Limnology of selected shallow-water habitats in Lower Granite reservoir, 1994-95

Fish Ecology Division

Northwest Fisheries Science Center

National Marine Fisheries Service

Seattle, Washington

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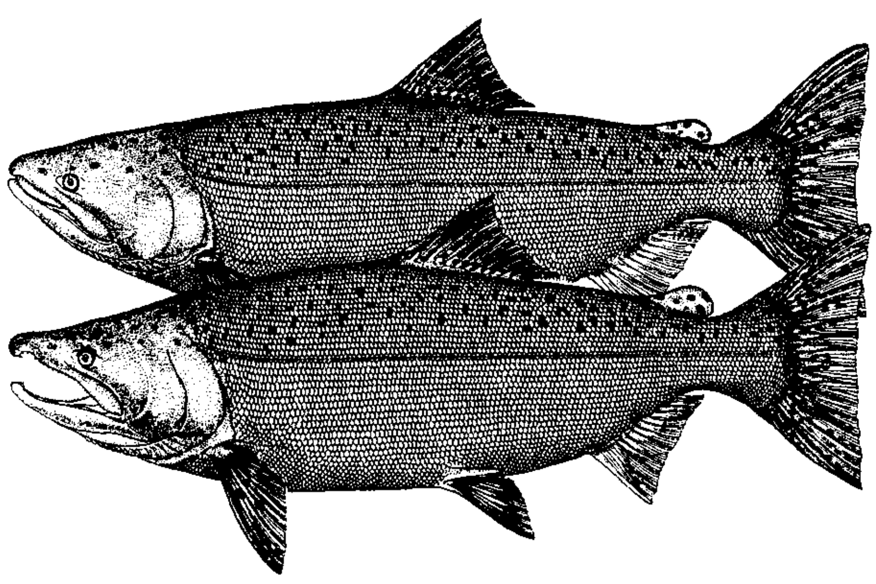
August 2000



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EXECUTIVE SUMMARY

In an effort to recover dwindling Snake River salmon runs, a drawdown, or lowering of the water level in Lower Granite Reservoir, has been proposed. Some fisheries managers believe that reservoir drawdown would help restoration efforts for depleted upriver stocks of Snake River chinook (*Oncorhynchus tshawytscha*) and sockeye salmon (*O. nerka*). The drawdown would simulate a free-flowing river, which would theoretically decrease downstream travel time and thus increase the survival of juvenile salmonids (*Oncorhynchus* spp.).

Several drawdown scenarios have been proposed for selected Columbia and Snake River reservoirs. Each involves the operation of reservoirs at or below minimum operating pool (MOP) for several months. Any extended drawdown at or below MOP would be an unprecedented event in the operation of these reservoirs and would have undetermined impacts on reservoirs and their associated riverine ecosystems. For Lower Granite Reservoir, a drawdown to depths of 10, 13, and 16 m below MOP during the spring and summer juvenile salmonid outmigration periods (April-August) has been suggested. A drawdown to depths of 33.5 to 35 m below MOP to simulate a free-flowing river has also been suggested.

To better understand possible changes that may occur in Lower Granite Reservoir as a result of a drawdown, we began limnological studies to document pre-drawdown conditions. The goals of these studies were to document physical, chemical, and biological parameters existing within the reservoir before a drawdown occurs. Our research commenced in March 1994 and continued through October 1995. We concentrated on potential impacts of drawdown in three selected shallow-water habitats of the reservoir.

In a previous report, we described temporal changes observed in benthic invertebrate populations inhabiting the soft substrate in these shallow-water habitats. This report covers the

remaining aspects of these investigations, mainly temporal changes in physical characteristics of the water column, water quality, chlorophyll concentrations, zooplankton populations, and sediment composition.

Sampling areas were located on the upstream end of the reservoir near Silcott Island, at mid-reservoir near Centennial Island, and near the terminus of the reservoir about 3 km upstream from Offield Landing. At each area, samples for physical, chemical, and biological parameters were collected from the water column at approximately the 18-m depth contour, and sediment samples were collected from along the 3-, 9-, and 18-m depth contours.

Water samples were collected biweekly from April through September and monthly for the rest of the year except during December and February. Sediment samples were collected quarterly through the year. Water temperature, dissolved oxygen, conductivity, and pH were measured at 1-m depth intervals through the water column. Water transparency and depth of the euphotic zone were also measured, and water samples from 1-, 7-, and 15-m depths were collected for turbidity measurements.

Various water chemistry parameters were also examined, with collected water samples stored in the dark on ice and transported within 24 hours to the State of Washington Water Research Center for analyses of nitrogen, phosphorus, cations, anions, silica, and alkalinity. Composite water samples were collected for analysis of chlorophyll concentrations, and concentrations of chlorophyll *a* were used as an index of phytoplankton biomass. Because a large portion of the phytoplankton present in the water column is often less than 25-µm in size, chlorophyll concentrations were determined for both an unfiltered water sample and a sample filtered through a 25-µm net. Chlorophyll *a*, *b*, and *c* and pheophytin *a* concentrations were determined using the cold-acetone extraction and spectrophotometric method.

Zooplankton samples were collected with a plankton net and preserved and stained in the field. Analyses for zooplankton species composition and numerical density were conducted under contract to Beaver Schaberg Associates, Inc. Sediment samples were collected using a Ponar grab, and analyses for particle grain size, soil classification, and percent volatile solids were conducted under contract.

Surface-to-bottom water quality profiles for water temperature, dissolved oxygen, conductivity, and pH showed little stratification of the water column at the three shallow-water areas sampled. Temporal changes in water temperature and dissolved oxygen showed expected seasonal changes during the study period, with no apparent difference among sampling areas. Dissolved oxygen was generally above 85% saturation throughout the study, except near the bottom during August and September 1994, when there was evidence of oxygen depletion. In 1994, a low-flow drought year, water temperature was higher than in 1995, an average-to-high flow year. Conductivity was lowest in the summer and highest in the winter, whereas pH values were highest in the summer and lowest in the winter.

At all three sampling areas, depths of euphotic zone were shallow through the spring and early summer, then increased in the summer following the spring freshet period (range 1 to 8 m). Changes in euphotic depth were positively correlated to depth of Secchi-disk transparency and inversely correlated to turbidity measurements.

In general, there were only slight differences among sampling areas and depths for the various nutrient parameters and alkalinity. Seasonal trends for each of these parameters were observed, with highest concentrations during winter and lowest concentrations during summer.

Monochromatic chlorophyll *a* concentrations (corrected for pheophytin) were variable between sampling areas and through time. Concentrations from the fraction of the sample less

25 μm in size generally comprised more than 50% of the measured chlorophyll *a*. Monthly mean monochromatic chlorophyll *a* values for the 3 sampling sites ranged from 0.3 to 19.2 mg/m^3. Zooplankton populations were dominated by rotifers, and to a lesser extent, cladocerans and copepods: 31 species of rotifers and 16 species of cladocerans were identified.

There were apparent differences in sediment characteristics between sampling areas and between depths within each sampling area. However, there was little indication of temporal change in sediment characteristics among sampling areas and depths. Sand and fines were more common than gravel at all three sampling areas, and median grain size varied between sampling areas and depths. Percentages of silt/clay and volatile solids were generally higher at Centennial Island than at the other two sampling areas.

In summary, water quality parameters sampled in the shallow-water sites within Lower Granite Reservoir exhibited some obvious seasonal changes, with little stratification of the water column. Seasonal trends for various nutrient parameters, alkalinity, and conductivity showed highest concentrations during winter and lowest concentrations during summer, whereas pH values were highest during winter and lowest during summer. Concentrations of monochromatic chlorophyll *a* varied throughout the year and between sites with no obvious seasonal trend. The zooplankton population was dominated numerically by rotifers and to a lesser extent, cladocerans and copepods. There was little indication of temporal change in sediment characteristics among sampling areas and depths.

CONTENTS

INTRODUCTION

Historical estimates of the number of adult salmon in the Columbia River Basin before hydroelectric dams were built ranged from 8 to 16 million, but present estimates range from 2 to 2.5 million (COE 1992a). Snake River sockeye salmon (*Oncorhynchus nerka*) were listed as endangered in 1991 under the Endangered Species Act of 1973, and spring/summer and fall chinook salmon (*O. tshawytscha*) were listed as threatened in 1992. A "Salmon Summit" was held in 1990 and 1991 among regional fishery and power agencies, tribes, and river users to develop a restoration plan for declining salmon runs. One suggestion was to draw the river water level down in one or several reservoirs in the Snake and Columbia Rivers during juvenile salmon migration to increase downstream water velocity and thus theoretically decrease the travel time for salmon smolts migrating to the ocean.

A 1-month test drawdown to lower the water level to elevation 212 m (695 ft) in Lower Granite Reservoir occurred during March 1992 as part of an extensive effort to evaluate possible effects of a long-term reservoir drawdown. Following the test drawdown, various limnological studies of Lower Granite and other downstream Snake River reservoirs commenced in an effort to document conditions existing prior to other possible reservoir drawdowns (Ledgerwood et al. 1996, Bennett et al. 1997, Juul 1997). In March 1994, we began a multi-year limnological study of shallow-water habitats in Lower Granite Reservoir. A drawdown was planned for Lower Granite Reservoir from April to June 1996. Initially our study was planned for 5 years to document conditions during the 2 years prior to drawdown, the 1 year during drawdown, and the 2 years after drawdown. However, plans for drawdown of Lower Granite Reservoir have been canceled or delayed; thus sampling of pre-drawdown conditions ceased in October 1995.

The goal of our study was to document existing physical, chemical, and biological factors of the reservoir to provide a more thorough understanding of the dynamics of this complex reservoir ecosystem, including temporal changes to compare conditions prior to drawdown with those that prevail during and after drawdown. Three shallow-water habitats were selected as sampling areas: one in the upstream, one in the middle, and one in the downstream portion of Lower Granite Reservoir. Measurements were made of physical parameters: water temperature, dissolved oxygen, conductivity, pH, euphotic depth, Secchi disc transparency, and turbidity. Sediment composition and chemical parameters including nitrogen, phosphorus, cations, anions, silica, and alkalinity were analyzed. Biological parameters examined were chlorophyll *a* concentrations and zooplankton populations. These locations were chosen to provide an overall picture of the limnological conditions in the reservoir. This report covers results of our investigations of pre-drawdown limnological conditions in these habitats between March 1994 and October 1995 and supplements our earlier report on benthic invertebrate populations in the same habitats of the reservoir from the same period (Pool and Ledgerwood 1997).

METHODS

Study Area

Lower Granite Reservoir was created in 1975 when Lower Granite Dam was constructed for production of hydroelectric power, improved navigation, irrigation, and recreation (COE 1992b). The reservoir is located in southeastern Washington and western Idaho near Clarkston, Washington, and Lewiston, Idaho, and extends upstream 61.8 km from the dam on the Snake River to Asotin, Washington, and 7.3 km upstream from the confluence of the Snake and Clearwater Rivers (COE 1992b). Following construction of the dam, the hydrography of this segment of the Snake River changed from free-flowing river to a pool with a maximum depth of 35 m (Dorband 1980).

We selected three shallow-water areas in Lower Granite Reservoir for the study (Fig. 1). These areas were at River Kilometer (RKm) 212 near Silcott Island, at RKm 193 near Centennial Island, and at RKm 177 near Offield Landing. The sampling area near Silcott Island is located about 39 km upstream from Lower Granite Dam, about 11 km downstream from the confluence of the Snake and Clearwater Rivers at Lewiston, Idaho, and Clarkston, Washington. Centennial Island was created near the middle of the reservoir in 1989 as a result of dredging activity by the U.S. Army Corps of Engineers (COE 1992b) and is about 20 km upstream from the dam. The Offield area was about 4 km upstream from Lower Granite Dam (RKm 173). At all three areas, most limnological samples were collected biweekly from April through September and monthly during the rest of the year, except in December 1994 and February 1995. Sediment samples were collected quarterly, and benthic invertebrate samples were collected monthly except during April and December 1994 and February 1995 (Pool and Ledgerwood 1997).

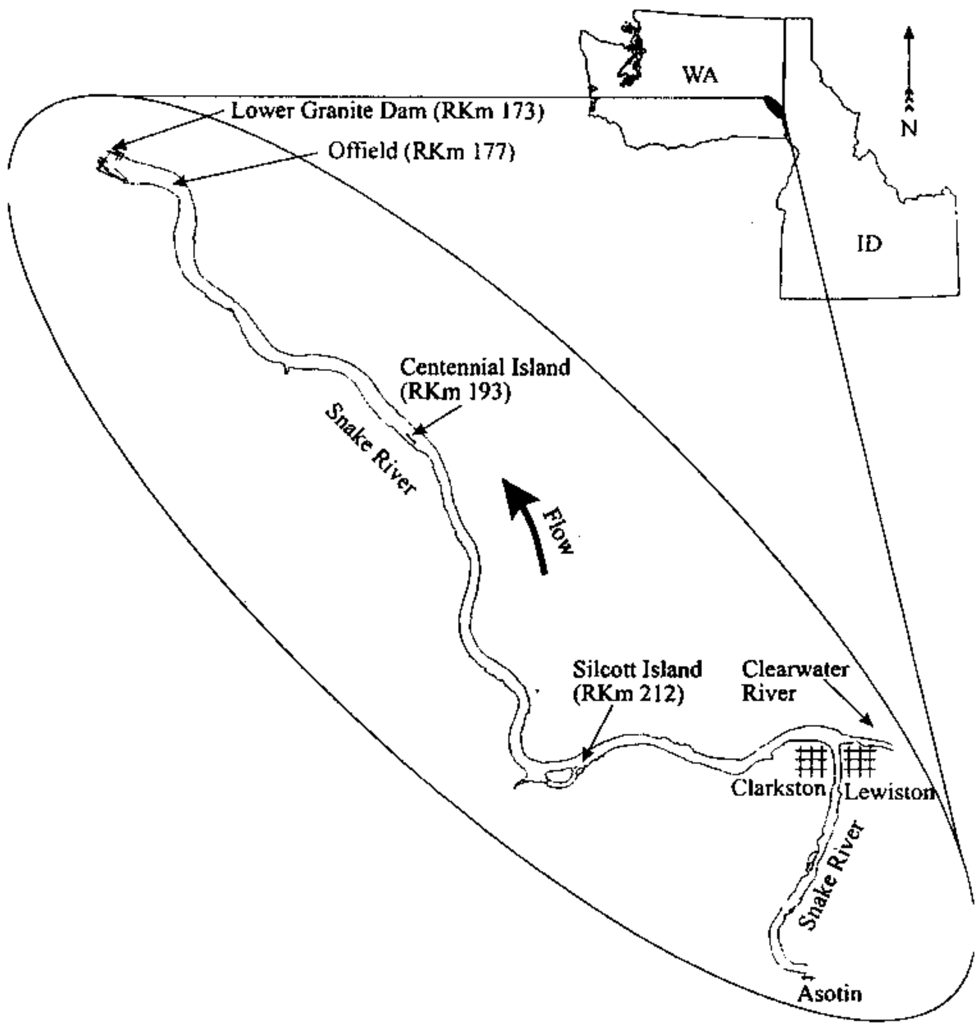

Figure 1. Location of Lower Granite Reservoir and locations of three selected shallow-water sampling areas.

Water Column Profiles

Surface-to-bottom water-column profiles for measurements of water temperature, dissolved oxygen, conductivity, and pH were obtained using a multiparameter Hydrolab Surveyor[1] submersible probe and data logger. The water-column profiles were obtained from a boat anchored or drifting along the 18-m depth contour, and data were recorded at 1-m depth intervals from the surface to a depth of 15 m and at 0.5 m above the bottom. The percent saturation of dissolved oxygen for each water column profile was calculated using the following formula (Wetzel and Likens 1991):

$$\text{Percent saturation} = \frac{DO}{S\left(\frac{P}{B}\right)} \times 100$$

where

DO = dissolved oxygen (mg/L)
P = measured barometric pressure (mm Hg)
S = oxygen solubility (mg/L) at 100% saturation at standard pressure in moist air
B = 760 mm Hg which is standard barometric pressure at sea level

Transparency, Turbidity, and Euphotic Depth

A 20-cm-diameter black and white Secchi disc was used to measure depth of water transparency (Goldman and Horne 1983, Lind 1985, Wetzel and Likens 1991). The Secchi disc was lowered into the water column in the shadow of the boat until it disappeared, then the depth of disappearance was recorded.

Turbidity is a measurement of suspended matter, which has a tendency to reduce and scatter sunlight the water receives (Welch 1952, Lind 1985, Wetzel and Likens 1991). Water samples for turbidity measurements were collected from 1-, 7-, and 15-m depths using a 4-L Van Dorn sampler. From March through July 1994, turbidity was measured in the field using an HF Instruments model DRT15 turbidimeter, and thereafter, using a Hach model 2100P turbidimeter.

1 Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

Beginning in mid-May 1994, we used two KAHLSICO underwater irradiameter probes to determine the depth of the euphotic zone. The euphotic zone was defined as a water layer receiving enough sunlight for photosynthesis of chlorophyll pigments and population growth of phytoplankton (McKee and Wolf 1963, Schwoerbel 1987, Moss 1988). To obtain the measurement, we lowered one irradiameter probe to the depth at which the reading was 1% of the partial energy value from available sunlight at the water surface, as indicated by the second probe, which was held just beneath the water surface (Lind 1985, Kimmel et al. 1990) (Gerald J. Kahl, KAHLSICO International Corp., P.O. Box 947, El Cajon, CA 92022-0947, Pers. commun., July 1995). The depth to which the first irradiameter probe was lowered defined the depth of the euphotic zone, and thus the level at which subsequent water samples were taken for zooplankton and chlorophyll analyses.

Nutrients

Water samples for nutrients were collected from 1-, 7-, and 15-m depths using a 4-L Van Dorn sampler along the 18-m depth contour at each sampling area. Samples were stored in the dark on ice until transport and were transported on ice within 24 hours of collection. Analyses were conducted under contract to the State of Washington Research Center (WRC), Washington State University, Pullman, WA (Dr. Steve Juul, point of contact). Samples were analyzed for nitrogen, phosphorus, and silica; the cations sodium, potassium, calcium, and magnesium; and the anions chloride and sulfate.

Alkalinity

Water samples for measurements of alkalinity, like those for nutrient analyses, were obtained using a 4-L Van Dorn sampler, with samples taken from 1-, 7-, and 15-m depths along the 18-m depth contour at each sampling area. Alkalinity measurements were taken while in the field using a chemical titration kit (LaMotte model WAT-MP-DR).

Chlorophyll

Chlorophyll *a* concentrations were used as a crude index of phytoplankton biomass (APHA 1992). Laboratory analyses of chlorophyll *a* concentrations in samples included interference of accessory pigments such as chlorophyll *b* and pheophytin *a* (APHA 1992). Therefore, our laboratory procedures included analyses for concentrations of monochromatic chlorophyll *a* (pheophytin-corrected), pheophytin *a*, and trichromatic chlorophyll *a*, *b*, and *c*.

Water samples for analysis of chlorophyll were generally collected from a boat drifting along the 18-m depth contour at each sampling area. Initially samples were collected from the water column from the surface to a depth of 15 m. In April 1995, we modified this procedure to collect samples from 0.5 m deeper than the depth of the euphotic zone, which had been previously established using an irradiameter. In April, July, and October 1995, an additional set of composite samples was collected from the water surface to the 15-m depth in order to compare chlorophyll results with those obtained from the fixed 0- to 15-m depth samples and the variable-depth euphotic zone samples.

Each composite sample was obtained with a 38- or 50-mm (inner diameter) hose. A rope and weight were attached to the distal end of the hose, which was deployed vertically to a specified depth in the water column (Goldman and Horne 1983). After deployment, the surface end of the hose was capped shut and the distal end retrieved from depth using the attached rope. The retrieved sample was then emptied into a clean 19-L bucket for mixing and subsampling. Two subsamples were obtained from the bucket and stored in the dark on ice in brown, opaque plastic bottles.

Because a large portion of the phytoplankton in water is often less than 25 μm in size (Lieberman 1992), two additional subsamples were obtained from the bucket after filtering through a stoppered 25-μm plankton net. Beginning in March 1995, we modified the general procedure to obtain two independent subsamples from the reservoir using one unfiltered subsample and one filtered subsample from each 19-L sample.

From March to June 1994, chlorophyll samples were taken to WRC for analysis, and thereafter, samples were transported to and analyzed at our laboratory. The cold-acetone extraction and spectrophotometric method was utilized by both laboratories (APHA 1992). Samples were suction filtered in subdued light through 47-mm Whatman GF/C glass fiber filters (APHA 1992). Depending on turbidity, up to 1000 mL of water samples were filtered. To avoid damaging delicate phytoplankton, vacuum pressure during filtration was not allowed to exceed 25 cm Hg (Wetzel and Likens 1991). Samples on filters were stored in the freezer prior to extraction and spectrophotometric analysis (APHA 1992). Complete details of the collection and laboratory methods for chlorophyll analyses are presented in Appendix A.

Calculations for concentrations of monochromatic chlorophyll *a* and pheophytin *a* and trichromatic chlorophyll *a*, *b*, and *c*, and for deterioration ratio were derived from the formulas given by APHA (1992). Calculations for monochromatic chlorophyll *a* included correction for pheophytin *a*, a degradatory pigment which absorbs wavelengths similar to those absorbed by chlorophyll *a*.

Analyses of chlorophyll concentrations collected from the three selected shallow-water habitats were separated into two groups due to differences in methodologies (i.e., the depth from which samples were taken). The first group included samples collected from the water surface to the 15-m depth, and the second group included samples collected from 0.5 m below the euphotic zone. The second group of samples did not include chlorophyll concentrations from depths beneath the euphotic zone; therefore, variations in chlorophyll concentration between 1994 and 1995 were not entirely comparable. Mean values of the two replicate samples for monochromatic (pheophytin-corrected) chlorophyll *a* concentrations were presented.

Zooplankton

Zooplankton samples were collected using an 80-μm Wisconsin-style plankton net with a 15-cm-diameter mouth. Samples were collected at approximately the 18-m depth contour at each sampling area. Three vertical tows were made by lowering the net to the 15-m depth, then retrieving it by hand at a vertical speed of about 0.5 m/second (APHA 1992). Beginning in April 1995, sample depth was adjusted to the depth of the euphotic zone plus 0.5 m (the euphotic zones having been previously determined with an irradiameter). In April, July, and October 1995, additional zooplankton samples were obtained from the 15-m depth to compare the two sampling methods. Zooplankton samples were poured and rinsed with distilled water into 250-mL plastic bottles and preserved and stained with addition of Lugol's iodine solution; from 3 to 7 mL of the iodine solution was added to the sample depending on the final volume after rinsing.

Analysis of zooplankton samples for species composition and numerical density were conducted under contract to Beaver Schaberg Associates, Inc., Shaker Heights, Ohio (Dr. John Beaver, point of contact). Mean densities of zooplankton from three replicate samples at each sampling area were used for data analysis and presentations. We also assigned the National Oceanographic Data Center (NODC) taxonomic codes (version 7.0) to each organism based on its taxonomic classification.[2] Taxonomic information for each organism was contained in the hierarchy of each code and allowed data for organisms to be grouped and summed into a desired taxonomic classification.

Computer programs were utilized to combine tallies of organisms into five possible taxonomic levels. For example, tallies for *Diacyclops thomasi* and Cyclopoida were combined into the order Cyclopoida, and total densities for this order of copepods were then compared with those of other orders of copepods. Mean densities were calculated for each grouped or ungrouped taxon/category of zooplankton for comparisons among sampling areas and dates. Density was expressed as number of organisms/L.

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[2] National Oceanographic Data Center, NOAA/NESDIS E/OC1, SSMC3, Room 4649, 1315 East-West Highway, Silver Spring, MD 20910-3282.

For analysis, zooplankton data were separated into two groups, one for samples collected from a depth of 0-15 m, and one for samples collected from a depth of 0 m to 0.5 m below the euphotic zone. Zooplankton also live below the euphotic depth and migrate vertically for feeding. Therefore, conclusions regarding seasonal variation in zooplankton species composition and numerical density of the two groups were limited.

Sediment

Soft-substrate sediment samples were obtained using a Ponar grab measuring about 0.05 m^2. This was the same sampler used for collecting benthic invertebrate samples (Pool and Ledgerwood 1997). Sediment samples were collected in May, August, and November 1994 and January, April, July, and October 1995. These samples were collected from the same stations established along four transects in each sampling area for our sampling for benthic invertebrate populations (Pool and Ledgerwood 1997). For sediment samples, we used only the middle upstream transect along the 3-, 9-, and 18-m depth contours from each sampling area. In July 1995, sediment samples were collected from all 36 benthic invertebrate stations; however, only samples from the middle upstream transect at each sampling area were included for this analysis.

Sediment samples were emptied from the Ponar grab onto a metal tray: a ladle was used to transfer about 0.5 L of sediment from the tray to a plastic zippered bag. The bags were then sealed and stored in the dark and kept cool. Samples were taken to the U.S. Army Corps of Engineers North Pacific Division Materials Laboratory, Troutdale, Oregon (Jim Hinds, point of contact), for analyses, including particle grain size, soil classification, and percent volatile solids.

Statistical Analyses

The study design was to compare pre- and post-drawdown limnologeal parameters. Abrupt termination of the study in October 1995 precluded detailed statistical comparisons because drawdown did not occur. One-way analysis of variance was used to compare possible differences among sample sites, depths, and dates. For these rather primitive comparisons, we assumed there was no interaction between sites and dates. For brevity, when differences in sites, dates, or depths of samples were not significant ($P < 0.05$), we used the pooled mean value $\pm$ the standard error of the mean in the text. Detailed data for each parameter are presented in tables, figures, and appendixes for each sampling area, depth, and date.

RESULTS

A total of 30 sampling trips were made to the reservoir, with each trip generally requiring 3 to 4 days for sample collection. Data summaries for all parameters studied are presented in Appendix B. In addition, data from all samples were compiled into a relational database (Microsoft Access version 2.0).[3] Electronic formats of the data are available upon request.

Water Column Profiles

Temporal changes in water temperature, dissolved oxygen, conductivity, and pH during the study period showed seasonal changes and little stratification of the water column in the shallow-water habitats studied (Figs. 2-6). There were significant differences among sampling areas ($P > 0.05$) and the water column appeared well mixed throughout the year, with the possible exception of August to September 1994.

In 1994, a low-flow drought year, water temperatures were considerably higher than in 1995, an average-to-high-flow year. For instance, the highest mean surface-to-bottom temperature in 1994 was 23.0°C, while in 1995 the highest mean was only 19.9°C (Fig. 2). Throughout the study period, the lowest mean surface-to-bottom temperature was 3.3°C. At no time during our sampling did we record a thermocline, or vertical change in water temperature, that exceeded 1°C per meter (Moss 1988). The greatest thermal stratification within our sampling areas occurred in July and August 1994, with a change of about 3°C, and the least thermal stratification was seen during the winter months, with a change of about 0.5°C (Appendix Table B1).

There were only minor differences in dissolved oxygen concentrations at sampling areas between 1994 and 1995 (mean 10.0 ± 0.1 mg/L) (Fig 3). Generally, mean surface-to-bottom dissolved oxygen concentrations were highest during winter and lowest during summer at each sampling area. During August and September 1994, the period of warmest water, the percent saturation of dissolved oxygen at the water surface was over 95% at all sampling areas (Fig. 4). However, the percent saturation of dissolved oxygen near the bottom (down to the 22-m depth) dropped to about 5 mg/L, approaching concentrations known to be stressful and fatal to fish (Welch 1952, McKee and Wolf 1963) (Appendix Table B1). These dangerously low levels of dissolved oxygen near the bottom at our sampling areas were not recorded in 1995.

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3 Included in the database are results of limnological sampling conducted in John Day Reservoir on the Columbia River during a similar time period (Lyle Gilbreath, FE Project Leader).

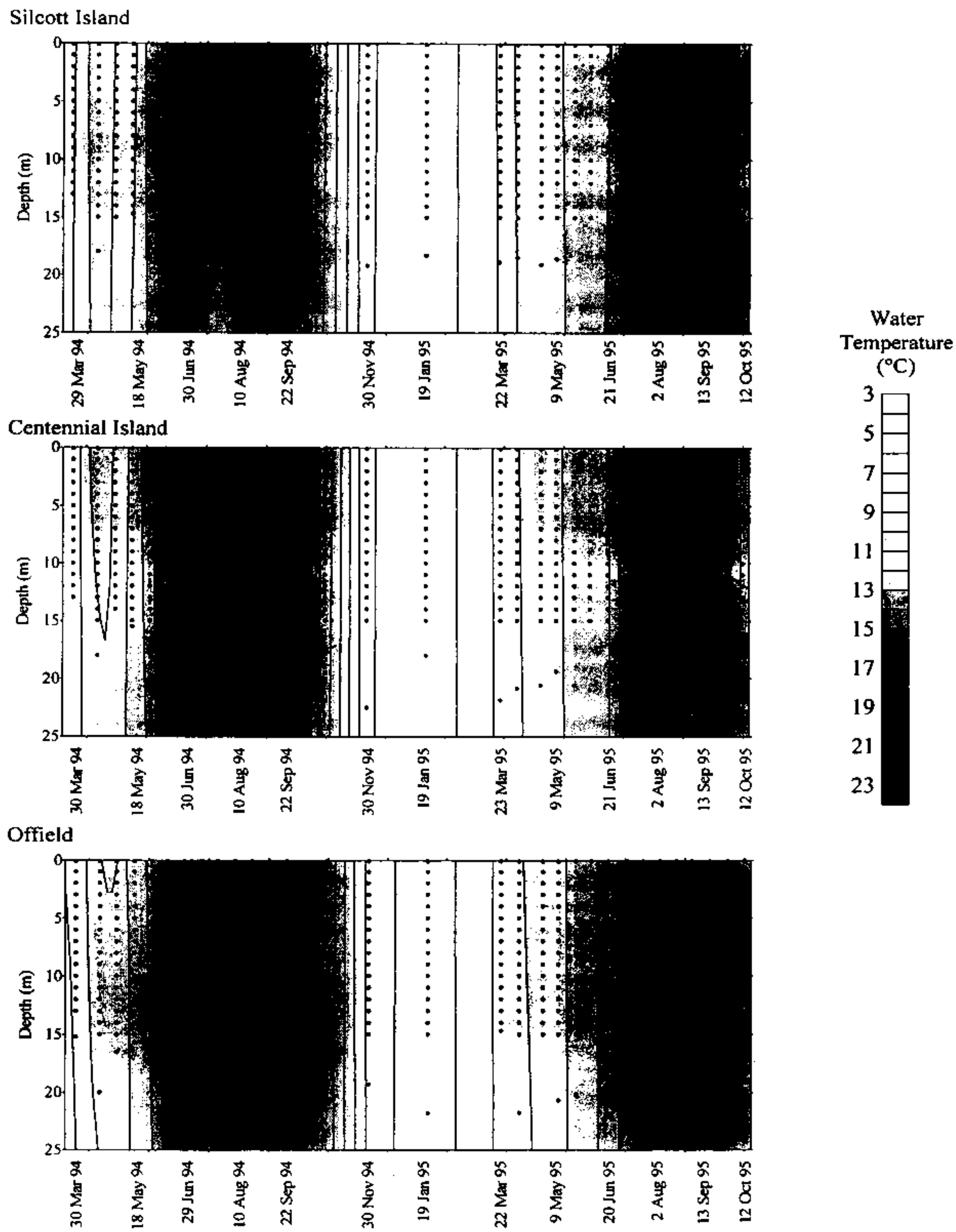

Figure 2. Vertical profiles of temporal changes in water temperature (°C) at each sampling area in Lower Granite Reservoir, 1994-95. Dots are locations of each measurement in the water column.

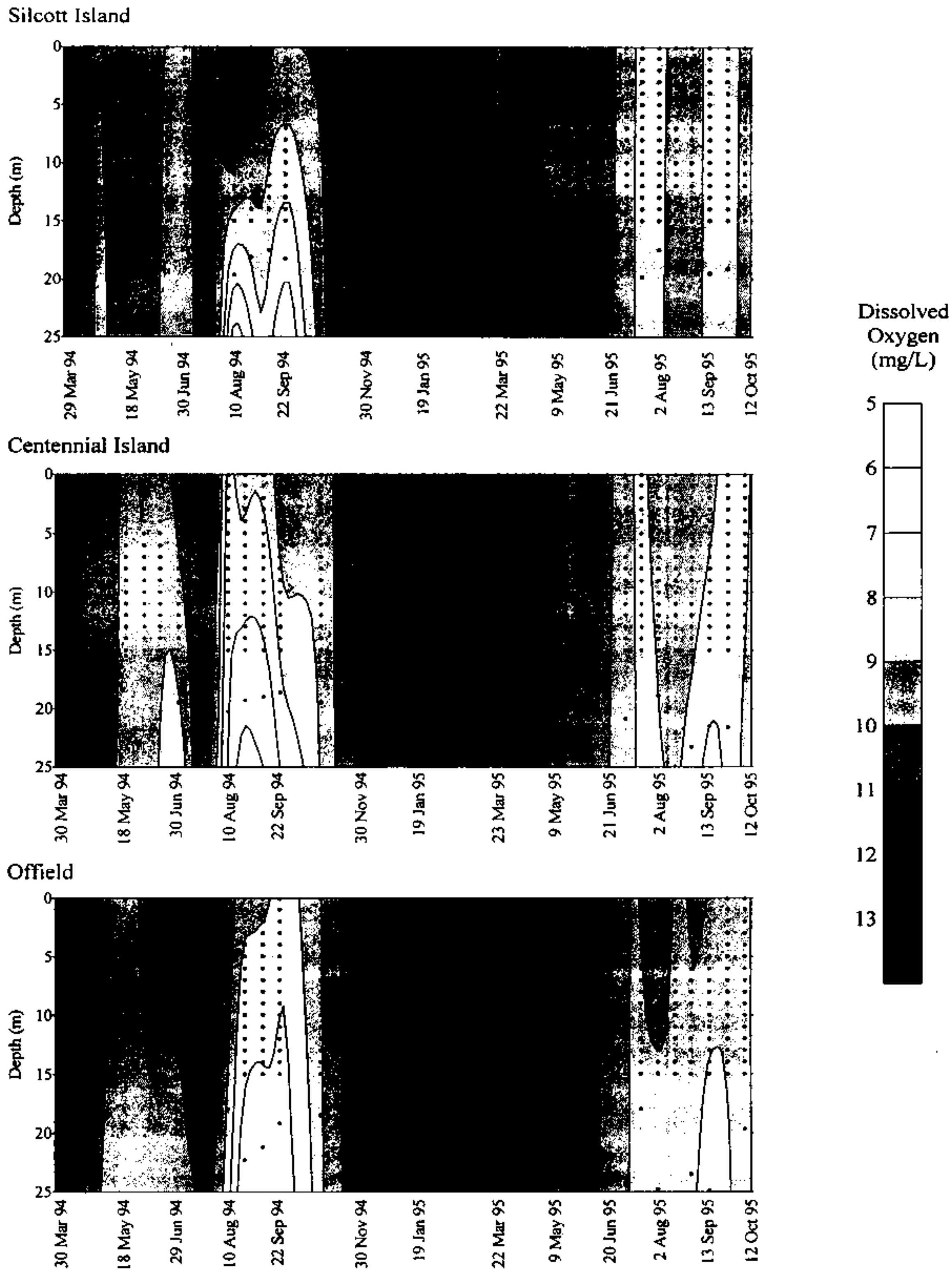

Figure 3. Vertical profiles of temporal changes in dissolved oxygen (mg/L) at each samping area in Lower Granite Reservoir, 1994-95. Dots are locations of each measurement in the water column.

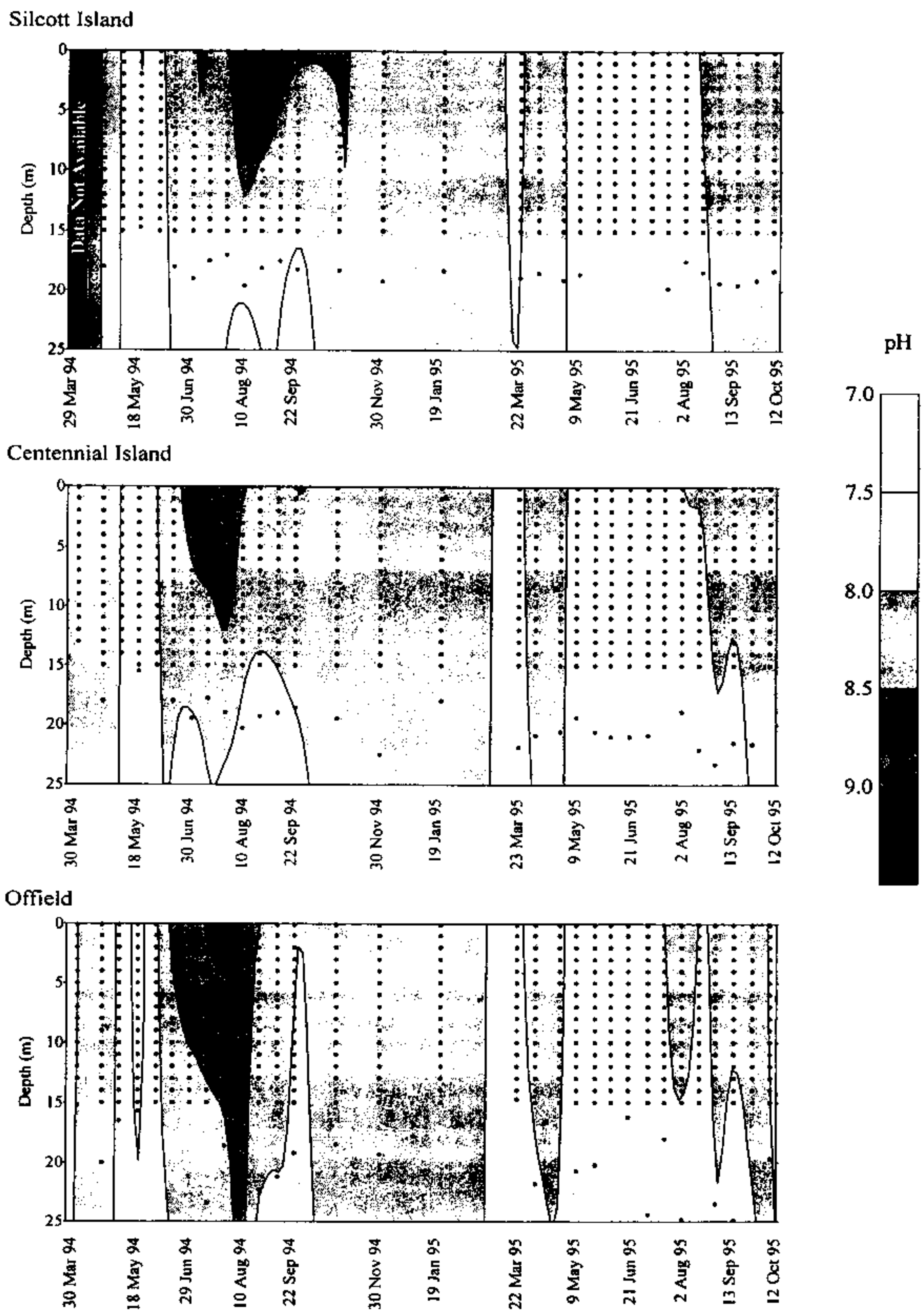

Figure 6. Vertical profiles of temporal changes in pH values at each sampling area in Lower Granite Reservoir, 1994-95. Dots are locations of each measurement in the water column.

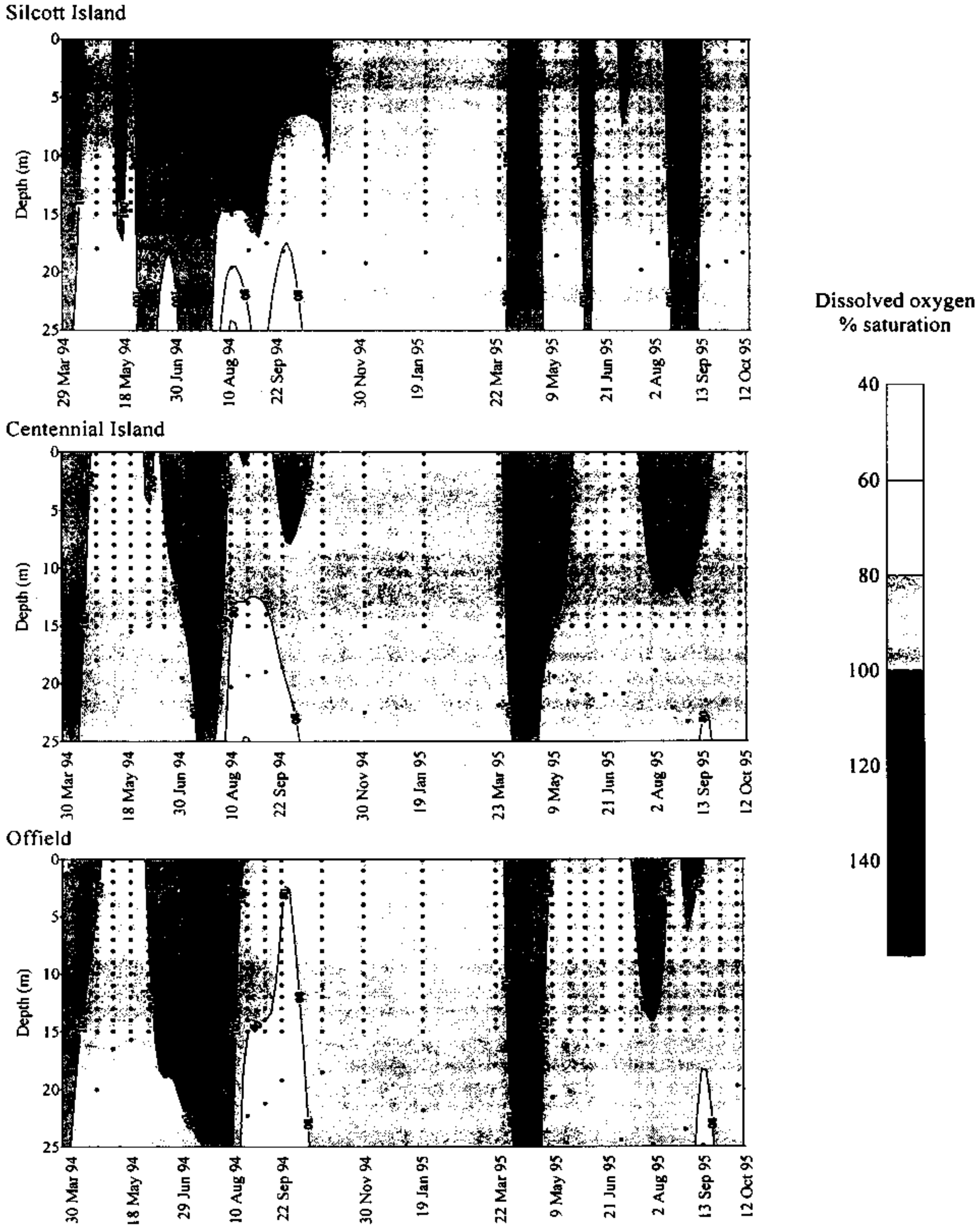

Figure 4. Vertical profiles of temporal changes in dissolved oxygen percent saturation at each sampling area in Lower Granite Reservoir, 1994-95. Dots are locations of each measurement in the water column.

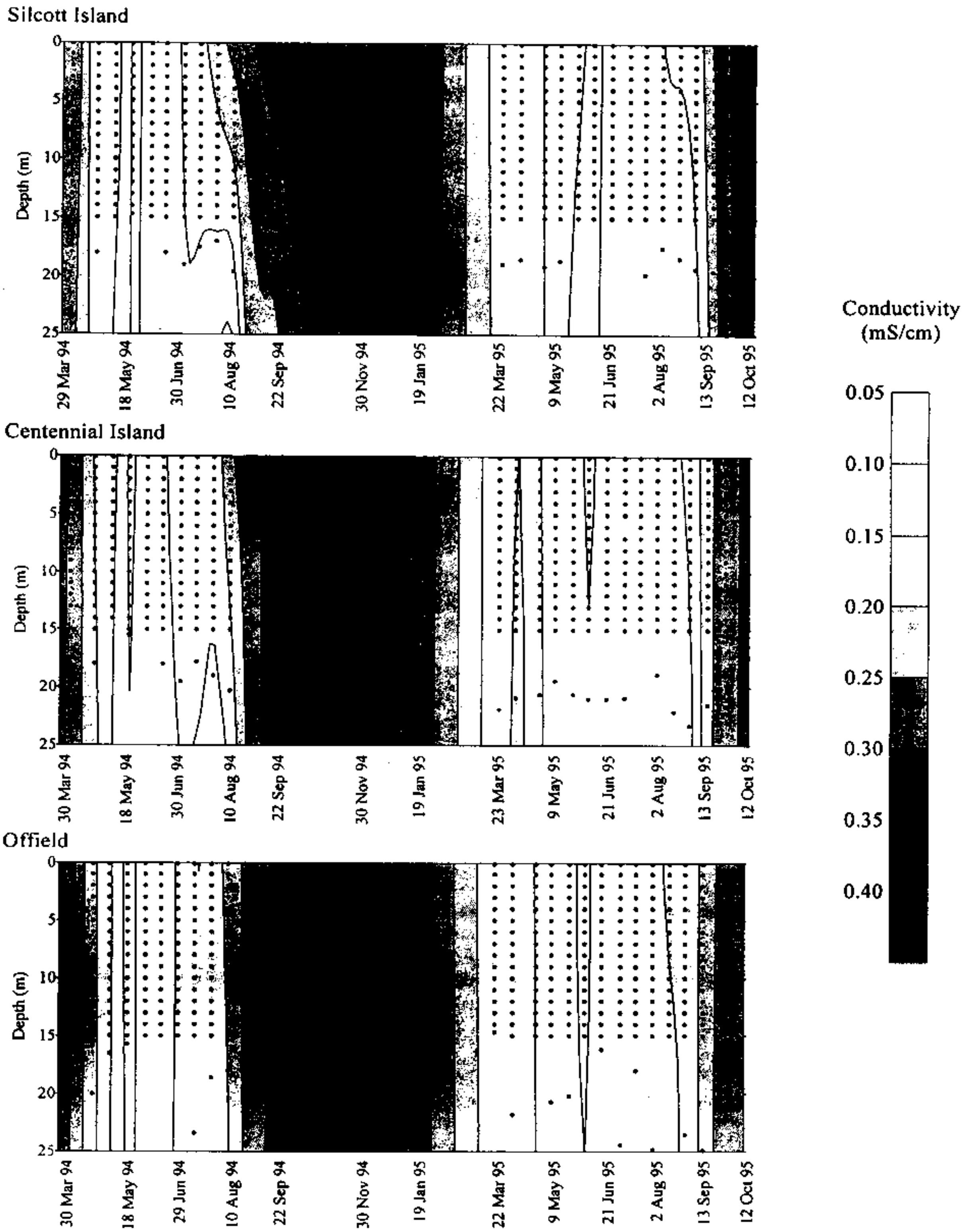

Figure 5. Vertical profiles of temporal changes in water conductivity (mS/cm) at each sampling area in Lower Granite Reservoir, 1994-95. Dots are locations of each measurement in the water column.

There were no significant differences ($P = 0.949$) among sampling areas in conductivity during the study period (mean 0.194 mS/cm $\pm$ 0.009) (Appendix Table B1). Surface-to-bottom conductivity profiles at each sampling area were not stratified (Fig. 5). Throughout the study period, water in Lower Granite Reservoir was slightly alkaline, and there were no significant differences ($P = 0.610$) in pH among sampling areas (mean pH = 8.1 $\pm$ 0.04) (Appendix Table B1). Surface-to-bottom pH profiles at each sampling area were also similar throughout the study period (Fig. 6).

Transparency, Turbidity, and Euphotic Depth

The amount of sunlight penetrating the water column and the depth of sunlight penetration were estimated using Secchi disc turbidimeters and irradiameters, respectively. There was good temporal correlation between the various estimations of light penetration at all sampling areas (Appendix Tables B2 and B3).

Both Secchi disk transparency and estimates of euphotic depth (obtained beginning in mid-May 1994) increased through the spring and summer each year (Fig. 7). Maximum values were recorded in November 1994, with transparency at about 3 m and euphotic depth at about 8 m. Minimum values were recorded in May 1995, with transparency at about 0.3 m and euphotic depth at about 1 m. There were no significant differences among sampling areas in either Secchi disk transparency ($P= 0.714$) or euphotic depth ($P= 0.698$).

Turbidity values were generally similar among sample areas and depths with some notable exceptions (mean 10 NTU $\pm$ 1.6) (Fig. 8). Major spikes in turbidity occurred (> 40 NTU) at the 5-m depths during May and June 1994 at Centennial Island and Offield, but not at Silcott Island. Similar spikes occurred in May 1995 at all sites and depths. A final peak in turbidity value was recorded throughout the water column at Silcott Island in August 1995, but this trend was not seen at the downstream sampling locations.

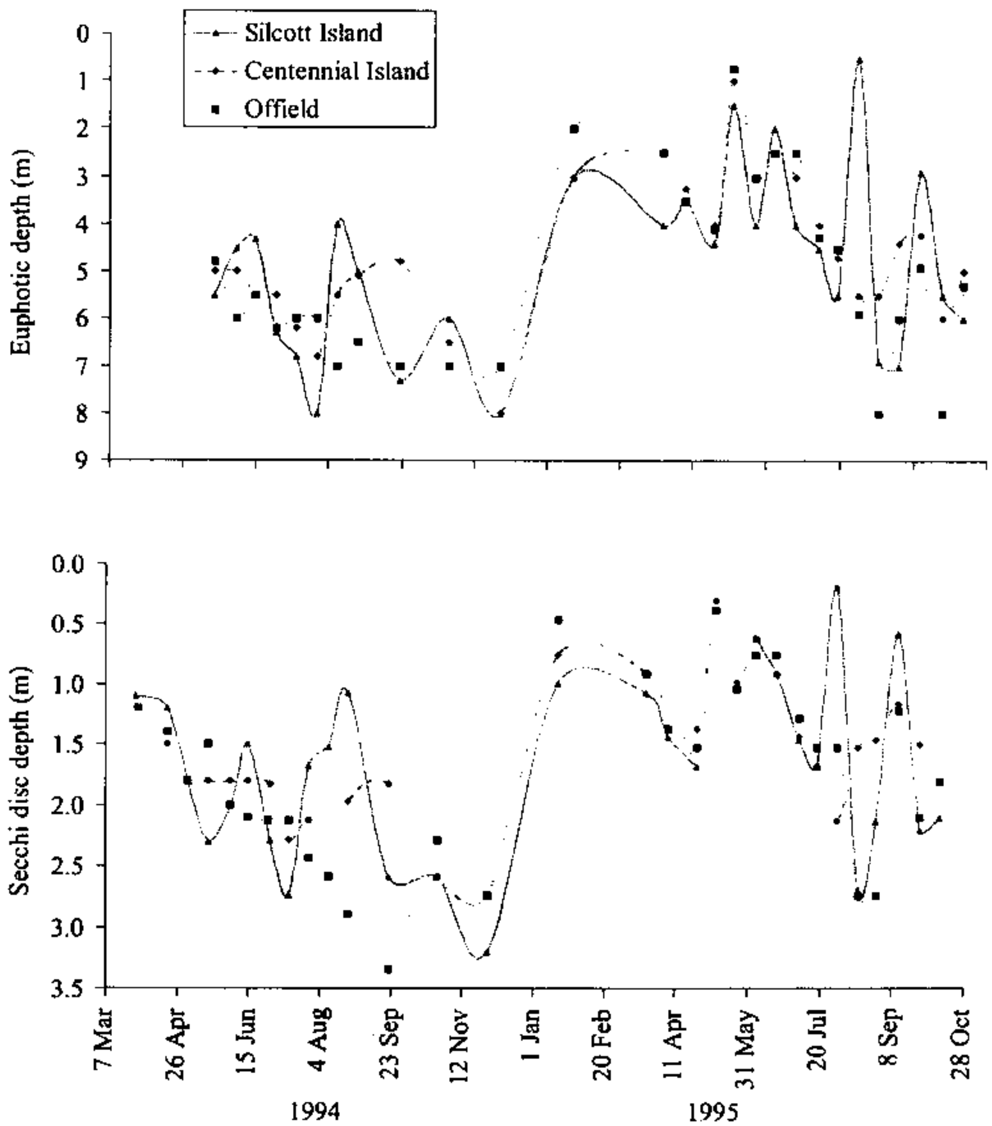

Figure 7. Depths of the euphotic zone (m) and Secchi disk transparency at each sampling area at Lower Granite Reservoir, 1994-95.

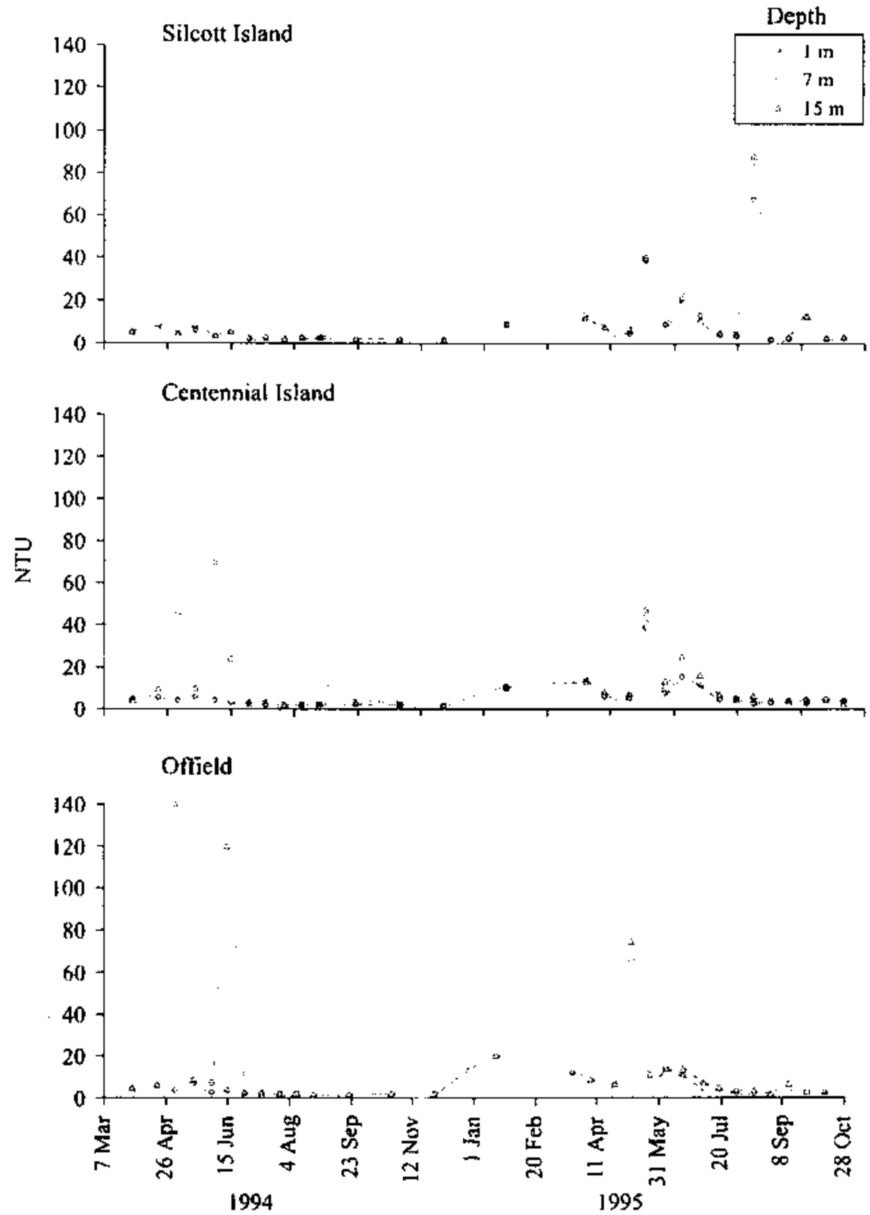

Figure 8. Turbitidy values (NTU) by depth at each sampling area in Lower Granite Reservoir, 1994-95.

Nutrients

Results of detailed analyses for the various nutrient parameters sampled are presented for each sampling area, date, and depth in Appendix Table B4. Temporal and seasonal changes for each parameter and sample area were evident (Figs. 9-13). Concentrations generally declined during spring, were low during summer, increased through fall, and remained high over winter. There were no apparent differences among sampling areas or depths for the various parameters. Mean values were as follows: 0.59 mg-N/L total nitrogen, 0.29 mg-N/L nitrite + nitrate, 0.03 mg-N/L ammonia, 0.02 mg-P/L total phosphorus, 0.02 mg-P/L orthophosphate, 13.9 mg/L sodium, 2.3 mg/L potassium, 16.4 mg/L calcium, 6.5 mg/L magnesium, 7.3 mg/L chloride, 19.4 mg/L sulfate, and 16.5 mg/L silica.

Alkalinity

Results of alkalinity analyses are presented for each sampling area, date, and depth in Appendix Table B5. There were no apparent differences in alkalinity among sampling sites or depths, but there were seasonal and temporal changes similar to those seen in nutrients: alkalinity generally declined during spring, was low during summer, increased through fall, and remained high during winter (mean 69.8 mg $CaCO_3$/L $\pm$ 2.8) (Fig. 14).

Chlorophyll

Monochromatic chlorophyll *a* concentrations (pheophytin-corrected) generally followed similar patterns at sampling sites in all three areas (Silcott Island, Centennial Island, and Offield) throughout the study period (Table 1, Fig. 15). Concentrations were variable with no obvious seasonal trends between years, although a change in sampling methods that occurred in April of 1995 may have masked possible trends. Overall, phytoplankton less than 25 μm in size contributed to more than 50% of the measured chlorophyll *a* during both years of study, regardless of sampling methods. Concentrations of pheophytin and trichromatic chlorophyll *a*, *b*, and *c* are presented in Appendix Table B6.

From March 1994 through March 1995, highest concentrations of chlorophyll *a* were observed during June, July, and August with most values exceeding 5 mg/m^3 (Fig. 15). Mean chlorophyll *a* values for all three sites combined during this period ranged from 0.5 to 12.3 mg/m^3, with an overall mean of 4.0 mg/m^3.

Chlorophyll *a* values for the period April through October 1995 were markedly different from those of the previous year. Highest chlorophyll *a* values in 1995 were observed during the week of 5 April (mean 17.3 mg/m^3). This sample period was unique in that it was one of the few instances where we sampled a phytoplankton bloom near

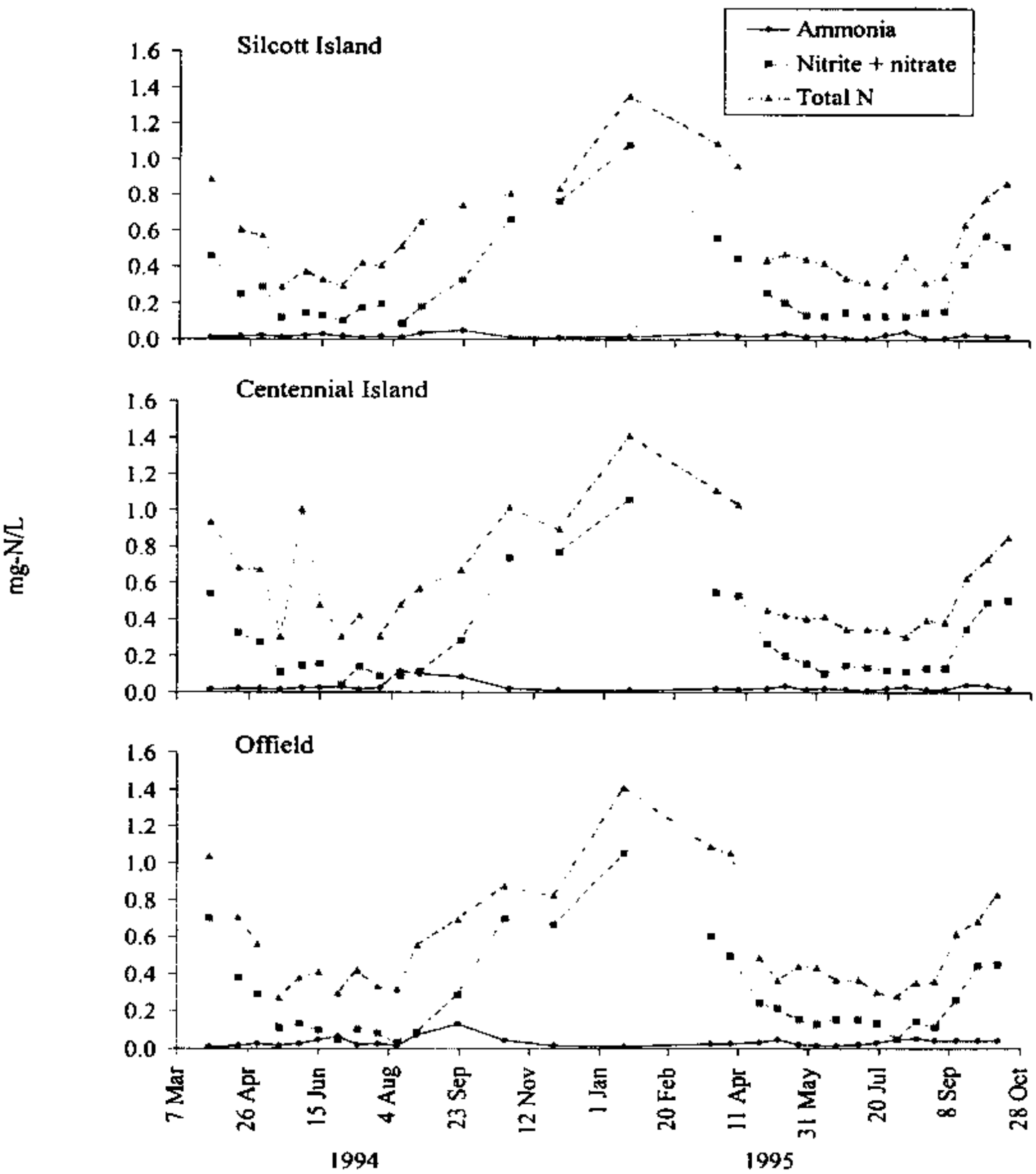

Figure 9. Total nitrogen, ammonia, and nitrite + nitrate concentrations (mg-N/L) in the water column at each sampling area in Lower Granite Reservoir, 1994-95. Data are means of 1-, 7-, and 15-m sampling depths.

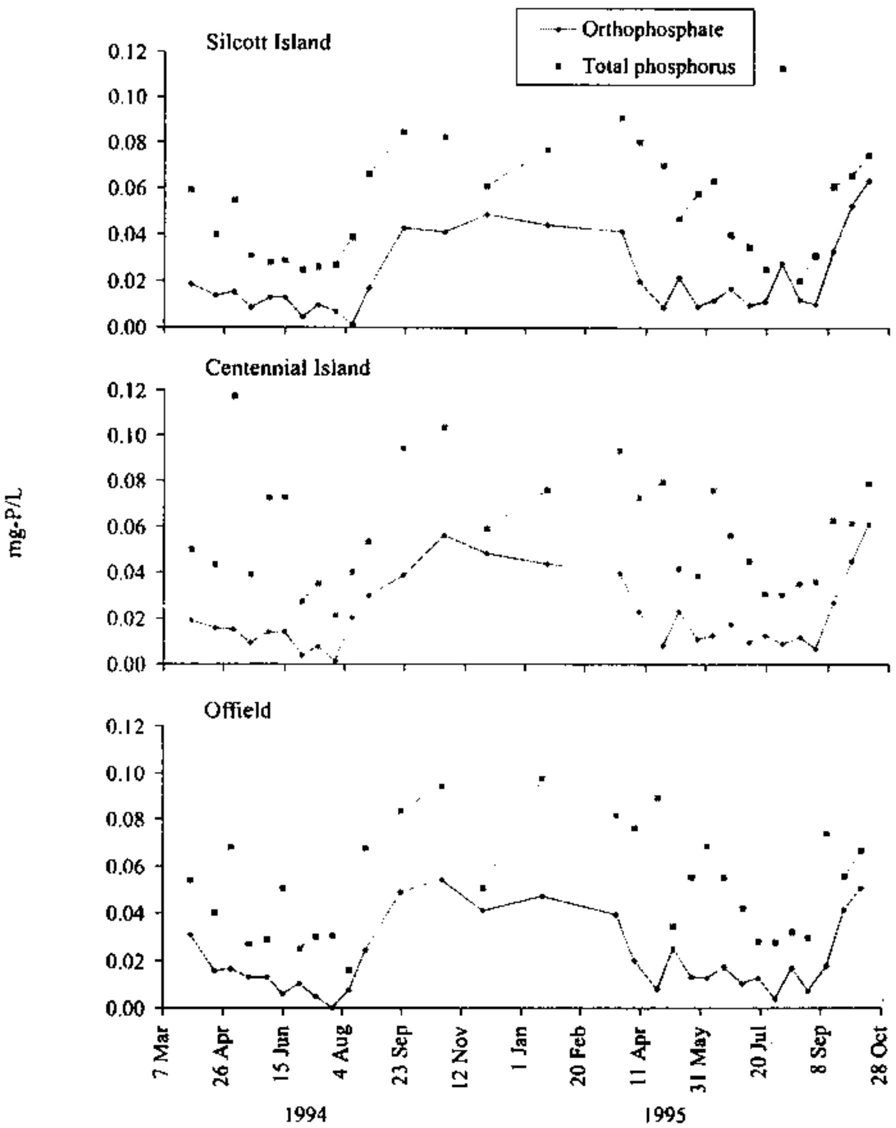

Figure 10. Total phosphorus and orthophosphate concentrations (mg-P/L) in the water column at each sampling area in Lower Granite Reservoir, 1994-95. Data are means of 1-, 7-, and 15-m sampling depths.

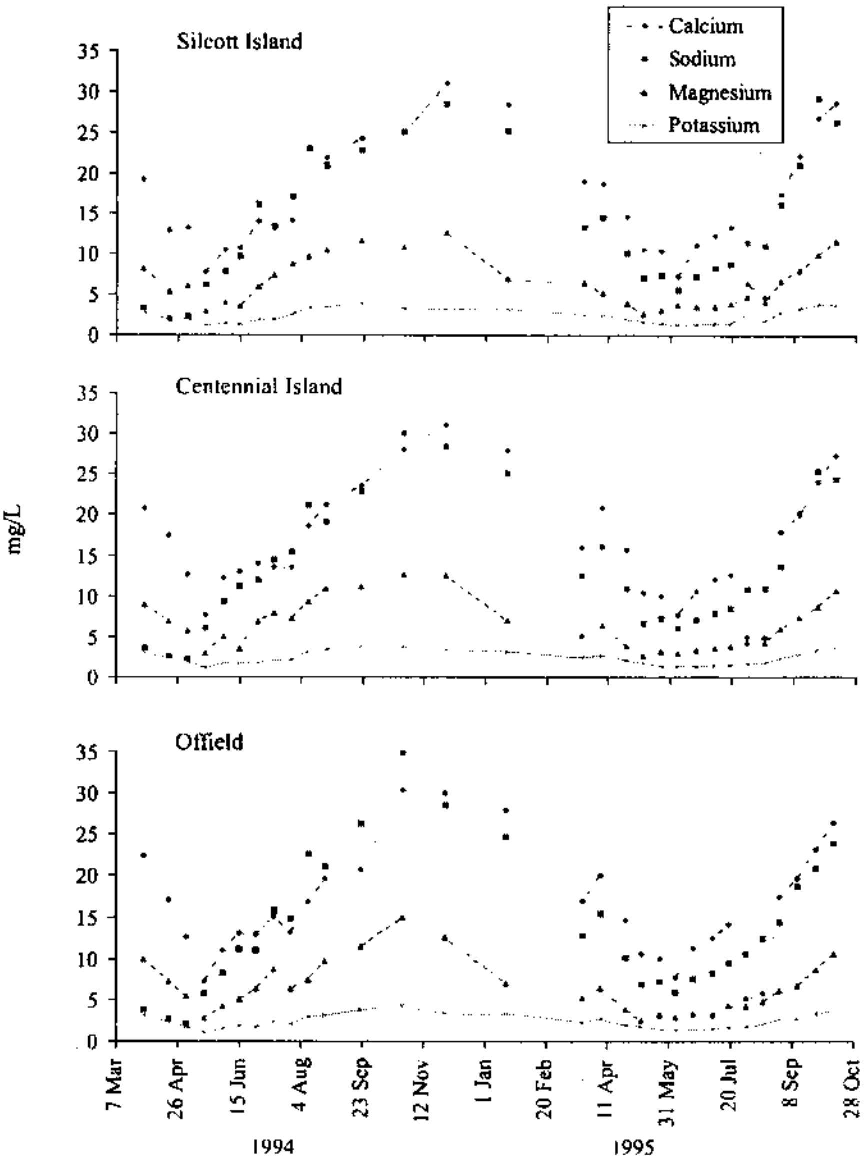

Figure 11. Concentrations (mg/L) of four cations in the water column at each sampling area in Lower Granite Reservoir, 1994-95. Data are means of 1-, 7-, and 15-m sampling depths.

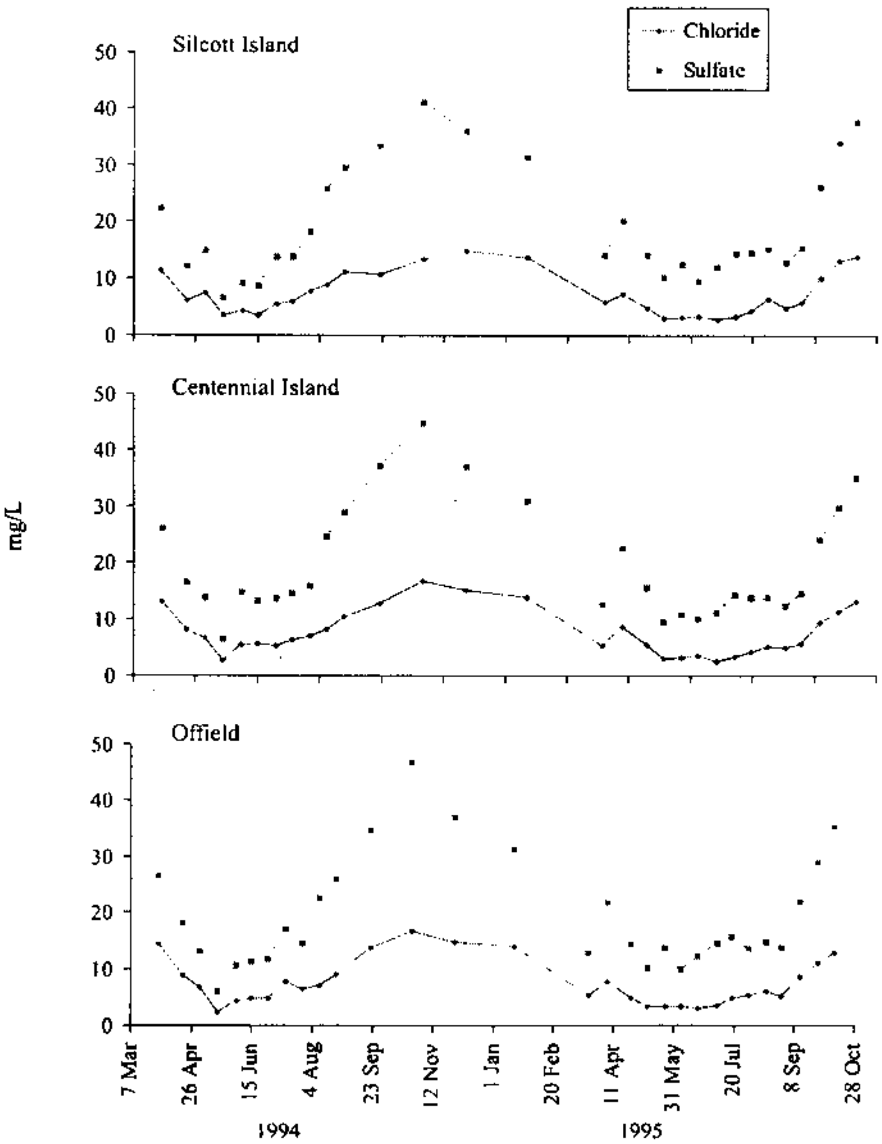

Figure 12. Concentrations (mg/L) of two anions in the water column at each sampling area in Lower Granite Reservoir, 1994-95. Data are means of 1-, 7-, and 15-m sampling depths.

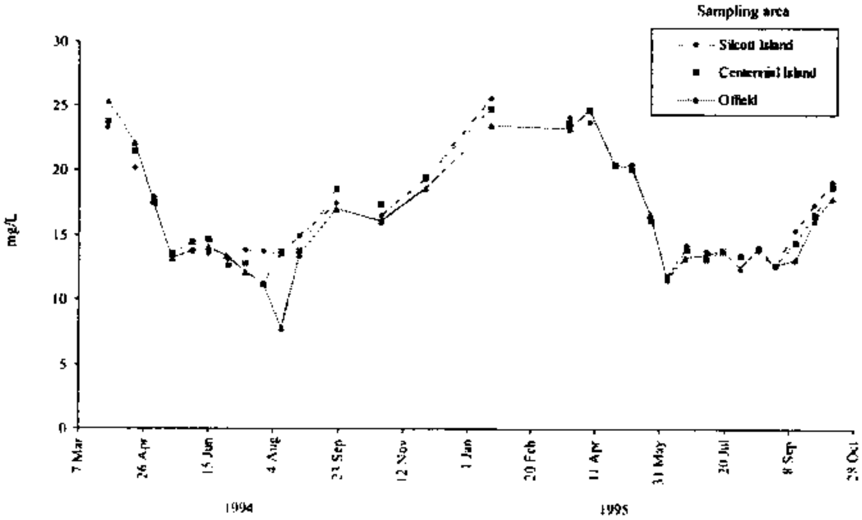

Figure 13. Silica concentrations (mg/L) in the water column at each sampling area in Lower Granite Reservoir, 1994-95. Data are means of 1-, 7-, and 15-m sampling depths.

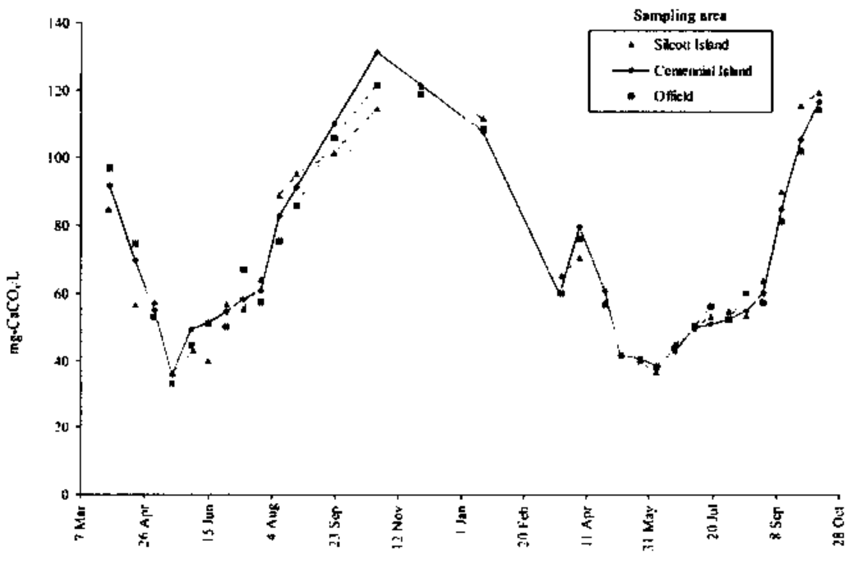

Figure 14. Alkalinity concentrations (mg-$CaCO_3$/L) in the water column at each sampling area in Lower Granite Reservoir, 1994-95. Data are means of 1-, 7-, and 15-m sampling depths.

Table 1. Monochromatic chlorophyll *a* concentrations (mg/m³) comparing 0- to 15-m and euphotic zone plus 0.5-m sampling depths at three shallow-water areas in Lower Granite Reservoir, 1995.

		Monochromatic chlorophyll *a* (mg/m³)					
		26 Apr 95		19 Jul 95		12 Oct 95	
Sampling area	Size fraction	Euphotic plus 0.5 m	0 to 15 m	Euphotic plus 0.5 m	0 to 15 m	Euphotic plus 0.5 m	0 to 15 m
Silcott Island	Total	4.14	4.54	0.67	0.61	1.31	1.58
	< 25 µm	2.27	1.20	0.51	0.45	1.15	1.15
Centennial Island	Total	4.41	6.14	0.56	0.72	1.47	1.68
	< 25 µm	2.54	2.40	0.45	0.53	1.15	1.07
Offield	Total	5.61	4.08	0.80	0.67	2.00	2.59
	< 25 µm	2.80	2.36	0.56	0.40	1.01	1.28

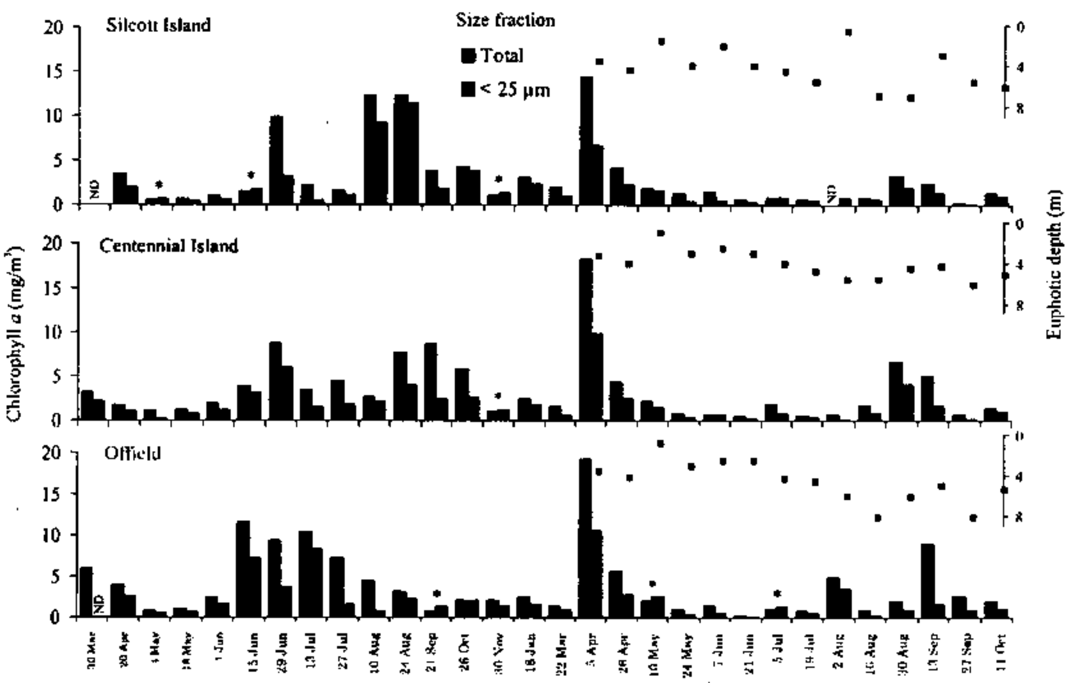

Figure 15. Monochromatic chlorophyll *a* (pheophytin-corrected) concentrations (mg/m³) in two size fractions at each sampling area in Lower Granite Reservoir, 1994-95. Prior to April 1995, samples were obtained from a fixed 0- to 15-m depth; afterwards, samples were obtained from the euphotic zone + 0.5 m (depth shown). (ND = No data available; * = Because concentrations were low, the total size fraction does not appear greater than the < 25-μm size fraction.)

peak production. Pheophytin levels on this date were low (mean 3.19 mg/m^3), indicating that little degradation of chlorophyll *a* had occurred. After this sample date, chlorophyll *a* levels generally declined through the spring and summer except for another small peak in late August. Mean chlorophyll *a* values for all three sites combined during this period ranged from 0.3 to 19.2 mg/m^3, with an overall mean of 3.2 mg/m^3.

Zooplankton

Zooplankton populations at the three sampling areas were dominated by 31 species of rotifers, 16 species of cladocerans, and 7 taxa/categories of copepods (Table 2). Species composition and numerical densities of zooplankton are presented in Appendix Table B7. Details of taxonomic groupings and electronic formats of the data are available upon request.

Numerically, highest mean zooplankton densities (organisms/L) occurred for rotifers (33.6/L), cladocerans (7.2), and copepods (4.6/L)(Fig. 16). Three numerically dominant rotifers were *Keratella cochlearis* (27.5/L), *Polyarthra vulgaris* (25.6./L), and Synchaeta pectinata (22.2/L)(Fig. 17). An obvious peak in rotifer density occurred in May 1995 at Silcott Island and in early August 1995 at Offield. Three numerically dominant cladocerans were *Daphnia retrocurva* (9.1/L), *Bosmina longirostris* (6.9/L), and *D. thorata* (4.3/L)(Fig. 18). Generally, unidentified nauplii dominated the total copepod population at all three sampling areas, especially during population spikes (mean nauplii density, 405/L)(Fig. 19). In late June at Silcott Island, both the copepod nauplii and cyclopoids contributed to the total copepod population peak. Temporally, copepod populations appeared highest during late spring and again in late summer. Ostracods were observed only in one sample at Offield in October 1995 (0.07/L).

In analyses of the three double samples taken in April, July, and October 1995, we observed differences between sampling methods for zooplankton concentrations (i.e., samples taken from a depth of 0.5 m below the euphotic zone and those taken from a depth of 0-15 m) (Table 3). At Silcott Island and Centennial Island in 1995, mean rotifer densities from 0.5 m below the euphotic zone were higher than those from the 0- to 15-m sample depth in April and July, but the opposite was observed in October. At all three sampling areas and all three test dates, mean densities of cladocerans and copepods were less than 2.5/L using either sampling method.

Table 2. Taxa/categories found in zooplankton samples collected from Lower Granite Reservoir, 1994-95.

Taxon/category	NODC code[1]	Taxon/category	NODC code[1]
Cladocera	6108000000	Rotifera	
Cladocera (immature)	6108000000	*B. caudatus*	4506010409
Alona affinis	6109070103	*B. patulus*	4506010416
A. costata	6109070107	*B. quadridentatus*	4506010411
A. guttata	6109070101	*B. urceolaris*	4506010405
A. quadrangularis	6109070104	*Keratella cochlearis*	4506010103
A. rectangula	6109070110	*K. quadrata*	4506010102
Chydorus spaericus	6109070201	*K. serrulata*	4506010116
Kurzia latissima	6109071401	*Kellicottia longispina*	4506010501
Leydigia leydigi	6109070503	*Notholca acuminata*	4506010203
Pleuroxus striatus	6109070904	*Euchlanis calpidia*	4506011808
Bosmina longirostris	6109030101	*E. dilatata*	4506011804
Ceriodaphnia quadrangula	6109020402	*Mytilina mucronata*	4506011305
Daphnia retrocurva	6109020104	*Trichotria pocillum*	4506011502
D. thorata	6109020121	*Macrochaetus longipes*	4506011205
Scapholeberis mucronata (kingi)	6109020501	*Colurella* spp.	4506010300
Diaphanosoma birgei	6109010203	*Lepadella ovalis*	4506010703
Leptodora kindtii	6109060101	*Lecane* spp.	4506020100
Copepoda	6117000000	*Trichocerca* spp.	4506070100
Copepoda (nauplii)	6117000000	*Asplanchna girodi*	4506120106
Calanoida	6118000000	*A. seiboldi*	4506120107
Leptodiaptomus ashlandi	6118180501	*Synchaeta pectinata*	4506130204
Cyclopoida	6120000000	*Polyarthra vulgaris*	4506130307
Diacyclops thomasi	6120081412	*Pompholyx sulcata*	4507010202
Eucyclops agilis	6120080401	*Filinia longiseta*	4507050101
Harpacticoida	6119000000	*Hexarthra mira*	4507020101
Rotifera	4500000000	*Conochilus unicornis*	4507040202
Philodina spp.	4504020200	*Conochiloides dossuarius*	4507040101
Brachionus angularis	4506010406	*Collotheca* spp.	4508010100
B. calyciflorus	4506010402	Ostracoda	6110000000

[1] The NODC codes listed are taxonomic numerical codes assigned by the National Oceanographic Data Center.

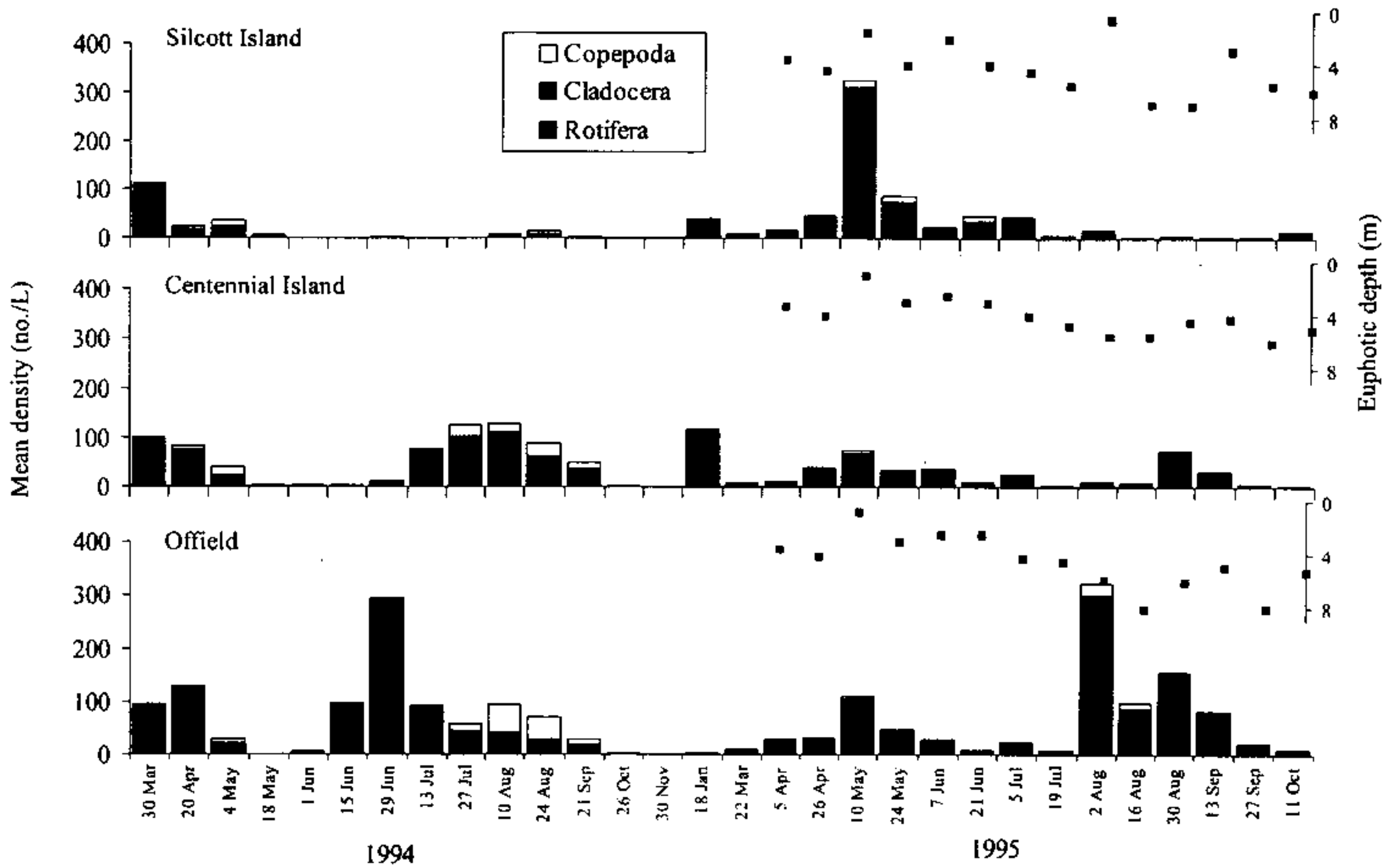

Figure 16. Numerical density (organisms/L) of three major zooplankton taxa at each sampling area in Lower Granite Reservoir, 1994-95. Densities are the mean of three vertical zooplankton tows. Prior to April 1995, samples were obtained from a fixed 0- to 15-m depth; afterwards, samples were obtained from the euphotic zone (depth shown).

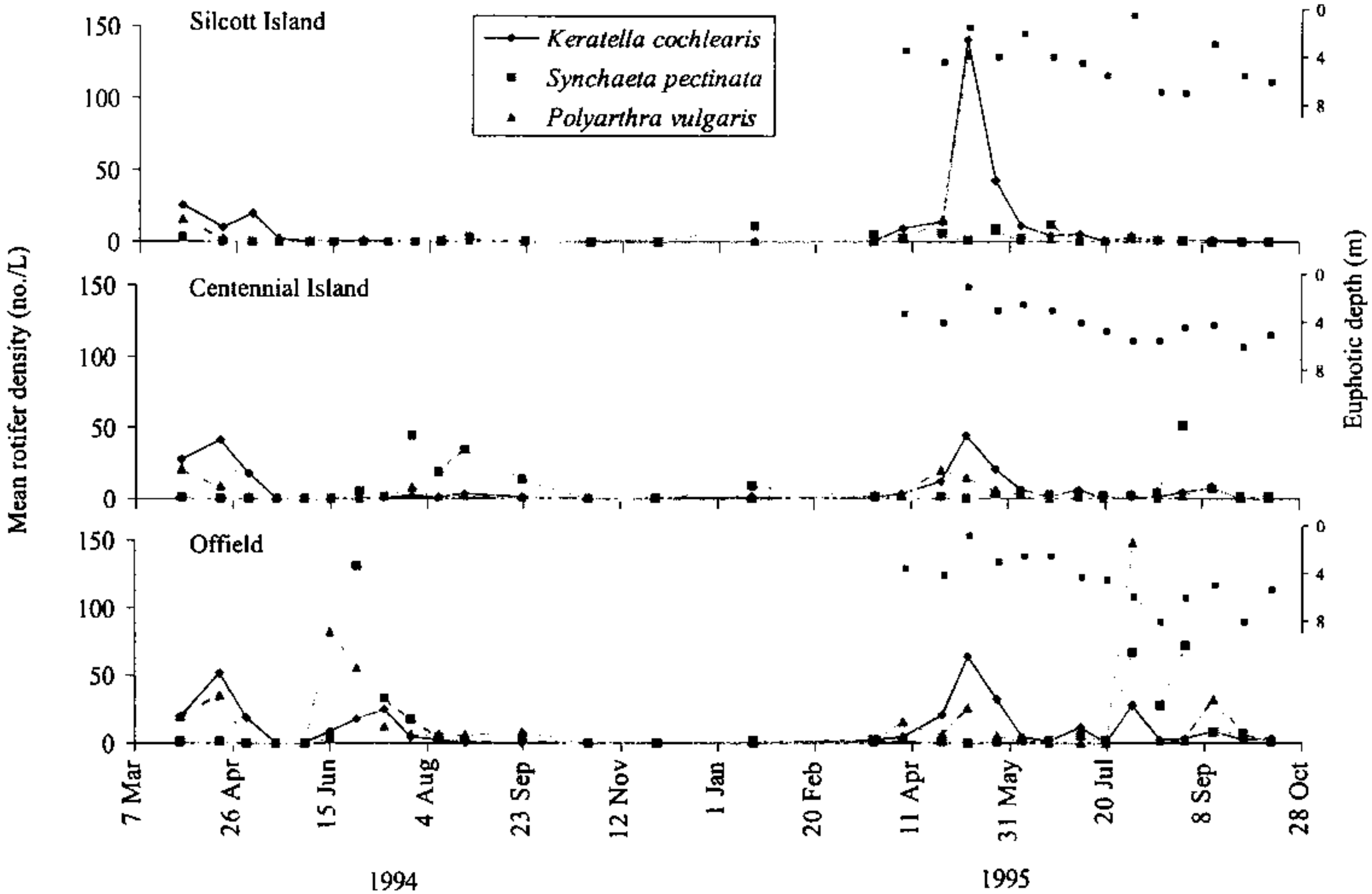

Figure 17. Numerical density (organisms/L) of three predominant rotifers at each sampling area in Lower Granite Reservoir, 1994-95. Densities are the mean of three vertical zooplankton tows. Prior to April 1995, samples were obtained from a fixed 0- to 15-m depth; afterwards, samples were obtained from the euphotic zone (depth shown).

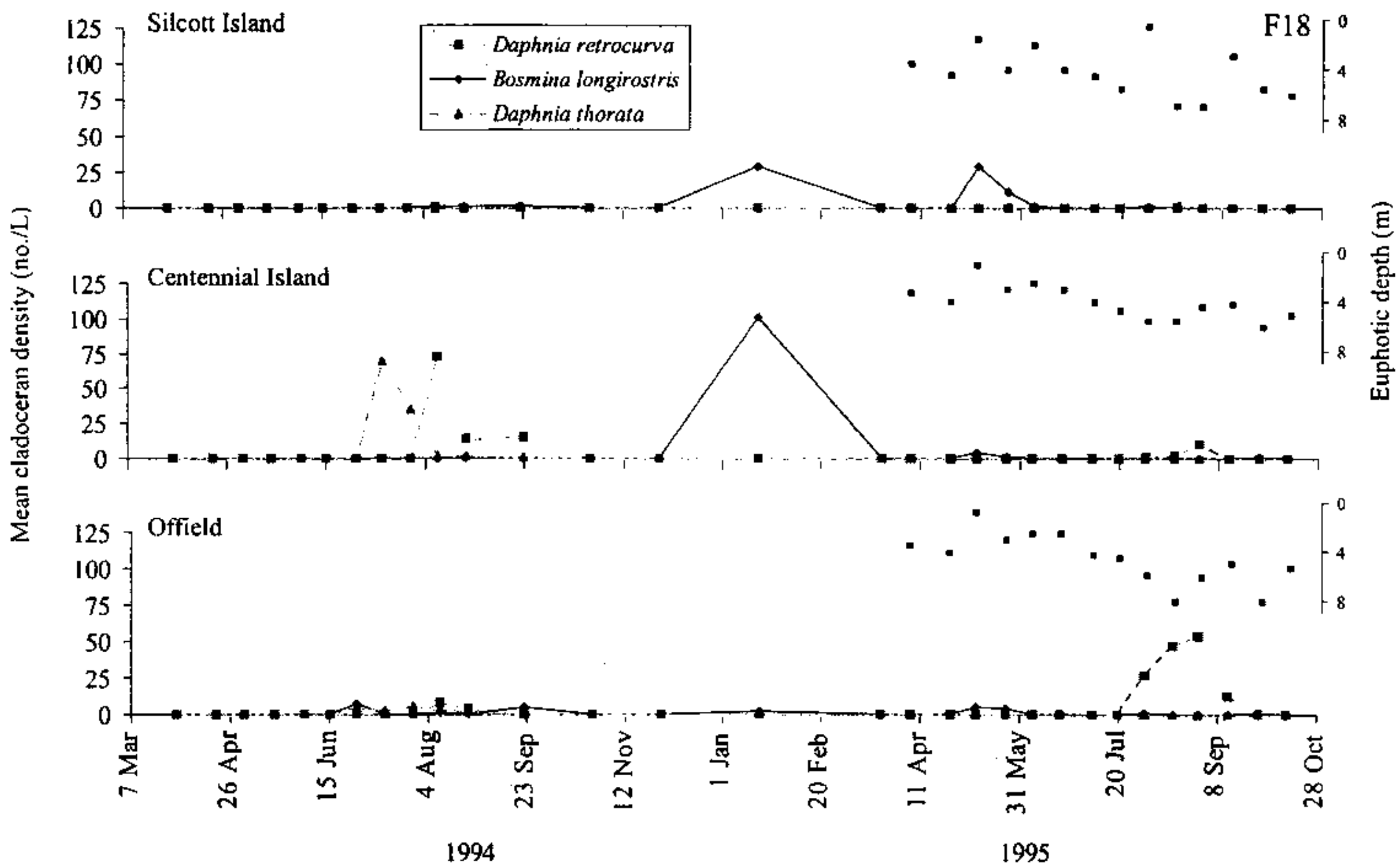

Figure 18. Numerical density (organisms/L) of three predominant cladocerans at each sampling area in Lower Granite Reservoir, 1994-95. Densities are the mean of three vertical zooplankton tows. Prior to April 1995, samples were obtained from a fixed 0- to 15-m depth; afterwards, samples were obtained from the euphotic zone (depth shown).

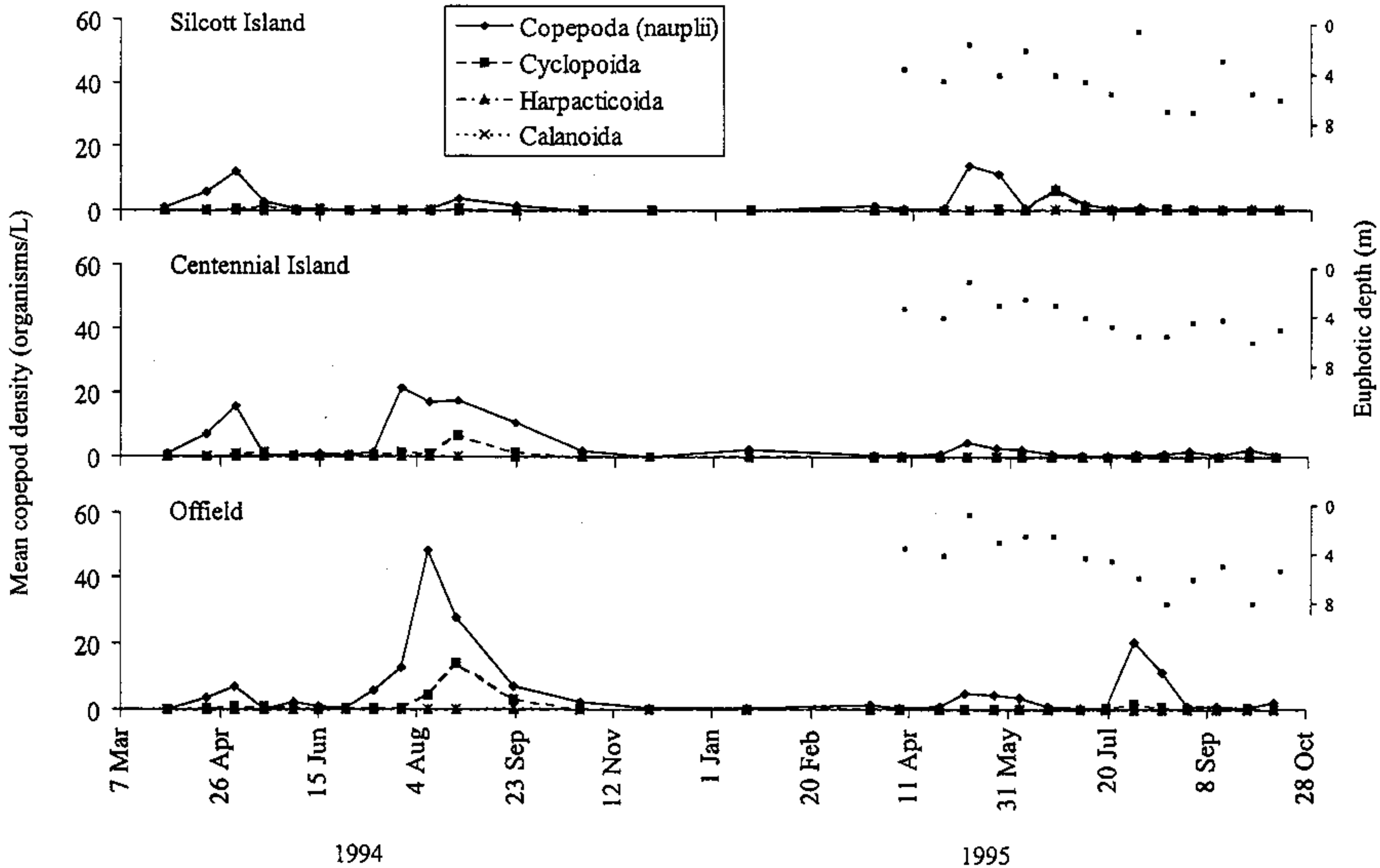

Figure 19. Numerical density (organisms/L) of copepods at each sampling area in Lower Granite Reservoir, 1994-95. Densities are the mean of three vertical zooplankton tows. Prior to April 1995, samples were obtained from a fixed 0- to 15-m depth; afterwards, samples were obtained from the euphotic zone (depth shown).

Table 3. Zooplankton density (no./L) of selected taxa/categories comparing 0- to 15-m and euphotic zone plus 0.5-m sampling depths at three shallow-water areas in Lower Granite Reservoir, 1995.

	Zooplankton density (no./L)					
	26 Apr 95		19 Jul 95		12 Oct 95	
Sampling area Taxon/category	Euphotic plus 0.5 m	0 to 15 m	Euphotic plus 0.5 m	0 to 15 m	Euphotic plus 0.5 m	0 to 15 m
Silcott Island						
Rotifera (total)	45.78	13.60	4.81	2.08	12.76	15.86
Keratella cochlearis	14.14	3.05	0.00	0.00	0.35	0.41
Synchaeta pectinata	5.62	2.31	0.38	0.14	0.24	0.31
Polyarthra vulgaris	14.89	3.76	0.63	0.05	0.24	0.21
Cladocera (total)	0.00	0.14	0.00	0.05	0.00	0.00
Daphnia retrocurva	0.00	0.00	0.00	0.05	0.00	0.00
Bosmina longirostris	0.00	0.14	0.00	0.00	0.00	0.00
Copepoda (total)	0.50	0.15	0.63	0.04	0.24	0.10
Copepoda (nauplii)	0.50	0.15	0.63	0.04	0.24	0.10
Centennial Island						
Rotifera (total)	39.68	13.83	3.19	2.44	3.45	7.58
Keratella cochlearis	11.78	3.27	0.21	0.00	0.74	0.54
Synchaeta pectinata	1.46	1.95	2.04	1.41	0.61	0.25
Polyarthra vulgaris	19.75	4.79	0.05	0.25	0.10	0.16
Cladocera (total)	0.34	0.18	0.18	0.09	0.00	0.03
Daphnia retrocurva	0.00	0.00	0.00	0.00	0.00	0.00
Bosmina longirostris	0.23	0.18	0.18	0.04	0.00	0.03
Copepoda (total)	0.93	1.14	0.34	0.31	0.54	0.31
Copepoda (nauplii)	0.93	1.05	0.23	0.22	0.54	0.28
Offield						
Rotifera (total)	31.87	49.43	6.94	11.21	7.79	7.20
Keratella cochlearis	20.36	22.06	0.45	0.64	3.38	2.57
Synchaeta pectinata	0.55	0.69	2.12	6.62	1.08	1.24
Polyarthra vulgaris	6.13	19.79	0.32	0.73	1.40	1.67
Cladocera (total)	0.00	0.05	0.76	1.06	0.57	0.53
Daphnia retrocurva	0.00	0.00	0.46	0.26	0.08	0.10
Bosmina longirostris	0.00	0.05	0.00	0.56	0.41	0.28
Copepoda (total)	0.70	1.12	0.76	0.15	2.36	1.50
Copepoda (nauplii)	0.67	1.08	0.47	0.15	2.29	1.44

Sediment Composition

There were only slight temporal changes in sediment characteristics within the three shallow-water sampling areas we studied (Figs. 20-25). However, there were obvious differences in sediment composition among sampling areas and between depths within sampling areas.

Gravel (grain sizes 75 to 4.75 mm) was common at Offield, where the percentages ranged from 0 to 33.2 for all three sample depths (Figs. 20-22). However, gravel was present only once in Centennial Island sediment samples and was absent in all Silcott Island sediment samples. Sand (median grain sizes 4.75 to 0.074 mm) and fines (grain sizes < 0.074 mm) were more abundant than gravel at all three sampling areas. Respective mean percentages of sand at the 3-, 9-, and 18-m depths were 36.2, 50.4, and 90.4 at Silcott Island; 78.5, 13.4, and 10.7 at Centennial Island; and 32.9, 17.2, and 18.8 at Offield. Respective mean percentages of fines at the 3-, 9-, and 18-m depths were 63.8, 49.6, and 9.6 at Silcott Island; 21.4, 86.6, and 89.3 at Centennial Island; and 61.0, 75.1, and 81.1 at Offield.

Differences in median grain sizes, percentages of silt/clay, and percentages of volatile solids between sampling areas and between depths within each sampling area were apparent (Figs. 23-25). Respective means of median grain size at the 3-, 9-, and 18-m depths were: 0.064, 0.076, and 0.177 mm at Silcott Island; 0.217, 0.027, and 0.020 mm at Centennial Island; and 0.087, 0.045, and 0.024 mm at Offield. Respective mean percentages of silt/clay at the 3-, 9-, and 18-m depths were 53.1, 38.6, and 8.4 at Silcott Island; 19.9, 84.1, and 86.6 at Centennial Island; and 54.1, 72.1, and 77.7 at Offield. Respective mean percentages of volatile solids at the 3-, 9-, and 18-m depths were 6.5, 5.2, and 1.5 at Silcott Island; 2.3, 11.3, and 9.7 at Centennial Island; and 3.5, 5.1, and 7.1 at Offield.

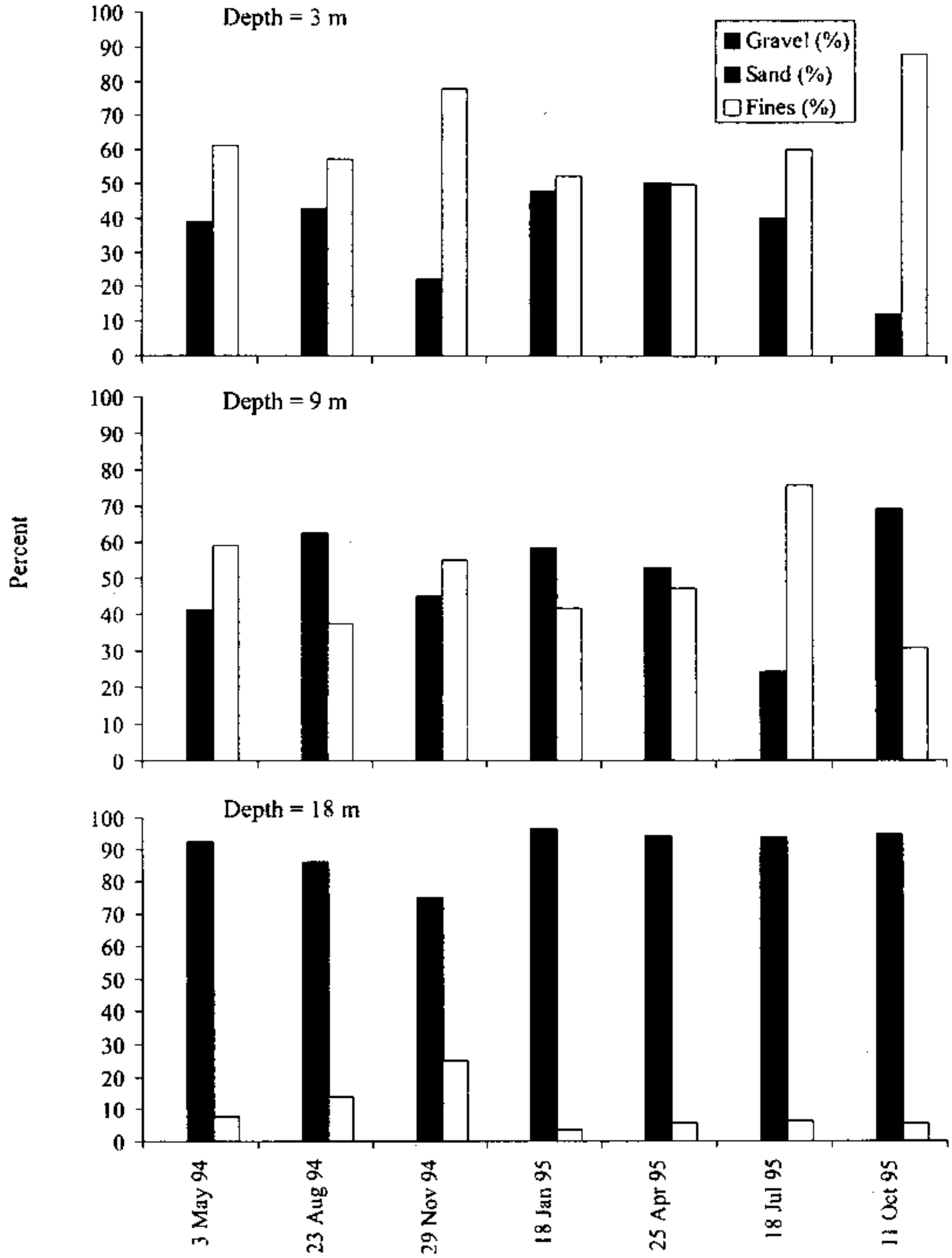

Figure 20. Percentages of gravel, sand, and fines in sediment samples collected from three depths at Silcott Island sampling area in Lower Granite Reservoir, 1994-95.

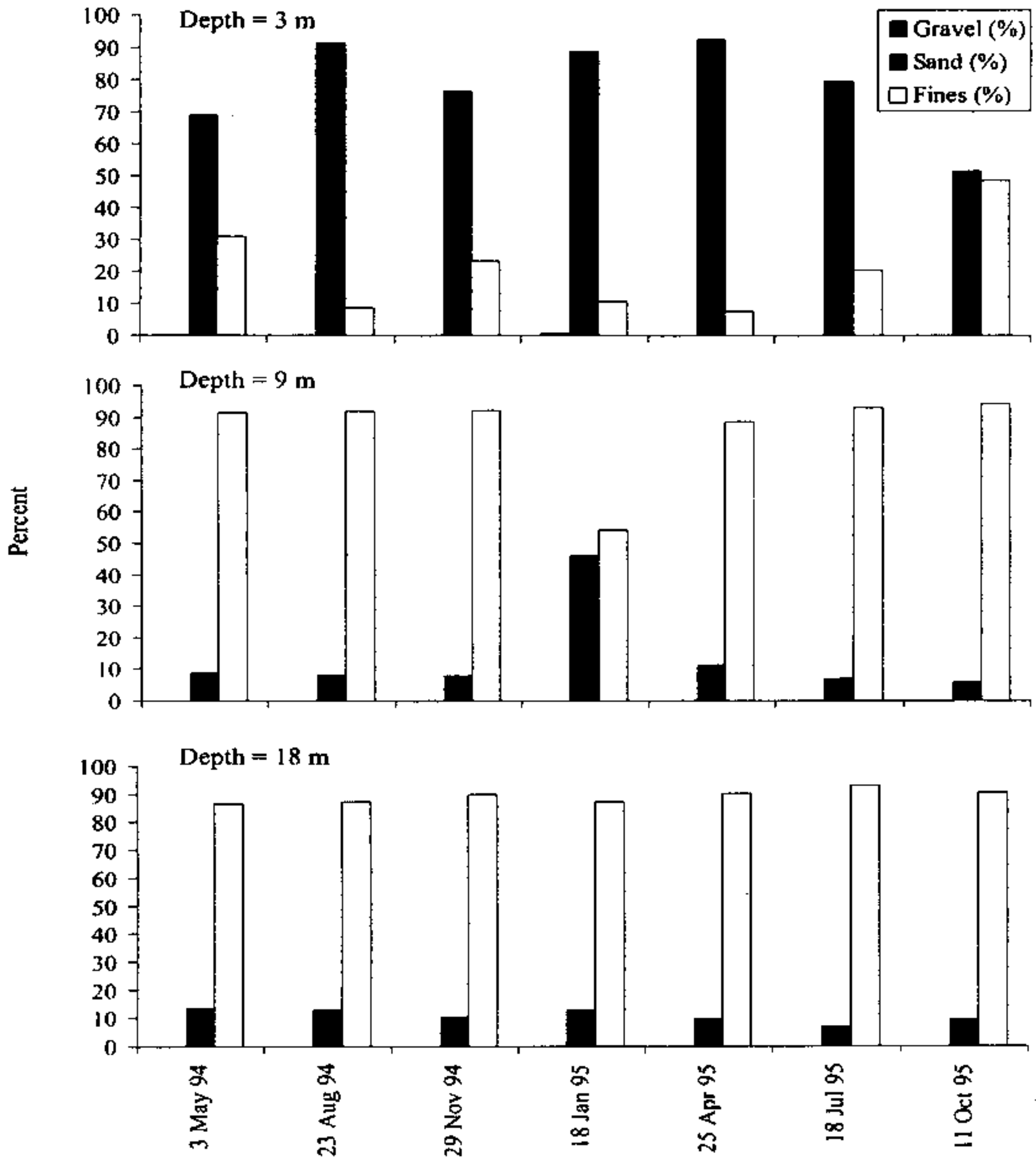

Figure 21. Percentages of gravel, sand, and fines in sediment samples collected from three depths at Centennial Island sampling area in Lower Granite Reservoir, 1994-95.

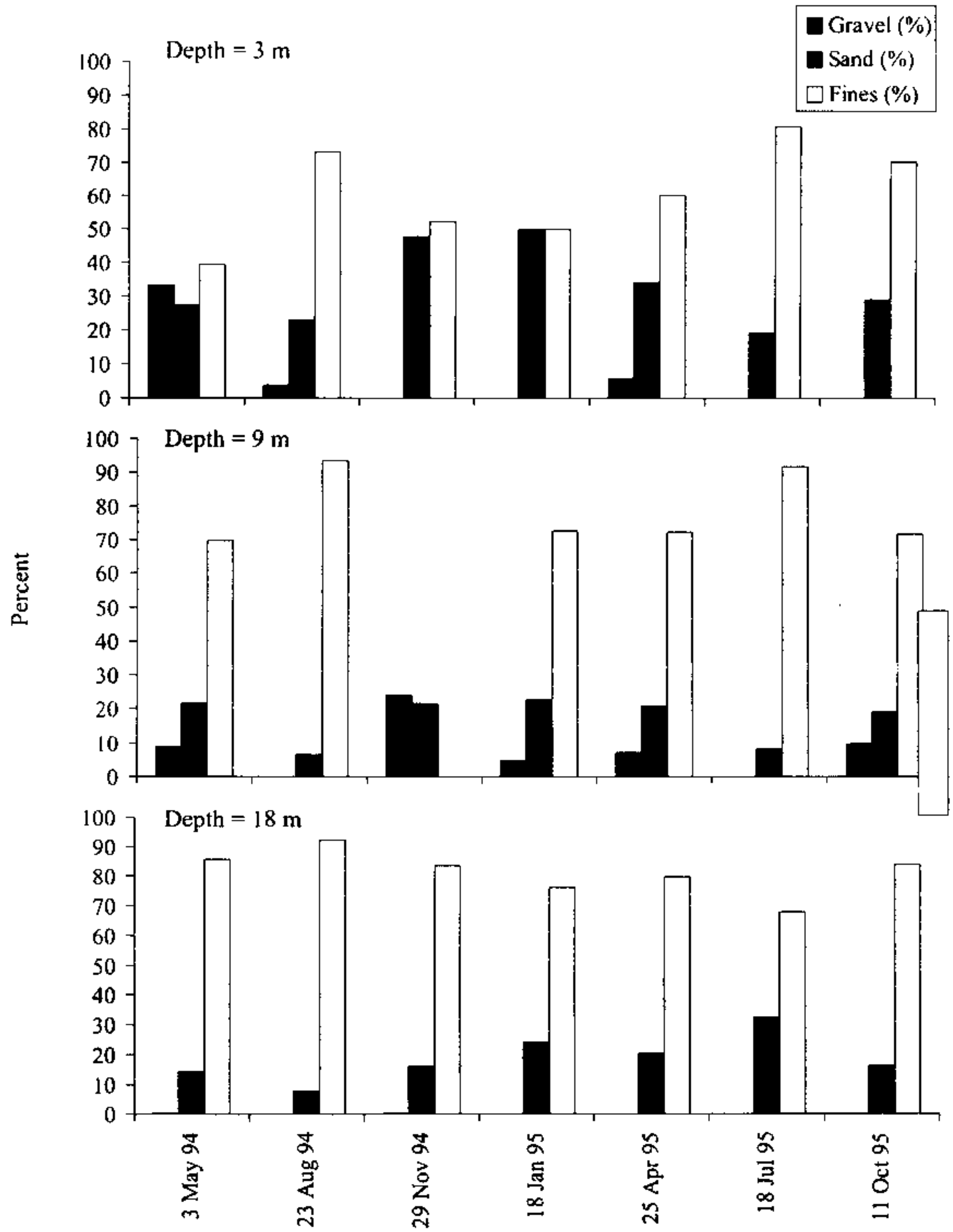

Figure 22. Percentages of gravel, sand, and fines in sediment samples collected from three depths at Offield sampling area in Lower Granite Reservoir, 1994-95.

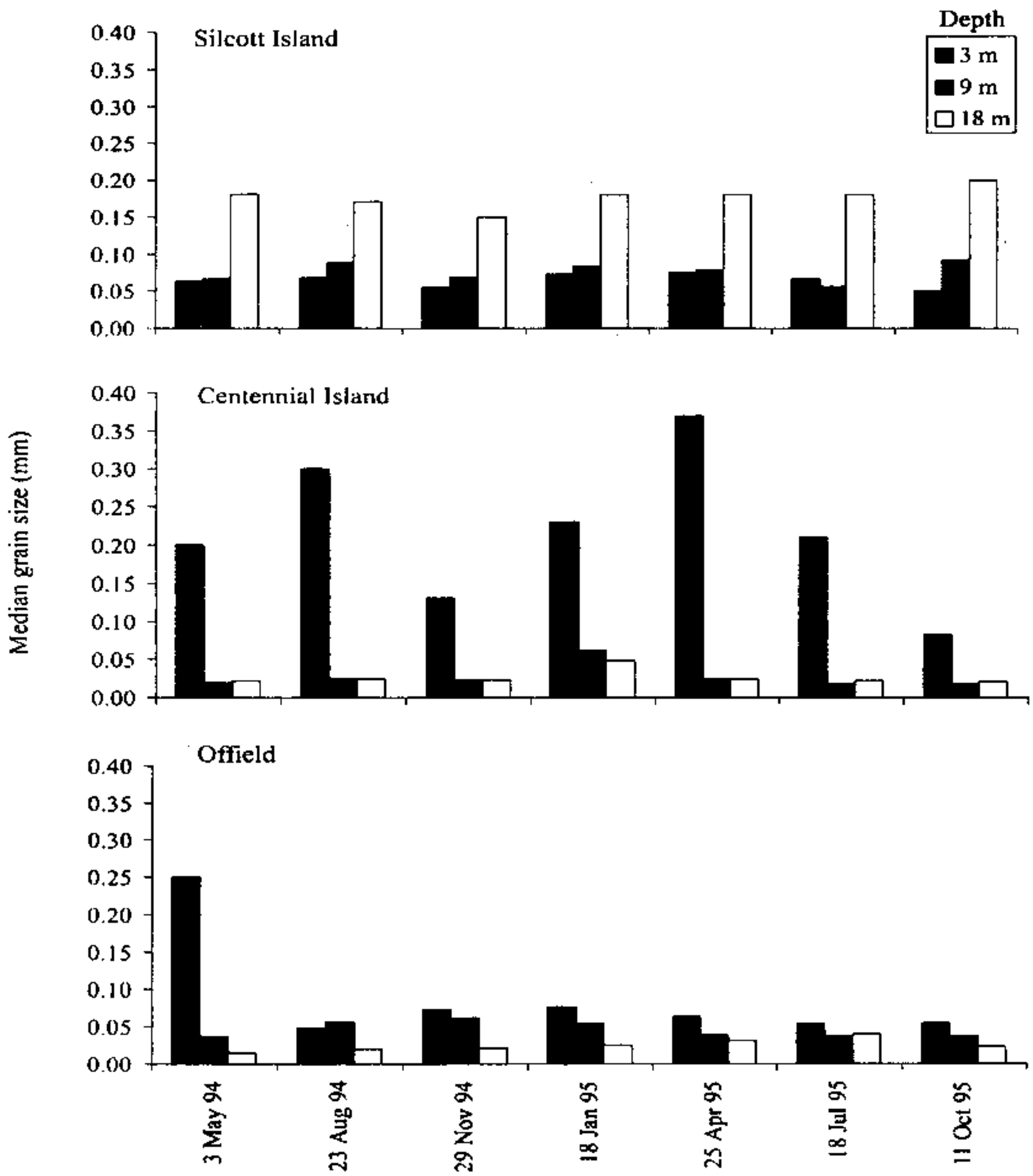

Figure 23. Median grain size (mm) of particles by depth in sediment samples collected from each sampling area in Lower Granite Reservoir, 1994-95.

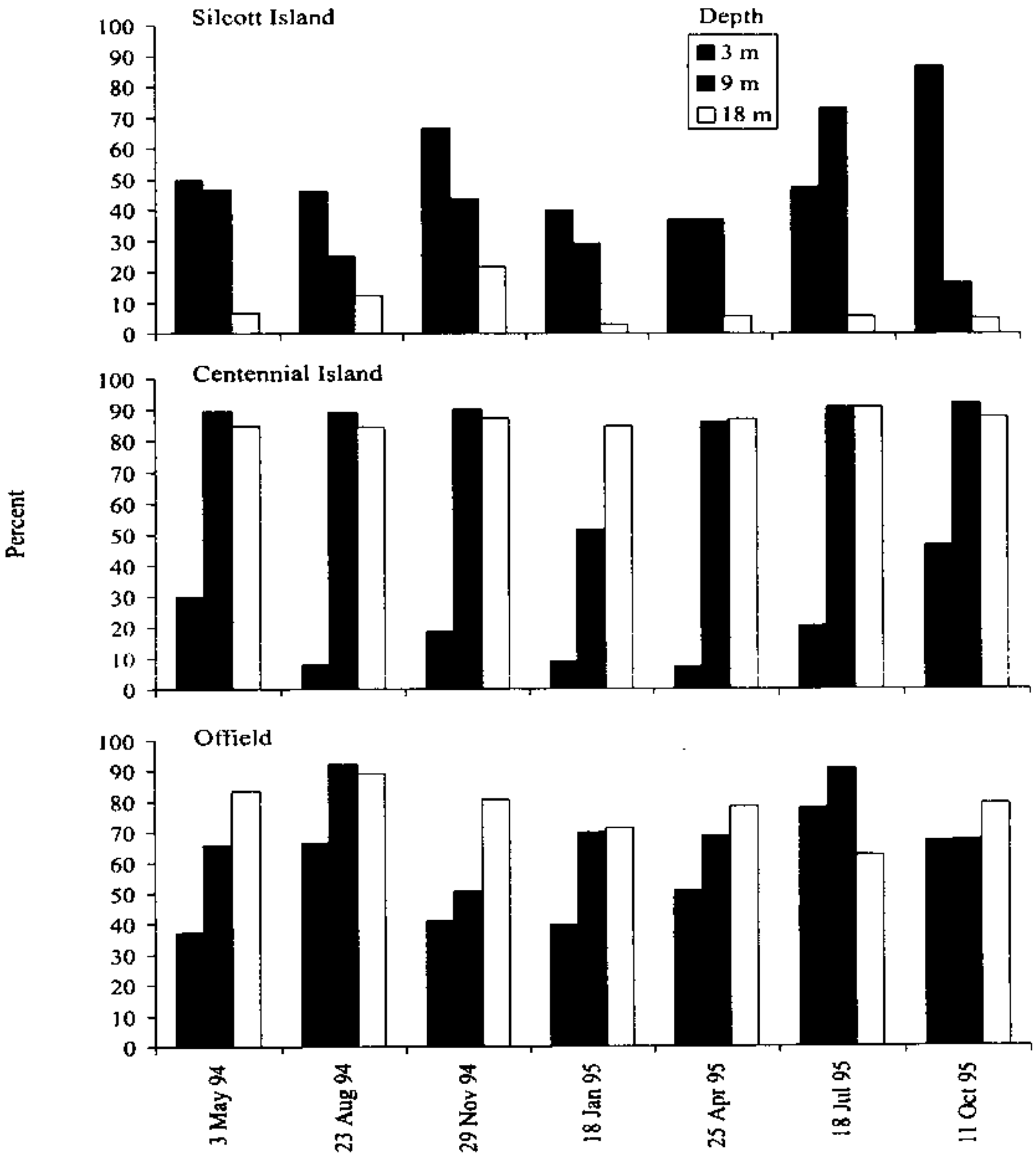

Figure 24. Percentages of silt/clay by depth in sediment samples collected from each sampling area in Lower Granite Reservoir, 1994-95.

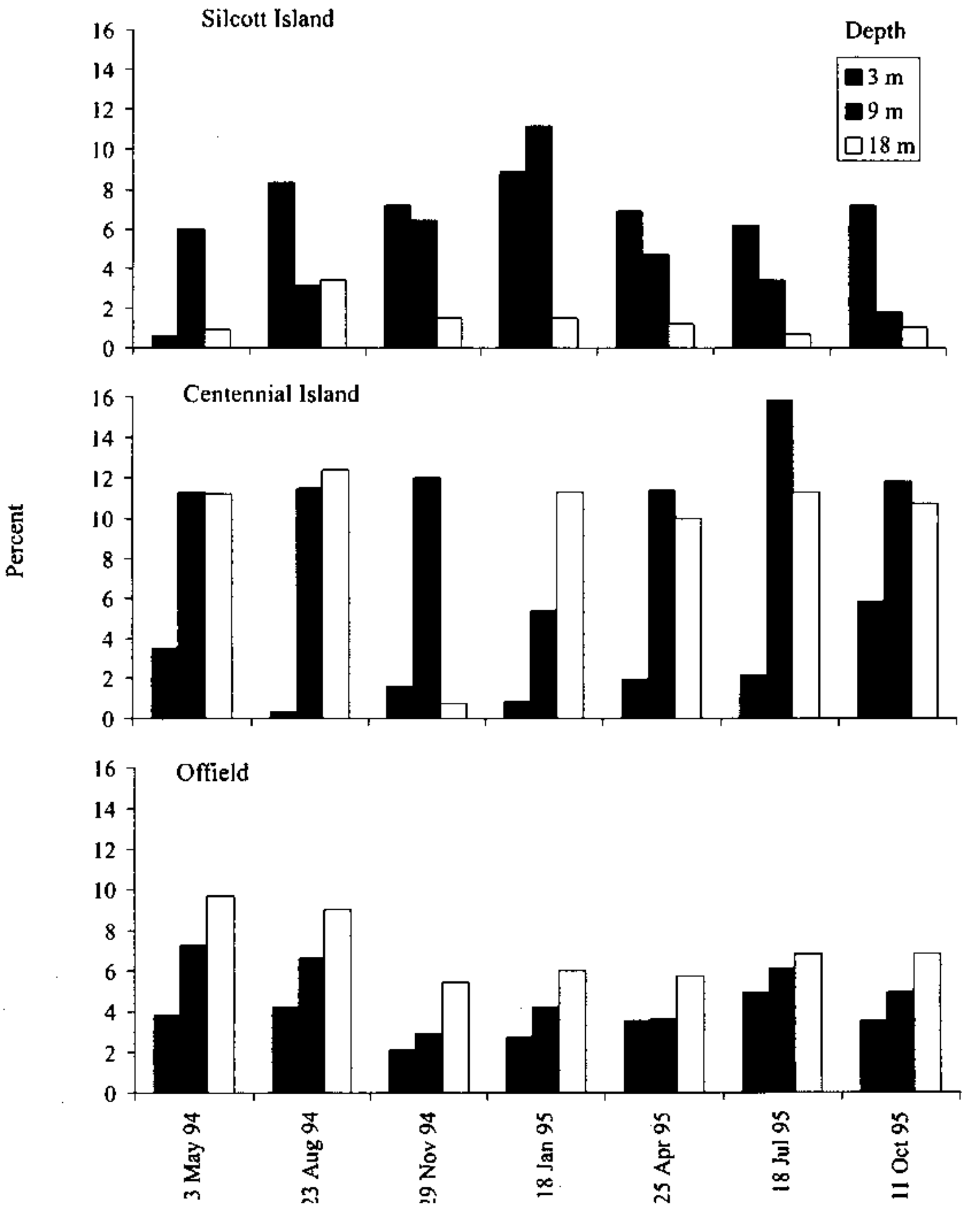

Figure 25. Percentages of volatile solids by depth in sediment samples collected from each sampling area in Lower Granite Reservoir, 1994-95.

DISCUSSION

The various limnological parameters sampled in our study areas within Lower Granite Reservoir during 1994-95 showed generally well-mixed water with distinct temporal changes. Juul (1997) found that many of the chemical and biological characteristics of Lower Snake River reservoirs were directly related to hydrologic and physicochemical properties of the Snake and Clearwater Rivers. Lower Granite Reservoir, situated immediately downstream from the confluence of the Snake and Clearwater Rivers, is greatly influenced by interannual differences in discharges from these two rivers, according to Juul. Correlations between specific discharge rates from those two rivers and the observed temporal changes in limnological parameters we observed within the reservoir would be important factors in evaluating possible impacts of reservoir drawdown.

The relatively short duration of our study (March 1994 to October 1995) and the long-term variability of major factors affecting water quality within Lower Granite Reservoir make it difficult to elucidate possible relationships between the parameters we monitored. In addition, since no drawdown occurred, there is no comparison to evaluate; therefore no rigorous statistical assessments were prepared. We discuss below some of the general limnological relationships important to the biota of Lower Granite Reservoir.

The results of our study and those of the previous pre-impoundment (1970-72) and post-impoundment (1975-77) studies were similar, although somewhat difficult to directly compare (USACE 1973, Funk et al. 1979). Before construction of Lower Granite Dam was completed, the maximum surface-to-bottom difference in water temperature among the four lower Snake River reservoirs was 3.5°C (USACE 1973). Following impoundment in 1977, the maximum surface-to-bottom difference in water temperature increased to about 4.6°C. The maximum surface-to-bottom difference we observed occurred in July and August 1994 (about 3°C), but we typically measured temperature profiles within our study areas to an 18-m depth, and the surface-to-bottom temperature difference may have been greater in deeper areas of the reservoir.

Dissolved oxygen is released into the water by phytoplankton as a by-product of photosynthesis. Saturation of dissolved oxygen at and near the water surface observed in August and September 1994 was possibly a result of increased phytoplankton productivity (i.e., increased photosynthesis). As phytoplankton is consumed by zooplankton, the secondary producers, dissolved oxygen in the water decreases. This may have in part contributed to the oxygen depletion observed near the bottom at the three sampling areas during August and September 1994.

Water temperature can affect algal growth (McKee and Wolf 1963, Schwoerbel 1987), and our sampling revealed correspondingly low concentrations of chlorophyll in areas where water temperature was lower than 10°C. Water temperature may also have affected the observed seasonal changes in cladoceran abundance. Pennak

(1989) observed higher cladoceran densities in the spring and summer when water temperature ranged between 6 and 20°C. He also noted that a second seasonal peak in cladoceran abundance may occur in the fall before temperatures drop during winter; a trend similar to the patterns observed in our study.

Our observations of temporal and seasonal changes in nitrogen and phosphorus concentrations were similar to those seen in pre-impoundment/post-impoundment studies. Nitrogen and phosphorus concentrations declined during spring, were low during summer, increased through fall, and remained high over winter (USACE 1973, Funk et al. 1979). Such seasonal changes were also observed for sulfate in pre-impoundment studies and our study.

Nitrogen and phosphorus are utilized by phytoplankton for photosynthesis of chlorophyll (McKee and Wolf 1963, Round 1981, Sze 1986, Schwoerbel 1987). Phosphorus was observed to promote algal growth, especially for conversion of ADP to ATP in photosynthesis, and this growth then causes the amount of available orthophosphate to decline (Schwoerbel 1987). Availability of nitrogen and phosphorus may have limited chlorophyll production in our study areas. Cations and anions are also required for growth of phytoplankton (Welch 1952, Sze 1986, Schwoerbel 1987), but we saw no evidence that they were limiting factors in phytoplankton production in our study areas.

Silica concentrations greater than 0.5 mg/L are required for growth of diatoms which utilize silica as building material for cell walls (McKee and Wolf 1963, Round 1981, Schwoerbel 1987). Growth of diatoms is optimal when water temperature is between 15 and 30°C (McKee and Wolf 1963). Round (1981) reported that in freshwater habitats, few organisms besides diatoms use silica, and changes in concentrations of silica in the water generally are related to growth of diatoms. Silica concentrations at our sampling areas were higher than 5 mg/L, and during some months water temperatures were within the range for optimal diatom growth.

The diversity and abundance of freshwater ploimate rotifers (i.e., *Brachionus, Keratella, Kellicottia*) are affected by pH (Pennak 1989). Alkaline waters generally have many species with few individuals, whereas acidic waters have few species with many individuals. In our samples, we found 31 species of rotifer, the following 5 of which represented genera generally restricted to water with pH higher than 7.0: *Asplanchna, Mytilina, Brachionus, Filinia*, and *Notholca.*

Zooplankters in general graze on phytoplankton for food, which in turn affect chlorophyll production and other chemical parameters in the water. A population growth of zooplankton could increase the consumption rate of phytoplankton; thus phytoplankton populations and measured chlorophyll concentrations would decline.

Factors affecting changes in the in zooplankton population include predator-prey relationships, species competition, food availability, and physical and chemical characteristics of the water (Edmondson 1959, Gilbert 1980, Gliwicz and Pijanowska 1989, Pennak 1989). For instance, after cladoceran densities of *Daphnia* and *Bosmina* decline, the population of *Ceriodaphnia*, which was observed in our samples, may increase (Gliwicz and Pijanowska 1989). In research on stomach contents of outmigrating subyearling and yearling chinook salmon (*Oncorhynchus tshawytscha*) in the Columbia River system, including those in the lower Snake River, cladocerans (mostly *Bosmina* and *Daphnia*), and to a lesser extent copepods, constituted the diets of the juvenile salmonids (Becker 1973, Craddock et al. 1976, Dauble et al. 1980, Kirn et al. 1986, Muir and Emmett 1988, Muir and Coley 1996). The feeding of juvenile salmonids on cladocerans and copepods could also affect overall zooplankton species composition and numerical abundance in the reservoir.

The frequency of these natural but subtle periodicities in the food web were not necessarily accurately reflected in our bimonthly/monthly sampling schedule. Had reservoir drawdown occurred and sampling proceeded into the drawdown period and through a post-drawdown recovery period, our sampling periodicity probably would have been adequate to describe the major limnological consequences of the drawdown event.

CONCLUSIONS

1) Water concentrations of physical and chemical parameters were similar between the three sampling areas and between the water surface and the 15-m depth. Generally, the water was well mixed with seasonal or temporal changes.

2) The three shallow-water areas sampled during 1994-95 had similar availability of nutrients. Availability of nitrogen and phosphorus may have limited chlorophyll production at times.

3) Zooplankton in the three shallow-water areas sampled during 1994-95 were numerically dominated by rotifers. Cladocerans, copepods, and ostracods were also present to a lesser extent. There were no strong temporal trends evident in zooplankton population densities during our sampling, though lowest densities occurred during the winter months.

4) There were only slight temporal changes in sediment characteristics, but there were obvious differences in sediment composition among sampling areas and between depths within sampling areas. Sand and fines were more abundant than gravel at all three sampling areas.

5) The frequency of natural but subtle periodicities in the food web were not accurately reflected in our bimonthly/monthly sampling schedule.

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APPENDIX A: Methodology for Chlorophyll *a* analysis

Detailed method of collection and laboratory analysis used for determining chlorophyll *a* concentrations in water samples collected from Lower Granite Reservoir, 1994-95.

Purpose: Analysis of chlorophyll *a* concentrations in water.

I. Collection

A. Equipment

1. A hose with appropriate inner diameter and length to collect at least 10 L of water. We used a 16-m-long by 38-mm-id hose to sample from the 0- to 15-m depth and a 7-m-long by 50-mm-id hose to sample from 0.5 m below the euphotic zone. Each hose had a weight, a rope attached to the distal end, and a cap on the other end.
2. Two clean 19-L buckets.
3. Four 500- to 1000-mL brown and opaque plastic bottles for each composite sample.
4. One 25-µm plankton net with a sealed end for filtering water samples.
5. One large cup for dipping subsamples from buckets and pouring them into sample bottles.
6. One ice chest and ice necessary for keeping water samples cold and in the dark.

B. Procedure: Water samples for analysis of chlorophyll *a* concentrations were collected from generally the 18-m depth contour at each sampling area. Chlorophyll *a* concentrations were used as an index of phytoplankton biomass (APHA 1992). Composite samples were collected from the water surface to a depth of 15 m. In April 1995, we modified this procedure to sample from 0.5 below the euphotic zone, which was determined with an irradiameter. In April, July, and October 1995, an additional set of samples was collected from the water surface to the 15-m depth. These additional samples were collected to compare chlorophyll concentrations between fixed 0- to 15-m depth samples and variable euphotic zone plus 0.5-m depth samples.

Each chlorophyll sample was obtained with a 38- or 50-mm-id hose, weighted and attached with a rope at the distal end, and deployed vertically to a specified sampling depth in the water column (Goldman and Horne 1983). The surface end of the deployed hose was capped and the distal end was retrieved from the bottom using the attached rope (Goldman and Horne 1983). After retrieval, the composite sample in the hose was emptied into a 19-L bucket for mixing and subsampling. Two subsamples were obtained from the bucket and poured into brown and opaque plastic bottles. Because a large portion of the phytoplankton often occurs in the < 25-µm size fraction (Lieberman 1992), two additional subsamples were obtained after filtering the composite sample through a stoppered 25-µm plankton net. Beginning in March 1995, we modified the procedure to obtain two independent composite samples from the reservoir: we took one unfiltered subsample and one filtered subsample at each site. The four subsamples were immediately stored in an ice chest to keep them cold and dark until transport to the laboratory for processing. From March to June 1994, the chlorophyll samples were taken to the State of Washington Water Research Center, Washington State University, Pullman, WA (Dr. Steve Juul, point of contact) for analysis under contract; thereafter, samples were transported to and analyzed at our laboratory. Upon arriving at our laboratory, the samples were put in the refrigerator overnight unless filtration took place immediately. Samples were filtered within 3 days of collection.

II. Filtration

A. Equipment

1. Six 250-mL capacity Nalgene filter funnels for 47-mm diameter filters.
2. Whatman GF/C glass fiber filters (1.2 µm pore size) with 47-mm diameter.
3. Reservoir to support filter funnels and hold up to 6 L of filtrate.
4. Six 500-mL graduated cylinders to measure water samples.
5. Tubing. We used Tygon tube.
6. One vacuum pump for suction filtration of the water samples. We used Stant Inc. Vacuum tester, model SVT-260.
7. Distilled water in a 500-mL wash bottle for dampening filters and rinsing sample bottles and filter funnels.
8. Filter forceps for handling filters.

9. Plastic petrislides for 47-mm diameter filters. We used Millipore brand petrislides. Manilla coin envelopes may be used as an alternative to petrislides.
10. Aluminum foil to wrap a set of filters for storage in a freezer and to avoid exposure of samples to light.
11. Adhesive labels and marking pen.
12. One freezer.

B. Procedure: Filtration occurred within 3 days of collection. Filtration was conducted in subdued light (APHA 1992). Glass fiber filters were placed onto the filter funnel apparatus and dampened with distilled water from a wash bottle. Before adding water samples, suction was applied to the dampened filters with the vacuum pump to assure that the filters did not leak. For each subsample, the water in the sample bottle was thoroughly shaken to assure it was well mixed before measuring the water in a graduated cylinder. Depending on turbidity, up to 1000 mL of the water sample were suction filtered with a vacuum pressure not exceeding 25 cm Hg (Wetzel and Likens 1991). After filtration, the filter was transferred to a numbered petrislide using forceps. Petrislides were wrapped in aluminum foil and labeled, then stored in the freezer (< 32°C) prior to extraction. Labelling included reservoir, collection date(s), sample numbers, and filtration date. The pH of several subsamples from each sampling trip was measured to ascertain that pH values were ≥ 7. Because we never measured pH <7 in the field or in the laboratory, we found it unnecessary to buffer water samples with saturated magnesium carbonate solution (APHA 1992).

III. Extraction

A. Equipment
1. Tissue grinder.
    a. A 30-mL capacity grinding tube (Thomas or Kontes) with a pestle.
    b. Motor for turning the pestle in the grinding tube.
    c. Stand with clamp to hold motor and pestle.
2. Centrifuge tubes with 15-mL capacity and caps. We used Kimax disposable 15-mL centrifuge tubes with snap caps and Corning polypropylene 15-mL centrifuge tubes with screw caps.
3. Fume hood for use during extraction procedure.
4. Test tube racks for supporting centrifuge tubes during extraction and for overnight storage in a refrigerator.

5. One 5-mL capacity repipet fitted on a container. We used Universal Repipet Dispenser with 5-mL capacity.
6. Chemicals
    a. Acetone
        i. A solution of 90% aqueous acetone containing 1.0-g $MgCO_3$, 100-mL dH_2O, 900-mL 100% acetone (APHA 1992). This solution was made in a 1-L volumetric flask, poured into a container fitted with a repipet, then stored in a refrigerator.
        ii. 100% acetone in a 250-mL plastic wash bottle.
    b. Saturated magnesium carbonate solution (not needed for Lower Granite Reservoir samples).
    c. Distilled water in a 500-mL wash bottle.
7. Two pairs of forceps to handle filters.
8. Glass fiber filters with 47-mm diameter for preparation of spectrophotometric blanks. We used Whatman GF/C glass fiber filters.
9. Beaker to hold used acetone.
10. Laboratory tissues. We used Kimwipes.
11. Timer with countdown, start, and stop capabilities.
12. Refrigerator for storing extracted samples in test tubes.
13. Aluminum foil, adhesive labels, marking pen.

B. Procedure: Extractions were generally done 4 to 5 days after filtration.[4] Chlorophyll *a* pigments were extracted from phytoplankton filtered onto glass fiber filters in subdued light using the cold-acetone extraction method (APHA 1992). The entire extraction procedure was conducted in a fume hood. Two blank extracts were made for each set of samples for baseline corrections of the spectrophotometer and for comparisons with the samples. Using forceps, each slightly thawed sample filter was folded into quarters (phytoplankton to the inside) and placed into the bottom of a 30-mL grinding tube (Wetzel and Likens 1991).

A total of 10 mL of 90% aqueous acetone was used in three separate portions during this extraction procedure. First, 3.33 mL of 90% aqueous acetone was added to the grinding tube, then the filter was ground for 45 seconds with a pestle and motor (Wetzel and Likens 1991). The

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[4] While setting up the laboratory and developing the method for chlorophyll analysis, samples on filters were frozen from 3 days to several months.

resulting slurry was poured into a numbered 15-mL centrifuge tube and capped to prevent evaporation of the acetone. Another 3.33 mL of 90% aqueous acetone was added to the grinding tube in which the remaining slurry was ground for 15 seconds (Wetzel and Likens 1991). The slurry was added to the numbered 15-mL centrifuge tube and recapped.

A third 3.33-mL portion of 90% aqueous acetone was added to the grinding tube for a final rinse with the pestle for approximately 5 seconds. This rinse was poured into the numbered 15-mL centrifuge tube and capped, making a total extract volume of 10 mL. Between samples, the grinding tube was rinsed with 100% acetone using a wash bottle, and the pestle was spun in it once more. The acetone rinse was then decanted into a beaker for used acetone. Both the grinding tube and pestle were wiped clean with a laboratory tissue. Upon extraction of samples, the numbered centrifuge tubes in test tube racks were covered with aluminum foil labeled with reservoir, collection dates, sample numbers, and extraction dates, and stored in the refrigerator for 24 hours prior to spectrophotometric analysis (APHA 1992).

IV. Spectrophotometric Analysis

A. Equipment

1. A spectrophotometer with wavelengths set at 630.0, 647.0, 664.0, 750.0, and 665.0 nm. We used a Shimadzu UV-160U spectrophotometer.
2. Spectrophotometric cuvettes. Eight cuvettes were used for our analyses. We used 1-cm cell path length when expected photometric readings at 664.0 nm were > 0.1; otherwise, cuvettes with 5-cm cell path length were used (APHA 1992).
3. Transfer pipets.
    a. Extra long disposable plastic pipets.
    b. Disposable 1-mL plastic pipets.
4. Repipet with disposable tips for acid. We used Eppendorf 100-μL repipet with disposable tips.
5. Hydrochloric acid of 0.1 mol/L.
6. Centrifuge to fit test tubes with 15-mL capacity. We used a Clay Adams Safety Head Centrifuge.
7. A 250-mL wash bottle with 100% acetone.
8. Hood for ventilation during spectrophotometric analysis procedure.
9. Test tube racks for supporting centrifuge tubes with samples inside.

10. Lens paper for wiping spectrophotometric cuvettes clean.

B. Procedure: After refrigeration for 24 hours after extraction, the contents of each centrifuge tube were gently mixed. The tubes were then spun at about 2000 rpm in a centrifuge for 2 minutes (Wetzel and Likens 1991). Each capped tube was taken out to remove debris from the inside of the tube by rolling. The tubes were then spun for an additional 18 minutes. (Wetzel and Likens 1991).

The spectrophotometer was set to use five different wavelengths: 630.0 nm for chlorophyll *c*, 647.0 nm for chlorophyll *b*, 664.0 nm for chlorophyll *a* before acidification, 750.0 nm for turbidity, and 665.0 nm for chlorophyll *a* after acidification (APHA 1992). Each cuvette was rinsed with 100% acetone prior to analysis. One cuvette containing a blank extract was put in the reference cell holder, and the second cuvette containing the other blank extract was put in the sample cell holder. The baseline correction was run on the spectrophotometer according to the spectrophotometer's manual, then with the two cuvettes still in the cell holders, a photometric reading was obtained of the blank extract. The cuvettes with the blank extracts were switched before a second photometric reading was obtained.

Prior to mid-June 1995, we used cuvettes with a 1-cm cell path length to analyze samples. In mid-June 1995, we began using cuvettes with a 5-cm cell path length which allowed the 664- and 665-nm wavelength readings to be between 0.1 and 1.0 for better precision of the wavelength absorbance of sample extracts.

Spectrophotometric readings of each sample extract before and after acidification was obtained. One cuvette containing a blank extract was placed in the reference cell for comparison with the extract of the chlorophyll samples. For each sample, extract was transferred to a clean cuvette using a disposable pipet as described by APHA (1992). Volume of extract necessary for analysis was 3 mL for a 1-cm cell path length and 6 mL for 5-cm cell path length (APHA 1992). Prior to analysis, the cuvette containing the extract was wiped with lens paper. With the cuvette placed in the sample cell holder of the spectrophotometer, a before-acidification reading was obtained of the extract. After this reading, a repipet with a disposable tip was used to add to the extract 0.1 mL of 0.1 mol/L hydrochloric acid for a 1-cm cell path length, or 0.2 mL of the same acid for a 5-cm cell path length (APHA 1992). The cuvette was gently agitated and placed back in the spectrophotometer. Ninety seconds after acidification, a second reading was obtained of the acidified extract. The acidification procedure determines the deterioration ratio of chlorophyll *a* to pheophytin *a*, which should be near or at 1.7 (APHA 1992). Between samples, the cuvette was rinsed with 100% acetone.

V. Data processing

A. The spectrophotometer we used printed photometric readings of the different wavelengths. Appropriate numbers from these readings were entered into a relational database (Microsoft Access version 2.0).

B. Calculations of monochromatic chlorophyll *a* (pheophytin-corrected), trichromatic chlorophyll *a*, *b*, and *c*, pheophytin *a*, and deterioration ratio were derived from the formulas given by APHA (1992). A computer program was written in our database to perform these calculations, which were also verified manually.

C. Data analyses excluded chlorophyll concentrations having a deterioration ratio outside the range of 1.0 to 1.7.

Appendix B. Data tables

Appendix Table B1. Water column profiles of temperature (°C), dissolved oxygen (mg/L), conductivity (mS/cm), and pH at each sampling area in Lower Granite Reservoir, 1994-95.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
Silcott Island				
29 Mar 94				
0.1	8.73	12.66	0.297	9.41
1	8.20	12.55	0.294	9.46
2	8.07	12.34	0.294	9.47
3	8.04	12.21	0.293	9.47
4	8.02	12.19	0.292	9.47
5	8.02	12.16	0.292	9.48
6	8.02	12.13	0.292	9.48
7	8.02	12.15	0.292	9.48
8	8.02	12.14	0.292	9.48
9	8.01	12.13	0.293	9.49
10	8.01	12.11	0.293	9.49
11	8.02	12.13	0.295	9.50
12	8.03	12.15	0.296	9.50
13	8.01	12.15	0.297	9.50
19 Apr 94				
0.1	12.65	9.46	0.150	8.35
1	12.57	9.45	0.151	8.31
2	12.44	9.44	0.152	8.30
3	12.39	9.43	0.152	8.30
4	12.35	9.41	0.153	8.30
5	12.35	9.42	0.153	8.30
6	12.29	9.39	0.156	8.30
7	12.26	9.37	0.156	8.31
8	12.26	9.37	0.156	8.31
9	12.24	9.35	0.156	8.31
10	12.24	9.34	0.157	8.31
11	12.24	9.36	0.157	8.31
12	12.24	9.35	0.157	8.32
13	12.22	9.34	0.157	8.32
14	12.24	9.35	0.157	8.32
15	12.22	9.35	0.157	8.32
18	12.22	9.35	0.158	8.32
04 May 94				
0.1	10.73	11.23	0.177	7.95
1	10.36	11.16	0.170	7.95
2	10.39	11.07	0.171	7.96
3	10.24	11.06	0.166	7.96
4	10.28	11.04	0.167	7.97
5	10.24	11.01	0.166	7.97
6	10.26	10.98	0.167	7.98
7	10.24	10.96	0.166	8.00
8	10.24	10.93	0.166	8.00
9	10.24	10.91	0.166	8.02
10	10.24	10.89	0.167	8.02
11	10.24	10.89	0.167	8.03
12	10.24	10.88	0.167	8.03
13	10.24	10.88	0.167	8.04
14	10.24	10.88	0.167	8.04
15	10.24	10.87	0.167	8.04
18 May 94				
0.1	10.37	10.79	0.089	7.47
1	10.28	10.78	0.089	7.47
2	10.26	10.80	0.089	7.46
3	10.23	10.78	0.089	7.48
4	10.26	10.79	0.089	7.49
5	10.25	10.77	0.089	7.49
6	10.25	10.76	0.090	7.50
7	10.25	10.76	0.089	7.51
8	10.25	10.75	0.089	7.51
9	10.23	10.73	0.089	7.52
10	10.23	10.73	0.090	7.52
11	10.23	10.73	0.089	7.53
12	10.25	10.73	0.089	7.53
13	10.23	10.73	0.089	7.53
14	10.23	10.70	0.089	7.53
14.7	10.23	10.69	0.089	7.53
03 Jun 94				
0.1	14.53	10.40	0.122	8.00
1	14.49	10.37	0.122	8.01
2	14.48	10.34	0.122	8.01
3	14.49	10.34	0.122	8.01
4	14.48	10.32	0.122	8.02
5	14.48	10.32	0.122	8.02
6	14.44	10.30	0.120	8.01
7	14.46	10.28	0.121	8.01
8	14.48	10.28	0.122	8.01
9	14.48	10.27	0.122	8.01
10	14.47	10.25	0.120	8.02
11	14.46	10.24	0.120	8.02
12	14.46	10.25	0.121	8.02
13	14.44	10.23	0.120	8.02
14	14.44	10.24	0.120	8.02
15	14.44	10.24	0.120	8.02
15 Jun 94				
0.1	15.81	9.92	0.113	8.12
1	15.01	9.88	0.112	8.10

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
2	14.78	9.88	0.111	8.08
3	14.68	9.87	0.111	8.06
4	14.64	9.85	0.110	8.05
5	14.66	9.85	0.110	8.04
6	14.54	9.82	0.110	8.03
7	14.40	9.81	0.110	8.02
8	14.40	9.80	0.110	8.01
9	14.40	9.80	0.110	8.00
10	14.35	9.77	0.110	8.00
11	14.33	9.76	0.110	8.00
12	14.31	9.73	0.110	7.99
13	14.33	9.74	0.110	7.99
14	14.31	9.72	0.110	7.99
15	14.31	9.73	0.110	7.98
18	14.31	9.71	0.110	7.98
30 Jun 94				
0.1	19.64	9.57	0.166	8.57
1	19.60	9.61	0.165	8.58
2	19.55	9.52	0.165	8.57
3	19.60	9.60	0.166	8.59
4	19.51	9.50	0.165	8.58
5	19.53	9.52	0.165	8.57
6	19.57	9.58	0.165	8.57
7	19.53	9.50	0.165	8.57
8	19.51	9.45	0.166	8.56
9	19.46	9.38	0.164	8.54
10	19.41	9.33	0.165	8.52
11	19.38	9.29	0.163	8.51
12	19.39	9.29	0.164	8.50
13	19.34	9.22	0.164	8.49
14	19.29	9.12	0.156	8.47
15	19.29	9.09	0.157	8.45
19	19.24	8.99	0.153	8.40
13 Jul 94				
0.1	17.05	10.63	0.192	8.44
1	16.96	10.67	0.191	8.44
2	16.86	10.69	0.188	8.45
3	16.59	10.76	0.180	8.45
4	16.21	10.85	0.168	8.44
5	15.94	10.92	0.157	8.42
6	15.77	10.93	0.152	8.39
7	15.59	11.00	0.146	8.37
8	15.34	11.05	0.138	8.35
9	15.19	11.10	0.131	8.33
10	15.09	11.09	0.129	8.30
11	15.07	11.09	0.129	8.28
12	15.06	11.10	0.128	8.28
13	15.05	11.09	0.128	8.28
14	15.01	11.09	0.128	8.27
15	15.01	11.08	0.127	8.26
17.5	14.99	11.08	0.127	8.25
27 Jul 94				
0.1	19.33	10.25	0.229	8.48
1	19.21	10.19	0.231	8.46
2	19.03	10.37	0.223	8.48
3	17.00	10.60	0.199	8.45
4	16.44	10.63	0.190	8.40
5	16.22	10.68	0.180	8.39
6	15.96	10.75	0.179	8.37
7	15.52	10.86	0.169	8.35
8	14.58	11.01	0.154	8.30
9	14.36	11.05	0.152	8.26
10	14.28	11.11	0.145	8.25
11	14.00	11.15	0.144	8.24
12	13.95	11.23	0.136	8.19
13	13.62	11.30	0.129	8.16
14	13.54	11.29	0.131	8.16
15	13.54	11.35	0.126	8.16
17	13.52	11.36	0.126	8.15
10 Aug 94				
0.1	24.26	13.76	0.269	9.22
1	24.22	13.77	0.268	9.21
2	23.04	11.03	0.270	8.91
3	23.01	10.62	0.271	8.89
4	22.99	10.40	0.270	8.86
5	22.94	9.98	0.270	8.81
6	22.86	9.53	0.265	8.75
7	22.79	8.92	0.257	8.68
8	22.58	8.65	0.247	8.61
9	22.49	8.55	0.243	8.58
10	22.33	8.34	0.232	8.53
11	22.17	8.19	0.225	8.47
12	22.03	8.10	0.213	8.42
13	22.03	8.08	0.213	8.41
14	21.90	7.93	0.212	8.34
15	21.34	7.39	0.203	8.15
19.6	14.05	4.84	0.104	7.77
24 Aug 94				
0.1	23.22	11.78	0.295	8.78
1	22.49	11.88	0.295	8.80
2	21.89	11.23	0.293	8.74
3	21.67	10.15	0.293	8.63
4	21.53	9.62	0.292	8.54
5	21.52	9.50	0.292	8.52

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
6	21.48	9.25	0.289	8.48
7	21.43	9.11	0.289	8.46
8	21.43	8.96	0.289	8.46
9	21.36	8.70	0.284	8.39
10	21.30	8.58	0.282	8.36
11	21.29	8.37	0.283	8.32
12	21.13	7.85	0.276	8.21
13	21.11	7.79	0.272	8.17
14	21.09	7.79	0.271	8.16
15	21.06	7.77	0.267	8.14
18.1	21.06	7.71	0.266	8.16
08 Sep 94				
0.1	22.54	10.07	0.320	8.63
1	21.22	10.36	0.320	8.67
2	20.88	10.07	0.321	8.64
3	20.80	9.80	0.322	8.61
4	20.73	9.50	0.319	8.56
5	20.71	9.39	0.319	8.55
6	20.67	9.30	0.318	8.53
7	20.66	9.25	0.318	8.53
8	20.57	9.13	0.312	8.50
9	20.48	9.06	0.304	8.49
10	20.22	8.88	0.288	8.43
11	20.03	8.88	0.282	8.43
12	19.72	8.62	0.255	8.33
13	19.46	8.49	0.244	8.26
14	19.33	8.40	0.234	8.20
15	19.29	8.29	0.233	8.16
17.5	19.18	8.04	0.226	8.07
22 Sep 94				
0.1	20.90	10.07	0.338	8.56
1	20.08	10.18	0.337	8.57
2	19.89	9.83	0.334	8.52
3	19.77	9.54	0.332	8.48
4	19.73	9.43	0.334	8.47
5	19.72	9.31	0.333	8.46
6	19.67	9.22	0.329	8.45
7	19.62	9.09	0.323	8.42
8	19.53	8.92	0.315	8.38
9	19.27	8.79	0.286	8.33
10	19.19	8.72	0.281	8.31
11	18.78	8.28	0.244	8.19
12	18.56	8.09	0.236	8.06
13	18.27	7.78	0.223	7.96
14	17.81	7.50	0.221	7.85
15	17.60	7.36	0.235	7.81
18.2	17.28	5.79	0.264	7.62
26 Oct 94				
0.1	13.08	10.38	0.348	8.52
1	13.10	10.33	0.348	8.52
2	13.10	10.23	0.348	8.52
3	13.10	10.23	0.348	8.52
4	13.10	10.23	0.348	8.52
5	13.08	10.22	0.348	8.52
6	13.08	10.22	0.348	8.52
7	13.08	10.23	0.348	8.51
8	13.06	10.21	0.348	8.51
9	13.08	10.22	0.348	8.52
10	13.06	10.21	0.348	8.51
11	13.06	10.19	0.348	8.51
12	13.06	10.19	0.348	8.51
13	13.05	10.19	0.346	8.51
14	13.03	10.16	0.345	8.50
15	13.03	10.15	0.345	8.50
18.3	13.02	10.14	0.345	8.50
30 Nov 94				
0.1	5.34	11.40	0.341	8.42
1	5.33	11.52	0.341	8.42
2	5.33	11.61	0.341	8.41
3	5.32	11.65	0.341	8.42
4	5.33	11.67	0.341	8.41
5	5.32	11.76	0.341	8.40
6	5.32	11.79	0.341	8.41
7	5.32	11.82	0.342	8.41
8	5.31	11.85	0.342	8.41
9	5.31	11.87	0.342	8.41
10	5.30	11.89	0.342	8.41
11	5.30	11.91	0.342	8.41
12	5.30	11.93	0.342	8.41
13	5.30	11.94	0.342	8.41
14	5.31	11.95	0.342	8.41
15	5.30	11.96	0.342	8.41
19.2	5.30	11.97	0.342	8.41
19 Jan 95				
0.1	3.45	12.19	0.327	8.32
1	3.42	12.28	0.327	8.32
2	3.38	12.33	0.327	8.32
3	3.37	12.39	0.327	8.31
4	3.33	12.44	0.329	8.31
5	3.33	12.47	0.328	8.31
6	3.33	12.50	0.327	8.30
7	3.33	12.53	0.327	8.30
8	3.33	12.56	0.327	8.30
9	3.33	12.59	0.327	8.30

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
10	3.33	12.61	0.328	8.30
11	3.33	12.64	0.327	8.30
12	3.33	12.65	0.327	8.30
13	3.33	12.68	0.328	8.30
14	3.33	12.69	0.327	8.30
15	3.33	12.70	0.328	8.30
18.3	3.33	12.71	0.328	8.29
22 Mar 95				
0.1	7.21	10.83	0.168	7.89
1	7.18	10.87	0.173	7.92
2	7.21	10.91	0.174	7.93
3	7.17	10.96	0.171	7.94
4	7.18	11.02	0.172	7.95
5	7.17	11.04	0.170	7.96
6	7.19	11.07	0.174	7.96
7	7.25	11.08	0.178	7.98
8	7.19	11.10	0.173	7.97
9	7.22	11.11	0.175	7.97
10	7.19	11.12	0.176	7.97
11	7.25	11.13	0.178	7.98
12	7.21	11.14	0.177	7.98
13	7.20	11.15	0.177	7.98
14	7.20	11.15	0.176	7.98
15	7.20	11.15	0.176	7.98
18.9	7.19	11.16	0.176	7.98
06 Apr 95				
0.1	9.85	11.58	0.179	8.28
1	9.46	11.56	0.186	8.27
2	9.40	11.57	0.185	8.27
3	9.38	11.57	0.191	8.26
4	9.38	11.57	0.192	8.26
5	9.36	11.58	0.192	8.26
6	9.37	11.58	0.196	8.26
7	9.37	11.60	0.193	8.26
8	9.39	11.61	0.195	8.26
9	9.38	11.61	0.197	8.26
10	9.37	11.63	0.192	8.26
11	9.36	11.64	0.196	8.26
12	9.38	11.65	0.197	8.26
13	9.40	11.64	0.199	8.26
14	9.39	11.65	0.197	8.26
15	9.40	11.65	0.202	8.26
18.5	9.41	11.64	0.202	8.26
26 Apr 95				
0.1	9.60	10.93	0.148	8.02
1	9.53	10.96	0.148	8.01
2	9.57	11.00	0.148	8.01

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
3	9.44	11.01	0.149	8.02
4	9.40	11.04	0.149	8.00
5	9.41	11.10	0.149	8.01
6	9.46	11.11	0.149	8.01
7	9.40	11.11	0.149	8.01
8	9.40	11.13	0.149	8.02
9	9.41	11.14	0.149	8.02
10	9.42	11.15	0.149	8.02
11	9.39	11.15	0.149	8.02
12	9.41	11.15	0.149	8.03
13	9.42	11.15	0.149	8.03
14	9.40	11.16	0.150	8.03
15	9.39	11.16	0.149	8.03
19.1	9.38	11.15	0.149	8.04
09 May 95				
0.1	10.20	10.55	0.103	7.85
1	10.20	10.48	0.103	7.82
2	10.16	10.52	0.103	7.82
3	10.33	10.48	0.110	7.81
4	10.25	10.48	0.106	7.80
5	10.17	10.51	0.103	7.81
6	10.15	10.44	0.104	7.78
7	10.10	10.45	0.101	7.79
8	10.07	10.43	0.100	7.78
9	10.05	10.48	0.097	7.76
10	10.00	10.53	0.097	7.75
11	10.00	10.49	0.096	7.75
12	10.00	10.49	0.097	7.74
13	10.02	10.45	0.096	7.74
14	10.00	10.50	0.097	7.74
15	10.02	10.43	0.097	7.74
18.6	10.02	10.57	0.097	7.76
24 May 95				
0.1	12.66	10.31	0.108	7.74
1	12.48	10.36	0.104	7.72
2	12.39	10.36	0.104	7.75
3	12.37	10.36	0.103	7.71
4	12.39	10.37	0.103	7.70
5	12.42	10.37	0.103	7.72
6	12.37	10.36	0.103	7.71
7	12.38	10.36	0.102	7.73
8	12.38	10.36	0.103	7.73
9	12.37	10.35	0.103	7.74
10	12.39	10.35	0.103	7.74
11	12.38	10.35	0.103	7.75
12	12.37	10.33	0.103	7.75
13	12.38	10.34	0.102	7.75

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH	Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
14	12.37	10.33	0.102	7.75	10	16.55	9.40	0.128	7.79
15	12.39	10.34	0.102	7.75	11	16.54	9.39	0.128	7.79
06 Jun 95					12	16.57	9.39	0.128	7.79
0.1	11.75	10.57	0.091	7.66	13	16.53	9.39	0.128	7.80
1	11.69	10.55	0.089	7.60	14	16.52	9.38	0.129	7.80
2	11.69	10.55	0.090	7.59	15	16.52	9.37	0.129	7.79
3	11.73	10.57	0.094	7.63	19 Jul 95				
4	11.77	10.57	0.092	7.60	0.1	20.85	8.69	0.138	7.84
5	11.71	10.57	0.091	7.59	1	20.16	8.75	0.137	7.86
6	11.69	10.58	0.090	7.59	2	19.79	8.71	0.135	7.87
7	11.70	10.59	0.090	7.59	3	19.67	8.70	0.135	7.87
8	11.70	10.58	0.091	7.60	4	19.50	8.69	0.134	7.87
9	11.70	10.58	0.091	7.59	5	19.41	8.69	0.134	7.86
10	11.69	10.57	0.092	7.60	6	19.42	8.69	0.134	7.86
11	11.71	10.57	0.091	7.60	7	19.37	8.68	0.134	7.87
12	11.69	10.58	0.090	7.61	8	19.40	8.66	0.134	7.87
13	11.68	10.58	0.092	7.60	9	19.31	8.67	0.133	7.87
14	11.68	10.58	0.090	7.60	10	19.32	8.67	0.133	7.87
15	11.68	10.58	0.090	7.60	11	19.29	8.66	0.133	7.87
21 Jun 95					12	19.30	8.67	0.133	7.87
0.1	12.60	10.30	0.116	7.73	13	19.30	8.66	0.133	7.87
1	12.61	10.28	0.116	7.72	14	19.29	8.66	0.133	7.87
2	12.62	10.29	0.116	7.71	15	19.28	8.66	0.133	7.88
3	12.60	10.29	0.116	7.71	19.8	19.29	8.64	0.133	7.88
4	12.61	10.29	0.116	7.71	02 Aug 95				
5	12.61	10.29	0.116	7.72	0.1	20.86	8.56	0.152	7.80
6	12.61	10.29	0.116	7.72	1	19.67	8.58	0.152	7.80
7	12.60	10.30	0.116	7.72	2	19.34	8.61	0.151	7.80
8	12.59	10.30	0.115	7.73	3	19.30	8.59	0.151	7.79
9	12.59	10.31	0.115	7.73	4	19.27	8.58	0.151	7.78
10	12.59	10.30	0.115	7.73	5	19.24	8.57	0.150	7.78
11	12.58	10.30	0.115	7.73	6	19.27	8.57	0.150	7.78
12	12.59	10.32	0.115	7.74	7	19.26	8.57	0.150	7.79
13	12.58	10.31	0.115	7.74	8	19.23	8.56	0.150	7.79
14	12.58	10.30	0.115	7.74	9	19.22	8.55	0.150	7.78
15	12.59	10.31	0.115	7.75	10	19.21	8.55	0.150	7.79
06 Jul 95					11	19.19	8.55	0.150	7.79
0.1	16.85	9.44	0.129	7.78	12	19.20	8.54	0.150	7.79
1	16.73	9.44	0.128	7.77	13	19.20	8.54	0.149	7.79
2	16.62	9.43	0.128	7.77	14	19.20	8.54	0.150	7.79
3	16.57	9.41	0.128	7.77	15	19.20	8.53	0.150	7.79
4	16.53	9.41	0.128	7.78	17.5	19.19	8.53	0.150	7.79
5	16.57	9.41	0.128	7.78	16 Aug 95				
6	16.56	9.40	0.129	7.77	0.1	17.89	9.54	0.159	8.05
7	16.57	9.41	0.129	7.77	1	17.76	9.53	0.159	8.06
8	16.58	9.41	0.128	7.78	2	17.66	9.55	0.158	8.06
9	16.56	9.41	0.128	7.78	3	17.45	9.53	0.154	8.04

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH	Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
4	16.90	9.69	0.142	8.01	15	19.11	8.38	0.240	8.04
5	16.81	9.72	0.138	8.00	19.5	19.04	8.33	0.235	8.02
6	16.65	9.74	0.136	7.97	28 Sep 95				
7	16.61	9.78	0.134	7.95	0.1	17.49	8.79	0.309	8.27
8	16.10	9.87	0.121	7.91	1	17.49	8.84	0.310	8.29
9	15.88	9.90	0.114	7.89	2	17.44	8.85	0.310	8.29
10	15.79	9.92	0.113	7.86	3	17.44	8.86	0.310	8.29
11	15.74	9.91	0.111	7.83	4	17.43	8.86	0.309	8.29
12	15.63	9.88	0.108	7.80	5	17.42	8.88	0.309	8.29
13	15.49	9.83	0.105	7.75	6	17.42	8.89	0.309	8.29
14	15.41	9.83	0.103	7.72	7	17.42	8.90	0.309	8.29
15	15.37	9.83	0.101	7.71	8	17.41	8.90	0.308	8.29
18.4	15.34	9.81	0.101	7.69	9	17.38	8.88	0.308	8.28
29 Aug 95					10	17.40	8.89	0.308	8.29
0.1	19.04	9.90	0.172	8.56	11	17.38	8.90	0.307	8.29
1	19.04	9.88	0.173	8.56	12	17.37	8.89	0.306	8.28
2	19.05	9.87	0.173	8.56	13	17.36	8.89	0.305	8.28
3	19.05	9.90	0.172	8.57	14	17.35	8.89	0.305	8.28
4	18.94	9.87	0.169	8.54	15	17.35	8.89	0.305	8.28
5	18.43	9.88	0.157	8.50	19.1	17.34	8.85	0.305	8.27
6	18.32	9.86	0.155	8.47	12 Oct 95				
7	18.26	9.87	0.152	8.47	0.1	14.48	9.09	0.321	8.10
8	18.19	9.88	0.150	8.47	1	14.50	9.11	0.320	8.10
9	18.19	9.89	0.149	8.46	2	14.49	9.14	0.320	8.10
10	18.13	9.89	0.148	8.46	3	14.49	9.15	0.320	8.10
11	18.11	9.89	0.146	8.46	4	14.49	9.16	0.321	8.11
12	17.87	9.90	0.138	8.43	5	14.47	9.16	0.320	8.11
13	17.67	9.89	0.130	8.37	6	14.48	9.17	0.320	8.11
14	17.57	9.88	0.129	8.35	7	14.47	9.17	0.321	8.11
15	17.53	9.88	0.128	8.34	8	14.47	9.18	0.321	8.11
19.3	17.20	9.89	0.116	8.27	9	14.46	9.18	0.321	8.11
13 Sep 95					10	14.45	9.18	0.321	8.11
0.1	19.72	8.50	0.252	8.08	11	14.45	9.19	0.321	8.11
1	19.50	8.49	0.252	8.08	12	14.45	9.18	0.322	8.10
2	19.44	8.46	0.253	8.07	13	14.45	9.19	0.321	8.10
3	19.40	8.42	0.253	8.07	14	14.45	9.19	0.322	8.11
4	19.38	8.41	0.252	8.07	15	14.45	9.19	0.322	8.10
5	19.38	8.43	0.252	8.07	18.3	14.46	9.15	0.322	8.11
6	19.36	8.44	0.251	8.07	**Centennial Island**				
7	19.33	8.44	0.251	8.07	30 Mar 94				
8	19.33	8.44	0.249	8.06	0.1	7.79	12.81	0.306	8.06
9	19.30	8.43	0.248	8.06	1	7.76	12.83	0.306	8.06
10	19.25	8.42	0.246	8.06	2	7.70	12.82	0.305	8.08
11	19.18	8.39	0.242	8.04	3	7.65	12.78	0.305	8.09
12	19.16	8.38	0.242	8.04	4	7.61	12.75	0.305	8.10
13	19.16	8.38	0.241	8.04	5	7.61	12.74	0.304	8.10
14	19.16	8.38	0.240	8.04	6	7.57	12.71	0.303	8.10

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
7	7.47	12.65	0.309	8.09
8	7.42	12.65	0.311	8.09
9	7.42	12.64	0.310	8.10
10	7.40	12.66	0.311	8.10
11	7.37	12.63	0.311	8.10
12	7.35	12.61	0.312	8.10
13	7.25	12.55	0.314	8.09
19 Apr 94				
0.1	12.90	10.11	0.183	8.50
1	12.09	10.15	0.186	8.50
2	11.93	10.10	0.188	8.48
3	11.80	10.05	0.190	8.47
4	11.75	10.02	0.190	8.47
5	11.70	10.02	0.190	8.47
6	11.68	10.02	0.192	8.47
7	11.65	10.00	0.194	8.47
8	11.55	10.00	0.194	8.47
9	11.49	9.99	0.194	8.46
10	11.44	9.95	0.194	8.46
11	11.39	9.94	0.194	8.46
12	11.29	9.93	0.195	8.45
13	11.14	9.92	0.197	8.45
14	11.08	9.89	0.197	8.44
15	11.06	9.88	0.197	8.44
18	10.95	9.85	0.201	8.42
04 May 94				
0.1	10.46	10.88	0.166	7.93
1	10.37	10.85	0.166	7.92
2	10.37	10.84	0.166	7.93
3	10.36	10.84	0.166	7.94
4	10.37	10.81	0.166	7.95
5	10.36	10.82	0.167	7.95
6	10.34	10.80	0.168	7.96
7	10.33	10.80	0.168	7.96
8	10.33	10.79	0.168	7.97
9	10.34	10.77	0.168	7.97
10	10.33	10.77	0.168	7.98
11	10.33	10.76	0.168	7.98
12	10.33	10.76	0.168	7.99
13	10.33	10.75	0.168	7.99
14	10.33	10.75	0.168	7.99
18 May 94				
0.1	11.42	9.37	0.089	7.56
1	11.07	9.36	0.089	7.53
2	11.00	9.32	0.089	7.51
3	10.95	9.31	0.089	7.51
4	10.92	9.29	0.089	7.50
5	10.92	9.29	0.089	7.51
6	10.92	9.27	0.089	7.51
7	10.92	9.25	0.089	7.51
8	10.90	9.24	0.089	7.51
9	10.90	9.24	0.089	7.51
10	10.90	9.23	0.089	7.52
11	10.92	9.22	0.089	7.52
12	10.90	9.22	0.089	7.53
13	10.90	9.20	0.089	7.53
14	10.90	9.20	0.089	7.53
15	10.90	9.19	0.089	7.53
15.5	10.90	9.19	0.089	7.54
02 Jun 94				
0.1	14.86	10.36	0.145	8.03
1	14.68	10.20	0.145	8.03
2	14.49	10.11	0.145	8.03
3	14.46	10.02	0.145	8.02
4	14.31	10.00	0.144	8.02
5	14.26	9.97	0.144	8.02
6	14.25	9.94	0.144	8.01
7	14.20	9.91	0.145	8.02
8	14.21	9.91	0.145	8.01
9	14.18	9.88	0.145	8.02
10	14.18	9.86	0.145	8.01
11	14.20	9.83	0.145	8.02
12	14.25	9.82	0.145	8.02
13	14.23	9.81	0.145	8.02
14	14.20	9.79	0.145	8.02
15	14.18	9.79	0.145	8.02
15 Jun 94				
0.1	17.05	9.32	0.148	8.28
1	16.85	9.16	0.147	8.24
2	16.78	9.06	0.147	8.19
3	16.78	9.03	0.147	8.16
4	16.78	9.01	0.146	8.14
5	16.76	8.98	0.146	8.12
6	16.76	8.93	0.145	8.10
7	16.74	8.93	0.146	8.09
8	16.74	8.91	0.146	8.08
9	16.74	8.91	0.145	8.07
10	16.74	8.90	0.145	8.07
11	16.74	8.88	0.145	8.06
12	16.74	8.87	0.146	8.05
13	16.74	8.86	0.145	8.04
14	16.74	8.84	0.145	8.04
15	16.74	8.82	0.146	8.03
18	16.74	8.77	0.146	8.02

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
30 Jun 94				
0.1	20.59	10.80	0.157	8.89
1	20.41	10.83	0.158	8.87
2	20.36	10.65	0.158	8.84
3	20.34	10.52	0.158	8.82
4	20.22	10.47	0.157	8.80
5	20.19	10.46	0.158	8.78
6	20.17	10.44	0.158	8.78
7	20.17	10.41	0.158	8.77
8	20.15	10.41	0.158	8.77
9	20.14	10.41	0.158	8.77
10	20.05	10.40	0.158	8.77
11	19.72	10.07	0.158	8.66
12	19.00	9.03	0.157	8.41
13	18.83	8.78	0.157	8.23
14	18.52	8.56	0.156	8.10
15	18.35	8.43	0.155	8.04
19.5	17.60	7.76	0.150	7.74
13 Jul 94				
0.1	20.97	11.03	0.182	8.76
1	19.19	11.06	0.179	8.74
2	18.10	10.95	0.172	8.67
3	17.64	10.99	0.170	8.61
4	17.35	10.88	0.169	8.57
5	16.91	10.53	0.168	8.46
6	16.68	10.38	0.167	8.37
7	16.38	10.16	0.167	8.30
8	16.11	10.12	0.165	8.25
9	15.95	10.09	0.163	8.14
10	15.82	10.06	0.162	8.12
11	15.77	10.01	0.160	8.10
12	15.71	10.02	0.159	8.08
13	15.66	10.03	0.158	8.07
14	15.66	10.05	0.158	8.06
15	15.64	10.07	0.157	8.06
17.8	15.66	10.06	0.157	8.05
27 Jul 94				
0.1	24.20	11.52	0.172	9.05
1	21.90	12.43	0.172	9.18
2	21.46	12.40	0.171	9.19
3	20.55	11.57	0.177	9.06
4	18.95	11.04	0.185	8.76
5	18.59	10.86	0.186	8.58
6	18.49	10.86	0.186	8.57
7	18.33	10.84	0.186	8.55
8	18.10	10.81	0.186	8.52
9	18.06	10.77	0.186	8.51
10	17.15	10.71	0.181	8.43
11	16.41	10.67	0.174	8.35
12	14.54	10.83	0.149	8.22
13	14.40	10.91	0.144	8.14
14	14.31	10.92	0.143	8.10
15	14.10	10.98	0.139	8.07
19	14.00	11.00	0.136	8.01
10 Aug 94				
0.1	25.23	7.63	0.242	8.51
1	23.93	7.57	0.240	8.50
2	23.64	7.53	0.241	8.49
3	23.46	7.45	0.240	8.47
4	23.33	7.30	0.241	8.44
5	23.28	7.23	0.241	8.42
6	23.22	7.15	0.241	8.41
7	23.22	7.14	0.241	8.40
8	23.19	7.12	0.242	8.40
9	23.19	7.11	0.242	8.39
10	23.19	7.07	0.242	8.39
11	23.10	6.89	0.242	8.34
12	22.97	6.69	0.241	8.29
13	22.83	6.81	0.237	8.30
14	22.45	6.70	0.230	8.24
15	22.01	6.65	0.224	8.18
20.3	18.91	5.77	0.169	7.79
24 Aug 94				
0.1	23.49	9.07	0.279	8.55
1	23.12	8.48	0.280	8.50
2	22.79	8.08	0.282	8.43
3	22.70	7.74	0.282	8.37
4	22.67	7.75	0.280	8.36
5	22.63	7.65	0.283	8.35
6	22.63	7.72	0.282	8.36
7	22.60	7.72	0.284	8.36
8	22.58	7.66	0.285	8.35
9	22.58	7.60	0.285	8.34
10	22.56	7.50	0.286	8.33
11	22.52	7.45	0.287	8.31
12	22.51	7.48	0.287	8.32
13	22.49	7.52	0.288	8.33
14	22.36	7.01	0.290	8.22
15	22.10	6.76	0.289	8.11
19.3	21.09	5.31	0.271	7.63
08 Sep 94				
0.1	21.87	7.99	0.306	8.39
1	21.53	7.77	0.307	8.34
2	21.36	7.31	0.309	8.24

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH	Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
3	21.25	7.17	0.309	8.18	14	14.45	9.24	0.399	8.35
4	21.23	7.27	0.309	8.19	15	14.43	9.15	0.399	8.33
5	21.22	7.35	0.309	8.20	19.5	14.40	8.91	0.399	8.27
6	21.15	7.36	0.310	8.20	30 Nov 94				
7	21.15	7.37	0.309	8.20	0.1	5.37	11.17	0.358	8.38
8	21.13	7.39	0.309	8.20	1	5.38	11.24	0.359	8.38
9	21.13	7.40	0.309	8.20	2	5.37	11.29	0.359	8.37
10	21.13	7.38	0.309	8.20	3	5.37	11.34	0.359	8.37
11	21.09	7.31	0.308	8.19	4	5.36	11.38	0.359	8.37
12	20.99	7.17	0.309	8.15	5	5.37	11.42	0.359	8.37
13	20.92	7.26	0.307	8.16	6	5.36	11.46	0.359	8.37
14	20.88	7.02	0.308	8.12	7	5.35	11.48	0.359	8.37
15	20.83	7.04	0.308	8.10	8	5.35	11.51	0.359	8.37
19	20.62	6.10	0.307	7.88	9	5.35	11.53	0.359	8.37
22 Sep 94					10	5.36	11.61	0.359	8.37
0.1	20.12	10.19	0.331	8.53	11	5.35	11.65	0.359	8.37
1	20.07	10.08	0.330	8.53	12	5.35	11.66	0.359	8.37
2	20.06	10.03	0.331	8.53	13	5.35	11.68	0.359	8.37
3	20.04	9.92	0.331	8.53	14	5.35	11.69	0.359	8.37
4	20.02	9.78	0.331	8.50	15	5.35	11.69	0.359	8.37
5	19.99	9.77	0.330	8.51	22.5	5.34	11.67	0.359	8.36
6	19.96	9.30	0.331	8.43	19 Jan 95				
7	19.90	9.20	0.331	8.41	0.1	3.33	12.01	0.322	8.25
8	19.90	9.13	0.331	8.40	1	3.32	12.07	0.322	8.26
9	19.85	9.05	0.332	8.38	2	3.31	12.17	0.322	8.26
10	19.69	9.03	0.334	8.38	3	3.28	12.22	0.322	8.25
11	19.57	8.85	0.332	8.35	4	3.29	12.27	0.322	8.25
12	19.46	8.77	0.337	8.31	5	3.29	12.33	0.322	8.25
13	19.40	8.88	0.334	8.34	6	3.26	12.37	0.323	8.25
14	19.35	8.71	0.334	8.30	7	3.26	12.40	0.322	8.25
15	19.29	8.23	0.337	8.20	8	3.25	12.42	0.322	8.25
18.6	18.48	6.39	0.332	7.82	9	3.25	12.44	0.323	8.25
26 Oct 94					10	3.25	12.46	0.322	8.24
0.1	14.48	9.61	0.398	8.37	11	3.25	12.47	0.323	8.24
1	14.48	9.57	0.398	8.37	12	3.25	12.49	0.323	8.24
2	14.47	9.49	0.399	8.37	13	3.25	12.50	0.323	8.24
3	14.47	9.44	0.399	8.36	14	3.25	12.50	0.323	8.24
4	14.47	9.41	0.399	8.36	15	3.25	12.51	0.323	8.24
5	14.47	9.35	0.398	8.36	18	3.25	12.53	0.323	8.24
6	14.45	9.30	0.398	8.35	23 Mar 95				
7	14.45	9.30	0.399	8.35	0.1	7.44	11.13	0.164	7.86
8	14.45	9.28	0.399	8.35	1	7.42	11.13	0.164	7.87
9	14.45	9.27	0.398	8.35	2	7.42	11.14	0.164	7.88
10	14.45	9.27	0.398	8.35	3	7.41	11.14	0.164	7.88
11	14.45	9.26	0.398	8.35	4	7.41	11.14	0.164	7.88
12	14.45	9.25	0.398	8.35	5	7.41	11.15	0.164	7.88
13	14.45	9.25	0.398	8.35	6	7.40	11.15	0.164	7.88

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
7	7.41	11.15	0.164	7.88
8	7.40	11.15	0.164	7.88
9	7.40	11.15	0.164	7.88
10	7.38	11.15	0.165	7.88
11	7.37	11.15	0.165	7.87
12	7.37	11.15	0.165	7.87
13	7.37	11.15	0.165	7.88
14	7.36	11.14	0.165	7.88
15	7.36	11.14	0.165	7.88
21.9	7.37	11.12	0.165	7.87
06 Apr 95				
0.1	9.08	12.01	0.213	8.26
1	8.91	12.03	0.215	8.23
2	8.83	11.92	0.216	8.18
3	8.83	11.84	0.218	8.17
4	8.83	11.79	0.219	8.15
5	8.83	11.75	0.219	8.15
6	8.82	11.71	0.219	8.14
7	8.82	11.69	0.220	8.13
8	8.82	11.68	0.220	8.13
9	8.82	11.67	0.220	8.13
10	8.81	11.66	0.220	8.12
11	8.80	11.64	0.220	8.11
12	8.80	11.63	0.220	8.11
13	8.80	11.63	0.220	8.11
14	8.76	11.61	0.220	8.09
15	8.73	11.55	0.220	8.08
20.9	8.72	11.49	0.222	8.06
26 Apr 95				
0.1	10.41	10.95	0.156	8.19
1	10.34	11.01	0.156	8.20
2	10.17	11.04	0.156	8.18
3	10.17	11.07	0.156	8.18
4	10.13	11.08	0.157	8.17
5	10.07	11.08	0.158	8.15
6	10.11	11.08	0.158	8.16
7	10.12	11.09	0.158	8.16
8	10.07	11.10	0.158	8.16
9	10.00	11.09	0.158	8.16
10	9.98	11.08	0.157	8.15
11	9.93	11.07	0.157	8.14
12	9.93	11.06	0.157	8.14
13	9.90	11.05	0.157	8.14
14	9.89	11.04	0.158	8.13
15	9.87	11.03	0.158	8.13
20.6	9.85	11.00	0.159	8.12
09 May 95				

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
0.1	9.99	11.28	0.099	7.76
1	9.76	11.22	0.099	7.74
2	9.73	11.17	0.099	7.73
3	9.71	11.15	0.099	7.72
4	9.69	11.13	0.099	7.72
5	9.71	11.09	0.099	7.72
6	9.71	11.04	0.099	7.70
7	9.69	11.03	0.099	7.69
8	9.69	11.02	0.099	7.69
9	9.69	11.00	0.099	7.69
10	9.71	10.98	0.099	7.69
11	9.69	10.99	0.099	7.68
12	9.71	10.97	0.099	7.68
13	9.71	10.97	0.099	7.68
14	9.71	10.97	0.099	7.68
15	9.71	10.96	0.099	7.68
19.4	9.69	10.94	0.099	7.68
24 May 95				
0.1	13.05	10.31	0.103	7.72
1	12.57	10.35	0.103	7.71
2	12.50	10.35	0.103	7.69
3	12.46	10.35	0.103	7.69
4	12.45	10.35	0.103	7.69
5	12.44	10.36	0.103	7.68
6	12.48	10.35	0.103	7.69
7	12.44	10.35	0.103	7.69
8	12.43	10.36	0.103	7.69
9	12.43	10.36	0.103	7.70
10	12.43	10.36	0.103	7.71
11	12.43	10.37	0.103	7.71
12	12.43	10.36	0.103	7.70
13	12.43	10.36	0.103	7.71
14	12.43	10.36	0.103	7.71
15	12.44	10.36	0.103	7.72
20.6	12.44	10.31	0.103	7.71
06 Jun 95				
0.1	12.43	10.27	0.096	7.57
1	12.44	10.28	0.097	7.54
2	12.44	10.31	0.097	7.54
3	12.44	10.32	0.097	7.54
4	12.44	10.34	0.097	7.53
5	12.44	10.34	0.097	7.54
6	12.43	10.35	0.097	7.54
7	12.43	10.35	0.097	7.54
8	12.42	10.36	0.097	7.54
9	12.42	10.36	0.097	7.55
10	12.42	10.35	0.097	7.55

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
11	12.43	10.36	0.097	7.56
12	12.40	10.36	0.097	7.57
13	12.40	10.35	0.097	7.57
14	12.41	10.35	0.097	7.57
15	12.41	10.35	0.097	7.57
21	12.42	10.29	0.097	7.57
21 Jun 95				
0.1	12.77	10.19	0.109	7.69
1	12.54	10.22	0.109	7.68
2	12.52	10.22	0.109	7.65
3	12.51	10.23	0.109	7.66
4	12.51	10.24	0.109	7.65
5	12.50	10.24	0.109	7.65
6	12.49	10.24	0.110	7.65
7	12.48	10.25	0.110	7.66
8	12.48	10.26	0.110	7.65
9	12.47	10.26	0.110	7.65
10	12.47	10.26	0.110	7.65
11	12.47	10.26	0.110	7.66
12	12.48	10.26	0.110	7.66
13	12.47	10.27	0.110	7.67
14	12.47	10.27	0.110	7.66
15	12.47	10.26	0.110	7.67
21	12.47	10.21	0.110	7.64
06 Jul 95				
0.1	17.02	9.40	0.126	7.75
1	16.45	9.47	0.126	7.74
2	16.34	9.44	0.126	7.72
3	16.30	9.41	0.126	7.71
4	16.30	9.40	0.126	7.70
5	16.26	9.37	0.126	7.69
7	16.26	9.38	0.126	7.69
8	16.26	9.38	0.126	7.70
9	16.26	9.38	0.126	7.70
10	16.25	9.38	0.126	7.70
11	16.26	9.38	0.127	7.70
12	16.26	9.38	0.127	7.70
13	16.26	9.38	0.127	7.70
14	16.26	9.38	0.127	7.71
15	16.26	9.38	0.127	7.71
20.9	16.26	9.34	0.127	7.70
19 Jul 95				
0.1	20.34	8.71	0.128	7.82
1	20.11	8.72	0.128	7.81
2	19.94	8.70	0.128	7.81
3	19.78	8.70	0.128	7.81
4	19.75	8.70	0.128	7.81
5	19.66	8.67	0.128	7.80
6	19.67	8.67	0.128	7.81
7	19.63	8.66	0.128	7.80
8	19.65	8.65	0.128	7.80
9	19.66	8.65	0.128	7.81
10	19.65	8.65	0.128	7.81
11	19.63	8.64	0.128	7.81
12	19.59	8.62	0.128	7.80
13	19.56	8.61	0.128	7.80
14	19.57	8.61	0.128	7.80
15	19.51	8.60	0.128	7.79
02 Aug 95				
0.1	19.12	9.34	0.143	8.08
1	19.11	9.38	0.143	8.09
2	19.04	9.38	0.143	8.09
3	19.00	9.37	0.143	8.08
4	18.85	9.35	0.143	8.05
5	18.77	9.32	0.143	8.04
6	18.71	9.31	0.143	8.02
7	18.69	9.30	0.142	8.02
8	18.71	9.31	0.142	8.02
9	18.67	9.32	0.142	8.02
10	18.67	9.31	0.142	8.02
11	18.64	9.27	0.143	7.99
12	18.55	9.23	0.143	7.97
13	18.42	9.18	0.143	7.93
14	18.36	9.15	0.144	7.91
15	18.33	9.12	0.144	7.90
18.9	18.21	8.99	0.145	7.83
16 Aug 95				
0.1	18.01	9.50	0.144	7.95
1	17.89	9.48	0.144	7.93
2	17.83	9.46	0.144	7.90
3	17.60	9.42	0.144	7.88
4	17.57	9.36	0.144	7.87
5	17.56	9.33	0.144	7.85
6	17.56	9.27	0.144	7.84
7	17.56	9.27	0.144	7.84
8	17.52	9.30	0.143	7.84
9	17.49	9.36	0.143	7.86
10	17.48	9.41	0.143	7.88
11	17.43	9.43	0.143	7.88
12	17.39	9.41	0.143	7.87
13	17.28	9.42	0.140	7.85
14	17.09	9.42	0.139	7.84
15	16.87	9.31	0.134	7.76
22.1	16.38	9.02	0.126	7.59

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
29 Aug 95				
0.1	18.70	9.92	0.160	8.51
1	18.70	9.97	0.160	8.49
2	18.61	9.93	0.160	8.47
3	18.57	9.89	0.160	8.45
4	18.54	9.88	0.160	8.45
5	18.51	9.85	0.159	8.43
6	18.38	9.81	0.159	8.40
7	18.32	9.73	0.158	8.37
8	18.17	9.64	0.157	8.31
9	18.15	9.59	0.157	8.29
10	18.14	9.57	0.157	8.29
11	18.12	9.52	0.158	8.28
12	18.12	9.49	0.158	8.27
13	17.94	9.38	0.156	8.21
14	17.81	9.28	0.154	8.14
15	17.66	9.19	0.150	8.09
23.3	16.48	8.92	0.128	7.82
13 Sep 95				
0.1	21.44	9.52	0.239	8.32
1	19.65	9.45	0.236	8.29
2	19.55	9.18	0.236	8.22
3	19.42	9.14	0.236	8.19
4	19.37	9.05	0.236	8.18
5	19.26	8.82	0.235	8.13
6	19.22	8.75	0.235	8.10
7	19.20	8.67	0.235	8.09
8	19.11	8.54	0.234	8.05
9	19.01	8.48	0.234	8.03
10	19.01	8.41	0.234	8.01
11	18.97	8.37	0.234	8.00
12	18.88	8.26	0.233	7.97
13	18.85	8.23	0.233	7.96
14	18.76	8.23	0.232	7.96
15	18.74	8.18	0.232	7.95
21.5	18.65	6.68	0.241	7.67
28 Sep 95				
0.1	17.12	8.47	0.275	8.14
1	17.13	8.51	0.275	8.16
2	17.13	8.52	0.276	8.17
3	17.13	8.54	0.275	8.16
4	17.13	8.56	0.276	8.17
5	17.13	8.58	0.276	8.17
6	17.13	8.60	0.276	8.17
7	17.13	8.61	0.276	8.17
8	17.13	8.62	0.276	8.17
9	17.13	8.63	0.276	8.18
10	17.13	8.63	0.276	8.18
11	17.13	8.63	0.276	8.18
12	17.13	8.63	0.276	8.18
13	17.13	8.64	0.276	8.18
14	17.13	8.65	0.276	8.18
15	17.13	8.65	0.276	8.18
21.6	17.14	8.58	0.277	8.15
12 Oct 95				
0.1	14.27	8.99	0.310	8.04
1	14.27	9.01	0.310	8.04
2	14.27	9.02	0.311	8.04
3	14.25	9.03	0.311	8.05
4	14.22	9.07	0.309	8.06
5	14.21	9.10	0.309	8.06
6	14.22	9.14	0.308	8.06
7	14.20	9.18	0.308	8.06
8	14.18	9.20	0.308	8.06
9	14.19	9.22	0.308	8.07
10	14.19	9.22	0.308	8.06
11	14.18	9.22	0.308	8.06
12	14.18	9.21	0.308	8.06
13	14.19	9.20	0.308	8.06
14	14.19	9.21	0.308	8.07
15	14.19	9.20	0.308	8.06
27.3	14.19	9.17	0.309	8.05
Offield				
30 Mar 94				
0.1	7.42	12.44	0.328	7.94
1	6.86	12.63	0.325	7.94
2	6.67	12.61	0.329	7.96
3	6.65	12.59	0.329	7.97
4	6.60	12.55	0.329	7.97
5	6.55	12.52	0.329	7.96
6	6.54	12.50	0.330	7.96
7	6.54	12.51	0.329	7.96
8	6.49	12.47	0.329	7.96
9	6.47	12.45	0.329	7.96
10	6.45	12.44	0.329	7.95
11	6.42	12.40	0.329	7.95
12	6.40	12.41	0.329	7.95
13	6.40	12.38	0.329	7.95
15.2	6.37	12.35	0.329	7.94
19 Apr 94				
0.1	11.65	11.06	0.207	8.61
1	11.45	11.02	0.206	8.59
2	11.27	10.89	0.206	8.57
3	11.24	10.83	0.206	8.57

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
4	11.21	10.80	0.206	8.57
5	11.08	10.72	0.206	8.55
6	11.11	10.71	0.206	8.55
7	10.93	10.50	0.205	8.51
8	10.75	10.50	0.205	8.50
9	10.72	10.47	0.205	8.49
10	10.70	10.45	0.205	8.49
11	10.67	10.44	0.205	8.49
12	10.67	10.42	0.205	8.49
13	10.33	10.36	0.207	8.46
14	9.88	10.26	0.207	8.42
15	9.79	10.20	0.207	8.41
20	9.57	10.07	0.205	8.37
03 May 94				
0.1	11.04	10.05	0.159	7.78
1	10.85	10.11	0.161	7.76
2	10.58	10.13	0.163	7.75
3	10.29	10.31	0.163	7.79
4	10.24	10.18	0.163	7.79
5	10.15	10.13	0.163	7.79
6	10.06	10.11	0.163	7.79
7	9.98	10.08	0.163	7.79
8	9.69	10.06	0.164	7.79
9	9.59	10.05	0.163	7.78
10	9.57	10.03	0.163	7.78
11	9.54	10.00	0.163	7.77
12	9.56	10.00	0.163	7.78
13	9.54	10.00	0.164	7.77
14	9.54	9.99	0.164	7.78
15	9.54	9.99	0.164	7.78
16.5	9.54	9.98	0.164	7.78
18 May 94				
0.1	11.29	9.22	0.084	7.39
1	11.34	9.18	0.083	7.39
2	11.41	9.14	0.083	7.36
3	11.28	9.17	0.084	7.37
4	11.18	9.23	0.084	7.39
5	11.24	9.19	0.084	7.39
6	11.31	9.18	0.084	7.39
7	11.21	9.20	0.084	7.40
8	11.26	9.21	0.084	7.40
9	11.10	9.25	0.084	7.41
10	11.10	9.25	0.084	7.42
11	11.10	9.24	0.084	7.42
12	11.10	9.23	0.084	7.43
13	11.08	9.22	0.084	7.44
14	11.08	9.21	0.084	7.44
15	11.08	9.20	0.084	7.44
15.7	11.10	9.19	0.084	7.45
02 Jun 94				
0.1	14.05	10.38	0.128	7.85
1	13.93	10.37	0.128	7.85
2	13.65	10.33	0.130	7.84
3	13.59	10.27	0.130	7.84
4	13.57	10.22	0.130	7.83
5	13.55	10.20	0.130	7.83
6	13.57	10.17	0.130	7.83
7	13.54	10.14	0.131	7.82
8	13.50	10.11	0.131	7.82
9	13.49	10.11	0.131	7.82
10	13.48	10.09	0.131	7.82
11	13.45	10.05	0.131	7.83
12	13.44	10.04	0.131	7.83
13	13.33	9.90	0.128	7.80
14	13.31	9.88	0.128	7.80
15	13.26	9.82	0.127	7.79
15 Jun 94				
0.1	17.05	10.70	0.139	8.73
1	16.85	10.76	0.139	8.73
2	16.71	10.63	0.140	8.70
3	16.68	10.51	0.141	8.66
4	16.66	10.41	0.141	8.63
5	16.61	10.22	0.142	8.56
6	16.58	10.19	0.142	8.54
7	16.53	9.99	0.146	8.47
8	16.53	10.03	0.144	8.45
9	16.48	9.77	0.148	8.37
10	16.41	9.56	0.150	8.28
11	16.39	9.52	0.149	8.23
12	16.36	9.43	0.149	8.20
13	16.34	9.37	0.149	8.16
14	16.34	9.35	0.148	8.15
15	16.33	9.32	0.148	8.13
29 Jun 94				
0.1	21.52	10.27	0.144	8.72
1	21.48	10.33	0.144	8.73
2	21.20	10.38	0.144	8.74
3	21.09	10.31	0.145	8.73
4	21.06	10.24	0.145	8.71
5	21.04	10.20	0.145	8.70
6	20.94	10.14	0.145	8.69
7	20.88	10.13	0.146	8.68
8	20.83	10.10	0.147	8.68
9	20.71	10.07	0.147	8.66

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
10	20.57	9.80	0.147	8.62
11	19.79	9.14	0.150	8.45
12	19.64	8.84	0.150	8.24
13	19.62	8.78	0.150	8.21
14	19.58	8.73	0.149	8.19
15	19.57	8.68	0.149	8.18
13 Jul 94				
0.1	22.70	13.56	0.215	9.19
1	21.50	14.26	0.212	9.23
2	19.29	11.83	0.201	8.97
3	19.27	11.47	0.200	8.87
4	18.93	10.83	0.195	8.78
5	18.78	10.55	0.192	8.71
6	18.52	10.22	0.188	8.62
7	18.32	10.25	0.184	8.57
8	18.13	10.17	0.181	8.54
9	17.86	9.73	0.182	8.43
10	17.64	9.65	0.179	8.36
11	17.40	9.59	0.176	8.29
12	17.22	9.50	0.177	8.20
13	17.22	9.62	0.173	8.19
14	16.81	9.55	0.165	8.18
15	16.83	9.68	0.165	8.17
23.4	16.38	9.39	0.159	8.03
27 Jul 94				
0.1	21.92	11.82	0.170	9.22
1	20.95	12.25	0.169	9.19
2	20.33	12.06	0.170	9.10
3	18.86	11.33	0.170	8.88
4	18.15	11.14	0.165	8.73
5	18.03	10.98	0.164	8.66
6	17.76	10.63	0.163	8.55
7	17.43	10.51	0.164	8.47
8	17.38	10.39	0.164	8.40
9	17.18	10.31	0.163	8.35
10	16.76	10.26	0.161	8.28
11	16.61	10.33	0.162	8.24
12	15.91	10.44	0.160	8.19
13	15.77	10.42	0.160	8.13
14	15.44	10.39	0.157	8.10
15	15.27	10.41	0.156	8.06
18.6	14.49	10.31	0.149	7.96
10 Aug 94				
0.1	22.42	9.98	0.219	9.04
1	22.44	9.99	0.219	9.04
2	22.40	9.93	0.219	9.03
3	22.38	9.88	0.219	9.02
4	22.35	9.73	0.221	9.00
5	22.28	9.50	0.224	8.96
6	22.20	9.38	0.224	8.94
7	22.17	9.40	0.223	8.94
8	22.13	9.36	0.224	8.93
9	22.10	9.36	0.222	8.94
10	22.10	9.34	0.222	8.93
11	21.87	9.54	0.210	8.97
12	21.74	9.56	0.207	8.98
13	21.71	9.54	0.209	8.96
14	21.64	9.57	0.205	8.98
15	21.53	9.48	0.204	8.97
18	21.48	9.36	0.204	8.94
24 Aug 94				
0.1	22.94	8.04	0.258	8.44
1	22.94	7.98	0.258	8.43
2	22.90	7.90	0.257	8.41
3	22.88	7.81	0.258	8.40
4	22.85	7.74	0.258	8.38
5	22.86	7.73	0.258	8.38
6	22.86	7.69	0.258	8.37
7	22.86	7.66	0.258	8.37
8	22.85	7.63	0.258	8.37
9	22.81	7.33	0.260	8.32
10	22.74	7.01	0.262	8.26
11	22.67	6.83	0.261	8.21
12	22.58	6.35	0.257	8.08
13	22.54	6.17	0.256	8.02
14	22.52	5.99	0.256	7.98
15	22.51	5.91	0.256	7.95
22.3	22.33	5.31	0.257	7.80
08 Sep 94				
0.1	21.81	8.56	0.286	8.50
1	21.75	8.55	0.285	8.49
2	21.73	8.44	0.286	8.47
3	21.73	8.36	0.286	8.46
4	21.72	8.32	0.287	8.46
5	21.72	8.21	0.286	8.44
6	21.59	7.54	0.284	8.31
7	21.58	7.43	0.285	8.29
8	21.54	7.31	0.285	8.26
9	21.52	7.16	0.286	8.23
10	21.51	7.00	0.285	8.20
11	21.50	6.97	0.287	8.19
12	21.50	7.02	0.288	8.20
13	21.49	7.08	0.289	8.22
14	21.46	6.95	0.290	8.19

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
15	21.43	6.78	0.292	8.17
21.2	21.36	6.18	0.295	8.04
22 Sep 94				
0.1	19.88	7.22	0.316	8.00
1	19.90	7.20	0.316	8.00
2	19.88	7.13	0.316	7.99
3	19.88	7.12	0.316	7.99
4	19.85	7.05	0.317	7.98
5	19.83	7.03	0.319	7.97
6	19.81	6.99	0.319	7.97
7	19.78	6.92	0.320	7.96
8	19.71	6.81	0.323	7.94
9	19.59	6.35	0.325	7.86
10	19.59	6.30	0.324	7.85
11	19.52	6.71	0.326	7.92
12	19.50	6.79	0.327	7.94
13	19.47	6.41	0.327	7.88
14	19.45	6.41	0.327	7.86
15	19.38	5.99	0.328	7.81
19.2	19.25	5.81	0.329	7.76
26 Oct 94				
0.1	14.57	8.99	0.374	8.27
1	14.57	8.94	0.374	8.27
2	14.55	8.91	0.375	8.26
3	14.57	8.90	0.375	8.26
4	14.55	8.87	0.374	8.26
5	14.55	8.85	0.374	8.26
6	14.57	8.79	0.376	8.26
7	14.55	8.78	0.374	8.26
8	14.55	8.77	0.375	8.25
9	14.55	8.74	0.376	8.25
10	14.57	8.71	0.375	8.25
11	14.55	8.71	0.375	8.25
12	14.57	8.71	0.376	8.26
13	14.57	8.70	0.374	8.26
14	14.57	8.70	0.375	8.26
15	14.55	8.69	0.375	8.26
18.5	14.53	8.69	0.376	8.26
30 Nov 94				
0.1	6.17	11.26	0.345	8.30
1	6.17	11.25	0.346	8.29
2	6.16	11.24	0.346	8.29
3	6.16	11.23	0.346	8.29
4	6.16	11.23	0.346	8.29
5	6.15	11.22	0.346	8.29
6	6.13	11.22	0.346	8.29
7	6.13	11.21	0.346	8.29
8	6.13	11.20	0.346	8.29
9	6.13	11.20	0.347	8.29
10	6.13	11.20	0.347	8.29
11	6.11	11.21	0.347	8.30
12	6.11	11.22	0.347	8.30
13	6.11	11.22	0.347	8.30
14	6.10	11.21	0.348	8.29
15	6.10	11.19	0.347	8.29
19.3	6.10	11.17	0.348	8.29
19 Jan 95				
0.1	3.57	11.92	0.318	8.20
1	3.55	11.95	0.318	8.20
2	3.55	12.01	0.318	8.20
3	3.59	12.05	0.318	8.19
4	3.55	12.10	0.318	8.18
5	3.59	12.12	0.318	8.18
6	3.58	12.19	0.318	8.18
7	3.59	12.21	0.318	8.18
8	3.55	12.23	0.318	8.18
9	3.59	12.22	0.318	8.18
10	3.59	12.23	0.318	8.18
11	3.59	12.23	0.319	8.18
12	3.59	12.25	0.318	8.18
13	3.59	12.25	0.319	8.18
14	3.59	12.25	0.319	8.18
15	3.59	12.26	0.320	8.18
21.8	3.59	12.26	0.320	8.17
22 Mar 95				
0.1	7.46	10.90	0.164	7.87
1	7.46	10.96	0.164	7.88
2	7.42	11.00	0.164	7.88
3	7.43	11.05	0.164	7.89
4	7.43	11.07	0.164	7.88
5	7.43	11.09	0.164	7.88
6	7.43	11.13	0.164	7.88
7	7.42	11.14	0.164	7.88
8	7.40	11.15	0.164	7.88
9	7.40	11.15	0.165	7.87
10	7.40	11.16	0.164	7.87
11	7.40	11.17	0.164	7.87
12	7.40	11.17	0.164	7.87
13	7.39	11.18	0.164	7.87
14	7.39	11.18	0.165	7.87
14.7	7.39	11.19	0.164	7.87
06 Apr 95				
0.1	8.97	11.64	0.205	8.21
1	8.96	11.78	0.205	8.21

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
2	8.94	11.82	0.205	8.19
3	8.91	11.86	0.205	8.18
4	8.90	11.85	0.205	8.16
5	8.88	11.85	0.205	8.15
6	8.88	11.84	0.205	8.14
7	8.87	11.84	0.205	8.14
8	8.86	11.83	0.206	8.12
9	8.83	11.76	0.207	8.09
10	8.74	11.66	0.207	8.05
11	8.66	11.56	0.207	8.02
12	8.65	11.53	0.207	8.01
13	8.62	11.51	0.207	8.00
14	8.61	11.48	0.208	8.00
15	8.58	11.48	0.208	7.99
21.8	8.42	11.40	0.208	7.95
26 Apr 95				
0.1	9.65	11.22	0.146	8.23
1	9.65	11.32	0.146	8.23
2	9.63	11.39	0.146	8.21
3	9.60	11.13	0.145	8.18
4	9.48	11.30	0.145	8.15
5	9.48	11.41	0.145	8.13
6	9.43	11.45	0.145	8.13
7	9.29	11.51	0.146	8.10
8	9.33	11.50	0.146	8.10
9	9.20	11.48	0.147	8.08
10	9.34	11.48	0.146	8.10
11	9.27	11.48	0.146	8.09
12	9.20	11.44	0.147	8.09
13	9.21	11.45	0.147	8.09
14	9.16	11.44	0.147	8.08
15	9.22	11.44	0.147	8.09
09 May 95				
0.1	9.58	11.13	0.101	7.64
1	9.53	11.09	0.101	7.62
2	9.45	11.06	0.101	7.60
3	9.40	11.03	0.101	7.59
4	9.40	11.01	0.101	7.58
5	9.37	11.00	0.101	7.57
6	9.40	10.99	0.101	7.58
7	9.40	10.97	0.101	7.57
8	9.38	10.97	0.101	7.57
9	9.38	10.95	0.101	7.57
10	9.37	10.96	0.101	7.56
11	9.38	10.94	0.101	7.56
12	9.38	10.94	0.101	7.56
13	9.37	10.93	0.101	7.56
14	9.37	10.93	0.101	7.56
15	9.37	10.92	0.101	7.56
20.7	9.37	10.91	0.101	7.55
24 May 95				
0.1	12.66	10.12	0.105	7.67
1	12.68	10.15	0.105	7.67
2	12.66	10.15	0.105	7.65
3	12.65	10.16	0.105	7.65
4	12.70	10.16	0.105	7.65
5	12.59	10.15	0.105	7.65
6	12.61	10.13	0.105	7.66
7	12.59	10.13	0.105	7.66
8	12.58	10.13	0.105	7.67
9	12.60	10.13	0.105	7.67
10	12.61	10.13	0.105	7.67
11	12.59	10.12	0.105	7.67
12	12.58	10.13	0.105	7.67
13	12.58	10.13	0.105	7.68
14	12.58	10.12	0.105	7.68
15	12.58	10.11	0.105	7.68
20.2	12.58	10.11	0.105	7.68
06 Jun 95				
0.1	12.84	10.20	0.093	7.66
1	12.86	10.16	0.093	7.60
2	12.86	10.14	0.093	7.57
3	12.86	10.14	0.093	7.57
4	12.84	10.14	0.094	7.57
5	12.84	10.13	0.095	7.56
6	12.84	10.13	0.094	7.56
7	12.84	10.13	0.094	7.56
8	12.85	10.13	0.094	7.56
9	12.84	10.13	0.094	7.56
10	12.85	10.13	0.094	7.56
11	12.85	10.13	0.095	7.57
12	12.84	10.14	0.095	7.57
13	12.83	10.14	0.095	7.58
14	12.84	10.14	0.095	7.58
15	12.84	10.14	0.095	7.58
27	12.77	10.11	0.097	7.58
20 Jun 95				
0.1	13.45	10.00	0.115	7.64
1	13.38	10.01	0.115	7.63
2	13.35	10.02	0.115	7.62
3	13.37	10.03	0.115	7.63
4	13.35	10.03	0.115	7.63
5	13.34	10.03	0.115	7.63
6	13.34	10.04	0.115	7.63

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
7	13.34	10.03	0.115	7.62
8	13.30	10.03	0.115	7.63
9	13.30	10.02	0.115	7.63
10	13.30	10.02	0.115	7.63
11	13.29	10.02	0.115	7.63
12	13.29	10.02	0.115	7.63
13	13.28	10.02	0.115	7.63
14	13.28	10.02	0.115	7.63
15	13.27	10.01	0.115	7.63
16.2	13.27	10.01	0.115	7.64
06 Jul 95				
0.1	17.47	9.18	0.138	7.77
1	17.00	9.17	0.133	7.72
2	16.93	9.19	0.132	7.68
3	16.74	9.16	0.129	7.65
4	16.63	9.16	0.129	7.62
5	16.61	9.16	0.128	7.61
6	16.54	9.15	0.128	7.61
7	16.48	9.15	0.127	7.60
8	16.46	9.13	0.127	7.59
9	16.46	9.13	0.127	7.59
10	16.45	9.15	0.127	7.59
11	16.52	9.15	0.127	7.60
12	16.42	9.14	0.127	7.60
13	16.44	9.13	0.127	7.60
14	16.39	9.11	0.126	7.59
15	16.32	9.08	0.125	7.58
24.4	16.07	9.13	0.125	7.56
19 Jul 95				
0.1	20.43	8.85	0.141	7.94
1	20.43	8.86	0.141	7.92
2	20.41	8.88	0.141	7.93
3	20.40	8.86	0.141	7.93
4	20.16	8.65	0.142	7.87
5	19.94	8.51	0.143	7.80
6	19.82	8.39	0.143	7.75
7	19.76	8.33	0.144	7.75
8	19.66	8.25	0.144	7.73
9	19.60	8.22	0.145	7.70
10	19.53	8.16	0.145	7.69
11	19.42	8.09	0.145	7.68
12	19.33	8.01	0.145	7.66
13	19.28	7.99	0.145	7.65
14	19.28	7.98	0.145	7.65
15	19.28	7.96	0.145	7.65
18	19.13	7.81	0.144	7.61
02 Aug 95				
0.1	20.78	10.06	0.140	8.55
1	20.73	10.13	0.140	8.55
2	20.65	10.14	0.140	8.55
3	20.58	10.04	0.140	8.51
4	20.55	9.89	0.141	8.46
5	20.50	9.83	0.141	8.43
6	20.35	9.08	0.142	8.31
7	19.54	9.01	0.144	8.05
8	19.50	8.97	0.144	8.05
9	19.48	8.94	0.144	8.03
10	19.46	8.92	0.144	8.03
11	19.47	8.90	0.144	8.02
12	19.48	8.91	0.144	8.03
13	19.49	8.92	0.144	8.03
14	19.45	8.90	0.144	8.02
15	19.44	8.87	0.144	8.02
24.8	19.09	8.53	0.145	7.87
16 Aug 95				
0.1	19.01	8.50	0.159	7.81
1	19.00	8.51	0.160	7.77
2	18.95	8.53	0.160	7.77
3	18.93	8.55	0.160	7.77
4	18.90	8.54	0.159	7.77
5	18.90	8.54	0.160	7.76
6	18.86	8.62	0.160	7.79
7	18.85	8.69	0.160	7.81
8	18.86	8.71	0.160	7.81
9	18.85	8.72	0.160	7.81
10	18.86	8.71	0.160	7.82
11	18.82	8.72	0.160	7.82
12	18.81	8.71	0.160	7.81
13	18.80	8.68	0.160	7.80
14	18.76	8.61	0.160	7.78
15	18.69	8.45	0.159	7.75
26.2	17.38	8.18	0.137	7.56
29 Aug 95				
0.1	19.07	9.29	0.145	8.33
1	19.02	9.36	0.146	8.33
2	19.00	9.37	0.146	8.32
3	18.86	9.32	0.146	8.29
4	18.79	9.32	0.148	8.27
5	18.78	9.31	0.148	8.25
6	18.78	9.30	0.148	8.25
7	18.76	9.32	0.148	8.26
8	18.75	9.36	0.149	8.26
9	18.71	9.35	0.149	8.26
10	18.68	9.30	0.148	8.23

Appendix Table B1. Continued.

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
11	18.47	9.26	0.150	8.22
12	18.55	9.32	0.149	8.28
13	18.20	9.30	0.155	8.24
14	18.10	9.24	0.156	8.22
15	18.07	9.25	0.156	8.19
23.5	17.50	8.93	0.156	8.02
13 Sep 95				
0.1	20.33	8.91	0.217	8.26
1	20.17	9.02	0.216	8.30
2	19.95	9.21	0.218	8.34
3	19.87	9.32	0.222	8.36
4	19.76	9.32	0.266	8.35
5	19.72	8.97	0.222	8.28
6	19.68	8.67	0.220	8.20
7	19.64	8.48	0.219	8.13
8	19.62	8.39	0.219	8.11
9	19.62	8.37	0.219	8.10
10	19.62	8.31	0.219	8.09
11	19.60	8.20	0.218	8.07
12	19.57	8.14	0.219	8.05
13	19.56	8.06	0.218	8.03
14	19.55	8.08	0.219	8.03
15	19.51	7.78	0.215	7.96
24.9	18.90	6.33	0.215	7.68
28 Sep 95				
0.1	17.97	8.24	0.259	8.08
1	18.01	8.29	0.259	8.12
2	18.00	8.33	0.259	8.13
3	18.01	8.36	0.259	8.14
4	18.01	8.38	0.260	8.15
5	18.01	8.39	0.260	8.15
6	18.01	8.29	0.263	8.12
7	17.90	8.22	0.267	8.11
8	17.87	8.25	0.267	8.11
9	17.78	8.30	0.268	8.12
10	17.71	8.32	0.268	8.13
11	17.71	8.29	0.268	8.12
12	17.60	8.23	0.269	8.10
13	17.52	8.23	0.270	8.10
14	17.45	8.15	0.270	8.08
15	17.39	8.14	0.271	8.08
26.8	17.14	7.92	0.271	8.02
12 Oct 95				
0.1	14.96	8.41	0.304	7.96
1	14.97	8.41	0.304	7.96
2	14.96	8.45	0.304	7.97
3	14.96	8.50	0.304	7.98

Sampling area Date Depth (m)	Water temperature (°C)	Dissolved oxygen (mg/L)	Conductivity (mS/cm)	pH
4	14.94	8.55	0.303	7.98
5	14.96	8.56	0.304	7.98
6	14.91	8.59	0.303	7.99
7	14.91	8.59	0.303	7.99
8	14.91	8.60	0.304	7.99
9	14.92	8.60	0.304	7.99
10	14.89	8.61	0.303	7.99
11	14.90	8.62	0.303	7.99
12	14.86	8.64	0.301	7.99
13	14.86	8.65	0.300	7.99
14	14.81	8.66	0.298	7.98
15	14.75	8.67	0.297	7.96
19.7	14.69	8.79	0.296	7.99

Appendix Table B2. Depths (m) of Secchi disc transparency and euphotic zone at each sampling area in Lower Granite Reservoir, 1994-95.

Sampling area Date	Secchi disc transparency (m)	Euphotic zone depth (m)
Silcott Island		
29 Mar 94	1.1	--[a]
19 Apr 94	1.2	--[a]
04 May 94	1.8	--[a]
18 May 94	2.3	5.5
03 Jun 94	2.0	4.5
15 Jun 94	1.5	4.3
30 Jun 94	2.3	6.3
13 Jul 94	2.7	6.8
27 Jul 94	1.7	8.0
10 Aug 94	1.5	4.0
24 Aug 94	1.1	5.0
22 Sep 94	2.6	7.3
26 Oct 94	2.6	6.0
30 Nov 94	3.2	8.0
19 Jan 95	1.0	3.0
22 Mar 95	1.1	4.0
06 Apr 95	1.4	3.5
26 Apr 95	1.7	4.4
09 May 95	--[a]	1.5
24 May 95	--[a]	4.0
06 Jun 95	0.6	2.0
21 Jun 95	0.9	4.0
06 Jul 95	1.5	4.5
19 Jul 95	1.7	5.5
02 Aug 95	0.2	0.5
16 Aug 95	2.7	6.9
29 Aug 95	2.1	7.0
13 Sep 95	0.6	2.9
28 Sep 95	2.2	5.5
12 Oct 95	2.1	6.0
Centennial Island		
30 Mar 94	--[a]	--[a]
19 Apr 94	1.5	--[a]
04 May 94	1.8	--[a]
18 May 94	1.8	5.0
02 Jun 94	1.8	5.0
15 Jun 94	1.8	5.5
30 Jun 94	1.8	5.5
13 Jul 94	2.3	6.2
27 Jul 94	2.1	6.8
10 Aug 94	2.6	5.5
24 Aug 94	2.0	5.1
22 Sep 94	1.8	4.8
26 Oct 94	2.6	6.5
30 Nov 94	2.7	8.0
19 Jan 95	0.8	3.0
23 Mar 95	0.9	2.5
06 Apr 95	1.4	3.3
26 Apr 95	1.4	4.0
09 May 95	0.3	1.0
24 May 95	1.0	3.0
06 Jun 95	0.6	2.5
21 Jun 95	0.9	3.0
06 Jul 95	1.4	4.0
19 Jul 95	1.7	4.7
02 Aug 95	2.1	5.5
16 Aug 95	1.5	5.5
29 Aug 95	1.5	4.4
13 Sep 95	1.2	4.2
28 Sep 95	1.5	6.0
12 Oct 95	1.8	5.0
Offield		
30 Mar 94	1.2	--[a]
19 Apr 94	1.4	--[a]
03 May 94	1.8	--[a]

Appendix Table B2. Continued.

Sampling area Date	Secchi disc transparency (m)	Euphotic zone depth (m)	Sampling area Date	Secchi disc transparency (m)	Euphotic zone depth (m)
18 May 94	1.5	4.8			
02 Jun 94	2.0	6.0			
15 Jun 94	2.1	5.5			
29 Jun 94	2.1	6.2			
13 Jul 94	2.1	6.0			
27 Jul 94	2.4	6.0			
10 Aug 94	2.6	7.0			
24 Aug 94	2.9	6.5			
22 Sep 94	3.3	7.0			
26 Oct 94	2.3	7.0			
30 Nov 94	2.7	7.0			
19 Jan 95	0.5	2.0			
22 Mar 95	0.9	2.5			
06 Apr 95	1.4	3.5			
26 Apr 95	1.5	4.1			
09 May 95	0.4	0.8			
24 May 95	1.0	3.0			
06 Jun 95	0.8	2.5			
20 Jun 95	0.8	2.5			
06 Jul 95	1.3	4.3			
19 Jul 95	1.5	4.5			
02 Aug 95	1.5	5.9			
16 Aug 95	2.7	8.0			
29 Aug 95	2.7	6.0			
13 Sep 95	1.2	4.9			
28 Sep 95	2.1	8.0			
12 Oct 95	1.8	5.3			

[a] "--" = No data available

Appendix Table B3. Turbidity values (NTU) at each sampling area in Lower Granite Reservoir, 1994-95.

Sampling area	Date	Turbidity (NTU) Depth 1 m	7 m	15 m
Silcott Island				
	29 Mar 94[a]	5.0	5.0	5.0
	19 Apr 94	6.0	n/a[b]	9.0
	4 May 94	3.8	n/a	6.8
	18 May 94	5.8	n/a	8.2
	3 Jun 94	3.0	n/a	3.8
	15 Jun 94	4.8	n/a	5.6
	30 Jun 94	2.0	n/a	2.8
	13 Jul 94	2.2	2.6	2.7
	27 Jul 94	1.4	1.7	1.9
	10 Aug 94	2.4	1.9	2.6
	24 Aug 94	2.4	2.2	3.5
	22 Sep 94	1.3	1.5	2.3
	26 Oct 94	1.6	1.6	2.1
	30 Nov 94	1.6	1.2	1.5
	19 Jan 95	8.8	9.1	8.7
	22 Mar 95	11.3	11.9	14.0
	6 Apr 95	6.9	7.5	7.6
	26 Apr 95	4.4	6.2	6.5
	9 May 95	38.9	40.4	40.2
	24 May 95	8.5	9.9	9.7
	6 Jun 95	21.0	20.6	24.5
	21 Jun 95	13.0	10.2	10.4
	6 Jul 95	3.9	5.1	5.0
	19 Jul 95	3.4	3.9	4.5
	2 Aug 95	67.2	85.5	87.9
	16 Aug 95	1.7	1.9	2.1
	29 Aug 95	2.3	2.2	3.0
	13 Sep 95	12.3	12.7	13.2
	28 Sep 95	2.4	2.8	2.7
	12 Oct 95	2.1	2.5	3.0
Centennial Island				
	30 Mar 94	5.0	4.0	4.0
	19 Apr 94	5.3	n/a	9.5
	4 May 94	4.0	n/a	46.0
	18 May 94	5.8	n/a	10.0
	2 Jun 94	4.2	n/a	70.0
	15 Jun 94	3.0	n/a	24.0
	30 Jun 94	3.2	n/a	2.8
	13 Jul 94	2.0	2.8	2.7
	27 Jul 94	1.4	1.9	1.9
	10 Aug 94	1.5	1.9	2.9
	24 Aug 94	2.6	2.5	2.3
	22 Sep 94	2.5	4.8	3.4
	26 Oct 94	2.1	2.3	1.9
	30 Nov 94	1.3	1.5	1.4
	19 Jan 95	10.6	10.4	10.1
	23 Mar 95	12.9	13.2	14.8
	6 Apr 95	6.1	6.9	8.4
	26 Apr 95	5.0	5.8	7.1
	9 May 95	38.6	43.3	47.4
	24 May 95	7.6	9.1	13.3
	6 Jun 95	15.7	19.1	25.1
	21 Jun 95	11.6	13.5	16.6
	6 Jul 95	4.5	7.1	7.0
	19 Jul 95	4.5	4.8	5.5
	2 Aug 95	2.7	3.4	6.2
	16 Aug 95	3.1	3.8	3.8
	29 Aug 95	4.0	3.4	3.4
	13 Sep 95	2.6	4.7	4.0
	28 Sep 95	4.2	4.5	4.5
	12 Oct 95	3.6	3.5	2.8
Offield				
	30 Mar 94	4.0	4.0	5.0
	19 Apr 94	5.8	n/a	6.6
	3 May 94	3.8	n/a	140.0
	18 May 94	6.8	n/a	8.8
	2 Jun 94	2.8	n/a	7.8
	15 Jun 94	3.8	n/a	120.0
	29 Jun 94	2.2	n/a	2.8

Appendix Table B3. Continued.

Sampling area	Date	Turbidity (NTU) Depth 1 m	7 m	15 m	Sampling area	Date	Turbidity (NTU) Depth 1 m	7 m	15 m
	13 Jul 94	2.6	2.2	2.8					
	27 Jul 94	1.4	1.7	2.2					
	10 Aug 94	1.4	1.9	2.8					
	24 Aug 94	1.9	1.5	2.0					
	22 Sep 94	1.3	1.3	1.9					
	26 Oct 94	2.2	2.2	2.3					
	30 Nov 94	1.7	1.7	1.8					
	19 Jan 95	19.9	19.7	20.4					
	22 Mar 95	13.7	13.5	12.6					
	6 Apr 95	6.0	6.2	9.1					
	26 Apr 95	6.0	5.4	6.8					
	9 May 95	65.3	71.9	74.5					
	24 May 95	8.7	8.7	11.6					
	6 Jun 95	13.6	16.1	14.2					
	20 Jun 95	10.6	14.2	13.5					
	6 Jul 95	4.5	6.1	7.7					
	19 Jul 95	4.0	4.5	5.0					
	2 Aug 95	2.4	2.5	4.1					
	16 Aug 95	2.2	2.8	3.6					
	29 Aug 95	1.9	2.2	2.0					
	13 Sep 95	3.5	3.8	6.7					
	28 Sep 95	2.3	2.7	3.5					
	12 Oct 95	3.8	3.8	3.1					

[a] March 1994 data are from laboratory analysis done under contract to State of Washington Water Research Center, Washington State University, Pullman, WA (Dr. Steve Juul, point of contact). All other turbidity values were measured in the field.

[b] n/a = data not available

Appendix Table B4. Concentrations of nutrient parameters analyzed in water samples collected from each sampling area at Lower Granite Reservoir, 1994-95.

Sampling area Date Depth (m)	Total nitrogen (mg-N/L)	Nitrite + nitrate (mg-N/L)	Ammonia (mg-N/L)	Total phosphorus (mg-P/L)	Orthophosphate (mg-P/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Silica (mg/L)
Silcott Island												
29 Mar 94												
1	0.89	0.460	0.010	0.0540	0.0170	3.3	2.7	19.2	8.5	11.0	22.1	23.1
7	0.92	0.460	0.010	0.0640	0.0190	3.3	2.7	19.0	8.3	10.6	20.5	23.4
15	0.85	0.460	0.010	0.0600	0.0190	3.3	2.7	19.4	7.9	12.0	24.5	23.2
19 Apr 94												
1	0.56	0.230	0.010	0.0340	0.0130	2.0	1.8	12.5	5.1	5.5	11.5	19.9
7	0.61	0.250	0.020	0.0400	0.0140	2.1	1.9	13.2	5.4	6.1	12.5	20.1
15	0.64	0.250	0.020	0.0460	0.0140	2.1	1.9	13.0	5.5	6.6	--*	20.4
04 May 94												
1	0.65	0.300	0.020	0.0720	0.0150	2.4	2.0	13.6	6.0	6.7	15.2	18.0
7	0.49	0.290	0.020	0.0340	0.0150	2.3	1.9	13.3	6.0	7.5	14.7	17.7
15	0.57	0.270	0.020	0.0580	0.0160	2.3	1.9	12.8	6.0	7.9	14.6	18.0
18 May 94												
1	0.25	0.120	0.020	0.0180	0.0090	6.1	1.1	7.7	2.9	4.4	6.4	13.7
7	0.25	0.120	0.010	0.0220	0.0080	6.2	1.1	7.7	3.0	2.9	6.5	13.6
15	0.37	0.120	0.001	0.0520	0.0080	6.2	1.1	7.8	3.0	2.8	6.4	13.2
03 Jun 94												
1	0.35	0.150	0.020	0.0220	0.0130	8.0	1.4	10.4	4.0	3.8	8.9	13.9
7	0.37	0.150	0.020	0.0260	0.0120	7.8	1.4	10.5	4.0	5.4	9.7	13.6
15	0.40	0.140	0.020	0.0360	0.0130	7.7	1.4	10.4	4.0	3.6	9.0	13.9
15 Jun 94												
1	0.33	0.130	0.030	0.0280	0.0130	10.8	1.4	11.2	3.6	3.2	8.4	13.6
7	0.32	0.130	0.020	0.0260	0.0130	9.6	1.3	10.7	3.5	3.4	8.0	13.6
15	0.35	0.130	0.030	0.0320	0.0130	8.8	1.3	10.1	3.4	3.6	9.4	13.5
30 Jun 94												
1	0.28	0.090	0.020	0.0220	0.0040	22.7	1.9	15.4	5.6	5.7	13.5	13.3
7	0.30	0.100	0.010	0.0260	0.0050	13.5	1.9	13.5	6.4	5.2	13.1	13.3
15	0.30	0.110	0.020	0.0260	0.0040	12.4	1.8	13.3	5.7	5.2	14.4	12.9

Appendix Table B4. Continued.

Sampling area Date Depth (m)	Total nitrogen (mg-N/L)	Nitrite + nitrate (mg-N/L)	Ammonia (mg-N/L)	Total phosphorus (mg-P/L)	Orthophosphate (mg-P/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Silica (mg/L)
13 Jul 94												
1	0.47	0.210	0.010	0.0260	0.0070	15.6	2.3	15.9	7.5	7.2	16.8	13.9
7	0.41	0.170	0.010	0.0260	0.0100	13.8	2.0	13.6	8.2	--a	--a	14.2
15	0.38	0.140	0.010	0.0260	0.0120	11.0	1.6	10.3	6.4	4.5	10.5	13.4
27 Jul 94												
1	0.47	0.240	0.020	0.0300	0.0120	20.9	3.1	17.5	9.5	9.9	23.4	14.0
7	0.42	0.200	0.010	0.0300	0.0040	18.8	2.7	15.3	10.3	8.5	20.0	13.8
15	0.32	0.130	0.020	0.0200	0.0040	11.7	1.7	9.7	6.5	4.7	10.9	13.3
10 Aug 94												
1	0.50	0.010	0.020	0.0420	0.0001	25.3	3.5	20.9	10.2	10.1	28.4	13.5
7	0.53	0.110	0.010	0.0320	0.0010	24.2	3.6	21.3	10.3	8.8	27.5	13.8
15	0.51	0.140	0.010	0.0420	0.0020	19.6	2.9	26.7	8.7	7.5	21.1	13.5
24 Aug 94												
1	0.81	0.130	0.020	0.0800	0.0090	19.0	3.5	22.6	10.3	11.8	30.5	14.8
7	0.53	0.180	0.030	0.0530	0.0150	22.6	3.5	22.2	10.2	10.7	29.9	14.8
15	0.62	0.220	0.050	0.0650	0.0260	21.3	3.3	20.9	10.9	10.0	27.9	15.0
22 Sep 94												
1	1.03	0.370	0.030	0.0990	0.0440	25.8	3.9	24.5	12.5	12.1	38.8	17.8
7	0.73	0.370	0.030	0.0820	0.0450	25.6	3.9	24.1	12.6	11.9	37.0	18.2
15	0.47	0.240	0.090	0.0720	0.0400	17.1	3.8	24.2	9.8	8.0	24.2	16.2
26 Oct 94												
1	0.78	0.610	0.010	0.0820	0.0380	25.5	3.2	25.0	10.8	12.9	41.1	16.8
7	0.83	0.740	0.010	0.0820	0.0430	25.3	3.2	25.0	10.8	13.0	41.3	17.5
15	0.81	0.630	0.010	0.0830	0.0420	24.5	3.2	25.0	10.8	13.7	41.4	15.2
30 Nov 94												
1	0.81	0.830	0.010	0.0600	0.0490	29.4	3.2	31.0	12.6	14.3	35.1	19.4
7	0.88	0.760	0.010	0.0620	0.0480	28.0	3.2	31.0	12.6	15.4	37.9	19.2
15	0.83	0.700	0.010	0.0600	0.0480	28.0	3.2	31.0	12.6	14.2	35.2	19.4
19 Jan 95												
1	1.30	1.080	0.030	0.0740	0.0450	25.2	3.2	28.0	7.0	13.7	31.4	25.5
7	1.37	1.090	0.010	0.0790	0.0430	25.2	3.2	29.0	7.0	13.5	31.1	25.5
15	1.39	1.060	0.010	0.0770	0.0440	25.2	3.2	28.0	7.0	13.5	31.1	25.7

Appendix Table B4. Continued.

Sampling area Date Depth (m)	Total nitrogen (mg-N/L)	Nitrite + nitrate (mg-N/L)	Ammonia (mg-N/L)	Total phosphorus (mg-P/L)	Orthophosphate (mg-P/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Silica (mg/L)
22 Mar 95												
1	1.04	0.570	0.030	0.0890	0.0420	13.9	2.6	19.0	6.5	5.5	13.6	24.4
6	1.06	0.550	0.030	0.0800	0.0420	13.2	2.5	19.0	6.5	5.6	13.5	24.0
14	1.16	0.560	0.030	0.1030	0.0400	13.0	2.5	19.0	6.5	5.9	14.8	24.0
06 Apr 95												
1	0.87	0.430	0.020	0.0670	0.0190	14.1	2.4	18.1	5.2	7.0	19.3	23.4
7	1.01	0.450	0.020	0.0860	0.0200	14.7	2.5	18.7	5.2	7.3	20.3	23.9
15	1.01	0.460	0.020	0.0880	0.0210	14.9	2.5	19.2	5.2	7.3	20.5	23.9
26 Apr 95												
1	0.44	0.260	0.020	0.0680	0.0080	10.1	1.9	14.7	3.9	4.8	14.0	20.6
7	0.44	0.250	0.020	0.0680	0.0080	10.1	1.9	14.7	3.9	4.8	14.2	20.3
15	0.44	0.260	0.020	0.0740	0.0090	10.1	1.9	14.7	3.9	4.8	14.0	20.3
09 May 95												
1	0.38	0.250	0.040	0.0360	0.0230	7.5	1.8	11.4	2.6	3.3	10.8	20.8
7	0.58	0.200	0.040	0.0430	0.0220	6.9	1.6	10.3	2.6	2.8	9.8	20.3
15	0.46	0.160	0.010	0.0610	0.0200	6.7	1.6	10.2	2.6	2.8	9.8	20.3
24 May 95												
1	0.39	0.100	0.020	0.0460	0.0080	7.2	1.4	10.4	3.0	3.1	12.3	16.1
7	0.44	0.150	0.020	0.0590	0.0100	7.5	1.4	10.8	3.1	3.1	12.3	16.1
15	0.50	0.150	0.010	0.0680	0.0100	7.5	1.4	10.0	3.1	3.1	12.7	16.1
06 Jun 95												
1	0.43	0.120	0.020	0.0830	0.0120	6.0	1.3	7.4	3.8	3.2	9.3	12.0
7	0.40	0.130	0.020	0.0660	0.0120	5.7	1.3	7.4	3.7	3.2	9.7	11.3
15	0.43	0.130	0.020	0.0410	0.0110	5.0	1.2	7.0	3.7	3.2	9.3	11.7
21 Jun 95												
1	0.34	0.150	0.010	0.0420	0.0170	7.5	1.4	11.2	3.6	2.7	11.9	14.2
7	0.34	0.150	0.010	0.0400	0.0170	7.3	1.4	11.2	3.6	2.8	12.1	14.2
15	0.34	0.150	0.020	0.0380	0.0170	7.2	1.4	11.1	3.5	3.0	11.9	14.2
06 Jul 95												
1	0.32	0.130	0.010	0.0320	0.0100	8.5	1.5	12.3	3.5	3.2	14.3	13.8
7	0.32	0.130	0.001	0.0400	0.0090	8.2	1.5	12.3	3.5	3.2	14.3	13.8
15	0.30	0.120	0.010	0.0320	0.0100	8.3	1.6	12.2	3.6	3.2	14.3	13.8

Appendix Table B4. Continued.

Sampling area Date Depth (m)	Total nitrogen (mg-N/L)	Nitrite + nitrate (mg-N/L)	Ammonia (mg-N/L)	Total phosphorus (mg-P/L)	Orthophosphate (mg-P/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Silica (mg/L)
19 Jul 95												
1	0.31	0.130	0.030	0.0220	0.0110	8.6	1.6	13.4	3.9	4.4	14.3	13.8
7	0.30	0.130	0.030	0.0270	0.0130	8.8	1.5	13.3	3.9	4.2	14.5	13.5
15	0.28	0.130	0.020	0.0270	0.0100	8.8	1.5	13.3	3.9	4.2	14.5	13.8
02 Aug 95												
1	0.43	0.130	0.040	0.1000	0.0250	11.6	2.7	6.3	4.8	6.3	15.3	13.4
7	0.47	0.130	0.040	0.1180	0.0290	11.4	2.6	6.0	4.8	6.0	14.9	13.7
15	0.49	0.130	0.050	0.1210	0.0290	11.3	2.4	6.8	4.6	6.8	15.1	13.4
16 Aug 95												
1	0.36	0.170	0.010	0.0220	0.0140	12.4	2.0	5.5	4.7	5.5	14.6	14.3
7	0.34	0.170	0.010	0.0220	0.0130	12.1	1.9	5.2	4.6	5.2	13.7	14.0
15	0.25	0.110	0.010	0.0170	0.0090	8.8	1.4	3.4	2.9	3.4	10.0	13.4
29 Aug 95												
1	0.35	0.160	0.010	0.0320	0.0100	15.6	2.8	17.4	6.5	5.9	16.2	12.6
7	0.37	0.160	0.010	0.0320	0.0090	16.6	2.9	17.5	6.7	5.9	15.6	12.6
15	0.32	0.140	0.010	0.0300	0.0110	16.2	2.6	17.6	6.9	5.1	13.9	12.6
13 Sep 95												
1	0.63	0.420	0.030	0.0600	0.0310	21.2	3.2	22.4	8.2	10.0	26.2	15.4
7	0.65	0.420	0.020	0.0620	0.0330	21.8	3.2	21.9	8.0	10.0	26.2	15.4
15	0.63	0.410	0.030	0.0600	0.0340	20.4	3.2	22.0	7.9	9.7	25.7	15.4
28 Sep 95												
1	0.78	0.580	0.020	0.0670	0.0520	29.6	3.8	27.1	10.2	13.1	33.7	17.1
7	0.78	0.590	0.020	0.0660	0.0530	29.2	3.7	26.8	9.6	13.1	33.9	17.4
15	0.80	0.560	0.030	0.0640	0.0520	29.2	3.8	26.4	10.1	13.1	33.9	17.4
12 Oct 95												
1	0.82	0.510	0.020	0.0740	0.0630	26.1	3.8	29.1	11.7	13.6	37.5	19.1
7	0.91	0.550	0.020	0.0740	0.0620	26.4	3.8	28.7	11.7	13.6	38.0	19.1
15	0.89	0.490	0.030	0.0750	0.0650	26.4	3.7	28.2	11.4	13.6	37.5	19.1

Appendix Table B4. Continued.

Sampling area Date Depth (m)	Total nitrogen (mg-N/L)	Nitrite + nitrate (mg-N/L)	Ammonia (mg-N/L)	Total phosphorus (mg-P/L)	Orthophosphate (mg-P/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Silica (mg/L)
Centennial Island												
30 Mar 94												
1	0.95	0.530	0.010	0.0500	0.0180	3.7	3.0	20.6	9.0	13.7	27.5	23.6
7	0.92	0.540	0.010	0.0460	0.0190	3.6	2.9	21.0	8.9	12.9	26.1	23.5
15	0.94	0.550	0.020	0.0540	0.0190	3.6	2.9	20.6	8.9	12.3	24.5	24.1
19 Apr 94												
1	0.62	0.310	0.010	0.0360	0.0140	2.5	2.2	20.0	6.7	7.2	14.7	21.0
7	0.67	0.320	0.020	0.0400	0.0160	2.6	2.3	16.0	7.0	8.5	17.0	21.2
15	0.76	0.350	0.030	0.0540	0.0170	2.7	2.4	16.3	7.0	8.1	17.6	22.0
04 May 94												
1	0.45	0.260	0.020	0.0320	0.0150	2.2	1.9	11.4	5.8	6.0	13.6	17.6
7	0.47	0.280	0.020	0.0440	0.0160	2.3	1.9	13.9	5.9	--[a]	--[a]	17.3
15	1.10	0.280	0.030	0.2760	0.0140	2.2	1.9	12.6	5.7	7.1	13.9	17.3
18 May 94												
1	0.26	0.110	0.010	0.0240	0.0090	6.1	1.1	7.7	2.9	2.3	6.3	13.6
7	0.26	0.110	0.010	0.0280	0.0090	6.1	1.1	7.6	2.9	2.7	6.4	13.4
15	0.39	0.110	0.020	0.0640	0.0100	6.1	1.1	7.7	2.9	2.6	6.5	13.6
02 Jun 94												
1	0.38	0.180	0.020	0.0260	0.0120	9.2	1.7	12.1	4.9	4.7	13.2	14.1
7	0.40	0.120	0.030	0.0320	0.0140	9.3	1.7	12.3	4.9	5.8	15.7	14.5
15	2.23	0.140	0.030	0.1600	0.0150	9.4	1.7	12.3	5.1	5.7	15.1	14.7
15 Jun 94												
1	0.37	0.150	0.030	0.0260	0.0130	11.4	1.8	13.5	4.5	4.6	12.8	14.6
7	0.38	0.160	0.030	0.0320	0.0140	11.0	1.7	13.1	1.5	6.0	12.5	14.6
15	0.68	0.170	0.020	0.1600	0.0150	11.1	1.7	12.6	4.4	6.1	14.1	14.8
30 Jun 94												
1	0.37	0.020	0.030	0.0380	0.0040	12.1	1.8	13.7	6.7	5.1	13.9	12.2
7	0.28	0.020	0.030	0.0260	0.0030	12.3	1.9	14.4	7.1	5.1	12.7	12.5
15	0.27	0.090	0.030	0.0180	0.0040	11.7	1.8	14.1	6.9	5.5	13.9	13.3

Appendix Table B4. Continued.

Sampling area Date Depth (m)	Total nitrogen (mg-N/L)	Nitrite + nitrate (mg-N/L)	Ammonia (mg-N/L)	Total phosphorus (mg-P/L)	Orthophosphate (mg-P/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Silica (mg/L)
13 Jul 94												
1	0.41	0.080	0.010	0.0280	0.0040	15.7	2.2	15.1	8.6	6.7	15.5	11.0
7	0.41	0.170	0.010	0.0420	0.0080	14.2	2.0	12.3	7.4	6.0	14.1	13.5
15	0.44	0.180	0.020	0.0360	0.0110	13.7	2.0	13.5	7.9	5.8	13.7	13.8
27 Jul 94												
1	0.23	0.001	0.030	0.0160	0.0001	14.8	2.1	13.3	7.2	6.4	15.1	9.0
7	0.34	0.110	0.020	0.0220	0.0001	16.3	2.3	14.1	7.3	7.5	16.5	11.5
15	0.34	0.160	0.030	0.0260	0.0040	15.4	2.2	13.3	7.2	6.8	15.7	13.0
10 Aug 94												
1	0.51	0.090	0.150	0.0400	0.0220	21.5	3.2	18.9	9.6	7.6	24.7	13.8
7	0.46	0.090	0.130	0.0400	0.0200	20.6	3.3	18.8	9.4	8.4	24.8	13.8
15	0.46	0.090	0.060	0.0400	0.0180	21.5	3.2	18.0	8.7	8.0	24.5	13.3
24 Aug 94												
1	0.39	0.100	0.090	0.0670	0.0310	19.4	3.4	21.0	11.0	10.1	28.7	13.3
7	0.63	0.110	0.090	0.0590	0.0250	19.2	3.4	21.1	10.8	9.7	28.5	13.5
15	0.68	0.130	0.120	0.0340	0.0340	18.9	3.4	21.6	11.2	10.9	29.2	14.3
22 Sep 94												
1	0.68	0.280	0.080	0.0910	0.0350	18.4	3.9	23.5	11.6	12.8	36.9	18.4
7	0.73	0.270	0.100	0.1030	0.0400	24.5	3.9	23.5	10.6	12.2	37.0	17.8
15	0.59	0.310	0.070	0.0890	0.0400	25.6	3.9	23.7	11.4	13.0	37.4	19.5
26 Oct 94												
1	1.15	0.730	0.020	0.1010	0.0540	30.4	3.7	28.0	13.6	17.1	46.1	17.3
7	0.95	0.710	0.020	0.1050	0.0590	29.8	3.7	28.0	12.2	16.1	42.8	16.6
15	0.95	0.770	0.020	0.1050	0.0550	29.8	3.7	28.0	12.2	16.7	45.4	18.1
30 Nov 94												
1	0.90	0.750	0.010	0.0600	0.0480	28.0	3.5	31.0	12.6	15.2	37.6	19.2
7	0.91	0.750	0.010	0.0590	0.0480	29.4	3.3	31.0	12.6	14.0	34.8	19.9
15	0.88	0.810	0.010	0.0590	0.0480	28.0	3.2	31.0	12.6	15.6	38.6	19.2
19 Jan 95												
1	1.43	1.080	0.010	0.0770	0.0430	25.2	3.2	28.0	7.0	13.5	30.4	24.8
7	1.41	1.040	0.010	0.0740	0.0440	25.2	3.2	28.0	7.0	13.7	31.2	24.8
15	1.39	1.060	0.010	0.0770	0.0440	25.2	3.2	28.0	7.0	13.7	31.4	24.8

Appendix Table B4. Continued.

Sampling area Date Depth (m)	Total nitrogen (mg-N/L)	Nitrite + nitrate (mg-N/L)	Ammonia (mg-N/L)	Total phosphorus (mg-P/L)	Orthophosphate (mg-P/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Silica (mg/L)
21 Mar 95												
1	1.12	0.540	0.030	0.1010	0.0390	12.5	2.4	16.0	5.2	5.2	12.8	23.7
6	1.10	0.560	0.020	0.0860	0.0400	12.6	2.4	16.0	5.2	5.3	12.3	23.7
14	1.11	0.540	0.020	0.0930	0.0400	12.5	2.4	16.0	5.2	5.2	12.4	23.7
06 Apr 95												
1	1.08	0.510	0.010	0.0690	0.0220	15.7	2.7	20.1	6.5	8.3	21.8	24.5
7	1.10	0.540	0.020	0.0710	0.0230	15.6	2.7	21.1	6.5	8.5	22.7	24.7
15	0.92	0.550	0.020	0.0790	0.0240	17.0	2.8	21.3	6.5	8.5	22.9	25.0
26 Apr 95												
1	0.44	0.260	0.020	0.0740	0.0070	10.9	2.0	15.6	3.9	5.3	15.3	20.0
7	0.46	0.260	0.020	0.0800	0.0080	11.0	2.1	15.7	3.9	5.6	15.5	20.6
15	0.46	0.280	0.030	0.0850	0.0090	11.1	1.9	15.8	3.9	5.3	15.7	20.6
09 May 95												
1	0.38	0.190	0.040	0.0400	0.0230	6.7	1.6	10.5	2.6	3.1	9.1	19.8
7	0.42	0.200	0.040	0.0400	0.0230	6.7	1.7	10.4	2.6	2.8	9.5	20.3
15	0.48	0.210	0.030	0.0450	0.0230	6.6	1.7	10.4	2.6	3.1	9.8	20.3
24 May 95												
1	0.37	0.150	0.020	0.0300	0.0090	7.2	1.4	10.0	3.2	3.1	10.9	16.4
7	0.39	0.160	0.010	0.0300	0.0130	7.3	1.4	10.0	3.2	3.1	10.6	16.1
15	0.46	0.160	0.020	0.0550	0.0110	7.4	1.4	10.1	3.2	3.1	10.6	16.1
06 Jun 95												
1	0.38	0.130	0.020	0.0620	0.0120	6.2	1.4	7.7	3.0	3.4	10.0	12.0
7	0.45	0.110	0.020	0.0950	0.0130	6.1	1.4	7.7	3.0	3.4	10.0	11.7
15	0.42	0.070	0.020	0.0710	0.0120	6.2	1.4	7.7	3.0	3.4	10.0	12.0
21 Jun 95												
1	0.32	0.150	0.010	0.0420	0.0170	7.2	1.3	10.8	3.4	2.4	10.8	13.9
7	0.34	0.150	0.010	0.0660	0.0190	7.2	1.4	10.7	3.4	2.4	11.3	13.9
15	0.38	0.150	0.020	0.0610	0.0160	7.1	1.3	10.6	3.3	2.7	11.3	13.9
06 Jul 95												
1	0.32	0.130	0.010	0.0370	0.0110	7.9	1.4	11.9	3.6	3.2	13.9	13.2
7	0.34	0.140	0.010	0.0450	0.0090	7.9	1.4	12.0	3.7	3.2	14.1	13.2
15	0.38	0.140	0.010	0.0520	0.0090	8.1	1.5	12.1	3.5	3.2	14.5	13.2

Appendix Table B4. Continued.

Sampling area Date Depth (m)	Total nitrogen (mg-N/L)	Nitrite + nitrate (mg-N/L)	Ammonia (mg-N/L)	Total phosphorus (mg-P/L)	Orthophosphate (mg-P/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Silica (mg/L)
19 Jul 95												
1	0.33	0.130	0.030	0.0310	0.0120	8.5	1.5	12.7	3.8	3.9	13.5	13.8
7	0.35	0.120	0.020	0.0310	0.0130	8.5	1.5	12.6	3.8	4.2	13.7	13.8
15	0.35	0.120	0.020	0.0310	0.0120	8.5	1.5	12.6	3.8	3.9	13.7	13.8
02 Aug 95												
1	0.29	0.110	0.030	0.0270	0.0080	10.8	1.7	5.0	4.3	5.0	13.7	13.4
7	0.29	0.120	0.030	0.0300	0.0090	10.7	1.7	5.0	4.3	5.0	13.5	13.4
15	0.33	0.120	0.040	0.0340	0.0100	11.0	1.7	5.0	4.4	5.0	13.7	13.4
16 Aug 95												
1	0.38	0.130	0.010	0.0290	0.0110	11.2	1.7	5.0	4.2	5.0	12.0	14.0
7	0.40	0.130	0.020	0.0360	0.0120	11.2	1.8	5.0	4.2	5.0	12.3	14.0
15	0.40	0.140	0.020	0.0410	0.0120	10.4	1.7	4.7	4.1	4.7	12.3	14.0
29 Aug 95												
1	0.45	0.110	0.010	0.0440	0.0050	13.2	2.3	18.1	5.9	5.6	15.0	12.6
7	0.37	0.130	0.010	0.0370	0.0060	13.8	2.3	17.9	5.8	5.6	14.8	12.6
15	0.34	0.160	0.020	0.0270	0.0090	14.0	2.1	17.8	6.3	5.4	13.9	12.9
13 Sep 95												
1	0.63	0.330	0.040	0.0590	0.0220	20.4	2.9	18.8	7.4	9.4	24.2	14.3
7	0.60	0.350	0.030	0.0600	0.0280	20.4	2.9	20.5	7.4	9.2	24.0	14.6
15	0.65	0.360	0.050	0.0690	0.0300	19.7	2.7	20.5	7.2	9.2	23.6	14.6
28 Sep 95												
1	0.73	0.500	0.040	0.0610	0.0450	25.6	3.4	23.9	8.6	11.5	29.8	16.6
7	0.73	0.490	0.030	0.0620	0.0440	25.2	3.4	24.1	8.8	11.2	29.3	16.6
15	0.73	0.490	0.040	0.0620	0.0450	25.2	3.4	24.0	8.8	11.2	29.8	16.6
12 Oct 95												
1	0.85	0.520	0.030	0.0800	0.0600	24.3	3.7	27.5	10.8	13.1	34.5	18.6
7	0.85	0.460	0.020	0.0790	0.0600	24.3	3.6	27.2	10.8	13.1	35.2	18.9
15	0.85	0.540	0.020	0.0770	0.0620	24.3	3.6	27.3	10.8	13.1	35.3	18.9

Appendix Table B4. Continued.

Sampling area Date Depth (m)	Total nitrogen (mg-N/L)	Nitrite + nitrate (mg-N/L)	Ammonia (mg-N/L)	Total phosphorus (mg-P/L)	Orthophosphate (mg-P/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Silica (mg/L)
Offield												
30 Mar 94												
1	1.02	0.700	0.010	0.0540	0.0300	3.9	3.1	22.6	10.2	16.3	26.7	24.9
7	1.04	0.700	0.010	0.0540	0.0310	3.8	3.1	22.2	9.7	13.6	26.1	25.5
15	1.05	0.700	0.010	0.0540	0.0310	3.9	3.1	22.4	10.1	13.3	26.6	25.4
19 Apr 94												
1	0.71	0.370	0.010	0.0400	0.0140	2.8	2.4	17.3	6.8	8.4	17.1	22.1
7	0.69	0.380	0.010	0.0400	0.0160	2.8	2.4	17.3	7.4	8.8	17.7	22.0
15	0.72	0.380	0.030	0.0400	0.0170	2.8	2.4	16.6	7.5	9.1	19.2	22.2
03 May 94												
1	0.57	0.300	0.020	0.0480	0.0160	2.1	1.9	12.2	5.4	6.4	13.2	17.6
7	0.45	0.280	0.020	0.0320	0.0160	2.2	1.8	12.2	5.6	7.0	13.0	17.8
15	0.65	0.290	0.030	0.1240	0.0170	2.2	1.8	13.5	5.6	--[a]	--[a]	17.4
18 May 94												
1	0.25	0.110	0.020	0.0220	0.0100	5.8	1.0	7.3	2.8	2.2	6.1	13.0
7	0.23	0.110	0.010	0.0240	0.0170	5.9	1.0	7.2	2.7	2.4	6.0	13.1
15	0.33	0.110	0.010	0.0340	0.0120	5.9	1.0	7.2	2.8	2.2	6.0	13.3
02 Jun 94												
1	0.38	0.120	0.020	0.0220	0.0110	8.3	1.5	11.0	4.0	4.1	10.4	14.1
7	0.38	0.160	0.030	0.0260	0.0130	8.3	1.5	11.1	4.3	4.2	10.5	13.6
15	0.38	0.120	0.030	0.0380	0.0140	8.1	1.5	10.7	4.3	4.3	10.9	13.8
15 Jun 94												
1	0.37	0.070	0.060	0.0260	0.0030	11.1	1.7	13.1	5.0	4.5	11.4	13.8
7	0.38	0.090	0.070	0.0260	0.0040	10.8	1.7	12.7	5.2	5.3	10.9	14.0
15	0.48	0.140	0.010	0.1000	0.0110	11.7	1.8	13.3	4.8	4.4	11.2	14.2
29 Jun 94												
1	0.28	0.020	0.090	0.0260	0.0120	10.6	1.7	12.8	6.3	4.7	10.8	13.0
7	0.28	0.030	0.060	0.0220	0.0110	11.3	1.6	12.7	6.3	5.0	11.4	13.3
15	0.32	0.090	0.030	0.0260	0.0070	11.4	1.7	13.4	6.6	4.5	12.9	13.9

Appendix Table B4. Continued.

Sampling area Date Depth (m)	Total nitrogen (mg-N/L)	Nitrite + nitrate (mg-N/L)	Ammonia (mg-N/L)	Total phosphorus (mg-P/L)	Orthophosphate (mg-P/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Silica (mg/L)
13 Jul 94												
1	0.36	0.010	0.010	0.0260	0.0100	17.0	2.5	14.5	8.4	8.4	18.5	10.2
7	0.44	0.130	0.010	0.0260	0.0020	15.6	2.3	15.8	9.0	7.2	16.6	12.6
15	0.46	0.170	0.040	0.0380	0.0020	15.2	2.3	15.0	8.7	7.2	15.7	13.7
27 Jul 94												
1	0.25	0.001	0.020	0.0200	0.0001	14.3	2.1	13.7	6.7	6.4	14.8	9.0
7	0.39	0.100	0.020	0.0390	0.0001	15.3	2.1	13.0	6.3	6.2	14.4	11.8
15	0.35	0.150	0.030	0.0320	0.0001	15.0	2.1	12.9	6.2	6.6	14.1	13.0
10 Aug 94												
1	0.30	0.030	0.020	0.0160	0.0001	22.9	2.9	17.4	7.2	6.6	23.0	7.8
7	0.34	0.030	0.020	0.0160	0.0050	22.9	2.9	17.1	7.7	7.4	22.7	7.8
15	0.30	0.030	0.010	0.0160	0.0170	21.9	2.8	16.3	7.5	7.2	21.9	8.0
24 Aug 94												
1	0.47	0.070	0.070	0.0550	0.0220	20.6	3.1	19.6	9.6	9.2	26.1	13.3
7	0.56	0.070	0.070	0.0930	0.0190	21.0	3.1	19.6	9.8	8.6	25.5	13.3
15	0.63	0.120	0.070	0.0550	0.0310	21.9	3.1	19.6	9.9	9.2	26.0	13.8
22 Sep 94												
1	0.77	0.270	0.010	0.0800	0.0440	26.2	3.7	22.6	12.4	12.2	33.6	16.4
7	0.65	0.280	0.090	0.0850	0.0480	26.4	3.8	19.2	10.7	13.4	34.5	16.9
15	0.66	0.310	0.290	0.0850	0.0540	26.4	3.9	20.1	11.4	15.6	36.1	17.8
26 Oct 94												
1	0.86	0.810	0.050	0.0940	0.0540	35.0	4.3	31.0	15.0	15.2	46.1	15.6
7	0.85	0.610	0.040	0.0940	0.0560	34.9	4.3	30.0	15.0	18.8	46.3	15.8
15	0.91	0.670	0.040	0.0940	0.0520	34.8	4.3	30.0	15.0	15.6	47.6	16.8
30 Nov 94												
1	0.83	0.670	0.020	0.0510	0.0410	28.0	3.4	30.0	12.6	14.7	37.0	18.6
7	0.83	0.650	0.020	0.0500	0.0410	28.0	3.4	30.0	12.6	14.7	36.8	18.6
15	0.81	0.670	0.010	0.0500	0.0400	29.4	3.4	30.0	12.6	14.7	36.9	18.6
19 Jan 95												
1	1.37	1.060	0.010	0.0940	0.0470	23.8	3.4	28.0	7.0	14.0	31.2	23.6
7	1.43	1.050	0.010	0.0980	0.0470	25.2	3.4	28.0	7.0	13.7	31.2	23.4
15	1.43	1.050	0.010	0.1000	0.0470	25.2	3.2	28.0	7.0	14.0	31.2	23.4

Appendix Table B4. Continued.

Sampling area Date Depth (m)	Total nitrogen (mg-N/L)	Nitrite + nitrate (mg-N/L)	Ammonia (mg-N/L)	Total phosphorus (mg-P/L)	Orthophosphate (mg-P/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Silica (mg/L)
22 Mar 95												
1	1.12	0.630	0.030	0.0820	0.0390	13.0	2.4	17.0	5.2	5.2	12.6	23.5
6	1.06	0.600	0.020	0.0870	0.0390	13.0	2.4	17.0	5.2	5.0	12.7	23.5
14	1.08	0.570	0.020	0.0760	0.0400	12.6	2.4	17.0	5.2	5.3	12.8	22.8
06 Apr 95												
1	0.99	0.460	0.020	0.0690	0.0180	15.4	2.6	20.0	6.5	7.5	21.8	24.5
7	1.08	0.500	0.020	0.0710	0.0180	15.6	2.6	19.9	6.5	7.8	21.6	24.5
15	1.08	0.530	0.030	0.0880	0.0240	15.6	2.7	20.2	6.5	7.8	21.6	25.0
26 Apr 95												
1	0.44	0.240	0.030	0.0740	0.0070	10.2	1.9	14.6	3.9	4.8	14.4	20.3
7	0.48	0.240	0.030	0.0850	0.0070	10.2	1.9	14.6	3.9	4.8	14.4	20.3
15	0.54	0.250	0.030	0.1080	0.0090	10.2	1.9	14.6	3.9	4.8	14.4	20.6
09 May 95												
1	0.40	0.220	0.050	0.0380	0.0240	6.9	1.8	10.6	2.6	3.3	10.0	20.0
7	0.27	0.200	0.050	0.0250	0.0250	7.1	1.8	10.6	2.6	3.3	10.0	20.3
15	0.42	0.210	0.040	0.0400	0.0260	6.8	1.8	10.6	2.6	3.1	10.2	20.3
24 May 95												
1	0.46	0.160	0.030	0.0650	0.0130	7.3	1.5	10.2	3.3	3.3	13.6	16.7
7	0.46	0.160	0.020	0.0590	0.0100	7.3	1.5	10.1	3.3	3.3	13.7	16.4
15	0.40	0.150	0.010	0.0420	0.0150	7.1	1.4	10.0	3.2	3.3	13.8	16.7
06 Jun 95												
1	0.40	0.130	0.020	0.0650	0.0130	5.8	1.4	7.8	2.9	3.2	10.0	11.7
7	0.47	0.130	0.010	0.0740	0.0120	5.9	1.3	7.7	2.9	3.2	10.0	11.7
15	0.43	0.130	0.010	0.0660	0.0120	6.0	1.4	7.7	2.9	3.4	10.0	11.7
20 Jun 95												
1	0.46	0.150	0.020	0.0400	0.0170	7.4	1.4	11.3	3.4	3.0	12.3	13.3
7	0.32	0.150	0.020	0.0520	0.0170	7.6	1.4	11.3	3.3	3.0	12.1	13.3
15	0.32	0.160	0.010	0.0740	0.0170	7.7	1.4	11.2	3.4	3.0	12.1	13.3
06 Jul 95												
1	0.32	0.140	0.010	0.0330	0.0080	8.2	1.5	12.5	3.2	3.8	15.2	13.5
7	0.46	0.160	0.030	0.0550	0.0100	8.3	1.4	12.6	3.2	3.2	14.3	13.5
15	0.32	0.160	0.020	0.0380	0.0120	8.2	1.3	12.5	3.2	3.2	14.1	13.5

Appendix Table B4. Continued.

Sampling area Date Depth (m)	Total nitrogen (mg-N/L)	Nitrite + nitrate (mg-N/L)	Ammonia (mg-N/L)	Total phosphorus (mg-P/L)	Orthophosphate (mg-P/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Silica (mg/L)
19 Jul 95												
1	0.30	0.110	0.030	0.0260	0.0070	9.1	1.6	13.9	4.3	4.7	15.4	14.1
7	0.30	0.130	0.020	0.0290	0.0140	9.6	1.6	14.0	4.3	4.7	15.6	13.8
15	0.30	0.160	0.040	0.0290	0.0160	9.8	1.7	14.8	4.4	5.0	15.8	13.8
02 Aug 95												
1	0.29	0.010	0.060	0.0270	0.0030	10.6	1.7	5.0	4.2	5.0	13.3	12.2
7	0.27	0.050	0.020	0.0270	0.0030	10.6	1.7	5.2	4.3	5.2	13.5	12.5
15	0.27	0.090	0.060	0.0290	0.0060	10.8	1.7	5.2	4.4	5.2	13.7	12.8
16 Aug 95												
1	0.34	0.140	0.050	0.0290	0.0170	12.4	2.0	5.8	4.8	5.8	14.8	14.0
7	0.38	0.150	0.060	0.0360	0.0170	12.8	2.0	5.8	4.8	5.8	14.6	14.0
15	0.33	0.150	0.050	0.0310	0.0160	12.4	2.0	5.8	4.7	5.8	14.6	14.0
29 Aug 95												
1	0.37	0.110	0.040	0.0300	0.0070	14.2	2.8	17.2	6.1	4.8	13.2	12.6
7	0.34	0.110	0.050	0.0270	0.0060	14.6	2.5	17.6	6.1	5.1	13.4	12.6
15	0.36	0.120	0.030	0.0320	0.0080	14.4	2.6	17.4	6.1	5.4	14.3	12.9
13 Sep 95												
1	0.60	0.230	0.020	0.0640	0.0130	18.8	2.7	19.6	6.6	8.6	21.9	12.6
7	0.58	0.260	0.050	0.0680	0.0170	18.2	2.7	19.4	6.6	8.3	21.3	13.1
15	0.66	0.290	0.050	0.0890	0.0220	19.2	2.7	19.9	6.8	8.6	22.5	13.7
28 Sep 95												
1	0.66	0.400	0.040	0.0540	0.0390	23.2	3.2	22.9	8.6	10.7	28.4	15.7
7	0.70	0.460	0.040	0.0560	0.0410	24.2	3.3	22.9	8.6	11.0	28.6	16.0
15	0.70	0.480	0.040	0.0570	0.0430	15.4	3.4	23.6	8.8	11.2	29.3	16.6
12 Oct 95												
1	0.82	0.430	0.040	0.0650	0.0500	23.7	3.7	26.6	10.8	12.8	35.0	18.0
7	0.84	0.430	0.040	0.0670	0.0500	24.0	3.7	26.3	10.5	12.8	35.5	17.7
15	0.84	0.490	0.040	0.0670	0.0510	24.0	3.6	26.2	10.5	12.6	35.2	18.0

[a] "--" = No data available

Appendix Table B5. Alkalinity concentrations (mg-$CaCO_3$/L) at each sampling area in Lower Granite Reservoir, 1994-95.

Sampling area	Date	Depth (m)	Alkalinity (mg-$CaCO_3$/L)
Silcott Island			
	29 Mar 94		
		1	88
		7	84
		15	82
	19 Apr 94		
		1	55
		7	57
		15	58
	04 May 94		
		1	59
		7	58
		15	56
	18 May 94		
		1	36
		7	36
		15	36
	03 Jun 94		
		1	44
		7	42
		15	43
	15 Jun 94		
		1	40
		7	40
		15	40
	30 Jun 94		
		1	58
		7	59
		15	54
	13 Jul 94		
		1	64
		7	57
		15	46
	27 Jul 94		
		1	78
		7	69
		15	46
	10 Aug 94		
		1	96
		7	95
		15	76
	24 Aug 94		
		1	101
		7	96
		15	89
	22 Sep 94		
		1	113
		7	110
		15	81
	26 Oct 94		
		1	113
		7	114
		15	117
	30 Nov 94		
		1	120
		7	124
		15	120
	19 Jan 95		
		1	111
		7	112
		15	112
	22 Mar 95		
		1	69
		6	63
		14	64
	06 Apr 95		
		1	69
		7	71
		15	72
	26 Apr 95		
		1	57
		7	58
		15	58

Appendix Table B5. Continued.

Sampling area	Date	Depth (m)	Alkalinity (mg-$CaCO_3$/L)
	09 May 95		
		1	43
		7	41
		15	41
	24 May 95		
		1	41
		7	40
		15	39
	06 Jun 95		
		1	37
		7	37
		15	36
	21 Jun 95		
		1	45
		7	45
		15	45
	06 Jul 95		
		1	50
		7	50
		15	50
	19 Jul 95		
		1	54
		7	53
		15	53
	02 Aug 95		
		1	55
		7	55
		15	55
	16 Aug 95		
		1	60
		7	59
		15	42
	29 Aug 95		
		1	67
		7	66
		15	59

Sampling area	Date	Depth (m)	Alkalinity (mg-$CaCO_3$/L)
	13 Sep 95		
		1	91
		7	91
		15	89
	28 Sep 95		
		1	113
		7	117
		15	117
	12 Oct 95		
		1	119
		7	120
		15	120
Centennial Island			
	30 Mar 94		
		1	91
		7	91
		15	93
	19 Apr 94		
		1	67
		7	69
		15	73
	04 May 94		
		1	55
		7	54
		15	56
	18 May 94		
		1	35
		7	36
		15	36
	02 Jun 94		
		1	48
		7	50
		15	50
	15 Jun 94		
		1	52
		7	51
		15	51

Appendix Table B5. Continued.

Sampling area	Date	Depth (m)	Alkalinity (mg-$CaCO_3$/L)
	30 Jun 94		
		1	55
		7	55
		15	54
	13 Jul 94		
		1	62
		7	57
		15	56
	27 Jul 94		
		1	60
		7	63
		15	60
	10 Aug 94		
		1	83
		7	83
		15	82
	24 Aug 94		
		1	86
		7	93
		15	95
	22 Sep 94		
		1	111
		7	109
		15	110
	26 Oct 94		
		1	128
		7	132
		15	134
	30 Nov 94		
		1	123
		7	119
		15	123
	19 Jan 95		
		1	108
		7	107
		15	108
	21 Mar 95		
		1	60
		6	60
		14	60
	06 Apr 95		
		1	79
		7	80
		15	80
	26 Apr 95		
		1	60
		7	61
		15	62
	09 May 95		
		1	42
		7	42
		15	41
	24 May 95		
		1	41
		7	41
		15	40
	06 Jun 95		
		1	39
		7	38
		15	39
	21 Jun 95		
		1	43
		7	43
		15	43
	06 Jul 95		
		1	50
		7	50
		15	50
	19 Jul 95		
		1	51
		7	51
		15	51

Appendix Table B5. Continued.

Sampling area	Date	Depth (m)	Alkalinity (mg-$CaCO_3$/L)	Sampling area	Date	Depth (m)	Alkalinity (mg-$CaCO_3$/L)
	02 Aug 95				18 May 94		
		1	53			1	33
		7	52			7	33
		15	53			15	34
	16 Aug 95				02 Jun 94		
		1	56			1	43
		7	55			7	47
		15	54			15	44
	29 Aug 95				15 Jun 94		
		1	62			1	50
		7	61			7	50
		15	58			15	53
	13 Sep 95				29 Jun 94		
		1	86			1	50
		7	85			7	50
		15	84			15	51
	28 Sep 95				13 Jul 94		
		1	105			1	72
		7	106			7	66
		15	106			15	63
	12 Oct 95				27 Jul 94		
		1	117			1	59
		7	117			7	58
		15	116			15	56
Offield					10 Aug 94		
	30 Mar 94					1	77
		1	97			7	76
		7	97			15	73
		15	97		24 Aug 94		
	19 Apr 94					1	85
		1	74			7	86
		7	75			15	86
		15	75		22 Sep 94		
	03 May 94					1	107
		1	52			7	105
		7	53			15	106
		15	54				

Appendix Table B5. Continued.

Sampling area	Date	Depth (m)	Alkalinity (mg-$CaCO_3$/L)	Sampling area	Date	Depth (m)	Alkalinity (mg-$CaCO_3$/L)
	26 Oct 94				20 Jun 95		
		1	121			1	44
		7	120			7	44
		15	124			15	44
	30 Nov 94				06 Jul 95		
		1	120			1	53
		7	119			7	50
		15	117			15	49
	19 Jan 95				19 Jul 95		
		1	109			1	56
		7	109			7	56
		15	108			15	57
	22 Mar 95				02 Aug 95		
		1	60			1	53
		6	61			7	52
		14	60			15	53
	06 Apr 95				16 Aug 95		
		1	76			1	60
		7	76			7	61
		15	77			15	60
	26 Apr 95				29 Aug 95		
		1	57			1	57
		7	57			7	57
		15	57			15	59
	09 May 95				13 Sep 95		
		1	42			1	82
		7	42			7	80
		15	41			15	82
	24 May 95				28 Sep 95		
		1	40			1	101
		7	40			7	102
		15	40			15	104
	06 Jun 95				12 Oct 95		
		1	38			1	115
		7	38			7	115
		15	38			15	114

Appendix Table B6. Chlorophyll concentrations (mg/m^3) from total phytoplankton at each sampling area in Lower Granite Reservoir, 1994-95.

			Chlorophyll concentrations (mg/m^3)				
			Monochromatic		Trichromatic		
Sampling area	Date	Depth (m)	Chl *a*	Pheophytin *a*	Chl *a*	Chl *b*	Chl *c*
Silcott Island							
	29 Mar 94	15	n/a[a]	n/a	n/a	n/a	n/a
	19 Apr 94	15	3.43	4.20	5.91	2.12	4.16
	4 May 94	15	0.50	5.11	3.48	1.57	2.84
	18 May 94	15	0.67	2.98	2.41	0.98	1.91
	3 Jun 94	15	0.93	2.34	2.32	0.82	1.18
	15 Jun 94	15	1.41	1.93	2.54	1.02	1.88
	30 Jun 94	15	9.88	2.64	11.86	--[b]	1.45
	13 Jul 94	15	2.14	0.67	2.63	--	--
	27 Jul 94	15	1.60	1.01	2.28	0.10	--
	10 Aug 94	15	12.28	7.16	16.88	2.67	2.07
	24 Aug 94	15	12.28	6.78	16.77	1.26	1.24
	22 Sep 94	15	3.74	2.24	5.23	0.21	0.37
	26 Oct 94	15	4.27	0.59	4.85	--	0.16
	30 Nov 94	15	1.07	1.46	2.00	--	0.35
	19 Jan 95	15	3.07	2.72	4.85	<0.01	0.34
	22 Mar 95	15	2.00	2.39	3.53	0.04	0.39
	6 Apr 95	3.5	14.42	2.78	16.68	--	2.11
	26 Apr 95	4.4	4.14	3.62	6.50	--	1.02
	9 May 95	1.5	1.87	2.06	3.22	--	--
	24 May 95	4.0	1.34	1.28	2.15	0.23	0.17
	6 Jun 95	2.0	1.42	1.44	2.33	0.28	0.41
	21 Jun 95	4.0	0.59	4.48	3.33	0.12	0.49
	6 Jul 95	4.5	0.91	4.70	3.77	0.47	0.79
	19 Jul 95	5.5	0.67	0.85	1.20	0.05	0.21
	2 Aug 95	0.5	n/a	n/a	n/a	n/a	n/a
	16 Aug 95	6.9	0.85	0.62	1.26	0.11	0.17
	29 Aug 95	7.0	3.26	1.70	4.37	0.54	0.54
	13 Sep 95	2.9	2.39	1.53	3.39	0.20	0.57
	28 Sep 95	5.5	0.27	0.50	0.57	0.13	0.24
	12 Oct 95	6.0	1.31	1.21	2.09	0.13	0.30
Centennial Island							
	30 Mar 94	15	3.20	0.91	3.90	--	0.30
	19 Apr 94	15	1.76	2.04	2.98	0.84	1.67
	4 May 94	15	1.07	3.79	3.30	1.24	1.88

Appendix Table B6. Continued.

Sampling area	Date	Depth (m)	Chlorophyll concentrations (mg/m³)				
			Monochromatic		Trichromatic		
			Chl *a*	Pheophytin *a*	Chl *a*	Chl *b*	Chl *c*
	18 May 94	15	1.26	4.22	3.77	1.13	2.32
	2 Jun 94	15	1.97	2.55	3.50	1.15	1.56
	15 Jun 94	15	3.87	2.76	5.66	0.37	1.47
	30 Jun 94	15	8.81	4.46	11.83	0.26	1.55
	13 Jul 94	15	3.47	1.01	4.21	0.12	0.26
	27 Jul 94	15	4.54	2.00	5.92	0.06	0.44
	10 Aug 94	15	2.67	4.43	5.40	0.86	0.77
	24 Aug 94	15	7.74	6.09	11.66	0.97	1.09
	22 Sep 94	15	8.81	4.65	11.95	0.31	0.55
	26 Oct 94	15	5.87	1.23	6.87	--	0.06
	30 Nov 94	15	1.07	1.55	2.07	--	0.38
	19 Jan 95	15	2.40	1.99	3.69	0.17	0.29
	23 Mar 95	15	1.60	2.23	3.00	0.16	0.63
	6 Apr 95	3.3	18.29	4.33	21.67	--	2.67
	26 Apr 95	4.0	4.41	7.18	8.94	--	1.39
	9 May 95	1.0	2.14	2.91	4.02	--	--
	24 May 95	3.0	0.80	2.10	2.10	0.05	0.25
	6 Jun 95	2.5	0.71	1.53	1.67	--	0.10
	21 Jun 95	3.0	0.53	4.64	3.38	0.03	0.40
	6 Jul 95	4.0	1.92	6.39	5.83	0.65	1.21
	19 Jul 95	4.7	0.56	0.64	0.96	0.07	0.21
	2 Aug 95	5.5	0.72	0.96	1.32	0.10	0.46
	16 Aug 95	5.5	1.76	1.00	2.43	0.16	0.34
	29 Aug 95	4.4	6.68	3.60	9.03	1.09	1.13
	13 Sep 95	4.2	5.15	2.12	6.56	0.90	1.12
	28 Sep 95	6.0	0.77	1.06	1.43	0.25	0.30
	12 Oct 95	5.0	1.47	1.05	2.15	0.13	0.32
Offield							
	30 Mar 94	15	5.87	0.85	6.62	--	1.25
	19 Apr 94	15	3.91	4.03	6.34	1.77	3.34
	3 May 94	15	0.76	3.70	2.90	1.52	2.42
	18 May 94	15	0.99	4.21	3.44	1.65	2.85
	2 Jun 94	15	2.54	1.50	3.48	0.69	1.11
	15 Jun 94	15	11.61	4.83	14.97	--	2.76
	29 Jun 94	15	9.35	4.49	12.42	0.02	1.22
	13 Jul 94	15	10.41	3.42	12.79	1.22	1.11
	27 Jul 94	15	7.21	4.38	10.05	1.07	1.80

Appendix Table B6. Continued.

Sampling area	Date	Depth (m)	Chlorophyll concentrations (mg/m³) Monochromatic Chl *a*	Monochromatic Pheophytin *a*	Trichromatic Chl *a*	Trichromatic Chl *b*	Trichromatic Chl *c*
	10 Aug 94	15	4.54	4.43	7.32	1.07	1.26
	24 Aug 94	15	3.20	3.71	5.55	0.41	0.66
	22 Sep 94	15	0.80	1.82	1.92	0.29	--
	26 Oct 94	15	2.14	3.10	4.12	--	0.43
	30 Nov 94	15	2.14	0.76	2.68	--	0.34
	19 Jan 95	15	2.53	1.67	3.65	--	0.29
	22 Mar 95	15	1.34	1.84	2.50	0.07	0.12
	6 Apr 95	3.5	19.22	2.46	21.51	--	2.94
	26 Apr 95	4.1	5.61	3.36	7.86	--	1.53
	9 May 95	0.8	2.00	2.67	3.77	--	--
	24 May 95	3.0	0.93	1.50	1.88	0.05	0.33
	6 Jun 95	2.5	1.42	1.19	2.18	0.21	0.48
	20 Jun 95	2.5	0.31	5.42	3.63	<0.01	0.37
	6 Jul 95	4.3	1.04	8.51	6.23	0.47	1.11
	19 Jul 95	4.5	0.80	1.24	1.57	0.14	0.29
	2 Aug 95	5.9	4.83	5.37	8.24	0.49	1.61
	16 Aug 95	8.0	0.88	0.84	1.42	0.09	0.12
	29 Aug 95	6.0	2.00	2.24	3.42	0.29	0.30
	13 Sep 95	4.9	8.97	5.89	12.82	0.92	1.59
	28 Sep 95	8.0	2.70	2.48	4.28	0.36	0.64
	12 Oct 95	5.3	2.00	1.66	3.07	0.18	0.32

[a] n/a = No sample was collected.
[b] "--" = Concentration was undetectable.

Appendix Table B7. Zooplankton species composition and mean densities (no./L) at each sampling area in Lower Granite Reservoir, 1994-95. Densities are means of three replicate vertical zooplankton tows.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
Silcott Island		
29 Mar 94		
15.0		
	Keratella quadrata	48.31
	Keratella cochlearis	25.08
	Polyarthra vulgaris	15.60
	Euchlanis dilatata	9.74
	Notholca acuminata	7.80
	Synchaeta pectinata	3.30
	Brachionus calyciflorus	1.64
	Copepoda (nauplii)	0.78
	Brachionus quadridentatus	0.30
	Asplanchna girodi	0.17
	Cladocera (immature)	0.09
	Trichocerca spp.	0.04
	Brachionus caudatus	0.04
19 Apr 94		
15.0		
	Keratella cochlearis	9.32
	Copepoda (nauplii)	5.60
	Keratella quadrata	2.92
	Polyarthra vulgaris	2.05
	Notholca acuminata	1.76
	Euchlanis dilatata	0.61
	Brachionus quadridentatus	0.57
	Synchaeta pectinata	0.13
	Filinia longiseta	0.12
	Brachionus calyciflorus	0.10
	Chydorus sphaericus	0.07
	Alona affinis	0.04
	Harpacticoida	0.03
	Hexarthra mira	0.03
	Mytilina mucronata	0.03
	Alona quadrangularis	0.03
	Cyclopoida	0.03
4 May 94		
15.0		
	Keratella cochlearis	20.03
	Copepoda (nauplii)	12.07
	Keratella quadrata	1.75
	Euchlanis calpidia	1.02
	Cyclopoida	0.39
	Polyarthra vulgaris	0.29
	Diacyclops thomasi	0.24
	Synchaeta pectinata	0.05
	Asplanchna girodi	0.05
18 May 94		
15.0		
	Copepoda (nauplii)	2.76
	Keratella cochlearis	2.17
	Diacyclops thomasi	0.83
	Cyclopoida	0.62
	Bosmina longirostris	0.25
	Asplanchna girodi	0.13
	Philodina spp.	0.06
	Polyarthra vulgaris	0.04
	Euchlanis calpidia	0.04
2 Jun 94		
15.0		
	Copepoda (nauplii)	0.46
	Cyclopoida	0.13
	Keratella quadrata	0.11
	Synchaeta pectinata	0.10
	Keratella cochlearis	0.04
	Euchlanis calpidia	0.04
	Calanoida	0.04
15 Jun 94		
15.0		
	Copepoda (nauplii)	0.43
	Cyclopoida	0.17
	Diacyclops thomasi	0.08
	Euchlanis dilatata	0.04
	Brachionus calyciflorus	0.04
	Cladocera (immature)	0.04
30 Jun 94		
15.0		
	Keratella cochlearis	1.21
	Euchlanis dilatata	0.97
	Euchlanis calpidia	0.23
	Lecane spp.	0.09
	Brachionus quadridentatus	0.09
	Brachionus calyciflorus	0.06
	Philodina spp.	0.06
	Collotheca spp.	0.06
13 Jul 94		
15.0		
	Synchaeta pectinata	0.27
	Euchlanis calpidia	0.12
	Copepoda (nauplii)	0.06
27 Jul 94		
15.0		
	Filinia longiseta	0.25
	Synchaeta pectinata	0.22

Appendix Table B7. Continued.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)	Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
	Daphnia thorata	0.16		Cladocera (immature)	0.03
	Bosmina longirostris	0.10	22 Sep 94		
	Alona rectangula	0.10	15.0		
	Polyarthra vulgaris	0.07		Copepoda (nauplii)	1.16
	Copepoda (nauplii)	0.06		*Bosmina longirostris*	0.62
	Conochiloides dossuarius	0.03		*Synchaeta pectinata*	0.54
	Trichocerca	0.03		*Euchlanis calpidia*	0.13
	Cyclopoida	0.03		*Lecane*	0.11
	Euchlanis calpidia	0.03		Cyclopoida	0.08
	Lecane	0.03		*Daphnia retrocurva*	0.07
10 Aug 94				*Trichocerca*	0.07
15.0				Cladocera (immature)	0.02
	Brachionus calyciflorus	4.50		*Keratella cochlearis*	0.02
	Daphnia retrocurva	1.20		*Ceriodaphnia quadrangula*	0.02
	Synchaeta pectinata	0.62		Harpacticoida	0.02
	Bosmina longirostris	0.50		*Pompholyx sulcata*	0.02
	Alona quadrangularis	0.36	26 Oct 94		
	Brachionus angularis	0.30	15.0		
	Copepoda (nauplii)	0.27		*Euchlanis calpidia*	0.67
	Pompholyx sulcata	0.07		Copepoda (nauplii)	0.22
	Daphnia thorata	0.07		*Lecane*	0.08
	Harpacticoida	0.07		*Filinia longiseta*	0.06
	Brachionus quadridentatus	0.07		*Keratella cochlearis*	0.06
	Diacyclops thomasi	0.06		*Brachionus caudatus*	0.06
	Brachionus patulus	0.04		*Mytilina mucronata*	0.05
	Brachionus urceolaris	0.04		*Polyarthra vulgaris*	0.03
	Leptodiaptomus ashlandi	0.03		*Diacyclops thomasi*	0.03
	Leptodora kindtii	0.03		Cladocera (immature)	0.02
	Keratella serrulata	0.03		*Synchaeta pectinata*	0.02
24 Aug 94				*Daphnia thorata*	0.02
15.0				Harpacticoida	0.01
	Copepoda (nauplii)	3.35		*Philodina*	0.01
	Synchaeta pectinata	3.05		*Pompholyx sulcata*	0.01
	Brachionus angularis	2.07		*Keratella quadrata*	0.01
	Brachionus calyciflorus	1.70		*Bosmina longirostris*	0.01
	Keratella cochlearis	0.73		*Daphnia retrocurva*	0.01
	Polyarthra vulgaris	0.66		*Chydorus sphaericus*	0.01
	Bosmina longirostris	0.61		*Brachionus urceolaris*	0.01
	Cyclopoida	0.17	30 Nov 94		
	Daphnia retrocurva	0.16	15.0		
	Keratella serrulata	0.14		Copepoda (nauplii)	0.08
	Brachionus quadridentatus	0.14		*Brachionus calyciflorus*	0.08
	Alona quadrangularis	0.11		*Trichocerca*	0.04
	Diacyclops thomasi	0.08		*Keratella cochlearis*	0.02
	Daphnia thorata	0.08		*Euchlanis calpidia*	0.02
	Asplanchna seiboldi	0.07		*Diaphanosoma birgei*	0.01
	Trichocerca	0.05		Harpacticoida	0.01
	Euchlanis calpidia	0.05		*Pompholyx sulcata*	0.01
	Scapholeberis mucronata (kingi)	0.03		*Eucyclops agilis*	0.01

Appendix Table B7. Continued.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
	Chydorus sphaericus	0.01
	Cyclopoida	0.01
	Keratella quadrata	0.01
	Lecane	0.01
19 Jan 95		
15.0		
	Bosmina longirostris	29.04
	Synchaeta pectinata	10.91
	Brachionus urceolaris	0.20
	Cladocera (immature)	0.20
	Copepoda (nauplii)	0.20
	Notholca acuminata	0.20
22 Mar 95		
15.0		
	Synchaeta pectinata	5.34
	Keratella quadrata	1.23
	Copepoda (nauplii)	1.21
	Notholca acuminata	0.95
	Polyarthra vulgaris	0.32
	Keratella cochlearis	0.32
6 Apr 95		
4.0		
	Keratella cochlearis	9.13
	Filinia longiseta	2.22
	Polyarthra vulgaris	2.00
	Synchaeta pectinata	1.75
	Keratella quadrata	0.60
	Notholca acuminata	0.56
	Brachionus angularis	0.31
	Brachionus calyciflorus	0.31
	Copepoda (nauplii)	0.31
	Lepadella ovalis	0.12
	Euchlanis calpidia	0.06
	Bosmina longirostris	0.05
26 Apr 95		
4.9		
	Polyarthra vulgaris	14.89
	Keratella cochlearis	14.14
	Notholca acuminata	6.38
	Synchaeta pectinata	5.62
	Brachionus angularis	2.10
	Keratella quadrata	0.92
	Euchlanis calpidia	0.76
	Filinia longiseta	0.58
	Copepoda (nauplii)	0.50
	Brachionus calyciflorus	0.13
	Keratella serrulata	0.12
	Collotheca	0.12
9 May 95		
2.0		
	Keratella cochlearis	140.16
	Polyarthra vulgaris	129.02
	Bosmina longirostris	28.82
	Copepoda (nauplii)	13.95
	Notholca acuminata	5.09
	Brachionus calyciflorus	3.60
	Synchaeta pectinata	1.09
	Keratella quadrata	0.98
	Cladocera (immature)	0.54
	Macrochaetus longipes	0.54
	Filinia longiseta	0.49
	Lecane	0.30
	Daphnia thorata	0.30
	Brachionus quadridentatus	0.24
24 May 95		
4.5		
	Keratella cochlearis	42.09
	Copepoda (nauplii)	11.17
	Bosmina longirostris	10.48
	Synchaeta pectinata	8.61
	Polyarthra vulgaris	8.11
	Conochiloides dossuarius	3.48
	Notholca acuminata	2.02
	Daphnia thorata	0.28
	Diacyclops thomasi	0.28
	Keratella quadrata	0.28
	Trichocerca	0.28
	Brachionus calyciflorus	0.28
6 Jun 95		
2.5		
	Keratella cochlearis	10.35
	Notholca acuminata	6.51
	Synchaeta pectinata	2.23
	Euchlanis dilatata	0.57
	Copepoda (nauplii)	0.57
	Bosmina longirostris	0.57
	Filinia longiseta	0.54
	Polyarthra vulgaris	0.54
21 Jun 95		
4.5		
	Brachionus angularis	12.49
	Synchaeta pectinata	11.76
	Copepoda (nauplii)	6.88
	Cyclopoida	4.25
	Keratella cochlearis	4.12
	Diacyclops thomasi	2.03
	Polyarthra vulgaris	1.63

Appendix Table B7. Continued.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
	Notholca acuminata	1.10
	Trichocerca	0.65
	Lecane	0.62
	Asplanchna girodi	0.33
	Colurella	0.31
	Philodina	0.31
	Harpacticoida	0.26
6 Jul 95		
5.0		
	Brachionus angularis	31.84
	Keratella cochlearis	4.75
	Copepoda (nauplii)	1.64
	Polyarthra vulgaris	1.38
	Trichocerca	1.01
	Filinia longiseta	0.78
	Diacyclops thomasi	0.52
	Cyclopoida	0.36
	Synchaeta pectinata	0.29
	Euchlanis calpidia	0.29
	Euchlanis dilatata	0.23
	Notholca acuminata	0.22
	Conochiloides dossuarius	0.21
	Philodina	0.21
	Keratella quadrata	0.14
	Calanoida	0.14
	Colurella	0.08
	Lecane	0.07
19 Jul 95		
6.0		
	Brachionus angularis	3.43
	Polyarthra vulgaris	0.63
	Copepoda (nauplii)	0.63
	Synchaeta pectinata	0.38
	Lecane	0.25
	Philodina	0.12
2 Aug 95		
1.0		
	Polyarthra vulgaris	3.68
	Keratella cochlearis	2.83
	Filinia longiseta	2.07
	Synchaeta pectinata	1.95
	Lecane	1.76
	Euchlanis calpidia	1.03
	Brachionus angularis	1.03
	Bosmina longirostris	1.03
	Copepoda (nauplii)	0.88
16 Aug 95		
7.4		
	Daphnia retrocurva	0.88
	Synchaeta pectinata	0.77
	Polyarthra vulgaris	0.50
	Trichocerca	0.39
	Keratella cochlearis	0.36
	Euchlanis calpidia	0.29
	Diacyclops thomasi	0.15
	Conochiloides dossuarius	0.15
	Brachionus angularis	0.12
	Cyclopoida	0.12
29 Aug 95		
7.5		
	Synchaeta pectinata	1.33
	Keratella cochlearis	1.09
	Filinia longiseta	0.75
	Euchlanis calpidia	0.66
	Brachionus angularis	0.23
	Copepoda (nauplii)	0.22
	Daphnia retrocurva	0.22
	Bosmina longirostris	0.10
	Euchlanis dilatata	0.10
13 Sep 95		
3.4		
	Keratella cochlearis	1.14
	Trichocerca	0.65
	Euchlanis calpidia	0.46
	Copepoda (nauplii)	0.46
	Conochiloides dossuarius	0.46
	Euchlanis dilatata	0.45
	Synchaeta pectinata	0.45
	Polyarthra vulgaris	0.23
28 Sep 95		
6.0		
	Polyarthra vulgaris	0.42
	Keratella cochlearis	0.38
	Copepoda (nauplii)	0.26
	Synchaeta pectinata	0.24
	Brachionus angularis	0.21
	Euchlanis calpidia	0.15
	Trichocerca	0.12
	Conochiloides dossuarius	0.07
	Diacyclops thomasi	0.07
	Brachionus urceolaris	0.06
	Lecane	0.06
	Filinia longiseta	0.06
12 Oct 95		
6.5		
	Filinia longiseta	7.60
	Brachionus urceolaris	2.78
	Conochiloides dossuarius	1.18

Appendix Table B7. Continued.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)	Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
	Keratella cochlearis	0.35		Cyclopoida	0.39
	Polyarthra vulgaris	0.24		*Diacyclops thomasi*	0.38
	Synchaeta pectinata	0.24		*Notholca acuminata*	0.15
	Copepoda (nauplii)	0.24		*Filinia longiseta*	0.12
	Euchlanis calpidia	0.13		*Conochilus unicornis*	0.07
	Collotheca	0.12		*Conochiloides dossuarius*	0.06
	Trichocerca	0.12		Harpacticoida	0.06
Centennial Island				*Brachionus quadridentatus*	0.05
30 Mar 94				*Chydorus sphaericus*	0.03
15.0				*Asplanchna girodi*	0.03
	Keratella quadrata	35.51		*Alona costata*	0.03
	Keratella cochlearis	27.91		*Kellicottia longispina*	0.02
	Polyarthra vulgaris	21.18		*Lecane*	0.02
	Euchlanis dilatata	6.93		*Philodina*	0.02
	Notholca acuminata	4.42		*Alona quadrangularis*	0.02
	Brachionus calyciflorus	1.14		*Bosmina longirostris*	0.02
	Synchaeta pectinata	1.06	18 May 94		
	Copepoda (nauplii)	0.70	15.0		
	Brachionus quadridentatus	0.62		Cyclopoida	0.68
	Filinia longiseta	0.32		*Diacyclops thomasi*	0.55
	Lecane	0.04		Copepoda (nauplii)	0.47
19 Apr 94				*Keratella cochlearis*	0.41
15.0				*Bosmina longirostris*	0.24
	Keratella cochlearis	41.55		*Conochilus unicornis*	0.03
	Keratella quadrata	11.19		*Chydorus sphaericus*	0.03
	Notholca acuminata	8.93		*Alona quadrangularis*	0.03
	Polyarthra vulgaris	8.66		*Kurzia latissima*	0.03
	Copepoda (nauplii)	6.84		*Asplanchna girodi*	0.03
	Filinia longiseta	1.40		*Lecane*	0.03
	Brachionus quadridentatus	1.30	2 Jun 94		
	Synchaeta pectinata	0.37	15.0		
	Euchlanis dilatata	0.22		Copepoda (nauplii)	0.61
	Euchlanis calpidia	0.17		*Keratella quadrata*	0.39
	Harpacticoida	0.06		*Keratella cochlearis*	0.30
	Asplanchna girodi	0.06		Cyclopoida	0.18
	Cyclopoida	0.05		*Synchaeta pectinata*	0.12
	Brachionus calyciflorus	0.04		*Euchlanis calpidia*	0.11
	Chydorus sphaericus	0.02		*Polyarthra vulgaris*	0.08
	Alona costata	0.02		*Alona quadrangularis*	0.04
	Alona affinis	0.02		*Bosmina longirostris*	0.04
	Philodina	0.01		*Pompholyx sulcata*	0.04
	Alona quadrangularis	0.01		Harpacticoida	0.04
4 May 94				*Diacyclops thomasi*	0.04
15.0			15 Jun 94		
	Keratella cochlearis	18.25	15.0		
	Copepoda (nauplii)	15.65		Copepoda (nauplii)	0.74
	Keratella quadrata	1.80		*Synchaeta pectinata*	0.24
	Polyarthra vulgaris	0.83		Cyclopoida	0.17
	Euchlanis calpidia	0.48		*Keratella cochlearis*	0.16

Appendix Table B7. Continued.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)	Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
	Euchlanis calpidia	0.13	10 Aug 94		
	Brachionus calyciflorus	0.09	15.0		
	Bosmina longirostris	0.08		*Daphnia retrocurva*	72.91
	Euchlanis dilatata	0.04		*Synchaeta pectinata*	18.28
30 Jun 94				Copepoda (nauplii)	17.08
15.0				Cladocera (immature)	6.10
	Synchaeta pectinata	4.90		*Brachionus calyciflorus*	4.53
	Brachionus calyciflorus	4.76		*Daphnia thorata*	2.12
	Copepoda (nauplii)	0.31		*Trichocerca*	1.61
	Keratella cochlearis	0.28		*Brachionus urceolaris*	1.03
	Bosmina longirostris	0.23		*Diaphanosoma birgei*	1.00
	Polyarthra vulgaris	0.22		*Polyarthra vulgaris*	0.87
	Cyclopoida	0.17		*Leptodora kindtii*	0.84
	Euchlanis dilatata	0.15		*Diacyclops thomasi*	0.73
	Diacyclops thomasi	0.14		*Keratella cochlearis*	0.59
	Brachionus urceolaris	0.09		Cyclopoida	0.29
	Calanoida	0.09		*Conochiloides dossuarius*	0.15
	Keratella quadrata	0.08		*Alona quadrangularis*	0.14
	Alona quadrangularis	0.08	24 Aug 94		
	Hexarthra mira	0.08	15.0		
13 Jul 94				*Synchaeta pectinata*	34.62
15.0				Copepoda (nauplii)	17.49
	Daphnia thorata	69.12		*Daphnia retrocurva*	14.55
	Cladocera (immature)	2.83		*Trichocerca*	4.19
	Synchaeta pectinata	1.22		Cyclopoida	3.50
	Copepoda (nauplii)	1.22		*Diacyclops thomasi*	3.15
	Keratella cochlearis	0.96		*Keratella cochlearis*	2.57
	Polyarthra vulgaris	0.54		*Polyarthra vulgaris*	2.10
	Diacyclops thomasi	0.40		*Daphnia thorata*	1.98
	Chydorus sphaericus	0.27		Cladocera (immature)	1.86
	Leptodora kindtii	0.14		*Diaphanosoma birgei*	0.47
	Cyclopoida	0.14		*Conochiloides dossuarius*	0.12
	Brachionus angularis	0.14	22 Sep 94		
27 Jul 94			15.0		
15.0				*Daphnia retrocurva*	14.75
	Synchaeta pectinata	44.32		*Synchaeta pectinata*	13.42
	Daphnia thorata	35.78		Copepoda (nauplii)	10.60
	Copepoda (nauplii)	21.13		Cladocera (immature)	2.79
	Polyarthra vulgaris	8.20		*Keratella cochlearis*	1.47
	Trichocerca	7.43		*Daphnia thorata*	1.28
	Cladocera (immature)	3.76		*Leptodora kindtii*	1.15
	Filinia longiseta	1.58		*Polyarthra vulgaris*	1.08
	Keratella cochlearis	1.57		Cyclopoida	0.79
	Cyclopoida	0.78		*Diacyclops thomasi*	0.65
	Diacyclops thomasi	0.62		*Trichocerca*	0.54
	Brachionus angularis	0.31		Calanoida	0.14
	Bosmina longirostris	0.16		*Chydorus sphaericus*	0.13
	Euchlanis dilatata	0.16			
	Conochiloides dossuarius	0.15			

Appendix Table B7. Continued.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
26 Oct 94		
15.0		
	Copepoda (nauplii)	1.67
	Euchlanis calpidia	0.17
	Hexarthra mira	0.10
	Keratella cochlearis	0.06
	Calanoida	0.06
	Brachionus calyciflorus	0.04
	Trichocerca	0.04
	Notholca acuminata	0.03
	Cladocera (immature)	0.03
	Diacyclops thomasi	0.03
	Leydigia leydigi	0.02
	Bosmina longirostris	0.02
	Synchaeta pectinata	0.02
30 Nov 94		
15.0		
	Brachionus calyciflorus	0.08
	Copepoda (nauplii)	0.06
	Euchlanis calpidia	0.04
	Cladocera (immature)	0.02
	Bosmina longirostris	0.02
19 Jan 95		
15.0		
	Bosmina longirostris	100.91
	Synchaeta pectinata	8.88
	Copepoda (nauplii)	1.96
	Brachionus urceolaris	1.41
	Keratella cochlearis	1.08
	Cladocera (immature)	0.85
	Brachionus calyciflorus	0.24
	Cyclopoida	0.24
	Notholca acuminata	0.18
	Polyarthra vulgaris	0.15
	Diacyclops thomasi	0.12
23 Mar 95		
15.0		
	Keratella quadrata	1.50
	Polyarthra vulgaris	1.49
	Synchaeta pectinata	1.46
	Keratella cochlearis	1.44
	Notholca acuminata	0.45
	Copepoda (nauplii)	0.34
	Filinia longiseta	0.27
	Bosmina longirostris	0.20
	Harpacticoida	0.13
	Pompholyx sulcata	0.13
	Euchlanis calpidia	0.13
	Leptodiaptomus ashlandi	0.13
	Brachionus calyciflorus	0.13
	Ceriodaphnia quadrangula	0.07
	Cyclopoida	0.07
6 Apr 95		
3.8		
	Keratella cochlearis	3.30
	Filinia longiseta	1.65
	Polyarthra vulgaris	1.47
	Synchaeta pectinata	1.30
	Brachionus calyciflorus	1.10
	Notholca acuminata	0.86
	Brachionus angularis	0.81
	Keratella quadrata	0.67
	Copepoda (nauplii)	0.64
	Leydigia leydigi	0.23
	Cyclopoida	0.21
	Lecane	0.21
26 Apr 95		
4.5		
	Polyarthra vulgaris	19.75
	Keratella cochlearis	11.78
	Notholca acuminata	4.79
	Synchaeta pectinata	1.46
	Keratella quadrata	1.15
	Copepoda (nauplii)	0.93
	Filinia longiseta	0.59
	Bosmina longirostris	0.23
	Alona costata	0.11
	Euchlanis calpidia	0.09
	Collotheca	0.09
9 May 95		
1.5		
	Keratella cochlearis	44.74
	Polyarthra vulgaris	15.08
	Copepoda (nauplii)	4.41
	Bosmina longirostris	4.14
	Euchlanis dilatata	1.40
	Keratella quadrata	1.06
	Notholca acuminata	1.04
	Brachionus urceolaris	0.83
	Brachionus calyciflorus	0.62
	Pompholyx sulcata	0.21
	Filinia longiseta	0.19
24 May 95		
3.5		
	Keratella cochlearis	20.24
	Polyarthra vulgaris	5.73
	Copepoda (nauplii)	2.71
	Synchaeta pectinata	2.49

Appendix Table B7. Continued.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
	Bosmina longirostris	0.79
	Brachionus calyciflorus	0.34
	Notholca acuminata	0.34
	Keratella quadrata	0.22
	Filinia longiseta	0.11
	Euchlanis calpidia	0.11
	Chydorus sphaericus	0.11
6 Jun 95		
1.5		
	Notholca acuminata	18.11
	Keratella cochlearis	6.20
	Synchaeta pectinata	3.72
	Polyarthra vulgaris	2.54
	Copepoda (nauplii)	2.33
	Brachionus calyciflorus	1.05
	Keratella quadrata	0.73
	Conochiloides dossuarius	0.71
	Collotheca	0.41
	Bosmina longirostris	0.41
21 Jun 95		
3.5		
	Synchaeta pectinata	2.57
	Brachionus angularis	1.75
	Keratella cochlearis	1.15
	Copepoda (nauplii)	0.87
	Notholca acuminata	0.85
	Trichocerca	0.49
	Harpacticoida	0.23
	Keratella quadrata	0.23
	Cyclopoida	0.13
	Brachionus calyciflorus	0.13
	Alona guttata	0.13
6 Jul 95		
4.5		
	Brachionus angularis	14.72
	Keratella cochlearis	5.81
	Synchaeta pectinata	2.06
	Filinia longiseta	1.28
	Polyarthra vulgaris	0.57
	Copepoda (nauplii)	0.47
	Trichocerca	0.32
	Notholca acuminata	0.15
	Euchlanis calpidia	0.15
	Ceriodaphnia quadrangula	0.09
	Daphnia thorata	0.08
	Philodina	0.08
	Harpacticoida	0.08
	Cyclopoida	0.08
19 Jul 95		
5.2		
	Synchaeta pectinata	2.04
	Brachionus angularis	0.57
	Copepoda (nauplii)	0.23
	Keratella cochlearis	0.21
	Bosmina longirostris	0.18
	Lecane	0.14
	Trichocerca	0.11
	Notholca acuminata	0.07
	Cyclopoida	0.05
	Diacyclops thomasi	0.05
	Polyarthra vulgaris	0.05
2 Aug 95		
6.0		
	Polyarthra vulgaris	2.69
	Synchaeta pectinata	1.76
	Filinia longiseta	1.54
	Daphnia retrocurva	1.04
	Copepoda (nauplii)	0.93
	Trichocerca	0.73
	Keratella cochlearis	0.57
	Brachionus calyciflorus	0.52
	Brachionus angularis	0.47
	Diacyclops thomasi	0.40
	Conochiloides dossuarius	0.36
	Bosmina longirostris	0.16
	Cladocera (immature)	0.16
	Colurella	0.16
16 Aug 95		
6.0		
	Synchaeta pectinata	3.79
	Daphnia retrocurva	1.84
	Copepoda (nauplii)	0.77
	Keratella cochlearis	0.76
	Euchlanis calpidia	0.61
	Brachionus angularis	0.46
	Polyarthra vulgaris	0.32
	Trichocerca	0.30
	Filinia longiseta	0.16
	Diacyclops thomasi	0.15
	Cyclopoida	0.15
	Brachionus calyciflorus	0.15
	Bosmina longirostris	0.15
29 Aug 95		
4.9		
	Synchaeta pectinata	50.86
	Daphnia retrocurva	10.18
	Keratella cochlearis	3.77

Appendix Table B7. Continued.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
	Polyarthra vulgaris	2.20
	Brachionus angularis	1.88
	Copepoda (nauplii)	1.70
	Trichocerca	1.13
	Cladocera (immature)	0.51
	Brachionus calyciflorus	0.48
	Euchlanis calpidia	0.37
	Bosmina longirostris	0.32
	Keratella serrulata	0.21
	Lecane	0.21
	Leptodora kindtii	0.21
13 Sep 95		
4.7		
	Polyarthra vulgaris	8.75
	Synchaeta pectinata	7.18
	Keratella cochlearis	6.43
	Trichocerca	3.70
	Brachionus calyciflorus	2.91
	Bosmina longirostris	0.41
	Copepoda (nauplii)	0.41
	Brachionus angularis	0.23
	Philodina	0.21
	Lecane	0.21
	Daphnia thorata	0.20
28 Sep 95		
6.5		
	Copepoda (nauplii)	2.05
	Bosmina longirostris	0.60
	Synchaeta pectinata	0.50
	Polyarthra vulgaris	0.36
	Trichocerca	0.24
	Keratella cochlearis	0.23
	Conochiloides dossuarius	0.19
	Euchlanis calpidia	0.12
	Daphnia retrocurva	0.12
	Ceriodaphnia quadrangula	0.06
	Philodina	0.06
	Brachionus angularis	0.06
	Cyclopoida	0.06
	Pleuroxus striatus	0.06
	Cladocera (immature)	0.06
12 Oct 95		
5.5		
	Filinia longiseta	1.22
	Keratella cochlearis	0.74
	Synchaeta pectinata	0.61
	Copepoda (nauplii)	0.54
	Brachionus angularis	0.33
	Conochiloides dossuarius	0.26

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
	Euchlanis calpidia	0.10
	Polyarthra vulgaris	0.10
	Brachionus urceolaris	0.10
Offield		
30 Mar 94		
15.0		
	Keratella quadrata	35.46
	Polyarthra vulgaris	19.85
	Keratella cochlearis	19.36
	Euchlanis dilatata	14.79
	Notholca acuminata	2.98
	Synchaeta pectinata	0.97
	Hexarthra mira	0.64
	Brachionus calyciflorus	0.41
	Copepoda (nauplii)	0.21
	Cyclopoida	0.08
	Diacyclops thomasi	0.04
19 Apr 94		
15.0		
	Keratella cochlearis	51.59
	Polyarthra vulgaris	34.88
	Notholca acuminata	20.04
	Keratella quadrata	10.03
	Filinia longiseta	3.88
	Copepoda (nauplii)	3.45
	Brachionus quadridentatus	2.84
	Synchaeta pectinata	0.64
	Brachionus calyciflorus	0.62
	Euchlanis dilatata	0.37
	Euchlanis calpidia	0.32
	Cyclopoida	0.28
	Asplanchna girodi	0.07
	Trichotria pocillum	0.02
	Trichocerca	0.02
	Alona affinis	0.02
	Chydorus sphaericus	0.02
	Diacyclops thomasi	0.02
3 May 94		
15.0		
	Keratella cochlearis	18.23
	Copepoda (nauplii)	7.06
	Keratella quadrata	1.17
	Cyclopoida	0.58
	Polyarthra vulgaris	0.45
	Euchlanis dilatata	0.33
	Notholca acuminata	0.31
	Diacyclops thomasi	0.13
	Bosmina longirostris	0.11
	Filinia longiseta	0.05

Appendix Table B7. Continued.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
	Lepadella ovalis	0.02
	Brachionus calyciflorus	0.02
	Conochilus unicornis	0.02
	Philodina	0.02
	Trichotria pocillum	0.02
18 May 94		
15.0		
	Cyclopoida	0.71
	Diacyclops thomasi	0.21
	Keratella cochlearis	0.17
	Euchlanis dilatata	0.08
	Bosmina longirostris	0.06
	Copepoda (nauplii)	0.05
	Asplanchna girodi	0.03
2 Jun 94		
15.0		
	Copepoda (nauplii)	2.10
	Cyclopoida	0.72
	Lecane	0.67
	Keratella cochlearis	0.39
	Keratella quadrata	0.37
	Diacyclops thomasi	0.35
	Polyarthra vulgaris	0.18
	Notholca acuminata	0.15
	Euchlanis calpidia	0.14
	Asplanchna girodi	0.09
	Kellicottia longispina	0.07
	Alona quadrangularis	0.07
	Synchaeta pectinata	0.06
	Conochilus unicornis	0.04
	Euchlanis dilatata	0.04
	Harpacticoida	0.03
	Pompholyx sulcata	0.03
	Bosmina longirostris	0.03
15 Jun 94		
15.0		
	Polyarthra vulgaris	81.93
	Keratella cochlearis	8.60
	Synchaeta pectinata	2.82
	Copepoda (nauplii)	0.73
	Keratella quadrata	0.64
	Euchlanis calpidia	0.44
	Chydorus sphaericus	0.21
	Trichocerca	0.11
	Daphnia thorata	0.10
	Cyclopoida	0.10
	Brachionus calyciflorus	0.10
	Bosmina longirostris	0.10
	Notholca acuminata	0.10

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
29 Jun 94		
15.0		
	Synchaeta pectinata	130.69
	Brachionus calyciflorus	67.61
	Polyarthra vulgaris	55.28
	Keratella cochlearis	17.93
	Bosmina longirostris	6.42
	Asplanchna seiboldi	6.26
	Daphnia thorata	4.48
	Brachionus urceolaris	2.84
	Euchlanis calpidia	0.45
	Chydorus sphaericus	0.44
	Cyclopoida	0.32
	Conochilus unicornis	0.32
	Copepoda (nauplii)	0.22
	Alona quadrangularis	0.22
	Keratella quadrata	0.11
	Leptodora kindtii	0.11
13 Jul 94		
15.0		
	Synchaeta pectinata	32.42
	Keratella cochlearis	24.49
	Polyarthra vulgaris	12.55
	Trichocerca	11.33
	Copepoda (nauplii)	5.60
	Daphnia thorata	3.08
	Brachionus angularis	0.68
	Conochiloides dossuarius	0.65
	Filinia longiseta	0.56
	Cladocera (immature)	0.49
	Cyclopoida	0.33
	Diacyclops thomasi	0.18
	Euchlanis calpidia	0.15
27 Jul 94		
15.0		
	Synchaeta pectinata	17.94
	Copepoda (nauplii)	12.51
	Trichocerca	9.13
	Polyarthra vulgaris	5.71
	Daphnia thorata	5.70
	Keratella cochlearis	3.86
	Brachionus angularis	1.44
	Diacyclops thomasi	0.36
	Leptodora kindtii	0.19
	Conochiloides dossuarius	0.19
	Cladocera (immature)	0.18
	Trichotria pocillum	0.18
	Filinia longiseta	0.18

Appendix Table B7. Continued.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
10 Aug 94		
15.0		
	Copepoda (nauplii)	48.53
	Trichocerca	13.22
	Daphnia retrocurva	8.11
	Polyarthra vulgaris	6.14
	Synchaeta pectinata	3.63
	Daphnia thorata	3.27
	Cyclopoida	2.71
	Keratella cochlearis	2.36
	Brachionus angularis	1.99
	Diacyclops thomasi	1.62
	Cladocera (immature)	0.73
	Leptodora kindtii	0.72
	Bosmina longirostris	0.54
	Diaphanosoma birgei	0.18
24 Aug 94		
15.0		
	Copepoda (nauplii)	27.81
	Trichocerca	13.70
	Cyclopoida	9.48
	Polyarthra vulgaris	5.96
	Diacyclops thomasi	4.50
	Daphnia retrocurva	3.44
	Synchaeta pectinata	2.02
	Daphnia thorata	1.49
	Brachionus angularis	0.40
	Cladocera (immature)	0.37
	Conochiloides dossuarius	0.36
	Keratella cochlearis	0.20
	Diaphanosoma birgei	0.19
	Euchlanis calpidia	0.10
	Bosmina longirostris	0.09
22 Sep 94		
15.0		
	Polyarthra vulgaris	8.40
	Copepoda (nauplii)	6.81
	Bosmina longirostris	4.69
	Synchaeta pectinata	2.98
	Cyclopoida	2.30
	Diacyclops thomasi	0.79
	Daphnia retrocurva	0.64
	Trichocerca	0.53
	Keratella cochlearis	0.40
	Calanoida	0.29
	Daphnia thorata	0.25
	Brachionus angularis	0.20
	Diaphanosoma birgei	0.19
	Cladocera (immature)	0.19
	Leptodiaptomus ashlandi	0.15
26 Oct 94		
15.0		
	Copepoda (nauplii)	2.10
	Bosmina longirostris	0.14
	Polyarthra vulgaris	0.12
	Daphnia thorata	0.12
	Daphnia retrocurva	0.09
	Synchaeta pectinata	0.08
	Keratella cochlearis	0.07
	Trichocerca	0.05
	Cyclopoida	0.04
	Philodina	0.01
	Leptodora kindtii	0.01
	Leptodiaptomus ashlandi	0.01
	Diacyclops thomasi	0.01
	Euchlanis calpidia	0.01
	Leydigia leydigi	0.01
	Brachionus calyciflorus	0.01
30 Nov 94		
15.0		
	Copepoda (nauplii)	0.39
	Brachionus calyciflorus	0.09
	Keratella quadrata	0.06
	Euchlanis calpidia	0.05
	Synchaeta pectinata	0.04
	Keratella cochlearis	0.03
	Euchlanis dilatata	0.03
	Leptodiaptomus ashlandi	0.03
	Bosmina longirostris	0.02
19 Jan 95		
15.0		
	Bosmina longirostris	1.94
	Synchaeta pectinata	0.78
	Copepoda (nauplii)	0.64
	Keratella cochlearis	0.17
	Keratella quadrata	0.06
	Cyclopoida	0.06
	Collotheca	0.03
	Notholca acuminata	0.03
	Conochilus unicornis	0.03
22 Mar 95		
15.0		
	Keratella quadrata	3.38
	Synchaeta pectinata	1.75
	Keratella cochlearis	1.62
	Polyarthra vulgaris	1.20
	Copepoda (nauplii)	1.17
	Notholca acuminata	0.73

Appendix Table B7. Continued.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
	Euchlanis calpidia	0.20
	Cyclopoida	0.17
	Filinia longiseta	0.17
	Diacyclops thomasi	0.11
	Cladocera (immature)	0.06
	Brachionus urceolaris	0.05
	Calanoida	0.05
	Lecane	0.05
	Daphnia thorata	0.05
6 Apr 95		
4.0		
	Polyarthra vulgaris	15.30
	Keratella cochlearis	4.03
	Notholca acuminata	3.79
	Synchaeta pectinata	2.21
	Keratella quadrata	1.42
	Filinia longiseta	0.74
	Copepoda (nauplii)	0.57
	Hexarthra mira	0.37
	Brachionus calyciflorus	0.20
	Alona costata	0.20
26 Apr 95		
4.6		
	Keratella cochlearis	20.36
	Polyarthra vulgaris	6.13
	Notholca acuminata	4.30
	Copepoda (nauplii)	0.67
	Synchaeta pectinata	0.55
	Keratella quadrata	0.31
	Collotheca	0.15
	Harpacticoida	0.03
	Pompholyx sulcata	0.03
	Brachionus urceolaris	0.03
9 May 95		
1.3		
	Keratella cochlearis	63.95
	Polyarthra vulgaris	26.03
	Notholca acuminata	4.92
	Copepoda (nauplii)	4.66
	Bosmina longirostris	4.38
	Euchlanis dilatata	1.72
	Keratella quadrata	1.24
	Filinia longiseta	1.21
	Brachionus calyciflorus	0.73
	Diaphanosoma birgei	0.24
24 May 95		
3.5		
	Keratella cochlearis	31.55
	Polyarthra vulgaris	5.35
	Copepoda (nauplii)	4.45
	Bosmina longirostris	3.58
	Synchaeta pectinata	1.13
	Notholca acuminata	0.66
	Filinia longiseta	0.42
	Keratella quadrata	0.33
	Alona costata	0.23
	Brachionus calyciflorus	0.22
	Euchlanis dilatata	0.20
	Euchlanis calpidia	0.12
	Brachionus angularis	0.10
6 Jun 95		
3.0		
	Notholca acuminata	13.76
	Keratella cochlearis	3.74
	Copepoda (nauplii)	3.38
	Polyarthra vulgaris	1.89
	Pompholyx sulcata	1.82
	Synchaeta pectinata	1.72
	Conochiloides dossuarius	0.86
	Harpacticoida	0.40
	Collotheca	0.37
	Euchlanis calpidia	0.20
	Keratella quadrata	0.18
	Brachionus urceolaris	0.18
	Lecane	0.17
	Brachionus calyciflorus	0.17
	Bosmina longirostris	0.17
	Leydigia leydigi	0.17
20 Jun 95		
3.0		
	Synchaeta pectinata	1.96
	Brachionus angularis	1.73
	Keratella cochlearis	1.29
	Notholca acuminata	0.90
	Copepoda (nauplii)	0.70
	Bosmina longirostris	0.40
	Daphnia retrocurva	0.27
	Euchlanis calpidia	0.15
	Harpacticoida	0.13
	Daphnia thorata	0.13
	Cyclopoida	0.13
	Trichocerca	0.13
	Alona costata	0.13
6 Jul 95		
4.8		
	Keratella cochlearis	11.07
	Synchaeta pectinata	5.52
	Brachionus angularis	4.69

Appendix Table B7. Continued.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)	Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
	Trichocerca	0.54		*Diacyclops thomasi*	0.49
	Polyarthra vulgaris	0.41		Cyclopoida	0.48
	Copepoda (nauplii)	0.30		*Colurella*	0.24
	Filinia longiseta	0.25		*Euchlanis dilatata*	0.24
	Conochiloides dossuarius	0.16	29 Aug 95		
	Daphnia thorata	0.15	6.5		
	Notholca acuminata	0.15		*Synchaeta pectinata*	72.32
	Diacyclops thomasi	0.08		*Daphnia retrocurva*	53.52
	Keratella quadrata	0.07		*Trichocerca*	12.29
	Bosmina longirostris	0.07		*Brachionus angularis*	7.74
19 Jul 95				*Keratella cochlearis*	2.72
5.0				Cladocera (immature)	1.99
	Brachionus angularis	3.91		*Polyarthra vulgaris*	1.65
	Synchaeta pectinata	2.12		*Leptodora kindtii*	0.91
	Copepoda (nauplii)	0.47		Copepoda (nauplii)	0.73
	Daphnia retrocurva	0.46		*Diaphanosoma birgei*	0.37
	Keratella cochlearis	0.45		Cyclopoida	0.19
	Polyarthra vulgaris	0.32		*Bosmina longirostris*	0.19
	Alona costata	0.30		*Brachionus caudatus*	0.18
	Diacyclops thomasi	0.29		*Filinia longiseta*	0.18
	Kellicottia longispina	0.15		*Conochilus unicornis*	0.17
2 Aug 95				*Conochiloides dossuarius*	0.17
6.4			13 Sep 95		
	Polyarthra vulgaris	147.58	5.4		
	Synchaeta pectinata	67.24		*Polyarthra vulgaris*	31.58
	Keratella cochlearis	27.40		*Trichocerca*	13.76
	Daphnia retrocurva	26.99		*Daphnia retrocurva*	12.48
	Copepoda (nauplii)	20.48		*Synchaeta pectinata*	8.71
	Conochilus unicornis	18.37		*Keratella cochlearis*	8.03
	Trichocerca	4.62		Cladocera (immature)	2.91
	Brachionus angularis	3.58		*Brachionus angularis*	1.01
	Cyclopoida	1.72		*Filinia longiseta*	0.73
	Bosmina longirostris	0.98		Copepoda (nauplii)	0.73
	Cladocera (immature)	0.95		*Pompholyx sulcata*	0.45
	Conochiloides dossuarius	0.71		*Bosmina longirostris*	0.25
	Brachionus calyciflorus	0.67		*Leptodora kindtii*	0.25
	Asplanchna girodi	0.63	28 Sep 95		
	Brachionus caudatus	0.33	8.5		
16 Aug 95				*Synchaeta pectinata*	7.54
8.5				*Polyarthra vulgaris*	7.35
	Daphnia retrocurva	47.19		*Trichocerca*	2.10
	Synchaeta pectinata	27.50		*Keratella cochlearis*	1.65
	Copepoda (nauplii)	11.17		*Daphnia retrocurva*	0.95
	Brachionus angularis	3.42		Copepoda (nauplii)	0.63
	Trichocerca	1.94		*Bosmina longirostris*	0.58
	Polyarthra vulgaris	1.71		*Brachionus angularis*	0.55
	Keratella cochlearis	1.70		*Diacyclops thomasi*	0.18
	Cladocera (immature)	0.97		Cyclopoida	0.18
	Conochiloides dossuarius	0.73		*Conochiloides dossuarius*	0.17

Appendix Table B7. Continued.

Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)	Sampling area Date Depth (m)	Taxon/category	Mean Density (no./L)
	Brachionus calyciflorus	0.06			
	Cladocera (immature)	0.06			
	Euchlanis calpidia	0.06			
	Ceriodaphnia quadrangula	0.06			
12 Oct 95					
5.8					
	Keratella cochlearis	3.38			
	Copepoda (nauplii)	2.29			
	Polyarthra vulgaris	1.40			
	Synchaeta pectinata	1.08			
	Trichocerca	0.81			
	Conochiloides dossuarius	0.45			
	Filinia longiseta	0.44			
	Bosmina longirostris	0.41			
	Brachionus angularis	0.15			
	Daphnia retrocurva	0.08			
	Leptodora kindtii	0.08			
	Brachionus calyciflorus	0.08			
	Ostracoda	0.07			
	Cyclopoida	0.07			

Appendix Table B8. Sediment characteristics at each sampling area in Lower Granite Reservoir, 1994-95.

Sampling area	Date	Depth (m)	Gravel (%)	Sand (%)	Fines (%)	Median grain size (mm)	Silt/Clay (%)	Volatile solids (%)
Silcott Island								
	03 May 94							
		3	0.0	38.9	61.1	0.063	49.5	0.6
		9	0.0	41.0	59.0	0.066	46.5	6.0
		18	0.0	92.4	7.6	0.180	6.6	0.9
	23 Aug 94							
		3	0.0	42.7	57.3	0.067	45.8	8.3
		9	0.0	62.5	37.5	0.088	25.0	3.1
		18	0.0	86.2	13.8	0.170	12.3	3.4
	29 Nov 94							
		3	0.0	22.0	78.0	0.055	66.3	7.2
		9	0.0	44.9	55.1	0.069	43.6	6.4
		18	0.0	75.1	24.9	0.150	21.4	1.5
	18 Jan 95							
		3	0.0	47.8	52.2	0.073	39.8	8.9
		9	0.0	58.5	41.5	0.084	29.0	11.2
		18	0.0	96.3	3.7	0.180	3.0	1.5
	25 Apr 95							
		3	0.0	50.3	49.7	0.075	36.8	6.9
		9	0.0	52.8	47.2	0.079	36.8	4.7
		18	0.0	94.5	5.5	0.180	5.4	1.2
	18 Jul 95							
		3	0.0	40.0	60.0	0.066	47.0	6.2
		9	0.0	24.2	75.8	0.057	73.0	3.4
		18	0.0	93.9	6.1	0.180	5.4	0.7
	11 Oct 95							
		3	0.0	11.9	88.1	0.050	86.8	7.2
		9	0.0	69.1	30.9	0.092	16.2	1.8
		18	0.0	94.7	5.3	0.200	4.8	1.0
Centennial Island								
	03 May 94							
		3	0.0	69.0	31.0	0.200	29.8	3.5
		9	0.0	8.6	91.4	0.019	89.3	11.3
		18	0.0	13.4	86.6	0.021	84.6	11.2
	23 Aug 94							
		3	0.0	91.4	8.6	0.300	8.1	0.3
		9	0.0	8.0	92.0	0.025	89.2	11.5
		18	0.0	12.7	87.3	0.024	84.3	12.4
	29 Nov 94							
		3	0.0	76.7	23.2	0.130	18.5	1.6
		9	0.0	7.7	92.3	0.023	90.0	12.0
		18	0.0	10.2	89.8	0.022	87.2	0.7

Appendix Table B8. Continued.

Sampling area	Date	Depth (m)	Gravel (%)	Sand (%)	Fines (%)	Median grain size (mm)	Silt/Clay (%)	Volatile solids (%)
	18 Jan 95							
		3	0.6	88.9	10.5	0.230	9.0	0.8
		9	0.0	45.9	54.1	0.061	51.3	5.4
		18	0.0	12.6	87.4	0.047	84.6	11.3
	25 Apr 95							
		3	0.0	92.5	7.5	0.370	7.2	1.9
		9	0.0	11.2	88.8	0.024	85.9	11.4
		18	0.0	9.9	90.1	0.024	87.0	10.0
	18 Jul 95							
		3	0.0	79.6	20.4	0.210	20.3	2.1
		9	0.0	6.9	93.1	0.018	91.0	15.8
		18	0.0	6.7	93.3	0.021	90.9	11.3
	11 Oct 95							
		3	0.0	51.5	48.5	0.082	46.2	5.8
		9	0.0	5.8	94.2	0.018	92.1	11.8
		18	0.0	9.5	90.5	0.020	87.8	10.7
Offield								
	03 May 94							
		3	33.2	27.3	39.5	0.250	37.1	3.8
		9	8.9	21.6	69.6	0.037	65.6	7.2
		18	0.4	14.3	85.4	0.015	83.3	9.7
	23 Aug 94							
		3	3.7	23.0	73.3	0.047	66.3	4.2
		9	0.0	6.5	93.5	0.056	92.1	6.6
		18	0.0	7.9	92.1	0.019	89.0	9.0
	29 Nov 94							
		3	0.0	47.6	52.4	0.072	40.6	2.1
		9	24.2	21.6	54.2	0.061	50.7	2.9
		18	0.2	16.2	83.6	0.021	80.4	5.4
	18 Jan 95							
		3	0,0	49.9	50.1	0.075	39.5	2.7
		9	4.7	22.7	72.6	0.053	69.9	4.2
		18	0.0	24.1	75.9	0.024	71.3	6.0
	25 Apr 95							
		3	5.8	33.9	60.3	0.062	50.6	3.5
		9	7.2	20.6	72.2	0.038	68.6	3.6
		18	0.0	20.4	79.6	0.031	78.2	5.7
	18 Jul 95							
		3	0.0	19.1	80.9	0.053	77.5	4.9
		9	0.0	8.3	91.7	0.036	90.6	6.1
		18	0.0	32.4	67.6	0.039	62.3	6.8
	11 Oct 95							
		3	0.1	29.2	70.7	0.053	66.8	3.5
		9	9.6	18.9	71.6	0.037	67.3	4.9
		18	0.0	16.3	83.7	0.022	79.1	6.8