Oct	12.0	3.0	7.01	11.8	490	Some	42	44.1	49.7	39.8	Green algae on bottom near shore
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	19.1	3.5	6.59	12.7	437		36	42.1	47.3	40.4	**TSI Average = 43.3**
Median	19.0	3.0	6.83	11.9	434		35	44.1	49.4	39.9	
Min	12.0	3.0	2.08	9	387		19	36.8	37.8	35.8	
Max	25.0	5.0	15.00	22.6	490		48	44.1	57.1	49.1	
Count	13	13	13	13	13		13	13	13	13	

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	14.0	4.8	3.30	9.4	378		40	37.4	42.3	36.5	
20-May	16.5	5.3	1.10	9.8	360	None	37	35.9	31.5	37.1	
3-Jun	18.5	4.8	1.24	32.7*	351	None	11	37.4	32.7	54.5	
17-Jun	18.5	4.8	1.74	9	366	None	41	37.4	36.0	35.8	*Profile sample*
1-Jul	21.5	4.3	2.48	6.7	349	None	52	39.0	39.5	31.6	
15-Jul	22.5	4.0	3.00	14.1	447	None	32	40.0	41.3	42.3	
30-Jul	21.0	4.0	2.10	7	359	Some	51	40.0	37.8	32.2	
12-Aug	24.5	3.8	1.04	12	420	None	35	40.7	31.0	40.0	
26-Aug	21.5	3.0	3.04	7	408	Some	58	44.1	41.5	32.2	*Profile sample.* Algae appears denser near shore
9-Sep	21.0	3.0	2.40	32.8*	406		12	44.1	39.2	54.5	
23-Sep	19.5	3.5	10.90	10.7	353	Some	33	41.9	54.0	38.3	
7-Oct	16.5	3.3	11.30	15.2	426	Some	28	42.8	54.4	43.4	
21-Oct	13.0	2.3	20.30	14.4	471	Dense	33	48.0	60.1	42.6	
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	19.1	3.9	4.92	13.9	392		36	40.7	41.6	40.1	**TSI Average = 40.8**
Median	19.5	4.0	2.48	10.7	378		35	40.0	39.5	38.3	
Min	13.0	2.3	1.04	6.7	349		11	35.9	31.0	31.6	
Max	24.5	5.3	20.30	32.8	471		58	48.0	60.1	54.5	
Count	13	13	13	13	13		13	13	13	13	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	15.0	2.8	3.40	16.1	640	Some	40	45.1	42.6	44.2	
20-May	16.0	2.5	6.65	19.4	578		30	46.8	49.2	46.9	
3-Jun	17.0	2.8	6.49	61.3*	523	Some	9	45.1	48.9	63.5	
17-Jun	19.0	2.5	2.76	15.8	562	Some	36	46.8	40.5	44.0	*Profile sample*
1-Jul	22.0	2.5	4.07	13.4	537	Some	40	46.8	44.3	41.6	
15-Jul											
29-Jul	21.0	2.8	20.90	31.1	690	some	22	45.1	60.4	53.7	
12-Aug	26.0	2.3	1.92	10.9	509	Some	47	48.0	37.0	38.6	
26-Aug	20.0	2.3	13.30	27.2	647	None	24	48.0	56.0	51.8	*Profile sample*
9-Sep	19.0	3.5	3.09	35.3*	481	Some	14	41.9	41.6	55.6	
23-Sep	19.0	2.5	11.70	20.7	468	Some	23	46.8	54.7	47.9	
7-Oct											
21-Oct	12.0	2.8	3.64	12.3	494	Some	40	45.1	43.2	40.4	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	18.7	2.7	7.08	24.0	557		29	46.0	47.1	48.0	**TSI Average = 47.0**
Median	19.0	2.5	4.07	19.4	537		30	46.8	44.3	46.9	
Min	12.0	2.3	1.92	10.9	468		9	41.9	37.0	38.6	
Max	26.0	3.5	20.90	61.3	690		47	48.0	60.4	63.5	
Count	11	11	11	11	11		11	11	11	11	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
7-May	16.5	2.5	3.10	11.5	447	None	39	46.8	41.7	39.4	
22-May	17.5	5.3	1.00	19.3	430	None	22	35.9	30.6	46.9	*Profile sample*
4-Jun	18.5	3.3	2.24	12.8	486	Some	38	42.8	38.5	40.9	Very little algae
19-Jun	18.5	3.5	5.01	8.4	525	None	63	41.9	46.4	34.8	*Profile sample*
3-Jul	20.5	3.5	6.41	17.4	524	Some	30	41.9	48.8	45.4	
16-Jul	19.0	2.8	17.70	14.6	578	Some	40	45.1	58.8	42.8	
30-Jul	19.0	2.8	8.87	12.6	490	Some	39	45.1	52.0	40.7	
12-Aug											
27-Aug	18.0	3.0	6.95	13.8	485	Some	35	44.1	49.6	42.0	*Profile sample*
10-Sep	17.0	3.3	6.47	32.9	514	Some	16	44.1	48.9	54.5	
25-Sep	16.5	2.8	8.68	12.7	407	Some	32	45.1	51.8	40.8	
9-Oct	12.5	3.3	8.69	15.1	555	Some	37	42.8	51.8	43.3	
22-Oct	10.0	2.8	9.85	12.1	424	Some	35	45.1	53.0	40.1	
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	17.0	3.2	7.08	15.3	489		35	43.4	47.6	42.6	**TSI Average = 44.6**
Median	17.8	3.0	6.71	13.3	488		36	44.1	49.2	41.5	
Min	10.0	2.5	1.00	8.4	407		16	35.9	30.6	34.8	
Max	20.5	5.3	17.70	32.9	578		63	46.8	58.8	54.5	
Count	12	12	12	12	12		12	12	12	12	

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	11.5	2.0	25.90	41.7	790	Some	19	50.0	62.5	58.0	
20-May	11.0	2.3	9.85	39.8	609	Some	15	48.0	53.0	57.3	
3-Jun	13.0	4.0	0.62	92.4*	609	None	7	40.0	25.9	69.5	
18-Jun	13.0	3.8	3.18	84.2	1030	Some	12	40.7	41.9	68.1	*Profile sample*
2-Jul	19.5	1.5	13.70	31.4	497	None	16	54.1	56.2	53.9	
15-Jul	17.0	4.0	5.95	27.3	420	None	15	40.0	48.1	51.9	
30-Jul	18.0	2.0	25.30	25.2	520	None	21	50.0	62.3	50.7	
12-Aug	19.0	3.0	4.11	35.5	439	Some	12	44.1	44.4	55.6	
27-Aug	16.0	2.0	37.10	49.8	500	Dense	10	50.0	66.0	60.5	*Profile sample.* Algae dense in water column. Not so obvious at edges.
9-Sep	15.0	2.0	54.20	47.2	552	Some	12	50.0	69.7	59.8	
23-Sep	15.0	3.8	3.86	25.3	498	None	20	40.7	43.8	50.8	
7-Oct	11.0	4.3	6.55	31	598	None	19	39.0	49.0	53.7	
21-Oct	9.0	2.5	1.07	30.8	664	None	22	46.8	31.2	53.6	

	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	14.5	2.9	14.72	43.2	594		15	45.7	50.3	57.2	**TSI Average = 51.0**
Median	15.0	2.5	6.55	35.5	552		15	46.8	49.0	55.6	
Min	9.0	1.5	0.62	25.2	420		7	39.0	25.9	50.7	
Max	19.5	4.3	54.20	92.4	1030		22	54.1	69.7	69.5	
Count	13	13	13	13	13		13	13	13	13	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	14.0	3.3	6.00	8.4	385	Some	46	42.8	48.1	34.8	
20-May	15.0	4.8	2.58	11.8	373	None	32	37.4	39.9	39.8	
3-Jun	17.5	5.5	1.32	57.1*	415	None	7	35.4	33.3	62.5	
17-Jun	17.5	4.5	2.02	12.6	417	None	33	38.3	37.5	40.7	*Profile sample.* Water is choppy. Secchi may be inaccurate
1-Jul	20.0	4.3	1.60	8.9	355	None	40	39.0	35.2	35.7	
15-Jul	22.0	4.5	2.38	8.9	359	None	40	38.3	39.1	35.7	
30-Jul	21.0	4.3	2.36	8.9	354	None	40	39.0	39.0	35.7	
12-Aug	24.0	4.3	1.50	5.2	338	None	65	39.0	34.5	27.9	
26-Aug	21.0	5.5	2.28	8.1	337	None	42	35.4	38.7	34.3	*Profile sample*
9-Sep	20.0	4.3	2.53	32.4*	401	Some	12	39.0	39.7	54.3	Flecks of algae all across lake surface. Waves may have influenced Secchi.
23-Sep	19.0	4.8	2.88	7.5	307		41	37.4	40.9	33.2	Film of algae? Junk? In cove
7-Oct	15.0	4.8	3.27	6.7	344	None	51	37.4	42.2	31.6	
21-Oct	12.5	5.8	2.82	9.2	358	None	39	34.6	40.7	36.2	
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	18.3	4.7	2.58	14.3	365		38	37.9	39.1	38.6	**TSI Average = 38.6**
Median	19.0	4.5	2.38	8.9	358		40	38.3	39.1	35.7	
Min	12.5	3.3	1.32	5.2	307		7	34.6	33.3	27.9	
Max	24.0	5.8	6.00	57.1	417		65	42.8	48.1	62.5	
Count	13	13	13	13	13		13	13	13	13	

*Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
7-May	18.5	4.8	5.00	18	454	Some	25	37.4	46.4	45.8	
21-May	20.0	3.3	3.06	16.3	602	Some	37	42.8	41.5	44.4	
4-Jun	16.5	3.8	3.97	14.7	466	None	32	40.7	44.1	42.9	
18-Jun	19.5	5.5	1.12	9.8	334	None	34	35.4	31.7	37.1	*Profile sample*
2-Jul	22.5	4.3	3.08	9.9	346	Some	35	39.0	41.6	37.2	
16-Jul	21.0	3.8	2.42	7.9	329	None	42	40.7	39.2	34.0	
30-Jul											
13-Aug	25.5	5.8	1.14	10.5	331	None	32	34.6	31.9	38.1	
27-Aug	22.5	5.3	2.24	6	268	None	45	35.9	38.5	30.0	*Profile sample*
10-Sep	20.0	4.8	1.82	7.4	304	None	41	37.4	36.4	33.0	
24-Sep	20.5	5.3	2.00	7.4	331	None	45	35.9	37.4	33.0	
8-Oct	14.5	4.3	2.24	10.8	398		37	39.0	38.5	38.5	
21-Oct	11.7										
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	19.4	4.6	2.55	10.8	378		37	38.1	38.8	37.6	**TSI Average = 38.2**
Median	20.0	4.8	2.24	9.9	334		37	37.4	38.5	37.2	
Min	11.7	3.3	1.12	6	268		25	34.6	31.7	30.0	
Max	25.5	5.8	5.00	18	602		45	42.8	46.4	45.8	
Count	12	11	11	11	11		11	11	11	11	

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	12.5	2.5	12.80	12.5	343	None	27	46.8	55.6	40.6	
20-May	14.5	2.8	10.80	15.5	317	None	20	45.1	53.9	43.7	Water is brownish
3-Jun	17.0	2.5	7.59	65.3*	286	None	4	46.8	50.5	64.4	
17-Jun	17.5	2.8	4.05	16.1	272	None	17	45.1	44.3	44.2	*Profile sample*
1-Jul	21.0	3.3	3.80	11	294	None	27	42.8	43.7	38.7	
15-Jul	21.0	3.3	2.36	11.2	265	None	24	42.8	39.0	39.0	
29-Jul	20.0	4.3	2.92	11.5	278	None	24	39.0	41.1	39.4	
12-Aug	23.5	3.8	2.20	12.8	256	None	20	40.7	38.3	40.9	
26-Aug	20.5	4.0	2.18	10.3	256	None	25	40.0	38.2	37.8	*Profile sample*
9-Sep	20.0	4.0	2.72	34*	273	Some	8	40.0	40.4	55.0	
23-Sep	19.0	4.8	3.66	14.3	262	Some	18	40.0	43.3	42.5	
7-Oct	15.0	4.5	2.86	12.3	251	Some	20	38.3	40.9	40.4	Very little bloom left
21-Oct	12.5	4.0	7.51	9.9	229	None	23	40.0	50.3	37.2	
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	18.0	3.5	5.03	18.2	276		20	42.1	44.6	43.4	**TSI Average = 43.4**
Median	19.0	3.8	3.66	12.5	272		20	40.7	43.3	40.5	
Min	12.5	2.5	2.18	9.9	229		4	38.3	38.2	37.2	
Max	23.5	4.5	12.80	65.3	343		27	46.8	55.6	64.4	
Count	13	13	13	13	13		13	13	13	12	

* Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
7-May	16.5	2.3	3.90	14.4	579	Some	40	48.0	43.9	42.6	Algae tiny, suspended.
21-May	18.0	3.0	4.21	16.4	552	Some	34	44.1	44.7	44.5	
4-Jun	18.0	2.5	12.50	62*	624	Some	10	46.8	55.3	63.7	Very fine algae - particulate, suspended.
18-Jun	19.5	2.8	3.52	18.1	541	Some	30	45.1	42.9	45.9	*Profile sample*
2-Jul	23.0	2.3	1.68	12.8	521	None	41	48.0	35.7	40.9	
16-Jul											
30-Jul	21.5	3.0	2.92	12.2	485	None	40	44.1	41.1	40.2	
13-Aug	26.0	3.0	1.62	11.4	448	None	39	44.1	35.3	39.3	
27-Aug	21.5	2.5	3.81	11.3	466	None	41	46.8	43.7	39.1	*Profile sample*
10-Sep	21.0	3.0	3.19	9.3	471	None	51	44.1	41.9	36.3	
24-Sep	18.6										
8-Oct	14.7										
21-Oct	11.7										
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	19.2	2.7	4.15	18.7	521		36	45.7	42.7	43.6	**TSI Average = 44.0**
Median	19.0	2.8	3.52	12.8	521		40	45.1	42.9	40.9	
Min	11.7	2.3	1.62	9.3	448		10	44.1	35.3	36.3	
Max	26.0	3.0	12.50	62	624		51	48.0	55.3	63.7	
Count	12	9	9	9	9		9	9	9	9	

* Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI Secc	chl-a	TP	Notes
6-May	15.5	4.1	5.70	13	443	None	34	39.6	47.6	41.2	
20-May	18.3	4.5	6.78	11	384	None	35	38.3	49.3	38.7	
3-Jun	18.3	3.8	4.13	96.4*	344	Some	4	40.7	44.5	70.1	
17-Jun	18.9	4.0	4.13	11.4	352	Some	31	40.0	44.5	39.3	*Profile sample*
1-Jul	22.2	4.0	2.70	6.5	332	Some	51	40.0	40.3	31.1	
15-Jul	21.1	4.0	4.61	7.6	340	Some	45	40.0	45.6	33.4	
29-Jul	21.1	5.0	1.82		335	None		36.8	36.4		
12-Aug	23.0	5.0	2.44	5.3	349	None	66	36.8	39.3	28.2	
26-Aug	23.0	4.7	1.03	5.8	339	None	58	37.7	30.9	29.5	*Profile sample*
9-Sep	21.1	5.6	1.54	28*	318	None	11	35.1	34.8	52.2	
23-Sep	21.1	6.0	2.56	8.9	277	None	31	34.1	39.8	35.7	
7-Oct	15.5	6.0	4.55	6	342	None	57	34.1	45.4	30.0	
21-Oct	12.8	5.5	7.48	8.7	331	None	38	35.4	50.3	35.4	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI Secc**	**chl-a**	**TP**	
Mean	19.3	4.7	4.08	18.2	360		37	37.6	42.2	38.7	**TSI Average = 39.5**
Median	21.0	4.7	4.13	10.0	342		34	37.7	44.5	35.5	
Min	12.8	2.5	1.03	5.3	277		4	34.1	30.9	28.2	
Max	23.0	6.0	7.48	96.4	521		66	40.7	50.3	70.1	
Count	13	13	13	12	13		12	13	13	12	

* Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	16.0	2.0	6.60	11.9	469	Some	39	50.0	49.1	39.9	
20-May	17.0	2.8	5.25	11.1	409	Some	37	45.1	46.8	38.9	
3-Jun	16.0	2.5	6.57	64.1*	358		6	46.8	49.0	64.2	
17-Jun	18.0	2.0	4.95	16.3	364	None	22	50.0	46.3	44.4	*Profile sample*
1-Jul	23.0	2.3	3.40	8.7	353	Some	41	48.0	42.6	35.4	Brown bloom Friday 6/29
15-Jul	23.0	2.8	3.16	9.1	350		38	45.1	41.9	36.0	
29-Jul	20.0	2.5	3.42	5.2	345	Some	66	46.8	42.6	27.9	
12-Aug	24.0	2.5	1.54	6.5	355	Some	55	46.8	34.8	31.1	
26-Aug	21.0	3.0	2.79	7.5	370	Some	49	44.1	40.6	33.2	*Profile sample*
9-Sep	20.0	3.0	1.74	10.2	378	Some	37	44.1	36.0	37.7	
23-Sep	19.0	3.3	1.86	8.8	313	Some	36	42.8	36.7	35.5	Algae bloom present for several days
7-Oct	16.0	3.0	3.16	11.4	361		32	44.1	41.9	39.3	
21-Oct	13.5	2.8	5.51	10.8	348	None	32	45.1	47.3	38.5	
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	19.0	2.7	3.84	14.0	367		38	46.1	42.7	38.6	**TSI Average = 42.5**
Median	19.0	2.8	3.40	10.2	358		37	45.1	42.6	37.7	
Min	13.5	2.0	1.54	5.2	313		6	42.8	34.8	27.9	
Max	24.0	3.3	6.60	64.1	469		66	50.0	49.1	64.2	
Count	13	13	13	13	13		13	13	13	13	

* Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	14.4										
21-May	17.0	5.8	2.72	8.6	320	None	37	34.6	40.4	35.2	
4-Jun	17.5	7.0	1.28	35.8*	329	None	9	31.9	33.0	55.8	
18-Jun	18.0	5.8	1.62	11.8	358	None	30	34.6	35.3	39.8	*Profile sample*
1-Jul											
16-Jul	19.0	4.0	3.01	12.1	367	Some	30	40.0	41.4	40.1	
31-Jul	18.0	5.5	2.52		337	None		35.4	39.6		
12-Aug											
27-Aug	17.5	5.3	1.25	5.9	305	Some	52	35.9	32.8	29.8	*Profile sample*
11-Sep	15.0	6.0	1.54	6.5	333	None	51	34.1	34.8	31.1	
25-Sep	14.0	5.5	2.75	8.1	268	None	33	35.4	40.5	34.3	
9-Oct	10.5	5.3	2.54	8.6	301	None	35	35.9	39.7	35.2	
23-Oct	7.5		3.30	10.2	283	None	28		42.3	37.7	Sample taken off dock in 3m of water about 200' from normal site. Too windy to sample from boat.
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	15.3	5.6	2.25	12.0	320		34	35.3	38.0	37.7	**TSI Average = 37.0**
Median	17.0	5.5	2.53	8.6	325		33	35.4	39.7	35.2	
Min	7.5	4.0	1.25	5.9	268		9	31.9	32.8	29.8	
Max	19.0	7.0	3.30	35.8	367		52	40.0	42.3	55.8	
Count	11	9	10	9	10		9	9	10	9	

* Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	14.4										
21-May	16.0	4.0	2.48	13.5	307	Some	23	40.0	39.5	41.7	
4-Jun	18.0	4.3	2.35	16.1	364	Some	23	39.0	39.0	44.2	Very little algae
18-Jun	20.0	4.3	4.05	15.2	365	None	24	39.0	44.3	43.4	*Profile sample*
2-Jul	20.5	3.5	3.10	12.7	367	None	29	41.9	41.7	40.8	
16-Jul	20.5	4.3	4.01	12	326	None	27	39.0	44.2	40.0	
30-Jul	21.0	4.0	2.50	13.8	382	None	28	40.0	39.6	42.0	
12-Aug											
27-Aug	22.0	3.8	2.50	8.8	315	None	36	40.7	39.6	35.5	*Profile sample*
10-Sep	20.0	3.0	2.72	12.7	399	None	31	44.1	40.4	40.8	
24-Sep	19.5	3.5	3.42	12.7	335	None	26	41.9	42.6	40.8	
8-Oct	15.5	4.0	8.13	13.5	379	None	28	40.0	51.1	41.7	
22-Oct	12.5	4.0	8.45	13.1	354	None	27	40.0	51.5	41.3	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	18.3	3.9	3.97	13.1	354		27	40.5	43.0	41.1	**TSI Average = 41.6**
Median	19.8	4.0	3.10	13.1	364		27	40.0	41.7	41.3	
Min	12.5	3.0	2.35	8.8	307		23	39.0	39.0	35.5	
Max	22.0	4.3	8.45	16.1	399		36	44.1	51.5	44.2	
Count	12	11	11	11	11		11	11	11	11	

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
7-May	15.0	2.0	2.60	26	951	Some	37	50.0	39.9	51.2	
21-May	19.0	2.3	2.14	31.8	998	Some	31	48.0	38.0	54.1	
4-Jun	19.0	1.8	9.89	75.5*	926	Some	12	51.5	53.0	66.5	
18-Jun	20.0	2.0	5.04	40.5	884	Some	22	50.0	46.4	57.5	*Profile sample*
2-Jul	21.0	2.0	6.65	23.2	832	Some	36	50.0	49.2	49.5	
17-Jul	20.0	2.0	13.30	26.5	762	None	29	50.0	56.0	51.4	
30-Jul	21.0	2.0	8.25	19.7	696	Some	35	50.0	51.3	47.1	
13-Aug	24.5	2.0	2.40	20.3	695	Some	34	50.0	39.2	47.6	
27-Aug											
11-Sep		2.3	12.60	20.9	743	Some	36	48.0	55.4	48.0	
24-Sep											
8-Oct	15.5	2.0	27.40	24.3	761	Some	31	50.0	63.0	50.2	
22-Oct	12.0	2.0	16.00	18.1	665	None	37	50.0	57.8	45.9	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	18.7	2.0	9.66	29.7	810		31	49.8	49.9	51.7	**TSI Average = 50.5**
Median	19.5	2.0	8.25	24.3	762		34	50.0	51.3	50.2	
Min	12.0	1.8	2.14	18.1	665		12	48.0	38.0	45.9	
Max	24.5	2.3	27.40	75.5	998		37	51.5	63.0	66.5	
Count	10	11	11	11	11		11	11	11	11	

* Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
7-May	18.0	2.3	4.70	7.5	434	Some	58	48.0	45.8	33.2	Bloom began 23 April. Clearing up now.
21-May	19.5	3.6	2.48	11.7	391	Some	33	41.5	39.5	39.6	
4-Jun	19.5	3.0	3.84	32*	366	None	11	44.1	43.8	54.1	
18-Jun	20.0	3.5	2.84	11.7	363	None	31	41.9	40.8	39.6	*Profile sample*
2-Jul	24.0	4.5	3.84	9.8	397	Some	41	38.3	43.8	37.1	
17-Jul	20.5	2.6	2.05	7.4	397	None	54	46.2	37.6	33.0	
30-Jul	20.5	3.5	1.44		362	Some		41.9	34.1		
13-Aug	25.0	3.6	1.10	6.1	376	None	62	41.5	31.5	30.2	
27-Aug	21.0	3.8	4.29	8	366	None	46	40.7	44.9	34.1	*Profile sample*
10-Sep	19.5	3.3	2.52	6.6	359	Some	54	42.8	39.6	31.4	
24-Sep	19.0	3.1	4.11	6.3	382	Some	61	43.7	44.4	30.7	
8-Oct	14.5	2.5	24.30	16.3	491	Some	30	46.8	61.9	44.4	
23-Oct	11.0	2.7	8.94	9.6	394	Some	41	45.7	52.1	36.8	
	Temp (°C)	**Secchi (m)**	**Chl-*a* (µg/l)**	**TP (µg/l)**	**TN (µg/l)**		**N:P**	**Calculated TSI**			
								Secc	**chl-a**	**TP**	
Mean	19.4	3.2	5.11	11.1	391		43	43.3	43.1	37.0	**TSI Average = 41.1**
Median	19.5	3.3	3.84	8.8	382		43	42.8	43.8	35.5	
Min	11.0	2.3	1.10	6.1	359		11	38.3	31.5	30.2	
Max	25.0	4.5	24.30	32	491		62	48.0	61.9	54.1	
Count	13	13	13	12	13		12	13	13	12	

* Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May		2.2	11.40	17.8	762	Some	43	48.6	54.4	45.7	
20-May	13.8	3.0	15.00	18.2	672	Some	37	44.1	57.1	46.0	Water clear. Algae ~.1 - .3mm spheres
3-Jun	16.1	2.2	19.40	67*	560	Some	8	48.6	59.7	64.8	
17-Jun	16.0	2.3	4.99	27.7	635	Some	23	48.0	46.3	52.1	*Profile sample*
2-Jul											
15-Jul	21.2	1.7	19.70	23	633	Some	28	52.3	59.8	49.4	
29-Jul	19.8	1.7	16.80	18.7	601	Some	32	52.3	58.2	46.4	
12-Aug	24.0	2.5	4.75	11.9	461	Some	39	46.8	45.9	39.9	
26-Aug	20.0	2.5	8.76	12.3	488	Some	40	46.8	51.9	40.4	*Profile sample.* A few blue-green rafts of algae, many threads, ~1mm balls
9-Sep	18.4	2.0	24.10	21.6	584	Some	27	50.0	61.8	48.5	
23-Sep	17.8	2.4	11.40	15	474	Some	32	47.4	54.4	43.2	Lots of ~1mm swimming bugs
7-Oct	13.8	2.2	4.91	10.9	578	Some	53	48.6	46.2	38.6	
21-Oct	11.0	2.3	4.79	12	679	None	57	48.0	45.9	40.0	
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	17.4	2.3	12.17	21.3	594		35	48.5	53.5	46.2	**TSI Average = 49.4**
Median	17.8	2.3	11.40	18.0	593		35	48.3	54.4	45.8	
Min	11.0	1.7	4.75	10.9	461		8	44.1	45.9	38.6	
Max	24.0	3.0	24.10	67	762		57	52.3	61.8	64.8	
Count	11	12	12	12	12		12	12	12	12	

* Unexplained high value

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

Date (2001)	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)	Algae Obsv.	N:P	Calculated TSI			Notes
								Secc	chl-a	TP	
6-May	13.0	7.0	2.20	19.3	387	None	20	31.9	38.3	46.9	
21-May	14.5	7.5	2.98	17.9	291	None	16	30.9	41.3	45.8	
3-Jun	17.0	8.5	0.92	105*	301	Some	3	29.1	29.7	71.3	
17-Jun	17.5	6.5	3.42	21.7	267	Some	12	33.0	42.6	48.5	*Profile sample.* Clumps on surface around logs/dock
1-Jul	21.5	5.5	2.60	15.9	286	Some	18	35.4	39.9	44.1	
15-Jul	22.0	6.0	2.00	18.5	307	None	17	34.1	37.4	46.2	
29-Jul	20.0	6.5	3.46	18.9	314	Some	17	33.0	42.7	46.6	
12-Aug	23.0	6.5		5.6	282	Some	50	33.0		29.0	
26-Aug	22.0	4.5	2.92	20.2	322	Dense	16	38.3	41.1	47.5	*Profile sample.* Algae dense in water column.
9-Sep	19.5	4.0	7.57	44.8*	384	Dense	9	40.0	50.4	59.0	Bloom present more than 21 days.
23-Sep	20.0	4.0	6.51	24.2	347	Some	14	40.0	48.9	50.1	
7-Oct	16.0	3.0	21.60	40.6	598	Some	15	44.1	60.7	57.6	
21-Oct	13.0	4.0	16.10	62	701	Some	11	40.0	57.8	63.7	Small particles in water column
	Temp (°C)	Secchi (m)	Chl-*a* (µg/l)	TP (µg/l)	TN (µg/l)		N:P	Calculated TSI			
								Secc	chl-a	TP	
Mean	18.4	5.7	6.02	31.9	368		17	35.6	44.2	50.5	**TSI Average = 43.4**
Median	19.5	6.0	3.20	20.2	314		16	34.1	42.0	47.5	
Min	13.0	3.0	0.92	5.6	267		3	29.1	29.7	29.0	
Max	23.0	8.5	21.60	105	701		50	44.1	60.7	71.3	
Count	13	13	12	13	13		13	13	12	13	

* Unexplained high value

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