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RESEARCH

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The limnology of Waskesiu Lake, Prince Albert National Park, Saskatchewan. July 1992 to October 1994 studies with historical comparisons.

N.W.R.I. Contribution Series No. 99-13

May 1999

ABSTRACT

This report is based on an investigation of the open lake limnology of Waskesiu Lake, from July 1992 to October 1994. The overall objective of the study was to characterize factors affecting the trophic status of the lake and to assess whether trophic condition had changed from Rawson's pioneering studies conducted from the late 1920 to mid 1930s. Most sampling took place during the ice-free season: studies were conducted monthly from July to October 1992, monthly from July to October 1993, and biweekly from May to October 1994. Sampling also was conducted in January (1993) and March (1993 and 1994). One site was sampled in the lower lakes, offshore of Prospect Point (depth ca. 24 m); the second site was sampled in the upper lake offshore of the Third Narrows (depth ca. 11 m).

Physical limnology studies (temperature, dissolved oxygen, pH) determined that the water column generally was well mixed at both study sites for much of the year. However, the water column was strongly thermally stratified at Prospect Point during summer 1992 and 1994 but not in summer 1993. During thermal stratification, dissolved oxygen concentrations in hypolimnetic waters were rapidly depleted: nutrient concentrations (phosphorus, ammonia) increased markedly. Thermal stratification was less pronounced at the Third Narrows, presumably because of its shallower depth. Nevertheless, oxygen concentrations near the sediments were reduced suggesting that significant oxygen depletion was occurring despite the strong vertical exchange of water. Nutrient regeneration at the sediment-water interface also must have been strong. While there was weak thermal stratification and hypolimnetic oxygen depletion at Prospect Point during winter, hypolimnetic nutrient concentrations were considerably lower than in summer. Low winter temperatures probably retard nutrient regeneration rates.

There was some evidence that summer hypolimnetic oxygen depletion was more intense at Prospect Point during the 1992-1994 studies than in Rawson's 1927-1934 studies. Additional years of monitoring through the 1990s and beyond would provide a stronger data set for assessing this hypothesis. Waskesiu Lake is very sensitive to climatic variation with the intensity of lake stratification (Prospect Point) varying markedly between year. Increased oxygen consumption in the hypolimnion may be related to increased nutrient inputs into Waskesiu Lake, either from localized town site sources or long-range atmospheric inputs.

Water clarity was greater in the lower than upper Waskesiu Lake (Secchi disc mean of 3.2 m at Prospect Point and 2.3 m at Third Narrows). This lower water clarity appeared to be related to higher algal standing stocks and suspended particulates in the upper than lower lake. This, in turn, appears to be related to factors such as lake depth, the presence of extensive macrophyte beds in the upper lake, terrestrial inputs, and continuous water inflow from the Kingsmere River. It is uncertain whether water clarity has changed since 1927-1934 when Rawson conducted his studies. This uncertainty is due to the fact that Rawson reported higher water clarity in his earlier than later publications; we have no way of establishing which publications are the more correct.

Waskesiu Lake had moderately high total phosphorus concentrations, characteristic of meso-eutrophic lakes: concentrations in the upper 10 m of the water column for the ice-free season averaged 19.1 µg/L at Prospect Point and 27.8 µg/L at the Third Narrows. Ammonia (mean 14.7 µg/L and 11.8 µg/L, respectively) predominated over nitrite-nitrate (mean 2.1 µ g/L and 2.3 µg/L) which frequently was below detection limits. Both phosphorus and nitrogen were, on occasion, limiting to algal growth.

Primary production was estimated at 57.2 g carbon/m^2/yr at Prospect Point and 68.6 g carbon/m^2/yr at Third Narrows. Primary production was at the upper range of values reported for oligotrophic lakes. Low primary production despite high phosphorus concentrations may be related to factors such as the shortness of the growing season, pronounced vertical mixing, and the relatively low summer temperatures for this northern lake.

The algal assemblage was characterized at Prospect Point. Diatoms, including species characteristic of meso-eutrophic waters, were major features of this assemblage during much of the year. Dinoflagellates also were abundant at times. Bluegreen algae generally were not a major feature of the plankton assemblages. The zooplankton assemblages was dominated by taxa characteristic of eutrophic waters and waters in which size-selective fish predation is significant. Although Rawson collected phytoplankton and zooplankton as part of his pioneering work, the data were not highly quantitative. Thus, it was difficult to assess whether plankton communities in Waskesiu Lake have changed since the late 1920s. There was the suggestion of small shifts in species composition. Paleolimnology studies could help resolve these unknowns.

Sediment trap studies were conducted at the Third Narrows and Prospect Point in order to estimate mass flux to the sediments. Flux rates at Prospect Point were similar to flux rates estimated from a sediment coring study. Total mass, inorganic and organic carbon, nitrogen, and phosphorus flux were measured. Rates were higher in the more productive waters of the upper than lower lake.

The report concludes with a series of recommended parameters to include in a long-term monitoring study of the limnology of Waskesiu Lake. It also recommends that such a program be initiated given the indications that the trophic status of the lake has changed over the years and the increasing impact of the Waskesiu town site and its operations on the lake.

ACKNOWLEDGEMENTS

Many people contributed to the success of this study. Steve Oates and Paul Tarleton, formerly with Prince Albert National Park, were highly supportive of the early beginnings of this study and contributed both funding and logistic support. Steve Oates and Margaret Put participated in the winter sampling trips.

The National Water Research Institute (NWRI) provided funding and logistic support for the field and laboratory studies and for the more extensive data synthesis and report preparation. Dr. Bob Halliday and Dr. Fred Wrona were instrumental in supporting this study. Special appreciation is extended to Ashleen Downes, Kori Woodward, Mitch Golay, and Jan Myndynski who, as students, conducted the field sampling and many of the laboratory measurements. Eric Marles, Marley Waiser, Ken Supeene, Vijay Tumber, Mary Ferguson, and Nancy Glozier also with NWRI, made many valuable contributions to the field and sampling effort.

Quat Peng Lee, with the Water Quality Laboratory, oversaw most chemical analyses. Her close attention to detail and sample accuracy is much appreciated. Dr. Richard Stemberger, Dartmouth University (Dartmouth, New Hampshire) identified one series of zooplankton samples and made an outstanding effort to put names on hybrid and otherwise puzzling taxa. Jason Inkster, NWRI, also identified a number of zooplankton samples. Dr. Chris Earle, Concordia College (Edmonton Alberta) identified the phytoplankton providing a wealth of detail of species composition, biomass, and size.

Early data management was conducted by Kori Woodward, Ashleen Downes, and Mitch Golay while final management, including data and figure preparation, was conducted by Jason Inkster and Carol Casey. Carol also edited the report, clarifying wording and concepts.

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1 INTRODUCTION

1.1 General background

Waskesiu Lake, in Prince Albert National Park, is a moderately large, moderately deep lake (Figure 1). It has a surface area of 70 km^2, a mean depth of 11.1 m, and a maximum depth of 24 m (Rawson 1936). It also is a relatively productive lake; phosphorus and chlorophyll concentrations and littoral zone macrophyte assemblages are characteristic of meso-eutrophic lakes (Evans 1996). Waskesiu Lake is a naturally mesotrophic lake because of geological influences, i.e., it is a moderately deep lake located in glacial deposits (Rawson 1960). It is possible that the lake is experiencing mild forms of cultural eutrophication as a result of the utilization of natural resources in the lake watershed (e.g. forestry and cottage development) and/or in the lake itself (e.g., the harvesting of predatory fish). Long-range atmospheric transport of nutrients, particularly from the agricultural regions to the south, may also have affected the productivity of the lake. This report is based on an investigation of these issues by determining water quality characteristics of the lake during the mid 1990's and comparing these data with earlier studies of the lake.

1.2 Waskesiu Lake and a brief history of anthropogenic activities

Prince Albert National Park was created in 1927 on land that had been and continues to be of local economic importance (Waiser 1989). Historically important activities included beaver trapping, forestry, and commercial fishing. In more recent years, recreationally-based economies have been important: sport fishing, town site business operations (restaurants, hotels, stores), camp grounds, cabins, and a golf course.

Beaver trapping occurred between the North Saskatchewan River and the Churchill River from the late 1700's to early 1900's and, presumably, within the Park itself (Waiser 1989). This trapping apparently decimated the beaver population in Prince Albert National Park. As a consequence, shortly after the park was created, Grey Owl was appointed by the federal government to re-establish the beaver population in Prince Albert National Park. Although beaver eventually became reestablished within the Park, including Waskesiu Lake, beaver dams were routinely removed from Mud Creek (and possibly the Kingsmere River) in order to allow for the upstream spring spawning runs of walleye and pike (Evans and Beaven 1993).

Beaver, through their dam building and feeding activities, affect stream hydrology, channel geomorphology, biogeochemical pathways, and productivity (Naiman et al. 1986). Intense beaver harvesting, which eventually results in the loss of beaver dams, disrupts stream ecosystems by increasing flow velocity. This, in turn, results in a more efficient transport of organic matter and nutrients into the receiving rivers and lakes and a net loss in the material retained and assimilated by the stream. Beaver trapping in Waskesiu Lake watershed in the 1800's and the breaching of beaver dams for improved fish spawning runs in the 1940's may have resulted in an increase in the productivity of Waskesiu Lake.

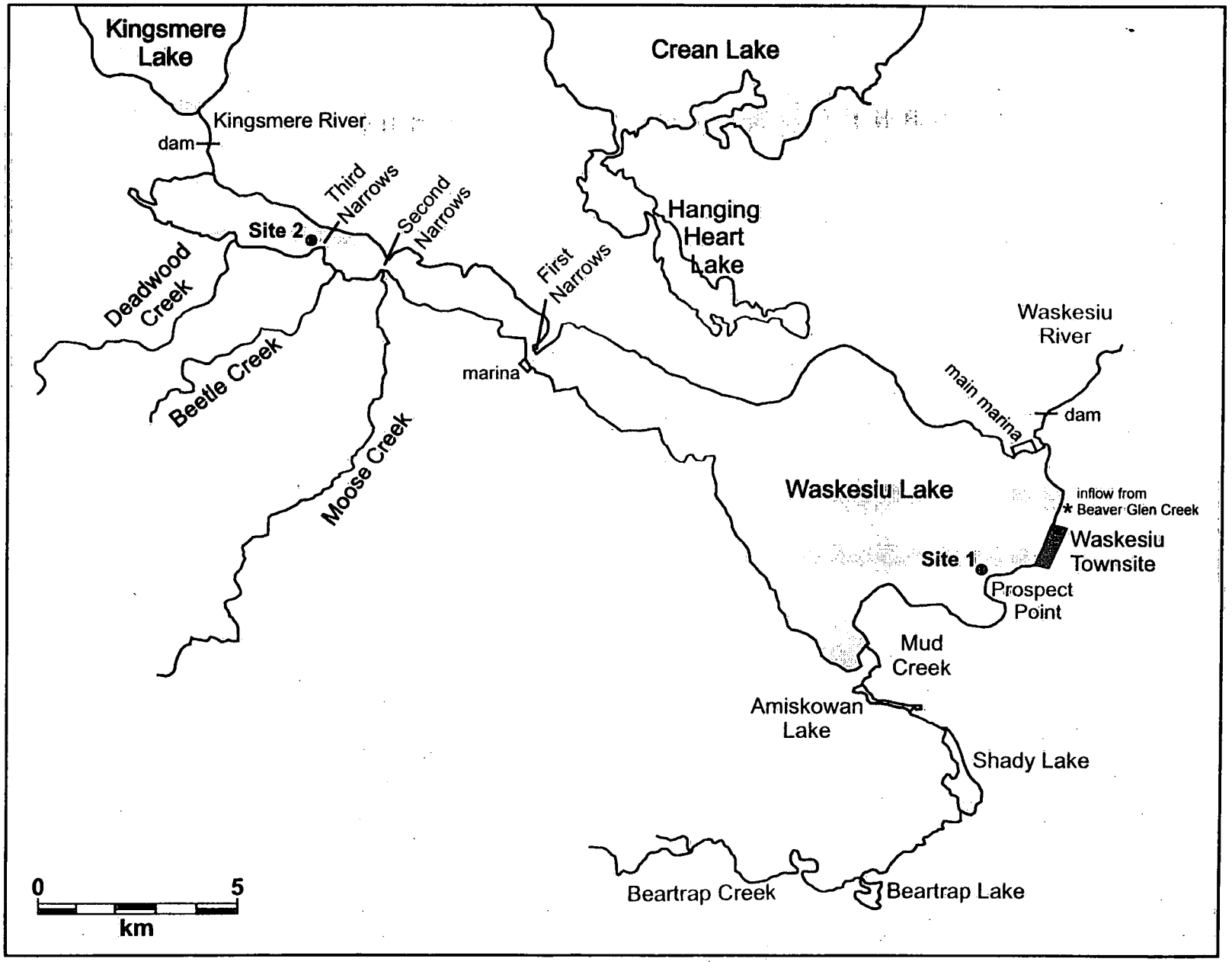

Figure 1. Map of Waskesiu Lake showing major tributaries and study sites

Forestry began to be of economic importance in Prince Albert National Park during the early 1890's and continued until 1927 with the establishment of the Park (Gimbarevsky 1973). Deforestation may effect an increase in lake productivity by increased erosional losses of nutrients from the watershed into streams, and then into lakes. For example, there is strong evidence that deforestation activities in the Lake Ontario watershed during the late 1700's increased nutrient loading to the lake: this resulted in an increase in phytoplankton standing stocks and productivity (Schelske et al. 1991).

Commercial fisheries began operation in Prince Albert National Park in the late 1800's and continued until 1927 (Waiser 1989; Evans and Beaven 1993). The Waskesiu Lake fisheries continued, with some interruptions, until 1962. While whitefish (*Coregonus clupeaformis*) and suckers (*Catostomus* spp.) dominated the catch, large numbers of pike (*Esox lucius*), walleye (*Stizostedion vitreum*), and burbot (*Lota lota*) also were harvested. The latter three species are piscivorous, feeding on other fish (Scott and Crossman, 1977). There is strong evidence that removal of large numbers of predatory fish can result in the increased abundance of planktivorous fish and a concomitant decrease in the abundance of large-bodied zooplankton grazers (Carpenter et al. 1985; Kitchell and Carpenter 1988). This, in turn, can be accompanied by an increase in algal standing stocks as grazing pressures are reduced.

Although there is limited agricultural activity in the Park, agriculture becomes increasingly prevalent south of the park. Nutrients (and pesticides) may be transported by atmospheric pathways to Prince Albert National Park and contribute to the increased eutrophication of Waskesiu and other lakes. This atmospheric transport can extend over hundreds of kilometers. Stoermer et al. (1990) noted changes in the fossil diatom record in the pristine waters of McLeod Bay in Great Slave Lake: they hypothesized that this increase could be due to long-range atmospheric transport of nutrients.

The Waskesiu town site is the "urban hub" for Prince Albert National Park. The business area contains various restaurants, stores, motels, housing for Park staff, a gas station, and a golf course that are connected to a water and sewage system. In the spring and fall, treated water is released into Waskesiu Lake via Beaver Glen Creek. This creek enters the lake approximately 1 km north of the Main Beach, south of the Beaver Glen Campsite. Hamilton and Macdonald (1986) estimated that 109 kg/yr of total phosphorus (TP) entered the lake based on an estimated effluent volume of 6,650 m^3 and an effluent TP concentration of 1.15 mg/L. Occasionally, untreated raw sewage has been released into Waskesiu Lake (Canada Parks Service 1989).

There also is an extensive cabin area to the north of the town site that is used on a seasonal basis. The area is called the "portable cabin area" because it does not have a complete sewer system. Cabins (some 451) are serviced by seven public washrooms that provide toilet and showers facilities and running water for kitchen use (Canada Parks Service 1989). Cabin owners are required to deposit gray water into gray waterlines attached to the sewage system. Saskatchewan Public Health regulations require that installation of a holding tank for every building with plumbing that is not connected to a sewer line. There is insufficient space for each owner to install holding tanks and consideration is being given to upgrading the sewer system for the cabin area. There is some concern that this lack of

compliance to Federal, Provincial and Park regulations may result in some direct nutrient loading to Waskesiu Lake.

There are several campgrounds and outlying day-use areas. The Park maintains many pit privy facilities in these areas (Canada Parks Service 1989). Some privies, e.g., at Birch Bay, Beaver Glen Beach, and South Bay, have been placed too close to shore and may not be complying with Saskatchewan's Shoreline Pollution Control Regulation. Consequently, nutrients may be entering the lake from these regions.

There are two marinas on Waskesiu Lake. The Main Marina has three docks protected by two breakwaters: most boats dock at the Main Marina. Infrastructure includes refueling facilities and the marina office that also serves as a store, and toilet facilities. Sewage and gray water from these facilities are connected to a small lagoon for treatment. This treatment and the release of this water apparently are not monitored.

There is a second and smaller marina at the First Narrows primarily used by campers at the First Narrows Campground. In addition, the marina rents boats for people wishing to fish, primarily in upper Waskesiu Lake. The campground has flush toilets and running cold-water facilities that are connected to a simple sewer system. Sewage and gray water are transported away from the camp and released onto a tiled field. In 1994 there were 18 outhouses on Waskesiu Lake, 8 of which had holding tanks. Holding tanks are at the Kingsmere parking lot, the First Narrows Marina, Paignton Beach, Tripps Beach, Waskesiu River and Birch Bay (Prince Albert National Park Audit Team 1994).

Fertilizers also are used in the Park, primarily by the Waskesiu Golf Course, at the Main Marina, and as part of the Park's ground maintenance program (Canada Parks Service 1989). In addition, many seasonal and permanent residents apply fertilizers to their lawns. These fertilizers may enter Waskesiu Lake with snowmelt, rainfall runoff, and by winds blowing particulates into the lake.

1.3 Limnological research studies on Waskesiu Lake

Much of the early research on Waskesiu Lake was conducted by D. S. Rawson from the late 1920's to the early 1940's (Evans and Beaven 1993). In the late 1920's, Rawson (1929) provided general descriptions of macrophyte, plankton, benthos, and fish communities in the lake: most of these data were non-quantitative. In the early 1930's, Rawson (1936) investigated the physical limnology of Waskesiu Lake, focusing his research effort on characterizing seasonal, vertical, and spatial patterns in water temperature and dissolved oxygen concentrations. In the late 1930's and early 1940's, two of his graduate students investigated littoral zone macrobenthic communities (Milne 1941; Stevenson 1942).

In subsequent years, Rawson investigated the basic limnology and fisheries biology of other lakes including Great Slave Lake, lakes in British Columbia, and lakes in southern and northern Saskatchewan. From these studies, he determined broad principles in the factors affecting lake productivity and standing stocks. Mean lake depth was an important factor with moderately deep lakes such as Waskesiu having greater standing stocks of invertebrates and fish yield than deeper lakes such as Lake Michigan (Rawson 1955). Edaphic (soil) factors also were important with lakes located in hard-rock surroundings having lower invertebrate standing stocks and fish yield than lakes with a similar mean depth but located in

glacial-till drainage basins (Rawson 1960). Rawson completed his career as limnologists began recognizing the importance of phosphorus as the primary chemical factor affecting lake productivity. Thus his work did not include studies of phosphorus-productivity relationships.

Relatively little research has been conducted on the limnology of Waskesiu Lake since Rawson's early studies. Limited phytoplankton studies were conducted by Kuehne (1941) who described the relative abundance of net phytoplankton, i.e., phytoplankton which were large enough to be retained by a plankton net. Brooks (1957) identified various *Daphnia* species that apparently were collected by Rawson during his limnological investigations. Neither of these studies was quantitative.

The next comprehensive plankton and physical limnology studies of Waskesiu Lake were conducted by McLeod (1971) over May - September 1969 during his Master's research. McLeod investigated the food and feeding habits of cisco (*Coregonus artedii*) at two sites in Waskesiu Lake - Station 1 in 19 m of water offshore of Prospect Point and Station 2 in 10 m of water between the First and Second Narrows. Zooplankton were collected at 4.5 m with a 10-L Juday trap equipped with a #10 (156-µm) mesh net. Only crustacean zooplankton were identified. Water column temperatures and dissolved oxygen concentrations 1 m above the lake floor also were reported. McLeod determined that plankton standing stocks were greater at Station 2 in the upper lake than Station 1 in the lower lake. He related this to warmer water temperatures in the shallower, upper lake than in the deeper lower lake.

In summer 1972, Mayhood et al. (1973) investigated the limnology of several lakes and ponds in the southern part of the Park. Plankton were collected with a #20 (76-µm) mesh, 120-cm diameter net. Phytoplankton and zooplankton (rotifers and crustaceans) data were reported as relative abundance.

The next limnology studies were conducted by Hamilton and Macdonald (1986) who investigated chlorophyll, phosphorus, nitrogen, and silica concentrations and Secchi disc depths at three sites in Waskesiu Lake on three to four occasions between July 22 and September 23, 1986: an additional four sites were sampled once. Temperature and dissolved oxygen profiles were collected at five sites on July 1986. Water samples were collected at one half and twice the Secchi disc depth and were combined to form a composite which was representative of water quality in the euphotic zone. Major ion and bacteriological indicator studies were conducted at several inshore sites. The authors concluded that Waskesiu Lake is meso-eutrophic and that the historic database for the lake was inadequate to detect time trends. They further suggested that Secchi disc depth did not appear to be a reliable indicator of trophic status. Finally, they concluded that nutrient loading from the sewage treatment plant was not a significant source of TP to Waskesiu Lake relative to other natural (runoff, atmospheric inputs) sources.

Since 1992, Prince Albert National Park has been supporting research directed towards the improved management of Waskesiu Lake. The initial focus of these investigations was the assessment of the implications of the removal of the Kingsmere River dam (on the lake inflow) and the Waskesiu River dam (on the lake outflow) on the lake ecosystem (Evans and Beaven 1993; Evans et al. 1993 a, b; Evans 1996; Evans et al. 1996). Research sampling focused on the littoral zone that was operationally set as the zone within

the 4-m depth contour. Studies of water quality, macrophyte, and macrobenthos populations were conducted within this depth contour. Fish and habitat mapping studies also were investigated (Evans et al. 1996; Arsenualt, 1999). However, as the dam removal issue became better understood, environmental studies began to investigate other environmental issues relevant to the Waskesiu Lake ecosystem. One issue, and the focus of this report, is the general limnology of upper and lower Waskesiu Lake.

2 STUDY OBJECTIVES

In July 1992, open-lake limnology studies were initiated on upper and lower Waskesiu Lake to obtain baseline seasonal information on water quality and plankton dynamics in these two regions. These studies continued into 1993 and 1994. Primary productivity and particulate flux studies were incorporated into the 1994 studies. Overall, the study was designed to address the following questions.

1. What are the seasonal cycles in temperature, pH, dissolved oxygen concentrations, and light penetration in upper and lower Waskesiu Lake? How do these cycles vary between years?
2. Is there any evidence of major changes in pH and dissolved oxygen concentrations in the near-bottom waters of Waskesiu Lake since Rawson's (1936) historic measurements. Is there any evidence of change in light penetration? If changes have occurred, do they appear to be related to eutrophication?
3. What are the seasonal cycles in nutrient concentrations in upper and lower Waskesiu Lake. Do these cycles vary between years and, if so, why?
4. Is there any evidence that nutrients have changed in concentration since Hamilton and Macdonald's (1986) study?
5. What is the flux rate of nitrogen, phosphorus and organic carbon to the lake sediments? How do these rates vary between upper and lower Waskesiu Lake?
6. What are the seasonal cycles in algal standing stocks and composition? What factors appear to drive these cycles?
7. Is there any evidence that net plankton standing stocks have changed since Rawson's studies? If so, why?
8. What are the primary production rates for upper and lower Waskesiu Lake?
9. What is the seasonality in zooplankton standing stocks and composition. Do these cycles vary between years, and if so, why?
10. What appear to be the primary factors affecting zooplankton standing stocks and composition in Waskesiu Lake?
11. Is there any evidence that zooplankton populations in Waskesiu Lake have changed since Rawson's (1929) studies in the late 1920's and McLeod's (1971) in the late 1960's? If there is evidence of change, what are the possible causal factors affecting such change?
12. Based on these limnology studies and scientific considerations, what are the best parameters to include in a cost-effective, long-term, limnological monitoring program for Waskesiu Lake?

3 MATERIALS AND METHODS

3.1 Open-lake limnology studies

Open-lake limnological studies began in July 1992 and ended in October 1994. Two sites were selected for limnological study (Figure 1). Site1 (Prospect Point), the main sampling site, was located offshore of Prospect Point in lower Waskesiu Lake. Site 2 (Third Narrows) was located in upper Waskesiu Lake to the west of the Third Narrows. Both sites were situated in the deepest water for that region of the lake. The Prospect Point site was in ca. 25 m of water while the Third Narrows site was in ca. 13 m of water. Because both sites were located in depressions, sample depths varied slightly from one sampling time to another due to small differences in boat location over the depression.

In 1992, limnological sampling was conducted monthly, from July - October at Prospect Point and from August - October at Third Narrows. In 1993, limnological sampling was conducted once a month from May to October at both sites. In addition, both sites were sampled in March 1993. In 1994, limnological sampling was conducted once a month in May and in October and twice a month from June to September at both sites. Both sites also were sampled in March 1994. The same sampling protocol was followed on each sampling trip. However, in 1994, additional studies (primary productivity, particulate flux) were conducted.

At the beginning of each open-lake sampling season, a marker buoy was set at each sampling site. Site location was first determined by driving the boat over the general area and locating the deepest water with a depth sounder; geographic coordinates were determined with a GPS. In 1992, there was some movement of the marker buoy at Prospect Point, presumably due to strong winds. Sampling was conducted in the intended sampling area rather than where the marker buoy was located. On each sampling trip, the boat was anchored in order to prevent drifting while the various samples were being collected. Marker buoys were recovered in October.

In winter, sampling locations were located with a GPS. A ca. 0.75-m diameter hole was drilled through the ice to accommodate the various sampling equipment.

The physical features of the water column were measured during each limnological sampling trip. Water clarity was measured with a 20-cm diameter black and white Secchi disc. A Surveyor 3 Hydrolab was used to measure temperature, dissolved oxygen, percent saturation, and pH with depth. Measurements were made at 1-m or 2-m depth intervals in most months.

An 8-L Niskin sampling bottle was used to collect water samples. Three samples were collected at Prospect Point at depths of 1 m, 10 m, and ca. 1 m above the lake floor: this latter depth generally was at 22 m. Two samples were collected from Third Narrows at depths of 1 m and ca. 1 m above the lake floor: this latter depth generally was at 10 m. Subsamples of water were processed for subsequent nutrient (ammonia, nitrite-nitrate, dissolved phosphorus, soluble reactive phosphorus, silicon), particulate (total phosphorus, particulate organic carbon, particulate nitrogen), and chlorophyll determinations. Field methods follow Robarts et al. (1992) with the exception that soluble reactive phosphorus samples were preserved in the field with the addition of a few drops of chloroform. Samples were

transported in coolers and maintained in a refrigerator until their return to the National Water Research Institute (NWRI), Saskatoon. At that time, most samples were submitted to the Water Quality Laboratory for analyses. However, chlorophyll and silicon were analyzed at NWRI. Chlorophyll was analyzed fluorimetrically following the boiling ethanol method (Nusch 1980). All other analytical procedures followed Environment Canada (1992).

Redfield or phytoplankton sestonic ratios were calculated from determinations of particulate nitrogen (PN), carbon (PC), and phosphorus (PP) (Redfield 1958). PN:PP, PC:PP, and PC:PN ratios were calculated on a molar basis. PC:PP ratios >106 and PN:PP ratios >16 were indicative of P deficiency while PC:PN ratios >6.6 were indicative of N deficiency (Redfield 1958; Waiser and Robarts 1995).

Samples also were collected for phytoplankton community composition and abundance studies. At both sites, approximately 125-mL of water from 1- and 10-m were combined to form a single composite, which was then preserved with Defano's solution. A deep-water sample also was collected at Prospect Point as previously described. In the laboratory, phytoplankton were identified and enumerated according to Earle et al. (1987). Funding was sufficient only for the analysis of the Prospect Point phytoplankton series.

Zooplankton were collected with a 50-cm diameter, 76-µm mesh net equipped with a calibrated flowmeter. Two replicate vertical hauls were made from the lake floor to the surface. Zooplankton were first anaesthetized with club soda and then preserved with a sugar-formalin solution. Crustacean zooplankton were identified following procedures described in Evans (1990).

Primary production studies were conducted at both sites in 1994. Incident PAR radiation was measured using LI-190SA Quantum sensor, LI-COR Inc. The attenuation of photosynthetically active radiation (PAR) was measured with a pair of cosine-corrected quantum irradiance probes (LI-192SB, Lambda Instruments Co.) which simultaneously measured upwelling and downwelling irradiance. Underwater light readings were taken just beneath the surface and thereafter at 1-m intervals until ca. 1% of the subsurface PAR value (Z_{eu}), or the lake floor, was reached. Light measurements were taken the day before the production studies in order to determine the appropriate sampling depths for production measurements. The attenuation coefficient, K_d (units per meter) and Z_{eu} were calculated by linear regression (Kirk 1977). Three estimates of scattering properties for each station also were calculated according to Kirk (1977): reflectance (R_z) which is the ratio of the upwelling to the downwelling PAR at each depth; asymptotic reflectance (R_a), which is the asymptote value in the depth profile of R_z values; and the backscattering coefficient (b'_b).

Primary productivity of the euphotic zone was measured using the *in situ* ^{14}C light and dark bottle technique. Primary productivity and chlorophyll concentrations were determined at 11 depths at Prospect Point and seven depths at Third Narrows. Incubations were generally for four hours and were centered around midday. A second light profile was collected during the primary production incubations. Further descriptions of the sampling and measurement methods are in Robarts et al. (1992).

Sediment traps studies were conducted in 1994 at both sites to measure the flux of particulates, organic matter, phosphorus, and nitrogen to the lake floor. Duplicate traps, 10 cm internal diameter and 73 cm long, were mounted on a 75 cm wide, 60 cm high frame.

Traps were set at 3 m, 10 m, and 19 m at Prospect Point and 3 m and 10 m at Third Narrows. A funnel was mounted inside the trap over a 500-mL plastic bottle to which mercuric chloride had been added as a preservative. Samples were sieved to remove zooplankton, freeze-dried and their dry weight determined. Subsamples were then analyzed for organic carbon, nitrogen, and phosphorus.

4 RESULTS AND DISCUSSION

4.1 Meteorological data: 1992 - 1994

Meteorological data, obtained from Atmospheric Environment Service of Environment Canada, were used to calculate daily and monthly averages for air temperature, wind speed and precipitation. Precipitation data included both rainfall and snowfall. Air temperatures provide insight into the seasonal cycle in the warming and cooling of the entire water column: wind speed provides insight into factors affecting the vertical mixing of the water column. The amount of precipitation affects lake level and the amount of runoff into the lake.

4.2 Air temperatures

Mean monthly air temperatures varied seasonally, being lowest in December and January and highest in July (Figure 2). The greatest interannual differences in air temperature occurred in the winter months, i.e., December, January, and February. January-February temperatures were warmest in 1992 and coldest in 1994. June to August temperatures were warmest in 1994. Temperatures for 1993 differed from the other two years because although May temperatures were relatively warm (10.3°C), June (12.5°C) and July (14.5°C) temperatures were the coolest of the three years. Mean air temperatures were 1.5°C in 1992, 1.4°C in 1993 and 0.4°C in 1994.

Air temperatures for 1992-1994 were similar to those for 1928-1934 as reported by Rawson (1936, Figure 30). However Rawson's early May temperatures were slightly lower and July-August temperatures slightly higher than our study.

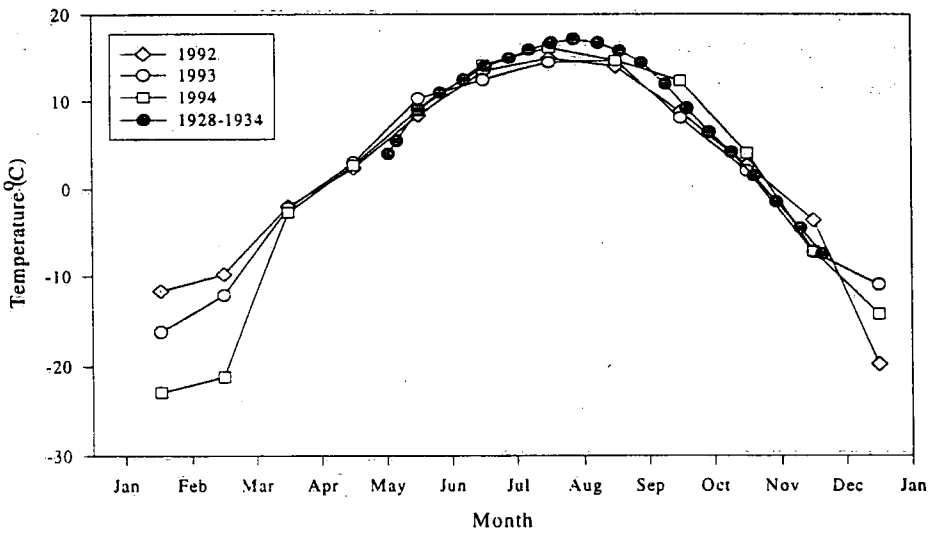

Figure 2. Waskesiu Lake mean monthly air temperatures for 1928-1934 and 1992-1994.

Rawson (1936) reported interannual differences in the duration of ice-cover (Table 1). These differences probably reflect interannual differences in spring warming and autumn cooling. Based on Table 1, spring warming was more intense in 1931, 1932, and 1934 and weakest in 1929 and 1933. Autumn cooling was relatively slow in 1928, followed by 1930 and 1934. The most rapid autumn cooling occurred in 1929. The duration of ice-cover was not recorded in our study.

Air temperatures recorded during McLeod's 1969 study were similar to those observed over the 1992-1994 ice-free season (Evans et al. 1993b).

Table 1. Duration of ice cover in Waskesiu Lake (from Rawson 1936).

Year	Ice break up	Ice formed	Days ice-free
1927	n.d.	Nov. 13	n.d.
1928	May 19	Nov. 28	193
1929	May 25	Nov. 10	169
1930	May 18	Nov. 20	186
1931	May 11	Nov. 15	188
1932	May 10	n.d.	n.d.
1933	May 20	Nov. 15	179
1934	May 11	Nov. 21	194
Average	May 15	Nov. 18	184

n.d.-not determined

4.3 Wind speeds

Average wind speeds (Figure 3) tended to be lowest in the winter and late summer for all three years. Each year showed the same trend of winds being highest in the spring and early summer, decreasing during the late summer and increasing in the fall. In 1992, winds decreased from an average of 8.1 km/h in May to 6.0 km/h in July and then increased to 9.9 km/h September. In 1993 winds decreased from 8.5 km/h in May to 6.9 km/h in July increasing to 7.9 km/h in September. In 1994, winds decreased from 8.0 km/h in May to 6.6 km/h in July and increased to 7.7 km/h in September. Strong winds combined with cooler temperatures during June 1993 may have been contributing factors to weak thermal stratification. Conversely weaker winds and higher temperatures during June and July of 1992 and 1994 probably facilitated strong thermal stratification.

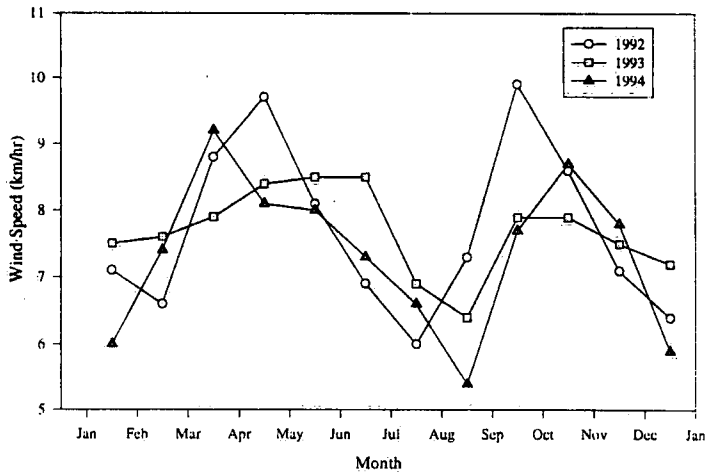

Figure 3. Waskesiu Lake mean monthly wind speeds.

4.4 Precipitation

Precipitation patterns (Figure 4) varied markedly between years. Precipitation was generally low in 1992 with the higher values occurring over May to November. Precipitation was higher in 1993, particularly in June, November, and December. This high precipitation continued into January and February 1994. Precipitation also was high in May and June of that year. Increased precipitation in 1994 apparently allowed for some recovery in lake level from the lows observed during the early 1990's and earlier (Evans et al. 1993 b; Evans 1996; Evans et al. 1996). Annual total precipitation was 351 mm in 1992, 769 mm in 1993 and 664 mm in 1994.

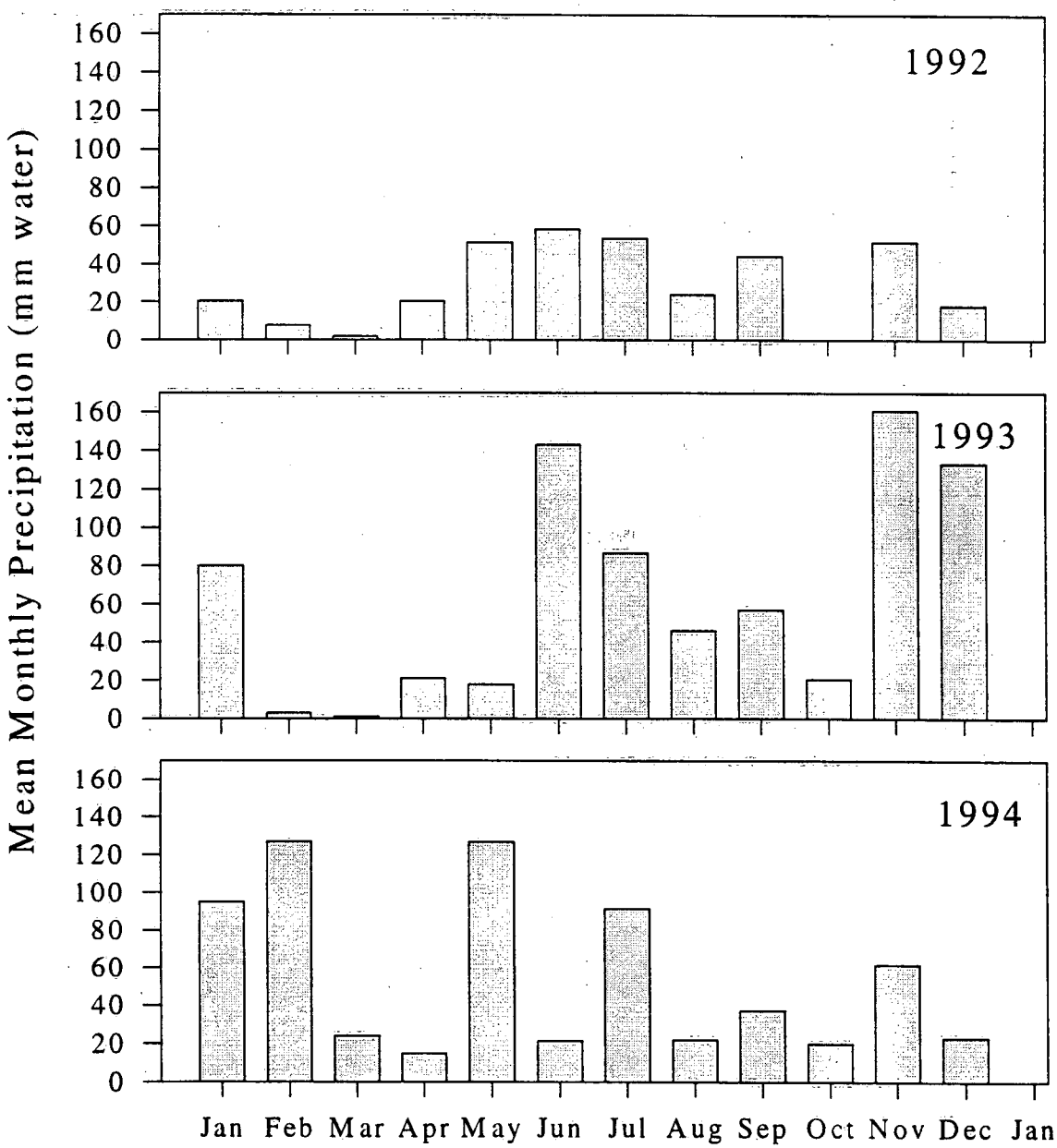

Figure 4. Waskesiu Lake mean monthly precipitation for 1992-1994.

4.5 Physical features of the open-lake water column

4.5.1 Temperature

Water temperature profiles were measured at Prospect Point from August 1992 to October 1994 (Figure 5). In August 1992, the water column was thermally-stratified with surface waters reaching 20.1^{o}C and deep waters only 9.9^{o}C. Thermal stratification was lost by mid-September with the water column near isothermal at ca. 11.6 C. Further cooling occurred with October water temperatures near isothermal at ca. 9.9^{o}C. Typical under ice water temperatures were seen during January with surface waters near 0°C increasing to about 4°C at deeper depths (Figure 6). By March surface waters had warmed to 3°C while the deeper waters remained near 4°C.

Shortly after May 1993 ice-out, the water column became weakly stratified but not to the extent seen in 1992. This weak stratification began breaking down in August and by September the water column was isothermal at ca. 13.3^{o}C. In October, it was isothermal at 8.9 °C. Weak thermal stratification during much of the ice-free season was associated with the weak warming which occurred after May and with relatively strong spring and summer winds.

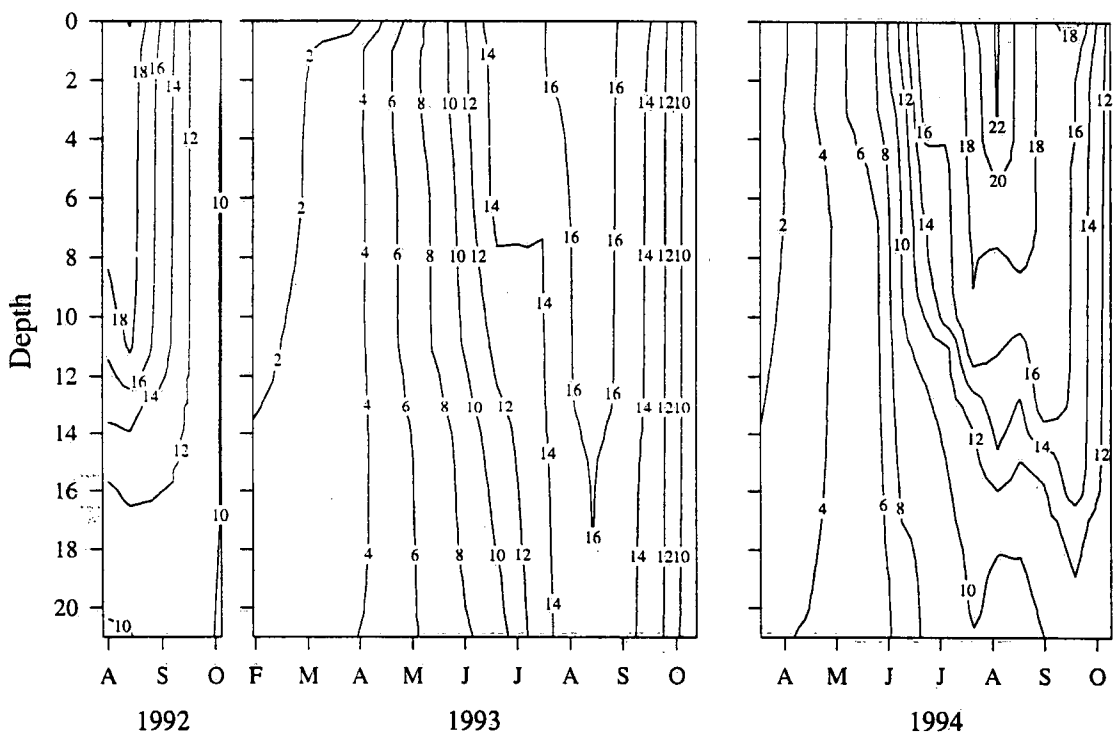

Figure 5. Prospect Point water temperature contours (°C).

In 1994 the water column stratified sooner than in 1993 and remained warmer for longer. Stratification began in May with water temperatures decreasing from ca. 8.1^{o}C at 1 m to 5.2^{o}C at 22 m. The water column remained stratified until mid-September with temperatures decreasing from 17.8^{o}C at 1 m to 10.9^{o}C at 21 m. In early October, the water column was near isothermal with temperatures decreasing from ca. 11.2°C at 1 m to 10.5°C at 21 m.

Rawson (1936) conducted detailed physical limnology studies in lower Waskesiu Lake over 1928 - 1934. The lake did not thermally stratify in 1929 but was stratified in 1928, 1930, 1932, and 1934. The lake was only briefly stratified in 1931 and probably was stratified in 1933 although sampling continued only until June 23. Stratification was of one to five weeks duration with the strongest stratification in 1928 and 1934.

Our study also showed variation in the amount of stratification at Prospect Point over several years. It was strongly stratified in 1992 and 1994 and only weakly stratified in 1993. McLeod (1971) showed that Waskesiu Lake also weakly thermally-stratified in 1969.

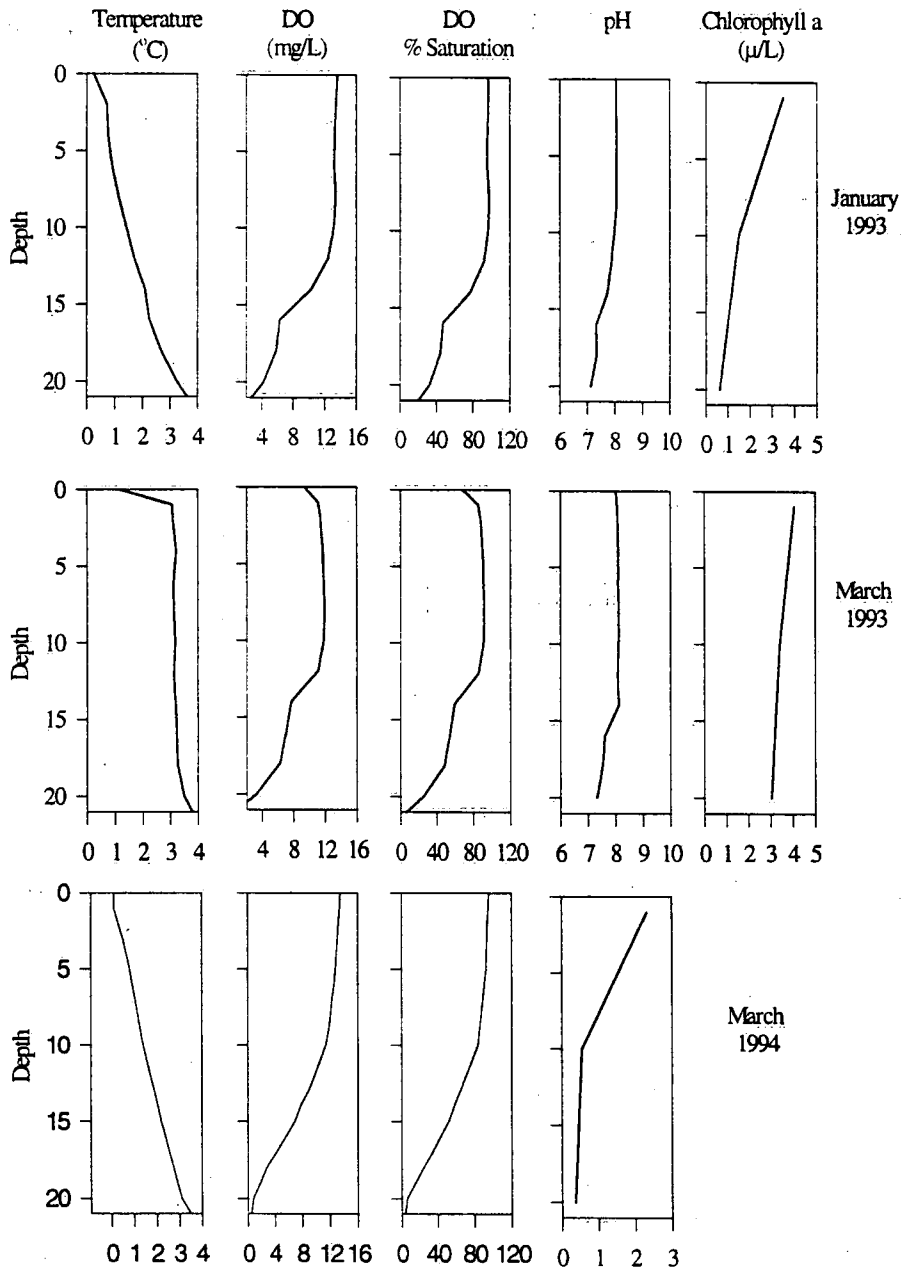

Figure 6. Prospect Point temperature, dissolved oxygen, percent dissolved oxygen, pH and chlorophyll values for January and March 1993 and January 1994. Chlorophyll data were not collected in March 1994.

Water temperatures tended to be warmer and more isothermal at Third Narrows (Figure 7) than at Prospect Point. These differences were related to the shallower water column at Third Narrows. There was no evidence of thermal stratification in summer-autumn 1992 with water temperatures decreasing from ca. 18.5 - 20°C in August to ca. 9.9°C in October. This site was isothermal in March 1993 with temperatures slightly warmer (ca. 3.8 - 4.1°C) than at Prospect Point. By May, water temperatures had increased to 7.4 - 9.9°C. The water column remained well-mixed through summer with August temperatures ranging from 18.7°C at 1 m to 17.6°C at 10 m. By October 1993, the water column was isothermal at ca. 8.4°C.

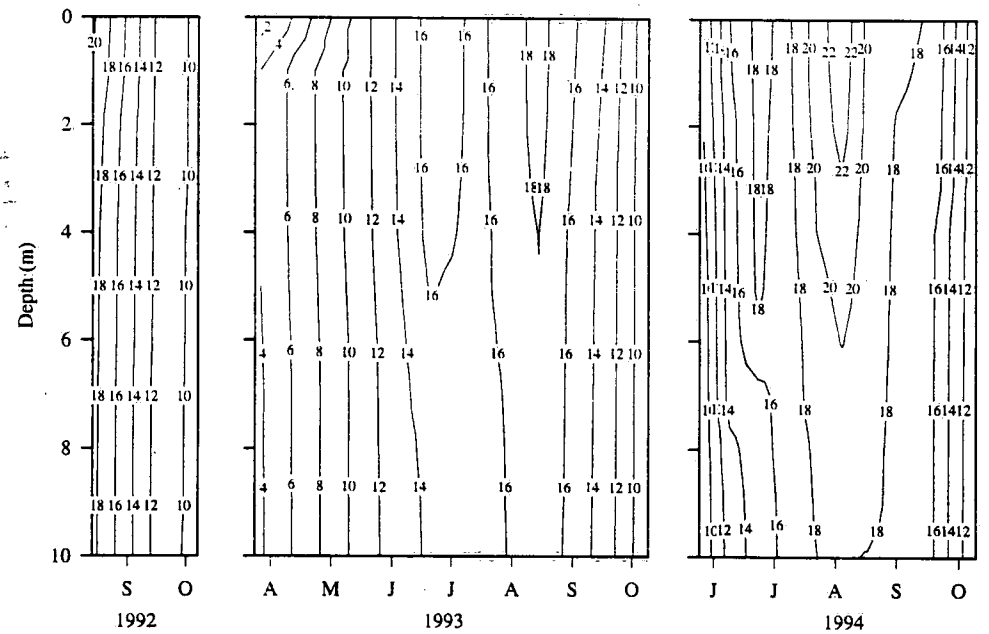

Figure 7. Third Narrows water temperature contours (°C).

In March 1994 water temperatures at Third Narrows increased from 0.5°C at 1 m to 3.5°C at 7 m. By May, temperatures ranged from 10.6°C at 1 m to 8.8°C at 10 m. There was a more pronounced warming of the water column in 1994 than in earlier years with early August thermal stratification decreasing from 23.3°C at 1 m to 18.3°C at 10 m. The water column was near isothermal (at 16.2 - 17.6 0°C) by mid-September with temperatures decreasing further to ca. 10.8 - 11.2°C in early October.

Mean temperatures for the ice-free season at Prospect Point averaged 14.4°C in the upper 10 m and 9.7°C at 20 m. Mean temperatures averaged 15.3°C for the upper 10 m at Third Narrows (Table 2).

4.5.2 Dissolved oxygen

Dissolved oxygen concentrations at Prospect Point varied seasonally and with depth (Figure 8). Variability in oxygen concentrations is affected by three factors (Wetzel 1983). Temperature is important with oxygen becoming less soluble in water as water temperature increases. Primary production is important with oxygen being added to the water during periods of intense algal growth. Respiration also is important, with oxygen being lost from the water column through consumptive losses.

Table 2. Means of physical and chemical parameters for the 1993 and 1994 ice-free sampling period.

Parameter	Prospect Point		Third Narrows
	1-10 m	20 m	1-10 m
Temperature (^{0}C)	14.4	10.0	15.3
Dissolved Oxygen (mg/L)	9.6	4.5	8.6
% Oxygen Saturation	96.7	38.6	89.7
pH	8.4	7.7	8.3
Secchi (m)	3.2	--	2.3
Total Phosphorus (µg/L)	19.1	49.4	27.8
Dissolved Phosphorus (µg/L)	10.4	33.4	14.2
Soluble Reactive Phosphorus (µg/L)	2.8	20.2	4.3
Particulate Phosphorus (µg/L)	8.7	16.1	13.7
Ammonia (µg/L)	14.7	155.8	11.8
Nitrite-nitrate (µg/L)	2.1	2.4	2.3
Particulate Nitrogen (µg/L)	92.2	96.9	140.1
Particulate Organic Carbon (mg/L)	725.1	551.7	993.5
Silicon (mg/L)	0.6	2.2	1.4
Chlorophyll a (µg/L)	6.2	7.4	10.4

In general, dissolved oxygen concentrations at Prospect Point were highest in the winter months, when water temperatures were low (Figure 6). However, these high oxygen concentrations were limited to the upper 15 m of the water column. Concentrations were lower at greater depths reflecting consumptive losses due to decomposition at the sediment-water interface. Dissolved oxygen concentrations in summer generally exceeded 9 mg/L in the upper region of the water column with concentrations decreasing below 3 mg/L in deeper water. In general, dissolved oxygen concentrations in deep water during the ice-free period were high only during periods of strong vertical mixing, i.e., May-June and September-October. While we did not measure oxygen in November, levels probably remained high as the lake continued to cool and mix.

Dissolved oxygen concentrations at the Third Narrows (Figure 9) followed a similar seasonal pattern as at Prospect Point. However, because the site was shallower, deep-water oxygen depletion was not as strong as at Prospect Point. Nevertheless, significant oxygen depletion did occur and there were pronounced vertical gradients in dissolved oxygen concentrations in all three summers. Thus, although the water column was well-mixed with respect to temperature, the vertical exchange was slow enough to allow for significant oxygen depletion. Depletion was greater in June 1993 than 1994 despite slightly stronger winds and cooler temperatures. Dissolved oxygen concentrations tended to be lower in surface water at the Third Narrows than Prospect Point during the summer months. These differences may be related to the slightly warmer waters at Third Narrows than Prospect Point.

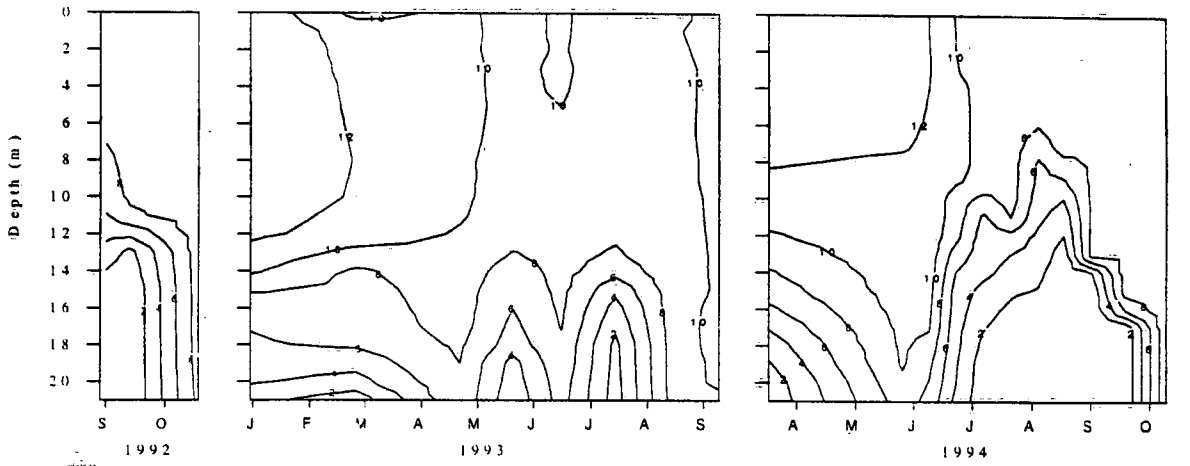

Figure 8. Prospect Point dissolved oxygen contours (mg/L).

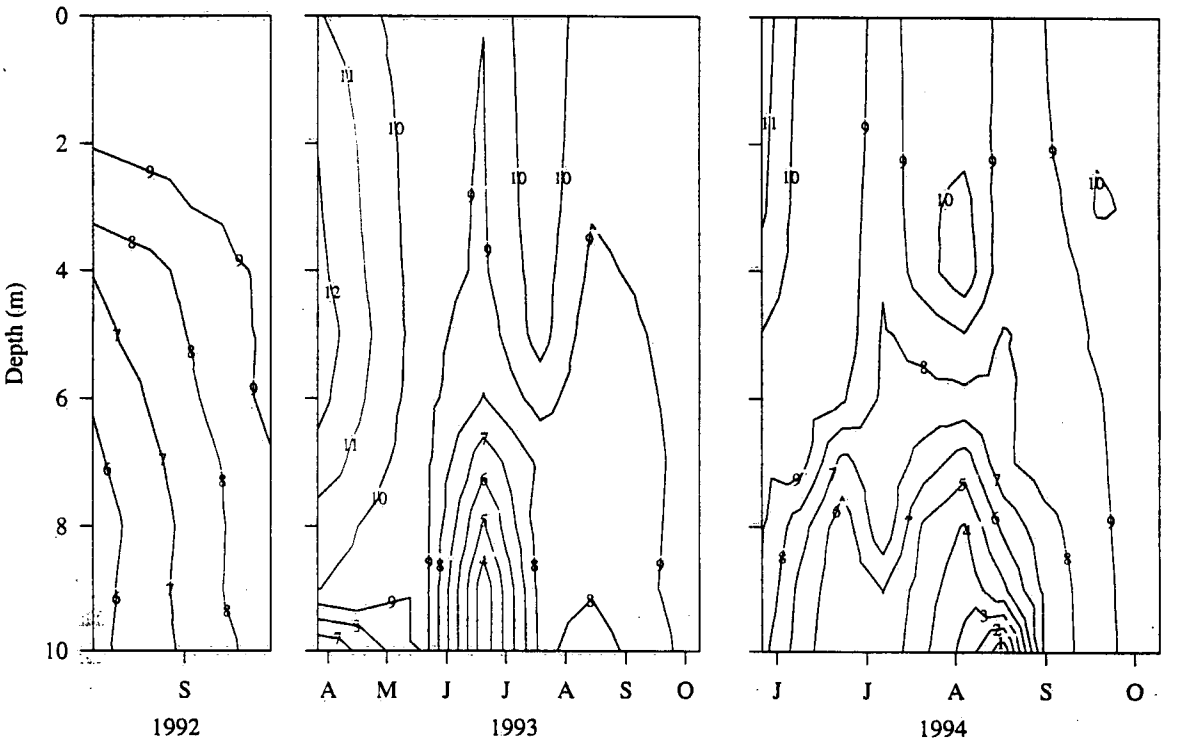

Figure 9. Third Narrows dissolved oxygen contours (mg/L).

At Prospect Point dissolved oxygen concentrations during the 1993 and 1994 ice-free season averaged 9.6 mg/L in the upper 10 m of the water column and 4.5 mg/L at 20 m (Table 2). Concentrations averaged 8.6 mg/L over the same time period at Third Narrows. McLeod (1971) measured dissolved oxygen concentrations 1-m above the lake bottom in the lower lake. These deep water oxygen concentrations declined from 8 mg/L in early July to 3 mg/L in late July and then increased to 4 mg/L in late August. Concentrations at his 10-m deep station in the upper lake ranged from 2.8 - 8.8 mg/L. Overall, dissolved oxygen concentrations over our 1992 - 1994 sampling are similar to observations made by McLeod during the late 1960's.

Rawson's (1936) detailed data for the 1928 - 1934 ice-free seasons show oxygen concentrations in surface waters as ranging from 6.4 - 12.9 mg/L and bottom-water concentrations ranging from 0.1 - 11.4 mg/L. Interannual variations in oxygen concentration, especially in deep waters, were significant. In July-August 1934 dissolved oxygen concentrations in bottom waters ranged from 0.34 mg/L to 7.6 mg/L and averaged 4.5 mg/L. As previously noted, 1934 was a relatively warm year with strong thermal stratification, and these concentrations were related to the strength of this thermal stratification (Table 3). While we have only three years of similar observations, our values tend to be lower than those observed by Rawson. Mean values for summer 1992-1993 are one-third those observed by Rawson.

Table 3. Minimum and average dissolved oxygen concentrations (mg/L) in bottom waters of Waskesiu Lake for the July 15 - August 15 period. Data from 1929-1934 are from Rawson (1936).

	1928	1929	1930	1931	1932	1934	Mean
Historic							
Average	2.6	7.7	4.4	5.8	6.0	0.35	4.5
Minimum	0.9	7.4	2.8	3.3	0.4	0.15	2.5
This study		1992	1993	1994			Mean
Average		0.10	4.00	0.16			1.4
Minimum		0.09	1.10	0.11			0.4

It is curious and somewhat troubling that Rawson (1960) later reported that July-August dissolved oxygen concentrations in Waskesiu Lake bottom waters averaged 2.9 mg/L. This is in marked contrast to his earlier reported mean value of 4.5 mg/L. The Waskesiu Lake data reported in this 1960 publication apparently are based on studies conducted over 1928 - 1934 as reported in Rawson (1936). Therefore, it is possible that a transcription error was made in preparing Table 3 in his 1960 publication.

4.5.3 Percent oxygen saturation

Percent oxygen saturation at Prospect Point generally exceeded 80% in the upper 10 m of the water column (Figure 10). Saturation exceeded 100% in the upper 5-10 m during mid to late summer 1992 and 1993 as well as January 1993 (Figure 6). Percent saturation decreased to less than 20% near the lake floor during mid-summer and mid-winter. Summer oxygen depletion was greater in 1992 and 1994 than in 1993.

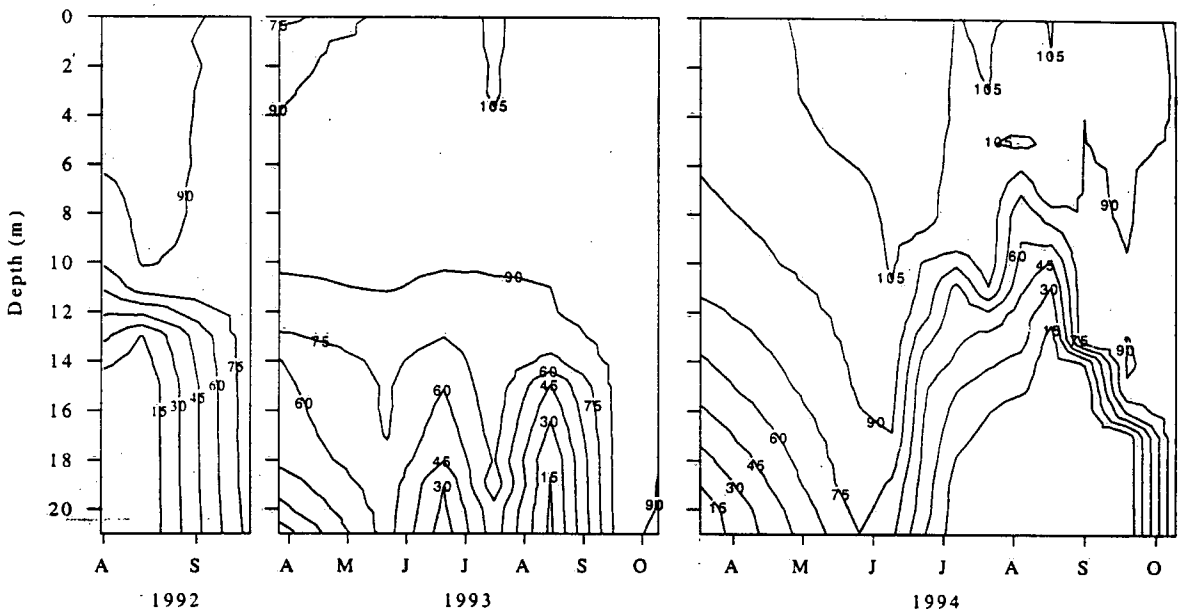

Figure 10. Prospect Point percent oxygen saturation.

Percent oxygen saturation at Third Narrows generally exceeded 90% in the upper 6 m of the water column (Figure 11). Percent saturation tended to be highest in summer with values reaching 127% at 4 m in August 1994. Percent saturation was lower near the lake floor with lowest values observed during summer thermal stratification. In August 1994, percent saturation declined to less than 30% at 10 m. It is interesting to note that although the water column generally was isothermal at Third Narrows during most of the ice-free season, pronounced vertical gradients in dissolved oxygen concentrations (and percent saturation) developed. This suggests that oxygen is rapidly lost from the deep-layer of the water column despite strong vertical mixing.

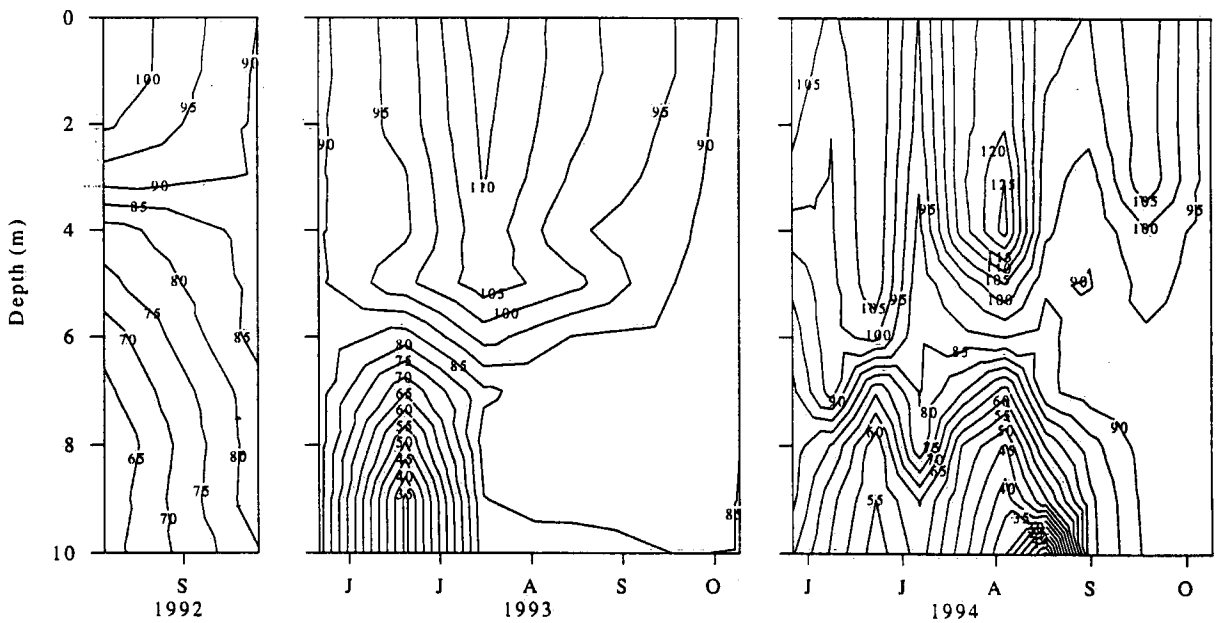

Figure 11. Third Narrows percent oxygen saturation.

Percent oxygen saturation at Prospect Point averaged 96.7 in the upper 10 m and 38.6 at 20 m (Table 2). At Third Narrows percent oxygen saturation averaged 89.7 in the upper 10 m.

Percent oxygen data for surface and bottom waters as presented by Rawson (1936) are shown in Figure 12. Low oxygen concentrations persisted in bottom waters for several weeks in 1928 and approximately one month in 1934. Percent oxygen remained high in bottom waters in 1929 and moderately high in summer 1930, 1931 and 1932.

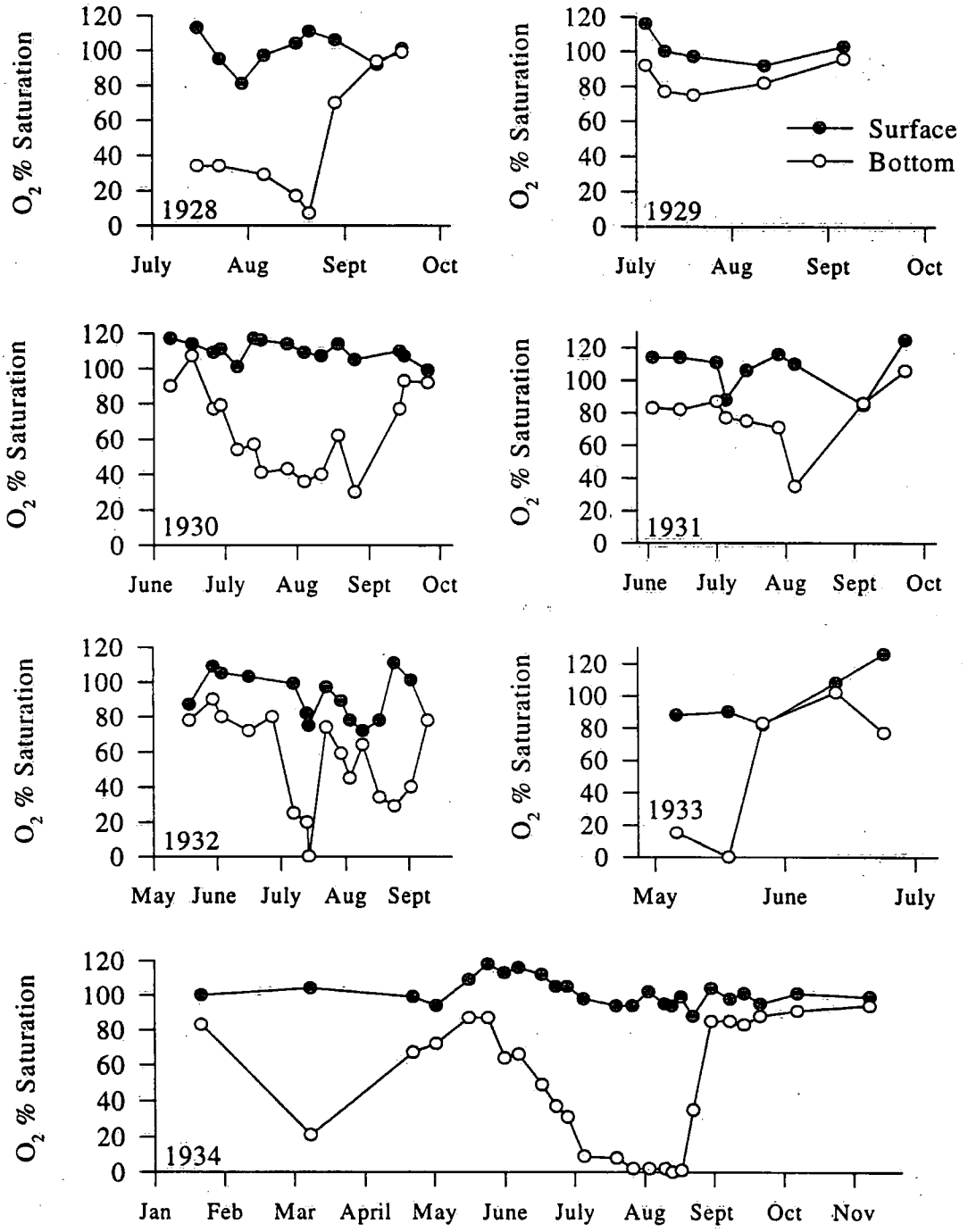

Figure 12. Percent oxygen saturation for lower Waskesiu Lake, 1928-1943 (Rawson 1936).

While our data are more limited, there was a longer period of low percent oxygen saturation in 1994 than in the years studied by Rawson (Figure 13). Dissolved oxygen concentrations from late July to late September were substantially lower than in most years investigated by Rawson. While deep water dissolved oxygen concentrations were higher in summer 1993 than 1992 and 1994; they barely reached 60%. In contrast, deep water dissolved oxygen concentrations frequently exceeded 80% during Rawson's study years in which thermal stratification was weak. Overall, these data may be suggestive of a small increase in sediment oxygen demand between Rawson's investigations and ours. Alternately, there were minor methodological differences between the two studies. We were able to sample relatively close to the sediments with our oxygen probe while Rawson, using a water bottle, was less able to sample so close to the lake floor. Rawson's study also shows higher percent saturation in surface waters than observed in our study. This could have been a result of a more productive algal community during his study than ours, a lower euphotic zone respiration rate, climatic variability and/or analytical differences between the two studies.

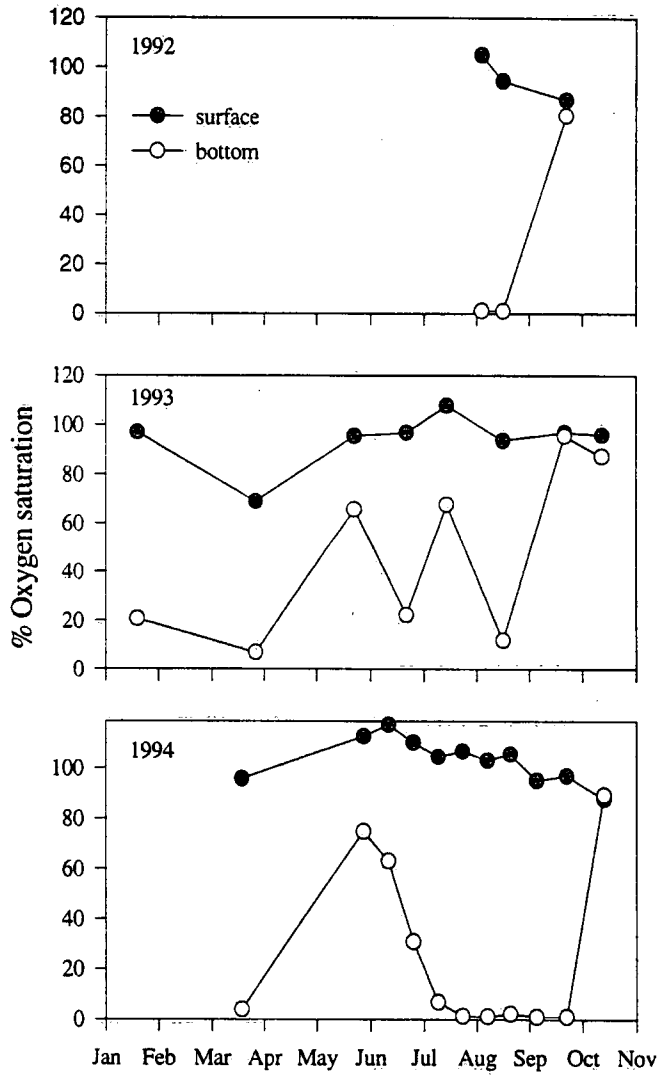

Figure 13. Prospect Point surface and bottom percent oxygen saturation 1992-1994.

4.5.4 pH

pH values at Prospect Point generally exceed 8 units in the upper 10 m of the water column (Figures 6 and 14). Low values, at 4 - 6 m in late July 1993, probably were associated with carbon dioxide release, either from decomposing particulates or from zooplankton respiration. pH values were lower in deeper waters, as a probable consequence of the decomposition of settling organic matter and organic matter at the sediment-water interface.

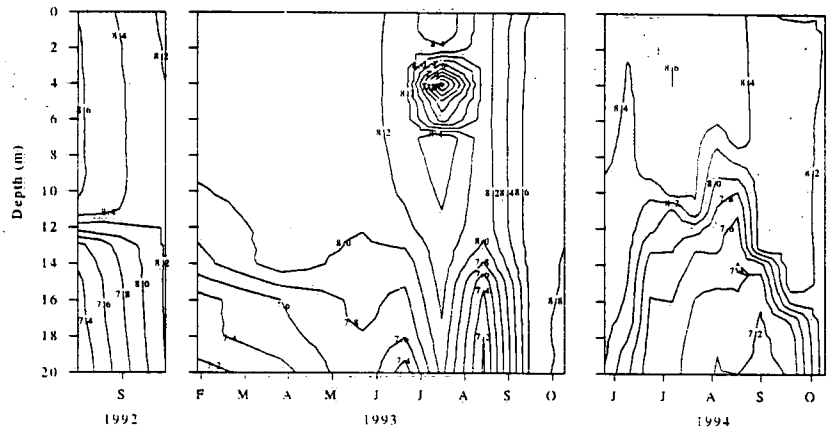

Figure 14. Prospect Point pH, 1992-1994.

pH values tended to be higher in the surface waters at Third Narrows (Figure 15) than at Prospect Point in midsummer 1993 and 1994 suggesting that phytoplankton productivity was greater at Third Narrows. pH values decreased with depth, indicating significant carbon dioxide production in near bottom waters and at the sediment-water interface because of decomposition.

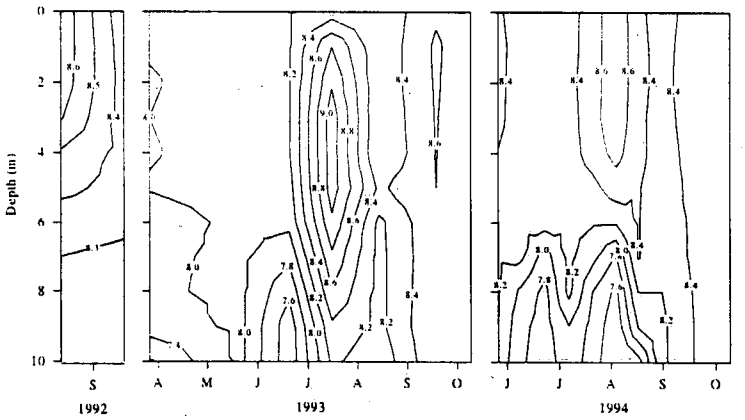

Figure 15. Third Narrows pH, 1992-1994.

pH averaged 8.4 for the upper 10 m at Prospect Point and 7.7 at 20 m for the 1993 and 1994 ice-free seasons: pH at Third Narrows averaged 8.3 for the upper 10 m (Table 2). These data can be compared to Hamilton and Macdonald's (1986) study that measured pH in the euphotic zone on four occasions between late July and September. pH at their station 6 in the lower basin averaged 8.6 while pH at their station 3, near the Third Narrows, averaged 8.5. These values are not appreciably different from what we observed over the 1993 and 1994 ice-free seasons.

Rawson (1960) reported that surface pH averaged 8.2 and bottom (23.8 m) pH averaged 7.4. pH during the 1934 ice-free season ranged from 8.0 - 8.4 in surface waters and 7.2 - 8.1 at 23.8 m. These values are not appreciably different from current values.

4.5.5 Secchi disc depth

Secchi disc depth at Prospect Point varied seasonally (Figure 16). In 1992 the highest value (4.1 m) was observed in mid August and the lowest (2.6 m) in early October. In 1993 and 1994, the highest values (4.8 and 5.6 m) were observed in mid-March (Figure 6) followed by the next highest values in mid-June to mid-July (4 - 4.7 and 4 - 4.9 m). Secchi disc depths declined to 1.9 and 1.8 m in August and increased in autumn although not to the high values of mid-summer. Secchi disc depths at the Third Narrows followed a similar trend as at Prospect Point (Figure 16) although water clarity tended to be slightly higher at Prospect Point than the Third Narrows.

Secchi disc depth averaged 3.2 m at Prospect Point during the 1993 and 1994 ice-free seasons (Table 2). Secchi disc depth averaged 2.3 m over the same time period at the Third Narrows. In contrast, Hamilton and Macdonald (1986) reported that Secchi disc depth averaged 2.1 m in western Waskesiu Lake and 2.6 m in eastern Waskesiu Lake. McLeod (1971) did not measure Secchi disc depth in Waskesiu Lake.

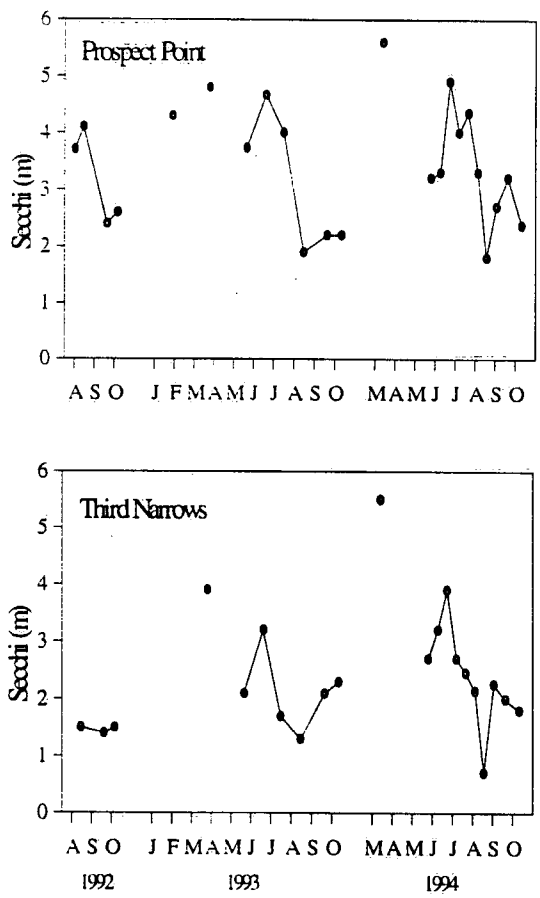

Figure 16. Secchi disc measurements for Prospect Point and Third Narrows, 1992-1994.

Rawson (1936), in his study of lakes in Prince Albert National Park, stated in his introduction that "The question of light penetration has not been investigated although such data are desirable in a report of this kind. Since Secchi disc is regularly seen at depths of 5 to 8 meters and traces of colour are rarely found in these waters, the question is not regarded as urgent". It is not evident from this statement how often were Secchi disc depths of 5 - 8 m seen, in which lakes, and at which times. Presumably, because most of Rawson's sampling was conducted in Waskesiu Lake and in summer, this statement refers to Waskesiu Lake.

Although Rawson apparently took Secchi disc depth measurements on several occasions during his 1928 -1934 Waskesiu study, only two measurements of Secchi disc depth data have been located in Rawson's Archives held by the University of Saskatchewan library. On July 13, 1928, a depth of 5.5 m was observed in 18.5 m of water at his station I (offshore of Camp 2 point in lower Waskesiu Lake). On July 20, 1928, a depth of 5 m was noted at station II, in the deepest water "off Heart Lake Point in direction of island 400 yards" (Research files, Prince Albert National Park, Record Books 1928-1942, Book II, pages 130 and 131). According to Figure 4 in Rawson (1936), the water column was strongly stratified on both days with the epilimnion deeper than 5 m. Thermal stratification had persisted for a sufficiently long period prior to the July 13 measurement for significant oxygen deletion to occur (Figure 12). This stratification may have caused significant loss of sedimenting particles to the lake floor and may have prevented the transfer of nutrients from the deeper waters to surface waters. Thus, these high values of 5 - 5.5 m appear to be associated with the relatively high water clarity that is observed in Waskesiu Lake during mid-summer. They are, however, higher than any value which we observed during comparable time periods.

Several years later, Rawson (1941) reported that the mean July-August transparency of Waskesiu Lake was 6.5 m; he also reported that mean temperature in the upper 10 m of the water column was 18.5°C. In still later publications, Rawson (1960, 1961) reported that Secchi disc depths in Waskesiu Lake averaged 3.1 m and ranged from 2.3 - 4.0 m. He also reported that July-August temperature in the upper 10 m of the water column averaged 17.4°C.

It is unlikely that reported differences in water clarity between Rawson's 1936, 1941, 1960 and 1961 publications were due to changes in lake limnology over the course of several decades. Moreover, there are no references or documentation available that would indicate that Rawson revisited Waskesiu Lake after 1934. Thus, it is assumed that the data presented in his 1941, 1960 and 1961 papers were collected during his 1928 - 1934 studies. Assuming this, it is likely that Rawson incorrectly reported mean water clarity in some or all of his publications.

If Rawson's (1961) most recently published values, are the most correct, there have been no major change in mean water clarity in Waskesiu Lake over the late 1920's and early 1930's (3.1 m) and our 1993 - 1994 study (3.2 m). The ranges in water clarity over the two studies also seem similar: the historic range in values was 2.3 - 4.0 m (or 2.3 - 5.5 m based on field data sheets) versus 1.8 - 4.9 m which we observed over the 1992 - 1994 ice-free season. However, if Rawson's earlier data are the more correct, there has been a major reduction in water clarity in Waskesiu Lake between 1928 -1934 and the 1980's and 1990's. Only

through paleolimnological studies will a definitive answer be obtained on historic trends in the trophic status of Waskesiu Lake.

4.6 Nutrients and particulates for the open-lake water column: 1992 - 1994

4.6.1 Total phosphorus

Total phosphorus (TP) concentrations varied seasonally and with depth (Figure 17). Moreover, there were subtle differences in TP concentrations between the Prospect Point and the Third Narrows sites.

TP concentrations at Prospect Point ranged from a minimum of 8 µg/L to a maximum of 151 µg/L over the 1992-1994 study period. Concentrations in the upper 10 m of the water column did not exhibit a pronounced pattern of seasonal variation. However, there was a weak trend for highest TP concentration to occur in late summer or early autumn. This trend may have been associated with the erosion of the thermocline. TP concentrations were substantially higher at 20 m and exhibited a pronounced trend of increase through summer thermal stratification. This increase reflects the decomposition of settling organic matter within the hypolimnion and the regeneration of nutrients at the sediment water interface. Because the euphotic zone at Prospect Point generally was limited to the upper 10 m of the water column, the algal community could not utilize nutrients regenerated in the hypolimnion. This situation changed with the late summer - early autumn breakdown of the thermocline.

TP concentrations were relatively low during the winter months. Low concentrations at 20 m may reflect slower decomposition rates than in summer, presumably because of lower hypolimnion temperatures. Low concentrations in the upper regions of the water column reflect low algal growth rates and the loss of particulates settling to the lake floor during the long and quiescent period of ice cover.

TP concentrations at Third Narrows also varied with time. The highest concentration of TP in surface waters occurred in July. At the 10 m sampling depth there was a weak tendency for highest concentrations to occur in September and October and for the lowest concentrations to occur in winter. There was no consistent pattern for TP concentrations to be higher at 1 m than 10 m.

TP concentrations at Prospect Point averaged 18.6 µg/L for the upper 10 m and 49.4 µ g/L at 20 m for the 1993 - 1994 ice-free seasons (Table 2). Concentrations at Third Narrows averaged 27.7 µg/L for the upper 10 m. These data can be compared to Hamilton and Macdonald's (1986) study. In that study, the researchers measured TP concentrations only in the euphotic zone on four occasions between late July and September. TP concentrations at their station 6 in the lower basin averaged 24 µg/L (range 13 - 31 µg/L). TP concentrations at their station 3, near the Third Narrows, averaged 25 µg/L (range 17 - 31 µg/L). These values are not appreciably different from what we observed over the 1993 - 1994 ice-free seasons.

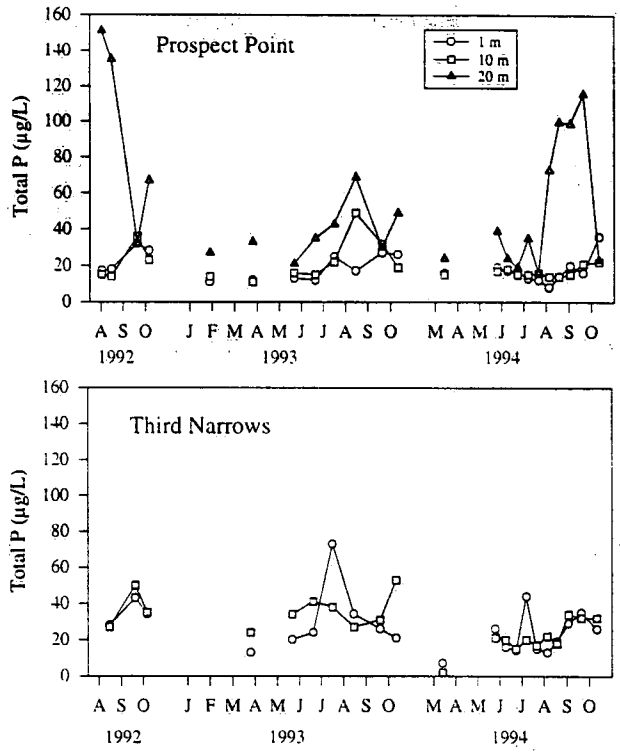

Figure 17. Total phosphorus concentrations for Prospect Point and Third Narrows, 1992-1994.

4.6.2 Dissolved phosphorus

Most of the TP was comprised of dissolved phosphorus (DP). Seasonal and spatial patterns in DP concentrations tended to follow that of TP (Figure 18). At Prospect Point, DP concentrations in the upper 10 m of the water column varied only slightly with season. There was a slight tendency for concentrations to be highest in September-October and lowest in winter and mid-summer (July-August). DP concentrations were substantially more variable at 20 m with concentrations increasing markedly through summer thermal stratification and declining rapidly with the fall breakdown of the thermocline. DP concentrations at 1 and 10 m increased following the autumn decrease in DP concentrations at 20 m in 1992 and 1993 but not 1994.

DP concentrations at the Third Narrows tended to be highest in autumn. They also tended to be relatively high in late spring and early summer (June). Lower concentrations in mid-summer probably were associated with intense utilization by the algal community. There was no clear pattern for DP concentrations to be higher at 1 m than 10 m. DP concentrations for the 1993-1994 ice-free season averaged 10.4 µg/L (54.4% of TP) for the upper 10 m at Prospect Point and 33.4 µg/L (51.6% of TP) at 20 m (Table 2). Concentrations at Third Narrows averaged 14.2 µg/L (51.1% of TP). Hamilton and Macdonald (1986) reported that DP concentrations averaged 3 µg/L (range < 3 - 8 µg/L) at their site 3 and 3 µg/L (range 3 - 5 µg/L) at their site 6. It is not clear why DP concentrations were higher in our study than Hamilton and Macdonald's study while TP concentrations were similar. In their study, DP accounted for only 12.0 - 12.5% of TP versus a reported range of 38-74% by Wetzel (1983) for a variety of lakes in the northern United States and Ontario.

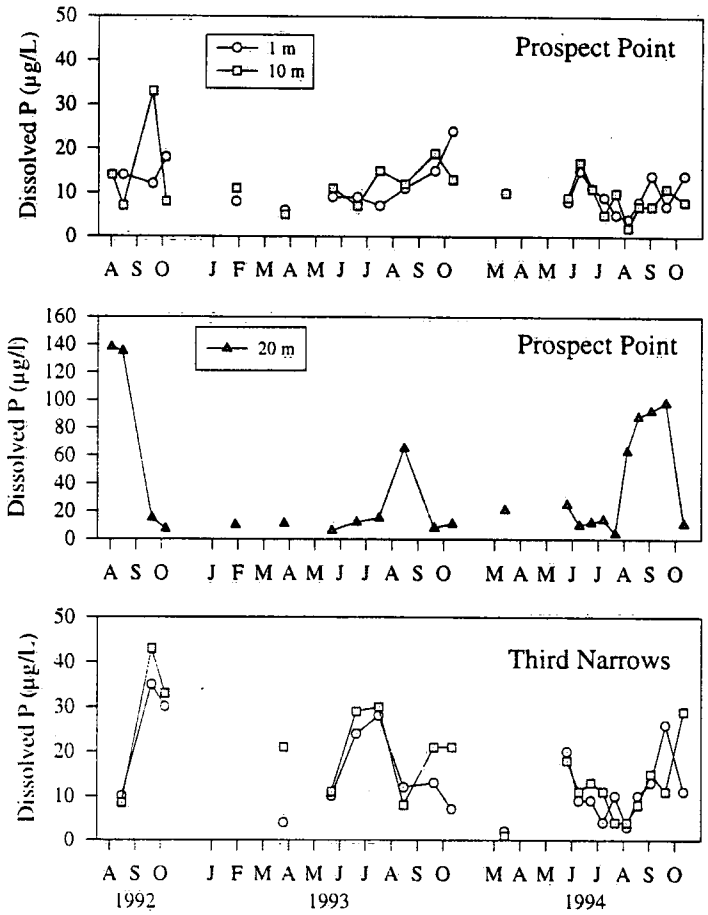

Figure 18. Dissolved phosphorus concentrations for Prospect Point and Third Narrows, 1992-1994.

4.6.3 Soluble reactive phosphorus

Soluble reactive phosphorus (SRP) is the form of phosphorus most utilized by the algal community. SRP concentrations frequently were below detection limits of 2 µg/L (Figure 19). In order to graph seasonal and spatial trends in SRP concentrations, a value of 1.5 µg/L was arbitrarily assigned to samples in which concentrations were below detection limits.

SRP concentrations in the upper 10 m of Prospect tended to be detected only in autumn with the breakdown of the thermocline and in May and June. Concentrations were low in summer, reflecting intense utilization by the algal community. SRP concentrations were substantially higher at 20 m than at 10 m during summer thermal stratification.

SRP concentrations were surprisingly low even in winter suggesting significant nutrient demand by the algal community. In January and March 1993, 20 m concentrations were similar to those observed in the upper 10 m of the water column. Concentrations in March 1994 were slightly higher at 20 m (8.0 µg/L) than in the upper 10 m (< 2.3 µg/L) of the water column. Low concentrations of SRP in deep water during the winter were unexpected because of the low oxygen concentration near the lake floor (Figure 6). Low SRP concentration in surface waters suggests strong utilization, even in winter.

SRP concentrations at the Third Narrows also were low and frequently below detection limits. Lowest concentrations occurred in winter. There was no clear pattern in SRP concentration during the ice-free season. However, concentrations tended to be low in October, reflecting intense demand, presumably by an autumn pulse in phytoplankton growth. Concentrations also were low in August 1993 and on four occasions in summer 1994. Because the water column is more readily mixed vertically at the Third Narrows station than at Prospect Point, phosphorus recycling must be more dynamic in the upper than lower lake.

SRP concentrations for the 1993-1994 ice-free season averaged < 2.8 µg/L for the upper 10 m at Prospect Point at < 20.2 µg/L at 20 m (Table 2). Concentrations at Third Narrows averaged < 4.3 µg/L. Hamilton and Macdonald (1986) did not measure SRP in their study.

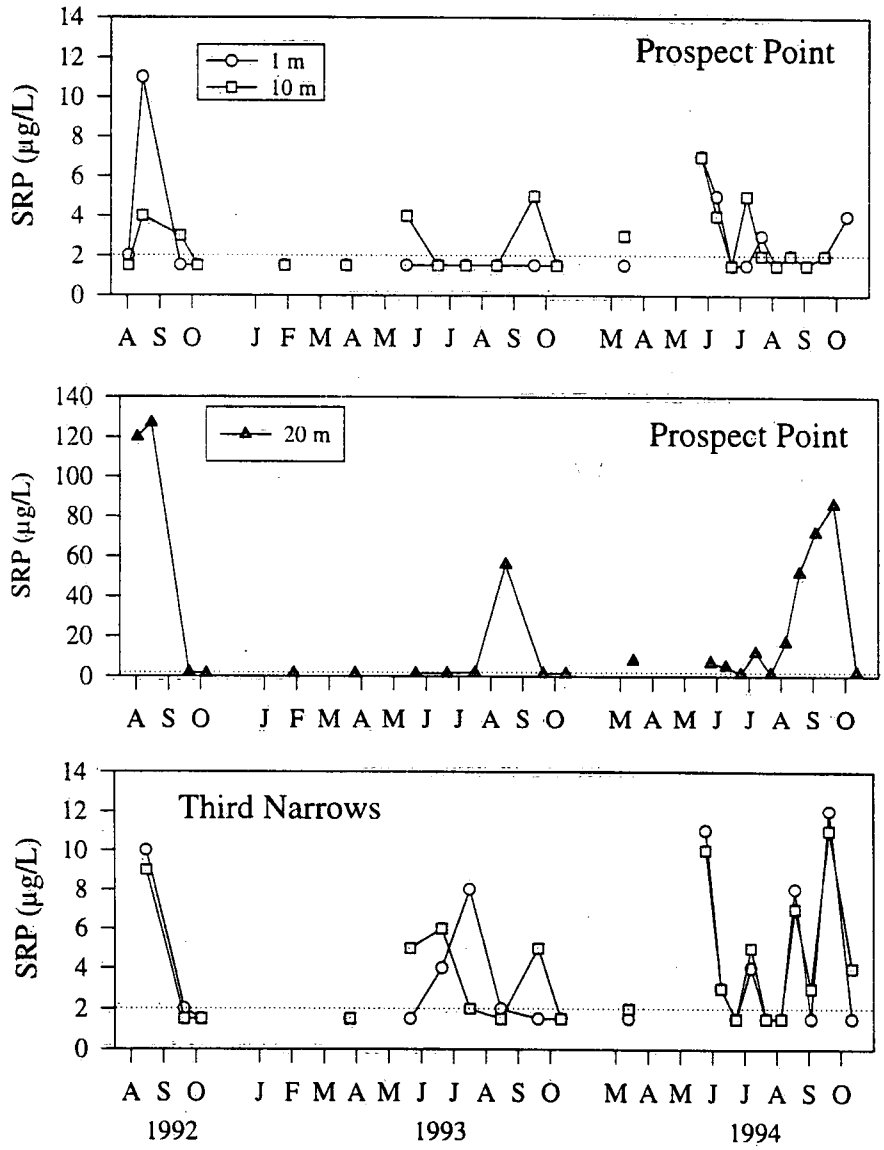

Figure 19. Soluble reactive phosphorus concentrations for Prospect Point Third and Narrows, 1992-1994. (····· detection limit)

4.6.4 Particulate phosphorus

Particulate concentrations were not measured directly but can be estimated by subtracting DP concentrations from TP concentrations (Figure 20). There was no clear pattern to these data. Concentrations for the 1993 and 1994 ice-free season averaged 8.7 µg/L for the upper 10 m and 16.1 µg/L for 20 m at Prospect Point (Table 2). Concentrations averaged 13.7 µg/L at the Third Narrows. Hamilton and Macdonald (1986) determined that PP concentrations averaged 22 µg/L at their site 3 in upper Waskesiu Lake and 21 µg/L at their site 6 in lower Waskesiu Lake.

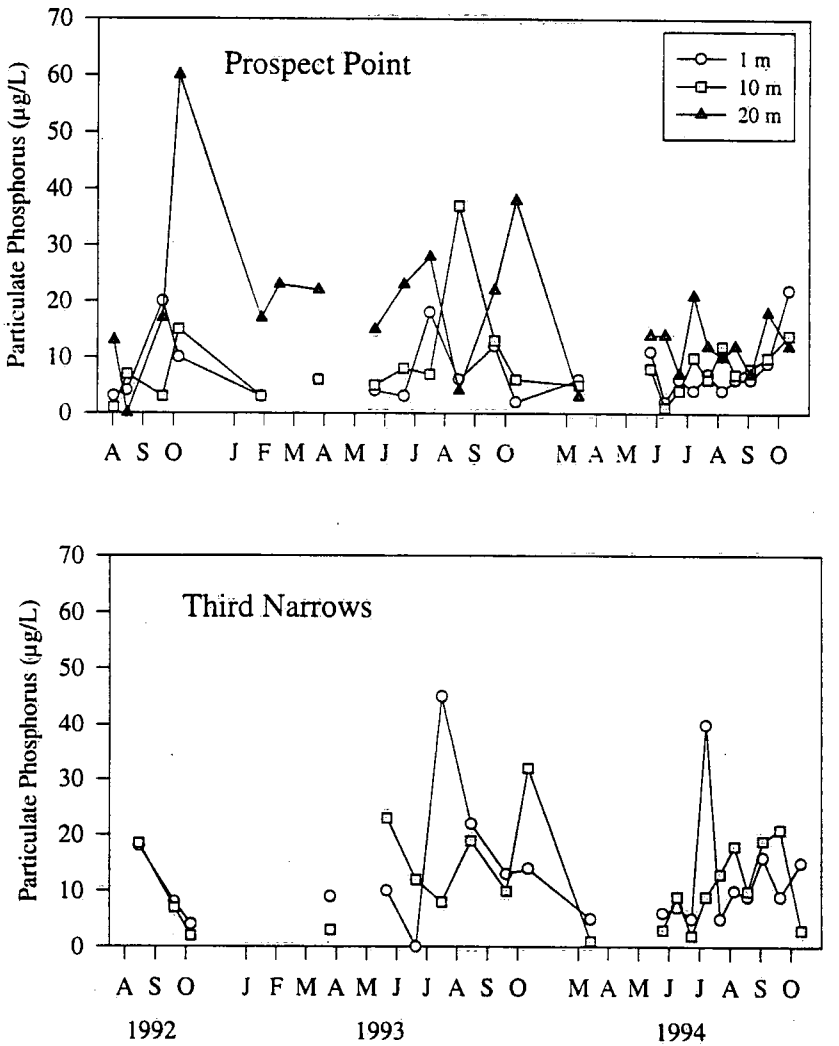

Figure 20. Particulate phosphorus concentrations for Prospect Point and Third Narrows, 1992-1994.

4.6.5 Ammonia

Two forms of dissolved nitrogen were measured; ammonia and nitrite-nitrate. Ammonia was the predominant of the two forms measured. In order to graph seasonal and spatial trends, a value of 4.5 µg/L was arbitrarily assigned to samples in which concentrations were below the 5 µg/L detection limit (Figure 21).

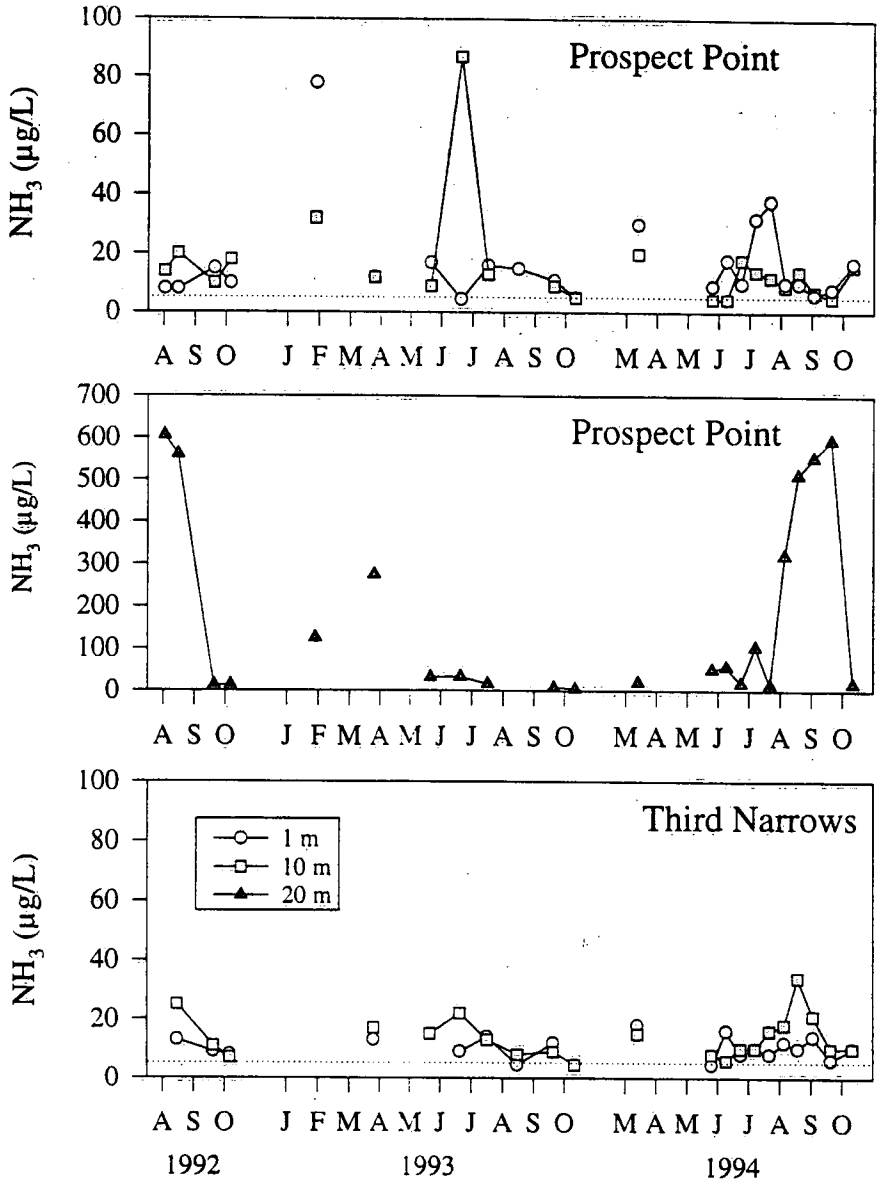

Figure 21. Ammonia concentrations for Prospect Point and Third Narrows, 1992-1994 (····· detection limit).

Like phosphorus, ammonia concentrations at Prospect Point were highest at 20 m, particularly during summer stratification. Concentrations were substantially lower at 1 and 10 m. Ammonia concentrations also were low at Third Narrows and showed a weak trend for concentrations to be higher at 10 than 1 m.

Ammonia concentrations for the 1993-1994 ice-free season averaged 14.7 µg/L for the upper 10 m at Prospect Point and 155.8 µg/L at 20 m (Table 2). Concentrations at Third Narrows averaged 11.8 µg/L. Hamilton and Macdonald (1986) determined that ammonia occurred in a mean concentration of < 49 µg/L at their site 3 and site 6. Because their detection limits were higher than ours (i.e., 49 µg/L versus 5 µg/L), we cannot compare average ammonia concentrations between the two studies.

4.6.6 Nitrite-nitrate

Nitrite-nitrate generally was below detection limits suggesting intense nutrient demand by an actively growing phytoplankton community. In order to graph seasonal and spatial trends, a value of 1.6 µg/L was arbitrarily assigned to samples in which concentrations were below the 2 µg/L detection limit (Figure 22). Nitrate generally was detected at Prospect Point only in winter or early summer. Because nitrogen is regenerated as ammonia in anoxic conditions, nitrite-nitrate concentrations remained low in deep waters during summer thermal stratification. Nitrate concentrations also were low at the Third Narrows and frequently below detection limits.

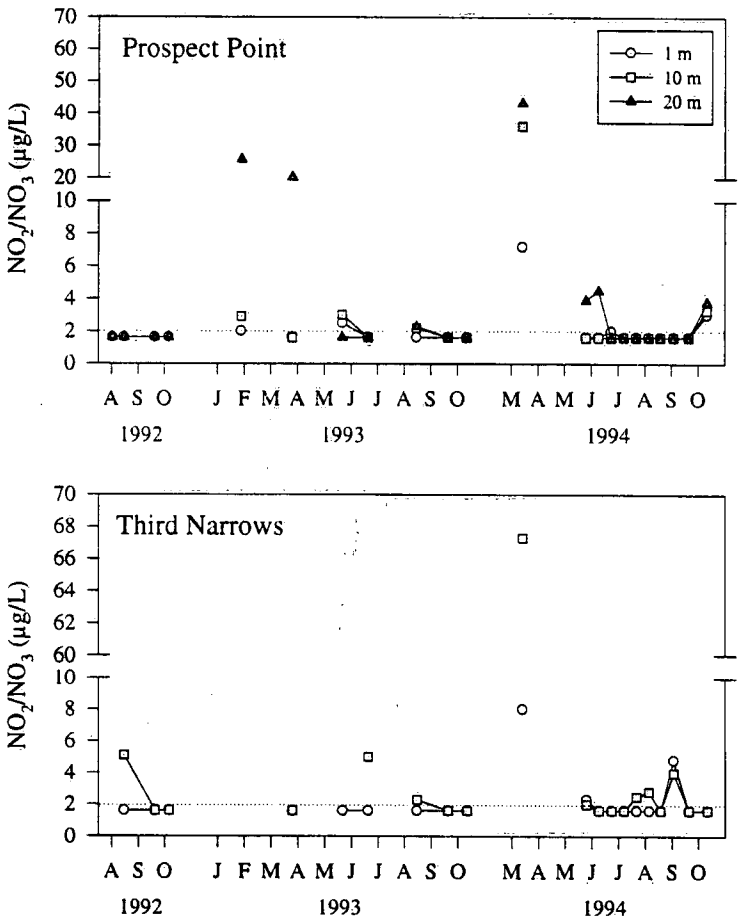

Figure 22. Nitrite-nitrate concentrations for Prospect Point and Third Narrows, 1992-1994. (····· detection limit)

Nitrite-nitrate concentrations for the 1993-1994 ice-free season averaged < 2.1 µg/L for the upper 10 m at Prospect Point and < 2.4 µg/L at 20 m (Table 2). Concentrations at Third Narrows averaged < 2.3 µg/L. Hamilton and Macdonald (1986) determined that nitrite-nitrate occurred in a mean concentration of < 12 µg/L (range < 9 - 20 µg/L) at their site 3 and at < 9 µg/L (their detection limits) at site 6. Because their detection limits apparently were higher than ours (i.e., 9 versus 2 µg/L), we cannot compare average nitrite-nitrate concentrations between the two studies.

4.6.7 Particulate Nitrogen

Particulate nitrogen (PN) concentrations were highly variable from month to month and with depth (Figure 23). In order to graph seasonal and spatial trends, a value of 5 µg/L was arbitrarily assigned to samples in which concentrations were below 10 µg/L. There was no clear pattern to these data. Concentrations for the 1993 and 1994 ice-free season averaged 92.2 µg/L for the upper 10 m and 96.9 µg/L for 20 m at Prospect Point (Table 2). Concentrations averaged 140.1 µg/L at the Third Narrows. Hamilton and Macdonald (1986) did not determine PN concentrations.

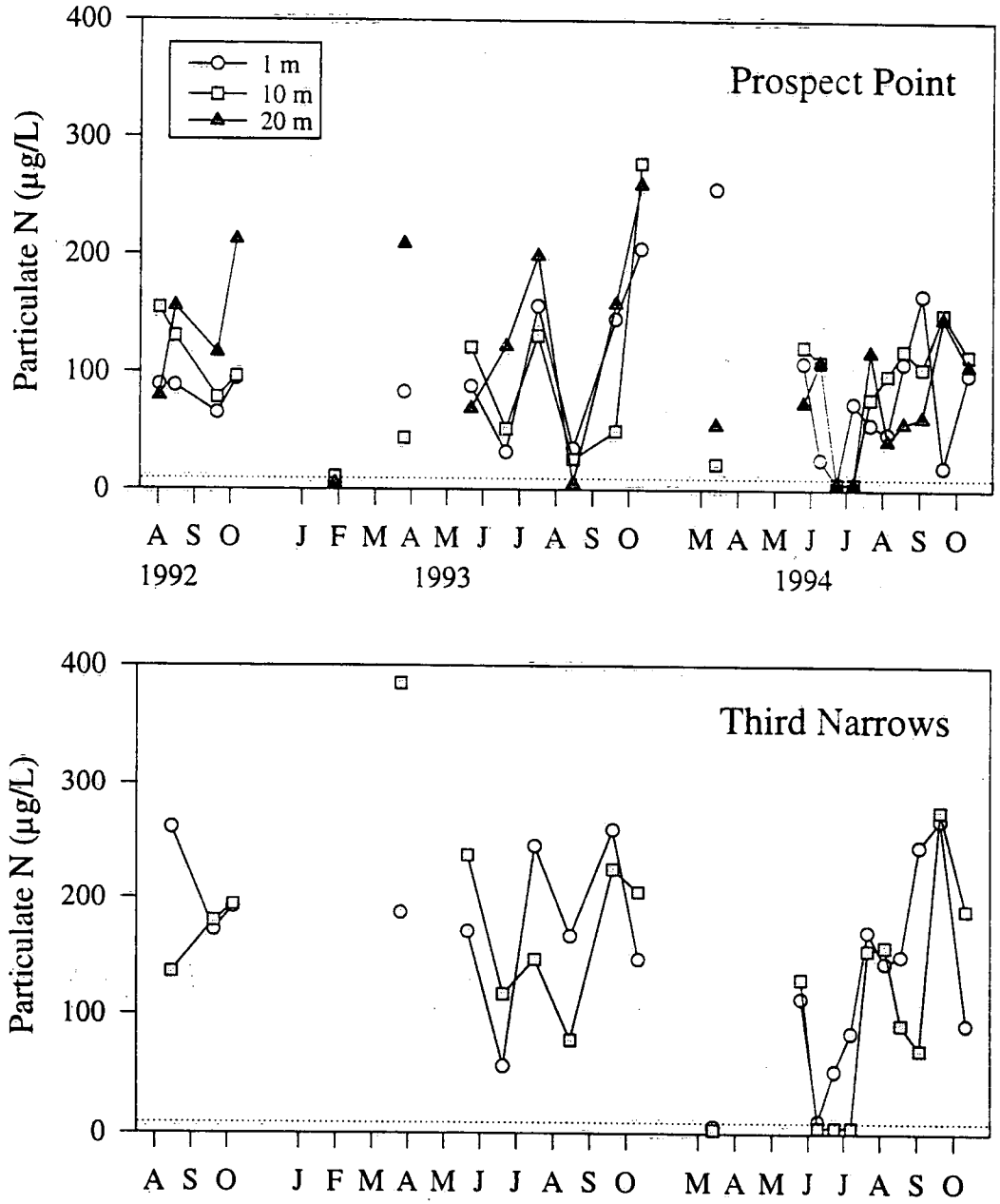

Figure 23. Particulate nitrogen concentrations for Prospect Point and Third Narrows, 1992-1994. (····· detection limit)

4.6.8 Particulate organic carbon

Particulate organic carbon (POC) concentrations were highly variable from month to month and with depth (Figure 24). There was no clear seasonal pattern to these data. Concentrations for the 1993 and 1994 ice-free season averaged 725 µg/L for the upper 10 m and 552 µg/L for 20 m at Prospect Point (Table 2). Concentrations averaged 995 µg/L at the Third Narrows. There was a general tendency for POC concentrations to be higher at 1 m than 10 m at Third Narrows but not Prospect Point. Hamilton and Macdonald (1986) did not determine POC concentrations.

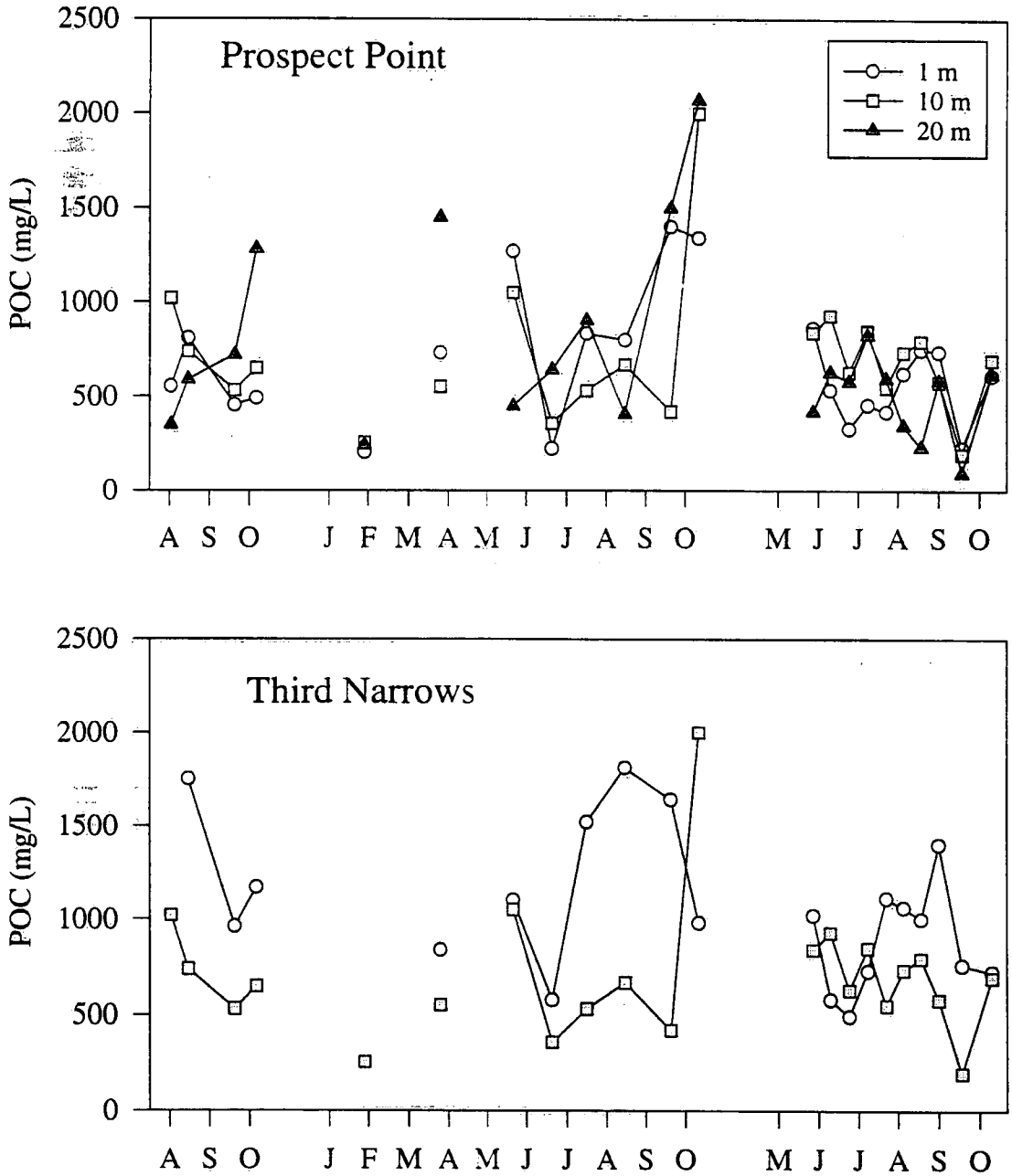

Figure 24. Particulate organic carbon concentrations for Prospect Point and Third Narrows, 1992-1994. (····· detection limit)

4.6.9 Silicon

Silicon concentrations at Prospect Point varied seasonally and with depth (Figure 25). In general, lowest concentrations were observed in surface waters and highest at 20 m. Concentrations tended to decrease through mid-summer, reflecting utilization, and increase with the late summer erosion of the thermocline. An October decrease in silicon concentrations suggests intense utilization by the diatom community.

At the Third Narrows station, silicon concentrations tended to be higher at 10 m than 1 m, reflecting utilization in the upper regions of the water column and regeneration from the lake floor. Utilization appeared to particularly intense in 1993, a year of strong vertical mixing.

Silicon concentrations for the 1993 and 1994 ice-free season averaged 0.61 mg/L in the upper 10 m of the water column at Prospect Point and 2.18 mg/L at 20 m (Table 2). At the Third Narrows station, silicon concentrations averaged 1.41 mg/L in for the ca. 10 m deep water column. Higher silicon values in the upper 10 m at Third Narrows than Prospect Point probably reflects greater silicon regeneration from the lake sediments in this shallower and warmer site.

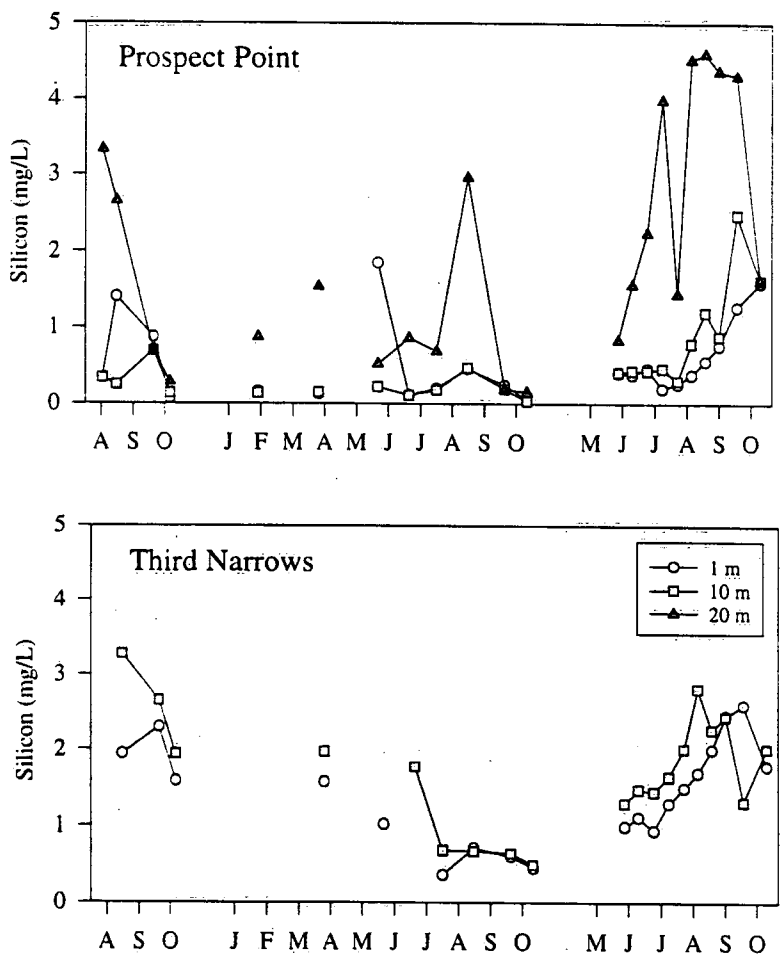

Figure 25. Silicon concentrations for Prospect Point and Third Narrows, 1992-1994.

4.7 Redfield ratios for the open-lake water column: 1992 - 1994

PN:PP and PC:PP determinations yielded similar results showing that phytoplankton community in the upper 10 m at Prospect Point was apparently phosphorus deficient during most of the ice-free season (Figure 26). Deficiencies were particularly great in August 1992, May and October 1993, and June 1994. However, even in winter, there were some indications of phosphorus deficiency. Nitrogen apparently was near sufficiency during the 1992 study period but deficient during most of the 1993 sampling with the possible exception of mid July and October. Nitrogen deficiency was very pronounced in mid 1994; a period of prolonged thermal stratification. Nitrogen deficiency was less evident later in the year.

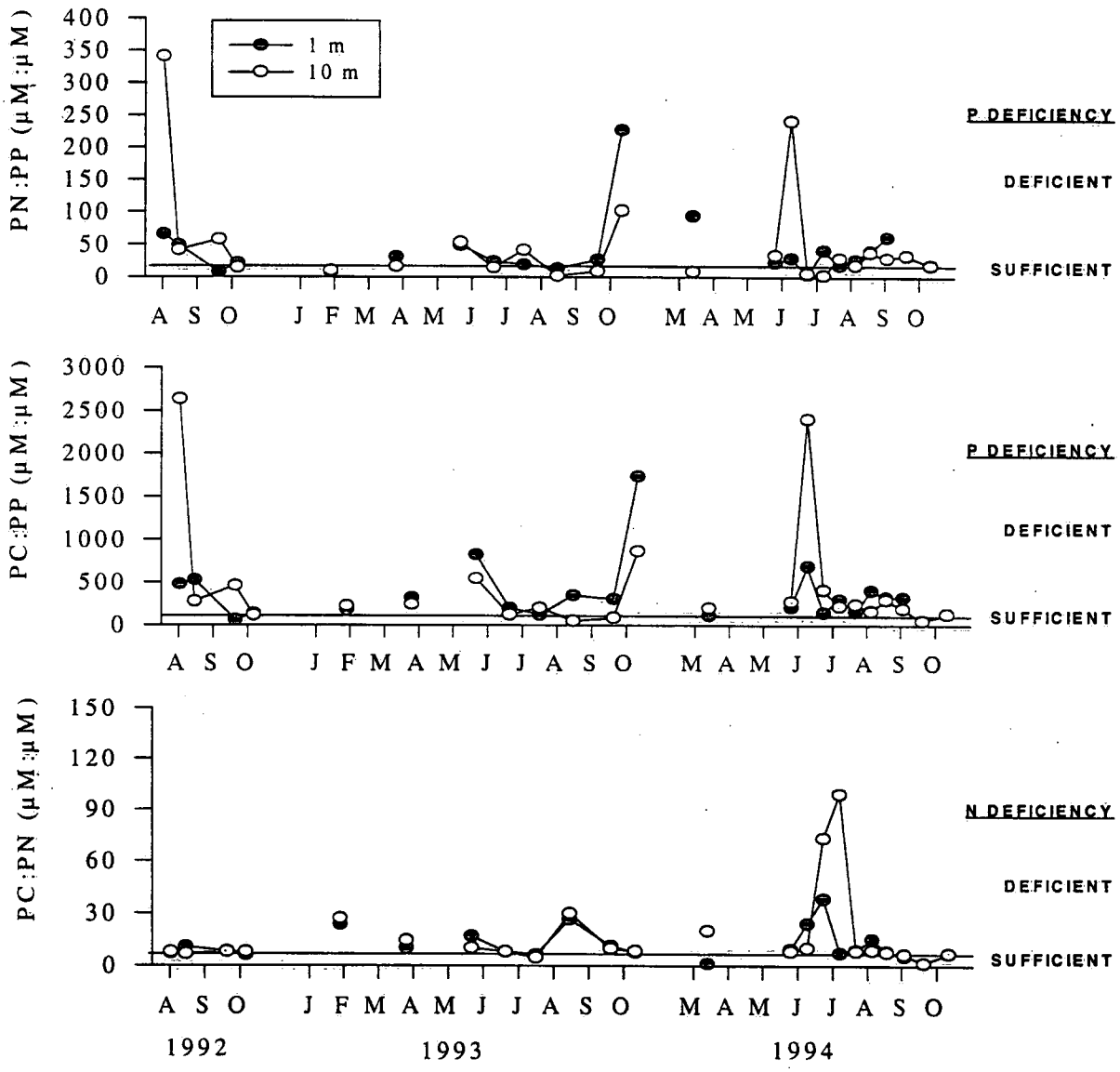

Figure 26. Redfield sestonic ratios calculated for 1 m and 10 m at Prospect Point with horizontal line showing sufficiency or deficiency as outlined by Redfield (1958).

Water at 20 m at Prospect Point was phosphorus sufficient based on PN:PP (Figure 27). On the basis of PC:PP, phosphorus was deficient in late summer and autumn 1993, when there was strong vertical mixing of the water column, and during some periods in early summer and autumn 1994, when the deficiency was much less than in surface waters. Nitrogen tended to be deficient in August 1993 and mid-summer 1994. However because of the severe light limitation which occurred at 20 m, it is unlikely that there was any significant phytoplankton growth due to photosynthesis.

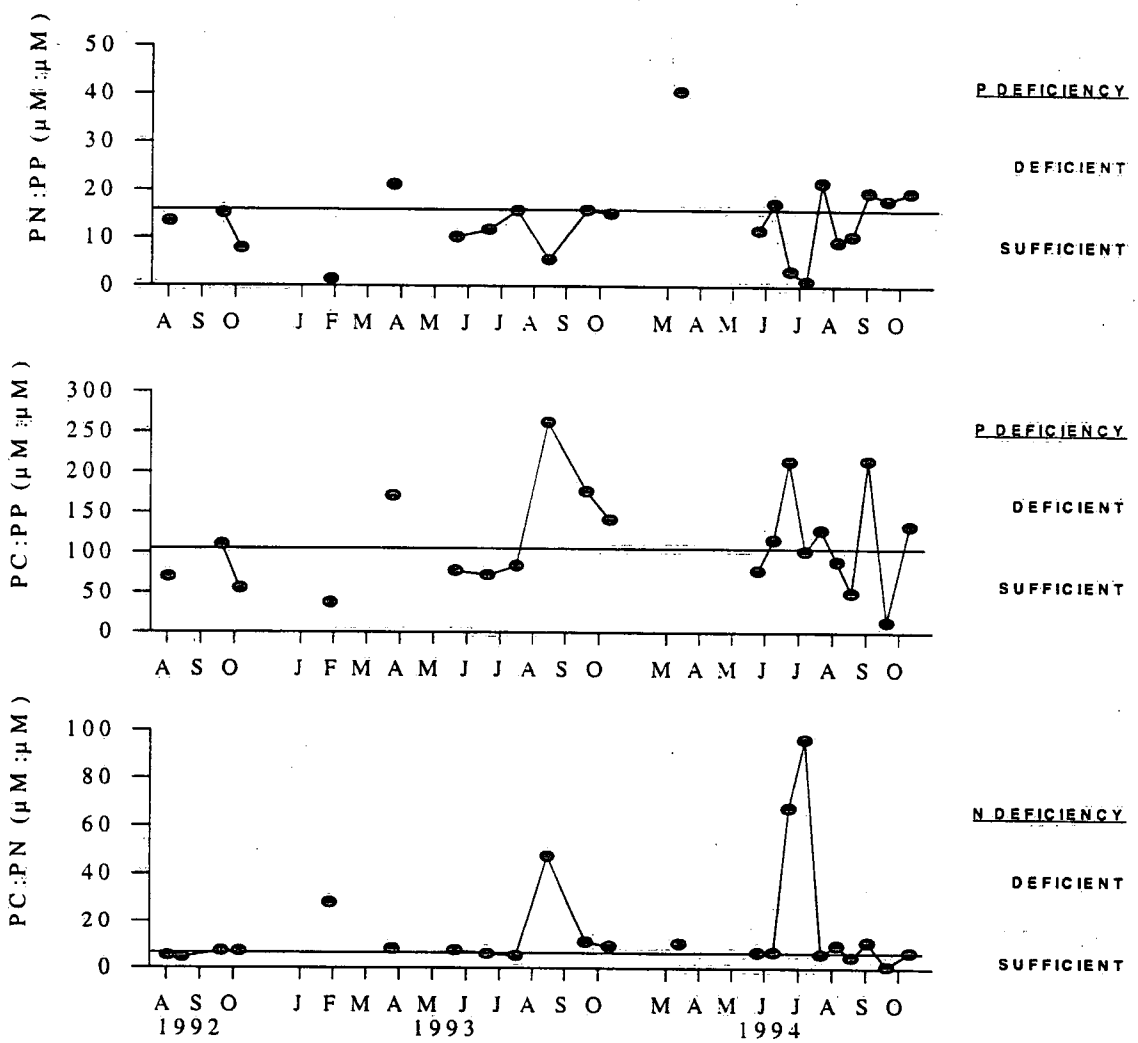

Figure 27. Redfield sestonic ratios calculated for 20 m at Prospect Point showing sufficiency or deficiency (solid line) as outlined by Redfield (1958).

Phosphorus also tended to be deficient at the Third Narrows station during most study periods (Figure 28). Deficiencies tended to be most pronounced in autumn although there was some evidence of strong phosphorus deficiency in March 1993. Nitrogen did not appear to be deficient in 1992, was somewhat deficient in 1993, but was very deficient in 1994 except in mid summer and late September-early October. Nitrogen deficiencies appeared to be less intense than at Prospect Point.

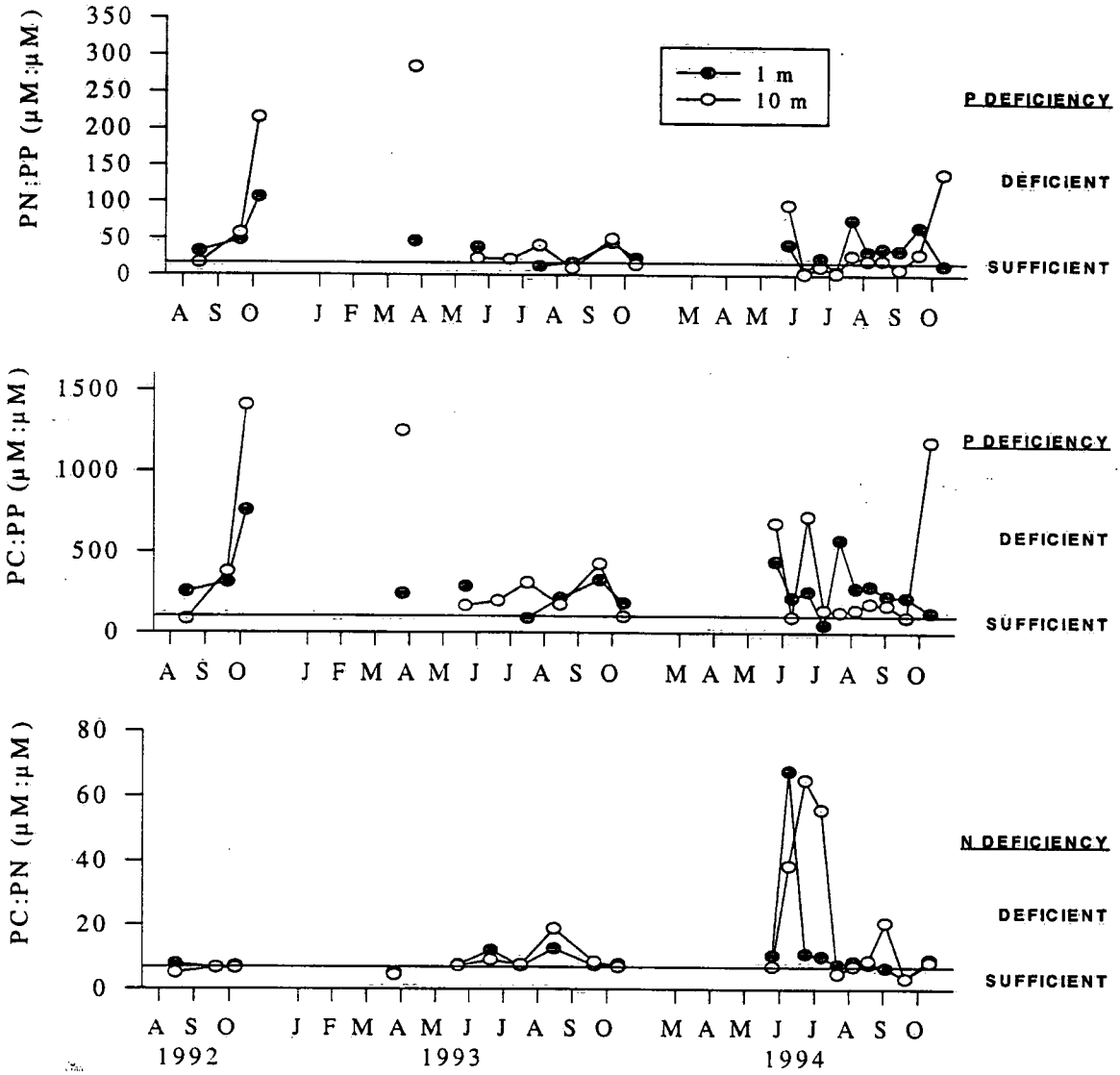

Figure 28. Redfield sestonic ratios calculated for 1 m and 10 m at Third Narrows showing sufficiency or deficiency (solid line) as outlined by Redfield (1958).

4.8 Sediment trap studies: 1992 - 1994

Sediment traps were set and recovered at approximately one month intervals from June 22 to October 8, 1994. Total mass flux rates varied seasonally at Prospect Point (Figure 29), tending to be highest during periods of weak thermal stratification and lowest during mid-summer when the lake was thermally stratified. Flux rates generally increased from 4 m to 10 m and from 10 m to 20 m. This increase in flux with depth reflects two phenomena: the continued production of particulates with depth and the possible down-slope movement of particulates from the shallow regions of Waskesiu Lake to deeper areas such as the depression offshore of Prospect Point. Total mass flux over the June 22 to October 8 period was 162.9 g/m^2 at 4 m, 228.0 g/m^2 at 10 m, and 398.1 g/m^2 at 20 m (Table 4).

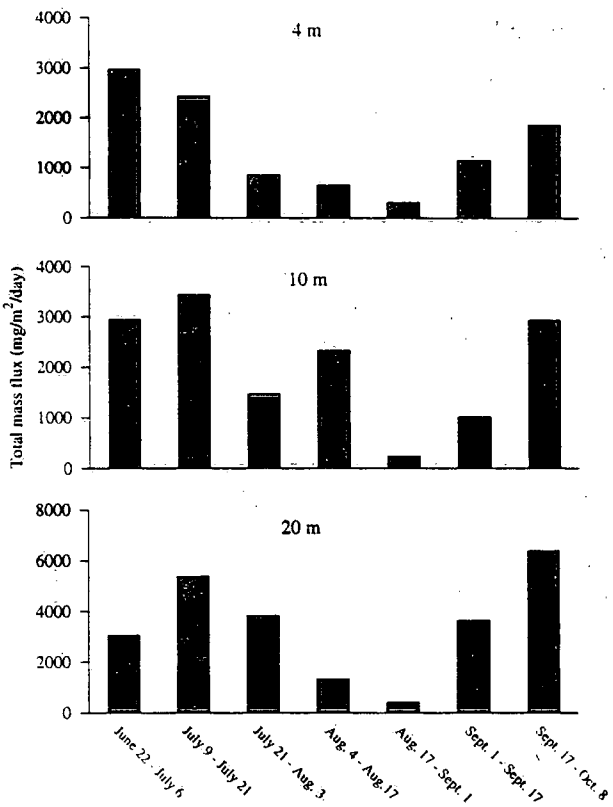

Figure 29. Total mass flux rates at Prospect Point, June to October 1994.

Total flux rates were not measured after October 1994. Relatively little flux would have occurred during ice cover. This is because the biological production of particulates would have been minimal during this period of low phytoplankton production and zooplankton growth rates. Wave action and water currents also are weak during ice-cover thus limiting the offshore movement of particulates, the re-suspension of particulates from the lake floor, and the maintenance of slow-sinking particulates in suspension in the water column. Flux rates probably were high in May, early June, and November, periods of strong vertical mixing. However, sediment traps overestimate net flux during these periods because intense vertical mixing tends to re-suspend particulates, both from the lake floor and from deeper regions of the water column (Evans, 1998).

Table 4. Flux rates ($g/m^2/yr$) at Prospect Point and Third Narrows, June 22 to October 8, 1994.

Site	Depth (m)	Total Flux	Total C	Organic C	CO_3	P	N
Prospect Point	4	162.9	43.9	40.4	3.5	0.6	6.5
	10	228.0	38.7	35.3	3.5	0.5	5.6
	20	398.1	70.1	60.9	9.2	0.9	8.4
Third Narrows	4	421.3	76.9	68.5	8.4	1.1	10.5
	10	606.0	107.9	95.1	12.9	1.8	12.6

Although our sediment trap studies were conducted only over the June to October period, we believe that they provide reasonable estimates of total annual flux. This opinion is supported by results of sediment coring study that was conducted in March 1996. One of the two cores collected from Prospect Point has been dated. Total mass flux rates during the 1990's was estimated to be 357 g/m^2/yr (Evans, unpublished data), a value not appreciable different for the 398.1 g/m^2 at 20 m for the June 22 - October 8 settings.

Total mass flux at the Third Narrows also varied seasonally (Figure 30). Flux was lowest in late July-early August and highest in mid-September to early October. Seasonality in flux rates, particularly at 10 m, appeared to be strongly linked to seasonality in wind speeds. Total mass flux for the study period was 421.3 g/m^2 at 4 m and 606.0 g/m^2 at 10 m (Table 4). Although a sediment core was collected at this site in March 1996, it has not been dated. Therefore, we do not have a second, independent measure of total mass flux against which to evaluate the precision of our sediment trap flux estimates at the Third Narrows.

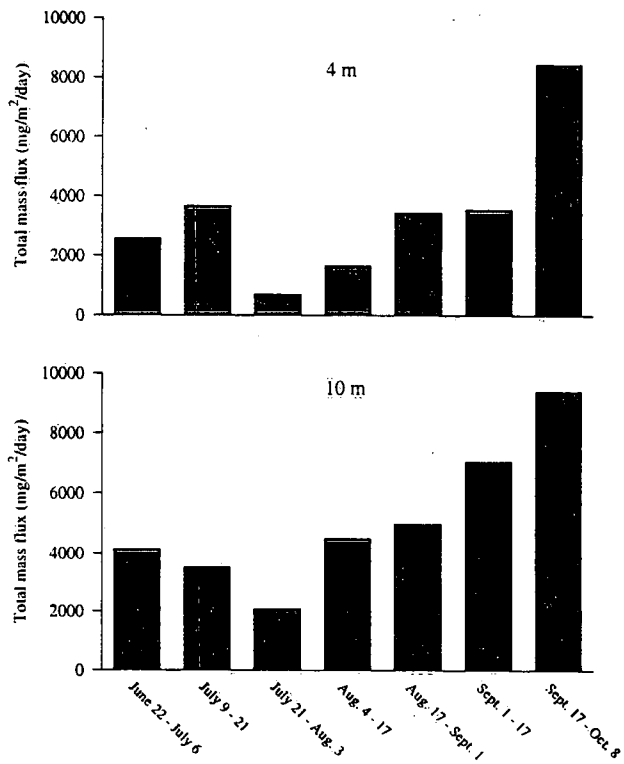

Figure 30. Total mass flux rates at Third Narrows, June to October 1994.

Carbon was a major component of mass flux at both sites. Carbon mass flux tended to follow total mass flux both at Prospect Point (Figure 31) and Third Narrows (Figure 32). Total carbon flux over the study period was 43.9 g/m^2 at 4 m, 38.7 g/m^2 at 10 m, and 70.1 g/m^2 at 20 m at Prospect Point and 75.9 g/m^2 and 107.9 g/m^2 at 10 m at Third Narrows (Table 4). Analysis of the core collected at Prospect Point yielded an estimated an annual carbon flux of 52.6 g/m^2 during the 1989-1996 period (Evans, unpublished data), an estimate not appreciably different from the carbon flux at 20 m for the June - October 1994 period. Carbon accounted for an average of 27.0 % of the flux at 4 m, 17.0 % of the flux at 10 m, and 17.6 % of the flux at 20 m at Prospect Point. Carbon accounted for 18.3% of the 4 m and 17.8 % of the 10 m flux at Third Narrows.

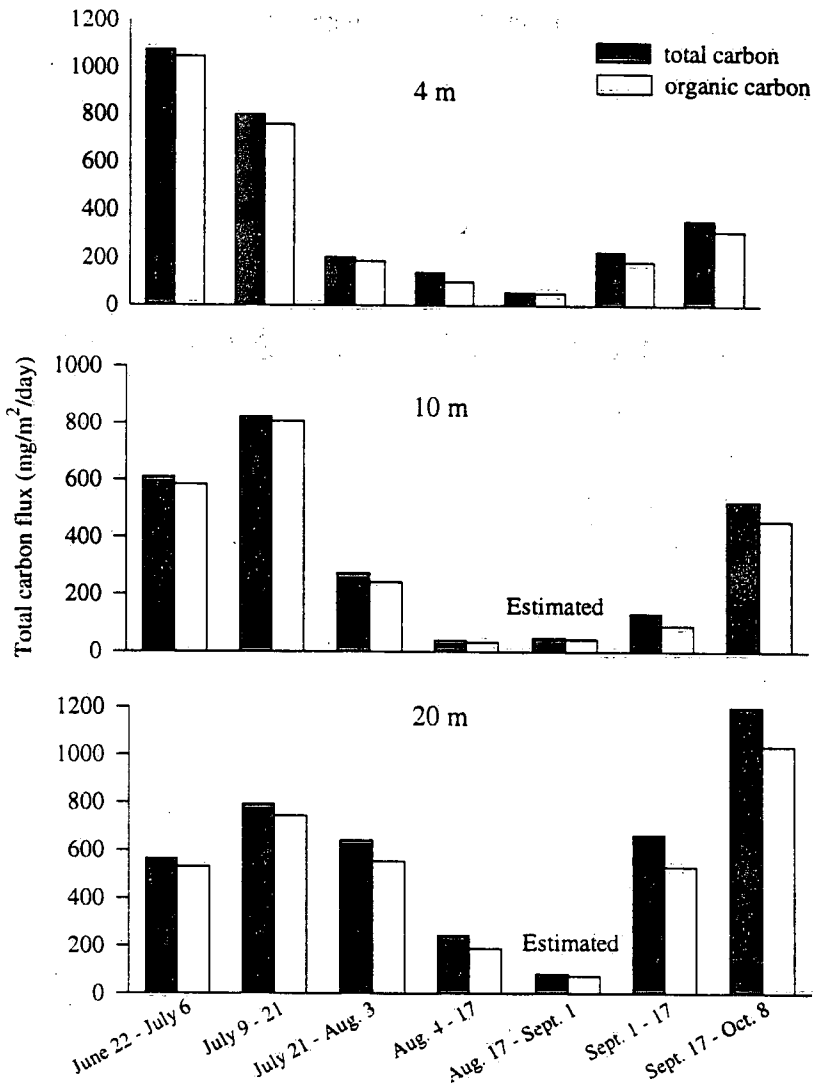

Figure 31. Total and organic carbon flux rates at Prospect Point, 1994.

Carbon flux was comprised largely of organic matter. Organic carbon flux rates at Prospect Point varied seasonally and with depth (Figure 31). At 4 m, highest flux rates were observed in June and July with rates declining markedly through summer: rates increased only slightly in autumn. At 10 and 20 m, rates increased from June through July, declined in summer, and then increased in September and October.

Organic carbon flux rates at Third Narrows tended to be lowest in late July-early August and highest from mid- September to early October (Figure 32). Total organic carbon flux over the study period was 40.4 g/m^2 at 4 m, 35.3 g/m^2 at 10 m, and 60.9 g/m^2 at 20 m at Prospect Point and 68.5 g/m^2 and 95.1 g/m^2 at 10 m at Third Narrows (Table 4). Organic carbon accounted for, on average, 92.0% of the 4 m, 91.1% of the 10 m, and 86.9% of the 20 m carbon flux at Prospect Point; it accounted for 89.1% of the 4 m and 88.1% of the 10 m flux at Third Narrows. Analysis of the sediment core collected at Prospect Point yielded an estimated an annual organic carbon flux of 46.0 g/m^2 during the 1989-1996 period (Evans, unpublished data), an estimate not appreciably different from the carbon flux at 20 m for the June - October 1994 period.

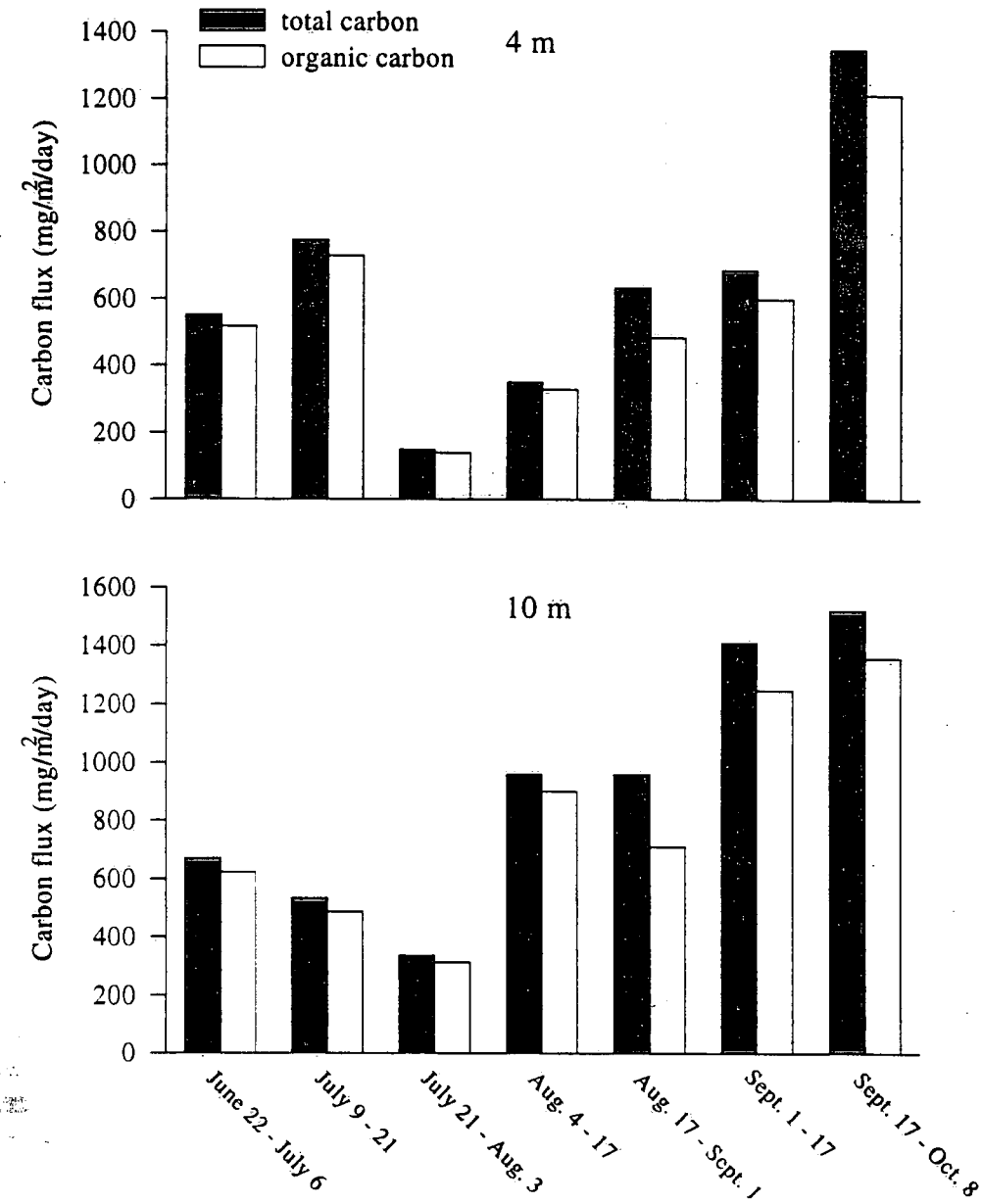

Figure 32. Total and organic carbon flux rates at Third Narrows, 1994.

Inorganic carbon (carbonates) had three potential sources. Some carbonates were re-suspended from the lake floor or transported offshore from the littoral and shallow inshore regions. Other carbonates may have been produced in the lake during periods of high primary production and warm water temperatures (Wetzel 1983). "Whitings", resulting from biologically-induced carbonate precipitates, are a common summer-autumn occurrence in the more productive regions of the Great Lakes (Strong and Eadie 1978).

Carbonate flux at Prospect Point varied seasonally, tending to be greatest during September-October, a period of strong vertical mixing and cooling lake temperatures (Figure 33). Primary productivity also was high during this period (see section 4.12).

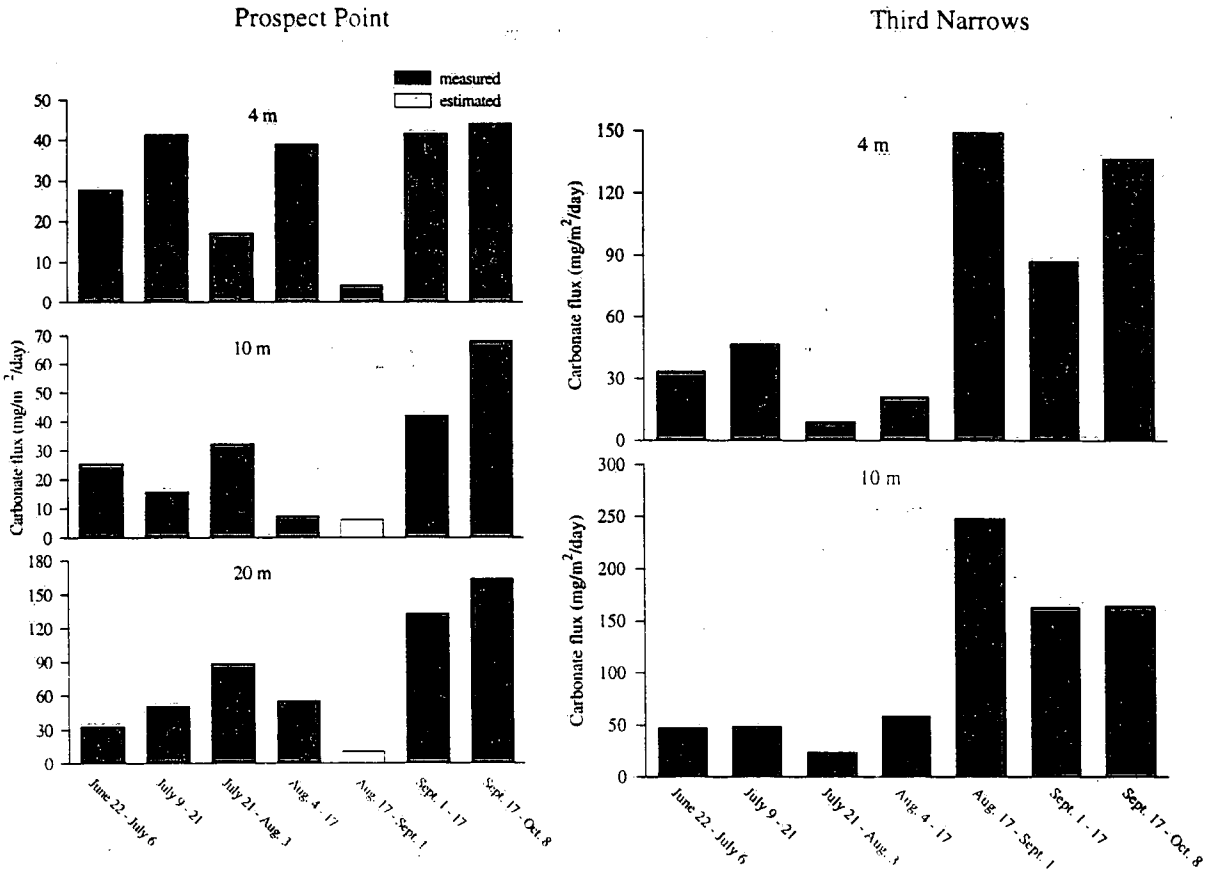

Figure 33. Carbonate flux rates at Prospect Point and Third Narrows, 1994.

Carbonate flux at the Third Narrows was substantially greater from mid-August to October than from June to mid-August (Figure 33). Total carbonate flux over the study period was 3.5 g/m^2 at 4 m, 3.5 g/m^2 at 10 m, and 9.2 g/m^2 at 20 m at Prospect Point and 8.4 g/m^2 at 4 m and 12.9 g/m^2 at 10 m at Third Narrows (Table 4). Analysis of the core collected at Prospect Point yielded an estimated annual carbonate flux of 6.6 g/m^2 during the 1989 - 1996 period (Evans, unpublished data), an estimate not appreciably different from the carbonate flux at 20 m for the June - October 1994 period.

Nitrogen flux at 4 m at Prospect Point declined rapidly from June to early August and then remained low through summer: flux increased in autumn (Figure 34). A similar pattern was observed at 10 m and 20 m although the autumn increase in nitrogen flux was more pronounced. At the Third Narrows site, nitrogen flux at 4 m increased from June to July, declined in mid-summer, and then increased through October (Figure 34). Flux was more constant at 10 m over much of the June-August period. Nitrogen flux increased markedly in September and October. Total nitrogen flux was 6.5 g/m^2 at 4 m, 5.6 g/m^2 at 10 m, and 8.4 g/m^2 at 20 m at Prospect Point and 10.5 g/m^2 at 4 m and 12.6 g/m^2 at 10 m at Third Narrows (Table 4). Analysis of the core collected at Prospect Point yielded an estimated annual inorganic carbon flux of 5.6 g/m^2 during the 1989-1996 period (Evans, unpublished data), an estimate not appreciably different from the estimated 8.4 g/m^2 nitrogen flux at 20 m for the June - October 1994 period.

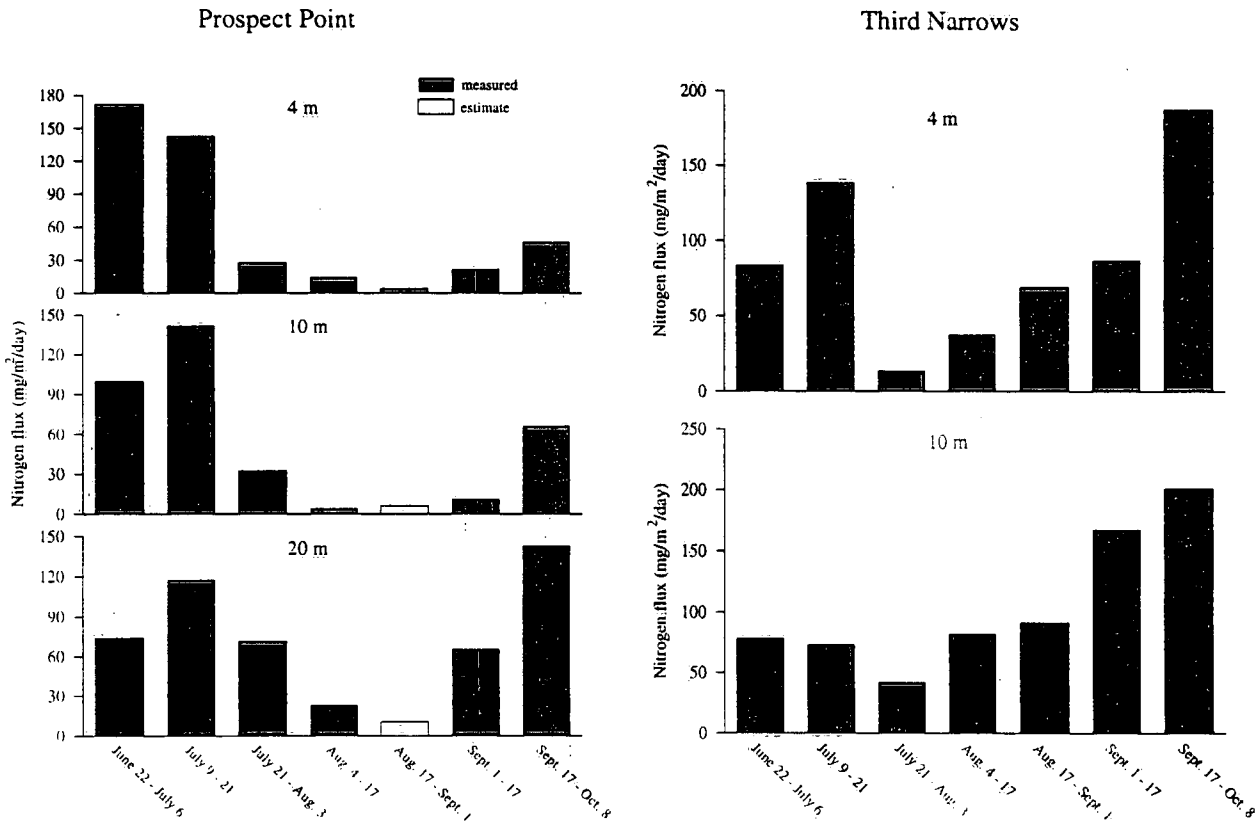

Figure 34. Nitrogen flux rates at Prospect Point and Third Narrows, 1994.

Phosphorus flux rates, although lower than nitrogen flux rates, tended to follow the same seasonal and spatial patterns at Prospect Point and Third Narrows (Figure 35). Total phosphorus flux was 0.6 g/m^2 at 4 m, 0.5 g/m^2 at 10 m, and 0.9 g/m^2 at 20 m at Prospect Point and 1.1 g/m^2 and 1.8 g/m^2 at 4 and 10 m, respectively, at Third Narrows (Table 4). Analysis of the core collected at Prospect Point yielded an estimated annual phosphorus flux of 0.5 g/m^2 during the 1989-1996 period (Evans, unpublished data), an estimate not appreciably different from the 0.9 g/m^2 phosphorus flux at 20 m for the June - October 1994 period.

Overall, the sediment trap studies provided information on seasonal and spatial variations in particulate flux and composition. Flux rates measured at 20 m at Prospect Point over June - October 1994 were remarkably similar to estimate rates at the same site based on coring studies. Flux rates were higher at the Third Narrows than at Prospect Point. This higher flux may be a consequence of the greater concentrations of particulate organic carbon, nitrogen, phosphorus, and of chlorophyll at Third Narrows than Prospect Point. Vertical mixing was greater at the shallower Third Narrows site than the deeper Prospect Point site. Thus, re-suspension rates may have been higher at the Third Narrows sites, thus increasing gross flux estimates. Analysis of the sediment core collected at the Third Narrows should help resolve whether or not sedimentation rates were, in fact, higher at this site than at Prospect Point.

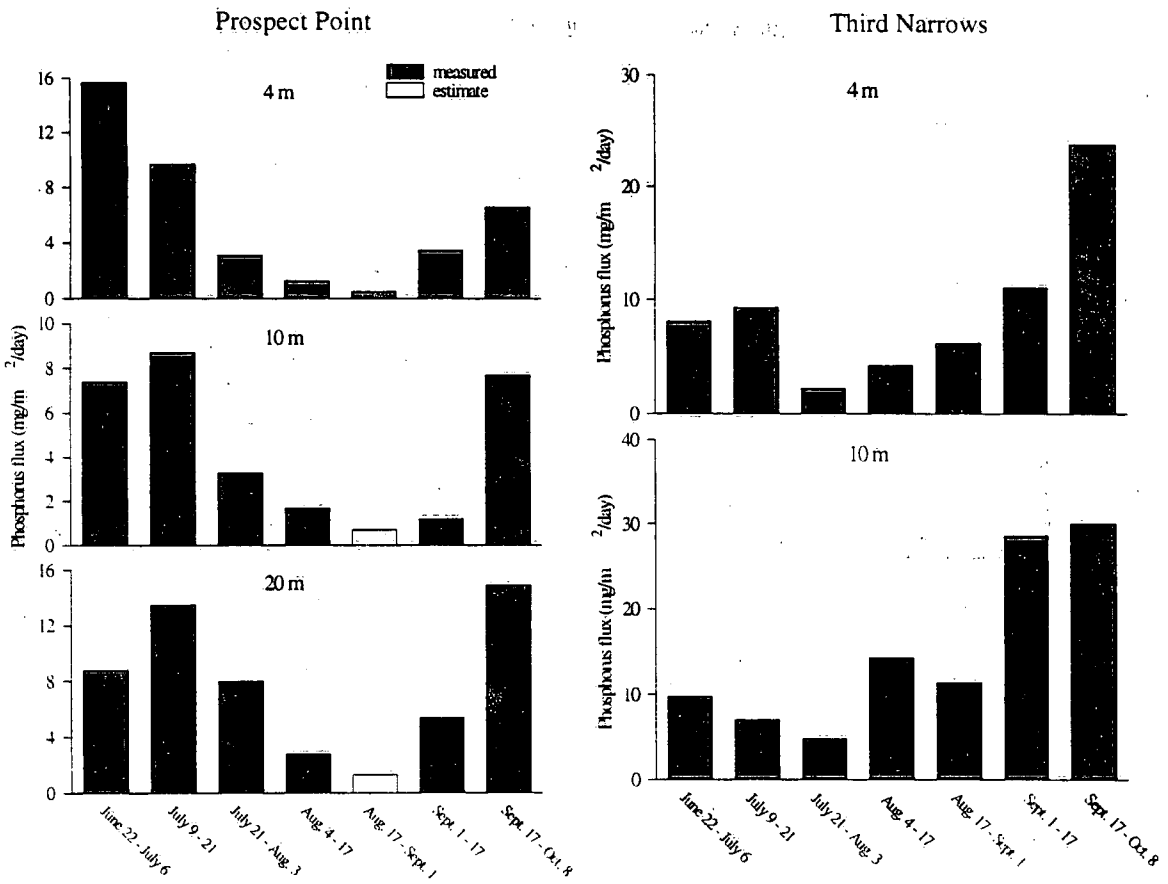

Figure 35. Phosphorus flux rates at Prospect Point and Third Narrows, 1994.

4.9 Chlorophyll for the open-lake water column: 1992 - 1994

Chlorophyll concentrations varied seasonally. In Prospect Point surface waters, the highest concentrations generally were observed in autumn and the lowest during the ice-free season (Figure 6 and 36). In 1993, there was relatively little variation in chlorophyll concentration with depth, reflecting the intense vertical mixing which occurred during this study period. Relatively high chlorophyll concentrations at ca. 10 m in early June and mid-August 1994 may reflect a small deep-chlorophyll layer where light and nutrients were sufficient for phytoplankton growth. High chlorophyll concentrations at 20 m probably reflect the sedimentation of relatively heavy algal cells.

Chlorophyll concentrations tended to be higher at the Third Narrows (Figure 37) than Prospect Point. Concentrations were especially high in summer 1993, a period of strong vertical mixing. Chlorophyll concentrations were lower in summer 1994 and gradually increased through October. Chlorophyll concentrations generally were uniform with depth except in summer when there were regions of relatively high concentration during periods of weak thermal stratification. These occurred near the surface in August 1993 and at intermediate depths in August and 1994.

Chlorophyll concentrations averaged 6.2 µg/L in the upper 10 m at Prospect Point and 7.4 µg/L at 20 m for the 1993-1994 ice-free season (Table 2). Concentrations were substantially higher at the Third Narrows, averaging 10.4 µg/L. Hamilton and Macdonald (1986; their Table 5) report that upper (west) Waskesiu Lake had an average chlorophyll concentration of 17 µg/L while the lower (eastern: Waskesiu Beach) lake had an average concentration of 10 µg/L. Comparisons between the two studies are problematic as described below.

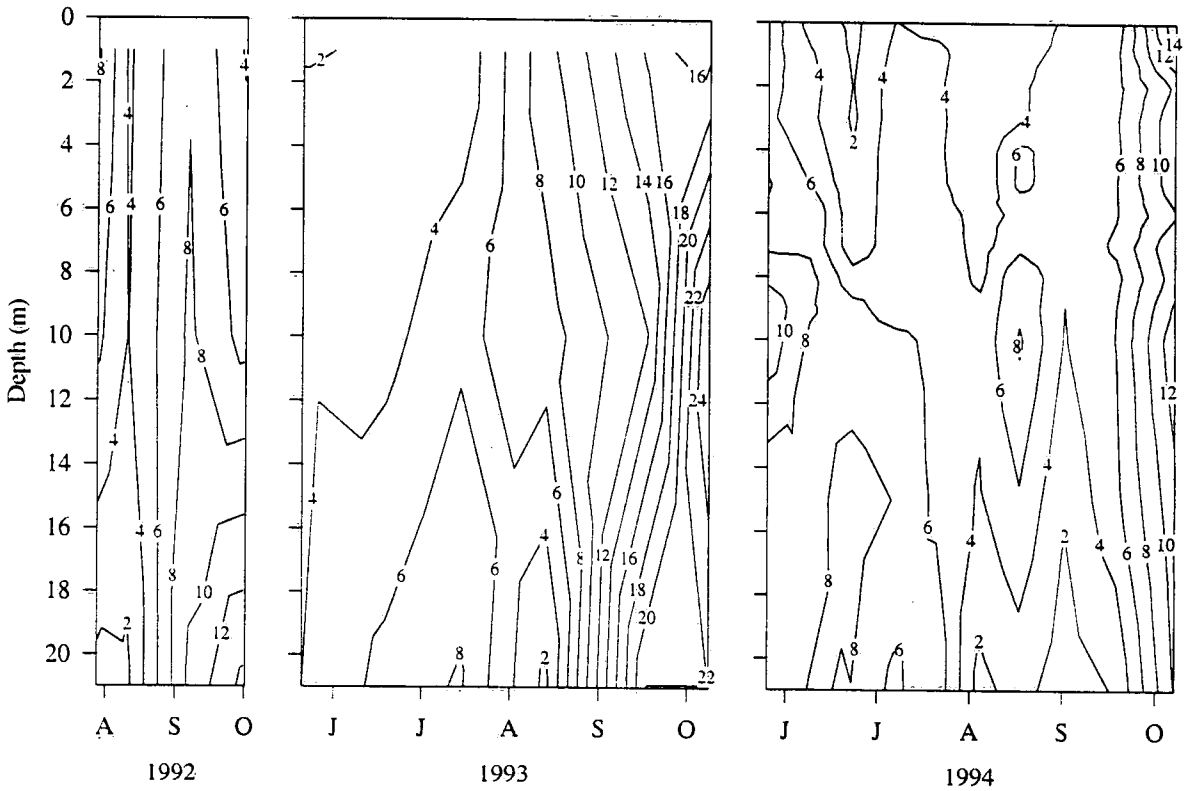

Figure 36. Chlorophyll concentrations (µg/L) at Prospect Point, 1992-1994.

Hamilton and Macdonald (1986) sampled the upper lake and Waskesiu Beach for chlorophyll on four occasions between late July and late September. They also sampled water at only depths equivalent to 1.5 and 5 times the Secchi disc depth, and then analyzed a composite sample. For Waskesiu East, with a mean Secchi disc depth of 2.6 m, this was equivalent to a depth if ca. 4 - 5 m. Based on mean Secchi disc depths of 2.1 m for West Waskesiu Lake, this was equivalent to a depth of ca. 3 - 4 m. In contrast, we sampled two sites in Waskesiu Lake from late May to early October and at least two and as many as 10 depths. Data presented in their Table 7 (Hamilton and MacDonald, 1986) show chlorophyll concentrations ranging from 9 - 20 µg/L for upper Waskesiu lake and 2 - 10 µg/L for lower Waskesiu Lake. These ranges are inconsistent with the reported means in their Table 5.

Overall, on the basis of the limited and inconsistent historic chlorophyll data that are available, we have no basis for assuming that average chlorophyll concentrations have changed markedly between 1986 and 1996.

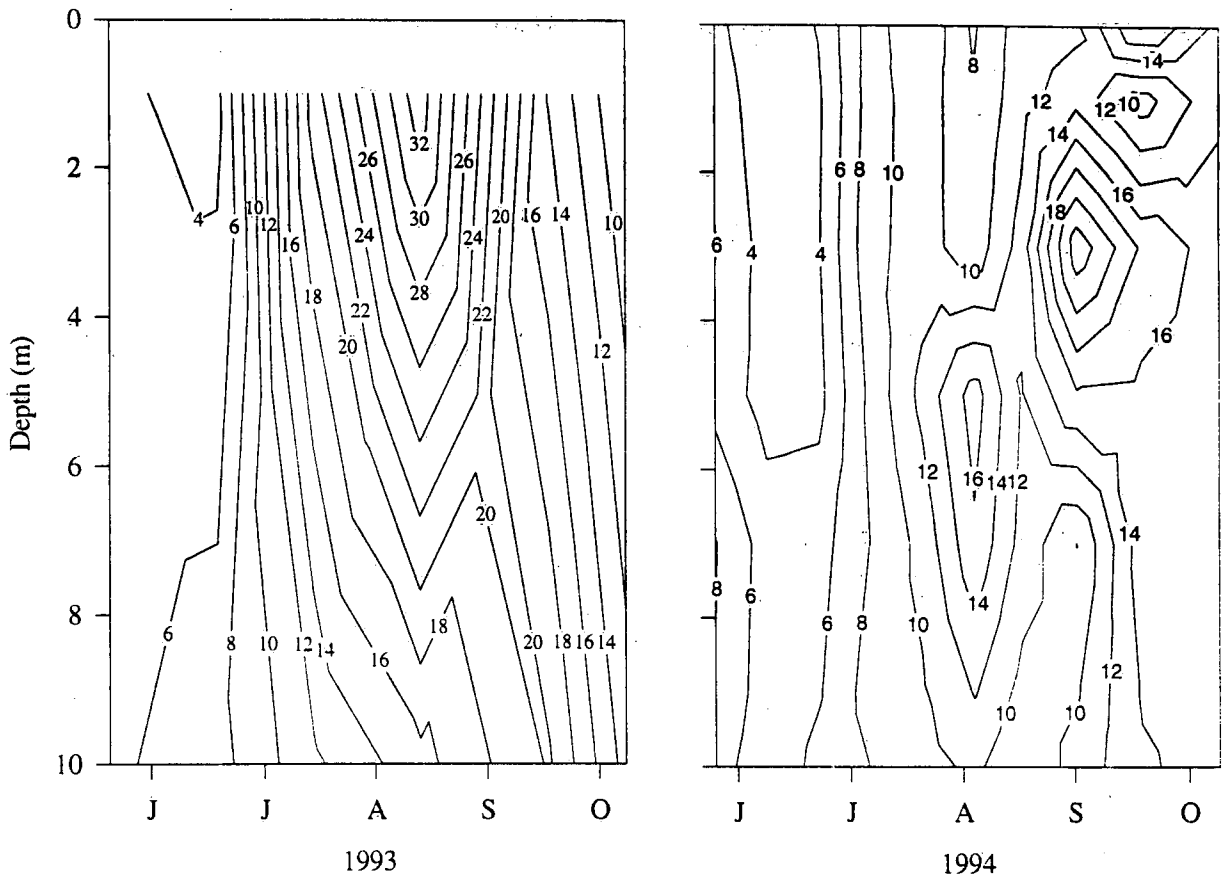

Figure 37. Chlorophyll concentrations (µg/L) at Third Narrows, 1992-1994.

4.10 Algal biomass at Prospect Point: 1992 - 1994

Algal biomass at Prospect Point varied with season and year. There was no consistent trend for biomass to be higher in surface than bottom waters (Figure 38). Accordingly, graphic presentations of seasonal cycles in biomass and size and taxa composition are based on water column means.

4.10.1 July - October 1992

Algal biomass increased slightly between late July and October 1992: the total range in mean biomass was 4,565 - 8,939 mg/m^3: there was a weak tendency for biomass to be greater in surface than deeper waters (Figure 38). Taxonomic composition varied markedly over mid-summer to early autumn (Figure 39, Appendix Table 18). The late July assemblage was dominated by green algae (Chlorophtyes) followed by diatoms and dinoflagellates (Pyrrophyta). The dominant species were the green algae *Coccomyxa minor*, the diatom *Cyclotella* spp., and the dinoflagellate *Ceratium hirundinella*. Green algae (*C. minor*) dominated in August. Diatoms (*Stephanodiscus niagarae*) dominated in September and October.

The size composition of the phytoplankton assemblage also varied seasonally as a function of variations in species assemblages (Figure 40). Small algae, 2 - 10 µm, dominated in July and August while large algae (>40 µm) dominated in September and October.

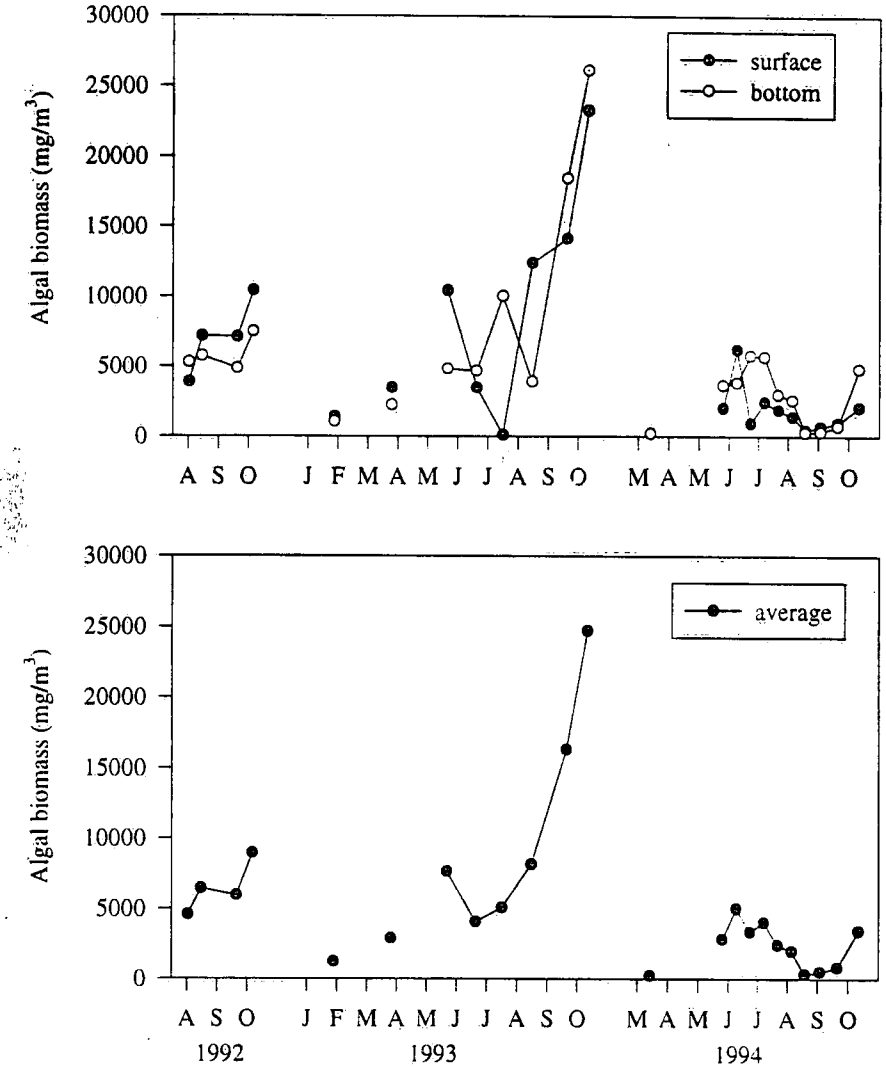

Figure 38. Algal biomass for Prospect Point, 1992-1994.

In general, phytoplankton cells (or colonies) smaller than 40 µm in length in length are considered edible by the zooplankton community; exceptions are bluegreen algae (Cyanophyta) and gelatinous colonial green algae (Evans et al. 1995). Overall, based on size and taxonomic considerations, a major fraction of the algal biomass was edible during July and August 1992. However, much of the algal biomass was inedible in September and October, when large-celled diatoms dominated.

4.10.2 January - October 1993

Algal biomass was low in January (1,214 mg/m^3) and dominated by the diatom *Stephanodiscus niagarae* (Figure 38 and 39, Appendix Table 17). Biomass increased to 2,893 mg/m^3 in March with the diatoms *Cyclotella comta*, *Melosira granuata*, and *Stephanodiscus astrea* dominating. Nearly 48% of algal biomass in January was comprised of taxa less than 40 µm in length while this percentage increased to 75% in March (Figure 40). Thus, a major fraction of the 1993 winter algal biomass appears to be edible by the zooplankton community.

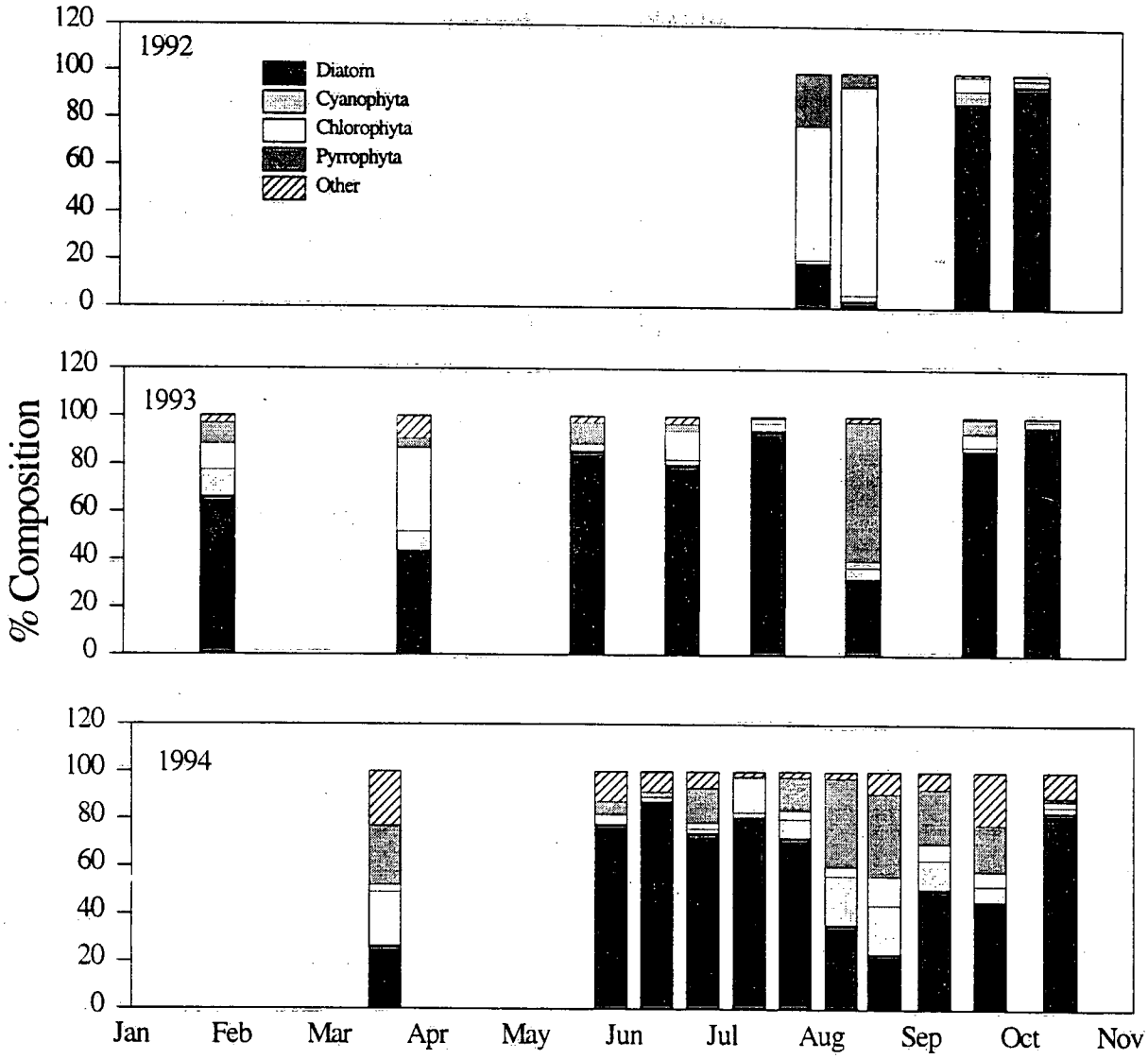

Figure 39. Percent phytoplankton composition by taxa, Prospect Point 1992-1994.

Algal biomass increased to 7,622 mg/m^3 by late May, decreased in June, increasing to 8,150 mg/m^3 in August (Figure 38). Then, with the late summer cooling of the water column and increased vertical mixing, biomass increased markedly reaching 24,729 mg/m^3 by early October. Diatoms (primarily *S. niagarae*) dominated the phytoplankton assemblage except in August when dinoflagellates (*C. hirundinella*) dominated (Figure 39; Appendix Table 17). During the summer and fall, phytoplankton were large (> 40 µm), accounting for 74.6 % (June 19) to 92.8% (Aug. 13) of algal biomass (Figure 40). The strong vertical mixing which occurred throughout much of the ice-free season probably was a major factor enabling large-celled diatoms to remain a dominant component of the algal assemblage throughout the summer. Moreover, silicon recycling from the sediments apparently was sufficient to enable these cells to persist through the summer and into autumn. While algal biomass was high in many months, a major portion of it probably was not edible by the zooplankton assemblage because large-celled species dominated.

4.10.3 March - October 1994

Algal biomass was low in March 1994 (223 mg/m^3) and dominated by a diverse assemblage of bluegreen algae (*Rhabdoderma sigoidea*), dinoflagellates (*Peridinium inconspicuum*), and unidentified centrics diatoms (Figure 38, 39; Appendix Table 18). Almost 94% of biomass was comprised of cells (or colonies) which were < 40 µm in length (Figure 40). Thus, based on size and taxonomic composition, a major fraction of algal biomass was edible. Differences in algal biomass and composition between March 1993 and March 1994 may have been related to the greater snow fall over the later than former winter. Snowfall, by affecting light penetration through the ice, may have affected primary production rates and competitive interactions within the winter algal assemblage.

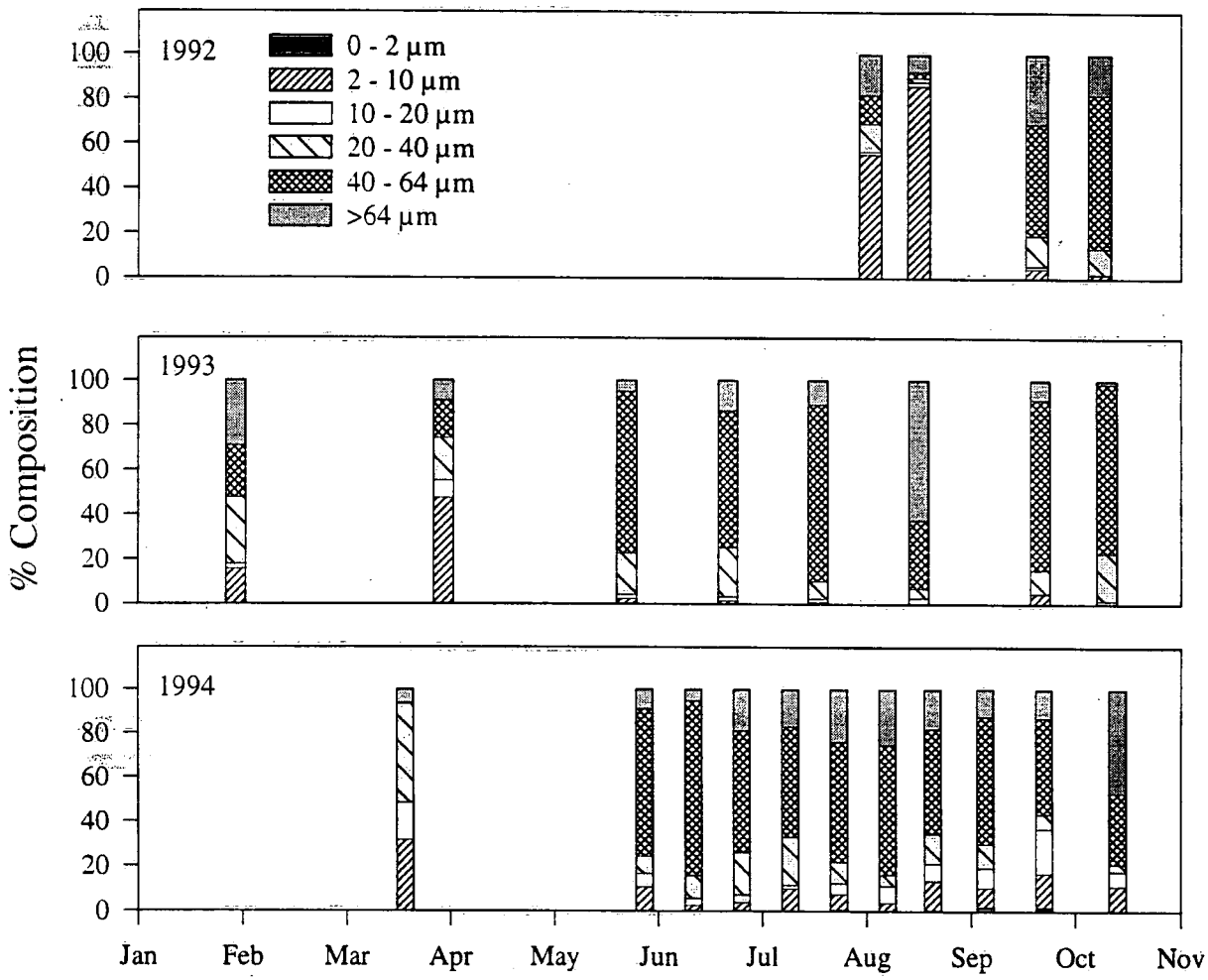

Figure 40. Percent phytoplankton composition by size, Prospect Point 1992-1994.

Algal biomass over May - August 1994 was approximately 43% lower than that observed in 1993 (Figure 38). Diatoms dominated (primarily *S. niagarae* with *Tabellaria fenestrata* becoming important in July) throughout most of the year (Figure 39). However, in August and early September the dinoflagellates *C. hirundinella* also was a biomass dominant. As in 1993, most of the biomass during the ice-free season was dominated by large cells and thus not directly available to the zooplankton community (Figure 40).

4.10.4 Discussion

The two years and one partial (1992) year of investigation of phytoplankton populations in Waskesiu Lake determined that, in two of three summers examined, large, inedible forms, primarily diatoms, dominated algal biomass. Only in 1992, was the summer assemblage dominated by smaller forms. The reasons for this are not clear because air and water temperatures were similar over the three study years. However, average wind speeds were much lower in June and July 1992 than in 1993 and 1994. These low winds would have reduced vertical mixing of the water column, possibly causing large-celled diatoms to sink to the lake floor. This then may have allowed small diatoms species and green algae to become dominant.

Bluegreen algae accounted for a small percentage of biomass in most months. This was surprising because, on the basis of TP, Waskesiu Lake is meso-eutrophic. Moreover, based on Redfield ratios, the algal assemblage was nitrogen deficient during much of the 1993 and 1994 ice-free season. However, phosphorus also was limiting during these periods. Thus, bluegreen algae may have remained relatively minor components of the algal assemblage in Waskesiu Lake in comparison to other taxonomic groups because they were less effective in competing for the limited phosphorus (and nitrogen) supplies. Bluegreen algae tend to predominate in eutrophic waters: phosphorus levels in Waskesiu Lake may not have been sufficiently high to enable bluegreen algae to become summer dominant. In addition, vertical mixing apparently was sufficient in 1993 and 1994 to enable large-celled diatoms to dominate during most of the ice-free period. Nitrogen was not strongly limiting in July - October 1992: thus it is not unexpected that bluegreen algae were minor components of the phytoplankton assemblage at these times.

Historic studies of phytoplankton populations in Waskesiu Lake are limited. As previously noted, Rawson's (1929) early limnological research focused on semi-quantitative descriptions of zooplankton and phytoplankton communities in the open waters of Waskesiu Lake. While information was provided on species composition and relative abundance, data were expressed as total plankton volume collected, i.e., data were not expressed in areal (numbers or biomass per m^2) or volumetric (numbers of biomass per m^3) units. Without knowing the diameter of the net used in these vertical haul collections or the depth of the water column where the collections were made, it is impossible to convert data reported in Rawson (1929) into areal or volumetric units.

In later publications, Rawson (1941, 1953, and 1961) reported plankton biomass in Waskesiu Lake as 91.6 kg/ha, 90.5 kg/ha, and 90.5 kg/ha (dry weight). These estimates are of limited value for several reasons. First, they do not report when (months, years) and where in the lake these determinations were made. However, it is most likely that these data were collected over July - August 1928, July - August 1929 and June - September 1931 (Kuehne, 1941). Second, these estimates are of limited usefulness because they include both phytoplankton and zooplankton. Third, these data are limited because they were based on net tows that would not have effectively sampled the smaller (ca. less than 70 μm) algae. Finally, these nets were not metered and so the amount of water filtered may have been overestimated and biomass underestimated.

Despite the above mentioned limitations in historic phytoplankton studies, it is useful to compare Rawson's plankton biomass estimates with modern estimates. Mean (May - August) algal wet weight biomass at Prospect Point was 4,977 mg/m^3 in 1993 and 2,853 mg/m^3 in 1994. On an areal basis, assuming that Waskesiu Lake has a mean water column depth of 11.1 m (Rawson 1936), this corresponds to an areal standing stock of 31.7 - 55.2 g/m^2 or 317 - 442 kg/ha. Assuming that the diatom-dominated algal community had a dry weight 20% of wet weight (Sicko-Goad et al. 1984), this corresponds to a phytoplankton dry weight biomass of 63.4 - 88.4 kg/ha. These values are not appreciably different from Rawson's historic estimates that plankton standing stocks in Waskesiu Lake averaged 90.5 - 91.6 kg/ha.

Kuehne (1941) provided semi-quantitative information on phytoplankton composition in Waskesiu Lake. He noted that *Melosira granulata* frequently was very abundant in 1928, 1929, and 1931. *Stephanodiscus niagarae* also was abundant on occasion. *Ceratium hirundinella* was moderately abundant in 1928 but not in 1929 and 1931: it was not as abundant as diatoms. Green algae generally were not abundant. The bluegreen *Anabaena lemmermanai* was somewhat abundant in July and August 1928 but not in 1929 and 1931. It is interesting to note that 1929 was a summer of prolonged thermal stratification while the water column was better mixed in 1928 and 1931 (Figure 12). *Coelosphaerium* and *Naegelianum* were moderately abundant on occasion in all three study years. *Lyngbya limnetica* was abundant in 1931. Bluegreens, in general, were not as abundant as diatoms. Phytoplankton samples analyzed by Kuehne were collected by Rawson and hence are biased towards large cells that could be retained by plankton nets. When only large algal cells are considered in our collections, algal composition appears similar between the two studies. However, we only occasionally observed *Melosira granulata* in our collections while the species appeared to be a major feature of the 1928-1931 algal assemblage.

Mayhood et al. (1973) conducted the most recent study of net plankton in Waskesiu Lake: a 12-cm diameter, 64 µm mesh net was used, apparently on only one collection date. They reported that *Melosira* and *Stephanodiscus* were the dominant taxa. The diatom *Fragilaria* was common while *Asterionella* was occasional in occurrence and *Dinobryon* was rare. Bluegreen algae were not reported.

In contrast to Kuehne (1941) and Mayhood et al. (1973), *Melosira* occurred in lower dominance in our collections than *Stephanodiscus*. The apparent decrease in the relative dominance of *Melosira* relative to *Stephanodiscus* is puzzling. These observations may be suggestive of a small change in the trophic status of Waskesiu Lake since the early 1920's. Analysis of a sediment core (diatoms, pigments) collected offshore of Prospect Point should provide additional insight into the possible changing trophic status of the lake.

4.11 Underwater light characteristics for the open-lake: 1994

The mean underwater light characteristics for Prospect Point and the Third Narrows in 1994 are shown in Table 5. The mean attenuation coefficient (K_d) was 0.453/m at Prospect Point and 0.651/m at Third Narrows. Thus, light was attenuated more rapidly with depth at Third Narrows than Prospect Point. Similarly, the mean depth of the euphotic zone (Z_{eu}) was shallower at Third Narrows (7.4 m) than Prospect Point (10.3 m). Mean euphotic zone depths were only slightly shallower than the mean depths of upper (7.8 m) and lower

(11.8 m) Waskesiu Lake (Rawson 1936). This suggests that during periods of strong vertical mixing, a significant fraction of the offshore Waskesiu Lake phytoplankton population is mixed below the euphotic zone, effectively reducing primary productivity rates. Water clarity was, however, sufficient to enable phytoplankton populations in shallower regions of the lake (i.e., ca. 7 m in the upper lake and ca. 10 m lower lake) to remain in a light-sufficient environment despite strong vertical mixing. Benthic algal production may also be important in these shallower regions of the lake.

R_a, the asymptotic reflectance, averaged 0.047 at both sites. The mean backscattering coefficient (b'_b) was lower at Prospect Point (0.042) than Third Narrows (0.058). The attenuation coefficient was plotted against mean chlorophyll concentrations in the euphotic zone in order to estimate the contribution of phytoplankton standing crop to light attenuation. Light attenuation was strongly correlated with chlorophyll at the Third Narrows but not Prospect Point (Figure 41). The intercept, a measure of light attenuation due to dissolved organic matter and other suspended matter in the water column, was similar at both sites (0.32 at Third Narrows and 0.33 at Prospect Point). This suggests that there were not large differences in dissolved organic matter and suspended particulates, other than chlorophyll containing particulates, at the two study sites.

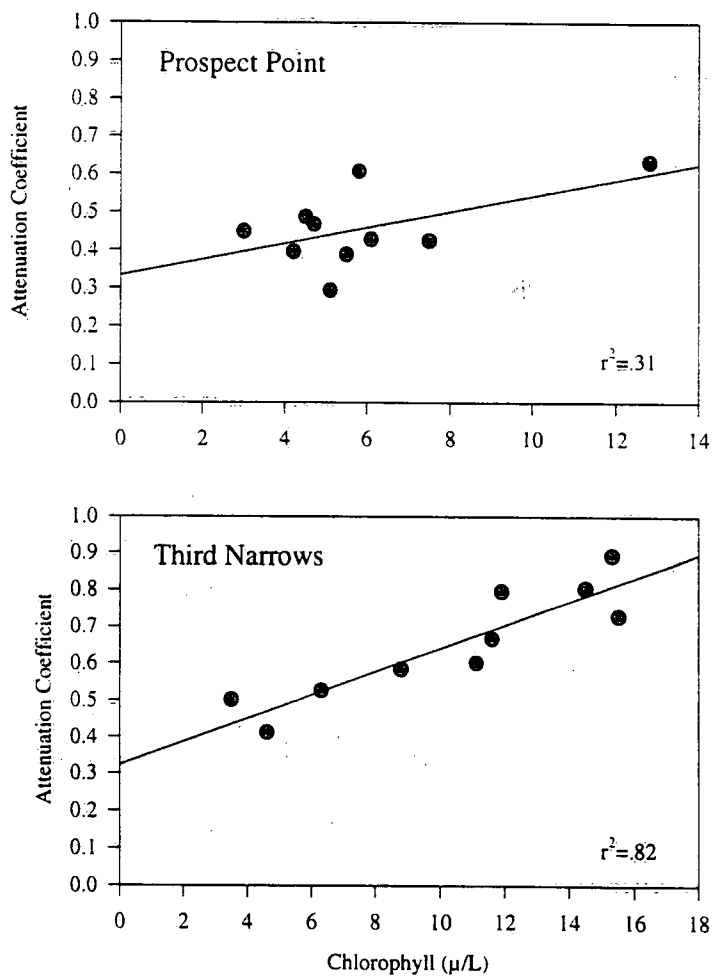

Figure 41. Regression for light attenuation and chlorophyll concentrations for Prospect Point and Third Narrows, 1994.

It is not clear why there was a poor relationship between light attenuation and chlorophyll at Prospect Point. It may, in point, be related to the relative small range in chlorophyll concentration measured when compared to the Third Narrows. Moreover, chlorophyll is not always an accurate predictor of algal biomass because different species contain different percentage of chlorophyll on a weight basis. When light attenuation was plotted as a function of algal biomass there was even a poorer relationship between algal standing stock and light attenuation: r^2 was only 0.02 for surface waters (0 - 10 m) and 0.07 for the water column average biomass.

Table 5. Underwater light characteristics and mean chlorophyll *a* concentrations of the euphotic zone for Prospect Point and Third Narrows during the ice-free period in 1994. Data are means (0), standard deviation (SD) and coefficients of variation (CV).

Site	K_d/m	Zeu (m)	R_a	b'_b	Chl a (mg/m^3)
Prospect Point 0	0.453	10.3	0.047	0.042	5.91
SD	0.10	2.5	0.02	0.02	2.69
CV	22	24	50	45	46
Third Narrows 0	0.651	7.4	0.047	0.058	10.31
SD	0.15	1.8	0.02	0.04	4.35
CV	24	24	48	58	42

4.12 Primary production rates for the open-lake: 1994

Primary production rates varied with depth at Prospect Point and the Third Narrows (Figure 42). In general, rates were low in the upper 2 m on the water column, reflecting light inhibition. Highest rates generally occurred between ca. 2 - 4 m and then decreased with depth as light became limiting. Production rates were very low below 6 m at Third Narrows and below 8 m at Prospect Point.

On a water column basis, primary production rates at Prospect Point varied little between late May and mid September; rates increased sharply in mid October (Figure 43) with autumn cooling and the vertical mixing nutrient-rich hypolimnetic waters with surface waters. Production rates were more variable at the Third Narrows. Production declined from late May to June and then increased in late July and early August. Production rates decreased in late August and then increased sharply in early September: production declined thereafter. Declining production through June at both sites appeared to be associated with declining SRP and nitrate. Total production for the ice-free period (mid-May to mid-November) was estimated at 57.2 gC/m^2/yr at Prospect Point and 68.6 gC/m^2/yr at the Third Narrows. Slightly higher production at the Third Narrows than Prospect Point may be related to its shallower, warmer waters that promote more rapid primary production rates and nutrient exchange from the lake sediments.

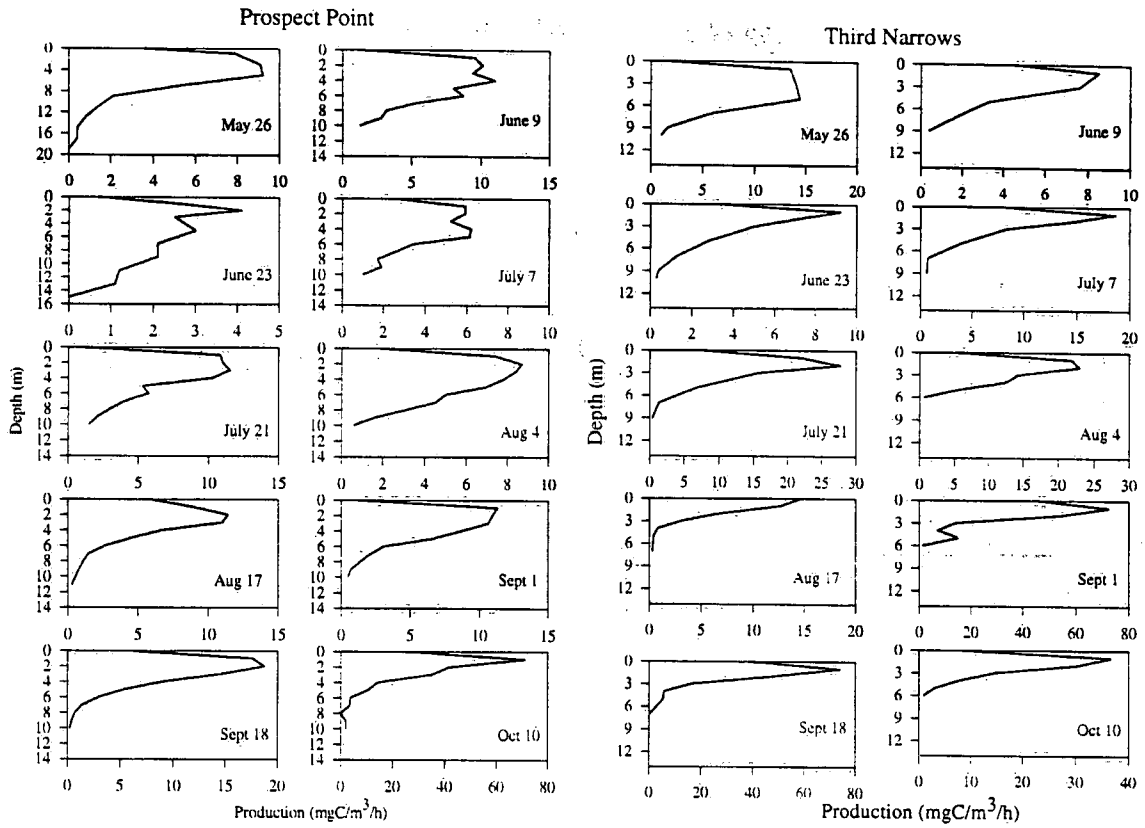

Figure 42. Primary production as a function of depth for Prospect Point and Third Narrows, 1994.

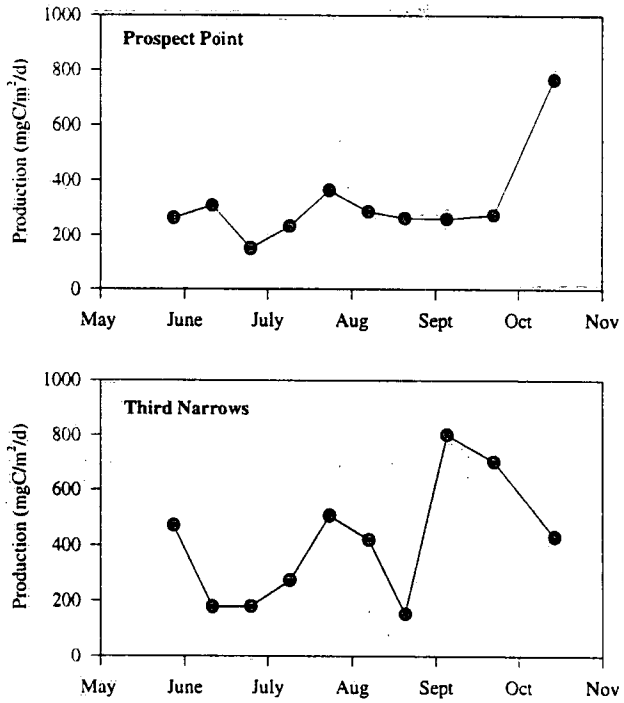

Figure 43. Monthly primary production rates for Prospect Point and Third Narrows, 1994.

Primary production at the two study sites in Waskesiu Lake was at the upper end of the range reported by Wetzel (1983) for oligotrophic lakes. This was somewhat unexpected because on the basis of mean TP concentrations of 20 - 30 μg/L at the upper and lower lake (Table 2); Waskesiu Lake would be considered mesotrophic. Low primary production rates for TP concentration may be associated with the fact that Waskesiu Lake waters are cold during most of the year, only briefly warming above 15° C for a few weeks, and are generally well mixed, thus mixing phytoplankton below the euphotic zone.

The maximum volumetric rate of primary production for a sampling period, A_{max}, averaged 16.3 mgC/m^3/hr at Prospect Point and 29.7 mgC/m^3/hr at Third Narrows (Table 6). A_{max} probably was greater at Third Narrows than at Prospect Point because chlorophyll concentrations tended to be higher at the former than latter site (Table 5). Higher chlorophyll concentrations at Third Narrows were probably related to higher TP concentrations at this site, compared to Prospect Point.

Average areal production rates were also higher at Third Narrows than at Prospect Point. ΣA averaged 88.9 mg C/m^3/h at Third Narrows and 71.2 mgC/m^3/h at Prospect Point while ΣΣA averaged 316 mg C/m^3/d at Prospect Point and 411 mgC/m^3/d at Third Narrows (Table 6). These rates are characteristic of oligo-mesotrophic lakes (Wetzel 1983).

Photosynthetic capacity, A_{ma}/B, is a measure of the amount of primary production supported per unit of chlorophyll biomass. A_{ma}/B averaged 2.8 mg C/mg Chl/h at Prospect Point and 3.4 mg C/mg Chl/h at Third Narrows (Table 6). Thus, phytoplankton at Third Narrows were slightly more productive per unit of chlorophyll biomass than at Prospect Point. This slightly greater productivity is probably due to warmer water at the Third Narrows.

The mean value for the light saturation parameter, I_k was 84.9 μE/m^2/s at Prospect Point and 162.4 μE/m^2/s at Third Narrows (Table 5). Thus, phytoplankton at Third Narrows were adapted to a higher light climate than at Prospect Point. This greater light adaptation may, in part, be related to the greater vertical mixing in the upper lake. This mixing would have transported phytoplankton more frequently into the well-lit surface layer than at Prospect Point. The reported range in the literature for I_k is 20 to 400 μE/m^2/s with a mode occurring between ca. 60 and 100 μE/m^2/s (Robarts et al. 1992). Waskesiu Lake phytoplankton therefore physiologically responded to the underwater light climate of this lake in a similar manner as phytoplankton in many other locations.

Photosynthetic efficiency, α, averaged 0.04 mgC/mgChl/h/μE/m^2/s at Prospect Point and 0.06 mg C/mg Chl/h/μE/m^2/s at Third Narrows (Table 6). Photosynthetic efficiency is a measure of light harvesting capability at low light levels, i.e., in the light limited portion of the euphotic zone. Relative to phytoplankton populations in other lakes, the photosynthetic efficiency of phytoplankton in Waskesiu Lake was average (Robarts et al. 1992).

Table 6. Volumetric, areal and intrinsic photosynthetic data calculated for the phytoplankton of Prospect Point and Third Narrows during the ice-free period in 1994. Data are means (0), standard deviations (SD), and coefficients of variation (CV).

	A_{max} mgC/m^3/h	ΣA mgC/m^2/h	$\Sigma\Sigma A$ mgC/m^2/d	A_{max}/B mgC/(mgChl)/h	I_k µE/m^2/s	$\propto$ mgC/(mgChl)/h/(µEm^2·s)
Prospect Point 0	16.3	71.2	316	2.8	84.9	0.039
SD	19.6	46.0	166	1.3	35.0	0.018
CV	121	65	53	44	41	49
Third Narrows 0	29.7	88.9	411	3.3	162.4	0.057
SD	24.5	53.6	222	2.0	108.7	0.099
CV	82	60	54	59	67	170

4.13 Zooplankton population dynamics

Twenty-three species of copepods and cladocerans were detected over the July 1992 to October 1994 zooplankton sampling period (Table 7). Many copepod and cladoceran species were rare with strong substrate affinities, i.e., most rare species probably originated either from the littoral region or the sediment-water interface. Water mites, ostracods, *Chaoborus* sp., and *Chironomus* sp. had similar origins.

Identifications of most copepod and cladoceran taxa were problematic. There were subtle differences between the taxonomy of these organisms and descriptions provided in the keys used in this study (Edmondson 1959, Pennak 1978, Dusart and Fernando 1990, DeMelo and Hebert 1994). Cladocerans, which are considerably variable in their morphology, were especially difficult to identify. Samples collected in 1992 and 1993 were sent to an independent zooplankton researcher who confirmed that, copepods, in general, and cladocerans, in particular, could not be accurately identified using current taxonomic keys. For example, approximately 50% of the *Chydorus* could not be identified to species. Six species of *Daphnia* were recognized but early instars frequently could not be identified to species. Many *Daphnia* were classified hybrids. For the purposes of this report, cladocerans and cyclopoid copepods are reported only to the genus level. Only one species of *Diaptomus* has been observed in Waskesiu Lake. More research must be conducted in order to more accurately assign taxonomic names and then investigate seasonality in species succession.

Table 7. Zooplankton species observed in Waskesiu Lake, 1992-1994.

Taxon	General Occurrence
COPEPODA	
Calanoida	
Skistodiaptomus oregonesis	Year-round dominant. Planktonic
Cyclopoida	
Diacyclops bicuspidatus thomasi	Year-round dominant. Planktonic, littoral, benthic.
Acanthocyclops robustus	Rare, ice-free season. Littoral and benthic affinities
Eucyclops neomacruroides	Very rare, ice-free season. Littoral and benthic affinities
Eucyclops speratus	Observed once in October 1992. Littoral and benthic affinities
Ergasilis sp.	Very rare. Observed once in October 1992. Ectoparasite on fish
Mesocyclops edax	Rare, ice-free season. Planktonic.
Macrocyclops albidus	Very rare, ice-free season. Littoral and benthic affinities
Tropocyclops prasinus	Very rare, ice-free season. Planktonic.
CLADOCERA	
Bosmina longirostris	Summer dominant. Planktonic
Chydorus sphaericus	Summer dominant. Present other months. Planktonic and littoral.
Chydorus sp. 1	Summer dominant. Present other months.
Daphnia longiremis	Summer dominant. Present other months. Planktonic
Daphnia galeata mendotae	Summer dominant. Present other months. Planktonic
Daphnia retrocurva/dubia	Summer dominant. Present other months. Planktonic.
Daphnia schodleri	Very rare. Planktonic.
Daphnia thorata	Summer dominant. Present other months. Planktonic.
Daphnia sp. *morph*	Summer dominant. Present other months. Planktonic.
Daphnia immature	Summer dominant. Present other months.
Diaphanosoma sp.	Summer dominant. Present other months. Planktonic.
Eubosmina longispina	Very rare, ice-free season. Planktonic
Holopedium gibberum	Rare. Planktonic
Leptodora kindtii	Rare. Planktonic
Pleuroxus striatus	Very rare, ice-free season. Littoral.
Eurycersus lamellatus	Very rare, ice-free season. Benthic and littoral
Alona sp.	Very rare, ice-free season. Benthic and littoral
Other	
Acari (Water mites)	Very rare, ice-free season. Littoral and benthic.
Ostracoda (Ostracods)	Very rare, ice-free season. Littoral and benthic.
Chaborous (Phantom midges)	Very rare, ice-free season. Littoral and benthic.
Chironomus sp. (Biting midges)	Very rare, ice-free season. Littoral and benthic.

Zooplankton were highly seasonal in abundance (Figure 44). Lowest abundances were observed during the winter months and highest abundances in the summer months. There were significant differences in seasonal abundance patterns between the Third Narrows and Prospect Point stations although these differences did not appear to be consistent between years. For example, zooplankton were more abundant at Third Narrows than Prospect Point in late winter and early spring 1993 but this pattern was less evident in 1994. Zooplankton were more abundant at Third Narrows in late summer and early autumn 1993 but not in 1994. Zooplankton samples were not collected at Third Narrows in July 1992.

Nauplii, which are the early development stages of copepods, were also highly variable in abundance (Figure 44). Copepod reproduction appeared to be continuous through the ice-free season with nauplii appearing in high numbers throughout most of this period. Nauplii abundances appeared lower in late summer-early autumn 1992 than in 1993 and 1994. In 1993, abundances increased markedly from late March to late May, declined rapidly in June, increased in July, and then declined in September and October. Abundance patterns were remarkably in phase with one another at Prospect Point and Third Narrows in 1993. In 1994, seasonal patterns in nauplii abundance differed between Prospect Point and Third Narrows: nauplii tended to be more abundant at Third Narrows than Prospect Point.

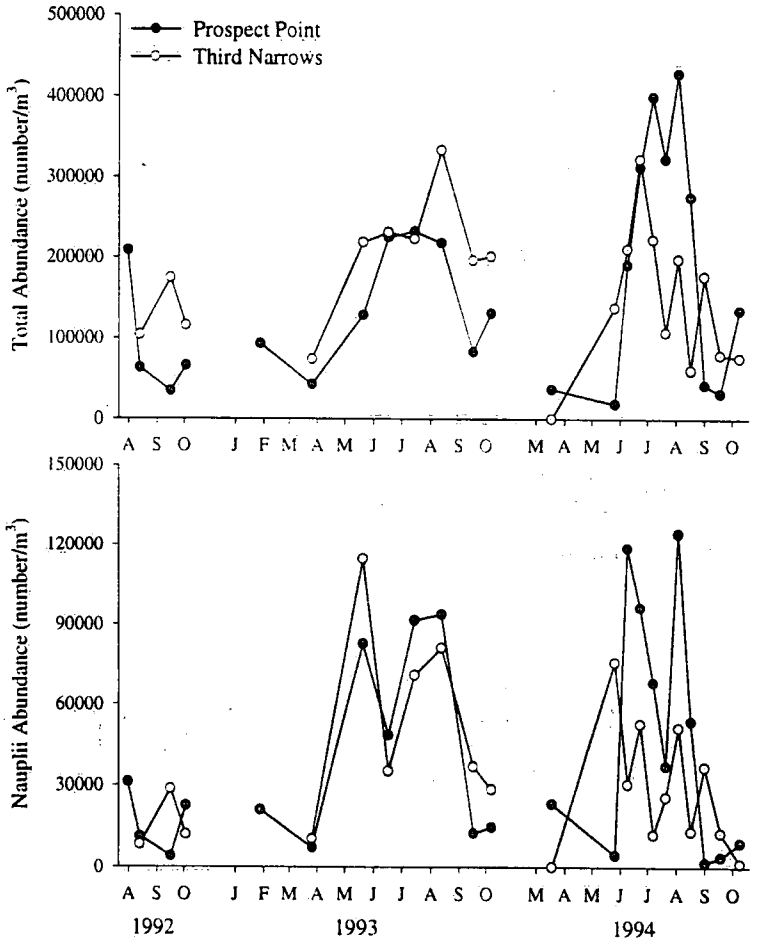

Figure 44. Total zooplankton abundance and nauplii at Prospect Point and Third Narrows, 1992-1994.

Diacyclops bicuspidatus thomasi is a cyclopoid copepod. Immature copepodites are herbivorous while adults are carnivorous. In 1993, immature copepodites abundances at Third Narrows increased from February to late July: abundances declined in August and then increased slightly (Figure 45). At Prospect Point, abundances changed little from February to June 1993 and then increased in mid-summer: abundances declined in mid-August and remained low. Seasonal patterns in immature *D. bicuspidatus thomasi* abundances were more pronounced in 1994 with abundances increasing sharply in late spring, peaking in July at Third Narrows and August at Prospect Point: abundances declined sharply at both sites through August and September. Adult *D. bicuspidatus thomasi*s were less abundant than immature copepodites (Figure 45). There were marked differences in seasonal patterns between years and between study sites. For example, adults tended to be more abundant at Third Narrows than Prospect Point in 1993 but not in 1994. At Third Narrows, adults were more abundant in late summer and autumn than in spring 1993 while, in 1994, adults were substantially more abundant in spring and early summer than in late summer and autumn. Differences in seasonal abundance patterns between years and sites may be related to interannual variations in warming and cooling, thermal stratification, and available plankton and prey. These factors are not investigated further in this report.

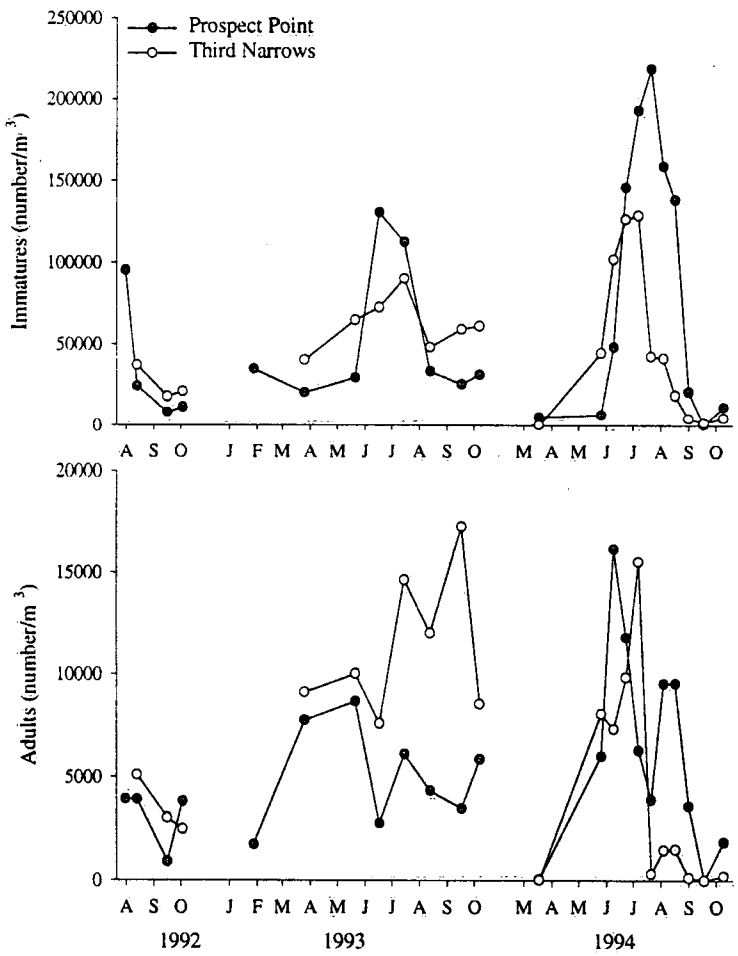

Figure 45. *Diacyclops bicuspidatus thomasi* abundance at Prospect Point and Third Narrows, 1992-1994.

Acanthocyclops robustus (formerly identified as *A. vernalis*) was occasionally observed in the plankton. This large-bodied cyclopoid is predaceous on invertebrates and, occasionally, fish fry (Hartig et al. 1982). Only adults were identified; immature copepodites are difficult to separate from *D. bicuspidatus thomasi*. Adults were observed only during the warmer summer and early autumn months (Table 8). Even at these times, *A. robustus* accounted from less than 1% of zooplankton standing stocks. *Mesocyslops* edax, another large-bodied, predaceous cyclopoid also was rare but frequent in appearance (Table 9). *M. edax* was observed more commonly than *A. robustus* but generally accounted for less than 1% of zooplankton standing stocks.

Table 8. Mean abundance and percent composition of *Acanthocyclops vernalis*, Waskesiu Lake, 1992-1994.

Site	Date		Abundance (number/m^3)	Percent Composition
Prospect Point	1992	July 31	341.2	0.2
		August 13	51.0	0.1
		October 3	45.0	0.1
	1993	June 17	711.1	0.3
		July 15	275.5	0.1
		August 13	684.7	0.3
	1994	July 7	872.7	0.2
		July 21	371.0	0.1
		August 4	502.0	0.1
Third Narrows	1992	October 3	757.0	0.6
	1993	June 17	1227.8	0.5
	1994	June 23	856.1	0.3
		July 7	397.6	0.2
		August 17	49.3	0.1
		September 1	47.0	0.03

Table 9. Mean abundance and percent composition of *Mesocyclops edax* Waskesiu Lake, 1992-1994.

Site	Date		Abundance (number/m^3)	Percent Composition
Prospect Point	1992	July 31	170.7	0.1
		August 13	471.3	0.9
		September 16	304.7	0.9
		October 3	158.4	0.2
	1993	May 21	69.5	0.05
		June 17	328.7	0.1
		July 15	902.9	0.4
		August 13	1291.5	0.6
		September 17	208.7	0.2
		October 7	106.7	0.1
	1994	May 26	36.0	0.2
		June 9	61.5	0.03
		July 7	290.9	0.1
		July 21	158.0	0.1
		August 4	2562.8	0.6
Third Narrows	1992	August 13	838.6	0.8
		September 16	989.1	0.6
	1993	June 17	394.9	0.2
	1994	May 26	27.5	0.02
		June 9	1049.1	0.5
		July 7	397.5	0.2
		August 17	4299.4	1.6
		September 1	407.0	1.0

Skistodiaptomus oregonensis was the only calanoid copepod identified from Waskesiu Lake. This species is a herbivorous zooplankter. Immatures gradually increased in abundance from very low numbers in winter and early spring attaining maximum numbers in mid-summer. Abundances declined through autumn as immatures matured into adults. Adults showed a somewhat different pattern. Adults dominated the winter plankton with numbers generally declining through early spring as adults reproduced and died. Adults began increasing in abundance in mid- to late summer as immature copepodites completed their development to adults. There was a second pulse of adults in October 1993. The origin of these adults is uncertain: adult numbers in October 1993 were greater than abundances of immature copepodites three weeks earlier. Possibly this October pulse in adults was associated with the physical exchange of littoral zone water and zooplankton with the offshore during autumn cooling. In 1993 and late spring-early summer 1994, *S. oregonensis* tended to be more abundant at the Third Narrows than Prospect Point.

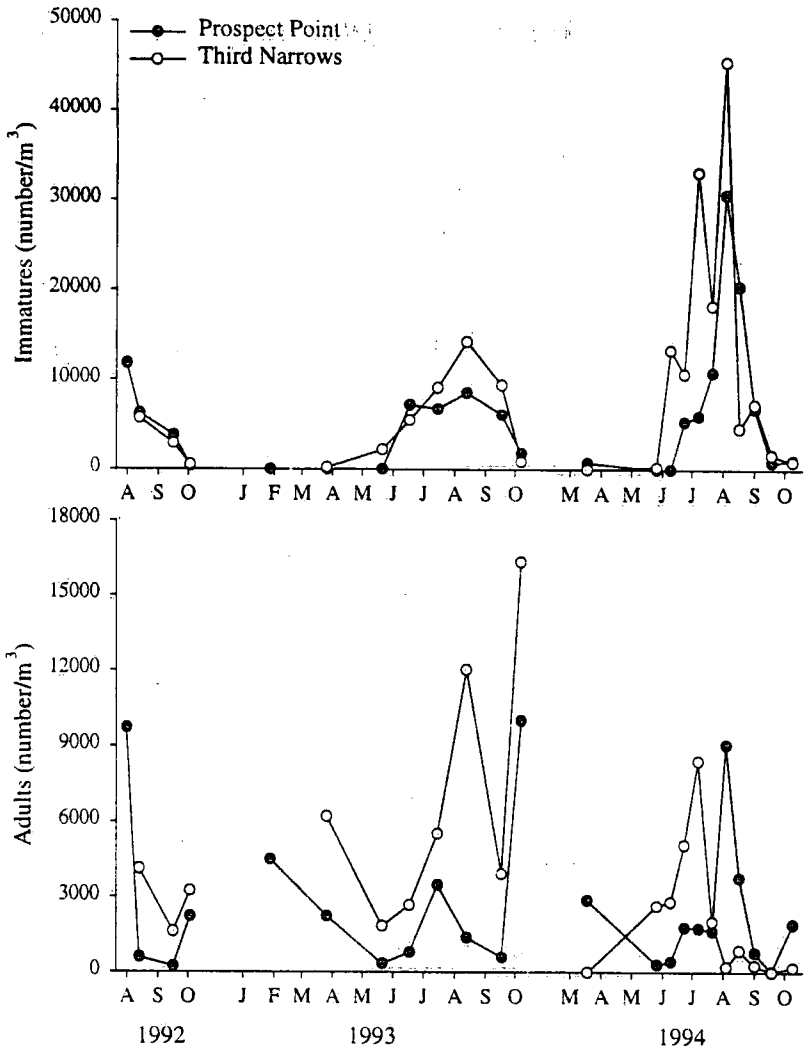

Figure 46. *Skistodiaptomus oregonensis* abundance at Prospect Point and Third Narrows, 1992-1994.

Bosmina sp. and *Chydorus* sp. are small-bodied, herbivorous cladocerans: they typically are <0.5 mm in length. They typically are abundant in mesotrophic and eutrophic environments, particularly when size-selective predation pressures are high on the zooplankton community. These two species were the most abundant of the four, commonly-observed cladocerans. *Bosmina* sp. occurred in low numbers in August - October 1992 (Figure 47). Abundances were surprisingly high at Prospect Point in February 1993. Peak abundances occurred in June-July and October 1993. There also were two population pulses in 1994. *Chydorus* sp. was very abundant in August-October 1992, especially at Third Narrows (Figure 47). In 1993, the population pulse peaked following the *Bosmina* decline but remained high into October. Abundances were substantially lower in 1994 with the population pulse occurring during the *Bosmina* population decline. Overall, the data are suggestive of significant competitive interactions between *Bosmina* sp. and *Chydorus* sp. Both species appeared to be more abundant at Third Narrows than Prospect Point in 1993; *Chydorus* at Third Narrows than Prospect Point in August-October 1992, while site differences were less evident in 1994.

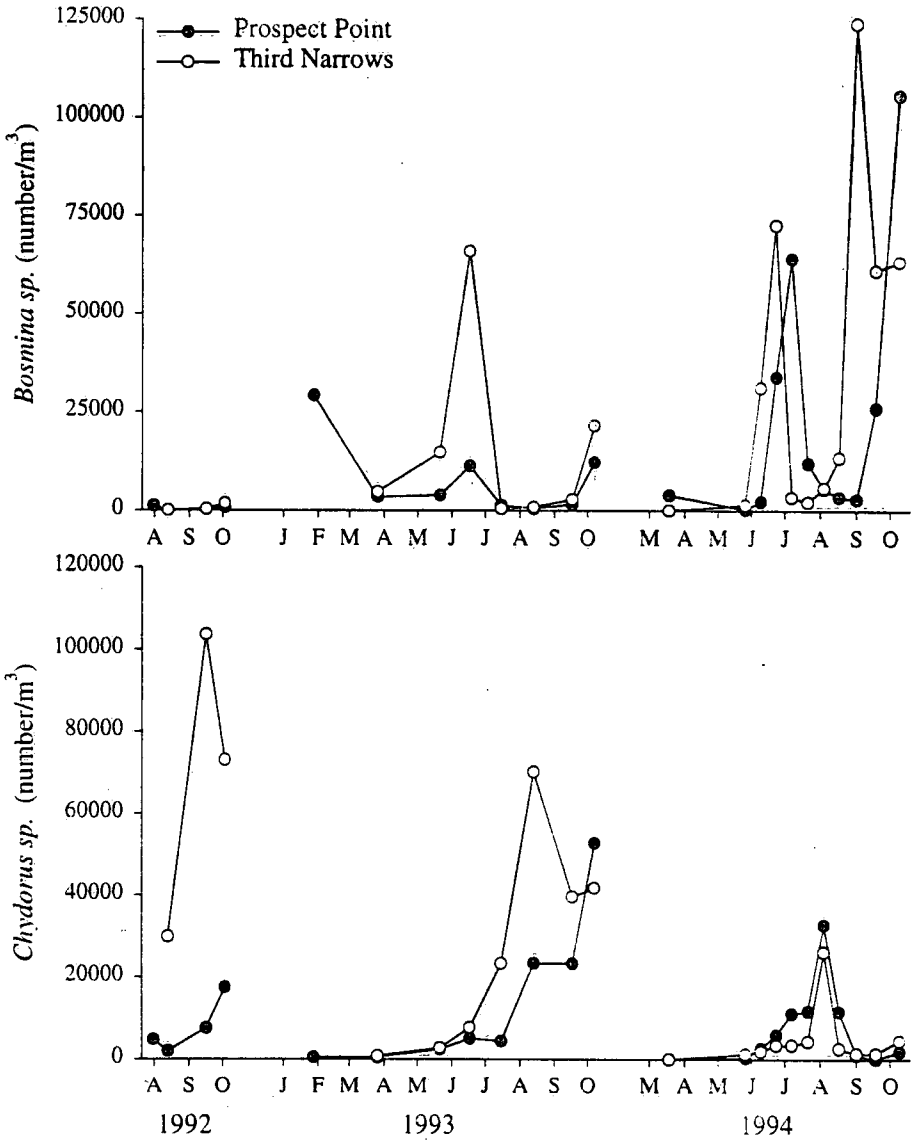

Figure 47. *Bosmina sp.* and *Chydorus* sp. abundance at Prospect Point and Third Narrows, 1992-1994.

Daphnia spp. consisted primarily of an assemblage dominated by *D. galeata mendotae, D. retrocurva, D. dubia, and D. thorata.* These are large-bodied cladocerans, capable of attaining lengths of 1.6 -1.8 mm: *D. galeata mendotae* may reach 3 mm in length (Edmondson 1959). Large animals have very high filtering structures and can be particularly effective in clearing water of edible algae. *Daphnia* are very vulnerable to predation because of their poor swimming abilities and their large size. They are relative transparent animals, which reduces their vulnerability to predation from visual feeding predators. They also develop elongate helmets which increases their body size and thus reduces their vulnerability to gap-limited predators such as the invertebrates *Chaoborus* and adult cyclopoid copepods and to fish fry. Helmet shape varies seasonally. Because helmet shape is a key feature used in identifying *Daphnia* to species, seasonal variability in helmet shape can confound taxonomic identifications.

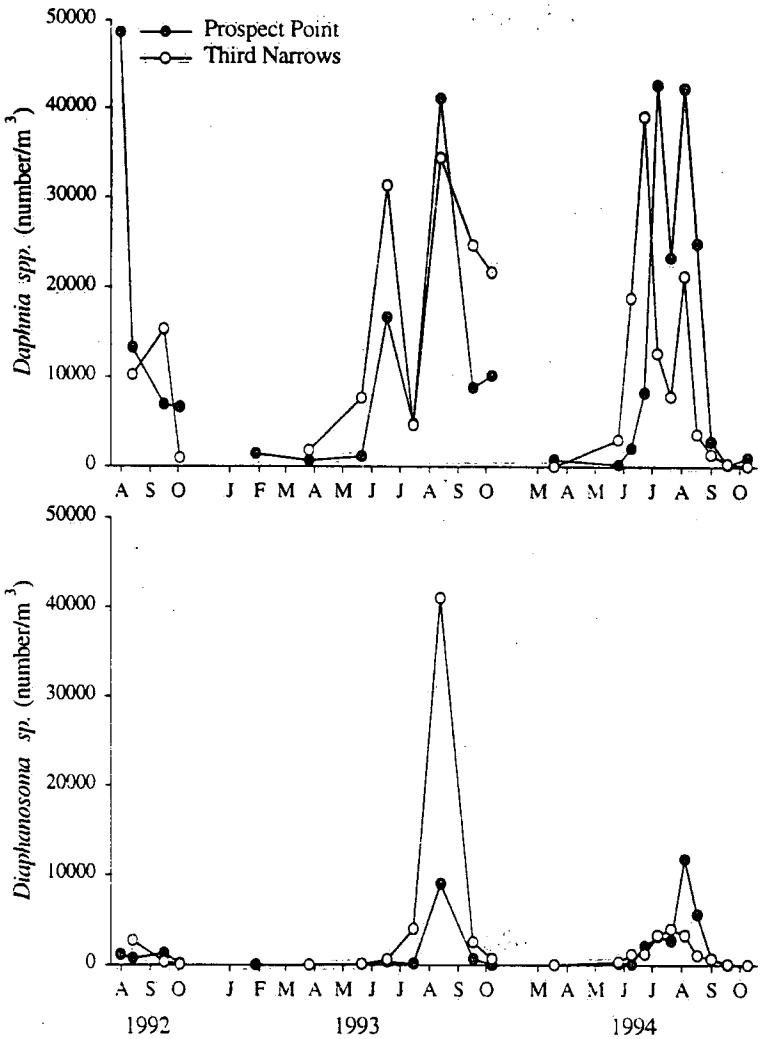

Figure 48. *Daphnia* spp. and *Diaphansoma* sp. abundance at Prospect Point and Third Narrows, 1992-1994.

Daphnia spp. occurred in low abundances during winter and early spring (Figure 48). Food levels apparently were not high enough levels to enable this species to persist in the winter plankton. Abundances increased through June, typically declined in mid-summer, and then increased in late-summer early-autumn. The mid-summer decline in abundance probably was related to a combination of increased food limitation and predation pressures. There was no clear pattern for *Daphnia* spp. to be consistently more abundant at Third Narrows than Prospect Point. However, the spring pulse at Third Narrows tended to be larger than at Prospect Point.

Diaphanosoma sp. is a medium-sized cladoceran that can attain a length of 1.2 mm (Edmondson 1959). It is a more effective grazer than *Bosmina* and *Chydorus* and but not as effective as *Daphnia* spp. *Diaphanosoma* sp. was not very abundant in 1992 and 1994 at either study site and at Prospect Point in 1993 (Figure 48). However, it did attain high numbers in August 1993 at Prospect Point. This pulse followed the July crash in *Daphnia* spp. standing stocks.

Holopedium gibberum is a herbivorous cladoceran, feeding on bacteria and small phytoplankton. It is large, attaining lengths of up to 2.2 mm Edmondson (1959). It is transparent and enclosed in a gelatinous sheath which, with increasing body size, may help reduce predation pressures exerted by invertebrates and fish fry. *H. gibberum* was not observed in 1992. In 1993, it was observed only in July and was a minor constituent of the zooplankton (Table 10). *H. gibberum* was observed more frequently in 1994 but always accounted for less than 0.5% of the zooplankton.

Table 10. Mean abundance and percent composition of *Holopedium gibberum* Waskesiu Lake, 1992-1994.

Site		Date	Abundance (number/m^3)	Percent Composition
Prospect Point	1993	June 17	749.1	0.3
	1994	June 9	61.6	0.03
		June 23	930.3	0.3
		July 7	1745.5	0.4
Third Narrows	1993	June 17	426.7	0.2
	1944	May 26	27.6	0.02
		June 9	179.0	0.1
		July 7	191.1	0.1

Leptodora kindtii is a predaceous cladoceran. It also is large, attaining lengths of up to 18 mm (Edmondson 1959) and transparent. *L. kindtii* was observed once in 1992 and on three occasions in 1994. It was relatively rare on all occasions accounting for less than 1% of the crustacean zooplankton (Table 11).

Overall, the zooplankton assemblage in Waskesiu Lake was dominated by taxa which are characteristic of productive waters and environments in which invertebrate and size-selective fish predation pressures are severe. Cyclopoids and small-bodied cladocerans dominated the zooplankton assemblage during much of the ice-free season. Large-bodied *Daphnia* spp. and *Skistodiaptomus oregonesis* adults were only abundant during a limited period during summer. Other large bodied taxa such as *Mesosyclops edax, Leptodora kindtii* and *Holepedium gibberum* were rare during all months of the year. Most taxa were highly seasonal in abundance increasing rapidly in numbers from the late May sampling to very high numbers in mid summer with abundances frequently decreasing again in autumn.

Table 11. Mean abundance and percent composition of *Leptodora kindtii*, Waskesiu Lake, 1992-1994.

Site	Date		Abundance (number/m^3)	Percent Composition
Prospect Point	1994	August 4	502.0	0.1
Third Narrows	1992	August 13	181.6	0.2
	1994	June 23	540.1	0.2
		August 4	1600.0	0.8
		August 17	184.5	0.3
		September 18	217.0	0.3

4.13.1 Historic comparisons

Zooplankton community structure appeared to be similar to that reported by Rawson (1929). In that study, Rawson reported that the copepods *Cyclops* sp. and *Diaptomus* sp. were the dominant copepods, as was observed in this study. Rawson also reported three species of copepods that do not appear in subsequent taxonomic lists for Waskesiu Lake, including our own (Evans and Beaven 1993). Rawson reported that the copepods *Osphranticum* sp., *Epischura lacustris* and *Canthocamptus* sp. were present in the lake, although rare. *Canthocamptus* is a benthic harpaticoid copepod. We have observed small numbers of these animals in our benthic studies but not in our zooplankton collections. *Osphranticum* is a large calanoid copepod attaining lengths of 2.5 mm while *E. lacustris* attains lengths of 2.0 mm (Edmondson 1959). The latter species is predaceous on small invertebrates. Fish predation pressures may be too high in Waskesiu Lake to support populations of these large-bodied copepods as apparently was observed in Rawson's studies.

Rawson (1929) reported that *Daphnia longispina* was abundant; *Bosmina longispina, Chydorus sphaericus,* and *Diaphanosoma* sp. were occasional while *Leptodora kindtii* and *Holopedium* sp. were rare. Zooplankton predominated over phytoplankton in July and first half of August. We observed that *Bosmina* tended to be more abundant than *Daphnia* spp. while Rawson reported the converse. We very rarely observed *Leptodora kindtii* and *Holopedium gibberum* in our samples. Again, there is a suggestion that fish predation pressures on the zooplankton communities was greater during our study than during Rawson's studies. Shifts, if they have occurred, may be due to an increase in grazing pressures on the zooplankton assemblage by planktivorous fish such as cisco and yellow perch. Cisco and yellow perch may have, in turn, become more abundant if the abundances of predatory fish such as walleye and pike are lower than during the 1920s. This appears unlikely because a commercial fishery operated on Waskesiu Lake during the 1920s (Evans and Beaven, 1997) and undoubtedly removed more pike and walleye than currently harvested by sports fishermen. On the other hand, pike and walleye spawning runs in Mud Creek and the Kingsmere River may be lower than in the 1920s. Low water levels and dams (beavers, Kingsmere River) and stream alterations (Kingsmere River) may now be impeding walleye and pike spawning runs. Runs may have been higher in the 1920s when beaver populations

were low and the Kingsmere River had its natural channel and had not yet been anthropogenically dammed.

McLeod (1971) conducted detailed studies of zooplankton population dynamics in upper and lower Waskesiu Lake between late May and early September 1969. Copepods were combined as a group; cladocerans were identified to genus (*Daphnia*) or species (all others). McLeod noted that, with the exception of *H. gibberum*, zooplankton were more abundant in the upper than lower lake. He also noted that maxima were reached approximately two weeks later in the lower than upper lake as was observed during our 1994 sampling. McLeod related these differences to the generally warmer waters in the upper lake during much of the growing season. We observed a somewhat similar pattern in 1993 but not 1994. McLeod noted that young-of-the-year cisco fed heavily on *Daphnia* spp. followed by *Diaphosoma* sp. Older fish also consumed a variety of benthic food items but zooplankton, especially *Daphnia*, remained important in their diet.

Mayhood et al. (1973) conducted a study on zooplankton in Waskesiu Lake, apparently on only one sampling effort. They reported that *Cyclops bicuspidatus thomasi* was abundant, *Bosmina* sp., was common, while *Daphnia longiremis, D. galeata mendotae, Chydorus, Holopedium, Diaptomus oregonensis, Acanthocyclops vernalis* (*A. robustus*), *Mesocyyclops edax* were occasional. *Leptodora kindtii* was rare. The time of this sampling is unknown. Thus, these data do not provide for precise comparisons of zooplankton community structure observed by Mcleod (1971) in the late 1960s and our observations in the early 1990s.

5 CONCLUSIONS AND RECOMMENDATIONS

This study, the most comprehensive limnological study ever to have been conducted on Waskesiu Lake, has illustrated the general limnological features of the lake. In doing so, it has provided a strong data set for assessing whether there have been changes in the limnology of the lake since Rawson's pioneering studies over the late 1920s to mid 1930s (Rawson 1929, 1936). While comprehensive limnological studies in the open lake did not continue after 1994, data collected over 1992-1994 form a strong baseline data set for evaluating future change in the lake. Furthermore, these data provide for an initial assessment of the limnological variables to include in a long-term monitoring study for the lake. The major limnological features of Waskesiu Lake are as follows.

Physical factors clearly had a major role in affecting the general limnological features of Waskesiu Lake. The lake is moderately deep with a mean depth of 11.1 m and a maximum depth of 24 m: approximately 72% of the lake volume is within the 10 m of the water column (Rawson (1936). Waskesiu Lake is long and narrow and orientated to prevailing winds from the northwest and southeast (Evans and Beaven 1993). Thus fetch distance is long, promoting the formation of large surface waves, various currents, and turbulent water-column mixing (Wetzel 1983). As a result, the water column is generally well-mixed during the ice-free season; the lake thermally stratifies only in its deepest regions (e.g., at Prospect Point) and for brief periods of time. This promotes an efficient exchange of nutrients between the sediment-water interface and the upper euphotic zone. Intense vertical mixing in moderately deep lakes is a major factor enhancing lake productivity (Rawson

1960). Moreover, this intense vertical mixing in Waskesiu Lake is an important contributing factor to the dominance of the algal community by large-celled diatoms such as *Melosira islandica* and *Stephanodiscus niagarae* (Stoermer et al. 1996). Interannual variations in climate exerted significant effects on lake stratification and, as a consequence, deep-water oxygen concentrations both in our study and Rawson's (1936) earlier work. Future limnological studies in Waskesiu Lake should investigate the role of climatic variability in moderating lake productivity.

Some physical factors limited the productivity of Waskesiu Lake. The most important was climate with the lake typically being ice-covered for six months of the year (Rawson 1936). Water temperatures exceeded 10°C only from late May to late September and 15°C only from late June to early September. Water temperatures seldom exceeded 20°C except for brief periods of time in mid-summer. Because photosynthetic rates are a function of temperature (Wetzel 1983), these low temperatures probably were important factors limiting lake productivity.

In general, upper Waskesiu Lake was more nutrient rich and productive than the lower lake: nutrient and particulate (including chlorophyll) concentrations and primary production rates were all higher at Third Narrows than Prospect Point. Greater productivity could be related to four factors. First, the upper lake is shallower than the lower lake. Second, the upper lake has extensive macrophyte beds which probably have a major role in enhancing lake productivity; macrophytes take up nutrients from the sediments and then release these nutrients into the water column through various exudates, the sloughing of biofilms, and the physical decomposition of the plant itself. Third, the upper lake has a more extensive shoreline relative to its surface area (Rawson 1936). Thus, littoral zone inputs, including macrophytes and terrestrial material (e.g. leaf litter, soil, humic matter) probably are greater in the upper than lower lake. Finally, the Kingsmere River, which flows into upper Waskesiu Lake, may be a significant source of particulates and nutrients during much of the ice-free season. Future research studies should focus on the role of the macrophyte community and terrestrial inputs in enhancing the productivity of Waskesiu Lake. The contribution of the Kingsmere River (and smaller tributary rivers) also requires addressing, along with localized anthropogenic inputs.

Nutrient levels generally were characteristic of meso-eutrophic systems. Soluble reactive phosphorus (SRP) levels tend to be highest in late spring and autumn, although levels also periodically were high in the summer, especially in the Third Narrows. Phosphorus recycling appeared to be rapid. In 1994, when the lake was sampled biweekly, there were pronounced variations in SRP concentrations from sampling period to sampling period, especially at the Third Narrows. In the deep waters at Prospect Point, there were pronounced increases in SRP concentrations during the extended period of summer anoxia periods. Similar phosphorus release by the sediments probably also was occurring at the Third Narrows but the vertical mixing of the water column prevented SRP from accumulating as at Prospect Point. Ammonia concentrations also were high, seasonably variable, and strongly regenerated near the lake floor at Prospect Point. Nitrate concentrations were lower and, in the upper 10 m, frequently below detection limits during the ice-free season, presumably because of intense demand. Phosphorus regeneration from the lake floor at Prospect Point appeared less intense in winter while nitrate concentrations

were high. Cooler lake temperatures and less intensive anoxia may have reduced phosphorus regeneration rates and enhanced nitrate (rather than ammonia) release rates.

Both nitrogen and phosphorus were limiting on occasion during the ice-free season although phosphorus appeared to be limiting to a greater degree than nitrogen. While limnologists have focused on phosphorus as the primary factor limiting algal growth in lakes, recent studies suggest that both phosphorus and nitrogen generally are limiting (Elser et al. 1990). Thus, the productivity in Waskesiu Lake could be enhanced not only by increased phosphorus inputs but also nitrogen. Potential anthropogenic nitrogen sources include sewage release, localized uses of fertilizers, and long-range atmospheric transport. Silicon levels were higher at Third Narrows than the upper waters of Prospect Point. Levels were sufficient to support diatom growth for much of the ice-free season. Bioassay studies could help elucidate the limiting nutrient to phytoplankton growth in Waskesiu Lake.

The phytoplankton assemblage at Prospect Point also was characteristic of meso-eutrophic waters (Wetzel 1983; Stoermer et al. 1996) with diatoms such as *Stephanodiscus, Melosira granulata* and dinoflagellates such as *Peridinium* and *Ceratium* the summer dominants. Average biomass and chlorophyll concentrations during the ice-free season also were characteristic of meso-eutrophic waters. However, annual primary production at Prospect Point and Third Narrows was more characteristic of oligo-mesotrophic lakes. Low annual primary production may, in part, be related to the relatively short growing season, i.e., a short period in which the lake is free of ice and daylight long. However, even in summer, daily production rates did not exceed 1 $gmC/m^2/day$, rates commonly observed in mesotrophic lakes (Wetzel 1983). It is possible that somewhat cool summer temperatures limited primary production rates. Further analysis of the primary production data sets as in Robarts et al. (1992) should help elucidate these issues.

The zooplankton assemblage also was dominated by taxa characteristic of meso-eutrophic waters, i.e., cyclopoids, *Bosmina, Chydorus,* and *Daphnia.* Such species composition also is characteristic of lakes in which size selective fish predation is intense. Yellow perch (*Perca flavescens*) probably are the most important zooplanktivores in the inshore region in addition to spottail (*Notropis hudsonius*) and blacknose (*N. heterolepis*) shiners. Trout perch (*Percopsis omiscomaycus*) and nine-spine (*Pungitius pungitius*) and brook stickleback (*Culeae inconstans*) may also consume zooplankton (Scott and Crossman 1973). Most fish inhabiting Waskesiu Lake are planktivorous as larvae but rapidly shift to larger food items (e.g., benthic invertebrates) with increasing body size. Cisco are the most important planktivores in the offshore region. More information is required on forage fish abundances in Waskesiu Lake and, in particular, their dietary habits. The only fish food habit study to have been conducted was McLeod (1971) on cisco as a Master's research project.

Zooplankton grazing pressure on the phytoplankton community generally is most significant during the ice-free season when zooplankton abundances are at their greatest, water temperatures their warmest, and algal standing stocks relatively high. In Waskesiu Lake, zooplankton abundances during the ice-free period exceeded $100,000/m^3$ and reached densities as high as $400,000/m^3$. Filtration rates vary with the taxa and, for a given taxa, animal size. Nauplii have daily filtering rates of <1mL while most copepods and cladocerans have rates of 1-10 mL (Wetzel 1983; Haney 1985). Very large *Daphnia* and *Holopedium* may have rates reaching 100 mL. If it is assumed that zooplankton grazing rates averaged 4

mL per animal per day, zooplankton theoretically would have been filtered the entire Waskesiu Lake water column in a matter of days. However, because large, inedible forms dominated much of the phytoplankton assemblage, zooplankton grazing pressure, while probably intense, would not have been sufficient to clear the water column of algae. Further investigations of these issues were outside the objectives and design of this study. Future research studies should focus on estimating zooplankton grazing rates for the various taxa dominating the crustacean community and on quantifying seasonal, diel, and spatial variations in grazing.

During the course of our study, we evaluated our 1992-1994 data sets to assess whether or not the trophic condition of Waskesiu Lake had changed since Rawson's studies conducted from the late 1920s to the mid 1930s. Comparisons were difficult because of differences in sampling methods, locations, and inconsistencies in the reporting of these data in papers that were published over the next 25-30 years. Nevertheless, there is some evidence of a small change in the trophic status of the lake. The summer oxygen deficit at Prospect Point appears to be more intense than in the 1920s to 1930s, water clarity may be slightly lower, and there apparently have been small shifts in plankton community structure. This speculation is further supported by the results of a sediment coring study conducted at Prospect Point which has shown a small increase in sedimentation rates and carbon, nitrogen, and phosphorus fluxes (Evans, unpublished data). Most of the increase began in the late 1950s, coincident with increased anthropogenic activity inside and outside the park. Additional analysis of the core for fossil phytoplankton, zooplankton, and benthos would help elucidate long-term changes in the plankton and invertebrate communities. Continued monitoring is required to further investigate limnological trends in the lake while research is required to investigate causal factors.

A long-term limnological monitoring study in Waskesiu Lake should contain a number of elements. Some of the elements and considerations are as follows.

1. It is essential that climatic variables such as air temperature, wind speed, and precipitation be included because these are the major physical factors driving the limnology of Waskesiu Lake. Lake level (and the height of the stop logs in the Waskesiu River dam) also should be monitored because water level remains an issue of concern. Information on ice-out and when the lake becomes ice-covered also would be useful in assessing long-term climatic trends.

2. At least one monitoring station should be established in the open lake. The deep station at Prospect Point is ideal because a long-term record already exists for this location, both for Rawson's earlier studies and for our 1992-1994 studies. A station in the upper lake also would be useful but, given its distance from the town site, would require a greater effort to sample. Important parameters to measure are water column temperature, dissolved oxygen, and water clarity. For Prospect Point, the duration and extent of the hypolimnetic oxygen deficit is particularly important to monitor. Sampling should be at least every two weeks and preferably once a week during summer. These data would be relatively inexpensive to collect.

3. A variety of nutrient and nutrient-related parameters merit inclusion in a long-term monitoring program. Total phosphorus (TP) is essential to measure because of the strong and well-established relationship between phosphorus and lake productivity. While we did not measure total nitrogen (TN), this also would be useful to measure because of the overall importance of nitrogen to lake productivity. TP and TN measurements would not require any special sample processing in the field such as filtering and sample preservation: clean bottles must be used and the samples kept cool and shipped as rapidly as possible. Additional measures such as soluble reactive phosphorus, ammonia, nitrate, and silicon are useful. as are particulate carbon, nitrogen, and phosphorus. However, all of these measurements add to the analytical cost and to field costs in sample filtering, preservation, supplies, etc. Many of these parameters were highly variable in concentration and would require at least three to four sampling periods during the ice-free season to provide a reasonable estimate of the mean for a given year. This would also increase the cost.

4. Chlorophyll should be measured to assess phytoplankton standing stocks. Chlorophyll measurements are relatively inexpensive. Two or three depths should be sampled and a water column mean calculated. Chlorophyll measurements are required because water clarity measurements alone are not strong predictors of chlorophyll concentrations at Prospect Point. Phytoplankton species composition and biomass would be useful to measure. However, such measurements are substantially more costly than chlorophyll determinations. Species composition also varied markedly through summer. At least three to four sampling periods would be required to characterize the algal assemblage in Waskesiu Lake during the ice-free period. Samples could be collected from two or three depths in the upper 10 m of the water column and combined to form an integrated sample. Ideally, samples would be identified within two years of collection. After that, significant degradation of smaller, more fragile species occurs unless special preservation and handling techniques are employed.

5. Zooplankton are an essential feature of Waskesiu Lake. Sample analysis costs are in the same range of costs for a full spectrum of water quality measurements or phytoplankton analyses. Zooplankton populations should be monitored with particular attention being addressed to detecting changes in the dominance of large-bodied species and the size of current dominants such as *Daphnia*. Changes in the size structure of the zooplankton community may provide useful insights into changes in the fish assemblages, particularly planktivores which, in turn, could be affected by changes in walleye, pike, and burbot abundances.

6. It is not recommended that the long-term monitoring study include sediment trap studies. Nor should such monitoring studies include primary productivity measurements. Both studies are time consuming to conduct, requiring frequent sampling, relatively long-days in the field, and significant laboratory effort. Studies of this type would, however, be essential components of research studies investigating trophic pathways, nutrient budgets, the significance of the microbial loop, etc.

7. Results of the monitoring effort for a given year should be produced in a short report. In doing so, the monitoring team will remain current with the status of Waskesiu Lake and emerging trends. Furthermore, it is considerably easier to maintain good quality for data which has been recently collected than for data which was collected four or five years ago. A timely presentation of the data would ensure continuing interest in the monitoring study and long-term funding.

8. Funding for limnological studies in Waskesiu Lake has diminished markedly since 1994. Open lake limnological sampling has been discontinued although sporadic measurements have been made of temperature, oxygen, and nutrients. Given the importance of the Waskesiu Lake ecosystem, a cost effective monitoring program should be developed to ensure the long-term protection of this lake. Funds should be identified for supporting this research and, on this basis, a cost-effective monitoring program developed. Such a program, in addition to ensuring the protection of Waskesiu Lake from localized perturbations (e.g., nutrient release from the town site) also would complement the ongoing Kingsmere Lake and River monitoring study.

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Appendix Table 1. Water temperature profiles (^{0}C), Prospect Point 1992-1994.

	1992				1993							
Depth	August 1	August 13	Sept 17	Oct 3	Jan 28	March 26	May 21	June 19	July 12	Aug 13	Sept 17	Oct 8
0	18.7	20.1	11.6	10.6	0.3	1.2	10.0	15.6	15.9	17.6	13.9	8.9
1	*18.7	19.4	11.6	10.4	*0.5	3.1	9.9	15.0	15.9	17.6	13.7	8.9
2	18.7	19.1	11.6	10.0	0.7	3.1	9.9	14.9	15.8	17.6	*13.6	8.9
3	*18.7	19.0	11.6	9.9	*0.7	*3.2	9.8	*14.9	15.1	17.5	13.5	9.0
4	18.7	18.9	11.6	9.9	0.8	3.2	9.6	14.9	14.7	17.5	*13.4	8.9
5	*18.7	18.9	11.6	9.9	*0.8	*3.2	9.3	*14.8	14.5	17.5	13.4	9.0
6	18.7	18.9	11.6	9.9	0.9	3.1	9.1	14.8	14.2	17.5	*13.4	8.9
7	*18.4	18.9	11.6	9.9	*1.0	*3.2	9.1	*14.3	14.0	17.5	13.4	8.9
8	18.1	18.8	11.6	9.9	1.1	3.1	9.1	13.8	14.0	17.5	*13.4	8.9
9	*17.9	18.7	11.6	9.9	*1.3	*3.2	9.0	*13.4	13.9	17.5	*13.4	8.9
10	17.6	18.5	11.6	9.9	1.4	3.2	9.0	12.9	13.9	17.5	13.4	8.9
11	*16.5	18.3	11.6	9.9	*1.6	*3.2	9.0	*12.6	13.9	17.4	*13.4	8.9
12	15.4	17.0	11.6	9.9	1.7	3.1	8.4	12.2	13.9	17.4	13.4	8.9
13	*14.6	14.6	11.6	9.9	*1.9	*3.2	8.2	*11.7	13.8	17.3	*13.4	8.9
14	13.7	14.0	11.6	9.9	2.1	3.2	7.7	11.1	13.8	16.7	13.4	8.9
15	*12.7	13.3	11.6	9.9	*2.2	*3.2	7.6	*10.8	13.7	16.2	*13.3	8.9
16	11.7	12.4	11.6	9.9	2.3	3.2	7.5	10.6	13.7	16.1	13.3	8.8
17	*11.3	11.6	11.6	9.9	*2.5	*3.2	7.5	*10.3	13.6	16.1	*13.3	8.8
18	10.8	11.1	11.6	9.8	2.7	3.3	7.4	10.1	13.6	16.0	13.3	8.8
19	*10.5	10.3	11.5	9.7	*3.0	*3.4	*7.3	9.7	13.6	16.0	*13.3	8.7
20	10.2	10.3	11.5	9.6	3.2	3.5	*7.2	*9.5	13.6	16.0	13.2	8.7
21	*9.7	10.0	11.3	9.5	*3.6	3.8	*7.0	*9.0	13.5	15.9	*13.2	8.5

	1994										
Depth	March 19	May 26	June 9	June 23	July 7	July 21	Aug 4	Aug 17	Sept 1	Sept 18	Oct 9
0	0.1	8.1	12.4	17.9	16.2	19.7	22.2	19.4	17.4	18.9	11.2
1	0.1	8.1	12.3	17.5	16.2	19.0	22.2	19.4	17.4	17.0	11.2
2	0.3	*8.1	11.7	17.2	16.1	19.0	22.1	19.4	17.4	16.2	11.2
3	0.5	8.0	10.7	16.8	16.1	18.8	22.1	19.3	17.4	16.2	11.2
4	*0.7	*7.2	10.4	16.1	16.1	18.7	21.9	19.3	17.4	16.0	11.1
5	0.8	6.5	10.3	15.1	16.0	18.7	20.4	19.3	17.3	15.8	11.1
6	*0.9	*6.2	10.1	14.7	15.9	18.5	19.4	19.3	17.4	15.8	11.0
7	*1.0	5.9	10.0	13.9	15.8	18.4	18.6	19.3	17.4	15.8	10.9
8	*1.2	*5.9	10.0	13.8	15.7	18.1	17.7	18.4	17.4	15.8	10.9
9	*1.3	5.8	9.9	13.2	15.7	18.0	17.4	17.6	17.4	15.8	10.9
10	*1.4	*5.8	9.8	12.1	15.2	17.9	16.9	16.6	17.4	15.8	10.9
11	*1.6	5.7	9.4	10.8	12.0	17.4	16.2	15.4	17.3	15.8	10.8
12	*1.7	*5.7	*9.3	10.1	11.7	15.2	15.4	14.7	17.2	15.8	10.8
13	*1.9	5.6	9.1	9.5	11.1	12.7	15.3	13.7	16.9	15.7	10.8
14	*2.1	*5.5	*8.8	9.1	10.6	11.9	14.4	13.2	15.3	15.6	10.8
15	2.2	5.4	8.6	8.9	10.2	11.4	13.7	11.9	12.6	15.6	10.7
16	*2.4	*5.4	*8.3	8.8	9.9	11.0	12.0	11.1	11.8	15.0	10.6
17	*2.6	5.3	8.0	8.6	9.8	10.7	10.7	10.5	11.4	12.8	10.6
18	*2.7	*5.3	*7.4	8.6	9.5	10.4	10.0	10.1	11.1	12.3	10.5
19	*2.9	5.3	6.8	8.6	9.5	10.2	9.8	9.6	10.9	12.0	10.5
20	3.1	*5.3	*6.7	8.5	9.4	10.2	9.7	9.4	10.3	11.5	10.5
21	3.5	5.3	6.6	8.4	9.3	9.9	9.6	9.3	10.0	10.9	10.5

* interoplated data

Appendix Table 2. Water temperature profiles (^{0}C), Third Narrows 1992-1994.

	1992			1993						
Depth	Aug 13	Sept 17	Oct 3	March 26	May 21	June 19	July 12	Aug 13	Sept 17	Oct 8
0	20.2	11.1	9.8	0.9	12.2	16.8	15.6	18.7	13.9	8.4
1	20.0	11.1	9.8	4.1	12.2	16.8	15.6	18.7	13.6	8.4
2	19.2	11.0	9.8	4.1	12.1	16.8	15.6	18.6	*13.4	8.4
3	19.0	11.0	9.8	4.1	12.1	*16.7	15.6	18.4	13.1	8.4
4	18.8	11.0	9.7	4.1	12.0	16.6	15.5	18.0	*13.1	8.4
5	18.7	11.0	9.7	4.0	11.8	*16.1	15.5	17.9	13.1	8.4
6	18.6	10.9	9.7	3.9	11.7	15.6	15.3	17.9	*13.0	8.4
7	18.6	10.8	9.7	3.8	11.7	*15.3	14.9	17.9	13.0	8.4
8	18.6	10.8	9.7	3.8	11.7	14.7	*14.6	17.8	*13.0	8.4
9	18.5	10.8	9.7	3.8	*11.6	14.4	*14.6	17.8	12.9	8.4
10	18.6	10.8	9.6	3.8	*11.6	14.3	*14.6	17.7	12.9	8.4

	1994									
Depth	May 26	June 9	June 23	July 7	July 21	Aug 4	Aug 17	Sept 1	Sept 18	Oct 9
0	10.6	16.0	18.6	17.4	20.7	23.5	19.4	18.6	17.8	10.5
1	10.6	15.8	18.6	17.3	20.7	23.1	19.4	18.3	17.6	10.5
2	*10.1	15.2	18.5	17.2	20.4	22.8	19.4	17.9	17.4	10.5
3	9.7	15.2	18.5	17.1	19.9	21.8	19.3	17.8	17.3	10.5
4	*9.4	15.1	18.4	17.0	19.8	21.2	19.2	17.7	16.3	10.5
5	9.1	15.0	18.3	16.9	19.2	20.6	19.1	17.7	16.2	10.4
6	*9.0	14.9	17.6	16.9	18.8	20.1	19.1	17.6	16.2	10.4
7	8.9	14.8	15.3	16.9	18.6	19.2	19.1	17.5	16.2	10.3
8	*8.9	13.4	15.0	16.9	18.2	18.8	18.8	17.4	16.2	10.3
9	8.8	12.9	14.9	16.5	18.0	18.5	18.8	17.4	16.1	10.3
10	8.8	12.7	14.8	16.5	18.0	18.3	17.9	17.4	16.1	10.2

* interpolated data

Appendix Table 3. Dissolved oxygen concentrations (mg/L), Prospect Point 1992-1994.

	1992			1993							
Depth	Aug 1	Aug 13	Sept 17	Jan 28	March 26	May 21	June 19	July 12	Aug 13	Sept 17	Oct 8
0	9.5	8.3	9.1	13.6	9.4	10.4	9.3	10.3	8.7	9.7	10.8
1	*9.4	8.4	8.9	*13.5	11.1	10.4	9.4	10.3	8.7	10.0	10.5
2	9.2	8.6	9.0	13.4	11.4	10.3	9.5	10.2	8.7	*9.9	10.5
3	*9.0	8.5	9.0	*13.4	*11.6	10.4	*9.5	10.4	8.7	9.7	10.4
4	8.8	8.5	9.0	13.3	11.7	10.4	9.6	10.2	8.7	*9.8	10.3
5	*8.6	8.5	9.0	*13.3	*11.8	10.4	*9.6	10.0	8.6	9.8	10.3
6	8.3	8.5	9.0	13.2	11.8	10.3	9.6	9.7	8.6	*9.8	10.3
7	*8.1	8.4	9.0	*13.3	*11.9	10.3	*9.6	9.4	8.6	9.8	10.2
8	7.8	8.4	9.0	13.4	11.9	10.2	9.5	9.2	8.5	*9.8	10.2
9	*7.5	8.4	8.9	*13.3	*11.9	10.3	*9.4	9.1	8.4	*9.8	10.2
10	7.2	8.3	8.9	13.1	11.8	10.3	9.3	9.1	8.4	9.8	10.2
11	*5.9	7.7	8.9	*12.8	*11.5	10.2	*9.1	8.9	8.4	*9.8	10.2
12	4.6	4.6	9.0	12.4	11.2	9.8	8.8	8.8	8.3	9.7	10.1
13	*3.2	1.4	8.9	*11.4	*9.4	9.6	*7.9	8.7	7.8	*9.7	10.1
14	1.9	0.8	9.0	10.3	7.7	9.1	7.0	8.7	6.7	9.6	10.1
15	*0.6	0.1	8.9	*8.3	*7.4	8.9	*6.5	8.5	4.5	*9.7	10.1
16	0.5	0.1	8.9	6.3	7.1	8.9	6.0	8.3	3.3	9.7	10.2
17	*0.4	0.1	8.9	*6.1	*6.7	8.8	*5.5	8.1	2.4	*9.8	10.2
18	0.3	0.1	8.8	5.8	6.3	8.3	5.0	7.7	1.5	9.8	10.2
19	*0.2	0.1	8.8	*5.0	*4.8	*8.0	3.3	7.5	1.4	*9.8	10.1
20	0.1	0.1	8.7	4.2	3.3	*7.8	*3.0	7.0	1.3	9.8	10.1
21	*0.1	0.1	8.5	*2.7	0.9	*7.6	*2.5	6.8	1.1	*9.7	9.9

	1994										
Depth	March 19	May 26	June 9	June 23	July 7	July 21	Aug 4	Aug 17	Sept 1	Sept 18	Oct 9
0	13.5	12.6	12.0	9.9	9.7	9.1	8.5	9.2	8.8	8.7	9.2
1	13.4	12.5	12.0	10.0	9.7	9.2	8.1	9.2	8.7	9.0	9.3
2	13.2	*12.6	12.1	10.0	9.7	9.2	8.2	9.2	8.5	9.2	9.3
3	13.1	12.6	12.1	10.1	9.7	9.2	8.5	9.1	8.4	9.3	9.3
4	*13.0	*12.6	12.0	10.3	9.6	9.1	8.3	9.1	8.3	9.2	9.3
5	12.8	12.6	11.9	10.5	9.5	9.1	9.2	9.0	8.3	8.8	9.3
6	12.6	*12.4	11.8	10.5	9.5	9.0	8.0	9.1	8.3	8.6	9.3
7	12.3	12.1	11.8	10.6	9.4	8.9	6.8	9.0	8.3	8.6	9.3
8	*12.1	*11.8	11.7	10.6	9.4	8.8	5.7	7.3	8.2	8.6	9.3
9	*11.8	11.5	11.7	10.2	9.4	8.9	5.5	5.7	8.2	8.6	9.3
10	11.4	*11.5	11.6	8.9	7.3	8.8	5.0	4.0	8.2	8.6	9.4
11	*10.6	11.4	11.4	9.0	5.6	8.0	4.4	2.7	8.1	8.6	9.3
12	*9.8	*11.3	*11.3	8.5	5.0	5.4	3.4	2.0	8.2	8.5	9.3
13	*9.0	11.2	11.1	7.0	4.9	4.0	3.4	0.9	8.2	8.6	9.4
14	*7.8	*11.1	*10.9	5.9	4.5	3.3	2.4	0.5	1.6	8.6	9.4
15	6.9	11.0	10.7	5.2	3.3	2.3	1.8	0.4	0.2	8.6	9.4
16	*5.6	*10.7	*10.4	5.0	2.6	1.6	0.6	0.3	0.1	5.9	9.4
17	*4.2	10.5	10.1	4.6	2.1	1.1	0.2	0.3	0.1	0.3	9.4
18	*2.8	*10.3	*9.3	4.5	1.5	0.6	0.1	0.3	0.1	0.1	9.5
19	*1.8	10.2	8.4	4.2	0.9	0.3	0.1	0.2	0.1	0.1	9.5
20	0.8	*9.6	*7.9	4.0	0.8	0.2	0.1	0.3	0.1	0.1	9.5
21	0.5	9.0	7.4	3.4	0.7	0.1	0.1	0.2	0.1	0.1	9.5

* interoplated data

Appendix Table 4. Dissolved oxygen concentration (mg/L), Third Narrows 1992-1994.

	1992		1993						
Depth	Aug 13	Sept 17	March 26	May 21	June 19	July 12	Aug 13	Sept 17	Oct 8
0	9.2	9.6	11.1	9.2	9.0	10.9	9.2	9.5	9.9
1	9.3	9.5	11.7	9.2	9.0	10.8	9.2	9.6	9.9
2	9.1	9.5	12.0	9.3	9.0	10.7	9.2	*9.5	9.9
3	8.3	9.6	12.1	9.3	*8.9	10.6	9.1	9.4	9.8
4	7.0	9.3	12.3	9.4	8.9	10.5	8.8	*9.3	9.8
5	6.7	9.3	12.7	9.4	*8.4	10.4	8.4	9.2	9.8
6	6.1	9.3	12.3	9.3	8.0	9.4	8.3	*9.0	9.7
7	5.8	8.9	11.6	9.2	*6.4	8.2	8.2	8.9	9.7
8	5.5	8.9	10.5	9.2	4.8	*8.6	8.1	*9.0	9.7
9	5.6	8.9	10.0	*9.2	3.3	*8.4	8.1	9.0	9.6
10	5.7	8.5	6.0	*9.2	3.3	*8.2	7.5	8.7	9.6

	1994									
Depth	May 26	June 9	June 23	July 7	July 21	Aug 4	Aug 17	Sept 1	Sept 18	Oct 9
0	11.6	9.8	9.7	8.6	9.5	9.5	8.8	9.0	10.0	9.8
1	11.4	9.7	9.7	8.5	9.5	9.6	8.8	8.9	9.9	9.8
2	*11.3	9.6	9.7	8.5	9.6	9.7	8.7	8.8	10.0	9.8
3	11.2	9.6	9.7	8.3	9.7	10.4	8.5	8.5	10.1	9.8
4	*10.6	9.6	9.7	8.1	9.6	10.7	8.4	8.3	9.4	9.8
5	10.0	9.5	9.7	7.9	8.3	8.9	7.9	8.2	9.2	9.9
6	*9.6	9.6	9.1	7.8	7.7	7.7	7.7	8.7	8.9	9.9
7	9.2	9.5	6.7	7.8	6.6	5.5	7.8	8.5	8.8	9.8
8	*9.1	7.4	5.4	7.7	4.8	3.9	6.2	7.6	8.8	9.8
9	8.9	6.7	5.3	6.0	4.5	3.3	4.8	7.3	8.7	9.8
10	8.3	6.5	5.0	5.8	4.2	2.7	0.3	7.2	8.6	9.8

* interpolated data

Appendix Table 5. Percent oxygen saturation, Prospect Point 1992-1994.

	1992			1993							
Depth	Aug 1	Aug 13	Sept 17	Jan 18	March 26	May 21	June 19	July 12	Aug 13	Sept 17	Oct 8
0	104.9	94.5	86.8	96.9	68.7	95.3	96.7	107.6	93.5	96.8	95.8
1	103.8	94.4	84.8	96.8	85.6	95.3	96.3	107.4	93.5	99.2	93.8
2	101.6	95.1	85.9	96.8	87.9	94.3	97.0	106.2	93.5	97.9	93.1
3	99.3	94.3	85.4	96.2	89.1	94.9	97.3	106.4	93.2	96.5	92.6
4	97.1	93.8	85.7	115.1	90.2	94.1	97.9	104.2	93.3	97.3	91.8
5	94.9	93.7	85.4	95.7	90.7	93.6	97.8	101.5	93.0	97.2	91.4
6	91.4	93.6	85.7	95.7	90.9	92.5	98.1	97.7	92.8	97.3	91.4
7	88.0	93.2	85.2	96.7	91.4	92.2	96.4	93.8	92.4	97.3	91.2
8	84.6	93.3	85.4	97.6	91.8	91.6	94.7	92.1	91.6	97.2	90.9
9	81.2	92.8	84.5	97.2	91.4	91.7	92.8	91.2	90.8	97.1	91.0
10	77.5	91.0	84.6	96.4	91.1	91.7	91.0	90.7	90.5	96.9	90.5
11	62.3	84.2	84.9	94.3	88.5	90.8	87.9	89.4	90.0	96.6	90.5
12	47.3	48.6	85.1	91.9	85.7	86.4	84.9	88.1	89.3	96.3	90.4
13	32.9	14.2	84.8	84.5	72.7	84.0	75.1	86.6	83.5	95.9	90.3
14	19.1	7.7	85.1	77.0	59.6	79.1	65.8	86.3	71.1	95.4	90.4
15	5.8	1.3	84.9	62.3	57.0	76.5	60.8	84.6	44.4	95.6	90.1
16	4.8	1.0	84.5	47.4	54.4	76.7	55.9	82.8	34.1	96.0	90.9
17	3.8	1.0	84.8	45.9	51.4	75.8	50.7	80.4	24.9	96.3	91.0
18	2.8	0.8	83.8	44.3	48.5	71.5	45.8	76.1	15.8	96.6	90.6
19	1.9	0.8	83.7	38.5	36.9	68.6	30.3	84.5	14.6	96.8	89.6
20	0.9	0.7	82.0	32.6	25.3	66.7	27.0	70.0	13.1	96.8	89.5
21	0.9	0.8	80.5	20.6	6.7	65.6	22.2	67.6	11.7	95.4	87.1

	1994										
Depth	Mar 18	May 26	June 9	June 23	July 7	July 21	4-Aug	Aug 17	Sept 1	Sept 18	Oct 9
0	95.6	112.7	117.5	110.3	104.6	106.7	103.1	105.6	95.0	96.8	87.7
1	94.9	112.1	117.2	110.5	104.3	105.7	98.1	105.1	94.3	97.1	88.6
2	94.0	112.1	116.3	109.9	103.9	105.5	99.1	104.9	92.4	97.6	88.9
3	93.8	112.0	114.1	109.5	103.6	104.9	102.3	104.5	90.9	97.8	88.9
4	93.1	110.2	112.1	111.0	103.4	104.6	100.1	103.9	90.0	96.6	88.9
5	92.4	108.3	110.9	110.7	101.8	104.3	107.1	102.8	89.8	92.0	88.8
6	90.7	105.4	109.6	110.0	101.4	102.7	91.8	103.8	89.5	90.5	88.1
7	89.0	102.5	108.9	108.3	100.8	101.7	76.6	102.7	89.5	90.4	88.1
8	87.2	99.9	108.4	108.2	100.4	99.6	63.3	81.5	89.4	90.3	88.1
9	85.5	97.2	107.8	103.0	99.7	99.9	60.6	63.5	89.0	90.1	88.4
10	83.6	96.5	106.7	87.9	77.0	99.0	54.5	42.8	88.3	89.9	88.5
11	77.4	95.8	104.0	85.4	55.0	88.8	47.3	28.9	87.5	89.8	88.2
12	71.1	94.9	102.3	80.4	48.9	56.9	36.3	20.5	88.2	89.3	88.3
13	64.7	94.0	100.6	64.8	47.4	40.1	35.6	8.9	87.5	90.1	88.5
14	58.1	92.9	98.2	54.2	42.4	32.2	25.1	4.8	16.2	90.3	88.7
15	51.8	91.8	95.7	47.0	31.3	22.2	18.7	3.6	1.5	89.8	88.8
16	43.0	89.5	92.6	45.3	24.7	15.5	5.9	3.0	1.4	61.2	88.6
17	34.1	87.2	89.5	42.0	19.5	10.3	1.9	2.5	1.3	2.7	88.8
18	24.4	86.0	80.8	40.9	13.8	5.5	1.1	2.4	1.0	1.3	89.4
19	15.3	84.8	72.1	37.8	8.3	3.0	1.1	2.3	1.2	1.4	89.5
20	6.2	79.8	67.5	36.3	7.6	1.9	1.2	2.3	0.9	1.2	89.1
21	3.9	74.7	62.9	30.7	6.7	1.2	1.0	2.1	0.9	0.9	89.3

Appendix Table 6. Percent oxygen saturation, Third Narrows 1992-1994.

	1992		1993						
Depth	Aug 13	Sept 17	March 26	May 21	June 19	July 12	Aug13	Sept 17	Oct 8
0	104.7	90.0	80.5	88.8	97.7	113.5	101.9	95.1	87.4
1	104.7	89.4	92.3	88.6	97.4	111.9	102.2	95.1	86.8
2	101.0	89.2	94.6	89.2	97.1	111.1	101.3	93.8	86.7
3	92.6	89.6	95.5	89.5	94.5	110.4	99.5	92.8	86.4
4	77.8	87.0	96.8	89.6	93.9	108.5	95.9	91.4	85.9
5	73.5	86.6	99.6	89.2	98.7	108.0	101.9	90.0	85.8
6	67.1	86.9	97.1	88.5	82.6	97.1	89.9	88.4	85.4
7	63.6	83.1	91.1	87.4	65.8	84.1	88.6	87.2	85.0
8	60.0	82.7	82.2	87.4	49.2	87.1	88.3	87.8	85.0
9	61.5	83.0	78.4	87.4	33.6	84.9	87.9	88.4	84.9
10	62.7	79.6	46.8	87.4	33.6	83.7	81.3	85.1	84.9

	1994									
Depth	May 26	June 9	June 23	July 7	July 21	Aug 4	Aug 17	Sept 1	Sept 18	Oct 9
0	109.5	104.0	109.7	94.8	113.6	117.2	101.0	99.8	108.8	91.6
1	108.3	102.1	109.7	93.8	113.3	118.7	100.5	98.8	108.2	91.8
2	106.1	100.1	109.7	93.0	113.2	119.4	99.3	96.8	108.0	91.9
3	103.9	99.7	109.4	90.6	113.9	125.0	97.3	92.5	109.1	92.1
4	97.5	99.4	109.3	88.6	112.2	127.0	96.0	90.9	99.4	92.3
5	91.1	98.6	108.7	86.4	95.7	105.0	90.6	89.6	96.8	92.3
6	87.5	98.7	101.1	85.4	88.3	89.9	88.2	94.2	94.2	92.3
7	83.8	97.5	70.7	85.2	75.1	62.2	88.8	92.6	93.5	91.9
8	82.5	74.4	56.2	84.4	54.5	44.2	70.5	82.8	92.7	91.4
9	81.2	66.2	55.0	65.3	50.2	37.1	54.2	78.7	91.9	91.3
10	75.5	63.8	52.4	62.3	47.1	30.0	3.0	78.3	91.2	91.2

Appendix Table 7. pH profiles, Prospect Point 1992-1994.

	1992		1993							
Depth	Aug 13	Sept 17	Jan 28	March 26	May 21	June 19	July 12	Aug13	Sept 16	Oct 8
0	8.6	8.2	8.1	8.0	8.1	8.3	8.6	8.1	8.7	8.7
1	8.6	8.2	8.1	8.1	8.1	8.3	8.6	8.1	8.7	8.8
2	8.6	8.2	8.1	8.1	8.1	8.3	8.4	8.1	8.7	8.8
3	8.6	8.2	8.1	8.1	8.1	8.3	7.5	8.1	8.7	8.8
4	8.6	8.2	8.1	8.1	8.1	8.3	6.5	8.1	8.7	8.8
5	8.6	8.2	8.1	8.1	8.1	8.3	7.3	8.1	8.7	8.8
6	8.6	8.2	8.1	8.1	8.1	8.3	7.5	8.1	8.8	8.8
7	8.6	8.2	8.1	8.1	8.1	8.3	8.6	8.1	8.8	8.8
8	8.6	8.2	8.1	8.1	8.1	8.3	8.5	8.1	8.8	8.8
9	8.6	8.2	8.0	8.1	8.1	8.3	8.5	8.1	8.8	8.8
10	8.6	8.2	8.0	8.1	8.1	8.2	8.4	8.1	8.8	8.8
11	8.6	8.2	7.9	8.1	8.1	8.2	8.4	8.1	8.8	8.8
12	8.1	8.2	7.9	8.1	8.0	8.2	8.4	8.1	8.8	8.8
13	7.5	8.2	7.8	8.1	8.0	8.0	8.3	8.0	8.8	8.8
14	7.4	8.2	7.7	8.1	7.9	7.9	8.3	7.8	8.8	8.8
15	7.4	8.2	7.5	7.9	7.9	7.8	8.3	7.5	8.8	8.8
16	7.3	8.2	7.3	7.6	7.9	7.7	8.2	7.3	8.8	8.8
17	7.3	8.2	7.3	7.6	7.9	7.7	8.2	7.3	8.8	8.8
18	7.3	8.2	7.3	7.5	7.8	7.6	8.2	7.2	8.8	8.8
19	7.2	8.2	7.2	7.4	7.8	7.5	8.1	7.2	8.8	8.8
20	7.2	8.2	7.1	7.3	7.8	7.3	8.1	7.2	8.8	8.8

	1994									
Depth	May 26	June 9	June 23	July 7	July 21	Aug 4	Aug 17	Sept 1	Sept 18	Oct 9
0	8.6	8.4	8.5	8.6	8.5	8.5	8.5	8.3	8.1	8.2
1	8.6	8.4	8.5	8.6	8.5	8.5	8.5	8.3	8.4	8.2
2	8.6	8.4	8.5	8.6	8.5	8.5	8.5	8.3	8.4	8.2
3	8.6	8.4	8.5	8.6	8.5	8.5	8.5	8.3	8.4	8.2
4	8.6	8.4	8.5	8.6	8.5	8.5	8.5	8.3	8.4	8.2
5	8.6	8.4	8.5	8.6	8.5	8.5	8.5	8.3	8.3	8.2
6	8.5	8.4	8.5	8.6	8.5	8.4	8.5	8.3	8.3	8.2
7	8.5	8.4	8.5	8.6	8.5	8.3	8.5	8.3	8.3	8.2
8	8.4	8.4	8.5	8.6	8.5	8.1	8.3	8.3	8.3	8.2
9	8.4	8.4	8.4	8.6	8.5	8.0	8.1	8.3	8.3	8.1
10	8.4	8.3	8.2	8.5	8.4	7.9	7.8	8.3	8.3	8.1
11	8.4	8.3	8.1	8.0	8.4	7.8	7.6	8.3	8.3	8.1
12	8.4	8.3	8.1	7.9	7.9	7.7	7.6	8.3	8.3	8.1
13	8.4	8.3	7.8	7.8	7.6	7.6	7.5	8.3	8.3	8.1
14	8.3	8.2	7.7	7.8	7.5	7.5	7.4	7.5	8.3	8.1
15	8.3	8.2	7.6	7.7	7.5	7.4	7.4	7.3	8.3	8.1
16	8.3	8.2	7.6	7.6	7.4	7.3	7.4	7.2	8.0	8.2
17	8.3	8.2	7.6	7.6	7.4	7.3	7.3	7.2	7.4	8.2
18	8.3	8.0	7.5	7.5	7.3	7.2	7.3	7.2	7.3	8.2
19	8.2	7.9	7.5	7.5	7.3	7.2	7.3	7.2	7.3	8.2
20	8.2	7.8	7.5	7.5	7.3	7.2	7.2	7.1	7.2	8.2

Appendix Table 8. pH profiles. Third Narrows 1992-1994.

	1992		1993						
Depth	Aug 13	Sept 17	March 26	May 21	June 19	July 12	Aug13	Sept 17	Oct 8
0	8.7	8.3	8.1	8.0	8.2	8.3	8.2	8.6	8.5
1	8.7	8.4	8.0	8.1	8.2	8.8	8.2	8.6	8.5
2	8.7	8.4	8.0	8.1	8.2	9.0	8.2	8.6	8.5
3	8.6	8.4	8.0	8.1	8.2	9.1	8.2	8.6	8.5
4	8.5	8.4	8.0	8.1	8.2	9.1	8.2	8.6	8.5
5	8.4	8.4	8.0	8.1	8.1	9.1	8.4	8.6	8.5
6	8.3	8.3	7.9	8.0	8.1	9.0	8.2	8.6	8.5
7	8.3	8.3	8.0	8.0	7.9	8.8	8.1	8.6	8.5
8	8.2	8.3	8.0	8.0	7.6	8.6	8.1	8.6	8.5
9	8.3	8.3	7.9	8.0	7.5	8.4	8.1	8.6	8.5
10	8.3	8.3	7.6	8.0	7.5	8.2	8.1	8.6	8.5

	1994									
Depth	May 26	June 9	June 23	July 7	July 21	Aug 4	Aug 17	Aug 31	Sept 18	Oct 9
0	8.5	8.2	8.4	8.3	8.5	8.8	8.5	8.3	8.5	8.4
1	8.5	8.3	8.4	8.3	8.5	8.8	8.5	8.3	8.5	8.4
2	8.5	8.2	8.4	8.3	8.5	8.8	8.5	8.3	8.6	8.4
3	8.5	8.3	8.4	8.3	8.5	8.8	8.5	8.3	8.6	8.4
4	8.4	8.3	8.4	8.3	8.5	8.7	8.5	8.3	8.5	8.4
5	8.3	8.2	8.4	8.3	8.3	8.5	8.4	8.3	8.5	8.4
6	8.3	8.3	8.3	8.3	8.2	8.2	8.4	8.3	8.4	8.4
7	8.2	8.2	7.9	8.3	8.1	7.8	8.4	8.3	8.4	8.4
8	8.2	8.0	7.7	8.3	7.8	7.6	8.2	8.2	8.4	8.4
9	8.2	7.9	7.7	8.0	7.7	7.5	8.0	8.2	8.4	8.4
10	8.1	7.8	7.7	7.9	7.7	7.4	7.5	8.2	8.4	8.4

Appendix Table 9. Total, dissolved, particulate and soluble reactive phosphorus (µg/L) concentration, Prospect Point, 1992-1994.

	1 m				10 m				20 m			
Date	Total	Dissolved	Particulate	Soluble Reactive	Total	Dissolved	Particulate	Soluble Reactive	Total	Dissolved	Particulate	Soluble Reactive
1992												
July 31	17.0	14.0	3.0	2.0	15.0	14.0	1.0	1.5	151.0	138.0	13.0	120.0
August 13	18.0	14.0	4.0	11.0	14.0	7.0	7.0	4.0	135.0	135.0	0.0	127.0
Sept 17	32.0	12.0	20.0	1.5	36.0	33.0	3.0	3.0	32.0	15.0	17.0	2.0
Oct. 3	28.0	18.0	10.0	1.5	23.0	8.0	15.0	1.5	67.0	7.0	60.0	1.5
1993												
Jan 28	11.0	8.0	3.0	1.5	14.0	11.0	3.0	1.5	27.0	10.0	17.0	1.5
March 26	12.0	6.0	6.0	1.5	11.0	5.0	6.0	1.5	33.0	11.0	22.0	1.5
May 21	13.0	9.0	4.0	1.5	16.0	11.0	5.0	4.0	21.0	6.0	15.0	1.5
June 19	12.0	9.0	3.0	1.5	15.0	7.0	8.0	1.5	35.0	12.0	23.0	1.5
July 15	25.0	7.0	18.0	1.5	22.0	15.0	7.0	1.5	43.0	15.0	28.0	2.0
August 13	17.0	11.0	6.0	1.5	49.0	12.0	37.0	1.5	69.0	65.0	4.0	56.0
Sept 17	27.0	15.0	12.0	1.5	32.0	19.0	13.0	5.0	30.0	8.0	22.0	1.5
Oct 8	26.0	24.0	2.0	1.5	19.0	13.0	6.0	1.5	49.0	11.0	38.0	1.5
1994												
March 18	16.0	10.0	6.0	1.5	15.0	10.0	5.0	3.0	24.0	21.0	3.0	8.0
May 26	19.0	8.0	11.0	7.0	17.0	9.0	8.0	7.0	39.0	25.0	14.0	7.0
June 9	17.0	15.0	2.0	5.0	18.0	17.0	1.0	4.0	24.0	10.0	14.0	5.0
June 23	17.0	11.0	6.0	1.5	15.0	11.0	4.0	1.5	19.0	12.0	7.0	1.5
July 7	13.0	9.0	4.0	1.5	15.0	5.0	10.0	5.0	35.0	14.0	21.0	12.0
July 21	12.0	5.0	7.0	3.0	16.0	10.0	6.0	2.0	16.0	4.0	12.0	1.5
Aug 4	8.0	4.0	4.0	1.5	14.0	2.0	12.0	1.5	73.0	63.0	10.0	17.0
Aug 17	14.0	8.0	6.0	2.0	14.0	7.0	7.0	2.0	100.0	88.0	12.0	52.0
Sept 1	20.0	14.0	6.0	1.5	15.0	7.0	8.0	1.5	99.0	92.0	7.0	72.0
Sept 17	16.0	7.0	9.0	2.0	21.0	11.0	10.0	2.0	116.0	98.0	18.0	86.0
Oct 9	36.0	14.0	22.0	4.0	22.0	8.0	14.0	n.a.	23.0	11.0	12.0	2.0

n.a. = not analyzed

Appendix Table 10. Total, dissolved, particulate and soluble reactive phosphorus (µg/L) concentrations, Third Narrows, 1992-1994

	1 m				10 m			
Date	Total	Dissolved	Particulate	Soluble Reactive	Total	Dissolved	Particulate	Soluble Reactive
1992								
July 31	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
August 13	28.0	10.0	18.0	10.0	27.0	8.0	18.5	9.0
Sept 17	43.0	35.0	8.0	2.0	50.0	43.0	7.0	1.5
Oct. 3	34.0	30.0	4.0	1.5	35.0	33.0	2.0	1.5
1993								
Jan 28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
March 26	13.0	4.0	9.0	1.5	24.0	21.0	3.0	1.5
May 21	20.0	10.0	10.0	1.5	34.0	11.0	23.0	5.0
June 19	24.0	24.0	0.0	4.0	41.0	29.0	12.0	6.0
July 15	73.0	28.0	45.0	8.0	38.0	30.0	8.0	2.0
August 13	34.0	12.0	22.0	2.0	27.0	8.0	19.0	1.5
Sept 17	26.0	13.0	13.0	1.5	31.0	21.0	10.0	5.0
Oct 8	21.0	7.0	14.0	1.5	53.0	21.0	32.0	1.5
1994								
March 18	7.0	2.0	5.0	1.5	2.0	1.0	1.0	2.0
May 26	36.0	20.0	6.0	11.0	21.0	18.0	3.0	10.0
June 9	16.0	9.0	7.0	3.0	20.0	11.0	9.0	3.0
June 23	14.0	9.0	5.0	1.5	15.0	13.0	2.0	1.5
July 7	44.0	4.0	40.0	4.0	20.0	11.0	9.0	5.0
July 21	15.0	10.0	5.0	1.5	17.0	4.0	13.0	1.5
Aug 4	13.0	3.0	10.0	1.5	22.0	4.0	18.0	1.5
Aug 17	19.0	10.0	9.0	8.0	18.0	8.0	10.0	7.0
Sept 1	29.0	13.0	16.0	1.5	34.0	15.0	19.0	3.0
Sept 17	35.0	26.0	9.0	12.0	32.0	11.0	21.0	11.0
Oct 9	26.0	11.0	15.0	1.5	32.0	29.0	3.0	4.0

n.a. = not analyzed

Appendix Table 11. Ammonia, particulate nitrogen and nitrite-nitrate concentrations (µg/L) for Prospect Point, 1992-1994.

	1 m			10 m			20 m		
Date	Ammonia	Particulate	Nitrite-Nitrate	Ammonia	Particulate	Nitrite-Nitrate	Ammonia	Particulate	Nitrite-Nitrate
1992									
July 31	8.0	89.0	1.6	14.0	154.0	1.6	605.0	79.0	1.6
August 13	8.0	88.0	1.6	20.0	130.0	1.6	560.0	155.0	1.6
Sept 17	15.0	65.0	1.6	10.0	78.0	1.6	12.0	116.0	1.6
Oct. 3	10.0	94.0	n.a.	18.0	96.0	1.6	13.0	212.0	1.6
1993									
Jan 28	78.0	5.0	2.0	32.0	11.0	2.9	125.0	5.0	25.7
March 26	12.0	83.0	1.6	12.0	44.0	1.6	275.0	209.0	20.2
May 21	17.0	88.0	2.5	9.0	121.0	3.0	32.0	69.0	1.6
June 19	4.5	32.0	1.6	87.0	52.0	1.6	33.0	122.0	1.6
July 15	16.0	156.0	n.a.	13.0	131.0	n.a.	16.0	199.0	n.a.
August 13	15.0	35.0	1.6	n.a.	26.0	2.2	n.a.	5.0	2.3
Sept 17	11.0	145.0	1.6	9.0	50.0	1.6	8.0	158.0	1.6
Oct 8	5.0	205.0	1.6	5.0	278.0	1.6	4.5	260.0	1.6
1994									
March 18	30.0	256.0	7.2	20.0	22.0	36.1	20.0	55.0	43.2
May 26	9.0	108.0	1.6	4.5	122.0	1.6	51.0	74.0	3.9
June 9	18.0	26.0	1.6	4.5	109.0	1.6	57.0	109.0	4.5
June 23	10.0	5.0	2.0	18.0	5.0	1.6	18.0	5.0	1.6
July 7	32.0	74.0	1.6	14.0	5.0	1.6	105.0	5.0	1.6
July 21	38.0	56.0	1.6	12.0	78.0	1.6	13.0	117.0	1.6
Aug 4	10.0	48.0	1.6	9.0	98.0	1.6	321.0	42.0	1.6
Aug 17	10.0	108.0	1.6	14.0	119.0	1.6	512.0	57.0	1.6
Sept 1	6.0	166.0	1.6	7.0	104.0	1.6	554.0	62.0	1.6
Sept 17	8.0	20.0	1.6	5.0	150.0	1.6	595.0	146.0	1.6
Oct 9	17.0	99.0	3.0	16.0	115.0	3.3	17.0	106.0	3.8

n.a. = not analyzed

Appendix Table 12. Ammonia, particulate nitrogen and nitrite-nitrate concentrations (µg/L), Third Narrows 1992-1994.

	1 m			10 m		
Date	Ammonia	Particulate	Nitrite-Nitrate	Ammonia	Particulate	Nitrite-Nitrate
1992						
July 31	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
August 13	13.0	261.0	1.6	25.0	136.0	5.1
Sept 17	9.0	172.0	1.6	11.0	180.0	1.6
Oct. 3	8.0	192.0	1.6	7.0	194.0	1.6
1993						
Jan 28	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
March 26	13.0	187.0	1.6	17.0	385.0	1.6
May 21	n.a.	171.0	1.6	15.0	237.0	n.a.
June 19	9.0	56.0	1.6	22.0	117.0	5.0
July 15	14.0	245.0	n.a.	13.0	147.0	n.a.
August 13	4.5	167.0	1.6	8.0	78.0	2.3
Sept 17	12.0	259.0	1.6	9.0	225.0	1.6
Oct 8	n.a.	147.0	1.6	4.5	205.0	1.6
1994						
March 18	18.0	5.5	8.0	15.0	3.0	67.3
May 26	4.5	113.0	2.3	8.0	130.0	2.0
June 9	16.0	10.0	1.6	6.0	5.0	1.6
June 23	8.0	52.0	1.6	10.0	5.0	1.6
July 7	10.0	84.0	1.6	10.0	5.0	1.6
July 21	8.0	171.0	1.6	16.0	155.0	2.5
Aug 4	12.0	144.0	1.6	18.0	158.0	2.8
Aug 17	10.0	150.0	1.6	34.0	91.0	1.6
Sept 1	14.0	245.0	4.8	21.0	70.0	4.0
Sept 17	6.0	268.0	1.6	10.0	276.0	1.6
Oct 9	10.0	91.0	1.6	10.0	190.0	1.6

n.a. = not analyzed

Appendix Table 13. Particulate organic carbon concentrations (mg/L), Prospect Point and Third Narrows, 1992-1994.

	Prospect Point			Third Narrows	
Date	1 m	10 m	20 m	1 m	10 m
1992					
July 31	552	1020	350	n.a.	n.a.
August 13	809	738	589	1750	577
September 17	452	531	719	961	1020
October 3	489	649	1280	1170	1090
1993					
Jan 28	202	255	240	n.a.	n.a.
March 26	730	551	1450	838	1450
May 21	1270	1050	448	1100	1470
June 19	222	358	641	578	908
July 15	834	531	904	1520	956
August 13	799	668	406	1810	1260
Sept 17	1400	420	1500	1640	1650
Oct 8	1340	2000	2070	980	1220
1994					
March 18	256	376	492	<10	<10
May 26	862	838	418	1020	787
June 9	532	928	627	579	329
June 23	328	628	578	491	556
July 7	455	847	825	727	478
July 21	418	547	594	1110	630
Aug 4	620	732	344	1060	968
Aug 17	747	792	230	1000	696
Sept 1	736	577	582	1400	1240
Sept 17	226	194	92	758	778
Oct 9	611	693	618	722	1370

n.a. = not analyzed

Appendix Table 14. Silicon concentrations (mg/L), Prospect Point and Third Narrows, 1992-1994.

Date	Prospect Point 1 m	Prospect Point 10 m	Prospect Point 20 m	Third Narrows 1 m	Third Narrows 10 m
1992					
July 31	0.34	0.34	3.33	n.a.	n.a.
August 13	1.40	0.25	2.65	1.94	3.27
September 17	0.87	0.69	0.69	2.29	2.65
October 3	0.07	0.14	0.28	1.58	1.94
1993					
Jan 28	0.16	0.14	0.87	n.a.	n.a.
March 26	0.13	0.15	1.54	1.57	1.97
May 21	1.85	0.22	0.52	1.02	n.a.
June 19	0.11	0.11	0.86	n.a.	1.77
July 15	0.20	0.18	0.69	0.36	0.68
August 13	0.46	0.47	2.96	0.71	0.67
Sept 17	0.24	0.19	0.19	0.60	0.64
Oct 8	0.05	0.03	0.15	0.45	0.49
1994					
March 18					
May 26	0.40	0.41	0.83	0.99	1.29
June 9	0.38	0.43	1.56	1.11	1.47
June 23	0.46	0.43	2.24	0.94	1.44
July 7	0.20	0.46	3.99	1.29	1.64
July 21	0.26	0.30	1.44	1.49	2.01
Aug 4	0.38	0.79	4.52	1.69	2.81
Aug 17	0.56	1.20	4.60	2.00	2.26
Sept 1	0.76	0.88	4.37	2.45	2.44
Sept 17	1.27	2.48	4.31	2.59	1.31
Oct 9	1.59	1.62	1.62	1.78	2.01

n.a. = not analyzed

Appendix Table 15. Flux rates at Prospect Point and Third Narrows, June to October 1994.

Site	Depth	Date	Flux Rate ($g/m^2/d$) Total	Total C	Organic C	Carbonate	P	N
Prospect Point	4 m	June 22 - July 6	2975.0	1074.0	1046.3	27.7	15.7	172.0
		July 9 - 21	2442.3	798.6	757.1	41.5	9.7	142.9
		July 21 - Aug. 3	848.2	203.6	186.4	17.2	3.1	27.8
		Aug. 4 - 17	651.8	138.2	99.2	39.0	1.3	14.5
		Aug. 17 - Sept. 1	312.5	55.0	50.8	4.3	0.5	4.2
		Sept. 1- 17	1154.4	226.3	184.5	41.8	3.5	21.9
		Sept. 17 - Oct. 8	1858.0	356.7	312.5	44.2	6.6	46.4
	10 m	June 22 - July 6	2941.7	608.9	583.3	25.6	7.4	99.7
		July 9 - 21	3442.3	822.7	806.9	15.8	8.7	141.5
		July 21 - Aug. 3	1473.2	274.0	241.6	32.4	3.3	32.3
		Aug. 4 - 17	2330.4	39.6	32.2	7.5	1.7	4.0
		Aug. 17 - Sept. 1*	242.2	47.7	41.5	6.2	0.7	6.1
		Sept. 1- 17	1022.1	131.8	89.6	42.2	1.2	11.1
		Sept. 17 - Oct. 8	2937.5	522.9	454.7	68.2	7.7	66.1
	20 m	June 22 - July 6	3066.7	564.3	531.5	32.8	8.8	73.9
		July 9 - 21	5394.2	793.0	742.2	50.7	13.5	117.1
		July 21 - Aug. 3	3839.3	641.2	552.5	88.7	8.0	71.4
		Aug. 4 - 17	1330.4	243.5	188.0	55.5	2.8	22.9
		Aug. 17 - Sept. 1*	421.9	83.1	72.4	10.8	1.3	10.5
		Sept. 1- 17	3647.1	663.8	530.6	133.1	5.4	65.3
		Sept. 17 - Oct. 8	6403.4	1197.4	1033.5	163.9	14.9	142.8
Third Narrows	4 m	June 22 - July 6	2583.3	550.3	516.7	33.6	8.1	83.7
		July 9 - 21	3673.1	775.0	728.4	46.6	9.3	138.5
		July 21 - Aug. 3	696.4	148.3	139.3	9.1	2.2	13.5
		Aug. 4 - 17	1660.7	350.4	329.3	21.1	4.2	37.5
		Aug. 17 - Sept. 1	3445.3	633.9	484.4	149.5	6.2	69.3
		Sept. 1- 17	3558.8	686.9	599.7	87.2	11.1	87.2
		Sept. 17 - Oct. 8	8460.2	1353.6	1216.6	137.1	23.9	188.7
	10 m	June 22 - July 6	4133.3	669.6	622.1	47.5	9.7	78.5
		July 9 - 21	3490.4	534.0	485.5	48.5	7.0	73.3
		July 21 - Aug. 3	2071.4	335.6	311.8	23.8	4.8	41.8
		Aug. 4 - 17	4500.0	958.5	900.0	58.5	14.2	81.9
		Sept. 1- 17	7058.8	1411.8	1248.7	163.1	28.6	167.3
		Sept. 17 - Oct. 8	9397.7	1522.4	1358.0	164.5	30.0	201.1
		Aug. 17 - Sept. 1*	4992.2	958.5	710.4	248.1	11.3	91.4

* estimated value for concentrations

Appendix Table 16. Chlorophyll concentrations (µg/L) at Prospect Point and Third Narrows, 1992-1994.

		1992				1993					
Site	Depth (m)	July 31	Aug 13	Sept 9	Oct 3	May 21	June 19	July 15	Aug 13	Sept 17	Oct 8
Prospect Point	1	8.3	3.7	7.8	3.8	1.9	2.2	2.6	9.4	16.3	15.6
	10	6.4	4.0	8.4	5.3	3.7	3.4	5.6	7.1	11.9	26.2
	21	1.4	1.6	10.3	14.5	4.0	6.6	8.3	1.5	22.0	22.0
Third Narrows	1	n.d.	n.d.	n.d.	n.d.	4.4	3.3	20.9	33.4	13.9	8.0
	10	n.d.	n.d.	n.d.	n.d.	5.6	7.3	11.6	15.3	20.2	13.2

		1994									
Site	Depth (m)	May 26	June 9	June 23	July 7	July 21	Aug 4	17-Aug	Sept 1	Sept 18	Oct 9
Prospect Point	0	7.2	3.1	1.5	4.1	3.2	2.5	2.9	4.3	5.1	16.9
	1	7.0	4.2	1.7	4.6	4.6	2.2	3.5	4.5	5.7	14.5
	2	6.7	4.7	2.0	5.1	4.3	2.1	3.7	5.1	5.5	11.0
	3	6.4	4.5	1.7	5.2	4.5	2.1	3.8	5.0	5.8	12.2
	4	7.3	5.1	2.1	5.3	4.3	2.3	6.5	4.9	5.6	12.3
	5	8.1	5.9	2.5	5.1	4.5	2.2	6.6	4.5	6.0	11.9
	6	7.9	7.9	2.6	5.1	4.8	3.4	4.5	4.7	5.9	10.3
	7	7.6	7.6	2.8	5.1	5.3	3.3	5.5	4.3	6.4	12.4
	8	9.5	8.6	4.7	5.3	5.5	3.5	7.8	4.3	5.5	11.6
	9	11.4	8.3	6.7	5.0	5.2	4.6	7.6	4.0	6.0	13.1
	10	11.3	7.6	7.0	6.7	5.4	4.6	8.3	3.9	6.1	14.2
	15	6.2	7.4	8.7	8.0	5.6	3.8	5.8	2.2	5.5	12.0
	21	7.0	8.0	8.0	5.5	7.5	1.4	2.7	1.0	2.1	10.9
Third Narrows	0	4.6	2.2	4.1	8.8	12.0	7.7	11.0	11.5	18.2	13.4
	1	5.4	2.5	3.6	8.8	11.3	8.3	11.2	13.4	9.0	13.7
	3	6.1	3.2	3.8	9.3	11.0	8.7	12.8	23.4	17.8	14.9
	5	5.3	3.2	3.4	8.5	12.5	16.9	11.8	15.7	15.5	15.1
	7	8.1	5.1	5.2	8.0	10.6	15.6	11.3	8.0	15.1	14.5
	9	8.0	4.8	5.8	9.0	9.8	12.1	9.3	9.8	14.2	14.7
	10	6.8	4.7	6.6	8.1	9.4	10.4	8.4	10.8	13.8	14.8

n.d. = no data

Appendix Table 17. Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

July 30, 1992

Surface

Taxon	Cells/L	biomass mg/m^3
Chroococcus limneticus Lemm.	2100	5.6
Aphanocapsa delicatissima W.&W.	85304	13.7
Anabaena spiroides Klebs	6562	61.6
Coccomyxa minor v. gallica Bourr.	30315560	1008.5
Gomphosphaeria aponica Kuetz.	6562	11.3
Chroococcus minutus (Kuetz.) Naegeli	6562	5.7
Gomphosphaeria lacustris v. compacta Lemm	6562	6.2
Gloetilia sp.1	1050	3.7
Oocystis solitaria Wittrock	6562	21.6
Crugigenia irregularis Wille	6562	0.4
Oocystis parva West & West	19685	12.9
Elakatothrix lacustris	6562	0.6
Oocystis Borgei Snow	13124	23.3
Nephrocytium agardhianum Naegeli	6562	11.9
Monoraphidium minutum (Naegeli) Komarkova	6562	0.5
Oocystis Borgei Snow	13124	6.1
Oocystis parva West & West	13124	2.5
Chrysochromulina parva Lackey	6562	0.1
Rhodomonas minuta v. nannoplanctica Skuja	19685	1.2
Peridinium Willei Huitfeldt-Kaas	5249	579.9
Ceratium hirundinella (Mueller) Schrank	9449	1310.7
Cyclotella comta (Ehr.) Kuetz.	39371	653.2
Pennate diatom	6562	1.2
Cyclotella comta (Ehr.) Kuetz.	6562	20.6
Melosira distans v. lirata	6562	13.4
Achnanthes sp.	6562	0.8
Fragilaria crotonensis Kitton	7349	62.3
Tabellaria fenestrata (Lygnb.) Kuetz.	5249	19.8
Strombidium sp.1	1050	49.9

Bottom

Taxon	Cells/L	biomass mg/m^3
Microcystis aeruginosa Kuetz.	4375	14.7
Aphanocapsa delicatissima W.&W.	21873	2.7
Gloetilia sp.1	1094	2.7
Pediastrum duplex v. clathratum (A. Br.)	1094	6.6
Oocystis parva West & West	13124	17.2
Monoraphidium contortum (Thuret in Breb.)	4375	0.2
Crugigenia irregularis Wille	8749	1.8
Oocystis Borgei Snow	13124	5.6
Oocystis parva West & West	13124	15.8
Salpingoeca frequestissima (Zach.) Lemm.	16405	1.1
Ceratium hirundinella (Mueller) Schrank	1094	151.7
Cyclotella comta (Ehr.) Kuetz.	1094	98.1
Melosira granulata (Ehr.) Ralfs	3281	22.8
Fragilaria crotonensis Kitton	1094	2.8
Melosira crenulata	1094	1.0
Cyclotella meneghiniana Kuetz.	26247	281.7
Cyclotella comta (Ehr.) Kuetz.	48120	152.7
Synedra sp.	4375	0.8
Tabellaria fenestrata (Lygnb.) Kuetz.	4375	13.2
Cyclotella comta (Ehr.) Kuetz.	13124	419.3
Cyclotella sp.	13124	10.5
Coccomyxa minor v. gallica Bourr.	84778580	4048.4
Ciliate	4375	4.0

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

August 13,1992

Surface

Taxon	Cells/L	biomass mg/m^3
Coccomyxa minor v. gallica Bourr.	166538700	5981.9
Anabaena flos-aquae (Lyngbye) Breb.	875	5.9
Chroococcus limneticus Lemm.	875	6.6
Anabaena affinis Lemm.	875	4.6
Oscillatoria prolifica (Grev.) Gomot	875	1.1
Microcystis aeruginosa Kuetz.	875	6.2
Aphanocapsa elachista W. & G.S. Smith	875	0.3
Oscillatoria limnetica Lemm.	875	8.4
Anabaena spiroides Klebs	11374	96.4
Aphanothece clathrata G.S. West in W.&W.	13124	3.9
Dactylococcopsis Smithii R. & F. Chod.	4375	1.3
Aphanocapsa delicatissima W.&W.	174982	6.5
Chroococcus minutus (Kuetz.) Naegeli	8749	27.3
Aphanocapsa elachista W. & G.S. Smith	26247	23.9
Gomphosphaeria lacustris v. compacta Lemm	30622	59.1
Chroococcus dispersus (Keiss.) Lemm.	21873	9.2
Gomphosphaeria lacustris v. compacta Lemm	8749	0.4
Chroococcus dispersus (Keiss.) Lemm.	26247	7.1
Microcystis aeruginosa Kuetz.	8749	8.8
Staurastrum chaetoceras (Schroeder) G.M.	875	0.4
Elakatothrix lacustris	875	0.0
Gloetilia sp.1	2625	1.4
Oocystis parva West & West	13124	7.3
Oocystis solitaria Wittrock	4375	4.4
Oocystis pusilla Hansgirg	13124	8.1
Pandorina morum (Mueller) Bory	8749	26.0
Crucigenia quadrata Morren	8749	6.3
Elakatothrix gelatinosa Willen	8749	0.5
Oocystis solitaria Wittrock	17498	6.4
Golenkia radiata (Chod.) Wille	8749	8.7
Oocystis parva West & West	69993	21.2
Crucigenia quadrata Morren	8749	1.9
Oocystis pusilla Hansgirg	52494	19.0
Stichogloea Doederleinii (Schmidle) Wille	8749	7.0
Erkenia subaequiciliata Skuja	8749	0.3
Chromulina sphaeridia Schiller	8749	1.0
Cercoboda sp.	34996	21.2
Stichogloea Doederleinii (Schmidle) Wille	26247	5.3
Monochrysis vesiculifera	8749	0.6
Cryptomonas erosa Erh.	4375	7.4
Rhodomonas minuta v. nannoplanctica Skuja	8749	0.3
Ceratium hirundinella (Mueller) Schrank	1750	242.7
Peridinium Willei Huitfeldt-Kaas	2625	226.5
Pennate diatom	875	0.6
Cyclotella comta (Ehr.) Kuetz.	875	104.4
Melosira granulata (Ehr.) Ralfs	875	23.6
Tabellaria fenestrata (Lygnb.) Kuetz.	875	1.7
Melosira crenulata	875	2.2
Fragilaria crotonensis Kitton	4375	0.4
Cyclotella comta (Ehr.) Kuetz.	21873	130.0
Gomphonema sp.	4375	1.5
Ciliate	8749	5.5

Bottom

Taxon	Cells/L	biomass mg/m^3
Coccomyxa minor v. gallica Bourr.	231894300	5024.6
Synechococcus sp. Nageli	262472	19.8
Gomphosphaeria lacustris v. compacta Lemm	7655	21.4
Chroococcus dispersus (Keiss.) Lemm.	1094	0.8
Aphanocapsa elachista W. & G.S. Smith	3281	3.1
Aphanocapsa delicatissima W.&W.	16405	5.7
Arthrodesmus megacanthum Ehr.	1094	248.2
Gloetilia sp.1	1094	2.6
Monoraphidium contortum (Thuret in Breb.)	6562	0.1
Oocystis solitaria Wittrock	13124	14.4
Tetraedron minimum (A. Braun) Hansgirg.	6562	4.8
Oocystis parva West & West	19685	6.7
Monoraphidium contortum (Thuret in Breb.)	6562	0.2
Crucigenia quadrata Morren	13124	3.5
Stichogloea Doederleinii (Schmidle) Wille	131236	35.7
Chromulina vagans Pascher	13124	3.8
Cryptomonas erosa v. reflexa Mars.	13124	5.6
Ceratium hirundinella (Mueller) Schrank	1094	151.7
Melosira crenulata	3281	10.0
Cyclotella comta (Ehr.) Kuetz.	2187	67.3
Fragilaria crotonensis Kitton	1094	39.0
Melosira granulata (Ehr.) Ralfs	2187	2.2
Fragilaria capucina Demazieres	13124	1.6
Melosira distans	13124	36.4
Ciliate	19685	20.6
Ciliate	1094	2.6

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

September 16, 1992

Surface

Taxon	Cells/L	biomass mg/m³
Coccomyxa minor v. gallica Bourr.	4567019	164.0
Aphanizomenon flos-aquae Ralfs	40829	62.9
Chroococcus limneticus v. distans G.M. Sm	4375	7.0
Anabaena circinalis Rabenhorst	4375	54.6
Lyngbya limnetica Lemm.	1458	2.7
Microcystis aeruginosa Kuetz.	1458	24.4
Pandorina morum (Mueller) Bory	2916	10.0
Cyanophyte	5833	0.5
Gomphosphaeria lacustris v. compacta Lemm	23331	57.4
Aphanocapsa elachista W. & G.S. Smith	5833	4.9
Aphanocapsa delicatissima W.&W.	122487	52.3
Staurastrum chaetoceras (Schroeder) G.M.	1458	2.3
Staurastrum longiradiatum W. & G.S. Smith	1458	22.2
Elakatothrix lacustris	4375	0.2
Pediastrum duplex v. clathratum (A. Br.)	1458	21.1
Cosmarium depressum (Naegeli) Lund	1458	14.1
Crucigenia quadrata Morren	2916	0.9
Oocystis parva West & West	1458	9.9
Monoraphidium contortum (Thuret in Breb.)	1458	0.1
Oocystis parva West & West	17498	20.3
Oocystis pusilla Hansgirg	17498	16.1
Planktosphaeria gelatinosa G.M. Sm.	5833	12.5
Scenedesmus quadricauda (Turp.) Breb.	5833	3.5
Sphaerocystis Schroeteri Chodat	5833	7.7
Ochromonas vallesiaca Chodat	23331	3.1
Erkenia subaequiciliata Skuja	40829	1.2
Chrysophyte	52494	4.2
Ochromonas sp.	5833	0.4
Rhodomonas minuta Skuja	52494	4.0
Cryptomonas reflexa Skuja	5833	3.8
Cryptomonas Marssonii Skuja	40829	12.4
Cryptomonas erosa v. reflexa Mars.	5833	3.7
Stephanodiscus niagarae Ehr.	51036	3310.2
Synedra acus Kuetzing	1458	0.9
Melosira granulata (Ehr.) Ralfs	11665	53.6
Melosira granulata (var. 2)	56869	576.2
Fragilaria crotonensis Kitton	26247	24.9
Melosira granulata v. angustissima	7291	16.6
Cymatopleura solea	1458	116.4
Synedra sp.	1458	1.5
Asterionella formosa Hassall	1458	6.6
Cyclotella comta (Ehr.) Kuetz.	17498	173.2
Cyclotella comta (Ehr.) Kuetz.	5833	18.3
Cyclotella comta (Ehr.) Kuetz.	11665	195.3
Cymbella sp.	5833	1.8
Stephanodiscus niagarae Ehr.	17498	1974.2
Urotricha sp.	11665	20.0
Vorticella sp.	1458	23.3

Bottom

Taxon	Cells/L	biomass mg/m³
Coccomyxa minor v. gallica Bourr.	4252053	235.8
Microcystis incerta Lemm.	24060	35.9
Chroococcus limneticus Lemm.	4375	6.3
Aphanocapsa delicatissima W.&W.	10936	4.8
Aphanizomenon flos-aquae Ralfs	24060	46.0
Oscillatoria limnetica Lemm.	6562	2.8
Anabaena spiroides Klebs	2187	8.5
Microcystis aeruginosa Kuetz.	4375	38.2
Aphanocapsa elachista v. conferta W.&W.	2187	3.7
Staurastrum longiradiatum W. & G.S. Smith	2187	37.2
Elakatothrix lacustris	2187	0.3
Closterium aciculare (Tuffen) West	2187	3.9
Crucigenia quadrata Morren	2187	0.5
Pandorina morum (Mueller) Bory	6562	19.9
Gloetilia sp.1	6562	6.0
Stephanodiscus niagarae Ehr.	26247	2278.6
Pennate diatom	4375	0.6
Navicula radiosa Kuetzing	4375	13.6
Urotricha sp.	2187	6.7
Synedra sp.	4375	3.2
Melosira granulata (var. 2)	45933	276.1
Fragilaria crotonensis Kitton	10936	180.0
Melosira granulata v. angustissima	8749	17.8
Melosira crenulata	6562	33.2
Synedra sp.	6562	2.7
Melosira granulata (var. 1)	17498	77.1
Melosira granulata (var. 3)	2187	93.8
Asterionella formosa Hassall	2187	1.9
Aphanocapsa delicatissima W.&W.	69993	3.5
Gomphosphaeria lacustris Chodat	17498	22.3
Chroococcus limneticus Lemm.	17498	18.5
Microcystis incerta Lemm.	192480	154.2
Aphanocapsa elachista W. & G.S. Smith	69993	15.5
Gomphosphaeria lacustris v. compacta Lemm	17498	26.5
Monoraphidium contortum (Thuret in Breb.)	17498	0.5
Scenedesmus quadricauda (Turp.) Breb.	17498	1.8
Oocystis pusilla Hansgirg	34996	6.1
Pandorina morum (Mueller) Bory	34996	14.5
Crucigenia quadrata Morren	34996	68.8
Erkenia subaequiciliata Skuja	209978	7.1
Monosiga varians Skuja	17498	0.6
Chrysophyte	34996	2.4
Bicoeca ainkkias Jarnefelt	17498	1.6
Chrysophyte	34996	4.6
Chrysophyte	17498	3.4
Katablepharis ovalis Skuja	17498	1.2
Cryptomonas ovata Erh.	17498	18.6
Cryptomonas erosa Erh.	52494	33.1
Rhodomonas minuta Skuja	52494	2.9
Cryptomonas reflexa Skuja	17498	7.4
Cyclotella comta (Ehr.) Kuetz.	34996	290.5
Cyclotella comta (Ehr.) Kuetz.	34996	606.1
Cyclotella sp.	17498	2.3
Ciliate	17498	68.3
Cyclotella sp.	17498	11.9
Synedra sp.	17498	2.9
Achnanthes sp.	17498	2.8

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

October 4,1992

Surface

Taxon	Cells/L	biomass mg/m³
Microcystis incerta Lemm.	37184	24.4
Anabaena flos-aquae (Lyngbye) Breb.	2187	1.4
Aphanizomenon flos-aquae Ralfs	32809	85.1
Oscillatoria limnetica Lemm.	10936	14.2
Chroococcus limneticus Lemm.	6562	38.1
Aphanocapsa elachista W. & G.S. Smith	2187	6.6
Microcystis aeruginosa Kuetz.	2187	5.6
Gomphosphaeria lacustris Chodat	8749	6.1
Gomphosphaeria lacustris Chodat	26247	26.4
Gomphosphaeria lacustris v. compacta Lemm	69993	94.1
Microcystis incerta Lemm.	52494	8.7
Aphanocapsa delicatissima W.&W.	17498	1.3
Staurastrum chaetoceras (Schroeder) G.M.	2187	34.8
Elakatothrix lacustris	2187	0.1
Staurastrum longiradiatum W. & G.S. Smith	2187	14.5
Mougeotia sp.	2187	4.4
Pandorina morum (Mueller) Bory	4375	9.2
Closterium acutum (Lyngbye) Breb.	2187	1.1
Lagerheimia longiseta (Lemm.) Printz	2187	2.1
Staurastrum cuspidatum Breb.	2187	9.1
Gloeocystis planktonica (W.&W.) Lemm.	2187	6.3
Pediastrum duplex v. clathratum (A. Br.)	2187	3.3
Oocystis pusilla Hansgirg	2187	1.7
Elakatothrix lacustris	8749	1.4
Oocystis Borgei Snow	34996	32.3
Oocystis pusilla Hansgirg	8749	6.2
Salpingoeca frequestissima (Zach.) Lemm.	15311	1.8
Bicoeca socialis Lauterborn	17498	0.9
Chrysophyte	61244	4.0
Salpingoeca frequestissima (Zach.) Lemm.	8749	0.2
Bicoeca socialis Lauterborn	26247	1.5
Rhodomonas minuta Skuja	61244	3.7
Stephanodiscus niagarae Ehr.	137798	6450.0
Asterionella formosa Hassall	8749	13.5
Synedra ulna (Nitz.) Ehr.	2187	9.4
Synedra acus v. delicatissima Grun.	2187	3.8
Synedra sp.	17498	4.2
Keratella sp.	2187	601.0
Cymatopleura solea	2187	339.5
Melosira granulata (Ehr.) Ralfs	76554	749.4
Melosira granulata v. angustissima	30622	113.0
Fragilaria crotonensis Kitton	34996	261.7
Synedra acus Kuetzing	4375	2.0
Tabellaria fenestrata (Lygnb.) Kuetz.	8749	51.5
Cyclotella comta (Ehr.) Kuetz.	69993	584.5
Coccomyxa minor v. gallica Bourr.	2204768	105.3
Crucigenia quadrata Morren	8749	1.1
Monoraphidium contortum (Thuret in Breb.)	17498	0.7
Oocystis submarina Lagerheim	8749	2.3
Chrysophyte	52494	2.5
Erkenia subaequiciliata Skuja	34996	1.5
Salpingoeca frequestissima (Zach.) Lemm.	34996	3.1
Katablepharis ovalis Skuja	8749	1.5
Cryptomonas erosa Erh.	8749	5.3
Pennate diatom	8749	35.6
Cyclotella sp.	8749	1.0
Cyclotella comta (Ehr.) Kuetz.	8749	263.9
Stephanodiscus niagarae Ehr.	8749	319.3
Achnanthes sp.	8749	0.7
Achnanthes sp.	8749	0.4
Ciliate	8749	29.7

Bottom

Taxon	Cells/L	biomass mg/m³
Coccomyxa minor v. gallica Bourr.	3184665	55.5
Aphanothece castagnei (Breb.) Kabenhorst	8749	15.3
Microcystis incerta Lemm.	17498	12.8
Gloetilia sp.1	2187	1.9
Bicoeca socialis Lauterborn	13124	0.9
Stephanodiscus niagarae Ehr.	85304	4756.5
Fragilaria crotonensis Kitton	41558	222.6
Asterionella formosa Hassall	6562	26.2
Tabellaria fenestrata (Lygnb.) Kuetz.	8749	51.5
Melosira granulata (var. 2)	100614	750.1
Anabaena flos-aquae (Lyngbye) Breb.	24060	37.8
Oscillatoria limnetica Lemm.	2188	1.2
Oscillatoria tenuis Ag.	2188	4.0
Microcystis aeruginosa Kuetz.	2188	10.2
Microcystis incerta Lemm.	43745	2.0
Chroococcus limneticus Lemm.	8749	0.9
Radiocystis geminata Skuja	17498	2.2
Monoraphidium contortum (Thuret in Breb.)	17498	0.5
Crucigenia quadrata Morren	17498	5.2
Oocystis Borgei Snow	17498	7.0
Elakatothrix lacustris	8749	0.7
Oocystis parva West & West	17498	16.0
Dinobryon bavaricum Imhof	2188	0.5
Bicoeca socialis Lauterborn	201229	10.5
Chrysophyte	8749	3.3
Chrysophyte	8749	4.6
Erkenia subaequiciliata Skuja	8749	0.4
Rhodomonas minuta Skuja	8749	0.3
Synedra ulna (Nitz.) Ehr.	2188	9.7
Pennate diatom	2188	1.0
Nitzschia palea (Kuetz.)	2188	0.6
Nitzschia sp. Hassall	2188	0.5
Synedra sp.	19686	2.5
Synedra acus Kuetzing	6562	6.3
Stephanodiscus niagarae Ehr.	17498	462.0
Cyclotella comta (Ehr.) Kuetz.	26247	338.7
Cyclotella comta (Ehr.) Kuetz.	61244	638.1
Cyclotella sp.	8749	9.4
Vorticella sp.	17498	25.5
Urotricha sp.	17498	30.7

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

January 28, 1993

Surface

Taxon	Cells/L	biomass mg/m^3
Aphanizomenon flos-aquae Ralfs	45933	113.2
Gomphosphaeria lacustris v. compacta Lemm	2187	1.7
Aphanothece clathrata G.S. West in W.&W.	2187	3.2
Anabaena spiroides Klebs	2187	2.1
Coelosphaerum Naegelianum Unger	8749	12.0
Lyngbya limnetica Lemm.	4375	1.5
Chroococcus dispersus v. minor G.M. Sm.	8749	0.5
Closterium longissima v. tropica W.&W.	2187	12.5
Monoraphidium contortum (Thuret in Breb.)	34996	1.1
Lagerheimia genevensis Skuja	8749	0.1
Kirchneriella obesa v. major (Bernard) G.	8749	1.8
Coccomyxa minor v. gallica Bourr.	2082281	86.6
Chrysophyte	8749	0.6
Erkenia subaequiciliata Skuja	52494	2.6
Chrysidalis peritaphrena Schill.	8749	0.6
Rhodomonas minuta Skuja	236225	20.2
Cryptomonas erosa Erh.	8749	13.6

Bottom

Taxon	Cells/L	biomass mg/m^3
Anabaena circinalis Rabenhorst	2187	47.7
Gomphosphaeria lacustris v. compacta Lemm	13124	20.4
Aphanocapsa pulchra (Kuetz.) Rabenhorst	2187	8.0
Aphanizomenon flos-aquae Ralfs	6562	7.0
Lyngbya limnetica Lemm.	6562	4.3
Coelosphaerum Naegelianum Unger	10936	49.2
Aphanocapsa delicatissima W.&W.	8749	0.1
Chroococcus dispersus (Keiss.) Lemm.	8749	1.2
Staurastrum chaetoceras (Schroeder) G.M.	2187	4.6
Mougeotia sp.	8749	11.1
Closterium aciculare (Tuffen) West	2187	2.6
Lagerheimia longiseta (Lemm.) Printz	2187	5.0
Lagerheimia genevensis Skuja	8749	0.2
Coccomyxa minor v. gallica Bourr.	2231015	125.7
Scenedesmus quadracauda v. parvus G.M.Sm	8749	4.4
Oocystis submarina v. variabilis Skuja	8749	4.9
Erkenia subaequiciliata Skuja	8749	0.3
Chrysophyte	244974	19.1
Ochromonas sp.	17498	1.8
Ochromonas sp.	8749	1.3
Bicoeca lacustris Clark	26247	1.7
Katablepharis ovalis Skuja	34996	3.6
Rhodomonas minuta Skuja	17498	1.3
Gymnodinium helveticum v. achroum Penard	6562	31.6
Stephanodiscus niagarae Ehr.	6562	221.0
Tabellaria fenestrata (Lygnb.) Kuetz.	2187	8.4
Cyclotella comta (Ehr.) Kuetz.	37184	381.2
Cyclotella comta (Ehr.) Kuetz.	10936	40.6
Melosira granulata (Ehr.) Ralfs	2187	7.6
Fragilaria crotonensis Kitton	6562	15.5
Centric diatom (15µm)	8749	9.3
Ciliate	8749	5.5
Mesodinium sp.	2187	8.2
Strobilidium sp.	2187	4.8

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

March 26, 1993

Surface

Taxon	Cells/L	biomass mg/m^3
Ankistrodesmus falcatus v. mirabilis West	6562	0.5
Coelosphaerum Naegelianum Unger	6562	8.2
Aphanizomenon flos-aquae Ralfs	354338	1210.7
Gleocapsa aeruginosa (Carm.) Kutz.	6562	27.0
Oscillatoria amphigranulata Van Goor	6562	11.5
Lyngbya limnetica Lemm.	19685	10.0
Aphanocapsa delicatissima W.&W.	52494	3.7
Closterium aciculare (Tuffen) West	6562	4.2
Mougeotia sp.	6562	6.7
Monoraphidium contortum (Thuret in Breb.)	209978	6.2
Scenedesmus quadricauda (Turp.) Breb.	52494	9.9
Coccomyxa minor v. gallica Bourr.	18688030	1052.9
Erkenia subaequiciliata Skuja	1049890	30.5
Chrysidalis peritaphrena Schill.	157483	17.8
Ochromonas vallesiaca Chodat	157483	16.9
Rhodomonas minuta Skuja	262472	28.0
Katablepharis ovalis Skuja	52494	3.5
Cryptomonas erosa v. reflexa Mars.	52494	17.6
Peridinium inconspicuum Lemm.	52494	467.0
Synedra delicatissima v. angustissima Gru	19685	30.1
Stephanodiscus niagarae Ehr.	6562	390.2
Fragilaria crotonensis Kitton	39371	16.1
Melosira granulata (Ehr.) Ralfs	6562	22.3
Centric diatom (9µm)	52494	14.9
Centric diatom (10µm)	52494	14.9
Gomphonema sp.	52494	24.2
Urotricha sp.	52494	44.0

Bottom

Taxon	Cells/L	biomass mg/m^3
Microcystis aeruginosa Kuetz.	2187	22.0
Aphanocapsa delicatissima W.&W.	2187	3.0
Lyngbya limnetica Lemm.	10936	1.7
Lyngbya sp.	24060	4.0
Aphanizomenon flos-aquae Ralfs	6562	5.0
Gomphosphaeria lacustris v. compacta Lemm	2187	3.8
Cyanophyte	26247	2.5
Rhabdoderma irregularis (Nau.) Geitler	26247	1.8
Monoraphidium setiformis (Nygaard) Komark	2187	0.1
Chlorophyta	2187	4.6
Ankistrodesmus falcatus v. mirabilis West	2187	0.2
Crucigenia quadrata Morren	8749	0.9
Coccomyxa minor v. gallica Bourr.	6378079	225.0
Monoraphidium contortum (Thuret in Breb.)	43745	1.0
Gloetilia sp.1	8749	5.2
Staurastrum chaetoceras (Schroeder) G.M.	8749	9.2
Rhabodomonas tortuosum v. playfairii (Bou	2187	0.7
Distigma proteus Ehr.	2187	9.5
Euglena acus Ehr.	2187	8.3
Ochromonas sp.	8749	2.3
Chrysophyte	87491	11.4
Chrysophyte	26247	1.7
Chrysophyte	26247	33.3
Chrysophyte	17498	7.6
Cryptomonas ovata Erh.	8749	14.5
Rhodomonas minuta Skuja	507447	58.8
Katablepharis ovalis Skuja	96240	8.5
Cryptomonas erosa Erh.	26247	29.5
Cryptomonas rostratiformis Skuja	8749	74.2
Gymnodinium varians Skuja	8749	16.2
Amphidinium luteum	166233	87.9
Tabellaria fenestrata (Lygnb.) Kuetz.	2187	4.1
Synedra acus Kuetzing	2187	0.9
Stephanodiscus astrea (Ehr.) Grun.	10936	454.4
Synedra delicatissima v. angustissima Gru	2187	3.1
Pennate diatom	2187	7.6
Melosira granulata (Ehr.) Ralfs	170607	334.1
Fragilaria crotonensis Kitton	4375	17.5
Melosira granulata v. angustissima	2187	1.8
Cyclotella sp.	227476	33.9
Centric diatom (20µm)	17498	54.7
Pennate diatom	8749	14.1
Cyclotella comta (Ehr.) Kuetz.	43745	587.8
Melosira distans	17498	63.3
Ciliate	17498	24.0
Urotricha sp.	17498	13.9
Urotricha sp.	26247	54.9

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

May 21, 1993

Surface

Taxon	Cells/L	biomass mg/m^3
Aphanocapsa delicatissima W.&W.	13124	15.4
Aphanizomenon flos-aquae Ralfs	13124	11.5
Chroococcus limneticus Lemm.	4375	6.1
Anabaena flos-aquae (Lyngbye) Breb.	4375	7.2
Gomphosphaeria lacustris v. compacta Lemm	13124	6.2
Aphanothece nidulans Richter	4375	3.2
Aphanocapsa elachista W. & G.S. Smith	4375	3.7
Chroococcus dispersus (Keiss.) Lemm.	8749	3.0
Pediastrum Boryanum (Turp.) Menegh.	4375	44.0
Monoraphidium setiformis (Nygaard) Komark	13124	2.3
Coccomyxa minor v. gallica Bourr.	297469	4.6
Golenkia radiata (Chod.) Wille	26247	10.0
Coccomyxa minor v. gallica Bourr.	104989	2.2
Monoraphidium contortum (Thuret in Breb.)	8749	0.2
Scenedesmus quadricauda (Turp.) Breb.	8749	1.3
Chrysocapsa planctonica (West & West) Pas	4375	0.3
Dinobryon sociale Ehr.	139985	36.2
Mallomonas pumilio v. canadensis Holgren	4375	7.7
Chrysophyte	8749	2.3
Dinobryon sp. (loose monad)	61244	15.1
Erkenia subaequiciliata Skuja	1041140	31.3
Kephyrion littorale Lund	69993	4.6
Dinobryon sp. (loose monad)	8749	7.9
Chrysophyte	17498	53.4
Desmarella sp.	17498	0.5
Chrysidalis peritaphrena Schill.	61244	1.9
Ochromonas globosa Skuja	61244	8.8
Cryptomonas ovata Erh.	4375	5.9
Cryptomonas erosa Erh.	30622	67.2
Cryptomonas rostratiformis Skuja	8749	19.8
Cryptomonas reflexa Skuja	17498	13.8
Cryptomonas Marssonii Skuja	17498	8.3
Rhodomonas minuta Skuja	174982	7.9
Katablepharis ovalis Skuja	52494	3.7
Rhodomonas lens	8749	4.1
Gymnodinium helveticum v. achroum Penard	8749	89.8
Peridinium Willei Huitfeldt-Kaas	4375	309.2
Gymnodinium ordinatum Skuja	4375	5.4
Peridinium pusillum (Penard) Lemm.	8749	20.9
Gymnodinium sp.	8749	23.5
Gymnodinium helveticum v. achroum Penard	8749	86.9
Gymnodinium ordinatum Skuja	34996	36.9
Cyclotella comta (Ehr.) Kuetz.	126862	2331.4
Synedra sp. 7R	26247	4.5
Melosira islandica	4375	17.0
Stephanodiscus niagarae Ehr.	131236	6809.5
Melosira granulata (Ehr.) Ralfs	8749	126.9
Synedra sp.	43745	5.1
Surirella sp.	4375	55.0
Centric diatom (27µm)	8749	50.7
Fragilaria crotonensis Kitton	4375	0.8
Centric diatom (10µm)	17498	9.6
Centric diatom (14µm)	8749	10.8
Diatoma tenue Ag.	8749	2.4
Centric diatom (9µm)	8749	2.2
Strombidium sp.1	13124	340.0
Ciliate	26247	86.2
Ciliate	13124	33.4

Bottom

Taxon	Cells/L	biomass mg/m^3
Oscillatoria limnetica Lemm.	4375	1.2
Sphaerocystis Schroeteri Chodat	4375	7.7
Golenkia radiata (Chod.) Wille	31497	7.8
Chlorophyta	10499	1.6
Coccomyxa minor v. gallica Bourr.	4934481	302.2
Tetraedron minumum (A. Braun) Hansgirg	10499	3.8
Pseudokephryion attenuatum Hilliard	4375	1.8
Dinobryon sociale Ehr.	34996	3.8
Dinobryon bavaricum Imhof	4375	0.5
Erkenia subaequiciliata Skuja	209978	9.5
Mallomonas pumilio v. canadensis Holgren	10499	23.7
Rhodomonas minuta Skuja	20998	1.6
Cryptomonas pyrenoidifera Geitler	10499	5.2
Cryptomonas erosa Erh.	20998	17.8
Cryptomonas erosa v. reflexa Mars.	10499	17.3
Chroomonas breviculata Nygaard	20998	3.0
Gymnodinium helveticum v. achroum Penard	13124	179.3
Peridinium Willei Huitfeldt-Kaas	8749	562.2
Peridinium pusillum (Penard) Lemm.	4375	14.5
Cryptomonas rostratiformis Skuja	4375	22.3
Stephanodiscus niagarae Ehr.	56869	2865.3
Cyclotella comta (Ehr.) Kuetz.	26247	156.7
Fragilaria crotonensis Kitton	17498	219.9
Synedra sp. Ehr.	4375	0.2
Cymatopleura solea	4375	169.6
Cyclotella comta (Ehr.) Kuetz.	8749	80.8
Synedra sp. Ehr.	13124	0.9
Melosira granulata (Ehr.) Ralfs	4375	11.5
Nitzschia sp. Hassall	4375	5.4
Melosira granulata (Ehr.) Ralfs	13124	120.9
Gomphonema sp.	10499	5.3
Ciliate	4375	3.1
Ciliate	21873	35.5
Ciliate	4375	2.5
Ciliate	4375	4.4

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

June 19,1993

Surface

Taxon	Cells/L	biomass mg/m^3
Gomphosphaeria lacustris v. compacta Lemm	15748	19.6
Aphanocapsa elachista W. & G.S. Smith	2625	2.2
Aphanothece nidulans Richter	36746	46.2
Aphanocapsa delicatissima W.&W.	23623	4.1
Aphanizomenon flos-aquae Ralfs	2625	1.4
Coelosphaerum Naegelianum Unger	2625	13.5
Oscillatoria granulata Gardner	2625	3.6
Chroococcus dispersus v. minor G.M. Sm.	20998	3.5
Chlorophyta	2625	0.9
Staurastrum longiradiatum W. & G.S. Smith	2625	12.3
Oocystis Borgei Snow	10499	17.1
Elakatothrix lacustris	13124	0.4
Oocystis Borgei Snow	2625	2.3
Coccomyxa minor v. gallica Bourr.	997395	26.0
Elakatothrix lacustris	10499	0.9
Lagerheimia ciliata (Lag.) Chodat	10499	7.9
Oocystis parva West & West	10499	5.5
Dinobryon sociale Ehr.	5249	0.7
Mallomonas pumilio v. canadensis Holgren	15748	52.7
Ochromonas globosa Skuja	62993	29.8
Erkenia subaequiciliata Skuja	745422	20.3
Desmarella sp.	20998	0.4
Cryptomonas erosa v. reflexa Mars.	13124	12.9
Cryptomonas Marssonii Skuja	5249	3.0
Cryptomonas curvata Ehr.	2625	14.8
Cryptomonas erosa Erh.	20998	16.0
Rhodomonas minuta Skuja	52494	3.0
Katablepharis ovalis Skuja	20998	1.8
Stephanodiscus astrea (Ehr.) Grun.	7874	192.1
Stephanodiscus niagarae Ehr.	26247	2522.4
Nitzschia sp. Hassall	2625	1.8
Cyclotella comta (Ehr.) Kuetz.	20998	232.8
Pennate diatom	2625	1.3
Fragilaria crotonensis Kitton	23623	85.8
Centric diatom (27µm)	2625	4.9
Rhiocosphenia curvata (Kuetz.) Grun.	5249	2.6
Cyclotella comta (Ehr.) Kuetz.	10499	57.7
Gomphonema sp.	2625	0.7
Amphora sp.	2625	3.6
Navicula sp.	5249	2.5
Centric diatom (5µm)	10499	0.8
Centric diatom (23µm)	10499	19.5
Centric diatom (8µm)	20998	4.4
Ciliate	31497	64.9
Ciliate	15748	26.1
Keratella sp.	5249	721.3
Ciliate	10499	31.7
Ciliate	5249	74.7

Bottom

Taxon	Cells/L	biomass mg/m^3
Gomphosphaeria lacustris v. compacta Lemm	15748	21.5
Oscillatoria granulata Gardner	2625	6.2
Aphanothece nidulans Richter	41996	47.3
Tetraedron minimum (A. Braun) Hansgirg	10499	14.0
Scenedesmus quadricauda (Turp.) Breb.	7874	2.6
Staurastrum curvatum W. West	5249	821.3
Gloetilia sp.1	5249	12.2
Dictyosphaerium pulchellum Wood	10499	11.0
Coccomyxa minor v. gallica Bourr.	813664	21.2
Gloetilia sp.1	10499	4.7
Crucigenia quadrata Morren	10499	0.8
Selenastrum minutum (Naegeli) Collins	26247	3.0
Oocystis parva West & West	26247	10.7
Dinobryon petiolatum Willena	15748	0.8
Chrysophyte	5249	9.7
Mallomonas pseudocornata Prescott	10499	23.7
Erkenia subaequiciliata Skuja	152234	2.9
Chrysophyte	26247	2.2
Chrysophyte	26247	1.1
Bicoeca lacustris Clark	141735	5.2
Cryptomonas erosa Erh.	13124	3.7
Cryptomonas erosa v. reflexa Mars.	34121	19.5
Cryptomonas Marssonii Skuja	5249	1.1
Rhodomonas minuta Skuja	52494	3.5
Katablepharis ovalis Skuja	89241	5.5
Ceratium hirundinella (Mueller) Schrank	5249	228.7
Stephanodiscus niagarae Ehr.	52494	2166.8
Cyclotella comta (Ehr.) Kuetz.	62993	661.2
Stephanodiscus astrea (Ehr.) Grun.	36746	403.5
Nitzschia sp. Hassall	5249	1.4
Fragilaria crotonensis Kitton	10499	51.9
Melosira granulata (Ehr.) Ralfs	5249	8.0
Melosira granulata (Ehr.) Ralfs	13124	73.2
Synedra sp.	18373	6.2
Centric diatom (9µm)	10499	2.0
Ciliate	57744	135.9

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

July 15,1993

Surface

Taxon	Cells/L	biomass mg/m^3
Aphanothece clathrata G.S. West in W.&W.	2734	1.1
Cyanophyte	112098	20.1
Cyanophyte	10936	0.5
Aphanothece microspora Naeg.	4101	39.0
Sphaerobotyrs fluviatilis Butcher	2734	2.4
Coccomyxa minor v. gallica Bourr.	472997	12.1
Sphaerobotyrs fluviatilis Butcher	54682	4.5
Melosira distans v. lirata	12303	11.2
Achnanthes sp.	1367	0.2
Pennate diatom	1367	0.2
Diatoma tenue Ag.	1367	2.9
Pennate diatom	1367	0.4

Bottom

Taxon	Cells/L	biomass mg/m^3
Gloetilia sp.1	7874	21.8
Chroococcus limneticus Lemm.	5249	18.9
Oscillatoria minima Gicklhorn	15748	6.0
Aphanothece nidulans Richter	86616	90.5
Aphanocapsa delicatissima W.&W.	57744	22.9
Gomphosphaeria lacustris v. compacta Lemm	31497	13.7
Gleocapsa punctata Naegeli	26247	22.0
Aphanocapsa elachista W. & G.S. Smith	5249	4.2
Coccomyxa minor v. gallica Bourr.	572190	19.2
Merismopedia tenuissima Lemm.	10499	0.1
Staurastrum chaetoceras (Schroeder) G.M.	10499	8.0
Oocystis Borgei Snow	10499	20.3
Sphaerocystis Schroeteri Chodat	15748	9.1
Pediastrum Boryanum (Turp.) Menegh.	5249	38.2
Tetraedron caudatum (Corda) Hansgirg	5249	9.9
Staurastrum longiradiatum W. & G.S. Smith	5249	41.8
Crucigenia quadrata Morren	10499	10.3
Elakatothrix lacustris	15748	1.1
Sphaerocystis Schroeteri Chodat	10499	4.7
Oocystis parva West & West	83991	16.5
Crucigenia quadrata Morren	20998	6.7
Pandorina morum (Mueller) Bory	10499	11.3
Chrysidalis peritaphrena Schill.	20998	0.8
Ochromonas sp.	120737	6.2
Chrysophyte	83991	2.8
Salpingoeca frequestissima (Zach.) Lemm.	31497	0.6
Bicoeca socialis Lauterborn	31497	1.3
Erkenia subaequiciliata Skuja	52494	1.2
Chrysophyte	52494	3.5
Chrysophyte	47245	2.4
Chrysophyte	15748	1.0
Bicoeca lacustris Clark	20998	1.6
Chrysophyte	15748	8.2
Cryptomonas rostratiformis Skuja	5249	9.5
Strombidium sp.1	5249	2.7
Cryptomonas erosa Erh.	5249	5.6
Rhodomonas minuta Skuja	78742	4.5
Katablepharis ovalis Skuja	41996	3.0
Gymnodinium ordinatum Skuja	10499	6.6
Stephanodiscus niagarae Ehr.	125987	7930.1
Fragilaria crotonensis Kitton	47245	375.1
Stephanodiscus astrea (Ehr.) Grun.	36746	214.1
Nitzschia sp. Hassall	5249	13.3
Cyclotella comta (Ehr.) Kuetz.	52494	424.7
Melosira granulata (Ehr.) Ralfs	89241	459.1
Centric diatom (14µm)	2625	3.0
Asterionella formosa Hassall	52494	135.4
Rhizosolenia longiseta Zach.	5249	4.3
Centric diatom (8µm)	10499	3.2
Ciliate	2625	2.4
Ciliate	2625	4.4
Ciliate	20998	106.7
Strombidium sp.1	5249	55.0
Ciliate	26247	25.7
Ciliate	36746	74.4

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

August 13,1993

Surface

Taxon	Cells/L	biomass mg/m^3
Oscillatoria limnetica Lemm.	69993	147.7
Aphanocapsa elachista v. conferta W.&W.	4375	1.4
Aphanothece nidulans Richter	21873	14.8
Gomphosphaeria lacustris v. compacta Lemm	74367	51.9
Aphanozomenon flos-aquae Ralfs	122487	138.8
Aphanothece clathrata G.S. West in W.&W.	21873	20.2
Anabaena spiroides Klebs	13124	75.4
Coelosphaerum Naegelianum Unger	4375	44.0
Aphanocapsa elachista W. & G.S. Smith	17498	7.7
Chroococcus limneticus Lemm.	8749	8.8
Aphanocapsa delicatissima W.&W.	91865	10.8
Oscillatoria limnetica Lemm.	8749	0.6
Aphanocapsa delicatissima W.&W.	61244	1.1
Gomphosphaeria aponica Kuetz.	8749	7.0
Microcystis incerta Lemm.	17498	1.9
Staurastrum longiradiatum W. & G.S. Smith	4375	20.0
Coenocystis subcylindrica Korschikov	4375	3.0
Sphaerobotyrs fluviatilis Butcher	8749	8.9
Crucigenia crucifera (Wolle) Collins	4375	3.6
Oocystis submarina Lagerheim	4375	2.5
Elakatothrix lacustris	8749	0.2
Sphaerocystis Schroeteri Chodat	4375	5.6
Pediastrum Boryanum (Turp.) Menegh.	4375	260.1
Coccomyxa minor v. gallica Bourr.	349963	9.0
Cosmarium depressum v. achondrum	8749	19.0
Oocystis pusilla Hansgirg	17498	1.2
Sphaerobotyrs fluviatilis Butcher	26247	4.0
Oocystis parva West & West	17498	4.1
Kirchneriella subsolitaria West	8749	6.2
Sphaerocystis Schroeteri Chodat	8749	3.3
Crucigenia quadrata Morren	17498	3.3
Mallomonas pseudocornata Prescott	4375	11.7
Erkenia subaequiciliata Skuja	34996	0.7
Chrysophyte	8749	1.0
Chrysophyte	26247	1.6
Chrysophyte	34996	0.3
Golenkia radiata (Chod.) Wille	8749	2.3
Chrysophyte	8749	0.5
Chrysophyte	8749	2.3
Chrysophyte	122487	3.5
Cyanomonas americana (Davis) Oltmanns	8749	0.2
Cryptomonas erosa Erh.	21873	29.2
Cryptomonas erosa v. reflexa Mars.	17498	9.2
Cryptomonas Marssonii Skuja	8749	3.7
Rhodomonas minuta Skuja	139985	8.5
Cryptomonas erosa Erh.	26247	18.1
Ceratium hirundinella (Mueller) Schrank	21873	7884.5
Phacus caudatus Hubner	4375	172.0
Fragilaria crotonensis Kitton	21873	47.2
Melosira distans v. lirata	4375	3.1
Tabellaria fenestrata (Lyn.) Kuetz.	4375	14.5
Pennate diatom	4375	2.9
Melosira distans v. lirata	8749	15.8
Melosira granulata (Ehr.) Ralfs	17498	110.6
Stephanodiscus niagarae Ehr.	34996	3010.1
Pennate diatom	4375	0.6
Cyclotella meneghiniana Kuetz.	4375	28.3
Synedra acus v. delicatissima Grun.	4375	22.4
Centric diatom (20µm)	17498	60.1
Cyclotella comta (Ehr.) Kuetz.	4375	47.1
Centric diatom (14µm)	8749	8.8
Keratella sp.	4375	632.1
Ciliate	4375	79.7
Ciliate	4375	11.1
Ciliate	8749	21.1

Bottom

Taxon	Cells/L	biomass mg/m^3
Oscillatoria limnetica Lemm.	34996	15.1
Aphanothece nidulans Richter	13124	2.6
Aphanizomenon flos-aquae Ralfs	65618	66.8
Gomphosphaeria lacustris v. compacta Lemm	43745	42.9
Aphanocapsa delicatissima W.&W.	139985	14.7
Aphanocapsa elachista W. & G.S. Smith	8749	2.4
Anabaena spiroides Klebs	21873	48.6
Microcystis aeruginosa Kuetz.	8749	38.1
Gomphosphaeria lacustris v. compacta Lemm	8749	0.4
Aphanocapsa delicatissima W.&W.	61244	1.6
Chroococcus limneticus Lemm.	8749	5.0
Aphanothece nidulans Richter	8749	0.3
Oocystis solitaria Wittrock	4375	4.3
Chroococcus limneticus Lemm.	8749	10.1
Staurastrum chaetoceras (Schroeder) G.M.	4375	3.3
Tetraedron minimum (A. Braun) Hansgirg	8749	4.4
Oocystsis Borgei Snow	8749	6.5
Gloetilia sp.1	4375	4.3
Sphaerocystis Schroeteri Chodat	4375	10.0
Kirchneriella subsolitaria West	4375	6.8
Coccomyxa minor v. gallica Bourr.	498698	9.4
Crucigenia quadrata Morren	34996	3.9
Oocystis parva West & West	8749	3.8
Chlorophyta	17498	12.2
Oocystis pusilla Hansgirg	8749	5.4
Oocystis parva West & West	8749	3.2
Coccomyxa minor Skuja	96240	1.0
Mallomonas pseudocornata Prescott	4375	14.4
Salpingoeca frequestissima (Zach.) Lemm.	21873	1.1
Chrysophyte	17498	0.6
Salpingoeca frequestissima (Zach.) Lemm.	8749	0.1
Chrysophyte	17498	2.5
Erkenia subaequiciliata Skuja	8749	0.2
Chrysophyte	17498	1.4
Chrysophyte	8749	0.2
Stichogloea Doederleinii (Schmidle) Wille	43745	147.1
Chrysophyte	61244	1.2
Bicoeca lacustris Clark	26247	1.0
Cryptomonas erosa Erh.	26247	18.1
Katablepharis ovalis Skuja	34996	2.2
Rhodomonas minuta Skuja	26247	1.3
Cryptomonas Marssonii Skuja	8749	2.9
Cryptomonas erosa v. reflexa Mars.	8749	2.1
Ceratium hirundinella (Mueller) Schrank	13124	1396.8
Stephanodiscus niagarae Ehr.	30622	1644.6
Asterionella formosa Hassall	4375	2.0
Centric diatom (25µm)	4375	24.9
Centric diatom (20µm)	4375	14.6
Melosira granulata (Ehr.) Ralfs	4375	53.9
Centric diatom (30µm)	8749	97.1
Melosira distans v. lirata	4375	2.9
Fragilaria crotonensis Kitton	8749	60.2
Fragilaria sp. Lyngb.	4375	18.5
Centric diatom (10µm)	8749	3.9
Centric diatom (6µm)	8749	1.0
Centric diatom (22µm)	8749	46.6
Centric diatom (8µm)	8749	1.8
Ciliate	4375	16.5
Vorticella sp.	4375	53.9
Ciliate	8749	6.4
Ciliate	8749	4.9

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

September 17,1993

Surface

Taxon	Cells/L	biomass mg/m^3
Gomphosphaeria lacustris v. compacta Lemm	69993	88.4
Aphanothece clathrata v. brevis Bachmann	17498	43.3
Aphanizomenon flos-aquae Ralfs	52494	51.5
Merismopedia punctata Meyen.	8749	0.4
Aphanocapsa delicatissima W.&W.	96240	6.5
Aphanothece nidulans Richter	8749	10.4
Oscillatoria limnetica Lemm.	8749	5.5
Pelogloea bacillifera Lauterborn	26247	9.0
Anabaena spiroides Klebs	8749	197.9
Chroococcus limneticus Lemm.	17498	3.7
Cyanophyte	52494	3.9
Closterium aciculare (Tuffen) West	8749	15.0
Gloeocystis planktonica (W.&W.) Lemm.	8749	38.7
Gloetilia sp.1	8749	21.8
Spondylosium planum (Wolle) W. & G.S. West	8749	56.3
Dictyosphaerium pulchellum Wood	17498	100.6
Cryptomonas erosa Erh.	17498	22.0
Coccomyxa minor v. gallica Bourr.	9518997	807.4
Crucigenia quadrata Morren	17498	2.1
Chlorophyta	17498	2.0
Oocystis Borgei Snow	17498	12.8
Elakatothrix lacustris	17498	1.5
Mallomonas elongata Reverdin	8749	17.6
Erkenia subaequiciliata Skuja	122487	2.3
Cryptomonas ovata Erh.	17498	31.7
Cryptomonas Marssonii Skuja	8749	2.9
Cryptomonas erosa Erh.	8749	5.1
Rhodomonas minuta Skuja	69993	6.5
Cryptomonas Marssonii Skuja	17498	3.8
Cyclotella comta (Ehr.) Kuetz.	61244	396.8
Stephanodiscus niagarae Ehr.	236225	10857.7
Nitzschia sp. Hassall	8749	1.4
Fragilaria sp. Lyngb.	174982	912.0
Rhizosolenia longiseta Zach.	17498	1.5
Fragilaria crotonensis Kitton	26247	54.0
Tabellaria fenestrata (Lyngbya) Kuetz.	17498	277.1
Navicula sp.	8749	27.9
Gomphonema sp.	17498	3.8
Centric diatom (18µ)	17498	31.2
Ciliate	8749	4.5
Ciliate	8749	29.7

Bottom

Taxon	Cells/L	biomass mg/m^3
Aphanocapsa delicatissima W.&W.	8749	1.1
Gomphosphaeria lacustris Chodat	8749	7.2
Microcystis aeruginosa Kuetz.	8749	14.3
Aphanocapsa elachista v. conferta W.&W.	17498	4.8
Chroococcus dispersus (Keiss.) Lemm.	8749	4.0
Microcystis incerta Lemm.	122487	44.3
Aphanizomenon flos-aquae Ralfs	43745	28.1
Cyanophyte	559941	6.4
Cyanophyte	17498	0.6
Chroococcus dispersus (Keiss.) Lemm.	17498	0.9
Gomphosphaeria lacustris v. compacta Lemm	43745	28.2
Elakatothrix lacustris	8749	0.9
Oocystis Borgei Snow	26247	38.2
Eudorina elegans Ehr.	17498	75.1
Monoraphidium contortum (Thuret in Breb.)	17498	0.5
Crucigenia quadrata Morren	17498	1.4
Coccomyxa minor v. gallica Bourr.	7611699	548.4
Scenedesmus quadricauda (Turp.) Breb.	17498	3.7
Bicoeca lacustris Clark	96240	4.0
Chromulina sp. Cienkowski	52494	1.2
Cryptomonas erosa Erh.	8749	3.7
Rhodomonas minuta Skuja	17498	0.6
Cryptomonas ovata Erh.	17498	14.7
Ceratium hirundinella (Mueller) Schrank	8749	2000.0
Tabellaria fenestrata (Lyngbya) Kuetz.	8749	79.4
Synedra delicatissima v. angustissima Gru	8749	13.2
Stephanodiscus astrea (Ehr.) Grun.	17498	336.7
Rhiocosphenia curvata (Kuetz.) Grun.	8749	25.4
Melosira granulata (Ehr.) Ralfs	26247	93.7
Stephanodiscus niagarae Ehr.	244974	13511.8
Fragilaria sp. Lyngb.	122487	966.4
Cyclotella comta (Ehr.) Kuetz.	26247	199.5
Asterionella formosa Hassall	8749	3.8
Centric diatom (34µ)	17498	198.6
Ciliate	8749	23.8
Fragilaria crotonensis Kitton	26247	206.2
Centric diatom (8µ)	17498	3.9
Pennate diatom	17498	1.1

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

October 6 ,1993

Surface

Taxon	Cells/L	biomass mg/m^3
Aphanocapsa elachista v. conferta W.&W.	10499	11.1
Chroococcus limneticus Lemm.	10499	61.0
Aphanocapsa delicatissima W.&W.	41996	4.0
Chroococcus dispersus (Keiss.) Lemm.	36746	18.8
Aphanizomenon flos-aquae Ralfs	10499	13.6
Oscillatoria minima Gicklhorn	5249	0.9
Microcystis incerta Lemm.	162733	92.2
Microcystis incerta Lemm.	5249	219.8
Gomphosphaeria lacustris v. compacta Lemm	78742	57.5
Oscillatoria limnetica Lemm.	20998	24.4
Anabaena spiroides Klebs	5249	84.8
Aphanothece nidulans Richter	31497	12.9
Chromulina sp. Cienkowski	41996	0.9
Cyanophyte	136486	1.9
Cyanophyte	31497	2.1
Ankistrodesmus setigens (Schroed.) G.S. West	5249	0.2
Botryococcus braunii Kuetz.	5249	46.7
Gloetilia sp.1	5249	6.7
Oocystis Borgei Snow	10499	11.8
Dictyosphaerium elegans Bachmann	5249	16.9
Crucigenia quadrata Morren	5249	2.5
Sphaerocystis Schroeteri Chodat	20998	27.3
Cosmarium depressum (Naegeli) Lund	5249	47.5
Elakatothrix lacustris	20998	0.8
Tetraedron minimum (A. Braun) Hansgirg	20998	3.6
Eudorina elegans Ehr.	10499	37.1
Oocystis Borgei Snow	10499	4.0
Crucigenia quadrata Morren	10499	1.3
Ankistrodesmus setigerus (Schroeder) West	20998	1.1
Erkenia subaequiciliata Skuja	304468	9.2
Salpingoeca frequestissima (Zach.) Lemm.	209978	16.1
Chrysophyte	10499	1.0
Cryptomonas erosa Erh.	5249	11.9
Rhodomonas minuta Skuja	62993	3.0
Cryptomonas Marssonii Skuja	31497	7.1
Katablepharis ovalis Skuja	10499	0.8
Gymnodinium varians Skuja	10499	6.2
Cyclotella Kutzingiana Thwaites	5249	19.1
Asterionella formosa Hassall	5249	4.8
Fragilaria sp. Lyngb.	5249	34.8
Fragilaria crotonensis Kitton	5249	5.9
Stephanodiscus niagarae Ehr.	257223	18615.2
Cyclotella comta (Ehr.) Kuetz.	62993	499.3
Fragilaria sp. Lyngb.	414706	3090.2
Melosira granulata (Ehr.) Ralfs	5249	21.8
Melosira distans v. lirata	10499	18.0
Centric diatom (20µ)	31497	118.7
Centric diatom (7µ)	10499	1.6
Ciliate	5249	5.1
Ciliate	5249	19.8
Vorticella sp	5249	12.7
Ciliate	5249	3.8

Bottom

Taxon	Cells/L	biomass mg/m^3
Oscillatoria limnetica Lemm.	36746	59.5
Microcystis incerta Lemm.	178481	14.5
Gomphosphaeria lacustris v. compacta Lemm	62993	59.4
Oscillatoria sp. Vaucher	5249	1.1
Chroococcus limneticus Lemm.	10499	19.0
Aphanocapsa delicatissima W.&W.	10499	1.1
Aphanothece nidulans Richter	26247	46.7
Oscillatoria tenuis Ag.	10499	17.2
Microcystis aeruginosa Kuetz.	5249	244.4
Coelosphaerium kuetzingianum Naegli	10499	9.9
Cyanophyte	78742	8.9
Chroococcus dispersus (Keiss.) Lemm.	52494	12.3
Cyanophyte	551192	7.8
Spondylosium planum (Wolle) W. & G.S. Wes	5249	8.1
Oocystis Borgei Snow	5249	13.2
Elakatothrix gelatinosa Willen	5249	0.6
Ankistrodesmus setigerus (Schroeder) West	5249	0.2
Oocystis pusilla Hansgirg	5249	7.1
Ulothrix subtillissima Rabenhorst	5249	24.5
Characiopsis pyriformis (A. Braun) Borzi	5249	4.0
Elakatothrix lacustris	15748	0.9
Gloetilia sp.1	15748	35.7
Pediastrum Boryanum (Turp.) Menegh.	10499	14.0
Chlorella vulgaris Beyerinck	5249	2.4
Eudorina elegans Ehr.	5249	18.2
Staurastrum chaetoceras (Schroeder) G.M.	5249	26.7
Coccomyxa minor v. gallica Bourr.	682428	42.9
Oocystis parva West & West	52494	21.4
Sphaerocystis Schroeteri Chodat	26247	13.7
Chlorophyta	288720	24.6
Crucigenia quadrata Morren	52494	5.5
Salpingoeca frequestissima (Zach.) Lemm.	146985	13.5
Chrysophyte	26247	1.0
Chrysophyte	26247	4.0
Bicoeca lacustris Clark	52494	1.1
Erkenia subaequiciliata Skuja	262472	6.3
Chrysophyte	78742	2.3
Chrysophyte	157483	12.4
Chromulina sp. Cienkowski	52494	4.3
Chromulina sp. Cienkowski	52494	1.8
Lagynion sp. Pascher	26247	2.2
Bicoeca socialis Lauterborn	52494	2.7
Salpingoeca buetschlii Lemm.	26247	0.3
Cryptomonas erosa Erh.	5249	8.7
Katablepharis ovalis Skuja	157483	8.3
Rhodomonas minuta Skuja	183731	8.9
Stephanodiscus niagarae Ehr.	309717	18380.6
Centric diatom (26µ)	5249	39.0
Cyclotella comta (Ehr.) Kuetz.	52494	390.5
Navicula radiosa Kuetzing	5249	12.1
Nitzschia sp. Hassall	5249	29.9
Melosira granulata (Ehr.) Ralfs	5249	24.9
Centric diatom (34µ)	10499	107.8
Fragilaria crotonensis Kitton	20998	82.3
Stephanodiscus astrea (Ehr.) Grun.	5249	60.6
Fragilaria sp. Lyngb.	5249	11.2
Fragilaria sp. Lyngb.	15748	30.0
Tabellaria fenestrata (Lyngbya) Kuetz.	5249	25.1
Fragilaria sp. Lyngb.	115488	6103.7
Diatoma tenue Ag.	26247	1.6
Cocconeis sp. Ehr.	52494	10.9
Ciliate	5249	15.4
Ciliate	5249	3.3

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

March 18, 1994

Surface

Taxon	Cells/L	biomass mg/m^3
Coelosphaerum Naegelianum Unger	1094	8.6
Oscillatoria limnetica Lemm.	13124	7.6
Aphanocapsa elachista v. conferta W.&W.	2187	0.2
Oscillatoria amphigranulata Van Goor	1094	0.6
Oscillatoria tenuis Ag.	1094	1.4
Rhabdoderma sigmoidea Moore & Carter	6562	0.1
Cyanophyte	98427	3.2
Pediastrum Boryanum (Turp.) Menegh.	1094	5.5
Ankistrodesmus convolutus Corda	6562	0.2
Coccomyxa minor v. gallica Bourr.	6562	0.5
Stichogloea Doederleinii (Schmidle) Wille	2187	2.1
Chrysophyte	13124	0.5
Chrysidalis peritaphrena Schill.	72180	9.9
Chrysophyte	13124	0.3
Chromulina elegans Doflein	137798	2.3
Chrysochromulina parva Lackey	164045	10.6
Erkenia subaequiciliata Skuja	32809	1.1
Monochrysis aphanaster Skuja	6562	1.0
Chromulina sp. Cienkowski	6562	0.7
Cryptomonas erosa Erh.	4375	3.7
Cryptomonas erosa v. reflexa Mars.	1094	0.6
Rhodomonas minuta Skuja	282158	25.3
Katablepharis ovalis Skuja	19685	1.4
Gymnodinium ordinatum Skuja	4375	4.9
Gymnodinium helveticum v. achroum Penard	1094	5.0
Peridinium inconspicuum Lemm.	8749	100.5
Fragilaria sp. Lyngb.	1094	4.2
Synedra sp. Breb.	1094	0.1
Centric diatom (7µ)	223102	33.7
Ciliate	1094	8.5
Ciliate	2187	7.0
Ciliate	2187	2.7

Bottom

Taxon	Cells/L	biomass mg/m^3
Aphanizomenon flos-aquae Ralfs	1094	1.7
Oscillatoria limnetica Lemm.	16405	6.9
Coelosphaerum Naegelianum Unger	1094	1.0
Gomphosphaeria lacustris v. compacta Lemm	3281	2.9
Microcystis incerta Lemm.	1094	1.5
Synechrococcus sp.	91865	7.3
Cyanophyte	59056	0.5
Rhabdoderma sigmoidea Moore & Carter	669305	57.8
Ankistrodesmus convolutus Corda	1094	0.0
Oocystis Borgei Snow	1094	0.9
Crucigenia quadrata Morren	1094	2.3
Coccomyxa minor v. gallica Bourr.	45933	2.7
Chromulina vagans Pascher	2187	0.8
Chrysophyte	32809	29.7
Chrysophyte	19685	0.6
Chrysophyte	19685	0.3
Chromulina sp. Cienkowski	26247	0.2
Chrysophyte	26247	0.3
Ochromonas sp.	39371	2.1
Chrysophyte	13124	0.6
Chroococcus minutus (Kuetz.) Naegeli	6562	0.7
Chrysophyte	6562	0.3
Chromulina pygmaea Nygaard	6562	0.3
Rhodomonas minuta Skuja	6562	0.7
Cryptomonas pusilla Bach.	19685	4.8
Katablepharis ovalis Skuja	6562	0.9
Gymnodinium ordinatum Skuja	1094	1.1
Synedra sp Ehr.	2187	0.5
Centric diatom (5µ)	13124	0.8
Centric diatom (7µ)	6562	1.0
Epithemia sp. Breb.	6562	13.4
Centric diatom (30µ)	6562	64.9
Mesodinium sp.	5468	18.6
Strombidium sp.	1094	2.5
Ciliate	3281	2.9
Urotricha sp.	2187	8.5
Ciliate	1094	14.8

Appendix Table 17 (cont.). Aigal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

May 26, 1994

Surface

Taxon	Cells/L	biomass mg/m^3
Aphanocapsa elachista W. & G.S. Smith	8749	0.9
Gleocapsa punctata Naegli	8749	2.1
Oscillatoria Lauterbornii Schmidle	4375	1.0
Lyngbya limnetica Lemm.	4375	4.9
Monoraphidium setiformis (Nygaard) Komark	17498	1.1
Monoraphidium contortum (Thuret in Breb.)	4375	0.2
Coccomyxa minor v. gallica Bourr.	1811059	100.0
Golenkia radiata (Chod.) Wille	61244	16.4
Paramastix conifera Skuja	8749	3.5
Chrysophyte	17498	26.9
Dinobryon sp. (cyst)	17498	25.1
Dinobryon sociale Ehr.	266847	62.1
Dinobryon bavaricum Imhof	13124	2.4
Chrysocapsa planctonica (West & West) Pas	4375	0.2
Pseudokephryion attenuatum Hilliard	8749	2.9
Erkenia subaequiciliata Skuja	2554731	117.7
Chrysophyte	227476	12.4
Kephyrion littorale Lund	244974	6.8
Chrysochromulina parva Lackey	34996	2.3
Chrysophyte	26247	8.4
Chrysophyte	61244	23.4
Chrysophyte	139985	11.0
Chrysocapsa planctonica (West & West) Pas	43745	1.4
Cryptomonas rostratiformis Skuja	4375	8.5
Cryptomonas ovata Erh.	4375	3.8
Cryptomonas erosa v. reflexa Mars.	8749	4.1
Cryptomonas erosa Erh.	8749	14.6
Cryptomonas reflexa Skuja	8749	5.7
Cryptomonas erosa v. reflexa Mars.	21873	24.9
Rhodomonas minuta Skuja	656181	63.6
Katablepharis ovalis Skuja	218727	13.7
Cryptomonas phaseolus Skuja	17498	16.5
Gymnodinium ordinatum Skuja	4375	10.6
Gymnodinium ordinatum Skuja	17498	26.9
Synedra sp.	17498	5.6
Stephanodiscus niagarae Ehr.	13124	941.1
Fragilaria sp. Lyngb.	21873	139.5
Asterionella formosa Hassall	34996	63.3
Synedra sp.	218727	68.6
Melosira sp.	4375	3.3
Centric diatom (15µ)	4375	5.4
Centric diatom (21)	4375	16.7
Fragilaria crotonensis Kitton	17498	83.1
Centric diatom (8µ)	253723	53.6
Centric diatom (12µ)	17498	13.9
Ciliate	4375	14.8
Mesodinium sp.	4375	681.8
Strobilidium sp.	26247	46.1
Urotricha sp.	13124	13.6
Strombidium sp.	4375	68.2

Bottom

Taxon	Cells/L	biomass mg/m^3
Chroococcus dispersus (Keiss.) Lemm.	4375	0.8
Aphanocapsa elachista v. conferta W.&W.	13124	3.4
Monoraphidium setiformis (Nygaard) Komark	8749	0.5
Monoraphidium contortum (Thuret in Breb.)	8749	0.2
Coccomyxa minor v. gallica Bourr.	1601082	92.4
Paramastix conifera Skuja	8749	2.6
Euglenophyte	4375	13.4
Dinobryon cyst	39371	41.2
Dinobryon bavaricum Imhof	17498	10.4
Dinobryon sociale Ehr.	104989	30.6
Pseudokephryion attenuatum Hilliard	4375	1.5
Dinobryon cylindricum Imhof	13124	7.0
Erkenia subaequiciliata Skuja	944901	48.3
Chrysochromulina parva Lackey	26247	1.8
Chrysophyte	43745	9.7
Chrysophyte	113738	5.4
Chrysocapsa planctonica (West & West) Pas	26247	5.8
Kephyrion littorale Lund	43745	1.1
Chrysocapsa planctonica (West & West) Pas	52494	1.9
Dinobryon sp. Ehr. (loose monad)	26247	3.9
Cryptomonas Marssonii Skuja	17498	7.6
Cryptomonas reflexa Skuja	4375	4.1
Cryptomonas erosa Erh.	34996	27.6
Cryptomonas erosa v. reflexa Mars.	8749	5.5
Rhodomonas minuta Skuja	174982	11.6
Cryptomonas phaseolus Skuja	26247	4.9
Katablepharis ovalis Skuja	52494	4.5
Gymnodinium ordinatum Skuja	13124	28.5
Gymnodinium helveticum v. achroum Penard	13124	223.0
Gymnodinium ordinatum Skuja	17498	28.7
Synedra delicatissima W. Smith	100614	30.2
Gomphonema sp. Kutz.	8749	5.7
Synedra sp.	4375	1.2
Synedra acus Kutz.	8749	8.2
Centric diatom (25µ)	13124	99.0
Fragilaria sp. Lyngb.	17498	72.5
Stephanodiscus niagarae Ehr.	17498	2589.4
Synedra delicatissima v. angustissima	8749	40.3
Asterionella formosa Hassall	21873	84.1
Tabellaria fenestrata (Lyn.) Kutz.	4375	19.4
Centric diatom (8µ)	218727	53.3
Urotricha sp.	8749	9.1
Mesodinium sp.	21873	34.8
Ciliate	4375	64.6

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

June 9. 1994

Surface

Taxon	Cells/L	biomass mg/m^3
Cyanophyte	5249	1.0
Gomphosphaeria lacustris v. compacta Lemm	10499	10.5
Aphanothece nidulans Richter	5249	5.6
Characium limneticum Lemm.	5249	7.2
Oscillatoria Utermoehlii (Uterm.) J. de T	10499	44.2
Monoraphidium setiformis (Nygaard) Komark	5249	0.6
Gloeotila pelagica (Nygaard) Skuja	15748	6.0
Elakatothrix lacustris	20998	0.7
Coccomyxa minor v. gallica Bourr.	577439	25.7
Golenkia radiata (Chod.) Wille	20998	6.1
Crucigenia quadrata Morren	10499	1.5
Dinobryon cylindricum Imhof	5249	0.8
Dinobryon sociale Ehr.	178481	37.8
Uroglena americana Catkins	5249	7.9
Dinobryon bavaricum Imhof	10499	1.1
Mallomonas mangofera Harris & Bradley	5249	7.9
Erkenia subaequiciliata Skuja	1826808	49.0
Chrysophyte	220477	22.5
Chrysochromulina parva Lackey	31497	1.3
Dinobryon sp. Ehr. (loose monad)	104989	16.5
Salpingoeoca frequentissima (Zach.) Lemm.	10499	0.4
Kephyrion littorale Lund	41996	1.1
Chromulina sp. Cienkowski	10499	9.5
Chromulina sp. Cienkowski	10499	0.2
Chrysocapsa planctonica (West & West) Pas	10499	0.5
Chrysophyte	10499	11.1
Chrysophyte	20998	3.2
Cryptomonas curvata	10499	49.5
Cryptomonas Marssonii Skuja	41996	16.7
Cryptomonas reflexa Skuja	5249	3.3
Cryptomonas erosa Erh.	62993	120.2
Cryptomonas platyuris Skuja	5249	5.9
Cryptomonas erosa v. reflexa Mars.	68243	69.5
Cryptomonas rostratiformis Skuja	10499	22.2
Rhodomonas minuta Skuja	388459	25.3
Katablepharis ovalis Skuja	241475	21.3
Cryptomonas phaseolus Skuja	20998	18.3
Gymnodinium eurytopum Skuja	26247	96.7
Gymnodinium ordinatum Skuja	10499	17.9
Syndera delicatissima v. angustissima	5249	21.7
Synedra delicatissima	425205	142.3
Stephanodiscus niagarae Ehr.	73492	4471.6
Centric diatom (25µ)	10499	61.8
Centric diatom (38µ)	10499	202.4
Centric diatom (18µ)	5249	11.4
Centric diatom (14µ)	5249	5.6
Melosira sp.	5249	11.9
Nitzschia acicularis W. Sm.	5249	0.3
Tabellaria fenestrata (Lyn.) Kutz.	20998	222.6
Fragilaria crotonensis Kitton	68243	183.7
Synedra acus Kutz.	5249	2.2
Fragilaria sp. Lyngb.	5249	29.8
Asterionella formosa Hassall	26247	39.1
Centric diatom (8µ)	52494	10.0
Centric diatom (16µ)	10499	16.5
Ciliate	5249	33.0
Urotricha sp.	20998	33.6
Mesodinium sp.	5249	15.0
Strombidium sp.	15748	16.0
Strobilidiun sp.	5249	77.6

Bottom

Taxon	Cells/L	biomass mg/m^3
Oscillatoria Utermoehlii (Uterm.) J. de T	5249	2.1
Lyngbya limnetica Lemm.	5249	2.7
Monoraphidium setiformis (Nygaard) Komark	5249	0.3
Monoraphidium contortum (Thuret in Breb.)	5249	0.3
Planktosphaeria gelatinosa G.M. Sm.	10499	24.3
Coccomyxa minor v. gallica Bourr.	829413	39.9
Chrysophyte	20998	50.7
Dinobryon bavaricum Imhof	5249	0.5
Dinobryon sociale Ehr.	20998	4.9
Erkenia subaequiciliata Skuja	818914	23.8
Chrysophyte	52494	60.4
Chrysophyte	73492	4.8
Kephyrion littorale Lund	10499	0.2
Chromulina sp. Cienkowski	10499	0.4
Dinobryon sp. Ehr. (loose monad)	10499	2.3
Bicoeca borealis Hilliard	10499	2.3
Chrysocapsa planctonica (West & West) Pas	10499	0.3
Cryptomonas curvata	5249	17.2
Cryptomonas erosa Erh.	36746	75.6
Cryptomonas erosa v. reflexa Mars.	36746	25.0
Cryptomonas ovata Erh.	5249	11.1
Cryptomonas Marssonii Skuja	36746	15.4
Rhodomonas minuta Skuja	209978	9.3
Katablepharis ovalis Skuja	104989	6.7
Chroomonas Nordstedtii Hansgirg	10499	1.6
Cryptomonas phaseolus Skuja	10499	5.3
Gymnodinium helveticum v. achroum Penard	5249	82.5
Gymnodinium uberrium (Allman) Kofoid & Swe	5249	30.2
Gymnodinium ordinatum Skuja	10499	7.3
Centric diatom (38µ)	5249	101.6
Tabellaria fenestrata (Lyn.) Kutz.	5249	13.3
Nitzschia acicularis W. Sm.	5249	2.2
Fragilaria crotonensis Kitton	36746	7.7
Syndera delicatissima	99740	9.7
Synedra acus Kutz.	10499	4.1
Stephanodiscus niagarae Ehr.	41996	3079.0
Synedra delicatissima v. angustissima	5249	21.4
Fragilaria sp. Lyngb.	26247	56.0
Centric diatom (8µ)	83991	18.9
Strobilidium sp.	5249	1.9
Ciliate	10499	164.3
Mesodinium sp.	5249	9.7
Urotricha sp.	10499	10.0

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

June 23, 1994

Surface

Taxon	Cells/L	biomass mg/m³
Gomphosphaeria lacustris Chodat	10499	10.8
Oscillatoria tenuis Ag.	5249	19.9
Aphanocapsa elachista v. conferta W.&W.	5249	12.8
Oocystis pusilla Hansgirg	5249	0.9
Elakatothrix lacustris	20998	0.5
Chlorella vulgaris Beyerinck	10499	10.6
Pediastrum Boryanum (Turp.) Menegh.	5249	10.6
Closteriopsis sp. Lemm.	5249	5.9
Tetraedron minimum (A. braun) Hansgirg	5249	4.9
Coccomyxa minor v. gallica Bourr.	1207373	60.6
Golenkia radiata (Chod.) Wille	31497	8.8
Dinobryon sociale Ehr.	26247	3.2
Dinobryon divergens Imhof	31497	67.6
Erkenia subaequiciliata Skuja	892406	16.5
Chrysophyte	115488	13.7
Ochromonas sp.	52494	7.0
Dinobryon sp. Ehr. (loose monad)	62993	7.3
Bicoeoca borealis Hilliard	31497	0.5
Salpingoeca de-saedeleeri Ellis	10499	0.5
Cryptomonas Marssonii Skuja	36746	12.0
Rhodomonas minuta Skuja	115488	5.8
Katablepharis ovalis Skuja	41996	2.4
Synedra delicatissima	36746	16.9
Rhizosolenia eriensis H.L. Smith	5249	83.1
Synedra delicatissima v. angustissima	5249	5.6
Centric diatom (30µ)	5249	54.2
Tabellaria fenestrata (Lyn.) Kutz.	20998	288.0
Asterionella formosa Hassall	31497	50.5
Synedra ulna(Nitzsch) Ehr.	5249	18.3
Fragilaria sp. Lyngb.	15748	130.3
Urotricha sp.	10499	5.2
Mesodinium sp.	5249	15.5

Bottom

Taxon	Cells/L	biomass mg/m³
Gomphosphaeria lacustris v. compacta Lemm	31497	33.0
Lyngbya limnetica Lemm.	10499	4.7
Cyanophyte	5249	13.2
Aphanocapsa elachista v. conferta W.&W.	5249	9.3
Aphanizomenon flos-aquae Ralfs	10499	10.6
Aphanothece nidulans Richter	5249	20.0
Elakatothrix gelatinosa Willen	10499	0.2
Cosmarium depressum v. achrondrum	5249	9.9
Coccomyxa minor v. gallica Bourr.	1238870	35.1
Tetraedron minimum (A. Braun) Hansgirg	10499	13.0
Phacus caudatus Hubner	5249	95.3
Dinobryon sociale Ehr.	10499	2.5
Dinobryon divergens Imhof	10499	1.3
Mallomonas pumilio v. canadensis Holgren	5249	14.1
Erkenia subaequiciliata Skuja	1175876	25.6
Chrysophyte	104989	6.0
Chrysophyte	31497	3.0
Kephyrion littorale Lund	20998	0.7
Chrysophyte	31497	55.7
Salpingoeoca de-saedeleeri Ellis	94490	2.0
Dinobryon sp. Ehr. (loose monad)	10499	1.0
Cryptomonas erosa v. reflexa Mars.	52494	35.3
Cryptomonas Marssonii Skuja	68243	18.1
Cryptomonas rostratiformis Skuja	10499	16.0
Cryptomonas curvata	5249	6.0
Cryptomonas ovata Erh.	5249	5.6
Rhodomonas minuta Skuja	283470	17.5
Katablepharis ovalis Skuja	31497	1.7
Gymnodinium helveticum v. achroum Penard	20998	106.9
Cryptomonas erosa Erh.	31497	72.4
Gymnodinium eurytopum Skuja	5249	22.6
Ceratium hirundinella (Mueller) Schrank	5249	790.2
Stephanodiscus niagarae Ehr.	41996	2216.8
Synedra delicatissima	230976	68.8
Centric (32µ)	15748	183.1
Synedra acus Kutz.	5249	1.7
Synedra delicatissima v angustissima	20998	89.7
Pennate diatom	10499	2.7
Tabellaria fenestrata (Lyn.) Kutz.	52494	1077.9
Asterionella formosa Hassall	47245	102.6
Pennate diatom	10499	0.5
Fragilaria sp. Lyngb.	62993	495.5
Stephanodiscus sp.	5249	53.4
Gomphonema sp. Kutz.	5249	4.7
Centric diatom (8µ)	52494	10.2
Strobilidium sp.	5249	3.9
Urotricha sp.	5249	6.3
Mesodinium sp.	15748	50.1

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

July 7, 1994

Surface

Taxon	Cells/L	biomass mg/m³
Aphanothece clathrata G.S. West in W.&W.	13124	57.6
Gomphosphaeria lacustris Chodat	26247	9.1
Chroococcus dispersus (Keiss.) Lemm.	6562	7.5
Aphanocapsa delicatissima W.&W.	13124	1.4
Cosmarium depressum (Naegeli) Lund	6562	24.5
Sphaerocystis schroeteri	6562	1.8
Oocystis pusilla Hansgirg	26247	18.6
Elakatothrix gelatinosa Willen	19685	0.5
Crucigenia quadrata Morren	6562	0.4
Quadrigula pfitzeri (Schroeder) Printz	6562	1.6
Pediastrum Boryanum (Turp.) Menegh.	6562	126.7
Gloeotila pelagica (Nygaard) Skuja	6562	13.8
Coccomyxa minor v. gallica Bourr.	2007914	96.6
Oocystis Borgei Snow	13124	6.2
Oocystis pusilla Hansgirg	13124	0.9
Dinobryon divergens Imhof	6562	0.5
Erkenia subaequiciliata Skuja	419956	19.7
Ochromonas sp.	26247	10.0
Dinobryon sp. Ehr. (loose monad)	26247	1.3
Ochromonas sp.	26247	2.4
Chrysophyte	13124	0.4
Salpingoeca frequentissima (Zach.) Lemm.	52494	8.6
Cryptomonas erosa v. reflexa Mars.	6562	2.2
Rhodomonas minuta Skuja	393709	19.2
Chroomonas breviculata Nygaard	13124	3.1
Synedra delicatissima	19685	6.3
Centric diatom (32µ)	26247	377.1
Centric diatom (36µ)	6562	128.6
Asterionella formosa Hassall	52494	92.2
Fragilaria crotonensis Kitton	72180	107.6
Tabellaria fenestrata (Lyn.) Kutz.)	98427	1011.9
Fragilaria sp. Lyngb.	26247	81.5
Centric diatom (15µ)	6562	8.3
Synedra delicatissima v angustissima	6562	34.0
Stephanodiscus sp.	13124	105.2
Centric diatom (22µ)	6562	25.7
Cocconeis sp. Ehr.	13124	8.2
Mesodinium sp.	6562	13.5
Urotricha sp.	13124	11.0

Bottom

Taxon	Cells/L	biomass mg/m³
Chroococcus dispersus (Keiss.) Lemm.	20998	11.5
Aphanocapsa delicatissima W.&W.	15748	18.0
Microcystis aeruginosa Kuetz.	5249	35.2
Oscillatoria Utermoehlii (Uterm.) J. de T	5249	3.0
Gomphosphaeria lacustris v. compacta Lemm	15748	12.3
Chroococcus minutus (Kuetz.) Naegeli	5249	3.5
Cyanophyte	104989	4.1
Cyanophyte	20998	3.0
Ankistrodesmus setigerus (Schroeder) West	10499	0.3
Closteriopsis longissima Lemm.	5249	9.1
Scenedesmus quadricauda (Turpin) Breb.	5249	0.9
Gleotilia pelagica (Nygaard) Skuja	5249	13.6
Pediastrum Boryanum (Turp.) Menegh.	5249	4.9
Oocystis lacustris Chodat	10499	22.6
Scenedesmus brevispina (Kuetz.) Naegeli	5249	3.6
Coelastrum microporum Naegeli	5249	187.0
Coccomyxa minor v. gallica Bourr.	1826808	644.3
Oocystis parva West & West	10499	1.5
Crucigenia quadrata Morren	10499	2.1
Dinobryon divergens Imhof	5249	1.3
Erkenia subaequiciliata Skuja	62993	1.4
Chrysophyte	41996	0.9
Chrysophyte	136486	8.6
Salpingoeca frequentissima (Zach.) Lemm.	10499	0.4
Chrysophyte	20998	0.4
Cryptomonas erosa Erh.	5249	7.1
Cryptomonas rostratiformis Skuja	10499	14.6
Cryptomonas erosa v. reflexa Mars.	26247	11.6
Rhodomonas minuta Skuja	346464	19.0
Chroomonas breviculata Nygaard	10499	2.5
Katablepharis ovalis Skuja	52494	5.0
Gymnodinium helveticum v. achroum Penard	10499	59.1
Synedra delicatissima	10499	2.6
Synedra delicatissima v angustissima	5249	20.7
Centric diatom (32µ)	20998	219.4
Centric diatom (26µ)	20998	149.3
Amphora sp.	5249	28.5
Fragilaria crotonensis Kitton	99740	567.3
Melosira granulata (Ehr.) Ralfs	5249	83.8
Stephanodiscus niagarae Ehr.	26247	1711.1
Fragilaria sp. Lyngb.	62993	197.7
Asterionella formosa Hassall	136486	390.6
Tabellaria fenestrata (Lyn.) Kutz.	94490	1187.7
Centric diatom (4µ)	20998	0.5
Pennate diatom	10499	0.6
Mesodinium sp.	10499	12.7
Strombidium sp.	15748	14.8

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

July 21, 1994

Surface

Taxon	Cells/L	biomass mg/m^3
Microcystis aeruginosa Kuetz.	3281	22.3
Aphanocapsa elachista v. planctonica G.M.	6562	7.0
Gomphosphaeria lacustris Chodat	3281	2.1
Anabaena circinalis Rabenhorst	3281	23.7
Aphanothece clathrata G.S. West in W.&W.	3281	1.0
Aphanothece nidulans Richter	39371	40.5
Microcystis stagnalis v. pulchra Lemm	3281	2.3
Aphanocapsa delicatissima W.&W.	16405	14.5
Gomphosphaeria lacustris v. compacta Lemm	34450	49.1
Anabaena flos-aquae (Lyngbye) Breb.	13124	19.1
Chroococcus dispersus (Keiss.) Lemm.	6562	2.6
Staurastrum johnsonii W. & G.S. West	3281	8.2
Ankistrodesmus setigerus (Schroeder) West	9843	0.4
Oocystis Borgei Snow	22966	22.2
Sphaerocystis Schroeteri Chodat	29528	27.2
Oocystis pusilla Hansgirg	19685	9.7
Crucigenia quadrata Morren	3281	1.4
Gloeotila pelagica (Nygaard) Skuja	1640	0.7
Oocystis parva West & West	6562	17.6
Oocystis solitaria Wittrock	6562	6.7
Ankistrodesmus setigerus (Schroeder) West	13124	0.8
Elakatothrix lacustris	6562	0.2
Bitrichia Chodatii (Reverdin) Chodat	6562	3.3
Chrysophyte	124674	21.4
Pseudokephyrion poculum Conrad	6562	0.2
Salpingoeca frequestissima (Zach.) Lemm.	6562	0.3
Ochromonas sp.	39371	6.2
Erkenia subaequiciliata Skuja	13124	0.3
Cryptomonas erosa v. reflexa Mars.	3281	3.7
Cryptomonas erosa Erh.	3281	3.1
Cryptomonas erosa v. reflexa Mars.	3281	2.5
Cryptomonas Marssonii Skuja	3281	0.5
Rhodomonas minuta Skuja	45933	2.6
Katablepharis ovalis Skuja	6562	0.3
Stephanodiscus sp.	8202	113.6
Cyclotella comta (Ehr.) Kuetz.	4921	63.3
Centric diatom (12u)	4921	3.0
Fragilaria sp. Lyngb.	24607	199.4
Fragilaria crotonensis Kitton	31169	143.0
Stephanodiscus niagarae Ehr.	3281	291.0
Melosira distans v. lirata	3281	9.3
Tabellaria fenestrata (Lygnb.) Kuetz.	65618	736.4
Achnanthes sp.	13124	2.6
Ciliate	1640	1.3
Ciliate	1640	27.7
Strombidium sp.	3281	48.5

Bottom

Taxon	Cells/L	biomass mg/m^3
Aphanothece nidulans Richter	22966	55.1
Gomphosphaeria lacustris v. compacta Lemm	29528	40.0
Aphanothece clathrata G.S. West in W.&W.	11483	79.5
Gleocapsa punctata Naegli	6562	2.9
Aphanocapsa elachista v. planctonica G.M.	4921	4.6
Aphanocapsa delicatissima W.&W.	9843	1.2
Aphanocapsa elachista W. & G.S. Smith	3281	7.3
Oocystis pusilla Hansgirg	16405	8.8
Oocystis Borgei Snow	26247	21.5
Sphaerocystis Schroeteri Chodat	6562	4.0
Crucigenia rectangularis (A. Braun) Gay	6562	5.9
Oocystis parva West & West	3281	1.3
Lagerheimia ciliata (Lag.) Chodat	3281	4.6
Ankistrodesmus setigerus (Schroeder) West	4921	0.1
Golenkia radiata (Chod.) Wille	3281	3.0
Pediastrum Boryanum (Turp.) Menegh.	3281	6.8
Ankistrodesmus falcatus (Chorda) Ralfs	3281	0.1
Gloeotila pelagica (Nygaard) Skuja	3281	1.9
Oocystis submarina Lagerheim	19685	16.0
Oocystis parva West & West	13124	5.3
Petalomonas curvata Skuja	6562	3.3
Mallomonas pumilio v. canadensis Holgren	3281	8.8
Chrysophyte	26247	0.7
Chrysophyte	6562	1.5
Salpingoeca frequestissima (Zach.) Lemm.	19685	1.0
Chrysophyte	19685	2.5
Erkenia subaequiciliata Skuja	13124	0.2
Chrysophyte	6562	0.5
Stichogloea Doederleinii (Schmidle) Wille	52494	20.8
Chrysococcus biparus Skuja	6562	0.7
Cryptomonas erosa v. reflexa Mars.	6562	1.8
Cryptomonas erosa Erh.	3281	4.9
Rhodomonas minuta Skuja	118113	6.6
Katablepharis ovalis Skuja	26247	1.8
Ceratium hirundinella (Mueller) Schrank	3281	689.5
Amphidinium luteum	6562	1.1
Synedra delicatissima W. Sm.	6562	0.6
Tabellaria fenestrata (Lygnb.) Kuetz.	141079	1047.3
Fragilaria sp. Lyngb.	19685	68.6
Centric diatom (26u)	3281	26.1
Stephanodiscus niagarae Ehr.	6562	465.9
Fragilaria crotonensis Kitton	39371	148.3
Cyclotella comta (Ehr.) Kuetz.	6562	83.4
Pennate diatom	4921	0.6
Asterionella formosa Hassall	16405	77.3
Centric diatom (16u)	13124	21.1
Centric diatom (8u)	6562	1.3
Centric diatom (10u)	6562	2.7
Strobilidium sp.	8202	13.5
Ciliate	1640	1.4
Ciliate	1640	1.1

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

August 4, 1994

Surface

Taxon	Cells/L	biomass mg/m^3
Aphanothece clathrata G.S. West in W.&W.	4375	9.3
Anabaena flos-aquae (Lyngbye) Breb.	15311	291.1
Aphanothece nidulans Richter	4375	13.2
Chroococcus limneticus Lemm.	10936	5.1
Gleocapsa punctata Naegli	59056	20.1
Gomphosphaeria lacustris v. compacta Lemm	13124	18.9
Dactylococcopsis Smithii R. & F. Chod.	4375	0.1
Chroococcus dispersus (Keiss.) Lemm.	2187	0.3
Microcystis aeruginosa Kuetz.	2187	14.7
Anabaena planctonica Brunnthaler	2187	14.5
Oscillatoria limosa (Roth) C.A. Agardh	2187	175.5
Gomphosphaeria lacustris Chodat	4375	2.2
Oscillatoria minima Gicklhorn	2187	0.3
Oscillatoria limnetica Lemm.	2187	0.4
Anabaena macrospora Kleb.	2187	21.2
Cyanophyte	9843	0.2
Oocystis submarina Lagerheim	8749	3.2
Oocystis Borgei Snow	10936	13.2
Crucigenia rectangularis (A. Braun) Gay	6562	7.9
Ankistrodesmus setigerus (Schroeder) West	4375	0.2
Oocystis parva West & West	2187	0.8
Sphaerocystis Schroeteri Chodat	13124	9.0
Gloeotila pelagica (Nygaard) Skuja	2187	9.3
Oocystis pusilla Hansgirg	10936	5.5
Nephrocytium limneticum (G.M.Smith) Skuja	6562	4.5
Oocystis parva West & West	6562	2.7
Crucigenia quadrata Morren	6562	2.6
Mallomonas pumilio v. canadensis Holgren	2187	4.0
Erkenia subaequiciliata Skuja	29528	0.4
Chrysophyte	9843	1.0
Chrysophyte	160764	5.4
Chromulina sphaeridia Schiller	9843	5.2
Pseudokephyrion striatum Hilliard	6562	0.3
Stichogloea Doederleinii (Schmidle) Wille	45933	14.1
Cryptomonas erosa v. reflexa Mars.	4375	1.9
Cryptomonas Marssonii Skuja	6562	1.9
Cryptomonas erosa Erh.	13124	15.9
Rhodomonas minuta Skuja	75461	5.2
Katablepharis ovalis Skuja	6562	0.4
Ceratium hirundinella (Mueller) Schrank	2187	503.8
Peridinium pusillum (Penard) Lemm.	6562	15.8
Centric diatom (14u)	2187	2.7
Fragilaria crotonensis Kitton	2187	6.9
Tabellaria fenestrata (Lygnb.) Kuetz.	6562	51.8
Stephanodiscus niagarae Ehr.	2187	103.1
Fragilaria sp. Lyngb.	2187	6.5
Centric diatom (11u)	9843	5.8
Ciliate	2187	3.0
Ciliate	2187	12.9
Strobilidium sp.	4375	2.2

Bottom

Taxon	Cells/L	biomass mg/m^3
Aphanocapsa delicatissima W.&W.	17498	15.1
Gomphosphaeria lacustris v. compacta Lemm	61244	36.0
Aphanizomenon flos-aquae Ralfs	8749	6.8
Gleocapsa punctata Naegli	4375	0.6
Gomphosphaeria aponica Kuetz.	4375	4.8
Coelosphaerium Naegelianum Unger	8749	63.7
Aphanothece clathrata G.S. West in W.&W.	34996	51.5
Chroococcus dispersus v. minor G.M. Sm.	17498	1.6
Chroococcus limneticus Lemm.	4375	4.6
Aphanothece nidulans Richter	4375	11.1
Anabaena planctonica Brunnthaler	4375	27.8
Cyanophyte	2187	0.0
Staurastrum johnsonii W. & G.S. West	4375	21.1
Scenedesmus quadricauda (Turp.) Breb.	4375	0.5
Oocystis Borgei Snow	17498	6.6
Monoraphidium contortum (Thuret in Breb.)	4375	0.2
Oocystis submarina v. variabilis Skuja	17498	6.2
Ankistrodesmus setigerus (Schroeder) West	4375	0.1
Gloeotila pelagica (Nygaard) Skuja	8749	34.5
Crucigenia quadrata Morren	8749	2.3
Oocystis crassa Wittrock	2187	2.9
Dictyosphaerium pulchellum Wood	4375	4.9
Oocystis submarina Lagerheim	4375	4.5
Crucigenia rectangularis (A. Braun) Gay	4375	4.1
Scenedesmus quadricauda (Turp.) Breb.	4375	1.5
Oocystis parva West & West	8749	2.0
Oocystis pusilla Hansgirg	26247	4.1
Euglena pisciformis Klebs	4375	6.7
Dinobryon divergens Imhof	4375	0.3
Pseudokephyrion ellipsoideum (Pascher) Sc	13124	0.5
Chrysophyte	6562	0.4
Chrysophyte	4375	0.3
Stichogloea Doederleinii (Schmidle) Wille	21873	10.1
Cryptomonas erosa Erh.	17498	15.6
Cryptomonas erosa v. reflexa Mars.	10936	6.3
Rhodomonas minuta Skuja	19685	1.1
Katablepharis ovalis Skuja	4375	0.3
Crytaulax vulgaris Skuja	2187	0.2
Ceratium hirundinella (Mueller) Schrank	4375	667.9
Peridinium Willei Huitfeldt-Kaas	4375	297.8
Gymnodinium varians Skuja	4375	1.6
Cyclotella comta (Ehr.) Kuetz.	8749	90.9
Synedra delicatissima W. Sm.	4375	1.0
Tabellaria fenestrata (Lygnb.) Kuetz.	74367	507.9
Achnanthes sp.	2187	1.0
Asterionella formosa Hassall	6562	6.8
Stephanodiscus niagarae Ehr.	19685	566.0
Fragilaria crotonensis Kitton	8749	53.9
Fragilaria sp. Lyngb.	17498	19.2
Pennate diatom	10936	0.7
Centric diatom (4u)	4375	0.1
Centric diatom (12u)	4375	4.0
Strobilidium sp.	6562	15.8

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

August 17, 1994

Surface

Taxon	Cells/L	biomass mg/m³
Gleocapsa punctata Naegli	3281	2.2
Lyngbya limnetica Lemm.	3281	0.7
Microcystis aeruginosa Kuetz.	3281	74.2
Gomphosphaeria lacustris v. compacta Lemm.	11483	6.7
Rhabdoderma lineare Schmidle & Lauterborn	8202	1.0
Anabaena circinalis Rabenhorst	8202	11.6
Aphanothece nidulans Richter	1640	3.9
Anabaena planctonica Brunnthaler	1640	12.6
Chroococcus limneticus Lemm.	4921	2.8
Gomphosphaeria aponica Kuetz.	1640	1.2
Cyanophyte	31715	1.0
Cosmarium depressum v. achrondrum	1640	2.4
Oocystis pusilla Hansgirg	21326	6.9
Oocystis Borgei Snow	8202	9.9
Sphaerocystis Schroeteri Chodat	3281	1.9
Gloeocystis planktonica (W.&W.) Lemm.	6562	2.6
Ankistrodesmus setigerus (Schroeder) West	1640	0.1
Golenkia radiata (Chod.) Wille	1640	0.6
Elakatothrix lacustris	3281	0.1
Oocystis submarina Lagerheim	1640	0.4
Gloeotila pelagica (Nygaard) Skuja	1640	0.6
Oocystis lacustris Chodat	1640	2.4
Botryococcus braunii Kuetz.	1640	2.9
Crucigenia quadrata Morren	3281	0.5
Oocystis pusilla Hansgirg	15311	0.7
Chlorophyta	13124	0.9
Dinobryon bavaricum Imhof	6562	2.0
Salpingoeca frequestissima (Zach.) Lemm.	4375	0.0
Erkenia subaequiciliata Skuja	17498	0.4
Dinobryon sp. Ehr. (loose monad)	6562	0.9
Pleuromonas nastua Skuja	1094	0.1
Chrysophyte	22966	2.7
Stichogloea Doederleinii (Schmidle) Wille	13124	6.1
Dinobryon cylindricum	3281	0.1
Cryptomonas Marssonii Skuja	8202	2.6
Cryptomonas erosa v. reflexa Mars.	8202	2.3
Cryptomonas erosa Ehr.	9843	15.7
Katablepharis ovalis Skuja	8749	0.6
Cryptomonas phaseolus Skuja	2187	0.3
Rhodomonas minuta Skuja	94053	4.1
Ceratium hirundinella (Mueller) Schrank	1640	178.1
Gymnodinium ordinatum Skuja	14217	4.9
Fragilaria crotonensis Kitton	1640	0.8
Synedra delicatissima W. Sm.	1640	0.5
Nitzschia acicularis W. Sm.	1640	0.1
Centric diatom (18u)	1640	3.8
Cyclotella comta (Ehr.) Kuetz.	1640	24.6
Fragilaria sp. Lyngb.	1640	12.5
Pennate diatom	1094	0.3
Cyclotella ocellata Pantocsele	8749	2.5
Pennate diatom	1094	0.3
Strombidium sp.	1640	24.2
Ciliate	3281	4.7
Strobilidium sp.	1640	5.1
Ciliate	3281	10.1
Urotricha sp.	2187	0.9

Bottom

Taxon	Cells/L	biomass mg/m³
Anabaena circinalis Rabenhorst	583	0.9
Gomphosphaeria lacustris v. compacta Lemm	12249	9.7
Microcystis aeruginosa Kuetz.	583	0.8
Chrococcus limneticus Lemm.	2916	1.2
Oscillatoria minima Gicklhorn	583	0.1
Gomphosphaeria aponica Kuetz.	583	1.5
Cyanophyte	583	0.0
Gleocapsa punctata Naegli	3500	2.3
Aphanizomenon flos-aquae Ralfs	2333	2.4
Anabaena planctonica Brunnthaler	583	4.1
Aphanocapsa elachista v. planctonica G.M.	583	0.5
Lyngbya limnetica Lemm.	1167	0.1
Gomphosphaeria lacustris Chodat	583	0.6
Cyanopnyte	437	0.1
Cyanophyte	14436	0.6
Staurastrum johnsonii W. & G.S. West	1167	5.6
Franceia ovalis (France) Lemm.	2333	1.7
Dictyosphaerium pulchellum Wood	583	1.2
Oocystis submarina Lagerheim	1750	1.0
Oocystis pusilla Hansgirg	1167	0.5
Planktosphaeria gelatinosa G.M. Sm.	2916	10.6
Sphaerocystis Schroeteri Chodat	1167	0.9
Closterium aciculare (Tuffen) West	583	0.7
Elakatothrix lacustris	1167	0.1
Oocystis Borgei Snow	3500	5.8
Oocystis parva West & West	583	0.3
Monoraphidium contortum (Thuret in Breb.)	583	0.0
Nephrocytium agardhianum Naegeli	583	0.3
Ankistrodesmus setigerus (Schroeder) West	583	0.0
Quadriguta closteroides (Bohlin) Printz	583	9.8
Oocystis Borgei Snow	5249	1.9
Tetraedron minimum (A. Braun) Hansgirg.	1312	0.8
Oocystis submarina v. variabilis Skuja	875	1.6
Gloeotila pelagica (Nygaard) Skuja	1167	1.6
Planctonema Lauterbornii Schmidle	583	0.6
Crucigenia rectangularis (A. Braun) Gay	583	0.7
Gloeocystis planktonica (W.&W.) Lemm.	2333	1.0
Scenedesmus quadracauda v. quadrispina (C	1750	0.5
Crucigenia quadrata Morren	875	0.0
Golenkia radiata (Chod.) Wille	3062	1.0
Oocystis pusilla Hansgirg	1750	0.6
Euglena pisciformis Klebs	1750	1.8
Stichogloea Doederleinii (Schmidle) Wille	583	0.3
Erkenia subaequiciliata Skuja	2187	0.0
Chrysophyte	3062	0.5
Chrysophyte	7437	0.4
Stichogloea Doederleinii (Schmidle) Wille	8749	2.2
Chrysophyte	3062	0.4
Chromulina vagans Pascher	3062	0.9
Chromulina sp. Cienkowski	3500	2.4
Rhodomonas minuta Skuja	23185	1.5
Katablepharis ovalis Skuja	875	0.1
Cryptomonas Marssonii Skuja	10499	2.7
Rhodomonas lens	2187	1.2
Chroomonas Nordstedtii Hansgirg	437	0.1
Cryptomonas erosa Erh.	5249	6.0
Cryptomonas erosa v. reflexa Mars.	9187	5.3
Ceratium hirundinella (Mueller) Schrank	583	58.8
Pennate diatom	583	0.6
Pennate diatom	1167	0.3
Fragilaria sp. Lyngb.	1167	6.5
Synedra nana Meister	583	0.1
Nitzschia sp. Hassall	1167	0.3
Centric diatom (28u)	2916	20.8
Stephanodiscus niagarae Ehr.	1167	71.5
Fragilaria crotonensis Kitton	1167	5.3
Tabellaria fenestrata (Lygnb.) Kuetz.	1167	3.4
Centric diatom (16u)	875	1.9
Pennate diatom	1312	0.2
Cyclotella ocellata Pantocsele	7437	4.9
Centric diatom (8u)	6999	1.5
Centric diatom (10u)	1750	0.7
Cymbella sp.	875	0.1
Ciliate	583	14.2
Ciliate	583	3.7
Ciliate	1750	1.4
Urotricha sp.	583	0.6
Ciliate	1167	9.0
Ciliate	583	0.8
Ciliate	583	5.5
Strobilidium sp.	2187	2.0

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

September 1, 1994

Surface

Taxon	Cells/L	biomass mg/m³
Chroococcus limneticus Lemm.	9624	17.3
Gomphosphaeria lacustris v. compacta Lemm	22748	9.7
Gleocapsa punctata Naegli	6999	1.4
Anabaena circinalis Rabenhorst	11374	36.9
Aphanizomenon gracile Lemm.	5249	3.5
Lyngbya limnetica Lemm.	3500	2.8
Aphanocapsa elachista v. planctonica G.M.	875	0.7
Microcystis aeruginosa Kuetz.	875	1.7
Gomphosphaeria aponica Kuetz.	875	0.6
Gomphosphaeria lacustris Chodat	6124	0.9
Microcystis aeruginosa Kuetz.	875	3.5
Aphanocapsa elachista v. conferta W.&W.	875	0.5
Cyanophyte	34121	0.6
Chroococcus dispersus v. minor G.M. Sm.	6999	0.1
Planktosphaeria gelatinosa G.M. Sm.	875	0.4
Closterium aciculare (Tuffen) West	875	1.5
Gloeotila pelagica (Nygaard) Skuja	1750	2.6
Cosmarium depressum (Naegeli) Lund	2625	3.9
Staurastrum chaetoceras (Schroeder) G.M.	2625	1.6
Crucigenia rectangularis (A. Braun) Gay	875	0.6
Quadrigula closteroides (Bohlin) Printz	1750	0.0
Oocystis Borgei Snow	2625	2.9
Crucigenia quadrata Morren	875	0.1
Oocystis parva West & West	9624	4.0
Planktosphaeria gelatinosa G.M. Sm.	1750	2.5
Sphaerocystis Schroeteri Chodat	2625	1.7
Nephrocytium agardhianum Naegeli	875	0.4
Pediastrum Boryanum (Turp.) Menegh.	1750	7.5
Gloeocystis planktonica (W.&W.) Lemm.	875	0.2
Oocystis pusilla Hansgirg	6999	1.2
Oocystis parva West & West	13999	2.6
Dictyosphaerium elegans Bachmanni	3500	1.1
Oocystis Eremosphaerica G.M. Smith	875	3.4
Oocystis submarina v. variabilis Skuja	24497	1.6
Tetraedron minimum (A. Braun) Hansgirg.	5249	1.4
Golenkia radiata (Chod.) Wille	6999	1.3
Chlorophyta	875	0.3
Stichogloea Doederleinii (Schmidle) Wille	1750	0.9
Dinobryon sociale Ehr.	4375	0.4
Dinobryon bavaricum Imhof	3500	0.6
Salpingoeca frequestissima (Zach.) Lemm.	3500	0.1
Mallomonas pseudocornata Prescott	875	1.8
Dinobryon cylindricum	1750	0.0
Chromulina elegans Doflein	14873	0.5
Chrysophyte	2625	0.1
Dinobryon cylindricum	10499	0.3
Erkenia subaequiciliata Skuja	21873	0.5
Chrysophyte	32372	2.8
Salpingoeca frequestissima (Zach.) Lemm.	9624	0.4
Kephyrion obliquum Hilliard	3500	0.0
Ochromonas sp.	4375	1.3
Cryptomonas ovata Erh.	3500	4.2
Cryptomonas erosa Erh.	4375	4.6
Rhodomonas minuta Skuja	26247	1.3
Cryptomonas erosa v. reflexa Mars.	10499	6.1
Cryptomonas Marssonii Skuja	10499	1.4
Katablepharis ovalis Skuja	7874	0.5
Rhodomonas lens	9624	3.1
Gymnodinium eurytopum Skuja	1750	3.8
Amphidinium luteum	1750	0.6
Ceratium hirundinella (Mueller) Schrank	1750	193.9
Gymnodinium uberrium (Allman) Kofoid & Sw	875	18.1
Gymnodinium ordinatum Skuja	11374	10.1
Pennate diatom	875	0.1
Synedra delicatissima W. Sm.	3500	1.0
Centric diatom (18u)	875	2.0
Rhizosolenia longiseta Zach.	1750	4.9
Tabellaria fenestrata (Lygnb.) Kuetz.	875	6.5
Centric diatom (10u)	875	1.4
Stephanodiscus niagarae Ehr.	3500	173.7
Centric diatom (30u)	1750	16.7
Melosira granulata (Ehr.) Ralfs	875	4.0
Fragilaria crotonensis Kitton	2625	38.2
Centric diatom (21u)	875	3.0
Centric diatom (20u)	7874	26.1
Centric diatom (14u)	3500	3.5
Centric diatom (7u)	16623	3.2
Centric diatom (6u)	6999	0.7
Centric diatom (5u)	3500	0.2
Ciliate	875	2.2
Ciliate	875	1.2
Urotricha sp.	875	0.6
Strobilidium sp.	875	3.3
Ciliate	875	4.8
Strombidium sp.	875	42.5
Ciliate	875	10.8

Bottom

Taxon	Cells/L	biomass mg/m³
Chroococcus limneticus Lemm.	6562	4.8
Lyngbya limnetica Lemm.	13124	7.4
Anabaena circinalis Rabenhorst	1094	1.3
Gleocapsa punctata Naegli	2187	0.2
Anabaena planctonica Brunnthaler	1094	1.5
Gomphosphaeria lacustris v. compacta Lemm	12030	8.4
Rhabdoderma lineare Schmidle & Lauterbom	1094	0.0
Oscillatoria Utermoehlii (Uterm.) J. de T	1094	0.9
Anabaena flos-aquae (Lyngbye) Breb.	1094	7.5
Microcystis aeruginosa Kuetz.	1094	4.6
Cyanophyte	102802	2.7
Golenkia radiata (Chod.) Wille	2187	0.5
Oocystis Borgei Snow	9843	4.7
Crucigenia rectangularis (A. Braun) Gay	1094	0.6
Oocystis lacustris Chodat	5468	3.0
Oocystis pusilla Hansgirg	4375	0.5
Elakatothrix viridis (Snow) Printz	1094	0.0
Monoraphidium contortum (Thuret in Breb.)	1094	0.0
Oocystis parva West & West	2187	0.5
Gloeotila pelagica (Nygaard) Skuja	3281	4.2
Gloeocystis planktonica (W.&W.) Lemm.	1094	0.3
Elakatothrix lacustris	2187	0.1
Scenedesmus quadricauda (Turp.) Breb.	1094	0.2
Aphanocapsa elachista v. conferta W.&W.	1094	2.3
Chlorophyta	2187	0.2
Monoraphidium contortum (Thuret in Breb.)	2187	0.1
Oocystis submarina v. variabilis Skuja	63431	5.2
Chlamydomonas gloeophila Skuja	4375	1.5
Petalomonas curvata Skuja	3281	0.6
Dinobryon sociale Ehr.	1094	0.0
Dinobryon bavaricum Imhof	1094	0.4
Erkenia subaequiciliata Skuja	19685	0.4
Chrysophyte	2187	0.1
Chrysophyte	98427	8.6
Ochromonas sp.	2187	0.2
Pleuromonas nastua Skuja	4375	0.3
Stichogloea Doederleinii (Schmidle) Wille	2187	0.5
Bicoeca cylindrica (Lackey) Bourrelly	2187	0.1
Dinobryon cylindricum	19685	0.7
Ceroobodo alexeievii Lemm.	6562	1.0
Cryptomonas Marssonii Skuja	7655	1.8
Cryptomonas erosa v. reflexa Mars.	14217	6.9
Cryptomonas erosa Erh.	9843	7.9
Cryptomonas ovata Erh.	1094	0.9
Rhodomonas minuta Skuja	87491	4.9
Katablepharis ovalis Skuja	17498	2.2
Rhodomonas lens	4375	1.3
Peridinium pusillum (Penard) Lemm.	1094	0.4
Gymnodinium ordinatum Skuja	4375	3.2
Synedra delicatissima W. Sm.	2187	0.6
Centric diatom (20u)	1094	3.4
Pennate diatom	1094	0.2
Nitzschia sp. Hassall	1094	0.3
Stephanodiscus niagarae Ehr.	2187	195.9
Synedra nana Meister	1094	0.1
Melosira granulata (Ehr.) Ralfs	1094	9.4
Pennate diatom	1094	0.0
Rhizosolenia longiseta Zach.	1094	3.1
Synedra acus Kuetzing	1094	1.2
Centric diatom (6u)	1094	0.7
Centric diatom (6u)	15311	3.1
Centric diatom (8u)	17498	1.9
Ciliate	1094	3.3
Mesodinium sp.	1094	0.9
Cyclidium sp.	1094	1.6
Ciliate	4375	23.0

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

September 18, 1994

Surface

Taxon	Cells/L	biomass mg/m³
Anabaena solitaria fa. planktonica Brunnt	1750	1.6
Microcystis aeruginosa Kuetz.	1750	4.6
Gomphosphaeria lacustris v. compacta Lemm	5249	2.3
Anabaena circinalis Rabenhorst	6999	12.2
Nephrocytium agardhianum Naegeli	1750	1.0
Aphanocapsa elachista v. planctonica G.M.	6999	8.4
Gleocapsa punctata Naegli	1750	0.9
Chroococcus dispersus v. minor G.M. Sm.	5249	1.3
Chroococcus limneticus Lemm.	1750	3.7
Lyngbya limnetica Lemm.	6999	6.0
Aphanizomenon gracile Lemm.	10499	19.6
Cyanophyte	64743	1.5
Monoraphidium contortum (Thuret in Breb.)	5249	0.2
Ankistrodesmus setigerus (Schroeder) West	1750	0.1
Gloeotila pelagica (Nygaard) Skuja	1750	5.5
Crucigenia quadrata Morren	5249	1.2
Oocystis Borgei Snow	3500	7.0
Coelastrum cambricum Archer	1750	1.8
Elakatothrix lacustris	3500	0.4
Crucigenia irregularis Wille	5249	2.1
Ankistrodesmus falcatus (Chorda) Ralfs	3500	0.1
Oocystis pusilla Hansgirg	1750	0.9
Dictyosphaerium elegans Bachmanni	1750	0.6
Sphaerocystis Schroeteri Chodat	6999	7.5
Chlorophyta	8749	4.6
Oocystis parva West & West	15748	11.1
Oocystis submarina v. variabilis Skuja	20998	1.1
Oocystis pusilla Hansgirg	27997	8.8
Golenkia radiata (Chod.) Wille	13999	2.5
Salpingoeca frequestissima (Zach.) Lemm.	6999	0.5
Ciliate	1750	9.8
Mallomonas papillosa Harris & Bradley	5249	7.1
Dinobryon sociale Ehr.	3500	0.6
Dinobryon bavaricum Imhof	1750	0.2
Mallomonas pseudocornata Prescott	1750	6.5
Dinobryon cylindricum	3500	0.3
Erkenia subaequiciliata Skuja	43745	0.8
Chromulina sp. Cienkowski	5249	1.6
Chrysophyte	8749	0.3
Chrysophyte	27997	1.8
Chrysophyte	1750	0.3
Chrysophyte	1750	0.2
Chrysophyte	1750	0.2
Ochromonas globosa Skuja	3500	0.9
Salpingoeca frequestissima (Zach.) Lemm.	55994	2.5
Cryptomonas erosa v. reflexa Mars.	41996	53.9
Cryptomonas erosa Ern.	66493	92.2
Cryptomonas ovata Ern.	24497	21.8
Cryptomonas reflexa Skuja	1750	2.6
Cryptomonas platyuris Skuja	1750	4.6
Cryptomonas Marssonii Skuja	8749	1.7
Cryptomonas curvata Ehr.	1750	10.5
Rhodomonas minuta Skuja	138235	9.5
Cryptomonas pusilla Bach.	5249	0.8
Rhodomonas lens	26247	13.2
Ceratium hirundinella (Mueller) Schrank	1750	237.8
Peridinium inconspicuum Lemm.	1750	10.6
Peridinium Volzii Lemm.	1750	2.3
Rhizosolenia longiseta Zach.	12249	32.5
Synedra delicatissima W. Sm.	8749	3.3
Asterionella formosa Hassall	1750	6.7
Fragilaria crotonensis Kitton	12249	26.6
Centric diatom (16u)	3500	5.3
Lagerheimia genevensis Skuja	3500	10.6
Pennate diatom	1750	6.8
Entomoneis ornata (Bail.) Reim.	1750	135.8
Synedra delicatissima v. angustissima Gru	1750	7.5
Fragilaria sp. Lyngb.	1750	15.0
Synedra acus Kuetzing	3500	8.7
Rhizosolenia eriensis H.L. Smith	1750	31.9
Centric diatom (7u)	19248	2.7
Centric diatom (8u)	43745	13.3
Centric diatom (16u)	13999	20.6
Ciliate	1750	12.9
Ciliate	8749	28.2
Strobilidium sp.	1750	0.6
Ciliate	5249	10.2
Ciliate	1750	39.4
Strobilidium sp.	6999	3.2

Bottom

Taxon	Cells/L	biomass mg/m³
Lyngbya limnetica Lemm.	6999	4.8
Anabaena flos-aquae (Lyngbye) Breb.	1750	4.1
Aphanocapsa elachista v. conferta W.&W.	2625	9.5
Gomphosphaeria lacustris v. compacta Lemm	3500	0.7
Microcystis aeruginosa Kuetz.	875	0.6
Anabaena circinalis Rabenhorst	5249	14.2
Aphanizomenon gracile Lemm.	3500	9.0
Chroococcus limneticus Lemm.	1750	0.2
Cyanophyte	43745	1.5
Merismopedia tenuissima Lemm.	1750	0.2
Ulothrix subtillissima Rabenhorst	1750	2.7
Planktosphaeria gelatinosa G.M. Sm.	1750	1.6
Dictyosphaerium elegans Bachmanni	1750	0.4
Monoraphidium contortum (Thuret in Breb.)	5249	0.2
Oocystis submarina Lagerheim	1750	1.1
Oocystis parva West & West	1750	1.3
Pediastrum Boryanum (Turp.) Menegh.	1750	19.7
Gloeotila pelagica (Nygaard) Skuja	1750	3.3
Ankistrodesmus setigerus (Schroeder) West	1750	0.0
Planktosphaeria gelatinosa G.M. Sm.	5249	3.4
Cosmarium depressum (Naegeli) Lund	1750	1.8
Oocystis submarina v. variabilis Skuja	34996	3.7
Scenedesmus quadricauda (Turp.) Breb.	1750	0.6
Crucigenia quadrata Morren	1750	0.2
Crucigenia irregularis Wille	3500	2.5
Oocystis Borgei Snow	1750	0.6
Scourfieldia cordiformis Takeda	1750	0.6
Tetraedron minimum (A. Braun) Hansgirg.	1750	0.2
Menoidium tortuosum Stokes	1750	0.9
Petalomonas curvata Skuja	1750	0.8
Petalomonas curvata Skuja	1750	0.5
Dinobryon sociale Ehr.	3500	1.5
Mallomonas cratis Harris & Bradley	1750	5.0
Mallomonas pumilio v. canadensis Holgren	3500	11.2
Mallomonas papillosa Harris & Bradley	1750	1.0
Mallomonas cratis Harris & Bradley	3500	6.3
Mallomonas zellensis Fott	1750	4.4
Erkenia subaequiciliata Skuja	13999	0.3
Stichogloea Doederleinii (Schmidle) Wille	1750	0.2
Chrysophyte	31497	1.1
Chrysophyte	1750	0.3
Dinobryon cylindricum	5249	0.1
Ochromonas sp.	3500	0.9
Cryptomonas erosa Ern.	15748	23.9
Cryptomonas erosa v. reflexa Mars.	17498	8.6
Cryptomonas Marssonii Skuja	4375	0.6
Cryptomonas ovata Ern.	6124	19.7
Cryptomonas curvata Ehr.	3500	26.5
Rhodomonas minuta Skuja	38496	2.6
Cryptomonas tenuis Pasch.	1750	0.4
Katablepharis ovalis Skuja	10499	0.7
Rhodomonas lens	3500	1.4
Cryptomonas pusilla Bach.	3500	0.5
Cryptomonas tenuis Pasch.	5249	0.7
Gymnodinium ordinatum Skuja	875	1.4
Ceratium hirundinella (Mueller) Schrank	875	66.3
Gymnodinium varians Skuja	3500	0.5
Peridinium pusillum (Penard) Lemm.	1750	6.8
Rhizosolenia eriensis H.L. Smith	5249	12.5
Melosira granulata (Ehr.) Ralfs	3500	30.2
Cyclotella comta (Ehr.) Kuetz.	1750	26.2
Rhizosolenia longiseta Zach.	7874	5.9
Synedra nana Meister	15748	1.3
Tabellaria fenestrata (Lygnb.) Kuetz.	3500	17.1
Fragilaria crotonensis Kitton	17498	24.4
Synedra delicatissima W. Sm.	6999	3.6
Fragilaria sp. Lyngb.	5249	18.4
Centric diatom (16u)	1750	2.9
Asterionella formosa Hassall	875	1.9
Cyclotella comta (Ehr.) Kuetz.	1750	14.5
Pennate diatom	875	0.1
Stephanodiscus niagarae Ehr.	5249	245.3
Synedra sp.	875	0.2
Synedra delicatissima v. angustissima Gru	4375	18.9
Centric diatom (12u)	1750	1.2
Centric diatom (8u)	8749	1.7
Centric diatom (6u)	12249	1.6
Centric diatom (4u)	5249	0.1
Ciliate	1750	3.5
Ciliate	1750	2.4
Ciliate	4375	48.0
Ciliate	1750	5.6
Urotricha sp.	1750	1.3

Appendix Table 17 (cont.). Algal and ciliate concentration and biomass by size at Prospect Point, 1992-1994

October 9, 1994

Surface

Taxon	Cells/L	biomass mg/m^3
Lyngbya limnetica Lemm.	6562	3.2
Oscillatoria limnetica Lemm.	29528	12.3
Aphanizomenomon gracile Lemm.	22966	32.9
Dactylococcopsis acicularis Lemm.	3281	0.3
Cyanophyte	49214	0.7
Crucigenia quadrata Morren	6562	3.2
Oocystis parva West & West	16405	5.7
Ankistrodesmus falcatus (Chorda) Ralfs	13124	0.5
Monoraphidium contortum (Thuret in Breb.)	22966	1.0
Planktonema nasuta Skuja	6562	3.4
Elakatothrix lacustris	3281	0.3
Tetraedron minimum (A. Braun) Hansgirg	3281	2.1
Oocystis parva West & West	3281	0.9
Oocystis Borgei Snow	9843	3.6
Pediastrum Boryanum (Turp.) Menegh.	3281	2.5
Scenedesmus quadracauda (Turpin) Breb.	13124	6.5
Mallomonas cratis Harris & Bradley	6562	8.7
Kephyrion littorale Lund	3281	0.1
Erkenia subaequiciliata Skuja	68899	1.2
Salpingoeca frequestissima (Zach.) Lemm.	101708	5.1
Chrysophyte	42652	5.3
Cryptomonas erosa Erh.	62337	85.6
Cryptomonas erosa v. reflexa Marsson	124674	86.5
Cryptomonas curvata Ehr.	22966	78.4
Cryptomonas Marssonii Skuja	26247	6.7
Cryptomonas ovata Erh.	13124	20.3
Cryptomonas reflexa Skuja	9843	6.4
Katablepharis ovalis Skuja	3281	0.2
Rhodomonas lens	9843	3.3
Cryptomonas phaseolus Skuja	3281	1.5
Rhodomonas minuta Skuja	134517	8.2
Rhodomonas tenuis Skuja	3281	1.2
Chroomonas Nordstedtii Hansgirg	6562	1.1
Gymnodinium inversum	6562	22.3
Gymnodinium ordinatum Skuja	6562	6.9
Gymnodinium varians Skuja	6562	3.1
Centric diatom (21u)	3281	15.5
Rhizosolenia longiseta Zach.	13124	21.5
Stephanodiscus niagarae Ehr.	3281	212.4
Rhizosolenia eriensis H.L. Smith	22966	459.1
Centric diatom (16u)	3281	5.3
Melosira granulata (Ehr.) Ralfs	42652	504.0
Fragilaria sp. Lyngb.	16405	45.6
Fragilaria crotonensis Kitton	42652	208.6
Asterionella formosa Hassall	13124	39.5
Pennate diatom	3281	16.5
Synedra delicatissima W. Sm.	6562	8.3
Synedra sp.	3281	2.8
Centric diatom (6u)	436360	50.1
Centric diatom (8u)	157483	27.8
Centric diatom (10u)	26247	12.4
Centric diatom (4u)	6562	0.2
Ciliate	6562	6.7
Strobilidium sp.	3281	4.4

Bottom

Taxon	Cells/L	biomass mg/m^3
Aphanizomenon gracile Lemm.	45933	54.3
Gomphosphaeria lacustris v. compacta Lemm	13124	7.6
Oscillatoria limnetica Lemm.	39371	23.4
Lyngbya limnetica Lemm.	3281	0.9
Cyanophyte	26247	0.3
Dactylococcopsis Smithii R. & F. Chod.	3281	0.0
Aphanocapsa delicatissima W.&W.	3281	6.9
Chroococcus limneticus Lemm.	3281	3.5
Gomphosphaeria aponica Kuetz.	6562	15.8
Monoraphidium contortum (Thuret in Breb.)	29528	1.1
Ankistrodesmus falcatus (Chorda) Ralfs	9843	0.4
Pediastrum Boryanum (Turp.) Menegh.	6562	110.9
Dictyosphaerium elegans Bachmanni	3281	8.6
Sphaerocystis Schroeteri Chodat	9843	1.8
Oocystis parva West & West	6562	7.4
Scenedesmus incrassatulus Bohlin	6562	1.5
Elakatothrix lacustris	3281	0.2
Mallomonas cratis Harris & Bradley	26247	35.0
Mallomonas pumilio v. canadensis Holgren	3281	10.6
Erkenia subaequiciliata Skuja	160764	4.8
Chrysophyte	9843	6.0
Kephyrion littorale Lund	6562	0.3
Bicoeca socialis Lauterbom	22966	2.0
Mallomonas coronata Bolochonzew	6562	19.8
Dinobryon sociale Ehr.	3281	0.8
Salpingoeca frequestissima (Zach.) Lemm.	42652	2.5
Chrysophyte	6562	0.4
Cryptomonas erosa Erh.	75461	147.9
Cryptomonas erosa v. reflexa Mars.	170607	91.9
Cryptomonas Marssonii Skuja	39371	10.6
Cryptomonas ovata Erh.	6562	6.9
Cryptomonas curvata Ehr.	22966	34.3
Rhodomonas minuta Skuja	88584	5.7
Cryptomonas pusilla Bach.	6562	3.9
Cryptomonas tenuis Pasch.	9843	3.2
Cryptomonas tetrapyenoidosa Skuja	13124	20.0
Katablepharis ovalis Skuja	6562	0.4
Cryptomonas pusilla Bach.	13124	3.7
Gymnodinium ordinatum Skuja	13124	13.9
Gymnodinium helveticum v. achroum Penard	3281	47.5
Stephanodiscus niagarae Ehr.	39371	1849.8
Cyclotella comta (Ehr.) Kuetz.	3281	31.4
Tabellaria fenestrata (Lygnb.) Kuetz.	6562	111.8
Rhizosolenia eriensis H.L. Smith	62337	289.7
Fragilaria sp. Lyngb.	22966	86.2
Fragilaria crotonensis Kitton	82023	318.5
Asterionella formosa Hassall	19685	51.4
Melosira granulata (Ehr.) Ralfs	68899	1273.8
Centric diatom (6u)	439641	44.8
Centric diatom (8u)	91865	18.5
Centric diatom (4u)	6562	0.2
Rhizosolenia longiseta Zach.	3281	5.8
Centric diatom (10u)	13124	5.7
Urotricha sp.	13124	12.7
Strobilidium sp.	3281	1.1
Ciliate	3281	38.7
Urotricha sp.	22966	21.2
Ciliate	6562	118.5
Ciliate	3281	6.2
Vorticella sp.	3281	21.8

Appendix Table 18. Algal and ciliate concentration (cells per liter) and biomass (mg/m^3) by major taxon, Prospect Point 1992-1994.

1992

	July 30 surface		July 31 bottom		August 13 surface		August 13 bottom	
Algal group	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass
Cyanobacteria	113652	104.1	26248	17.4	341216	276.9	290907	50.8
Chlorophyta	30408480	1092.1	84833260	4098.2	166757500	6093.6	231962100	5305.0
Euglenophyta	0	0.0	0	0.0	0	0.0	0	0.0
Chrysophyta	6562	0.1	16405	1.1	96239	35.4	144360	
Cryptophyta	19685	1.3	0	0.0	13124	7.7	13124	5.6
Pyrrophyta	14698	1890.6	1094	151.7	4375	469.2	1094	151.7
Diatoms	78217	771.3	115928	1002.8	34998	264.4	34997	156.4
Total Algae	30641290	3859.4	84992940	5271.3	167247400	7147.1	232446600	5709.1
Total Ciliate	7612	60.0	4375	4.0	8749	5.5	20779	23.2

	Sept 16 surface		Sept 16 bottom		Oct 4 surface		Oct 4 bottom	
Algal group	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass
Cyanobacteria	212895	276.7	463702	386.5	269033	311.8	126863	86.3
Chlorophyta	4635553	294.8	4413909	395.3	2318503	235.8	3265593	86.9
Euglenophyta	0	0.0	0	0.0	0	0.0	0	0.0
Chrysophyta	122487	8.9	349962	20.8	260284	17.0	242788	20.1
Cryptophyta	104989	23.9	139984	62.0	69993	8.9	8749	0.3
Pyrrophyta	0	0.0	0	0.0	0	0.0	0	0.0
Diatoms	217267	6469.6	297468	3963.4	459325	9834.1	391525	7275.6
Total Algae	5293191	7073.9	5665025	4828.1	3377138	10407.8	4035518	7469.2
Total Ciliate	13123	43.3	2187	6.7	0	0.0	34996	56.2

Appendix Table 18 (cont.). Algal and ciliate concentration (cells per liter) and biomass(mg/m^3) by major taxon, Prospect Point 1992-1994.

1993

	Jan 28 surface		Jan 28 bottom		March 26 surface		March 26 bottom		May 21 surface		May 21 bottom	
Algal group	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass
Cyanobacteria	74367	134.3	59056	137.9	452765	1271.6	100613	43.8	65621	56.3	4375	1.2
Chlorophyta	2136962	102.1	2272572	158.6	18963630	1079.9	6454632	246.2	463702	64.7	4991351	323.2
Euglenophyta	0	0.0	0	0.0	0	0.0	6561	18.6	0	0.0	0	0.0
Chrysophyta	69992	3.7	306217	24.2	1364856	65.3	166232	56.3	1496094	170.2	264223	39.4
Cryptophyta	253723	34.4	52494	4.9	367460	49.0	647432	185.6	314967	130.6	83992	44.9
Pyrrophyta	6562	180.9	6562	31.6	52494	467.0	174982	104.0	78742	572.6	30623	778.3
Diatoms	111549	932.6	74367	683.5	229662	512.7	511819	1577.2	402458	9425.9	163610	3636.6
Total Algae	2653155	1388.0	2771268	1040.7	21430870	3445.6	8062271	2231.7	2821584	10420.3	5538174	4823.6
Total Ciliate	2187	79.4	13123	18.5	52494	44.0	61243	92.7	52495	459.6	34998	45.5

	June 19 surface		June 19 Bottom		July 15 surface		July 15 bottom		Aug 13 surface		Aug 13 bottom	
Algal group	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass
Cyanobacteria	107615	94.2	60369	75.0	129869	60.8	818913	219.2	546819	532.1	424330	238.7
Chlorophyta	1060390	73.3	926526	901.5	530413	19.1	204727	177.9	498699	354.0	721801	88.7
Euglenophyta	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Chrysophyta	850410	103.9	377959	45.6	0	0.0	493447	29.8	266846	24.2	236225	169.7
Cryptophyta	115488	51.4	194229	33.3	0	0.0	136485	25.3	214352	68.7	107988	26.5
Pyrrophyta	0	0.0	5249	228.7	0	0.0	10499	6.6	26248	8056.5	13124	1396.8
Diatoms	154860	3132.9	215226	3374.1	17771	14.9	427829	9562.3	139988	3371.5	109366	1971.9
Total Algae	2288763	3455.6	1779558	4658.2	678053	94.8	2091900	10021.1	1692952	12407.0	1609834	3892.3
Total Ciliate	68242	918.8	57744	135.9	0	0.0	94490	268.5	21874	744.1	26248	81.8

Appendix Table 18 (cont.). Algal and ciliate concentration (cells per liter) and biomass(mg/m^3) by major taxon, Prospect Point 1992-1994.

1993

	Sept 17 surface		Sept 17 bottom		Oct 6 surface		Oct 6 bottom	
Algal group	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass
Cyanobacteria	367460	420.4	813663	111.6	629935	606.0	1039389	501.9
Chlorophyta	9658981	1080.2	7760432	696.4	157482	207.4	1223115	269.7
Euglenophyta	0	0.0	0	0.0	0	0.0	0	0.0
Chrysophyta	131236	20.0	148734	5.2	524945	26.3	960646	51.7
Cryptophyta	122487	50.0	43745	19.0	110238	22.7	346463	25.9
Pyrrophyta	0	0.0	8749	2000.0	10499	6.2	0	0.0
Diatoms	586188	12563.4	551190	15639.7	813662	22429.3	640428	25310.2
Total Algae	10866350	14133.8	9326513	18471.8	2246761	23297.9	4210041	26159.5
Total Ciliate	17498	34.1	8749	23.8	20996	41.5	10498	18.7

Appendix Table 18 (cont.). Algal and ciliate concentration (cells per liter) and biomass(mg/m^3) by major taxon, Prospect Point 1992-1994.

1994

	March 18 surface		March 18 bottom		May 26 surface		May 26 bottom		June 9 surface		June 9 bottom	
Algal group	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass
Cyanobacteria	123582	21.7	843194	79.8	26248	8.9	17499	4.2	36745	68.5	10498	4.0
Chlorophyta	14218	6.2	49215	5.9	1902925	121.2	1627329	95.8	650931	40.5	850410	64.9
Euglenophyta	0	0.0	0	0.0	0	0.0	4375	13.4	0	0.0	0	0.0
Chrysophyta	448391	28.6	199041	35.9	3661489	303.1	1456721	168.5	2503987	170.8	1044640	150.7
Cryptophyta	307312	31.0	32809	6.4	949276	155.5	319341	66.0	855660	352.3	456701	167.3
Pyrrophyta	14218	110.4	1094	1.1	21873	37.5	43746	280.2	36746	114.6	26246	125.5
Diatoms	225290	38.0	34997	80.7	608062	1394.1	424331	3003.3	734919	5432.7	320215	3313.9
Total Algae	1133011	236.0	1160350	209.8	7169873	2020.2	3893342	3631.3	4818988	6179.3	2708710	3827.0
Total Ciliate	5468	18.2	13124	47.3	52496	824.6	34997	108.6	52493	175.3	31496	185.8

	June 23 surface		June 23 bottom		July 7 surface		July 7 bottom		July 21 surface		July 21 bottom	
Algal group	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass
Cyanobacteria	20997	43.6	68242	90.8	59057	75.6	194228	90.6	132879	184.2	888584	190.7
Chlorophyta	1291363	102.8	1265117	58.2	2119466	291.5	1900298	889.9	123034	95.1	113192	79.3
Euglenophyta	0	0.0	5249	95.3	0	0.0	0	0.0	0	0.0	6562	3.3
Chrysophyta	1223121	116.4	1496093	112.0	570877	43.0	278221	13.0	196855	31.8	154202	36.6
Cryptophyta	194230	20.2	456701	100.2	413395	24.5	451452	59.8	65619	12.6	154203	15.2
Pyrrophyta	0	0.0	62993	992.1	0	0.0	10499	59.1	0	0.0	9843	690.6
Diatoms	125985	647.0	561689	4307.7	347776	1986.7	519695	4559.8	159124	1561.7	270676	1943.0
Total Algae	2855696	929.9	3916084	5756.3	3510571	2421.3	3354393	5672.1	677511	1885.4	797262	2958.7
Total Ciliate	15748	20.7	26246	60.3	19686	24.5	26247	27.5	6561	77.5	11482	16.0

Appendix Table 18 (cont.). Algal and ciliate concentration (cells per liter) and biomass(mg/m3) by major taxon, Prospect Point 1992-1994.

1994

	Aug 4 surface		Aug 4 bottom		Aug 17 surface		Aug 17 bottom		Sept 1 surface	
Algal group	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass
Cyanobacteria	141079	586.8	172796	223.7	79286	117.8	41702	24.8	111113	80.4
Chlorophyta	78742	58.7	124677	95.5	85848	32.8	38787	48.9	95367	43.0
Euglenophyta	0	0.0	4375	6.7	0	0.0	1750	1.9	0	0.0
Chrysophyta	264660	30.3	50309	11.6	75462	12.3	31642	7.0	115491	9.8
Cryptophyta	106084	25.3	54681	23.5	131236	25.6	51619	16.9	72618	21.3
Pyrrophyta	8749	519.7	13125	967.3	15857	183.0	583	58.8	17499	226.5
Diatoms	25153	176.7	161858	1251.5	20777	45.4	30332	118.0	56871	285.3
Total Algae	624467	1397.5	581821	2579.7	408466	416.9	196415	276.2	468959	666.3
Total Ciliate	8749	18.2	6562	15.8	12029	45.0	8019	37.2	6125	65.4

	Sept 1 bottom		Sept 18 surface		Sept 18 bottom		Oct 9 surface		Oct 9 bottom	
Algal group	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass
Cyanobacteria	143269	39.5	115487	63.0	71743	44.7	111551	49.4	144361	112.8
Chlorophyta	108272	23.7	129487	55.7	73494	43.8	101710	29.8	75462	131.8
Euglenophyta	3281	0.6	0	0.0	5250	2.2	0	0.0	0	0.0
Chrysophyta	159670	12.3	174982	33.7	73495	32.2	223102	20.5	288720	82.3
Cryptophyta	142173	25.9	316716	210.7	110239	85.5	419956	299.5	452766	328.4
Pyrrophyta	5469	3.5	5250	250.8	7000	75.1	19686	32.3	16405	61.4
Diatoms	47029	220.0	131239	327.1	111113	428.0	800542	1629.5	859597	4087.6
Total Algae	609163	325.6	873161	941.1	452334	711.4	1676547	2060.9	1837311	4804.1
Total Ciliate	7657	28.8	26247	94.6	11375	60.9	9843	11.0	55776	220.2

Appendix Table 19. Algal concentration (cells per L) and biomass (mg/m^3) by size for Prospect Point 1992-1994.

1992

	July 30 surface		July 31 bottom		August 13 surface		August 13 bottom	
Size	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass
0µm-2µm	0	0.0	0	0.0	0	0.0	0	0.0
2.01µm-10µm	30335250	1009.9	84794990	4049.5	166656000	6023.8	232169900	5047.9
10.01µm-20µm	91866	69.9	39372	43.4	258099	134.5	217635	108.3
20.01µm-40µm	170609	724.8	91866	440.2	79618	224.4	14217	21.7
40.01µm-64µm	19160	616.6	32811	539.7	45496	263.4	18592	72.0
>64µm	24410	1438.3	33905	198.4	208230	501.0	26249	459.3

	Sept 16 surface		Sept 16 bottom		Oct 4 surface		Oct 4 bottom	
Size	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass
0µm-2µm	0	0.0	2187	3.7	0	0.0	0	0.0
2.01µm-10µm	4739084	237.1	4626075	303.3	2508797	209.7	3466823	128.6
10.01µm-20µm	153109	104.6	122486	25.6	91865	45.7	43745	27.7
20.01µm-40µm	81658	462.3	360896	1181.8	297468	1070.7	150922	990.7
40.01µm-64µm	64160	3365.4	347777	2549.4	262471	6957.4	212167	5296.1
>64µm	255180	2904.5	205604	764.4	216537	2124.2	161861	1026.2

Appendix Table 19 (cont.). Algal concentration (cells per L) and biomass (mg/m^3) by size for Prospect Point 1992-1994.

1993

	Jan 28 surface		Jan 28 bottom		March 26 surface		March 26 bottom		May 21 surface		May 21 bottom	
Size	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass
0µm-2µm	0	0.0	0	0.0	0	0.0	0	0.0	0	0	0	0.0
2.01µm-10µm	2294445	215.5	2580977	168.3	20577830	2400.6	6883338	299.0	1754191	72.7	5196954	325.0
10.01µm-20µm	244974	22.0	65617	31.1	419954	79.7	822413	362.3	393710	216.9	86618	51.6
20.01µm-40µm	87490	279.7	67806	446.4	282157	483.3	120298	610.5	231852	2540.9	70868	306.1
40.01µm-64µm	10936	300.1	15311	260.9	6562	390.2	32808	546.9	201230	7384.4	78742	3606.9
>64µm	15310	570.8	41557	134.0	144360	91.8	203414	413.2	240601	205.4	104992	534.0

	June 19 surface		June 19 Bottom		July 15 surface		July 15 bottom		Aug 13 surface		Aug 13 bottom	
Size	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass
0µm-2µm	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
2.01µm-10µm	1881928	84.4	1118132	34.8	597398	32.9	1175876	57.9	616809	23.0	826788	30.8
10.01µm-20µm	112863	63.3	317590	97.1	13670	11.4	251973	152.8	279971	165.8	205605	225.0
20.01µm-40µm	194230	640.4	194229	1144.8	1367	0.4	209976	797.4	192482	456.6	153109	272.2
40.01µm-64µm	39372	2558.4	73491	2396.4	2734	1.1	162732	7975.2	126863	3262.8	56869	1662.2
>64µm	60370	109.1	76116	985.1	62884	49.0	291343	1038.0	476827	8498.9	367463	1702.2

	Sept 17 surface		Sept 17 bottom		Oct 6 surface		Oct 6 bottom	
Size	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass	Conc.	Biomass
0µm-2µm	17498	43.3	17498	4.8	0	0.0	10499	9.9
2.01µm-10µm	9737723	824.8	8294126	636.1	808416	149.1	2719209	199.2
10.01µm-20µm	131236	59.8	183730	32.0	241475	246.8	503943	182.1
20.01µm-40µm	446203	1645.5	314965	1803.0	656179	3747.1	356958	6822.0
40.01µm-64µm	288719	11177.5	376210	13635.5	435704	18988.1	509195	18451.3
>64µm	244973	383.0	139984	2360.5	104987	166.9	110237	495.1

Appendix Table 19 (cont.). Algal concentration (cells per L) and biomass (mg/m^3) by size for Prospect Point 1992-1994

1994

	March 18 surface		March 18 bottom		May 26 surface		May 26 bottom		June 9 surface		June 9 bottom	
Size	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass
0µm-2µm	2187	0.2	0	0.0	0	0.0	13124	3.4	0	0.0	0	0.0
2.01µm-10µm	793980	65.3	1049890	75.7	5695650	371.2	3162791	233.3	3076177	150.2	2152274	104.3
10.01µm-20µm	299657	36.1	68899	37.9	774294	200.4	306219	127.5	587936	158.2	167982	150.8
20.01µm-40µm	19687	116.1	19687	84.5	78744	209.9	100615	230.0	299218	690.7	131233	319.8
40.01µm-64µm	1094	0.1	1094	1.6	34997	952.6	34997	2831.8	115487	4707.4	68242	3199.4
>64µm	16406	18.2	20780	10.2	586188	286.2	275596	205.4	740170	472.8	188979	52.7

	June 23 surface		June 23 bottom		July 7 surface		July 7 bottom		July 21 surface		July 21 bottom	
Size	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass
0µm-2µm	5249	12.8	5249	9.3	0	0.0	0	0.0	183731	30.5	36090	3.9
2.01µm-10µm	2509237	126.4	2787457	109.6	2578791	139.6	2304508	670.0	160766	225.1	298563	105.6
10.01µm-20µm	99739	79.9	425204	154.9	465890	50.9	425205	65.4	103349	113.1	121394	115.2
20.01µm-40µm	99738	219.3	257221	1033.7	183732	905.9	199477	834.9	86944	257.5	96786	201.4
40.01µm-64µm	20998	288.0	110238	3390.5	111551	1069.5	136485	2971.6	72180	1028.3	165686	1608.8
>64µm	120735	203.5	330715	1058.3	170607	255.3	288718	1130.3	70541	230.9	78743	923.9

	Aug 4 surface		Aug 4 bottom		Aug 17 surface		Aug 17 bottom		Sept 1 surface		Sept 1 bottom	
Size	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass
0µm-2µm	191387	11.1	21874	1.7	63977	4.3	16185	0.7	92741	6.0	211073	14.3
2.01µm-10µm	160765	42.5	157485	92.6	231303	41.6	97989	46.4	181108	39.4	253726	44.2
10.01µm-20µm	114833	260.3	76556	41.7	32808	36.2	26102	16.1	85743	69.6	82023	16.0
20.01µm-40µm	48120	42.5	118114	149.2	45930	49.5	36308	44.2	65619	81.6	47027	25.8
40.01µm-64µm	19686	168.2	153109	2162.4	9842	181.9	8749	146.8	10500	377.8	3281	196.2
>64µm	89676	872.9	54683	132.1	24606	103.4	11082	22.0	33248	91.7	12033	29.1

	Sept 18 surface		Sept 18 bottom		Oct 9 surface		Oct 9 bottom	
Size	Cells/l	Biomass	Cells/L	Biomass	Cells/L	Biomass	Cells/L	Biomass
0µm-2µm	99740	17.8	109363	14.6	127956	7.5	98427	9.7
2.01µm-10µm	488197	161.0	171486	84.8	1197531	335.3	1236902	423.3
10.01µm-20µm	183732	225.9	82243	104.0	147642	232.0	124676	210.7
20.01µm-40µm	52495	45.0	20999	67.8	29529	25.3	36091	202.0
40.01µm-64µm	3500	373.6	20123	344.8	9843	215.8	59057	1988.1
>64µm	45497	117.7	48120	95.5	164046	1245.1	282158	1970.3

Appendix Table 20. Zooplankton densities and percent composition at Prospect Point, 1992-1994.

July 31, 1992		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		30378.7	32085.3	31232.0	15.6	14.5	15.0
Acanthocyclops vernalis	total immature	341.0	0.0	170.5	0.2	0.0	0.1
	total adults	0.0	341.3	170.7	0.0	0.2	0.1
	Species total	341.0	341.3	341.2	0.2	0.2	0.2
Diacyclops bicuspidatus thomasi	total immature	84991.0	105472.0	95231.5	43.6	47.7	45.6
	total adults	2730.7	5120.0	3925.4	1.4	2.3	1.9
	Species total	87721.7	110592.0	99156.9	45.0	50.0	47.5
Mesocyclops edax	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	341.3	0.0	170.7	0.2	0.0	0.1
	Species total	341.3	0.0	170.7	0.2	0.0	0.1
Skistodiaptomus oregonensis	total immature	11264.0	12288.0	11776.0	5.8	5.6	5.7
	total adults	5120.0	14336.0	9728.0	2.6	6.5	4.6
	Species total	16384.0	26624.0	21504.0	8.4	12.0	10.2
Bosmina longirostris	Species total	1877.3	512.0	1194.7	1.0	0.2	0.6
Chydorus sphaericus	Species total	4437.3	5006.3	4721.8	2.3	2.3	2.3
Daphnia spp	Species total	51882.7	45397.4	48640.1	26.6	20.5	23.6
Diaphanosoma sp	Species total	1536.0	682.7	1109.4	0.8	0.3	0.5
Total		194900.0	221241.0	208070.5	100.0	100.0	100.0

August 13, 1992		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		14643.2	7897.9	11270.6	18.2	17.7	18.0
Acanthocyclops vernalis	total immature	102.0	0.0	51.0	0.1	0.0	0.1
	total adults	0.0	0.0	0.0	0.0	0.0	0.0
	Species total	102.0	0.0	51.0	0.1	0.0	0.1
Diacyclops bicuspidatus thomasi	total immature	29388.0	18610.0	23999.0	36.5	41.8	39.2
	total adults	4710.4	3086.6	3898.5	5.9	6.9	6.4
	Species total	34098.4	21696.6	27897.5	42.4	48.7	45.6
Mesocyclops edax	total immature	204.0	273.0	238.5	0.3	0.6	0.4
	total adults	102.4	363.1	232.8	0.1	0.8	0.5
	Species total	306.4	636.1	471.3	0.4	1.4	0.9
Skistodiaptomus oregonensis	total immature	8703.0	3813.0	6258.0	10.8	8.6	9.7
	total adults	819.2	363.1	591.2	1.0	0.8	0.9
	Species total	9522.2	4176.1	6849.2	11.8	9.4	10.6
Chydorus sphaericus	Species total	3072.0	847.3	1959.7	3.8	1.9	2.9
Daphnia spp	Species total	17715.2	8805.7	13260.5	22.0	19.8	20.9
Diaphanosoma sp	Species total	989.9	453.9	721.9	1.2	1.0	1.1
Total		80449.3	44513.6	62481.5	100.0	100.0	100.0

Appendix Table 20 (cont.). Zooplankton densities and percent composition at Prospect Point, 1992-1994.

September 16, 1992		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		3498.9	4675.2	4087.1	11.2	12.8	12.0
Diacyclops bicuspidatus thomasi	total immature	5132.0	10984.0	8058.0	16.4	30.1	23.3
	total adults	816.4	998.7	907.6	2.6	2.7	2.7
	Species total	5948.4	11982.7	8965.6	19.0	32.9	26.0
Mesocyclops edax	total immature	117.0	45.0	81.0	0.4	0.1	0.2
	total adults	174.9	272.4	223.7	0.6	0.7	0.7
	Species total	291.9	317.4	304.7	0.9	0.9	0.9
Skistodiaptomus oregonensis	total immature	3382.0	4312.0	3847.0	10.8	11.8	11.3
	total adults	641.4	272.4	456.9	2.1	0.7	1.4
	Species total	4023.4	4584.4	4303.9	12.9	12.6	12.7
Bosmina longirostris	Species total	262.4	181.6	222.0	0.8	0.5	0.7
Chydorus sphaericus	Species total	8805.5	6309.2	7557.4	28.2	17.3	22.8
Daphnia spp	Species total	7405.9	6899.3	7152.6	23.7	18.9	21.3
Diaphanosoma sp	Species total	991.3	1497.9	1244.6	3.2	4.1	3.6
Total		31227.7	36447.7	33837.7	100.0	100.0	100.0

October 3, 1992		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		19065.7	26130.2	22598.0	27.9	41.7	34.8
Acanthocyclops vernalis	total immature	90.0	0.0	45.0	0.1	0.0	0.1
	total adults	0.0	0.0	0.0	0.0	0.0	0.0
	Species total	90.0	0.0	45.0	0.1	0.0	0.1
Diacyclops bicuspidatus thomasi	total immature	12084.0	10604.0	11344.0	17.7	16.9	17.3
	total adults	4206.9	3408.3	3807.6	6.2	5.4	5.8
	Species total	16290.9	14012.3	15151.6	23.9	22.4	23.1
Mesocyclops edax	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	89.5	227.2	158.4	0.1	0.4	0.2
	Species total	89.5	227.2	158.4	0.1	0.4	0.2
Skistodiaptomus oregonensis	total immature	717.0	0.0	358.5	1.1	0.0	0.5
	total adults	2327.3	2120.7	2224.0	3.4	3.4	3.4
	Species total	3044.3	2120.7	2582.5	4.5	3.4	3.9
Bosmina longirostris	Species total	656.4	883.6	770.0	1.0	1.4	1.2
Chydorus sphaericus	Species total	21124.5	13784.6	17454.6	30.9	22.0	26.5
Daphnia spp	Species total	7787.4	5377.6	6582.5	11.4	8.6	10.0
Diaphanosoma sp	Species total	134.3	151.5	142.9	0.2	0.2	0.2
Total		68283.0	62687.7	65485.4	100.0	100.0	100.0

Appendix Table 20 (cont.). Zooplankton densities and percent composition at Prospect Point, 1992-1994.

January 28, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		17170.7	24898.6	21034.7	20.3	24.6	22.4
Diacyclops bicuspidatus thomasi	total immature	31376.0	38049.7	34712.9	37.2	37.5	37.3
	total adults	1873.2	1578.1	1725.7	2.2	1.6	1.9
	Species total	33249.2	39627.8	36438.5	39.4	39.1	39.2
Skistodiaptomus oregonensis	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	3850.4	5143.3	4496.9	4.6	5.1	4.8
	Species total	3850.4	5143.3	4496.9	4.6	5.1	4.8
Bosmina longirostris	Species total	28565.9	29632.8	29099.4	33.8	29.2	31.5
Chydorus sphaericus	Species total	416.3	438.4	427.4	0.5	0.4	0.5
Daphnia spp	Species total	1196.8	1636.5	1416.7	1.4	1.6	1.5
Total		84449.3	101377.4	92913.4	100.0	100.0	100.0

March 26, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		7152.9	7044.3	7098.6	16.8	17.2	17.0
Diacyclops bicuspidatus thomasi	total immature	20652.6	19672.0	20162.3	48.5	47.9	48.2
	total adults	7636.9	7903.4	7770.2	17.9	19.2	18.6
	Species total	28289.5	27575.4	27932.5	66.5	67.2	66.8
Skistodiaptomus oregonensis	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	2742.8	1718.2	2230.5	6.4	4.2	5.3
	Species total	2742.8	1718.2	2230.5	6.4	4.2	5.3
Bosmina longirostris	Species total	3065.6	3694.0	3379.8	7.2	9.0	8.1
Chydorus sphaericus	Species total	654.3	343.6	499.0	1.5	0.8	1.2
Daphnia spp	Species total	645.3	687.3	666.3	1.5	1.7	1.6
Total		42550.4	41062.8	41806.6	100.0	100.0	100.0

Appendix Table 20 (cont.). Zooplankton densities and percent composition at Prospect Point, 1992-1994.

May 21, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		62338.5	103049.3	82693.9	62.6	65.4	64.0
Diacyclops bicuspidatus thomasi	total immature	23200.0	35523.0	29361.5	23.3	22.6	22.9
	total adults	8000.0	9368.1	8684.1	8.0	5.9	7.0
	Species total	31200.0	44891.1	38045.6	31.3	28.5	29.9
Skistodiaptomus oregonensis	total immature	62.0	0.0	31.0	0.1	0.0	0.0
	total adults	430.8	231.9	331.4	0.4	0.1	0.3
	Species total	492.8	231.9	362.4	0.5	0.1	0.3
Bosmina longirostris	Species total	2523.1	5101.5	3812.3	2.5	3.2	2.9
Chydorus sphaericus	Species total	1825.6	2875.4	2350.5	1.8	1.8	1.8
Daphnia spp.	Species total	1066.6	1205.8	1136.2	1.1	0.8	0.9
Diaphanosoma sp	Species total	123.1	0.0	61.6	0.1	0.0	0.1
Total		99569.7	157494.0	128531.9	100.0	100.0	100.0

June 17, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		56661.3	39822.2	48241.8	24.7	18.1	21.4
Acanthocyclops vernalis	total immature	0.0	474.0	237.0	0.0	0.2	0.1
	total adults	0.0	948.1	474.1	0.0	0.4	0.2
	Species total	0.0	1422.1	711.1	0.0	0.6	0.3
Diacyclops bicuspidatus thomasi	total immature	123562.0	137799.0	130680.5	53.8	62.6	58.2
	total adults	1706.7	3792.6	2749.7	0.7	1.7	1.2
	Species total	125268.7	141591.6	133430.2	54.5	64.4	59.4
Mesocyclops edax	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	341.3	316.0	328.7	0.1	0.1	0.1
	Species total	341.3	316.0	328.7	0.1	0.1	0.1
Skistodiaptomus oregonensis	total immature	6941.0	7480.0	7210.5	3.0	3.4	3.2
	total adults	1024.0	790.1	907.1	0.4	0.4	0.4
	Species total	7965.0	8270.1	8117.6	3.5	3.8	3.6
Bosmina longirostris	Species total	14336.0	8217.2	11276.6	6.2	3.7	5.0
Chydorus sphaericus	Species total	4949.3	5056.7	5003.0	2.2	2.3	2.2
Daphnia spp	Species total	19114.7	14222.2	16668.5	8.3	6.5	7.4
Diaphanosoma sp	Species total	0.0	632.1	316.1	0.0	0.3	0.1
Holopedium gibberum	Species total	1024.0	474.1	749.1	0.4	0.2	0.3
Total		229660.3	220024.3	224842.3	100.0	100.0	100.0

Appendix Table 20 (cont.). Zooplankton densities and percent composition at Prospect Point, 1992-1994.

July 15, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		82671.6	100197.8	91434.7	37.2	41.4	39.3
Acanthocyclops vernalis	total immature	0.0	551.0	275.5	0.0	0.2	0.1
	total adults	0.0	0.0	0.0	0.0	0.0	0.0
	Species total	0.0	551.0	275.5	0.0	0.2	0.1
Diacyclops bicuspidatus thomasi	total immature	114848.0	110659.0	112753.5	51.6	45.7	48.7
	total adults	5636.7	6606.5	6121.6	2.5	2.7	2.6
	Species total	120484.7	117265.5	118875.1	54.2	48.4	51.3
Mesocyclops edax	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	704.6	1101.1	902.9	0.3	0.5	0.4
	Species total	704.6	1101.1	902.9	0.3	0.5	0.4
Skistodiaptomus oregonensis	total immature	5872.0	7708.0	6790.0	2.6	3.2	2.9
	total adults	2818.4	4129.1	3473.8	1.3	1.7	1.5
	Species total	8690.4	11837.1	10263.8	3.9	4.9	4.4
Bosmina longirostris	Species total	743.7	1789.3	1266.5	0.3	0.7	0.5
Chydorus sphaericus	Species total	4853.8	3853.8	4353.8	2.2	1.6	1.9
Daphnia spp	Species total	3992.7	5505.4	4749.1	1.8	2.3	2.0
Diaphanosoma sp	Species total	234.9	0.0	117.5	0.1	0.0	0.1
Total		222376.4	242101.0	232238.7	100.0	100.0	100.0

August 13, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		99961.9	87429.2	93695.6	44.0	42.0	43.0
Acanthocyclops vernalis	total immature	348.0	224.0	286.0	0.2	0.1	0.1
	total adults	348.3	449.1	398.7	0.2	0.2	0.2
	Species total	696.3	673.1	684.7	0.3	0.3	0.3
Diacyclops bicuspidatus thomasi	total immature	33959.0	32935.0	33447.0	15.0	15.8	15.4
	total adults	5050.3	3593.0	4321.7	2.2	1.7	2.0
	Species total	39009.3	36528.0	37768.7	17.2	17.6	17.4
Mesocyclops edax	total immature	465.0	349.0	407.0	0.2	0.2	0.2
	total adults	870.7	898.2	884.5	0.4	0.4	0.4
	Species total	1335.7	1247.2	1291.5	0.6	0.6	0.6
Skistodiaptomus oregonensis	total immature	8708.0	8383.0	8545.5	3.8	4.0	3.9
	total adults	1567.3	1197.6	1382.5	0.7	0.6	0.6
	Species total	10275.3	9580.6	9928.0	4.5	4.6	4.6
Bosmina longirostris	Species total	783.7	349.3	566.5	0.3	0.2	0.3
Chydorus sphaericus	Species total	22639.5	24102.9	23371.2	10.0	11.6	10.8
Daphnia spp	Species total	43189.1	39223.4	41206.3	19.0	18.9	18.9
Diaphanosoma sp	Species total	9055.8	8832.7	8944.3	4.0	4.2	4.1
Total		226946.6	207966.4	217456.5	100.0	100.0	100.0

Appendix Table 20 (cont.). Zooplankton densities and percent composition at Prospect Point, 1992-1994.

September 17, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		5519.3	19478.3	12498.8	8.1	20.1	14.1
Diacyclops bicuspidatus thomasi	total immature	22665.0	28244.3	25454.7	33.2	29.1	31.2
	total adults	3170.6	3756.5	3463.6	4.6	3.9	4.3
	Species total	25835.6	32000.8	28918.2	37.9	33.0	35.4
Mesocyclops edax	total immature	0.0	417.4	208.7	0.0	0.4	0.2
	total adults	0.0	0.0	0.0	0.0	0.0	0.0
	Species total	0.0	417.4	208.7	0.0	0.4	0.2
Skistodiaptomus oregonensis	total immature	5754.0	6539.0	6146.5	8.4	6.7	7.6
	total adults	352.3	834.8	593.6	0.5	0.9	0.7
	Species total	6106.3	7373.8	6740.1	8.9	7.6	8.3
Bosmina longirostris	Species total	1252.6	1947.8	1600.2	1.8	2.0	1.9
Chydorus sphaericus	Species total	21489.9	25043.5	23266.7	31.5	25.8	28.6
Daphnia spp	Species total	7398.2	10156.6	8777.4	10.8	10.5	10.7
Diaphanosoma sp	Species total	626.3	695.7	661.0	0.9	0.7	0.8
Total		68228.2	97113.9	82671.1	100.0	100.0	100.0

October 7, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		17280.0	12160.0	14720.0	13.2	9.3	11.3
Diacyclops bicuspidatus thomasi	total immature	26452.0	36479.0	31465.5	20.2	27.9	24.1
	total adults	5760.0	5973.3	5866.7	4.4	4.6	4.5
	Species total	32212.0	42452.3	37332.2	24.7	32.5	28.6
Mesocyclops edax	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	0.0	213.3	106.7	0.0	0.2	0.1
	Species total	0.0	213.3	106.7	0.0	0.2	0.1
Skistodiaptomus oregonensis	total immature	2063.0	1494.0	1778.5	1.6	1.1	1.4
	total adults	1635.6	1493.4	1564.5	1.3	1.1	1.2
	Species total	3698.6	2987.4	3343.0	2.8	2.3	2.6
Bosmina longirostris	Species total	12160.0	12373.4	12266.7	9.3	9.5	9.4
Chydorus sphaericus	Species total	55253.4	50133.4	52693.4	42.3	38.4	40.3
Daphnia spp	Species total	10026.7	10240.0	10133.4	7.7	7.8	7.8
Total		130630.7	130559.8	130595.3	100.0	100.0	100.0

Appendix Table 20 (cont.). Zooplankton densities and percent composition at Prospect Point, 1992-1994.

March 18, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		29219.0	17175.0	23197.0	65.0	61.6	63.3
Diacyclops bicuspidatus thomasi	total immature	6181.0	4351.0	5266.0	13.8	15.6	14.7
	total adults	62.0	39.0	50.5	0.1	0.1	0.1
	Species total	6243.0	4390.0	5316.5	13.9	15.7	14.8
Skistodiaptomus oregonensis	total immature	1041.0	521.0	781.0	2.3	1.9	2.1
	total adults	3538.0	2181.0	2859.5	7.9	7.8	7.8
	Species total	4579.0	2702.0	3640.5	10.2	9.7	9.9
Bosmina longirostris	Species total	4037.0	2982.0	3509.5	9.0	10.7	9.8
Chydorus sphaericus	Species total	21.0	0.0	10.5	0.0	0.0	0.0
Daphnia spp	Species total	853.0	655.0	754.0	1.9	2.3	2.1
Total		44952.0	27904.0	36428.0	100.0	100.0	100.0

May 26, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		4789.3	4050.0	4419.7	23.8	24.2	24.0
Diacyclops bicuspidatus thomasi	total immature	6753.0	6670.0	6711.5	33.5	39.9	36.7
	total adults	6944.5	5055.9	6000.2	34.5	30.2	32.4
	Species total	13697.5	11725.9	12711.7	68.0	70.2	69.1
Mesocyclops edax	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	71.9	0.0	36.0	0.4	0.0	0.2
	Species total	71.9	0.0	36.0	0.4	0.0	0.2
Skistodiaptomus oregonensis	total immature	0.0	40.0	20.0	0.0	0.2	0.1
	total adults	215.7	361.1	288.4	1.1	2.2	1.6
	Species total	215.7	401.1	308.4	1.1	2.4	1.7
Bosmina longirostris	Species total	352.1	184.9	268.5	1.7	1.1	1.4
Chydorus sphaericus	Species total	456.0	202.5	329.3	2.3	1.2	1.7
Daphnia spp	Species total	311.4	96.9	204.2	1.5	0.6	1.1
Diaphanosoma sp	Species total	239.6	52.6	146.1	1.2	0.3	0.8
Total		20133.5	16713.9	18423.7	100.0	100.0	100.0

Appendix Table 20 (cont.). Zooplankton densities and percent composition at Prospect Point, 1992-1994.

June 9, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		140066.7	97381.7	118724.2	63.2	61.0	62.1
Diacyclops bicuspidatus thomasi	total immature	57383.0	39347.0	48365.0	25.9	24.6	25.3
	total adults	15766.7	16558.2	16162.5	7.1	10.4	8.7
	Species total	73149.7	55905.2	64527.5	33.0	35.0	34.0
Mesocyclops edax	total immature	0.0	123.0	61.5	0.0	0.1	0.0
	total adults	0.0	0.0	0.0	0.0	0.0	0.0
	Species total	0.0	123.0	61.5	0.0	0.1	0.0
Skistodiaptomus oregonensis	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	367.2	492.3	429.8	0.2	0.3	0.2
	Species total	367.2	492.3	429.8	0.2	0.3	0.2
Bosmina longirostris	Species total	2568.5	1914.4	2241.5	1.2	1.2	1.2
Chydorus sphaericus	Species total	2874.6	2243.1	2558.9	1.3	1.4	1.4
Daphnia spp	Species total	2721.3	1367.0	2044.2	1.2	0.9	1.0
Diaphanosoma sp	Species total	0.0	164.4	82.2	0.0	0.1	0.1
Holopedium gibberum	Species total	0.0	123.1	61.6	0.0	0.1	0.0
Total		221748.0	159714.2	190731.1	100.0	100.0	100.0

June 23, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		73322.1	119277.5	96299.8	36.5	28.2	32.3
Diacyclops bicuspidatus thomasi	total immature	91402.0	200941.0	146171.5	45.4	47.5	46.5
	total adults	3766.5	19797.2	11781.9	1.9	4.7	3.3
	Species total	95168.5	220738.2	157953.4	47.3	52.2	49.7
Skistodiaptomus oregonensis	total immature	2175.0	8582.0	5378.5	1.1	2.0	1.6
	total adults	1590.2	1981.3	1785.8	0.8	0.5	0.6
	Species total	3765.2	10563.3	7164.3	1.9	2.5	2.2
Bosmina longirostris	Species total	18581.6	48997.9	33789.8	9.2	11.6	10.4
Chydorus sphaericus	Species total	4265.2	7263.5	5764.4	2.1	1.7	1.9
Daphnia spp	Species total	3639.6	12789.4	8214.5	1.8	3.0	2.4
Diaphanosoma sp	Species total	2008.8	2145.9	2077.4	1.0	0.5	0.8
Eubosmina longispina	Species total	0.0	0.0	0.0	0.0	0.0	0.0
Holopedium gibberum	Species total	376.5	1484.0	930.3	0.2	0.4	0.3
Total		201127.5	423259.7	312193.6	100.0	100.0	100.0

Appendix Table 20 (cont.). Zooplankton densities and percent composition at Prospect Point, 1992-1994.

July 7, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		81434.7	54690.9	68062.8	19.8	14.1	16.9
Acanthocyclops vernalis	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	581.8	1163.6	872.7	0.1	0.3	0.2
	Species total	581.8	1163.6	872.7	0.1	0.3	0.2
Diacyclops bicuspidatus thomasi	total immature	182259.0	204800.0	193529.5	44.2	52.9	48.6
	total adults	6204.5	6400.0	6302.3	1.5	1.7	1.6
	Species total	188463.5	211200.0	199831.8	45.7	54.6	50.1
Mesocyclops edax	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	581.8	0.0	290.9	0.1	0.0	0.1
	Species total	581.8	0.0	290.9	0.1	0.0	0.1
Skistodiaptomus oregonensis	total immature	4396.0	7564.0	5980.0	1.1	2.0	1.5
	total adults	2327.2	1163.6	1745.4	0.6	0.3	0.4
	Species total	6723.2	8727.6	7725.4	1.6	2.3	1.9
Bosmina longirostris	Species total	72903.5	55272.7	64088.1	17.7	14.3	16.0
Chydorus sphaericus	Species total	8533.7	13381.8	10957.8	2.1	3.5	2.8
Daphnia spp	Species total	48860.7	36848.6	42854.7	11.9	9.5	10.7
Diaphanosoma sp	Species total	2845.1	3490.9	3168.0	0.7	0.9	0.8
Eubosmina longispina	Species total	0.0	0.0	0.0	0.0	0.0	0.0
Holopedium gibberum	Species total	1163.6	2327.3	1745.5	0.3	0.6	0.4
Total		412091.6	387103.4	399597.5	100.0	100.0	100.0

July 21, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		47478.3	26232.1	36855.2	11.3	11.6	11.5
Acanthocyclops vernalis	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	742.0	0.0	371.0	0.2	0.0	0.1
	Species total	742.0	0.0	371.0	0.2	0.0	0.1
Diacyclops bicuspidatus thomasi	total immature	283881.0	154549.0	219215.0	67.7	68.4	68.1
	total adults	3956.6	3792.5	3874.6	0.9	1.7	1.3
	Species total	287837.6	158341.5	223089.6	68.6	70.1	69.4
Mesocyclops edax	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	0.0	316.0	158.0	0.0	0.1	0.1
	Species total	0.0	316.0	158.0	0.0	0.1	0.1
Skistodiaptomus oregonensis	total immature	11214.0	10430.0	10822.0	2.7	4.6	3.6
	total adults	1979.0	1264.2	1621.6	0.5	0.6	0.5
	Species total	13193.0	11694.2	12443.6	3.1	5.2	4.2
Bosmina longirostris	Species total	14512.1	9585.9	12049.0	3.5	4.2	3.9
Chydorus sphaericus	Species total	16325.2	6847.7	11586.5	3.9	3.0	3.5
Daphnia spp	Species total	35616.8	11114.2	23365.5	8.5	4.9	6.7
Diaphanosoma sp	Species total	3627.5	1738.3	2682.9	0.9	0.8	0.8
Total		419332.5	225869.9	322601.2	100.0	100.0	100.0

Appendix Table 20 (cont.). Zooplankton densities and percent composition at Prospect Point, 1992-1994.

August 4, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		147074.5	101287.0	124180.8	30.5	27.1	28.8
Acanthocyclops vernalis	total immature	1004.0	0.0	502.0	0.2	0.0	0.1
	total adults	0.0	0.0	0.0	0.0	0.0	0.0
	Species total	1004.0	0.0	502.0	0.2	0.0	0.1
Diacyclops bicuspidatus thomasi	total immature	159623.0	158608.0	159115.5	33.1	42.4	37.7
	total adults	9035.3	10017.4	9526.4	1.9	2.7	2.3
	Species total	168658.3	168625.4	168641.9	34.9	45.1	40.0
Mesocyclops edax	total immature	502.0	1670.0	1086.0	0.1	0.4	0.3
	total adults	1840.5	1113.0	1476.8	0.4	0.3	0.3
	Species total	2342.5	2783.0	2562.8	0.5	0.7	0.6
Skistodiaptomus oregonensis	total immature	35138.0	26156.0	30647.0	7.3	7.0	7.1
	total adults	7529.4	10573.9	9051.7	1.6	2.8	2.2
	Species total	42667.4	36729.9	39698.7	8.8	9.8	9.3
Bosmina longirostris	Species total	5688.9	5286.9	5487.9	1.2	1.4	1.3
Chydorus sphaericus	Species total	43670.6	21704.3	32687.5	9.0	5.8	7.4
Daphnia spp	Species total	58227.4	26713.1	42470.3	12.1	7.1	9.6
Diaphanosoma sp	Species total	12548.9	10944.9	11746.9	2.6	2.9	2.8
Leptodora kindtii	Species total	1003.9	0.0	502.0	0.2	0.0	0.1
Total		482886.4	374074.5	428480.5	100.0	100.0	100.0

August 17, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		76800.0	30062.4	53431.2	20.2	17.6	18.9
Diacyclops bicuspidatus thomasi	total immature	184981.0	92302.0	138641.5	48.7	54.1	51.4
	total adults	14864.5	4227.5	9546.0	3.9	2.5	3.2
	Species total	199845.5	96529.5	148187.5	52.6	56.5	54.6
Mesocyclops edax	total immature	826.0	391.0	608.5	0.2	0.2	0.2
	total adults	4954.8	2426.9	3690.9	1.3	1.4	1.4
	Species total	5780.8	2817.9	4299.4	1.5	1.7	1.6
Skistodiaptomus oregonensis	total immature	30555.0	10335.0	20445.0	8.0	6.1	7.0
	total adults	4954.8	2583.5	3769.2	1.3	1.5	1.4
	Species total	35509.8	12918.5	24214.2	9.3	7.6	8.5
Bosmina longirostris	Species total	4541.9	2192.0	3367.0	1.2	1.3	1.2
Chydorus sphaericus	Species total	14314.0	8455.0	11384.5	3.8	5.0	4.4
Daphnia spp	Species total	34133.4	15735.8	24934.6	9.0	9.2	9.1
Diaphanosoma sp	Species total	9083.9	2035.5	5559.7	2.4	1.2	1.8
Total		380009.3	170746.6	275378.0	100.0	100.0	100.0

Appendix Table 20 (cont.). Zooplankton densities and percent composition at Prospect Point, 1992-1994.

September 1, 1994		Abundance (number/m³)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii			1710.0	855.0	n/a	4.1	n/a
Diacyclops bicuspidatus thomasi	total immature	0.0	21065.0	10532.5	n/a	50.7	n/a
	total adults	0.0	3575.5	1787.8	n/a	8.6	n/a
	Species total	0.0	24640.5	12320.3	n/a	59.3	n/a
Mesocyclops edax	total immature	0.0	58.0	29.0	n/a	0.1	n/a
	total adults	0.0	349.0	174.5	n/a	0.8	n/a
	Species total	0.0	407.0	203.5	n/a	1.0	n/a
Skistodiaptomus oregonensis	total immature	0.0	6841.0	3420.5	n/a	16.5	n/a
	total adults	0.0	777.3	388.7	n/a	1.9	n/a
	Species total	0.0	7618.3	3809.2	n/a	18.3	n/a
Bosmina longirostris	Species total	0.0	2798.2	1399.1	n/a	6.7	n/a
Chydorus sphaericus	Species total	0.0	892.1	446.1	n/a	2.1	n/a
Daphnia spp	Species total	0.0	2798.2	1399.1	n/a	6.7	n/a
Diaphanosoma sp	Species total	0.0	696.4	348.2	n/a	1.7	n/a
Total		0.0	41560.7	20780.4	n/a	100.0	n/a

September 18, 1994		Abundance (number/m³)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		4929.7	2517.3	3723.5	13.2	10.3	11.7
Diacyclops bicuspidatus thomasi	total immature	204.0	313.0	258.5	0.5	1.3	0.9
	total adults	0.0	0.0	0.0	0.0	0.0	0.0
	Species total	204.0	313.0	258.5	0.5	1.3	0.9
Skistodiaptomus oregonensis	total immature	768.0	853.0	810.5	2.0	3.5	2.8
	total adults	0.0	42.7	21.4	0.0	0.2	0.1
	Species total	768.0	895.7	831.9	2.0	3.6	2.8
Bosmina longirostris	Species total	31272.9	20608.0	25940.5	83.4	84.0	83.7
Chydorus sphaericus	Species total	0.0	85.3	42.7	0.0	0.3	0.2
Daphnia spp	Species total	308.2	128.0	218.1	0.8	0.5	0.7
Total		37482.8	24547.3	31015.1	100.0	100.0	100.0

October 9, 1994		Abundance (number/m³)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		8064.2	9774.5	8919.4	6.2	7.1	6.6
Diacyclops bicuspidatus thomasi	total immature	10828.0	12334.0	11581.0	8.3	9.0	8.6
	total adults	2764.8	931.0	1847.9	2.1	0.7	1.4
	Species total	13592.8	13265.0	13428.9	10.4	9.6	10.0
Skistodiaptomus oregonensis	total immature	808.0	1320.0	1064.0	0.6	1.0	0.8
	total adults	1383.8	2404.9	1894.4	1.1	1.7	1.4
	Species total	2191.8	3724.9	2958.4	1.7	2.7	2.2
Bosmina longirostris	Species total	104604.0	107985.5	106294.8	79.8	78.4	79.1
Chydorus sphaericus	Species total	1614.2	1978.1	1796.2	1.2	1.4	1.3
Daphnia spp	Species total	998.6	930.9	964.8	0.8	0.7	0.7
Total		131065.6	137658.9	134362.3	100.0	100.0	100.0

Table 21. Zooplankton densities and percent composition at Third Narrows, 1992-1994.

August 13, 1992		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		12549.0	3994.3	8271.7	10.6	4.5	7.5
Diacyclops bicuspidatus thomasi	total immature	39320.0	34496.0	36908.0	33.1	38.7	35.9
	total adults	6190.8	3994.3	5092.6	5.2	4.5	4.8
	Species total	45510.8	38490.3	42000.6	38.3	43.2	40.7
Mesocyclops edax	total immature	251.0	303.0	277.0	0.2	0.3	0.3
	total adults	669.2	453.9	561.6	0.6	0.5	0.5
	Species total	920.2	756.9	838.6	0.8	0.8	0.8
Skistodiaptomus oregonensis	total immature	6359.0	5084.0	5721.5	5.3	5.7	5.5
	total adults	5354.2	2905.0	4129.6	4.5	3.3	3.9
	Species total	11713.2	7989.0	9851.1	9.9	9.0	9.4
Chydorus sphaericus	Species total	36141.2	23784.4	29962.8	30.4	26.7	28.5
Daphnia spp	Species total	9871.9	10530.5	10201.2	8.3	11.8	10.1
Diaphanosoma sp	Species total	2175.1	3177.3	2676.2	1.8	3.6	2.7
Leptodora kindtii	Species total	0.0	363.1	181.6	0.0	0.4	0.2
Total		118881.4	89085.8	103983.6	100.0	100.0	100.0

September 16, 1992		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		30075.5	27266.3	28670.9	16.0	17.0	16.5
Diacyclops bicuspidatus thomasi	total immature	19334.0	16057.0	17695.5	10.3	10.0	10.1
	total adults	3580.4	2423.7	3002.1	1.9	1.5	1.7
	Species total	22914.4	18480.7	20697.6	12.2	11.5	11.8
Mesocyclops edax	total immature	835.0	606.0	720.5	0.4	0.4	0.4
	total adults	537.1	0.0	268.6	0.3	0.0	0.1
	Species total	1372.1	606.0	989.1	0.7	0.4	0.6
Skistodiaptomus oregonensis	total immature	3223.0	2625.0	2924.0	1.7	1.6	1.7
	total adults	1551.5	1666.2	1608.9	0.8	1.0	0.9
	Species total	4774.5	4291.2	4532.9	2.5	2.7	2.6
Bosmina longirostris	Species total	358.0	303.0	330.5	0.2	0.2	0.2
Chydorus sphaericus	Species total	117079.7	90281.7	103680.7	62.1	56.2	59.2
Daphnia spp	Species total	11815.4	18783.5	15299.5	6.3	11.7	9.0
Diaphanosoma sp	Species total	0.0	605.9	303.0	0.0	0.4	0.2
Total		188389.6	160618.3	174504.0	100.0	100.0	100.0

Table 21 (cont.). Zooplankton densities and percent composition at Third Narrows, 1992-1994.

October 16, 1992		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		15395.8	8634.3	12015.1	12.6	7.9	10.3
Acanthocyclops vernalis	total immature	538.0	454.0	496.0	0.4	0.4	0.4
	total adults	0.0	303.0	151.5	0.0	0.3	0.1
	Species total	538.0	757.0	647.5	0.4	0.7	0.6
Diacyclops bicuspidatus thomasi	total immature	20946.0	20601.0	20773.5	17.2	18.9	18.0
	total adults	2506.2	2423.7	2465.0	2.1	2.2	2.1
	Species total	23452.2	23024.7	23238.5	19.3	21.1	20.2
Skistodiaptomus oregonensis	total immature	476.0	530.0	503.0	0.4	0.5	0.4
	total adults	2983.7	3534.5	3259.1	2.5	3.2	2.8
	Species total	3459.7	4064.5	3762.1	2.8	3.7	3.3
Bosmina longirostris	Species total	2118.5	1312.8	1715.7	1.7	1.2	1.5
Chydorus sphaericus	Species total	75546.9	70589.4	73068.2	62.0	64.7	63.4
Daphnia spp	Species total	1253.1	606.0	929.6	1.0	0.6	0.8
Diaphanosoma sp	Species total	0.0	151.5	75.8	0.0	0.1	0.1
Total		121764.2	109140.2	115452.2	100.0	100.0	100.0

March 26, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		10413.6		5206.8	14.1	n/a	n/a
Diacyclops bicuspidatus thomasi	total immature	40352.0	0.0	20176.0	54.8	n/a	n/a
	total adults	9111.8	0.0	4555.9	12.4	n/a	n/a
	Species total	49463.8	0.0	24731.9	67.2	n/a	n/a
Skistodiaptomus oregonensis	total immature	217.0	0.0	108.5	0.3	n/a	n/a
	total adults	6183.1	0.0	3091.6	8.4	n/a	n/a
	Species total	6400.1	0.0	3200.1	8.7	n/a	n/a
Bosmina longirostris	Species total	4772.9	0.0	2386.5	6.5	n/a	n/a
Chydorus sphaericus	Species total	795.5	0.0	397.8	1.1	n/a	n/a
Daphnia spp	Species total	1771.7	0.0	885.9	2.4	n/a	n/a
Total		73617.6	0.0	36808.8	100.0	n/a	n/a

Table 21 (cont.). Zooplankton densities and percent composition at Third Narrows, 1992-1994.

May 21, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		114829.0	114215.4	114522.2	52.9	51.9	52.4
Diacyclops bicuspidatus thomasi	total immature	56023.0	73453.0	64738.0	25.8	33.4	29.6
	total adults	13727.6	6301.8	10014.7	6.3	2.9	4.6
	Species total	69750.6	79754.8	74752.7	32.2	36.3	34.2
Skistodiaptomus oregonensis	total immature	2906.0	1511.0	2208.5	1.3	0.7	1.0
	total adults	1771.3	1903.5	1837.4	0.8	0.9	0.8
	Species total	4677.3	3414.5	4045.9	2.2	1.6	1.9
Bosmina longirostris	Species total	17252.2	12209.2	14730.7	8.0	5.6	6.8
Chydorus sphaericus	Species total	2040.6	3249.3	2645.0	0.9	1.5	1.2
Daphnia spp	Species total	8347.8	6892.3	7620.1	3.8	3.1	3.5
Diaphanosoma sp	Species total	0.0	196.9	98.5	0.0	0.1	0.0
Total		216897.5	219932.4	218415.0	100.0	100.0	100.0

June 17, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		33407.1	36693.3	35050.2	14.9	15.4	15.2
Acanthocyclops vernalis	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	1815.6	640.0	1227.8	0.8	0.3	0.5
	Species total	1815.6	640.0	1227.8	0.8	0.3	0.5
Diacyclops bicuspidatus thomasi	total immature	73351.0	71681.0	72516.0	32.8	30.1	31.4
	total adults	7988.6	7253.3	7621.0	3.6	3.0	3.3
	Species total	81339.6	78934.3	80137.0	36.3	33.2	34.8
Mesocyclops edax	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	363.1	426.7	394.9	0.2	0.2	0.2
	Species total	363.1	426.7	394.9	0.2	0.2	0.2
Skistodiaptomus oregonensis	total immature	5083.0	5973.0	5528.0	2.3	2.5	2.4
	total adults	3631.3	1706.7	2669.0	1.6	0.7	1.2
	Species total	8714.3	7679.7	8197.0	3.9	3.2	3.6
Bosmina longirostris	Species total	61367.4	70400.0	65883.7	27.4	29.6	28.5
Chydorus sphaericus	Species total	7504.2	7679.9	7592.1	3.4	3.2	3.3
Daphnia spp	Species total	28686.5	34133.3	31409.9	12.8	14.3	13.6
Diaphanosoma sp	Species total	726.2	426.7	576.5	0.3	0.2	0.3
Holopedium gibberum	Species total	0.0	853.3	426.7	0.0	0.4	0.2
Total		223924.0	237867.2	230895.6	100.0	100.0	100.0

Table 21 (cont.). Zooplankton densities and percent composition at Third Narrows, 1992-1994.

July 15, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		71747.4	70137.0	70942.2	32.2	31.5	31.8
Diacyclops bicuspidatus thomasi	total immature	99032.0	81358.0	90195.0	44.4	36.5	40.5
	total adults	12800.0	16482.1	14641.1	5.7	7.4	6.6
	Species total	111832.0	97840.1	104836.1	50.2	43.9	47.0
Skistodiaptomus oregonensis	total immature	9769.0	8416.0	9092.5	4.4	3.8	4.1
	total adults	4715.8	6312.3	5514.1	2.1	2.8	2.5
	Species total	14484.8	14728.3	14606.6	6.5	6.6	6.6
Bosmina longirostris	Species total	673.7	350.7	512.2	0.3	0.2	0.2
Chydorus sphaericus	Species total	15831.6	30860.2	23345.9	7.1	13.9	10.5
Daphnia spp	Species total	4491.2	4734.2	4612.7	2.0	2.1	2.1
Diaphanosoma sp	Species total	3929.8	3974.4	3952.1	1.8	1.8	1.8
Total		222990.5	222624 9	222807.7	100.0	100.0	100.0

August 13, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		69389.5	92891.4	81140.5	18.5	31.9	25.2
Diacyclops bicuspidatus thomasi	total immature	46484.0	49738.0	48111.0	12.4	17.1	14.7
	total adults	14147.4	9874.3	12010.9	3.8	3.4	3.6
	Species total	60631.4	59612.3	60121.9	16.1	20.5	18.3
Skistodiaptomus oregonensis	total immature	18190.0	10239.0	14214.5	4.8	3.5	4.2
	total adults	18189.4	5851.4	12020.4	4.8	2.0	3.4
	Species total	36379.4	16090.4	26234.9	9.7	5.5	7.6
Bosmina longirostris	Species total	1010.5	731.4	871.0	0.3	0.3	0.3
Chydorus sphaericus	Species total	84884.2	55588.5	70236.4	22.6	19.1	20.8
Daphnia spp	Species total	43789.5	25234.3	34511.9	11.7	8.7	10.2
Diaphanosoma sp	Species total	79494.8	40959.9	60227.4	21.2	14.1	17.6
Total		375579.3	291108.2	333343.8	100.0	100.0	100.0

Table 21 (cont.). Zooplankton densities and percent composition at Third Narrows, 1992-1994.

September 17, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		40464.5	33129.5	36797.0	25.8	14.1	19.9
Diacyclops bicuspidatus thomasi	total immature	37575.0	80459.0	59017.0	23.9	34.2	29.1
	total adults	17754.8	16779.9	17267.4	11.3	7.1	9.2
	Species total	55329.8	97238.9	76284.4	35.2	41.4	38.3
Skistodiaptomus oregonensis	total immature	8877.0	9896.0	9386.5	5.7	4.2	4.9
	total adults	2683.9	5163.1	3923.5	1.7	2.2	2.0
	Species total	11560.9	15059.1	13310.0	7.4	6.4	6.9
Bosmina longirostris	Species total	2408.6	3227.0	2817.8	1.5	1.4	1.5
Chydorus sphaericus	Species total	22916.1	56363.0	39639.6	14.6	24.0	19.3
Daphnia spp	Species total	21883.9	27536.2	24710.1	13.9	11.7	12.8
Diaphanosoma sp	Species total	2443.0	2581.5	2512.3	1.6	1.1	1.3
Total		157006.8	235135.2	196071.0	100.0	100.0	100.0

October 7, 1993		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		28218.2	28912.9	28565.6	14.2	14.3	14.2
Diacyclops bicuspidatus thomasi	total immature	75053.0	47285.0	61169.0	37.6	23.3	30.5
	total adults	9890.9	7228.3	8559.6	5.0	3.6	4.3
	Species total	84943.9	54513.3	69728.6	42.6	26.9	34.7
Skistodiaptomus oregonensis	total immature	1164.0	602.0	883.0	0.6	0.3	0.4
	total adults	12218.2	20480.0	16349.1	6.1	10.1	8.1
	Species total	13382.2	21082.0	17232.1	6.7	10.4	8.6
Bosmina longirostris	Species total	18036.3	24997.6	21517.0	9.0	12.3	10.7
Chydorus sphaericus	Species total	36072.7	47284.7	41678.7	18.1	23.3	20.7
Daphnia spp	Species total	17454.5	25901.2	21677.9	8.8	12.8	10.8
Diaphanosoma sp	Species total	1309.1	0.0	654.6	0.7	0.0	0.3
Total		199416.9	202691.7	201054.3	100.0	100.0	100.0

Table 21 (cont.). Zooplankton densities and percent composition at Third Narrows, 1992-1994.

March 18, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii			3.8	1.9	0.0	50.0	25.0
Diacyclops bicuspidatus thomasi	total immature	14.0	0.0	7.0	100.0	0.0	50.0
	total adults	0.0	3.8	1.9	0.0	50.0	25.0
	Species total	14.0	3.8	8.9	100.0	50.0	75.0
Total		14.0	7.6	10.8	100.0	100.0	100.0

May 26, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		77687.1	73927.3	75807.2	58.0	52.4	55.2
Diacyclops bicuspidatus thomasi	total immature	40539.0	49054.0	44796.5	30.3	34.7	32.5
	total adults	7002.2	9154.5	8078.4	5.2	6.5	5.9
	Species total	47541.2	58208.5	52874.9	35.5	41.2	38.4
Mesocyclops edax	total immature	55.0	0.0	27.5	0.0	0.0	0.0
	total adults	0.0	0.0	0.0	0.0	0.0	0.0
	Species total	55.0	0.0	27.5	0.0	0.0	0.0
Skistodiaptomus oregonensis	total immature	221.0	345.0	283.0	0.2	0.2	0.2
	total adults	2358.6	2936.4	2647.5	1.8	2.1	1.9
	Species total	2579.6	3281.4	2930.5	1.9	2.3	2.1
Bosmina longirostris	Species total	1423.6	1380.4	1402.0	1.1	1.0	1.0
Chydorus sphaericus	Species total	1400.4	919.6	1160.0	1.0	0.7	0.8
Daphnia spp	Species total	2948.2	3022.7	2985.5	2.2	2.1	2.2
Diaphanosoma sp	Species total	221.1	431.3	326.2	0.2	0.3	0.2
Holopedium gibberum	Species total	55.2	0.0	27.6	0.0	0.0	0.0
Total		133911.4	141171.2	137541.3	100.0	100.0	100.0

Table 21 (cont.). Zooplankton densities and percent composition at Third Narrows, 1992-1994.

June 9, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		33672.4	27092.3	30382.4	14.0	15.1	14.5
Acanthocyclops vernalis	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	0.0	0.0	0.0	0.0	0.0	0.0
	Species total	0.0	0.0	0.0	0.0	0.0	0.0
Diacyclops bicuspidatus thomasi	total immature	118213.0	86285.0	102249.0	49.1	48.0	48.6
	total adults	7164.3	7513.0	7338.7	3.0	4.2	3.6
	Species total	125377.3	93798.0	109587.7	52.1	52.2	52.1
Mesocyclops edax	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	1074.2	1024.0	1049.1	0.4	0.6	0.5
	Species total	1074.2	1024.0	1049.1	0.4	0.6	0.5
Skistodiaptomus oregonensis	total immature	14568.0	12067.0	13317.5	6.1	6.7	6.4
	total adults	2865.7	2731.9	2798.8	1.2	1.5	1.4
	Species total	17433.7	14798.9	16116.3	7.2	8.2	7.7
Bosmina longirostris	Species total	40120.2	22083.7	31102.0	16.7	12.3	14.5
Chydorus sphaericus	Species total	1511.9	2123.5	1817.7	0.6	1.2	0.9
Daphnia spp	Species total	19821.4	17757.4	18789.4	8.2	9.9	9.1
Diaphanosoma sp	Species total	1193.5	1137.4	1165.5	0.5	0.6	0.6
Holopedium gibberum	Species total	358.0	0.0	179.0	0.1	0.0	0.1
Total		240562.6	179815.2	210188.9	100.0	100.0	100.0

June 23, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		79455.2	25600.0	52527.6	19.4	10.9	15.1
Acanthocyclops vernalis	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	764.2	948.0	856.1	0.2	0.4	0.3
	Species total	764.2	948.0	856.1	0.2	0.4	0.3
Diacyclops bicuspidatus thomasi	total immature	149742.0	103665.0	126703.5	36.5	44.1	40.3
	total adults	10186.6	9481.4	9834.0	2.5	4.0	3.3
	Species total	159928.6	113146.4	136537.5	39.0	48.1	43.6
Skistodiaptomus oregonensis	total immature	11208.0	10113.0	10660.5	2.7	4.3	3.5
	total adults	5093.3	5056.7	5075.0	1.2	2.2	1.7
	Species total	16301.3	15169.7	15735.5	4.0	6.5	5.2
Bosmina longirostris	Species total	105940.2	39506.1	72723.2	25.8	16.8	21.3
Chydorus sphaericus	Species total	4075.6	2528.4	3302.0	1.0	1.1	1.0
Daphnia spp	Species total	40746.3	37609.8	39178.1	9.9	16.0	13.0
Diaphanosoma sp	Species total	2037.8	316.0	1176.9	0.5	0.1	0.3
Leptodora kindtii	Species total	764.2	316.0	540.1	0.2	0.1	0.2
Total		410013.4	235140.4	322576.9	100.0	100.0	100.0

July 7, 1994

Taxon	Stage	Abundance (number/m^3) Replicate 1	Replicate 2	Mean	Percent Composition Replicate 1	Replicate 2	Mean
Nauplii		10194.0	13625.8	11909.9	4.5	6.2	5.4
Acanthocyclops vernalis	total immature	0.0	413.0	206.5	0.0	0.2	0.1
	total adults	382.1	0.0	191.1	0.2	0.0	0.1
	Species total	382.1	413.0	397.6	0.2	0.2	0.2
Diacyclops bicuspidatus thomasi	total immature	132792.0	125523.0	129157.5	59.2	57.3	58.2
	total adults	15800.7	15277.4	15539.1	7.0	7.0	7.0
	Species total	148592.7	140800.4	144696.6	66.2	64.2	65.2
Mesocyclops edax	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	382.1	412.9	397.5	0.2	0.2	0.2
	Species total	382.1	412.9	397.5	0.2	0.2	0.2
Skistodiaptomus oregonensis	total immature	36698.0	29729.0	33213.5	16.4	13.6	15.0
	total adults	8155.2	8670.9	8413.1	3.6	4.0	3.8
	Species total	44853.2	38399.9	41626.6	20.0	17.5	18.8
Bosmina longirostris	Species total	1273.2	5367.7	3320.5	0.6	2.4	1.5
Chydorus sphaericus	Species total	1867.7	4817.2	3342.5	0.8	2.2	1.5
Daphnia spp	Species total	13761.9	11561.4	12661.7	6.1	5.3	5.7
Diaphanosoma sp	Species total	2717.4	3853.8	3285.6	1.2	1.8	1.5
Holopedium gibberum	Species total	382.1	0.0	191.1	0.2	0.0	0.1
Total		224406.4	219252.1	221829.3	100.0	100.0	100.0

July 21, 1994

Taxon	Stage	Abundance (number/m^3) Replicate 1	Replicate 2	Mean	Percent Composition Replicate 1	Replicate 2	Mean
Nauplii		40452.0	10802.8	25627.4	24.4	22.2	23.3
Diacyclops bicuspidatus thomasi	total immature	66862.0	18610.0	42736.0	40.4	38.2	39.3
	total adults	0.0	635.5	317.8	0.0	1.3	0.7
	Species total	66862.0	19245.5	43053.8	40.4	39.5	39.9
Skistodiaptomus oregonensis	total immature	26745.0	9713.0	18229.0	16.2	19.9	18.0
	total adults	3677.4	363.2	2020.3	2.2	0.7	1.5
	Species total	30422.4	10076.2	20249.3	18.4	20.7	19.5
Bosmina longirostris	Species total	3681.0	665.8	2173.4	2.2	1.4	1.8
Chydorus sphaericus	Species total	7024.2	1513.0	4268.6	4.2	3.1	3.7
Daphnia spp	Species total	12035.3	3540.4	7787.9	7.3	7.3	7.3
Diaphanosoma sp	Species total	5016.9	2904.9	3960.9	3.0	6.0	4.5
Total		165493.8	48748.6	107121.2	100.0	100.0	100.0

Table 21 (cont.). Zooplankton densities and percent composition at Third Narrows, 1992-1994.

August 4, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		66937.5	35200.0	51068.8	25.8	25.7	25.8
Diacyclops bicuspidatus thomasi	total immature	52594.0	30600.0	41597.0	20.3	22.4	21.3
	total adults	2125.0	800.0	1462.5	0.8	0.6	0.7
	Species total	54719.0	31400.0	43059.5	21.1	23.0	22.0
Skistodiaptomus oregonensis	total immature	58969.0	32400.0	45684.5	22.8	23.7	23.2
	total adults	0.0	400.0	200.0	0.0	0.3	0.1
	Species total	58969.0	32800.0	45884.5	22.8	24.0	23.4
Bosmina longirostris	Species total	7629.2	3800.0	5714.6	2.9	2.8	2.9
Chydorus sphaericus	Species total	34531.3	17600.0	26065.7	13.3	12.9	13.1
Daphnia spp	Species total	29750.1	12800.0	21275.1	11.5	9.4	10.4
Diaphanosoma sp	Species total	4608.3	1933.3	3270.8	1.8	1.4	1.6
Leptodora kindtii	Species total	2000.0	1200.0	1600.0	0.8	0.9	0.8
Total		259144.4	136733.3	197938.9	100.0	100.0	100.0

August 17, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		13340.8	12996.9	13168.9	24.6	19.8	22.2
Acanthocyclops vernalis	total immature	0.0	0.0	0.0	0.0	0.0	0.0
	total adults	0.0	98.5	49.3	0.0	0.2	0.1
	Species total	0.0	98.5	49.3	0.0	0.2	0.1
Diacyclops bicuspidatus thomasi	total immature	4056.0	33772.6	18914.3	7.5	51.5	29.5
	total adults	631.0	2363.1	1497.1	1.2	3.6	2.4
	Species total	4687.0	36135.7	20411.4	8.6	55.1	31.9
Skistodiaptomus oregonensis	total immature	5048.0	4135.7	4591.9	9.3	6.3	7.8
	total adults	811.2	886.2	848.7	1.5	1.4	1.4
	Species total	5859.2	5021.9	5440.6	10.8	7.7	9.2
Bosmina longirostris	Species total	25419.7	1493.3	13456.5	46.8	2.3	24.6
Chydorus sphaericus	Species total	1201.9	3840.0	2521.0	2.2	5.9	4.0
Daphnia spp	Species total	2223.4	5021.6	3622.5	4.1	7.7	5.9
Diaphanosoma sp	Species total	1277.0	820.5	1048.8	2.4	1.3	1.8
Leptodora kindtii	Species total	270.4	98.5	184.5	0.5	0.2	0.3
Total		54279.4	65526.9	59903.2	100.0	100.0	100.0

Table 21 (cont.). Zooplankton densities and percent composition at Third Narrows, 1992-1994.

September 1, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		37500.0	35490.9	36495.5	22.8	18.9	20.8
Acanthocyclops vernalis	total immature	94.0	0.0	47.0	0.1	0.0	0.0
	total adults	0.0	0.0	0.0	0.0	0.0	0.0
	Species total	94.0	0.0	47.0	0.1	0.0	0.0
Diacyclops bicuspidatus thomasi	total immature	5375.0	3103.0	4239.0	3.3	1.7	2.5
	total adults	250.0	0.0	125.0	0.2	0.0	0.1
	Species total	5625.0	3103.0	4364.0	3.4	1.7	2.5
Skistodiaptomus oregonensis	total immature	8750.0	5754.0	7252.0	5.3	3.1	4.2
	total adults	500.0	0.0	250.0	0.3	0.0	0.2
	Species total	9250.0	5754.0	7502.0	5.6	3.1	4.3
Bosmina longirostris	Species total	108625.0	140412.2	124518.6	65.9	74.8	70.4
Chydorus sphaericus	Species total	1588.3	1066.7	1327.5	1.0	0.6	0.8
Daphnia spp	Species total	1342.1	1357.5	1349.8	0.8	0.7	0.8
Diaphanosoma sp	Species total	751.5	581.8	666.7	0.5	0.3	0.4
Total		164775.9	187766.1	176271.0	100.0	100.0	100.0

September 18, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		14250.0	10697.1	12473.6	15.0	17.3	16.1
Diacyclops bicuspidatus thomasi	total immature	2009.0	822.0	1415.5	2.1	1.3	1.7
	total adults	0.0	0.0	0.0	0.0	0.0	0.0
	Species total	2009.0	822.0	1415.5	2.1	1.3	1.7
Skistodiaptomus oregonensis	total immature	1563.0	1676.0	1619.5	1.6	2.7	2.2
	total adults	0.0	0.0	0.0	0.0	0.0	0.0
	Species total	1563.0	1676.0	1619.5	1.6	2.7	2.2
Bosmina longirostris	Species total	75105.9	47177.2	61141.6	78.8	76.2	77.5
Chydorus sphaericus	Species total	1616.0	1005.7	1310.9	1.7	1.6	1.7
Daphnia spp	Species total	501.0	182.9	342.0	0.5	0.3	0.4
Diaphanosoma sp	Species total	0.0	137.1	68.6	0.0	0.2	0.1
Leptodora kindtii	Species total	251.0	182.9	217.0	0.3	0.3	0.3
Total		95295.9	61880.9	78588.4	100.0	100.0	100.0

Table 21 (cont.). Zooplankton densities and percent composition at Third Narrows, 1992-1994.

October 9, 1994		Abundance (number/m^3)			Percent Composition		
Taxon	Stage	Replicate 1	Replicate 2	Mean	Replicate 1	Replicate 2	Mean
Nauplii		550.9	2014.8	1282.9	0.8	2.4	1.6
Diacyclops bicuspidatus thomasi	total immature	3542.0	5925.0	4733.5	5.3	7.2	6.2
	total adults	157.4	237.0	197.2	0.2	0.3	0.3
	Species total	3699.4	6162.0	4930.7	5.5	7.4	6.5
Skistodiaptomus oregonensis	total immature	634.0	1107.0	870.5	0.9	1.3	1.1
	total adults	237.0	118.5	177.8	0.4	0.1	0.2
	Species total	871.0	1225.5	1048.3	1.3	1.5	1.4
Bosmina longirostris	Species total	58319.5	68266.7	63293.1	86.6	82.5	84.5
Chydorus sphaericus	Species total	3777.8	5096.3	4437.1	5.6	6.2	5.9
Daphnia spp	Species total	157.4	0.0	78.7	0.2	0.0	0.1
Total		67376.0	82765.3	75070.7	100.0	100.0	100.0

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