Phytoplankton Primary Production and Related Limnological Data for Lakes and Channels in the Mackenzie Delta and Lakes on the Tuktoyaktuk Peninsula, N.W.T.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABSTRACT

Fee, E.J., R.E. Hecky, S.J. Guildford, C. Anema, D. Mathew, and K. Hallard. 1988. Phytoplankton primary production and related limnological data for lakes and channels in the Mackenzie Delta and lakes on the Tuktoyaktuk Peninsula, N.W.T. Can. Tech. Rep. Fish. Aquat. Sci. 1614: v + 62 p.

The limnological characteristics of lakes and channels in the Mackenzie Delta and lakes in the Kukjuktuk drainage basin (Tuktoyaktuk Peninsula) were studied during the open-water seasons of 1985 and 1986. Detailed descriptions of the study sites, sampling procedures, and laboratory methods are given. Data on the following variables are presented: temperature, pH, oxygen (concentration and percent saturation), specific conductance, Secchi disk transparency, extinction coefficient, percent reflectance, total inorganic carbon concentration, chlorophyll-a concentration, and phytoplankton photosynthesis parameters (P_m^B and α). Ice-free season integral phytoplankton primary production rates were similar in the two study areas (3.8-7.5 g C•m^{-2} in the Delta and 4.1-24.2 g C•m^{-2} in the Kukjuktuk lakes); these differences are unlikely to be an important factor causing migration of whitefish from the Mackenzie Delta to the Kukjuktuk lakes. Limnological properties showed much greater variation from 1985 to 1986 in the Kukjuktuk lakes than in the Delta lakes. The Delta lakes probably have less year-to-year variability than the lakes on the Tuktoyaktuk Peninsula because: 1) Ice-out in the Delta lakes is caused by flooding of the Mackenzie River instead of by melting of the ice, so it occurs in a narrower window of time, and 2) Chemical and physical conditions in the Delta lakes are reset to a similar starting point each year when the Mackenzie River floods.

Key words: extinction coefficient; electrical conductivity; pH; oxygen; temperature; chlorophylls; photosynthesis; morphometry; turbidity; light penetration.

RÉSUMÉ

Fee, E.J., R.E. Hecky, S.J. Guildford, C. Anema, D. Mathew, and K. Hallard. 1988. Phytoplankton primary production and related limnological data for lakes and channels in the Mackenzie Delta and lakes on the Tuktoyaktuk Peninsula, N.W.T. Can. Tech. Rep. Fish. Aquat. Sci. 1614: v + 62 p.

Les caractéristiques limnologiques des lacs et chenaux dans le delta du Mackenzie et des lacs dans le bassin hydrographique de la Kukjuktuk (péninsule de Tuktoyaktuk) ont été étudiées au cours de la saison des eaux libres de 1985 et de 1986. La description détaillée des lieux de l'étude, des méthodes d'échantillonnage et des méthodes de travail en laboratoire sont présentées. Des données sont produites pour les variables suivantes: température, pH, oxygène (concentration et coefficient de saturation), conductivité spécifique, transparence mesurée au disque de Secchi, coefficient d'extinction, facteur de réflectance, concentration totale de carbone inorganique, concentration de chlorophylle-a, paramètres de photosynthèse du phytoplancton (P_m^B et α). Les taux d'ensemble de production primaire de phytoplancton de la saison des eaux libres étaient similaires dans les deux lieux étudiés (3.8-7.5 g C•m^{-2} dans le delta et 4.1-24.2 g C•m^{-2} dans les lacs du bassin de la Kukjuktuk) et ces différences n'ont probablement pas une grande importance dans la migration du corégone du delta du Mackenzie vers les lacs du bassin de la Kukjuktuk. Les propriétés limnologiques ont varié beaucoup plus de 1985 à 1986 dans les lacs du bassin de la Kukjuktuk que dans les lacs du delta; toutefois, il est probable que les fluctuations d'une année à l'autre soient moins grandes dans les lacs du delta que dans les lacs dans la péninsule de Tuktoyaktuk, pour deux raisons: 1) d'abord, le départ de la glace dans les lacs du delta étant le résultat de l'inondation du Mackenzie, non pas de la fonte de la glace, cela se produit donc sur une période plus courte, ensuite 2) les conditions physiqueset chimiques dans les lacs du delta reviennent chaque année au même point lorsque se produit l'inondation du Mackenzie.

Mots-clés: coefficient d'extinction; conductivité électrique; pH; oxygène; température; chlorophylle; photosynthèse; morphométrie; turbidité; pénétration de la lumière.

INTRODUCTION

The Mackenzie Delta region supports an important domestic fishery based on broad whitefish (Coregonus nasus) and associated coregonid species. These species are anadromous (Lawrence et al. 1984; Bond and Erickson 1985), utilizing the Mackenzie River, the coastal Beaufort Sea, and lakes both in the Mackenzie Delta and in the Tuktoyaktuk Peninsula at different stages of their life cycles. Industrial developments, primarily those associated with oil and gas exploration in the Beaufort Sea, but also B.C. Hyrdro's proposed hydroelectric projects on the Liard River, could severely impact these fish populations during the next decade. In order to be able to control these impacts, information on the ecology of aquatic habitats in this region important to coregonid species is needed. Accordingly, in 1985 and 1986 we undertook a study of a wide spectrum of aquatic habitats in this region. This report summarizes the information obtained. Included are descriptions of the study sites, the field and laboratory methods that were used, and preliminary analyses of the temperature, transparency, and phytoplankton primary production data. Other reports and papers now under preparation will be based on information archived in the appendices of this report.

STUDY AREAS

Both study sites are located well above the Arctic Circle (Fig. 1). The Mackenzie Delta study site is located at 69°20'N, 133°45'W and the Tuktoyaktuk site is at 69°35'N, 132°30'W. Despite the fact that they are separated by only 140 km, these sites are strikingly dissimilar habitats. The most obvious difference is that much of the Delta (including the study area) is densely forested while the Tuktoyaktuk Peninsula is treeless tundra. Just as important from a limnological viewpoint are the hydrological differences. Ice disappears from the Delta lakes in early June when the Mackenzie River reaches its maximum flood stage. From then until freeze-up in late September or early October the surface elevation (stage) of the river drops by as much as 4 m (Marsh 1988; Bigras 1987). The lakes on the Tuktoyaktuk Peninsula, on the other hand, lose their ice cover about a month later (late-June to mid-July) and water levels remain fairly constant throughout the ice-free season. Mackay (1963) provides further details on the geography, climate, and vegetation of this entire region.

Table 1 summarizes morphological information on the studied lakes. The study lakes on the Mackenzie Delta (Fig. 2) were located close to the town of Inuvik. On the Tuktoyaktuk Peninsula we worked on lakes in the Kukjuktuk drainage basin (Fig. 3), which is located 30 km northeast of the hamlet of Tuktoyaktuk. Sampling in the Delta was done from outboard motor powered boats while fixed-wing aircraft on pontoons were used to sample the Kukjuktuk lakes. Sampling at both sites started within a week after ice-out and samples were taken at each site every two weeks, except the Delta was sampled at 5-day intervals during the 2-3 week period immediately after ice-out when river stage and water temperatures were changing rapidly. Sampling continued in both areas until early September when ice started forming at the margins of the smaller lakes.

The study lakes in the Mackenzie Delta (Figs. 4-7) were chosen to cover a wide range of "closure" (the term that Marsh (1988) and Bigras (1987) use to describe the hydrological relationship of a lake with a channel of the Mackenzie River). Big Lake (Fig. 4) has the lowest closure, as it receives direct input at all seasons from a major distributary, Big Lake Channel; this lake experiences no flow reversals at any time. Skidoo Lake (Fig. 5) and New Lake (Fig. 6) have intermediate degrees of closure; water normally flows from Big Lake Channel into them, but infrequent flow reversals occur throughout the summer. South Lake (Figs. 7 and 8) and its bays South Lake Bay and Strange Bay have higher degrees of closure; water normally flows from them towards Big Lake Channel but occasional reversals occur during the summer. NRC Lake (Fig. 9) is the most closed Delta lake studied. Water flows from NRC lake toward Big Lake Channel for only a few weeks immediately following the spring flood; by mid-July this lake has no stream connection. Those lakes with low closure (Big, Skidoo, New, and South) have actively growing deltas at the point of their channel connection. South Lake Bay, Strange Bay, and NRC Lake, on the other hand, have no deltas. In addition to these lakes, two Delta channels were sampled routinely; East Channel near Inuvik and Big Lake Channel, which branches off the East Channel. The site sampled in Big Lake Channel is labeled NRC Channel in this report because it is next to NRC Lake.

Some miscellaneous lakes in or close to the Delta were also sampled. In early June of 1985, while testing methods, we sampled Boot Lake, located on the edge of the Inuvik townsite. This lake is flooded by the Mackenzie River at the time of ice-out but thereafter receives runoff from the uplands east of Inuvik. In 1986 we routinely sampled Noell Lake, a large (3000 ha) lake located on the tundra about 15 km north of Inuvik. This lake is located in the Caribou Hills and is more similar limnologically to the Kukjuktuk lakes than to the Delta lakes; Read and Roberge (1986) give a bathymetric map of this lake. Finally, we sampled two numbered lakes (274 and 522) in the Delta late in 1986. These are high closure Delta lakes located close to Inuvik; the lake numbers were assigned by P. Marsh of the National Hydrological Research Institute.

Figures 10-16 (maps supplied by B. Fallis, FWI) are bathymetric maps of the lakes and estuary that we studied on the Tuktoyaktuk Peninsula. These waterbodies differ among themselves primarily in their distance from the sea (but note that Lake 28, which is the farthest from the sea, is also deeper than the others).

MATERIALS AND METHODS

We sampled 125 stations during the summer of 1985 and 200 stations during 1986 (in this report the term "station" is used to identify data collected at a single place and time). Variables that were measured are:

- physical variables: water temperature and transparency.
- chemical variables: specific conductance, total inorganic carbon (TIC), nutrients, major ions, pH, oxygen, chlorophyll-a, suspended solids, and alkalinity.
- biological variables: phytoplankton primary production rate as a function of light intensity, phytoplankton species composition, phytoplankton biomass, algal nutrient deficiency indicators, zooplankton species composition, zooplankton biomass, macrophyte biomass, periphyton and epipelon biomass and/or production rates.

This report summarizes data on temperature, transparency, TIC, chlorophyll-a, phytoplankton primary production, and field measurements of pH, specific conductance, and oxygen. Other reports in this series will present data for the other variables.

Temperature, specific conductance, pH, and oxygen were measured as functions of depth with a Hydrolab 4041 water quality meter. The conductivity, oxygen, and pH sensors on this instrument were calibrated before each day's use. The temperature sensor on this instrument is permanently calibrated by the manufacturer; we occasionally checked this calibration with a mercury thermometer and found no discrepancy. Specific conductance and pH were later measured on integrated water samples in the laboratory (see below); we report here only the field measurements made with the Hydrolab instrument.

In situ profiles of photosynthetically available irradiance (PAR) were measured with a Licor LI-192S cosine response underwater quantum sensor used in conjunction with a Licor LI-185 meter. To avoid shading the sensor, readings were taken on the sunny side of the sampling platform. To start, a measurement in the air was made. The sensor was then lowered to the greatest depth at which measurements could be made and measurements were taken at several depths throughout the water column, the last underwater measurement being made at a depth of 0.2 m. Another measurement in air was then made and if this measurement differed from the mean of the initial and final air measurements by more than 10% (because of variations in cloudiness), results were discarded and the procedure was repeated. A final underwater measurement, taken with the sensor pointing downward at a depth of 0.2 m, was used in conjunction with that taken at 0.2 m with the sensor pointed upward as an index of light scattering. Extinction coefficients were calculated as the negative slope of the linear regression of the logarithm of light as a function of depth. Because of strong currents, we could not measure in situ PAR profiles in the channels of the Mackenzie River.

Other measurements related to water transparency that were routinely made are: 1) "Secchi disk depth": A 0.25 m Secchi disk divided into black and white quadrants was lowered on the shaded side of the boat (or in the shadow of the wing of the airplane) until it disappeared. The disk was then raised until it reappeared and the mean of the depths where it disappeared and reappeared was recorded. 2) The absorbance of light by whole, filtered, and filtered and centrifuged subsamples of water (the method used to obtain water samples is described below) was measured in the laboratory using a Spectronic 100 spectrophotometer equipped with a 10 cm cell at a wavelength of 543 nm (near the middle of the visible spectrum). Absorbance was measured relative to distilled/deionized water. 3) The concentration of filtered suspended solids was measured as the difference in the weight of a GF/C filter dried to constant weight before and after filtering a known volume of water.

Solar irradiance (PAR) was measured with quantum sensors (Lambda Instruments Co., Lincoln, Nebraska, model LI-190S) at Inuvik in 1985 and 1986 and at Tuktoyaktuk in 1986. The Inuvik data were recorded on strip charts, which were digitized with a Calcomp 9100 digitizer to give half hour mean values; the Tuktoyaktuk data (supplied by M. Lawrence, FWI) were recorded on a LI-550 printing integrator (Lamda Instr.).

Water samples for chemical analysis, phytoplankton biomass, and productivity measurements were collected with an integrating sampler (Shearer 1978). This sampler is a harness that accepts a 4 L bottle. Attached to the bottom of the harness is an epoxy coated lead weight of sufficient mass to submerge the empty sample bottle. Hydrostatic pressure forces water into the sampler at a slow rate which is independent of the depth where the sampler is located at any time. Integrated samples were obtained by raising and lowering the sampler in the water column until the bottle was full. Sample bottles were made of transparent polycarbonate and were wrapped in opaque plastic tape to prevent exposure of the sampled water to full surface irradiances. Because the currents in the Mackenzie River channels were too strong to allow the use of the integrating sampler, water samples were obtained from these locations by dipping a bottle at the surface. Sample bottles were transported to the laboratory in insulated coolers. The period from the time of sampling until the time the samples arrived in the laboratory was 0.5-3 hours for stations in the Mackenzie Delta and 1.5-5 hours for the Tuktoyaktuk Peninsula stations. Sample bottles were cleaned after each sampling trip by rinsing five times with tap water, three times with distilled water, and then draining until dry.

In the laboratory, the 4 L sample bottles were mixed by inverting them vigorously. Subsamples were then taken in the following order (subsamples were unfiltered unless otherwise indicated):

- Total inorganic carbon (TIC): Triplicate samples of 20 mL each were drawn into 50 mL plastic syringes. These were analysed within a day on a gas chromatograph using the method described by Stainton et al. (1977).
- Phytoplankton primary production: A 1 L brown glass bottle was filled by siphoning from the

field sampling bottle using silicone rubber tube. A disposable plastic syringe fitted with a short length of Tygon tubing was then used to add 6 mL of ^{14}C stock solution (activity 7.4 x 10^5 Bq•mL^{-1} = 20 µCu•mL^{-1}) to this subsample. After inverting several times to mix, aliquots were siphoned into 10 clear and two darkened 60 mL Pyrex bottles using a tube made of silicone rubber. These were placed in an incubator for three hours. The incubator was a simple rectangular trough (1.05 x 0.42 x 0.14 m) made of 9 mm opaque PVC plastic except for the end next to the light source, which was made of transparent plexiglass. A 150 watt high pressure sodium fixture served as the light source for the incubator. Because this type of light emits relatively little heat, the water in the incubator reservoir could be kept close to *in situ* temperatures by adding small amounts of ice once or twice during a 3 h incubation. While the bottles were incubating, the levels of PAR in the incubator were measured with a Biospherical QSL-100 spherical quantum sensor. All incubator positions were always occupied by water-filled glass bottles to achieve a relatively constant light field as samples were added and removed.

At the end of the incubation period, the bottles were removed from the incubator and 4 mL was withdrawn from each of the incubated bottles with an Oxford Macro pipette and put into glass scintillation vials containing 0.5 mL of 0.1 N HCl. The final pH in these scintillation vials was about 2.5. Unfixed inorganic ^{14}C was stripped from the vials by bubbling the contents with air for 20 min using the apparatus described by Shearer et al. (1985). "Standards" to determine the amount of inorganic ^{14}C available for uptake were prepared by pipetting five replicates of 4 mL each from one of the incubated bottles into scintillation vials containing 0.5 mL of pH 10 buffer. Fifteen mL of Beckman Ready-Solv MP scintillation fluor was added to both the standards and the bubbled samples, and their radioactivity was assayed in a Beckman LS7500 liquid scintillation counter. Raw counts were converted into absolute disintegrations by the "H-number" method which is built into this instrument. Standards were counted for one minute and samples were counted for 50 minutes or 10 000 disintegrations, whichever occurred first. If the samples could not be counted within a few days, 0.5 mL of pH 10 buffer was added to each vial and they were stored in a refrigerator. The equations given in Shearer et al. (1985) were used to calculate rates of photosynthesis from dpm, total inorganic carbon concentrations, and standards.

The programs of Fee (1984) were used to calculate photosynthetic parameters (P_m^B = the rate of carbon uptake at saturating irradiances per unit of chlorophyll, and α = the slope of the light limited part of the curve relating photosythetic carbon uptake per unit of chlorophyll to light) from the photosynthetic rates, chlorophyll concentrations, and incubator irradiances. These programs were also used to calculate daily and annual *in situ* primary production rates from input of photosynthetic parameter, water transparency, and solar irradiance data. Production was calculated for both actual and simulated cloudless irradiances. These programs were also used to calculate morphometry-corrected primary production rates and mean irradiances in the water column for the Tuktoyaktuk Peninsula lakes, Noell Lake, and NRC Lake. A new program (that took into account the seasonal fluctuations of water levels in the Mackenzie River and resulting changes in lake morphometry) was developed to calculate morphometry-corrected production rates and mean water column irradiances in Big Lake, Skidoo Lake, New Lake, South Lake, and South Lake Bay.

- Phytoplankton: Samples for species identification and counts were poured into 100 mL amber glass bottles and were preserved initially with Lugol's iodine solution; formalin was added later. Methodological details and complete data presentations will be presented elsewhere.
- Chemical analyses (alkalinity, pH, specific conductance, suspended phosphorus, suspended nitrogen, suspended carbon, major anions, major cations, total inorganic carbon, dissolved organic carbon, total dissolved nitrogen and phosphorus, filtered suspended solids, and chlorophyll-a): Details of sample preparation and analytical methods for these determinations and complete data presentations will be presented in another report in this series. We report here only the results directly relevant to phytoplankton primary production (chlorophyll-a and total inorganic carbon).

Bathymetric maps of South Lake (sounded 26 July 1985) and Big Lake (sounded 1 and 6 August 1985) were drawn from depth transects measured with a Raytheon DE719 Precision Survey Fathometer Depth Recorder, kindly loaned by the National Hydrology Research Institute (NHRI). Bathymetric data for Skidoo, NRC, and New lakes are from Bigras (1987). Lake morphometry was determined by digitizing the areas of depth contours on these maps with a Calcomp 9100 digitizer at a resolution of 0.25 mm; this is equal to 0.25 m in the small Mackenzie Delta lakes and 12.5 m in the largest waterbody (Kukjuktuk Bay).

DATA SUMMARY

Because Delta lakes are shallow and at least intermittently connected to a river that can fluctuate by 3-4 m in elevation in a season (Figs. 17 and 18), they undergo important changes in morphometry during the ice-free season. Any materials budget calculations for these lakes must make appropriate corrections for these seasonal morphometric changes. Figures 19-23 show how mean depth, lake volume, and surface area vary in the Delta study lakes as functions Mackenzie River stage.

Figure 24 shows mean daily water temperatures (1 m depth) at Kukjuktuk Lake 10 and in

Strange Bay (South Lake) in 1986. Figures 25 and 26 show daily totals of photosynthetically available solar irradiance for 1985 and 1986 at Inuvik and Tuktoyaktuk. Total irradiance for the ice-free period (10 June to 1 October) at Inuvik was 3.43×10^{6} and 3.27×10^{6} $mE \cdot m^{-2}$ in 1985 and 1986, respectively; these totals are 70.6% and 67.3% of the theoretical cloud-free weather total for this period. However, it should be noted that even though the seasonal total differed little between 1985 and 1986, the period from mid-July to mid-September was less sunny in 1986 than in 1985.

Depth profiles of temperature, PAR, conductivity, pH, and oxygen were measured at most stations. However, all of the lakes studied are shallow and stratification was rare. Kukjuktuk Bay was the only waterbody that was always stratified, with less saline water overlying more saline water. In order to avoid presentation of a large amount of redundant information, only the surface measurements of temperature, pH, specific conductance, and oxygen are reported here. Depth profile information will be analyzed elsewhere as required.

Appendix 1 summarizes the location, date, time, depth, temperature, *in situ* pH, oxygen, percent saturation of oxygen, *in situ* specific conductance, Secchi disk depth, extinction coefficient, percent reflection of light, TIC, chlorophyll, and phytoplankton photosynthesis parameters for all sampling stations arranged by station number. Appendix 2 contains the same information as Appendix 1 but organized so that all information for each sampling location is together. Table 2 summarizes the minima and maxima of the measured variables. Table 3 summarizes the time-weighted ice-free season means of the measured variables.

Figures 27 and 28 show how daily integral primary production varied over time in the Mackenzie Delta and Tuktoyaktuk Peninsula lakes, respectively. Figures 29 and 30 show the seasonal patterns of change of mean water column irradiance in the Delta and Tuktoyaktuk Peninsula lakes in 1985 and 1986. Table 4 summarizes the annual total primary production rates in all of the studied waters.

DISCUSSION

GENERAL LIMNOLOGY

Although lakes on the Mackenzie Delta and Tuktoyaktuk Peninsula are similar in size and depth, they display several important limnological differences: 1) The period when the lakes were ice-covered was about a month shorter in the Mackenzie Delta than in the Tuktoyaktuk Peninsula. The Delta lakes lost their ice in early June when the Mackenzie River reached its flood peak, while the Kukjuktuk lakes remained ice-covered until late-June or mid-July when air temperatures became high enough to melt the ice cover. 2) Maximum midsummer water temperatures were 5 to 7°C cooler in the Kukjuktuk lakes than in the Delta lakes (Fig. 24). This temperature difference was similar in both 1985 and 1986 even though the Beaufort Sea ice pack remained atypically close to shore in 1985 and kept temperatures in the Kukjuktuk lakes lower than has been observed in other years (B. Fallis and L. DeMarch, FWI unpubl. data). 3) All the Delta lakes were reset to a common chemical condition at the start of the open water season due to flooding by the Mackenzie River; the Kukjuktuk lakes were much more diverse in their chemical composition. 4) Water level (Figs. 17, 18) and transparency (Table 2) varied greatly during the ice-free season in the Delta lakes while they were much less variable in the Kukjuktuk lakes. The high variability of transparency in the Delta lakes is a consequence of spring flooding by the Mackenzie River. At the time of flooding, all the Delta lakes studied were filled with turbid water. During the summer, water levels in the river channels dropped by 3-4 m. As the channel level dropped, the transparencies and levels of each Delta lake changed, depending primarily on the level of the sill that connected each the lake to a channel. Those lakes with low sills received channel water more or less continuously (Big Lake, Skidoo Lake, and New Lake) throughout the summer and consequently remained turbid. Those with high sills became disconnected from a channel (NRC Lake) and quickly achieved high transparencies and showed little fluctuations of water level. Lakes that were intermediate between these two extremes (e.g. South Lake and its bays) received channel water infrequently during the summer and were thus more variable both in transparency and level. The Kukjuktuk lakes, on the other hand, did not fluctuate significantly in either level or in transparency.

LIGHT EXTINCTION

Transparency varied greatly in the waters studied. At one extreme were the low-closure Delta lakes (e.g. Big Lake) which always contained very turbid Mackenzie River water. At the other extreme were the Kukjuktuk lakes (e.g. Lake 28) which contained very little dissolved or suspended matter. Because we knew that such extreme gradients of transparency occurred in the study lakes and because light is one of the most important factors controlling phytoplankton primary production, several different measurements of transparency were made. The purpose of this section is to compare the data obtained with these different techniques, pointing out the advantages and limitations of each.

Transparency-related measurements included: 1) Secchi disk visibility depth, 2) vertical extinction of PAR as measured with a quantum cell and characterized by the extinction coefficient, 3) absorbance of light at 543 nm (measured in a spectrophotometer) by a whole water sample, a centrifuged water sample, and a filtered and centrifuged water sample (data to be presented elsewhere), 4) concentration of filtered suspended solids, and 5) the ratio of upwelling PAR at 0.2 m to downwelling light at this depth.

Extinction profiles measured with a quantum cell are the preferred method of characterizing the transparency of a waterbody. Advantages of this method are: 1) the results have similar precision for both very turbid and very clear waters, 2) results are independent of the visual acuity of the different individuals who make the measurements, and 3) these data are in the format used as input for the numerical model that is used to estimate phytoplankton productivity; that is, no assumptions need to be made in order to convert these data to the required format. For these reasons, this method will be used as the "standard" against which the other methods will be compared. Drawbacks with this method are: 1) it requires specialized equipment, and 2) in some situations it is difficult to make this measurement (e.g. in river channels where currents are strong, or when it is difficult to anchor an aircraft because of wind or great depth) and 3) it is a resultant of losses of downwelling light by both scattering and absorption processes and cannot be decomposed into these components without auxiliary measurements.

Secchi disk visibility depths are the easiest transparency measurement to make. Unfortunately, Secchi data have limited utility in waters of this region for the following reasons: 1) many lakes in this region are so shallow that the Secchi disk encounters the bottom before disappearing from sight. Thus, statistical relationships based on Secchi depths are likely to be biased since this method can only be used in the deeper and/or more turbid lakes, 2) it is difficult to measure Secchi depths in the channels of the Mackenzie River because of strong currents, 3) Secchi readings depend on the visual acuity and experience of the observer as well as on the absolute surface irradiance at the time the reading is made, 4) Secchi depths can be read to a precision of only about 10 cm, accounting for the high scatter of points at the upper end of the plot of 1/Secchi disk vs extinction coefficient (Fig. 31), and 5) theoretically there is no simple relationship between vertical light extinction and Secchi disk measurements, especially when the waters being compared vary both in suspended materials and dissolved color (as our study areas did: note the apparent difference in the slope of the relationship between extinction and 1/Secchi disk (Fig. 31) in the turbid Delta lakes as compared with the clear Kukjuktuk lakes).

The method of making light absorbance measurements at 543 nm has the following advantages: 1) absorbance measurements are easy to make with standard laboratory equipment, 2) the measurement is equally sensitive in both very clear and very turbid waters (Fig. 32), 3) absorbance can be measured anywhere that a water sample can be taken, and the method, therefore, is not limited by shallowness, inability to anchor, or strong currents, and 4) separate measurements can be made on unfiltered, filtered, and centrifuged subsamples to separate the effects of suspended and dissolved materials on light absorption.

The relationship between the absorbance of light at 543 nm by unfiltered water and the *in situ* extinction coefficient appears to be different for the Kukjuktuk and Delta lakes (Fig. 32). This is probably due to differences in the nature of the light extinguishing processes in these two groups of lakes. The Kukjuktuk lakes are less colored than waters in the Delta, with absorbances after filtration and centrifugation of 0.01 or less (Fig. 33). Filtered suspended solids (FSS) are also very low in the Kukjuktuk lakes relative to most Delta waters (Fig. 34). Based on these results, it seems that scattering of light by suspended materials is the major light extinguishing process in turbid Delta lakes while absorption by dissolved materials predominates in the Kukjuktuk lakes.

Like absorption at 543 nm, the concentration of filtered suspended solids is made from a water sample. Although this measurement is relatively easy to make, it suffers from the same problem as Secchi disk data, i.e. it is not uniformly sensitive over the entire range of transparencies. Figure 34 shows that at low FSS concentrations extinction coefficients vary widely. This high scatter results from the difficulty of making accurate FSS measurements when FSS values are very low, and from the fact that at low FSS values, differences in dissolved color can have a greater effect on extinction than FSS. Consequently, estimation of extinction from FSS is only useful in waters that are moderately to very turbid. FSS is well correlated with absorbance of whole water at 543 nm (Fig. 35).

There is a strong, positive relationship between the percentage of upwelling light in a waterbody and the extinction coefficient (Fig. 36). This is not surprising because this quantity is a measure of back-scattered light and is indicative of the amount of non-absorbing suspended material. It appears that there is a consistent difference between this relationship for the Kukjuktuk lakes and the Delta lakes. This may be important information for interpretation of remotely-sensed data which utilizes light emergent from the lake; however, the scatter in this relationship suggests that it can be used only to make qualitative estimates of in situ light extinction.

MEAN WATER COLUMN IRRADIANCES

Figures 29 and 30 show the changes of mixed layer daily mean PAR levels (I_{mean}, taken over the full 24 hour period) in the Delta and Kukjuktuk lakes, respectively. I_{mean} integrates into a single number the three factors that determine the availability of light to phytoplankton: 1) incident surface irradiance, 2) water transparency, and 3) mixing depth. The main use of I_{mean} is to determine whether light is an important factor limiting phytoplankton photosynthesis. Although critical values for light limitation vary for different algae, values of I_{mean} less than 5 $mE \cdot m^{-2} \cdot min^{-1}$ indicate that, on average, phytoplankton photosynthesis is likely limited by light (Hecky and Guildford 1984).

Immediately after ice-out in early June, transparencies were low everywhere in the Mackenzie Delta and this caused I_{mean} to be below 5 $mE \cdot m^{-2} \cdot min^{-1}$ at all stations.

I_{mean} in low closure lakes (e.g. Big Lake) remained below 5 $mE \cdot m^{-2} \cdot min^{-1}$ throughout the entire season, primarily because of high concentrations of suspended solids. I_{mean} was undoubtedly even lower in the channels of the Mackenzie River because FSS and absorption at 543 nm in water samples from the channels were the same as in Big Lake and the channels had deeper mixing depths than Big Lake. In South Lake and its bays transparency increased rapidly during June. Combined with the drop of water levels following the spring flood, this caused I_{mean} values to rise above 10 $mE \cdot m^{-2} \cdot min^{-1}$, a level which is clearly not limiting to photosynthesis, by mid-July. I_{mean} in Skidoo Lake and New Lake fluctuated between the values observed in Big Lake and South Lake. NRC Lake had very high I_{mean} values throughout the summer and light in this lake should never be limiting to phytoplankton photosynthesis.

I_{mean} in the Kukjuktuk lakes closely followed the seasonal changes of surface irradiance. Among-lake differences are the result primarily of different mean depths, with the exception of Lake 10 in 1986 when an intense phytoplankton bloom occurred in August. Except for this brief period, it is unlikely that phytoplankton were light limited in any of the Kukjuktuk lakes during the ice-free season.

PHOTOSYNTHESIS PARAMETERS

One of the reasons for measuring photosynthesis in the laboratory with an incubator instead of in situ is that it allows us to calculate the parameters of photosynthesis vs light curves. These parameters (P_m^B, the rate of photosynthesis per unit of chlorophyll at irradiances that are optimal for photosynthesis, and α, the slope of the curve relating photosynthesis per unit of chlorophyll to light at irradiances close to zero) must be known in order to be able to estimate integral primary production from chlorophyll concentration data. Because chlorophyll can be measured with remote sensors mounted in aircraft or satellites (Gower et al. 1985), knowledge of these parameters is the key to making accurate extrapolations of local measurements of primary production to larger regions.

Fee et al. (1987) showed that lakes where primary production was severely light limited had higher modal values of both P_m^B and α. The results of our measurements confirm this result (Fig. 37). Frequency distributions of both P_m^B and α in waterbodies where I_{mean} was always much less than 5 $mE \cdot m^{-2} \cdot min^{-1}$ (Big Lake, East Channel, NRC Channel) peaked at higher parameter values than in lakes where I_{mean} was always much higher than this critical value (Kukjuktuk lakes, NRC Lake). Lakes that had intermediate values of I_{mean} (South Lake and its bays, Skidoo Lake, and New Lake) had intermediate values of P_m^B and α. However, the separation of α values from lakes with very low and very high I_{mean} values was notably smaller than Fee et al. (1987) observed in other Canadian lakes. Surprisingly, the separation according to differences in I_{mean} was greater for P_m^B than for α. Compared to other Canadian lakes, α values in these lakes are low.

PRIMARY PRODUCTION RATES

Mackenzie Delta

From the point of view of primary production, the channels of the Mackenzie River that we sampled (East Channel and NRC Channel) and our "low closure" lake (Big Lake) were essentially replicates (Appendix 2). Productivity in these places was always strongly light limited and consequently the curve showing the seasonal changes of integral daily production in Big Lake (Fig. 27) was very similar in shape to the curve showing the seasonal changes of mean water column irradiance (Fig. 29). Water chemistry in Big Lake and in the channels was also nearly identical (Anema, pers. comm.). We conclude that "low closure" lakes and river channels are limnologically very similar, and data from any one of these sites can be used to characterize all these environments in any local part of the Delta.

Patterns and magnitudes of productivity were more variable in the "high closure" Delta lakes (Skidoo Lake, New Lake, South Lake and its bays, and NRC Lake). The curves showing the seasonal changes of production in these lakes (Fig. 27) did not closely mimic the curves showing I_{mean} (Fig. 29), indicating that light availability was not the main factor limiting phytoplankton production in them. Productivity in these lakes was higher than in Big Lake until late July, but varied thereafter both above and below the values from the "low closure" sites.

Variability of total production in the Delta lakes from 1985 to 1986 was low (Table 4). This may be related to the fact that the most important limiting factor (light) varies in a highly repetitive way in the Delta from year to year because it is driven by the annual cycle of Mackenzie River flows. Because of this, phytoplankton primary production in the Delta lakes can probably be well characterized with relatively short periods of study.

Kukjuktuk Lakes

In 1985, production in Lakes 10 and 28 was higher than in the other lakes (7, 14, and 18) from ice out until mid-August. This difference was not seen in I_{mean} (Fig. 30) and may reflect differences in nutrient availability. From mid-August until freeze-up in the fall of 1985, phytoplankton productivity in all Kukjuktuk lakes was essentially identical. With the exception of a single midsummer value, production in Kukjuktuk Bay was very similar to the values observed in the Kukjuktuk lakes.

Because of the overall similarity of production observed in all of the Kukjuktuk lakes in 1985, only two Kukjuktuk lakes (10 and 18) were monitored in 1986. However, in 1986 the patterns of phytoplankton productivity in these two lakes were dissimilar (Fig. 28) and total production in both was much higher than in any of the Kukjuktuk lakes in 1985 (Table 4). High interannual variability in the Kukjuktuk lakes is probably causally related to the fact that the timing of ice-out is more variable than in the Delta and that a single overriding physical factor (light) does not control primary production in these lakes as it does in the Delta. In any case, it is clear that an accurate characterization of primary production requires a longer period of study in the Kukjuktuk lakes than in lakes of the Mackenzie Delta.

CONCLUSIONS

Despite important differences in transparency, temperature, and chemistry between lakes of the Mackenzie Delta and the Tuktoyaktuk Peninsula, total phytoplankton production for the ice-free season was very similar in these two areas. In 1985 production ranged from 3.8-7.5 g $C \cdot m^{-2} \cdot yr^{-1}$ in the Delta lakes and from 4.3-7.1 in the Kukjuktuk lakes; in 1986 the range was 4.1-7.7 in the Delta lakes and 7.5-24.2 in the Kukjuktuk lakes. Differences in phytoplankton productivity are thus unlikely to be an important factor causing migration of juvenile whitefish from the Mackenzie Delta to the Kukjuktuk lakes.

The ice-free season phytoplankton production rates recorded in 1985 are among the lowest reported in the literature but they are comparable to values from other Arctic lakes (Kalff and Welch 1974). Climate is undoubtedly a factor causing such low productivities in Arctic lakes. Compared to more southerly locations, the open-water season at the latitude of Inuvik is short (3-4 months compared to 5-6 months at 50°N), and water temperatures are low (in 1985 temperatures were 7-10°C cooler than in similar sized lakes at 50°N).

However, other factors besides climate must keep phytoplankton productivities low in these waters since Subba Rao and Platt (1984) reported phytoplankton productivities up to an order of magnitude higher in the nearby Beaufort sea and other Arctic marine systems. As previously mentioned, low transparency constrains phytoplankton production in much of the Mackenzie Delta. Nutrients probably limit primary production in the higher closure Delta lakes as well as in the Kukjuktuk lakes; Kalff and Welch (1974) also reported nutrient limitation in Char Lake.

Shallow depth is another factor that contributed to low areal production rates in most of the lakes that we studied. A high percentage of incident light reaches the bottoms of all of the Kukjuktuk lakes (except for Lake 28) and several of the clearer Delta lakes. Numerical simulations (Fee, unpubl.) show that if these lakes were as deep as their potential euphotic zone depths (the depth where 0.5% of surface light would occur), integral production would be as much as 50% higher. Even these rates, however, are only one-quarter of the annual production of the least productive lakes at the Experimental Lakes Area (ELA), located at 50°N in northwestern Ontario (Fee et al. 1982).

Besides phytoplankton primary production there are other potentially important sources of food that could support the fishery of this region. 1) Macrophytes: Extensive growths of macrophytes occur in "high closure" Delta lakes (South Lake and its bays, NRC Lake) and all of the lakes on the Tuktoyaktuk Peninsula. Preliminary estimates of annual macrophyte production rates in South Lake show it to be five to 10 times higher than phytoplankton production (Guildford, et al., unpubl.). In Lake 18 on the Tuktoyaktuk Peninsula phytoplankton gross production was only one-third of the benthic macrophyte productivity (P. Ramlal, unpubl. data). When macrophytes die and decompose their stored carbon becomes available to fish through detrital microbial pathways. 2) Allochthonous dissolved and suspended organic materials: Delta lakes are filled with silty water at the time of flooding. Some of this imported material is converted through detrital microbial pathways into forms that are available to fish. 3) Algae growing on the surfaces of mud and plants: Benthic algal growths are favored by the shallowness of the lakes and the consequently high levels of photosynthetically available light reaching the bottom. Benthic invertebrates (e.g. snails) convert this material into forms that can be utilized by fish. Some species of fish can also feed directly on benthic algal growths (Fee 1965) but it is unclear whether any of the fish of this region do this.

We are currently assessing the relative importance of these different food sources to the Mackenzie Delta fishery. Such an assessment must take into account not only the magnitude of the food source but also the relative efficiency with which that food can be converted into forms utilizable by fish; for example, detrital pathways should be less efficient than planktonic ones because they involve more trophic levels. Further, the unique role that certain foods play must be considered; for example, the availability of zooplankton may be especially critical to the survival of juvenile fish. Our study of food pathways from plants to fish in these lakes will be based primarily on stable isotopes of carbon, nitrogen, and sulfur.

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REFERENCES

BIGRAS, S.C. 1987. Lake regimes, Mackenzie Delta, N.W.T., 1984. NHRI Scientific Series Contribution No. 87005: vi + 52 p.

BOND, W.A. and R.N. ERICKSON. 1985. Life history studies of anadromous coregonid fishes in two freshwater lake systems on the Tuktoyaktuk Peninsula, Northwest Territories. Can. Tech. Rep. Fish. Aquat. Sci. 1336: vii + 61 p.

FEE, E.J. 1965. Life history of the northern common shiner, *Notropis cornutus frontalis*, in Boone County, Iowa. Proc. Iowa Acad. Sci. 72: 272-281.

FEE, E.J. 1984. Freshwater Institute primary production model user's guide. Can. Tech. Rep. Fish. Aquat. Sci. 1328: v + 36 p.

FEE, E.J., D. HAYWARD, and J.A. SHEARER. 1982. Annual primary production in lakes of the Experimental Lakes Area, northwestern Ontario; 1976-1980 results. Can. Data Rep. Fish. Aquat. Sci. iv + 33 p.

FEE, E.J., R.E. HECKY, and H.E. WELCH. 1987. Phytoplankton photosynthesis parameters in central Canadian lakes. J. Plankton Res. 9: 305-316.

HECKY, R.E. and S.J. GUILDFORD. 1984. Primary productivity of Southern Indian Lake before, during, and after impoundment and Churchill River diversion. Can. J. Fish. Aquat. Sci. 41: 591-604.

KALFF, J. and H.E. WELCH. 1974. Phytoplankton production in Char Lake, a natural polar lake, and in Meretta Lake, a polluted polar lake, Cornwallis Island, Northwest Territories. J. Fish. Res. Board Can. 31: 621-636.

LAWRENCE, M.J., G. LACHO, and S. DAVIES. 1984. A survey of the coastal fishes of the southeastern Beaufort Sea. Can. Tech. Rep. Fish. Aquat. Sci. 1220: x + 178 p.

MACKAY, J.R. 1963. The Mackenzie Delta area, N.W.T. Can. Dep. Mines Tech. Surv. Geogr. Branch Mem. 8: 202 p.

MARSH, P. 1988. Hydrology of Mackenzie Delta lakes. *In* Northern Rivers and Lakes Workshop. Knowing the North: Integrating Tradition, Technology and Science. Boreal Institute for Northern Studies, University of Alberta, Edmonton.

SUBBA RAO, D.V. and P. PLATT. 1984. Primary production of Arctic waters. Polar Biol. 3: 191-201.

READ, C.J. and M.M. ROBERGE. 1986. Creel census and biological investigations of Noell Lake, Campbell Lake and Campbell Creek, North Territories. Can. Data Rep. Fish. Aquat. Sci. 571: iv + 33 p.

SHEARER, J.A. 1978. Two devices for obtaining water samples integrated over depth. Can. Fish. Mar. Serv. Tech. Rep. 772: iv + 9 p.

SHEARER, J.A., E.R. DEBRUYN, D.R. DECLERCQ, D.W. SCHINDLER, and E.J. FEE. 1985. Can. Tech. Rep. Fish. Aquat. Sci. 1341: iv + 58 p.

STAINTON, M.P., M.J. CAPEL, and F.A.J. ARMSTRONG. 1977. The chemical analysis of fresh water. 2nd ed. Can. Fish. Mar. Serv. Misc. Publ. 25: vii + 166 p.

Manual of primary production methodology.

Table 1. Physical features of the studied lakes. Because the morphometries of lakes in the Mackenzie Delta vary depending on the level (stage) of the Mackenzie River, the data given here are relative to the elevation of the lake surface above sea level on the date of the surveys (all midsummer; see lake maps for exact dates).

Water Body	Surface		Depths, m	
	Area (ha)	Stage (m)	Maximum	Mean
Mackenzie Delta				
Big Lake	826	2.12	4.0	2.2
Skidoo Lake	58.6	2.08	3.0	1.5
New Lake	42.5	2.57	3.5	1.6
South Lake	33.5	2.31	4.0	1.5
South Lake Bay	12.2	2.31	2.0	1.4
NRC Lake	5.2	3.71	1.6	0.9
Tuk Peninsula				
Kuk Bay				
Kuk Lake 7	306		3.0	1.2
Kuk Lake 10	1170		2.0	1.1
Kuk Lake 14	287		3.0	1.3
Kuk Lake 18	290		5.0	1.4
Kuk Lake 28	142		10.0	3.1
Other				
Noell Lake	2981		20.0	5.7
Boot Lake	23.4		----	---

Table 2. Minima and maxima of parameters observed at the sampling stations in the Mackenzie Delta and Tuktoyaktuk Peninsula in 1985 and 1986. The number preceding the name of the location is the year. Key to column headings:

Depth	maximum depth, m
Temp	surface temperature, °C
pH	*in situ* pH
O_2	oxygen concentration, mg•L^{-1}
%O_2	percent saturation of oxygen
Cond	specific conductance at 25°C, µS•cm^{-1}
Secchi	Secchi disk depth, m
e	light extinction coefficient, m^{-1}
%upw	100*(upwelling light at 0.2 m/downwelling light at 0.2 m)
TIC	total inorganic carbon, µM•L^{-1}
Chl	chlorophyll-a, mg•L^{-1}
P^B_m	light saturated rate of photosynthesis per unit of chlorophyll, mg C•mg Chl^{-1}•hr^{-1}
α	slope of photosynthesis vs light curve at irradiances near zero, per unit of chlorophyll, mg C•mg Chl^{-1}•E•m^{2}

Location	Depth	Temp	pH	O_2	%O_2	Cond	Secchi	e	%upw	TIC	Chl	P^B_m	α
85-BIG LAKE	1.0	7.8	7.8	9.2	84	205	0.15	1.98	13.3	1640	1.8	1.18	1.24
	3.8	16.2	8.7	13.0	114	270	0.50	12.23	23.5	1918	5.9	2.62	2.19
85-EAST CHANNEL		7.0	7.6	9.6	82	207				1634	1.5	1.25	1.21
		15.7	8.3	13.4	120	276				2016	6.7	2.69	3.40
86-EAST CHANNEL		7.9	7.6	8.9	88	205					0.6		
		16.8	8.2	12.1	108	281					2.6		
85-KUK BAY	1.8	3.7	8.3	11.0	94	10100	1.30	0.73	4.9	1194	0.9	1.42	1.12
	4.0	8.5	8.7	16.3	123	25200	2.70	1.07	9.2	1796	1.9	6.67	5.23
85-KUK LAKE 7	1.7	3.8	7.9	10.7	92	120		0.53	2.0	1000	2.5	0.63	0.66
	3.1	10.2	9.0	14.2	117	130		0.68	3.2	1077	5.0	1.12	0.98
85-KUK LAKE 10	1.3	4.2	7.8	10.7	95	112		0.69	4.1	699	5.3	0.56	0.73
	1.7	13.1	8.2	14.6	112	122		3.85	14.1	785	46.5	7.17	6.10
85-KUK LAKE 14	1.5	4.7	8.1	10.7	94	108		0.61	3.1	896	2.5	0.61	0.48
	2.5	11.1	9.7	15.1	126	124		0.83	5.1	1020	4.9	1.52	1.11
85-KUK LAKE 18	1.1	4.5	7.9	10.8	93	132		0.58	3.0	1159	2.6	0.73	0.65
	4.4	10.0	9.2	14.8	124	160		0.78	4.3	1270	3.9	1.34	1.28
86-KUK LAKE 18	1.2	5.4	8.0	9.7	90	115		0.66	3.7	1193	3.2	0.67	0.51
	4.5	13.1	8.5	14.5	116	172		1.36	5.9	1349	5.9	2.16	1.83
85-KUK LAKE 28	4.2	6.1	8.1	10.5	94	178		0.35	2.1	1453	1.6	0.63	0.80
	7.0	10.4	8.9	14.1	121	197		0.49	3.9	1605	2.0	1.41	1.67

Table 2. Cont'd.

Location	Depth	Temp	pH	O_2	$\%O_2$	Cond	Secchi	e	%upw	TIC	Chl	P_m^B	alpha
86-NEW LAKE	1.8	8.3	7.7	8.7	88	220	0.25	1.63	9.5	1398	1.5	0.94	1.15
	3.6	17.7	8.7	12.1	106	271	0.82	5.09	20.0	1780	6.2	2.67	2.21
86-NOELL LAKE	3.0	5.4	7.6	9.7	93	45		0.34	0.8	317	1.1	0.23	0.23
	6.8	14.9	7.9	14.8	117	62		0.52	2.6	389	3.1	0.86	0.98
85-NRC CHANNEL		8.7	7.6	9.3	85	206				1540	1.4	1.16	1.06
		15.5	8.8	13.6	121	277				1984	6.5	3.93	2.66
86-NRC CHANNEL		7.5	7.8	8.9	83	204				1451	0.4	1.43	1.24
		16.6	8.4	12.7	113	279				1870	2.5	3.46	2.81
86-NRC LAKE	0.7	4.1	8.0	8.7	67	264	0.90	0.77	2.9	739	1.8	0.49	0.41
	1.6	19.6	10.6	15.1	140	405	1.20	1.54	5.7	2488	9.0	3.69	1.90
85-SKIDOO LAKE	0.6	8.0	7.8	9.1	93	237	0.20	1.57	9.2	1562	1.9	0.94	0.84
	2.0	16.7	8.8	12.6	112	269	0.90	4.72	17.4	1860	5.3	2.00	2.86
86-SKIDOO LAKE	1.5	6.2	8.1	8.5	82	208	0.15	2.18	9.4	1438	1.0	1.19	0.99
	4.1	17.7	8.8	13.0	110	276	0.70	8.04	47.3	1805	6.2	2.04	2.05
85-SOUTH LAKE	2.0	7.3	7.3	8.3	75	213	0.35	1.04	3.1	1628	3.0	0.90	0.68
	3.8	17.5	8.9	12.9	111	286	2.00	3.75	11.3	2252	7.9	3.47	1.99
86-SOUTH LAKE	1.8	3.7	7.6	8.8	76	197	0.15	1.03	3.0	1497	0.7	0.86	0.97
	4.1	18.5	8.7	13.4	115	286	2.50	7.20	31.2	1896	11.8	1.82	2.13
85-SOUTH LAKE BAY	1.1	7.5	7.5	8.6	78	214	0.35	0.94	2.8	1519	2.5	0.73	0.76
	3.0	17.5	9.3	13.7	116	289	1.50	3.99	13.3	2104	8.2	1.75	1.98
86-SOUTH LAKE BAY	1.4	4.1	7.7	8.7	73	197	0.15	0.93	2.6	1506	1.0	0.71	0.65
	4.1	18.7	9.2	14.5	123	300	2.10	6.93	18.7	1976	8.2	2.57	1.90

Table 3. Time-weighted means of parameters observed at the sampling stations in the Mackenzie Delta and Tuktoyaktuk Peninsula in 1985 and 1986. The number preceding the name of the location is the year. See the legend for Table 2 for the key to column headings.

	Depth	Temp	pH	O_2	$\%O_2$	Cond	Secchi	e	%upw	TIC	Chl	P^B_m	α
85-BIG LAKE	2.24	12.8	8.4	10.3	98	240	0.30	4.89	16.6	1771	3.9	1.96	1.68
85-EAST CHANNEL		13.1	8.1	10.4	100	243				1787	3.3	2.30	2.04
86-EAST CHANNEL		14.4	8.0	9.6	100	250				1743	1.1		
85-KUK BAY	3.25	6.8	8.4	12.8	104	13297	1.90	0.87	6.5	1645	1.4	3.28	2.85
85-KUK LAKE 7	2.42	7.9	8.5	12.2	102	126		0.60	2.6	1023	4.0	0.81	0.80
85-KUK LAKE 10	1.52	8.1	8.4	12.1	102	131		0.92	6.2	737	6.9	0.93	0.96
86-KUK LAKE 10	1.49	9.2	7.9	11.7	101	106		2.23	9.7	687	19.3	2.35	2.41
85-KUK LAKE 14	1.93	8.4	8.7	12.3	105	120		0.74	3.8	959	3.4	1.07	0.83
85-KUK LAKE 18	2.54	7.8	8.7	12.2	103	154		0.66	3.8	1214	3.2	0.92	0.83
86-KUK LAKE 18	3.32	9.5	8.4	11.8	102	160		0.88	4.5	1297	4.1	1.61	1.50
85-KUK LAKE 28	5.96	8.8	8.6	12.0	103	187		0.39	2.9	1522	1.8	1.06	1.32
86-NEW LAKE	2.41	14.5	8.3	9.6	95	255	0.45	2.98	14.7	1679	5.1	1.54	1.41
86-NOELL LAKE	5.16	11.8	7.8	11.1	101	51		0.40	2.1	364	1.7	0.62	0.76
85-NRC CHANNEL		13.3	8.2	10.2	97	241				1771	3.3	2.80	1.93
86-NRC CHANNEL		14.2	8.1	9.6	95	244				1691	1.1	2.53	1.71
86-NRC LAKE	1.07	16.0	9.5	11.4	118	314	1.05	1.00	3.9	1356	3.2	1.44	1.02
85-SKIDOO LAKE	1.55	12.7	8.4	10.5	99	250	0.53	2.75	13.1	1755	3.3	1.48	1.51
86-SKIDOO LAKE	2.21	14.2	8.3	9.7	95	256	0.33	3.99	18.9	1673	4.7	1.63	1.38
85-SOUTH LAKE	2.84	13.2	8.4	10.1	96	264	1.32	1.49	5.3	1960	4.2	1.84	1.31
86-SOUTH LAKE	2.86	14.3	8.2	9.8	97	262	1.17	2.20	9.8	1779	4.8	1.37	1.12
85-SOUTH LAKE BAY	1.66	13.2	8.5	10.4	99	257	0.84	1.37	4.6	1830	4.1	1.37	1.04
86-SOUTH LAKE BAY	2.09	15.1	8.5	10.2	102	261	0.98	1.91	6.6	1767	3.9	1.26	0.93

Table 4. Annual phytoplankton primary production rates for the studied waterbodies. Values are corrected for the decreasing volume of the lakes as a function of depth (except for the Mackenzie River channel stations). The last columns give total primary production for the entire lake.

Water Body	$g\ C \cdot m^{-2} \cdot yr^{-1}$		$kg\ C \cdot lake^{-1} \cdot yr^{-1}$	
	85	86	85	86
Calculated with simulated cloudless insolation				
Mackenzie Delta				
Big Lake	3.8		30189	
Skidoo Lake	4.2	4.1	2428	2435
South Lake	7.5	7.7	2437	2659
South Lake Bay	6.8	5.3	826	669
NRC Channel*	3.5			
East Channel*	3.6			
New Lake		5.8		2527
NRC Lake		5.4		281
Tuk Peninsula				
Kuk Bay	6.2		328000	
Kuk Lake 7	4.8		14200	
Kuk Lake 10	7.1	24.2	81400	276000
Kuk Lake 14	4.5		12800	
Kuk Lake 18	4.3	7.5	12000	21200
Kuk Lake 28	5.7		7900	
Other				
Noell		3.3		97900
Calculated with actual insolation				
Mackenzie Delta				
Big Lake	2.3		17778	
Skidoo Lake	2.7	2.7	1535	1588
South Lake	4.4	5.2	1433	1766
South Lake Bay	4.6	3.2	577	405
NRC Channel*	2.4			
East Channel*	2.5			
New Lake		3.8		1615
NRC Lake		4.3		223
Tuk Peninsula				
Kuk Lake 10		17.4		198000
Kuk Lake 18		5.4		15100
Other				
Noell		2.3		67800

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* = not morphometry corrected

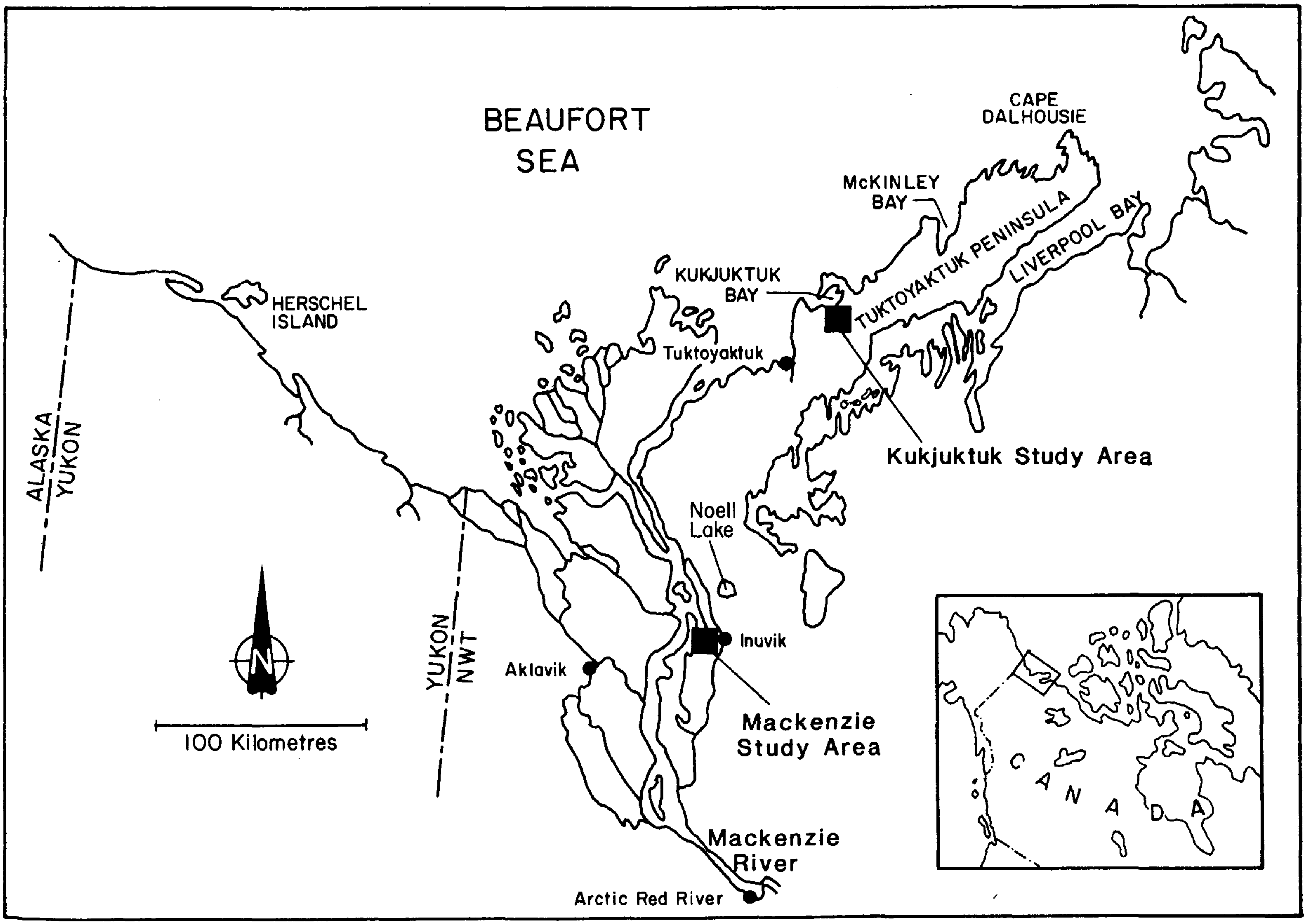


Fig. 1. Mackenzie Delta-Beaufort Sea area, showing locations of study sites in the Mackenzie Delta and the Tuktoyaktuk Peninsula.

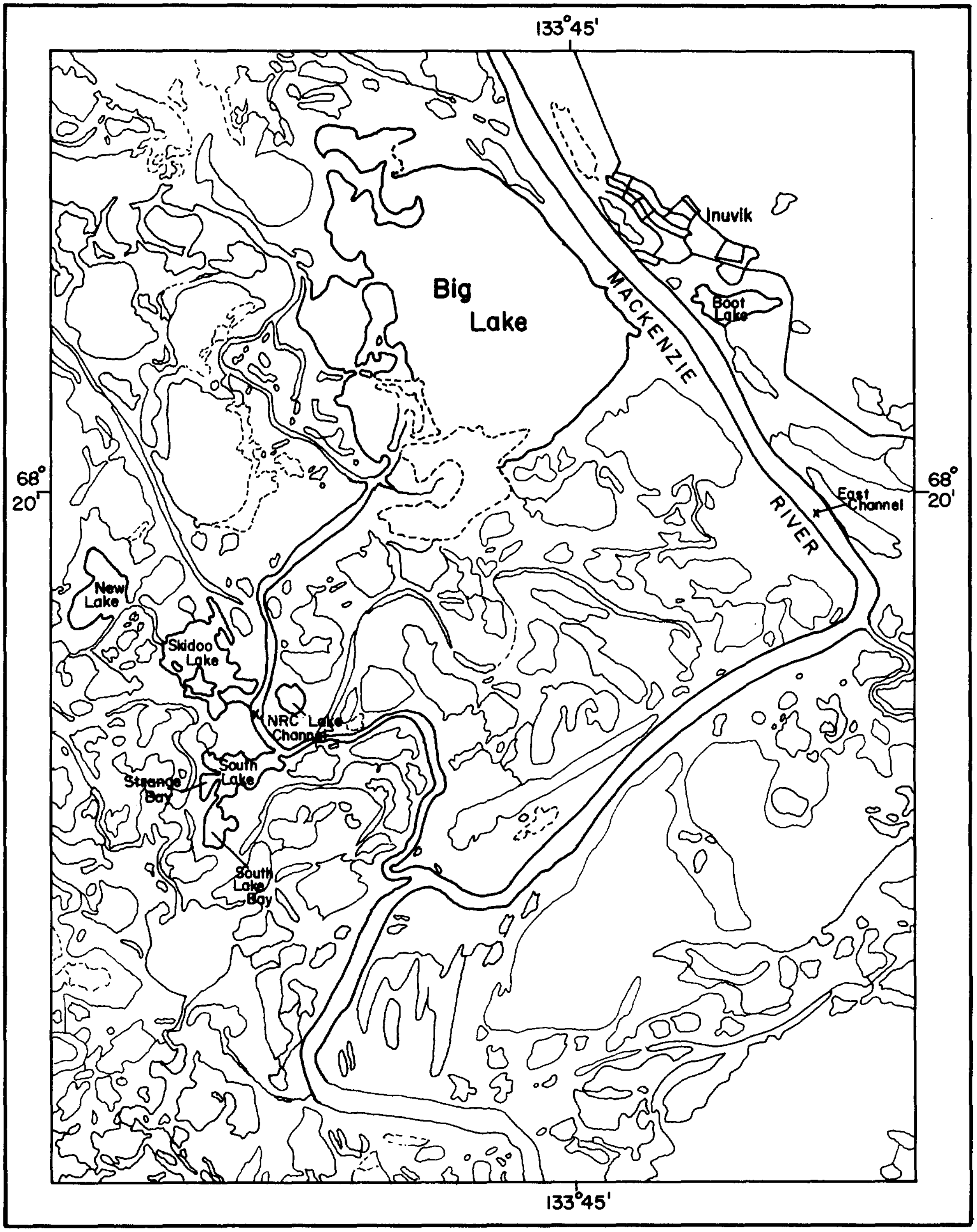


Fig. 2. The Mackenzie Delta near Inuvik. The dots show the locations of the sampling sites.

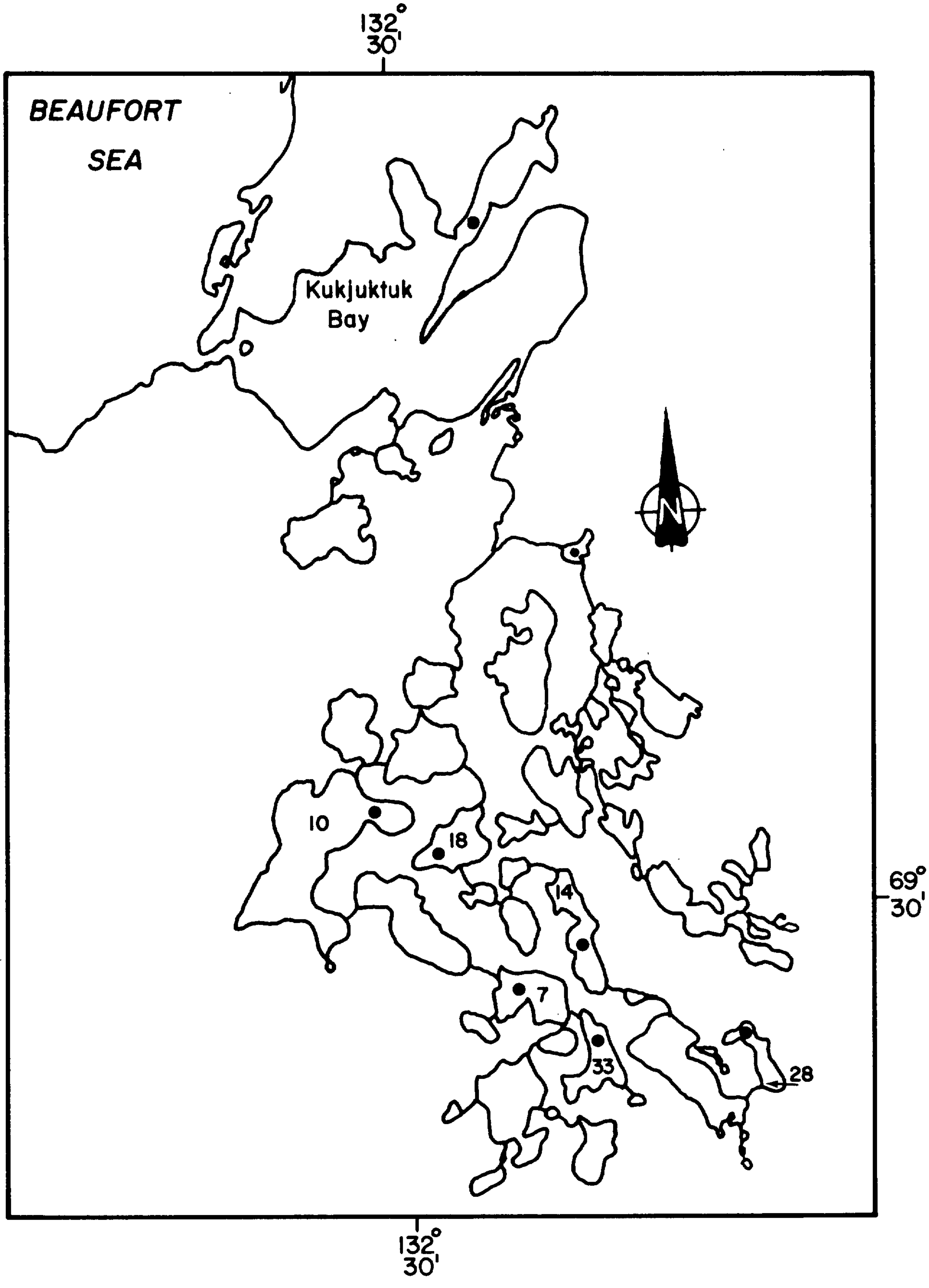


Fig. 3. The Kukjuktuk drainage basin. The dots show the locations of the sampling sites.

Fig. 4. Bathymetric map of Big Lake.

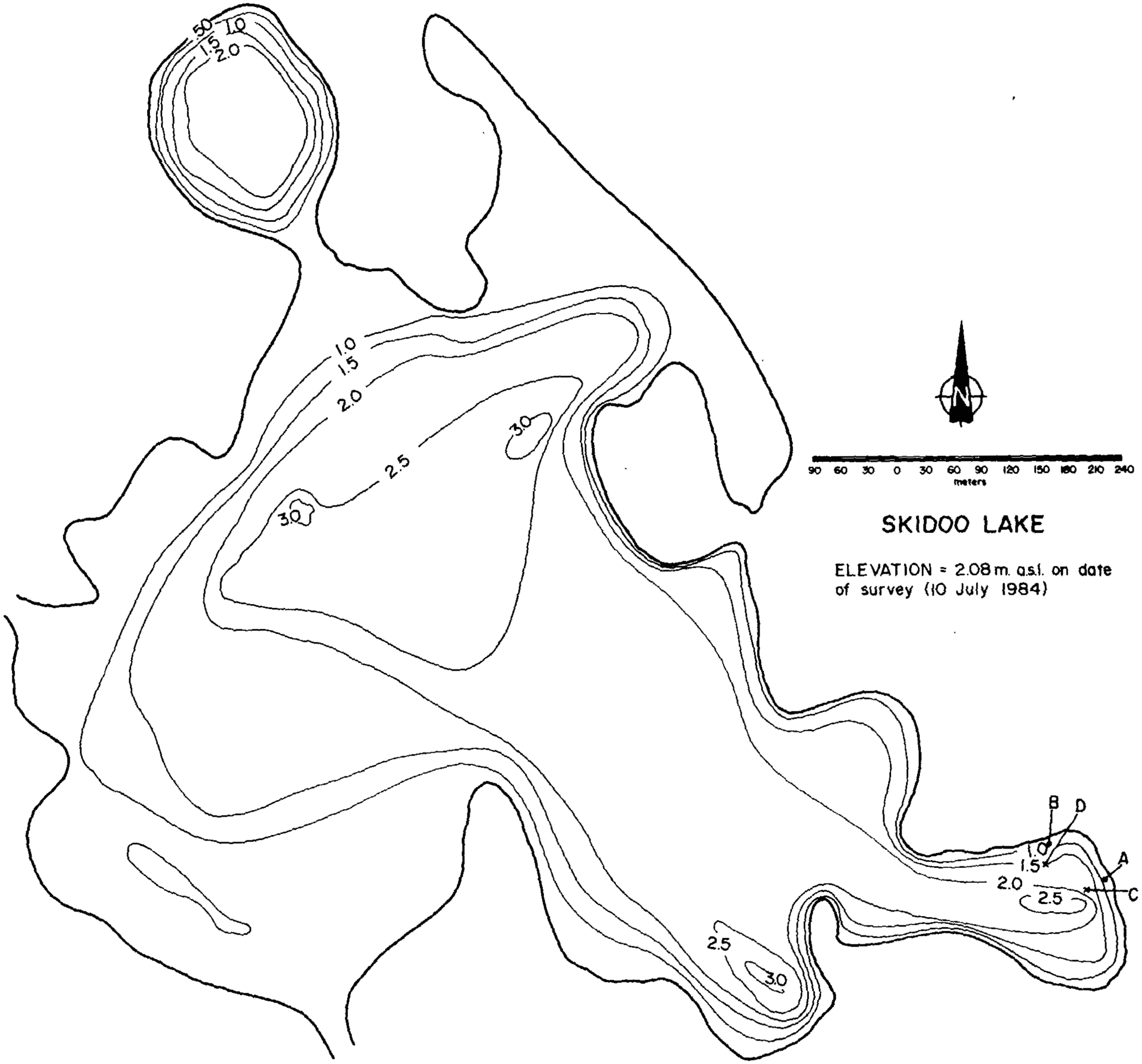
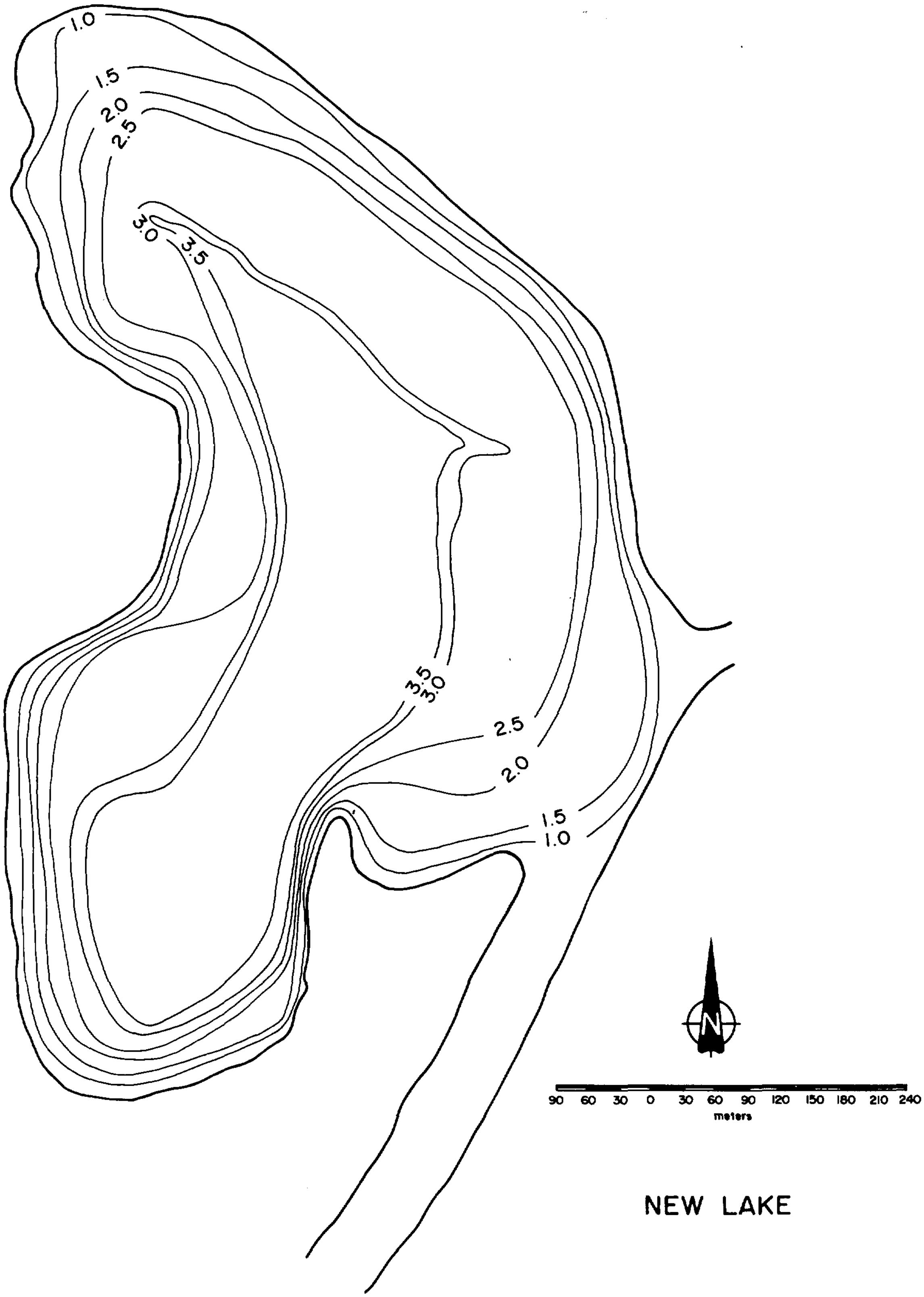


Fig. 5. Bathymetric map of Skidoo Lake.



ELEVATION = 2.08 m a.s.l. on date of survey (10 July 1986)

Fig. 6. Bathymetric map of New Lake.

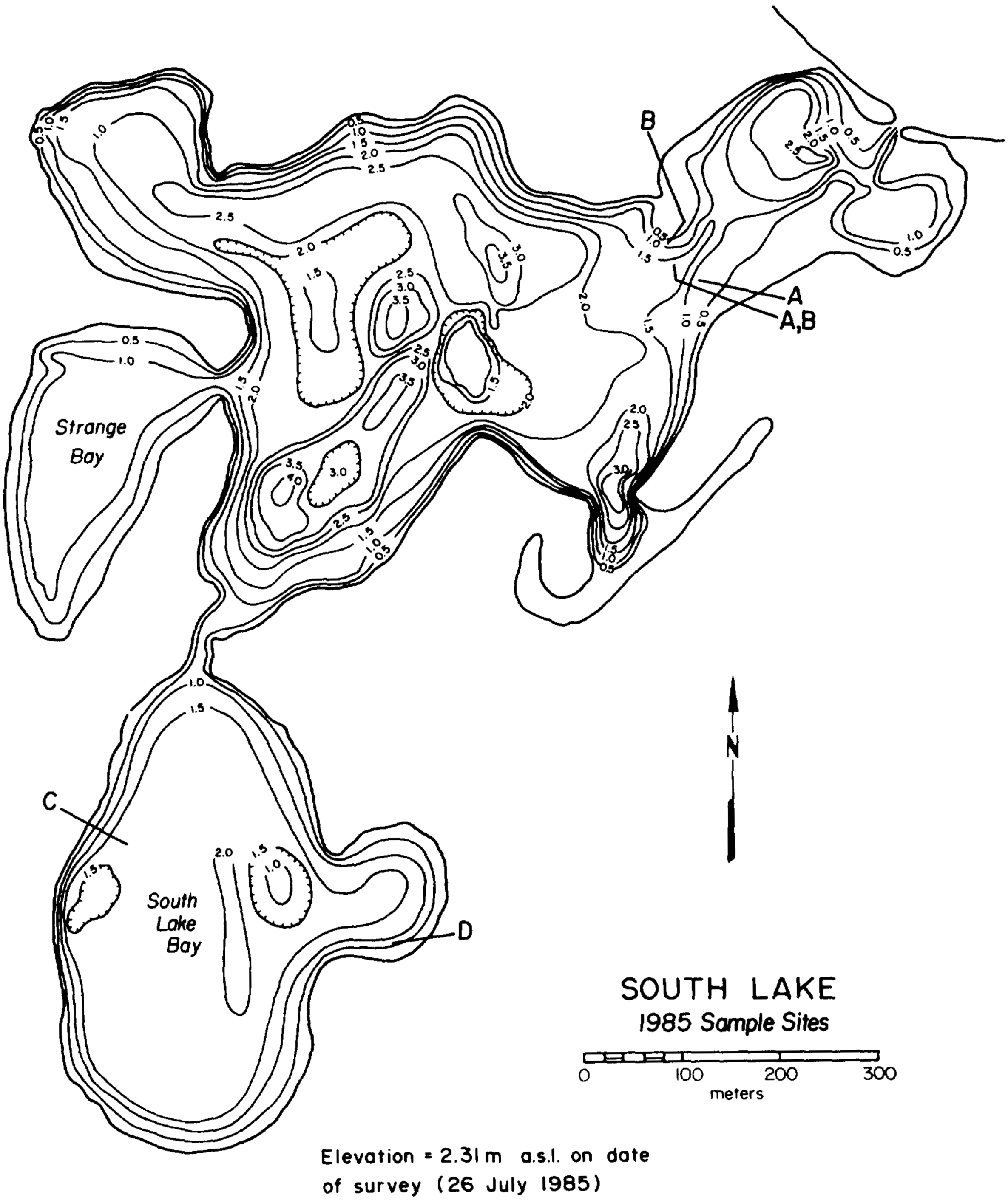


Fig. 7. Bathymetric map of South Lake showing locations of 1985 sampling sites.

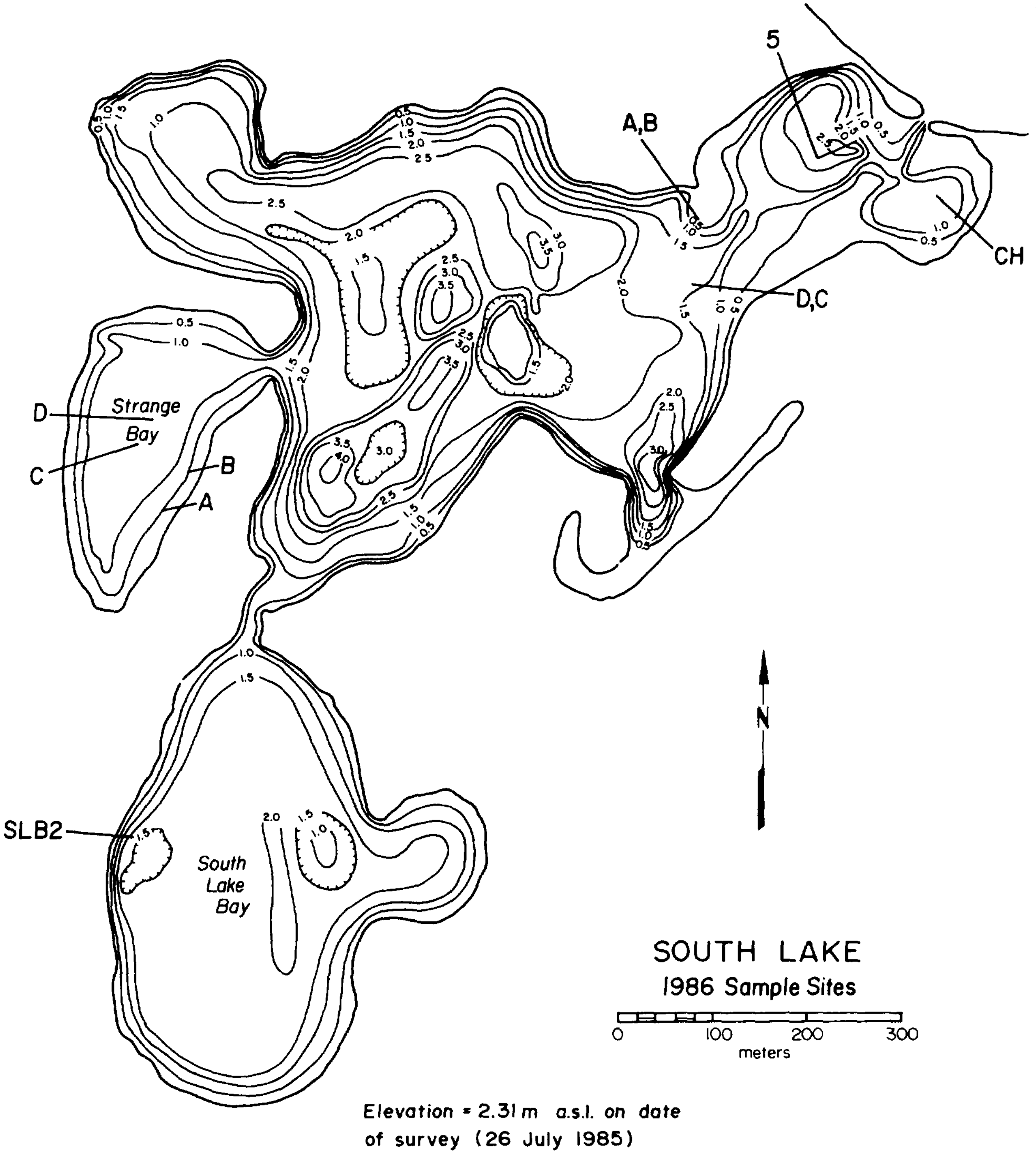
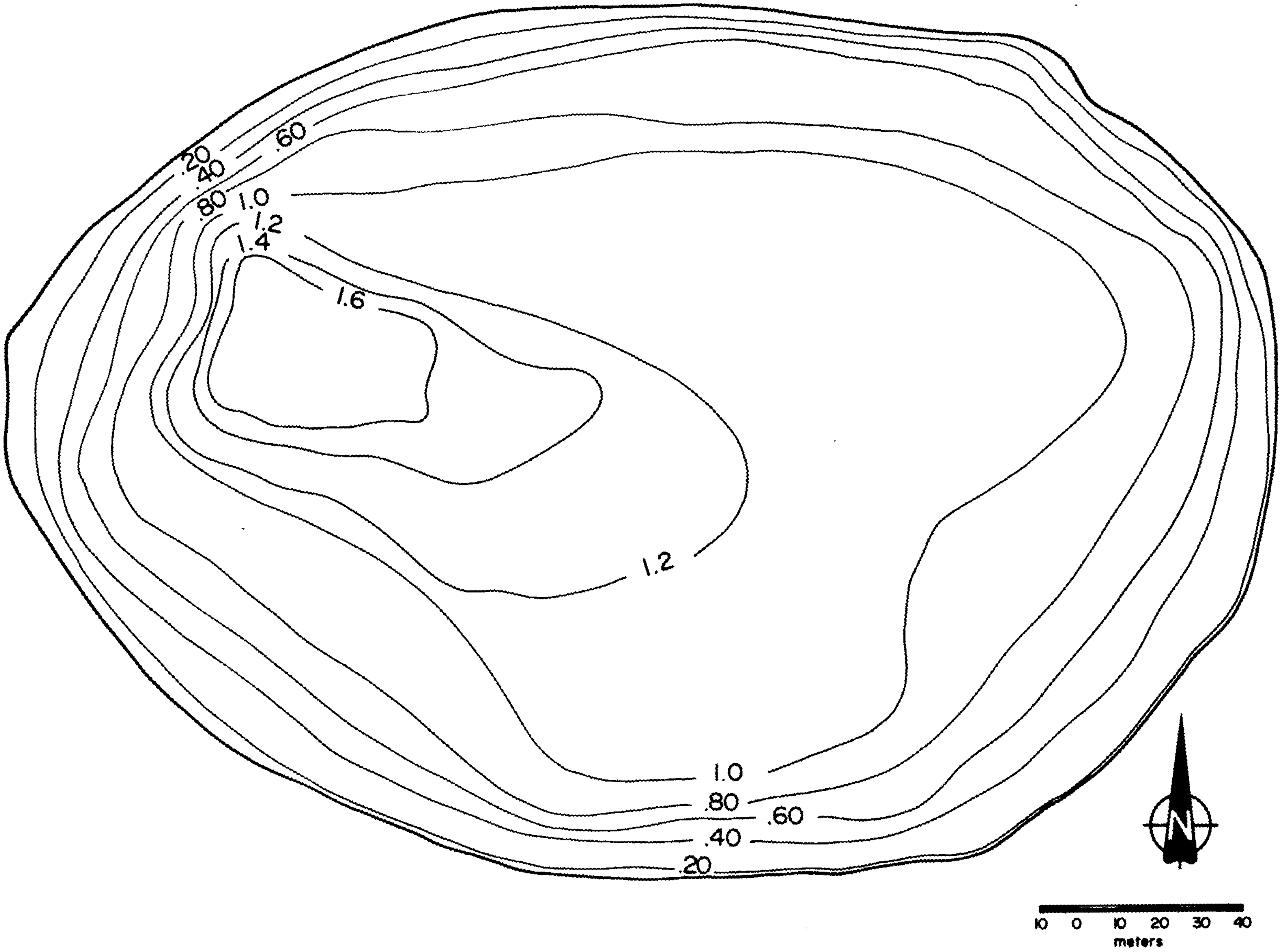


Fig. 8. Bathymetric map of South Lake showing locations of 1986 sampling sites.



NRC LAKE

ELEVATION = 3.71 m. a.s.l. on date
of survey (10 July 1984)

Fig. 9. Bathymetric map of NRC Lake.

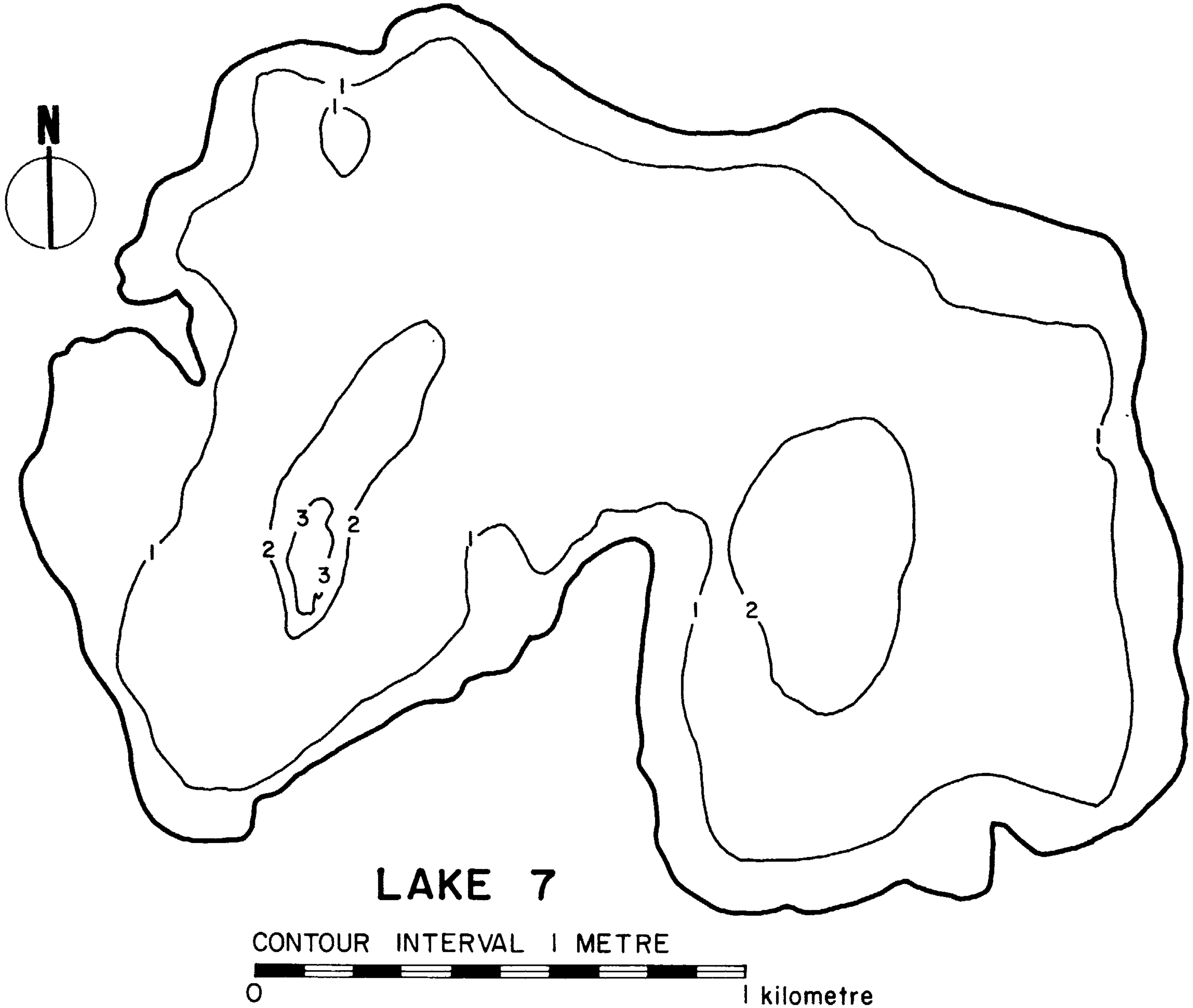


Fig. 10. Bathymetric map of Kukjuktuk Lake 7.

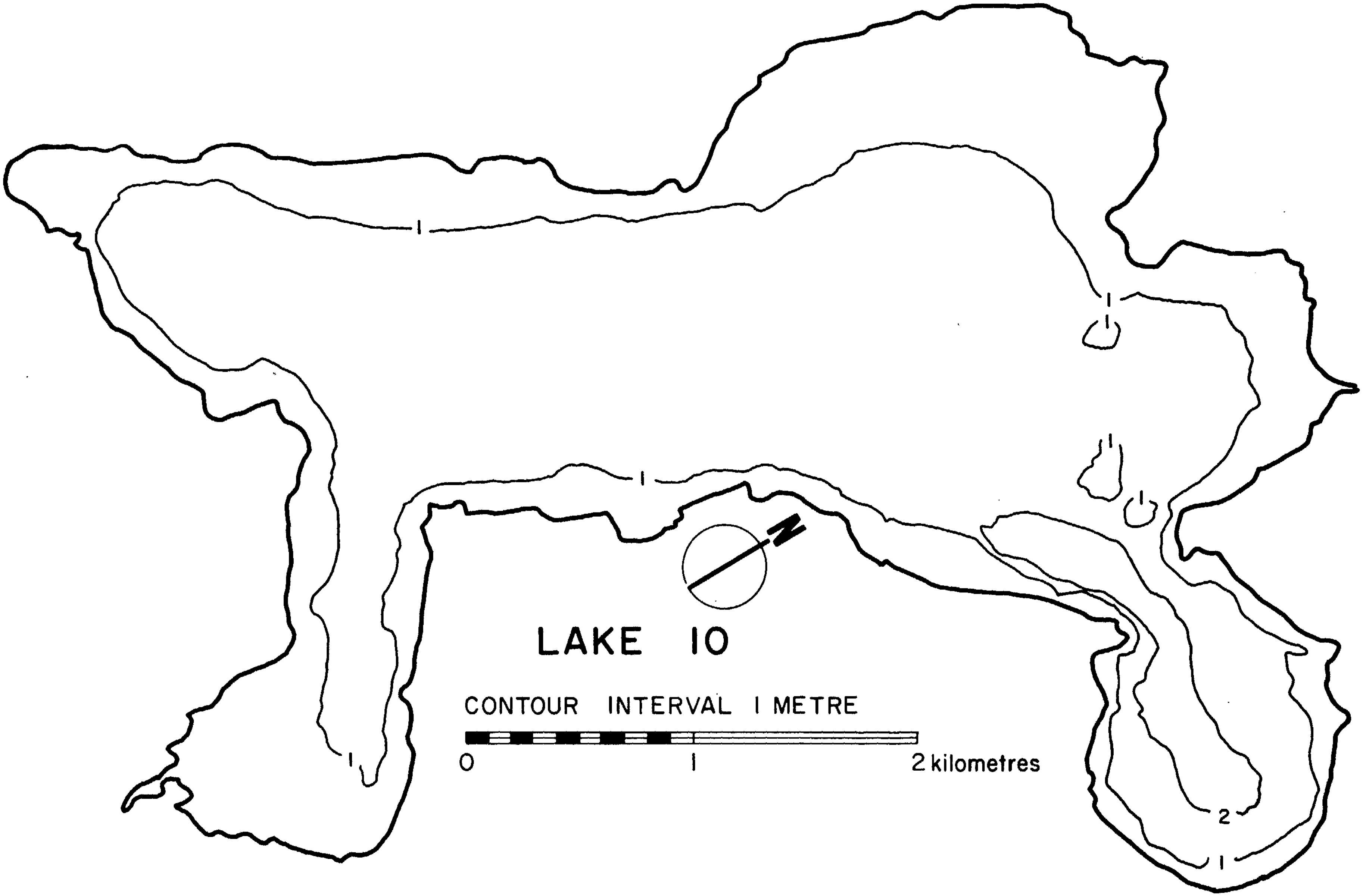


Fig. 11. Bathymetric map of Kukjuktuk Lake 10.

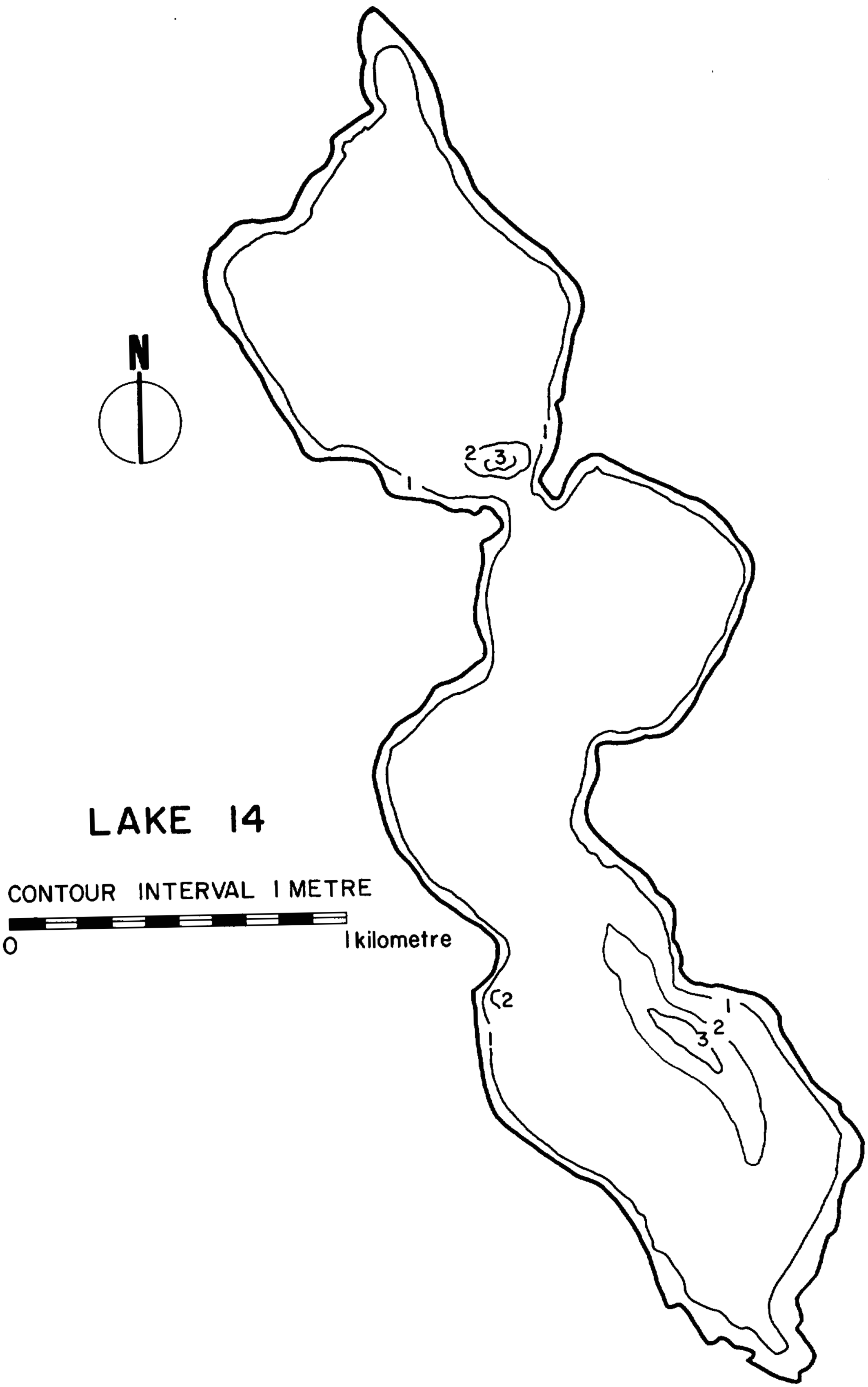


Fig. 12. Bathymetric map of Kukjuktuk Lake 14.

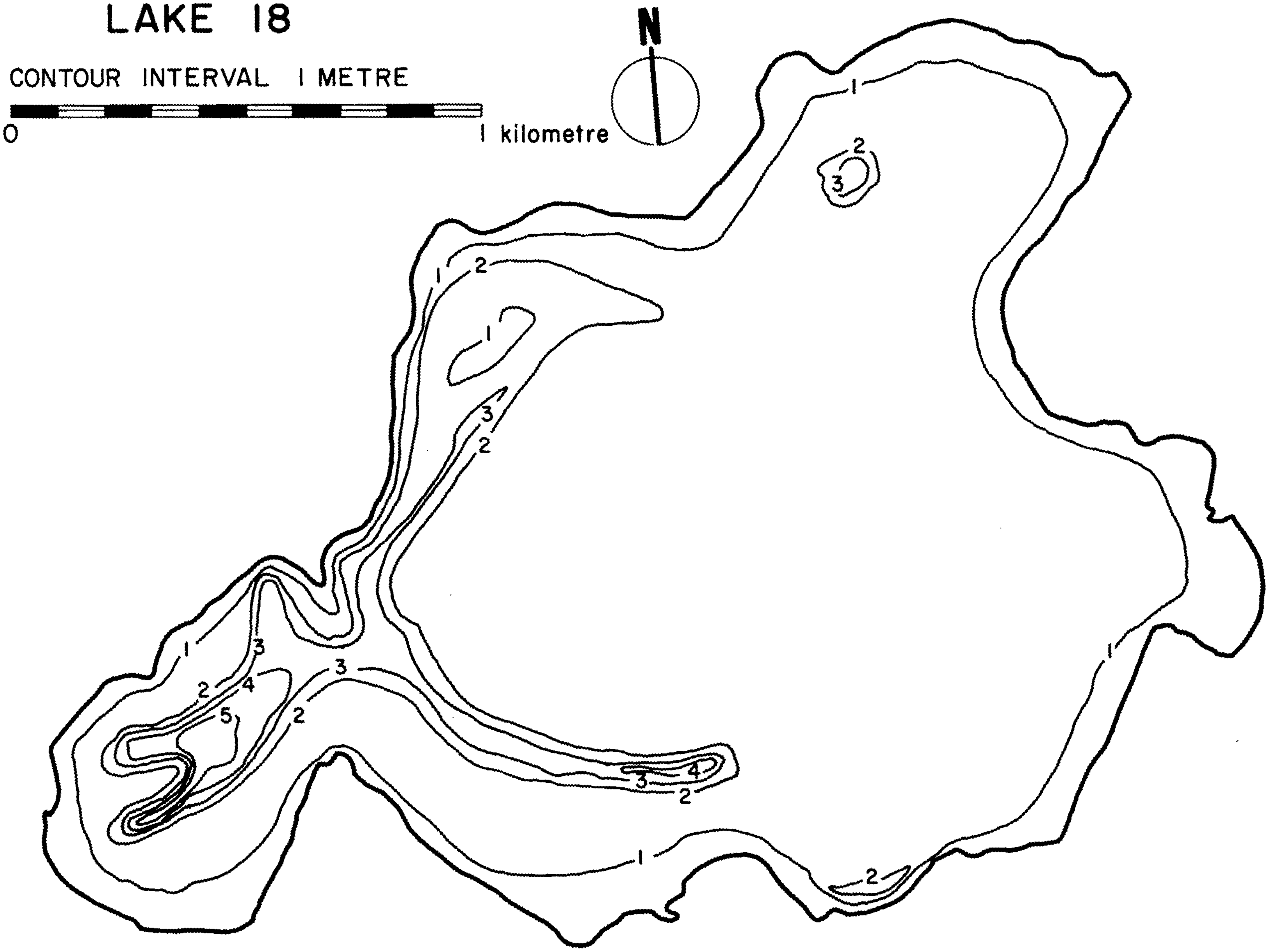


Fig. 13. Bathymetric map of Kukjuktuk Lake 18.

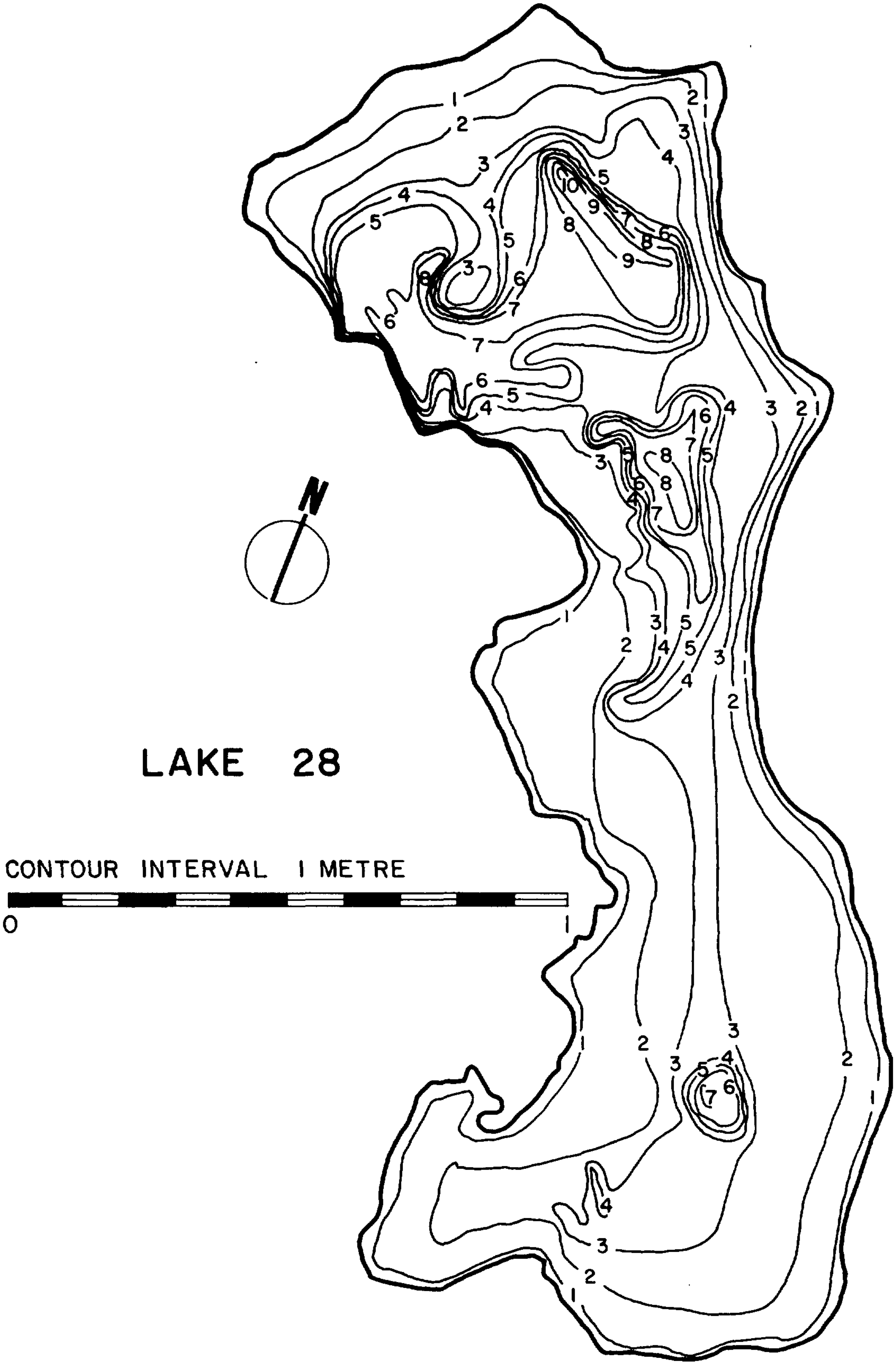


Fig. 14. Bathymetric map of Kukjuktuk Lake 28.

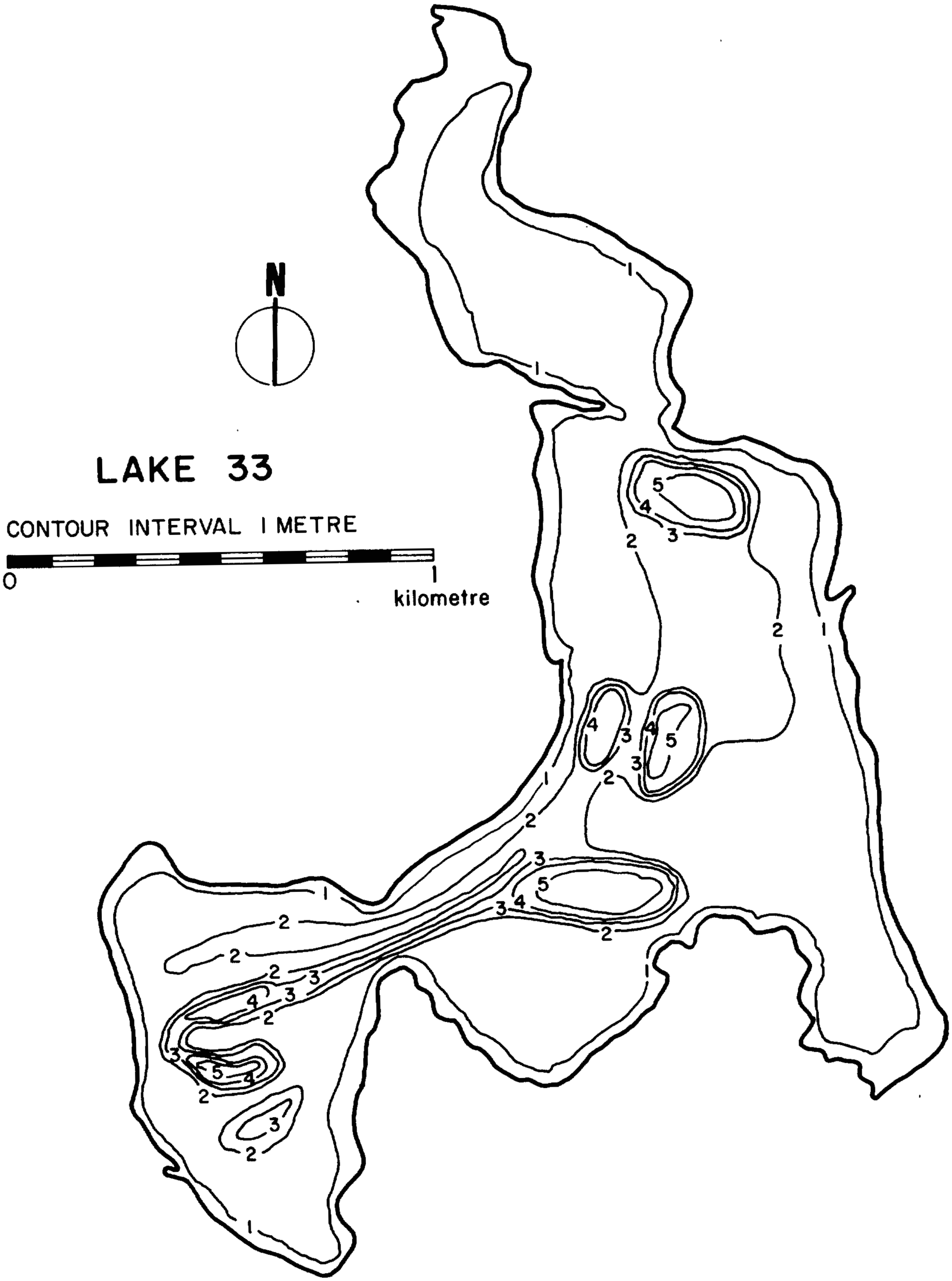


Fig. 15. Bathymetric map of Kukjuktuk Lake 33.

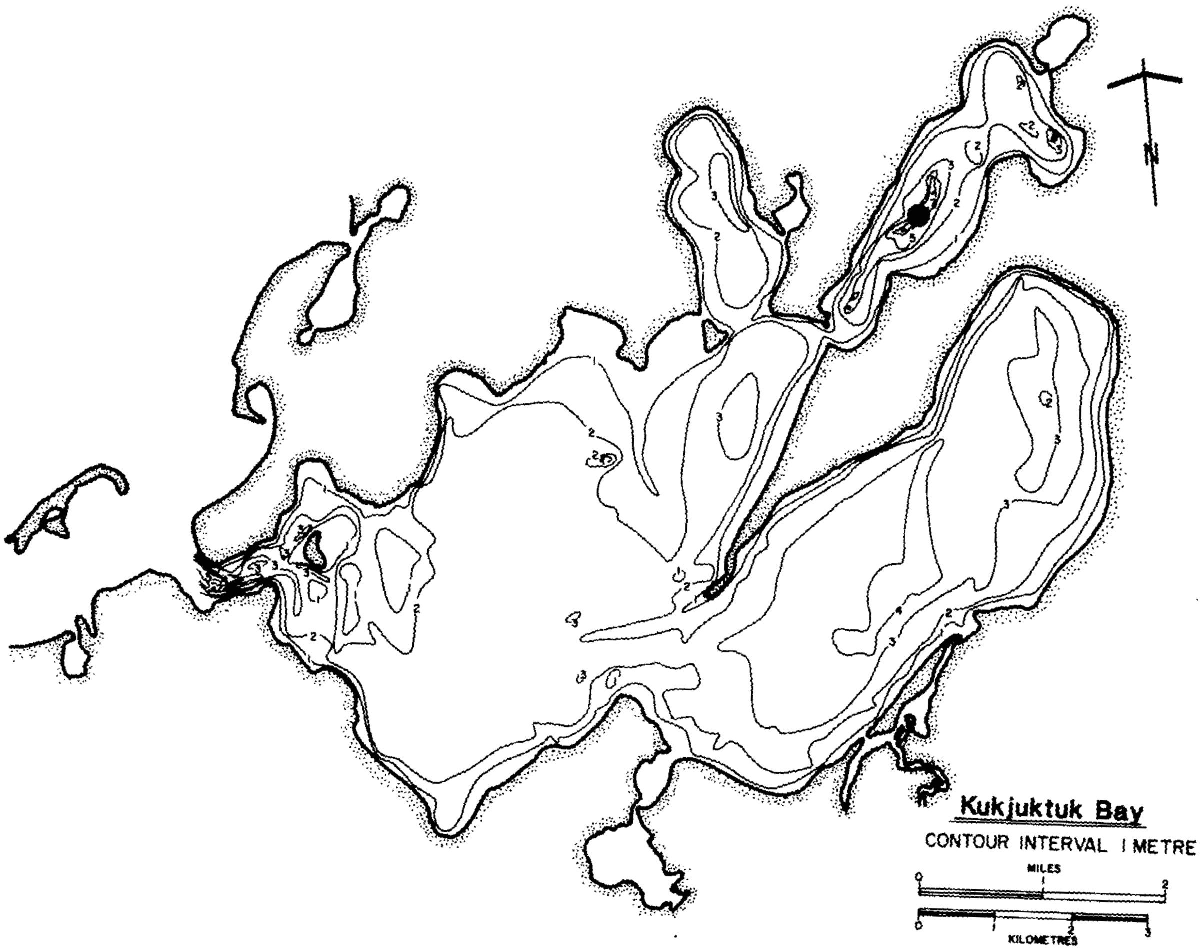


Fig. 16. Bathymetric map of Kukjuktuk Bay.

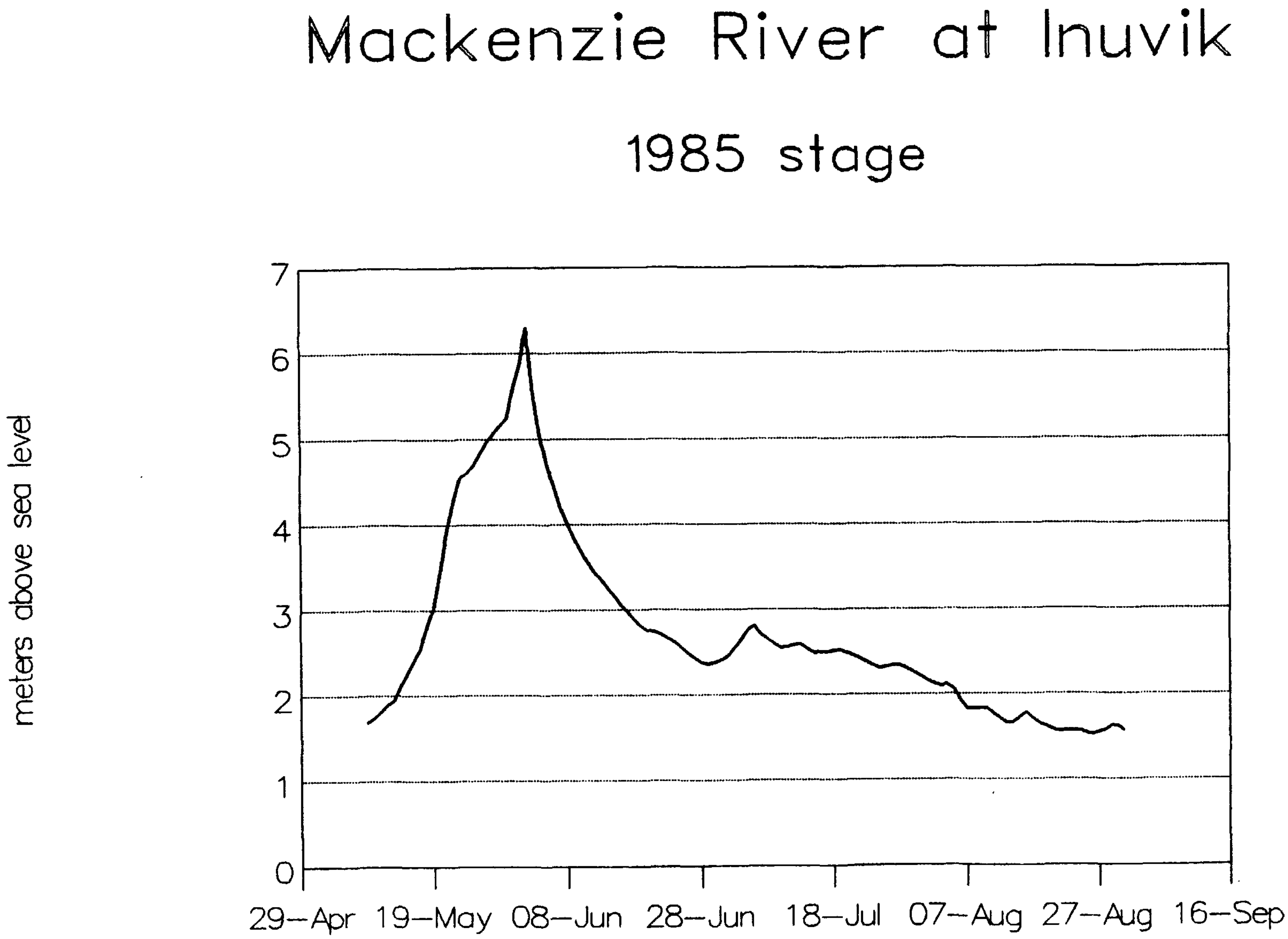


Fig. 17. Stages (elevation above sea level) of the Mackenzie River at Inuvik in 1985 (data supplied by P. Marsh, NHRI).

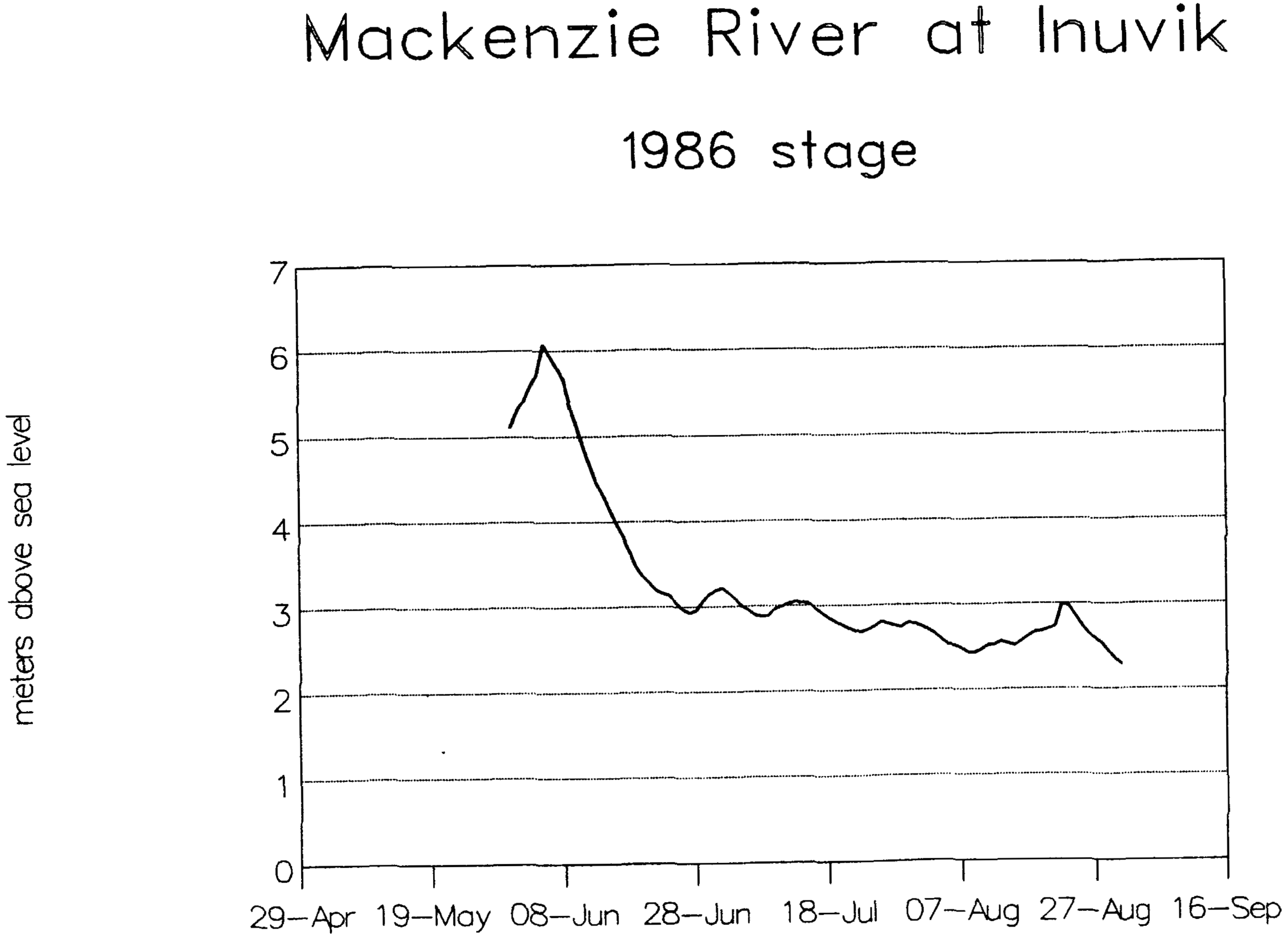


Fig. 18. Stages (elevation above sea level) of the Mackenzie River at Inuvik in 1986 (data supplied by P. Marsh, NHRI).

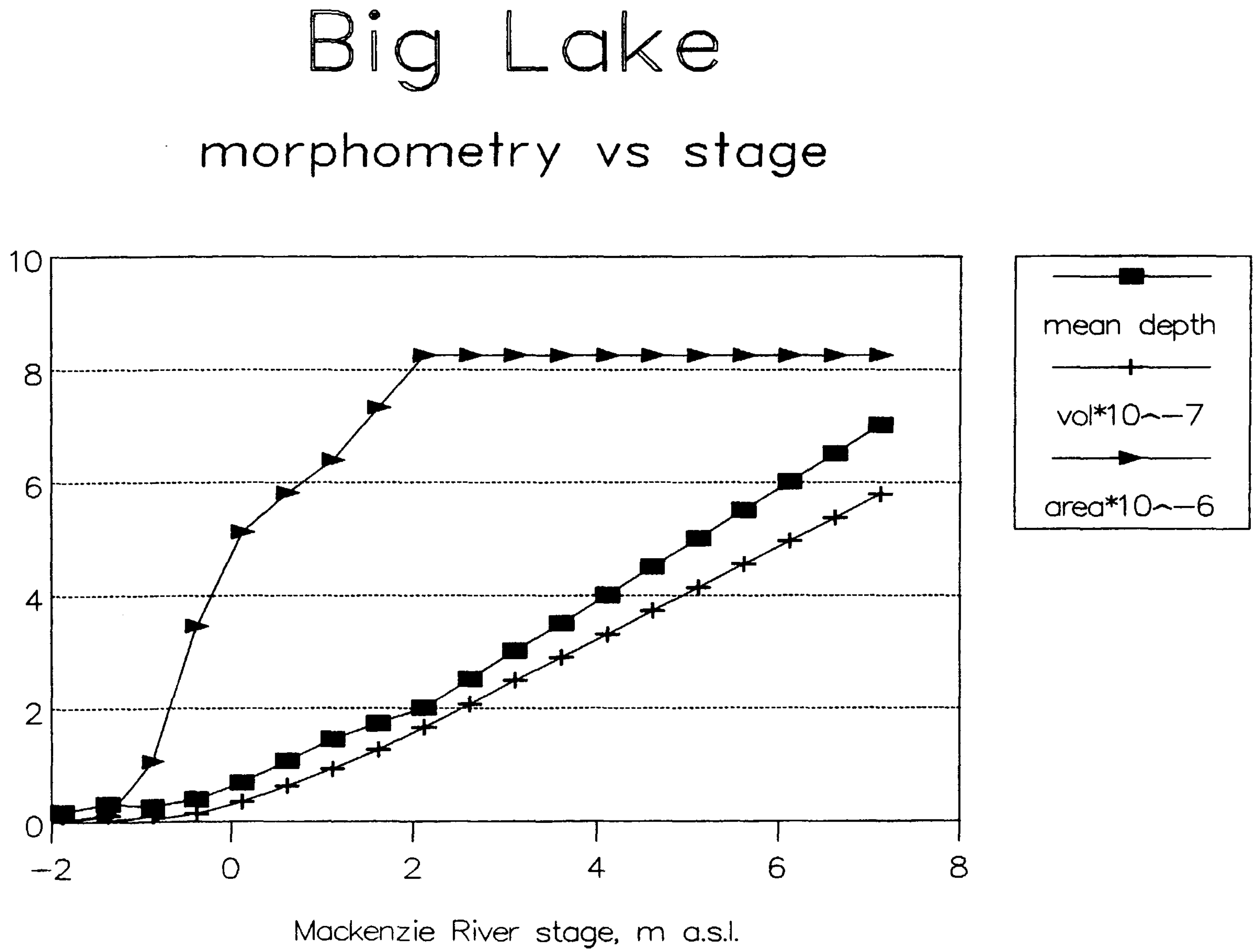


Fig. 19. The dependence of the morphometry of Big Lake on the stage of the Mackenzie River.

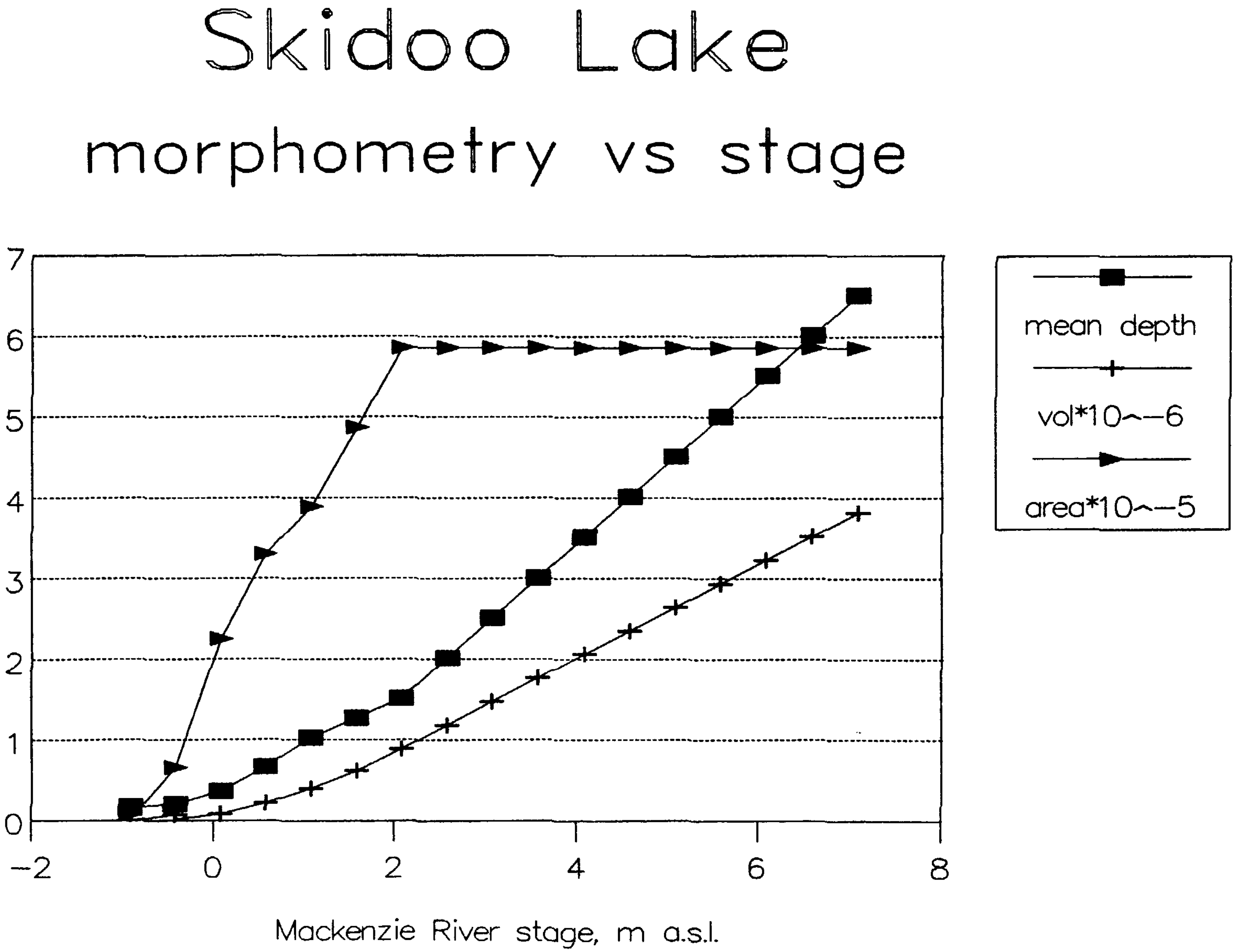


Fig. 20. The dependence of the morphometry of Skidoo Lake on the stage of the Mackenzie River.

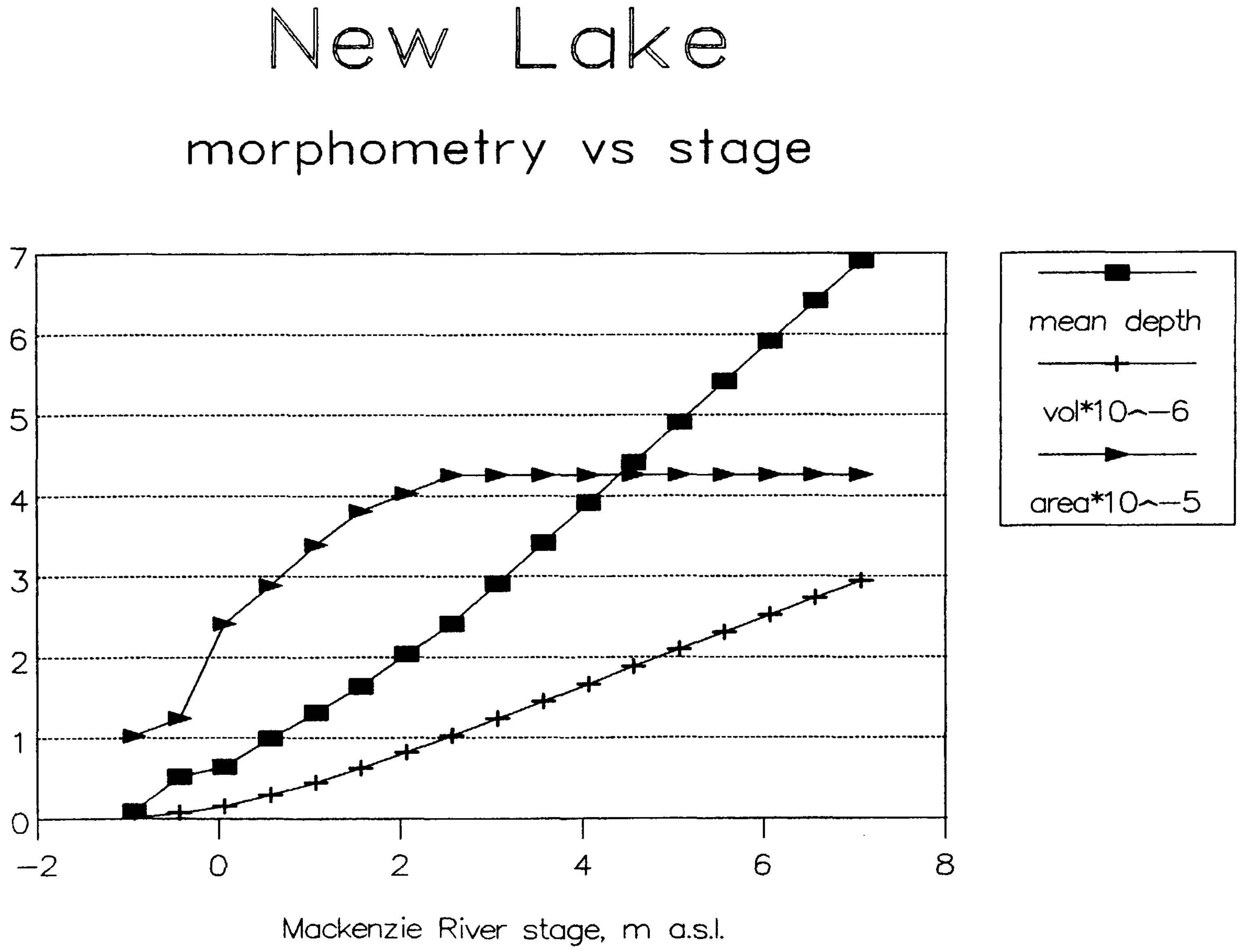


Fig. 21. The dependence of the morphometry of New Lake on the stage of the Mackenzie River.

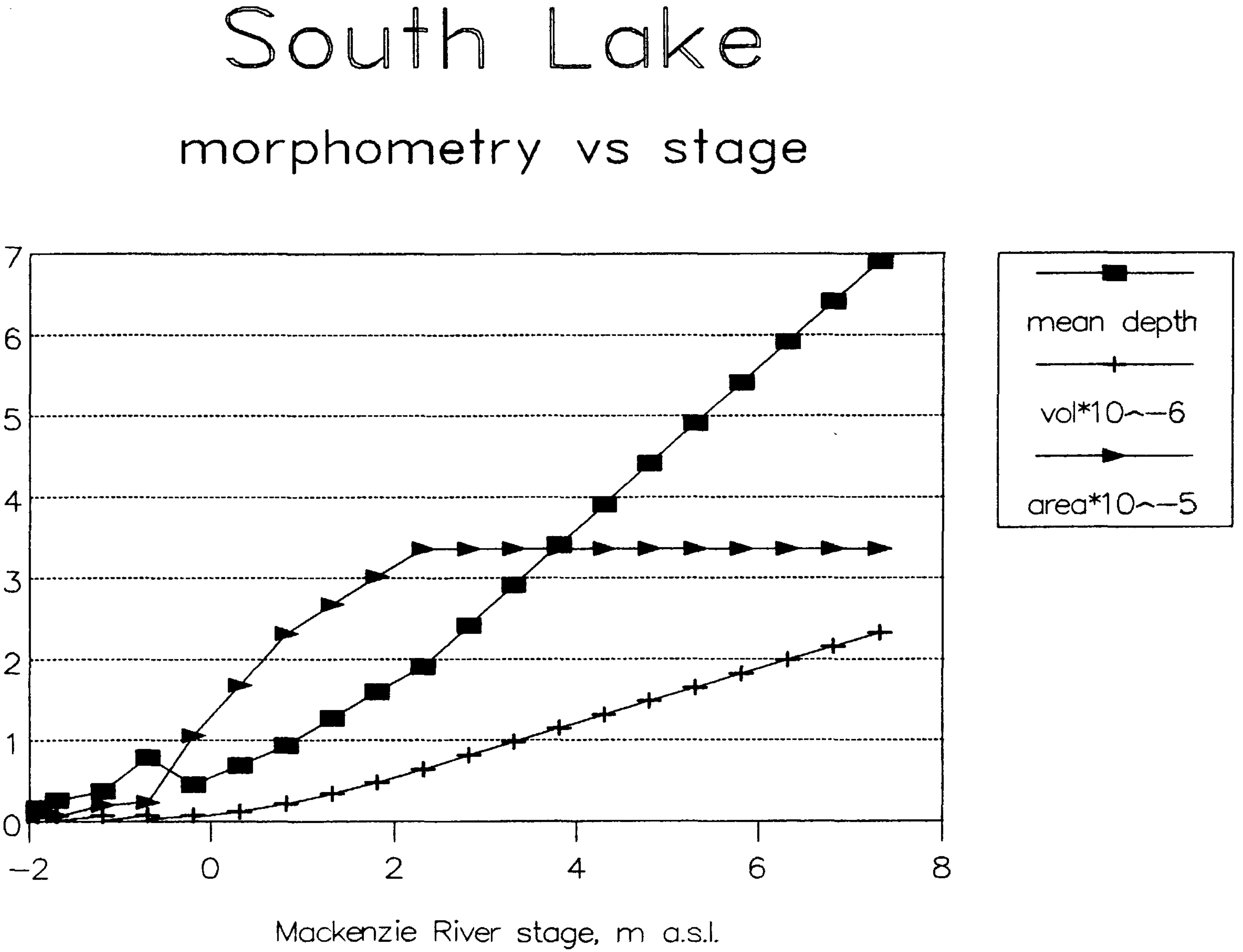


Fig. 22. The dependence of the morphometry of South Lake on the stage of the Mackenzie River.

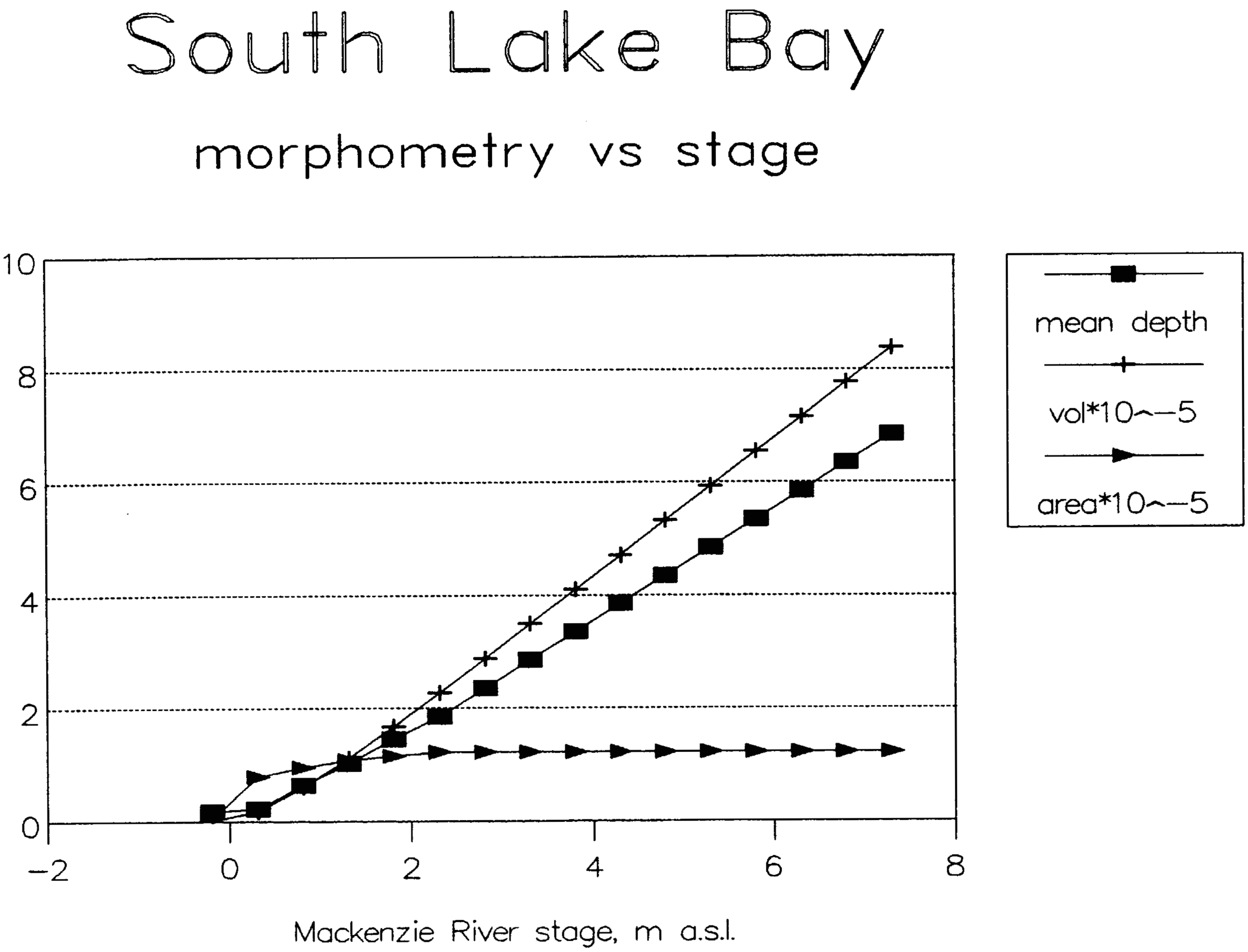


Fig. 23. The dependence of the morphometry of South Lake Bay on the stage of the Mackenzie River.

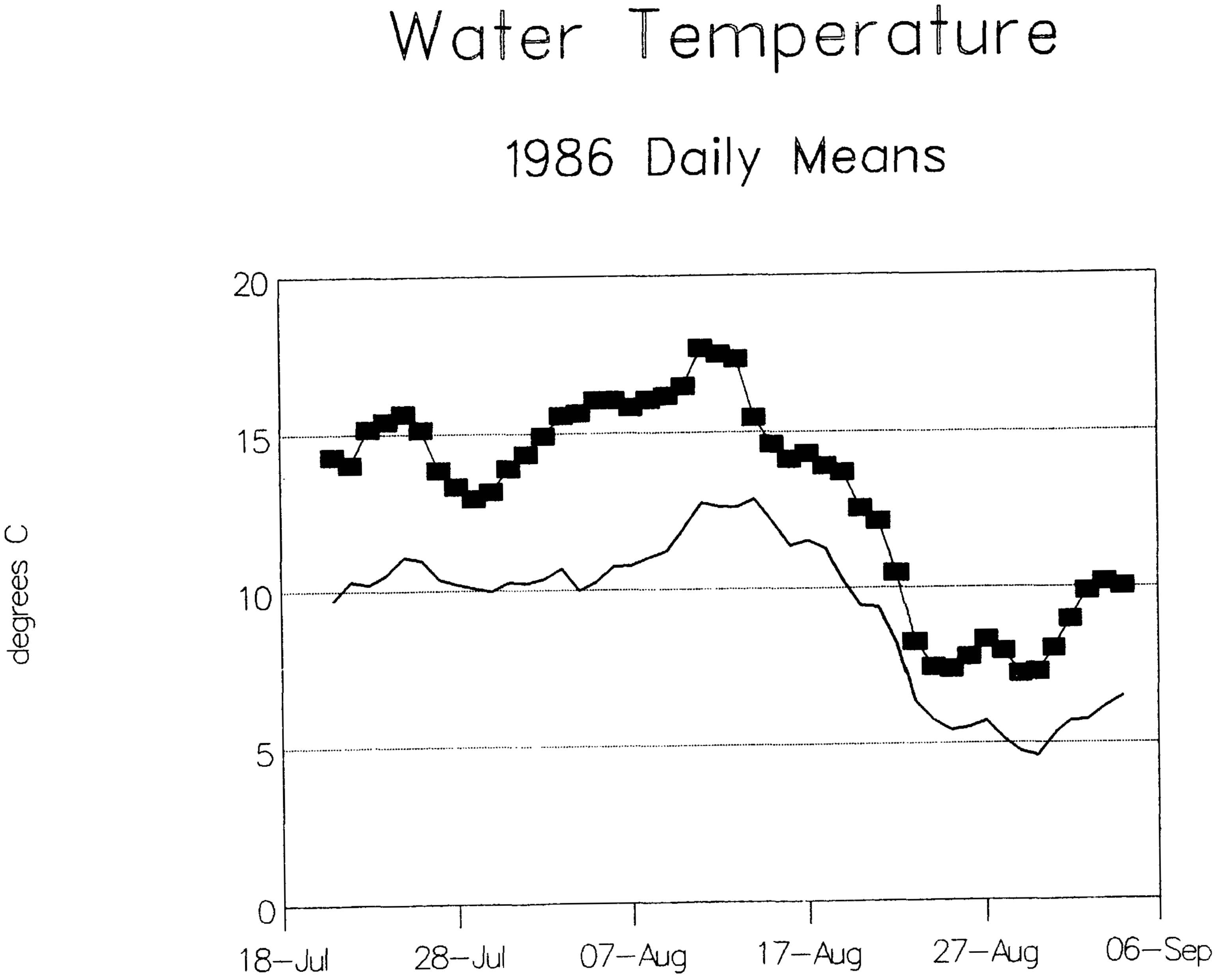
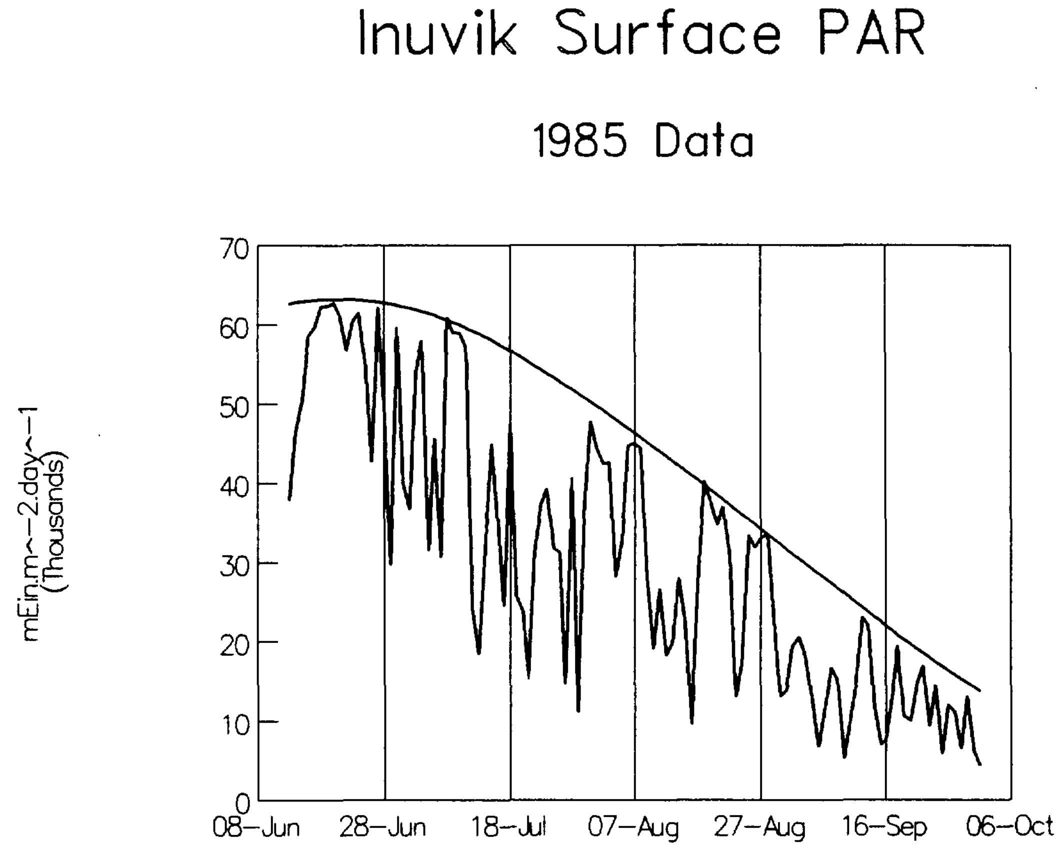


Fig. 24. Mean daily water temperatures measured in Kuk Lake 18 and in Strange Bay (South Lake) in 1986.



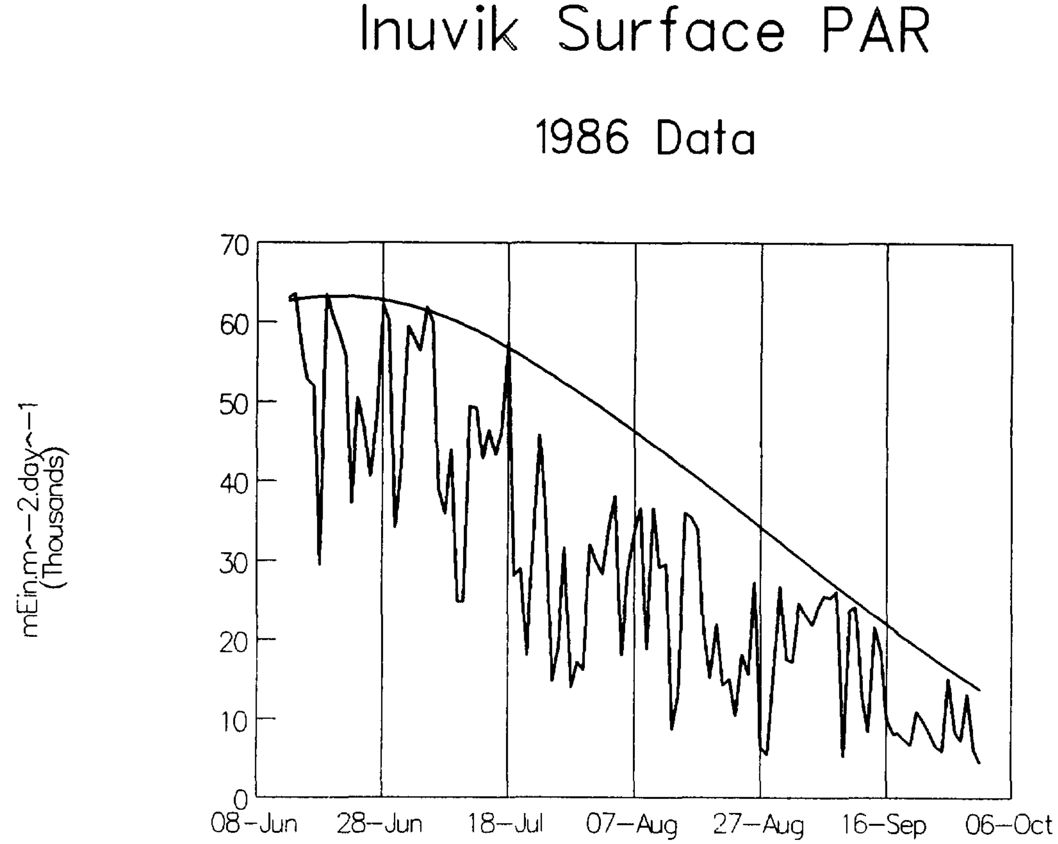


Fig. 25. Daily total photosynthetically available irradiance at Inuvik for the ice-free seasons of 1985 and 1986. The theoretical (cloudless weather) totals for this latitude (generated by the primary production model of Fee 1984) are shown as a smooth curve.

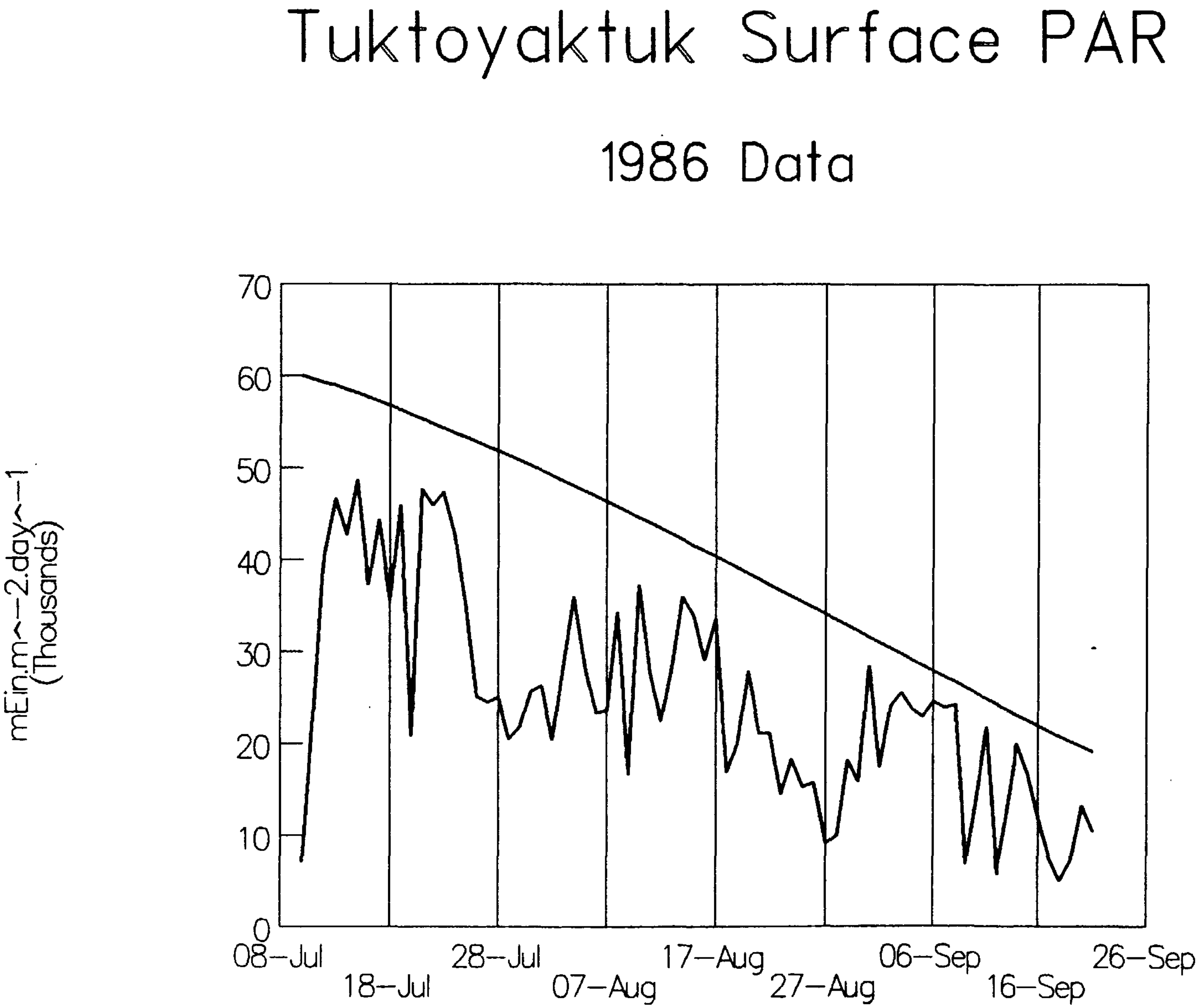
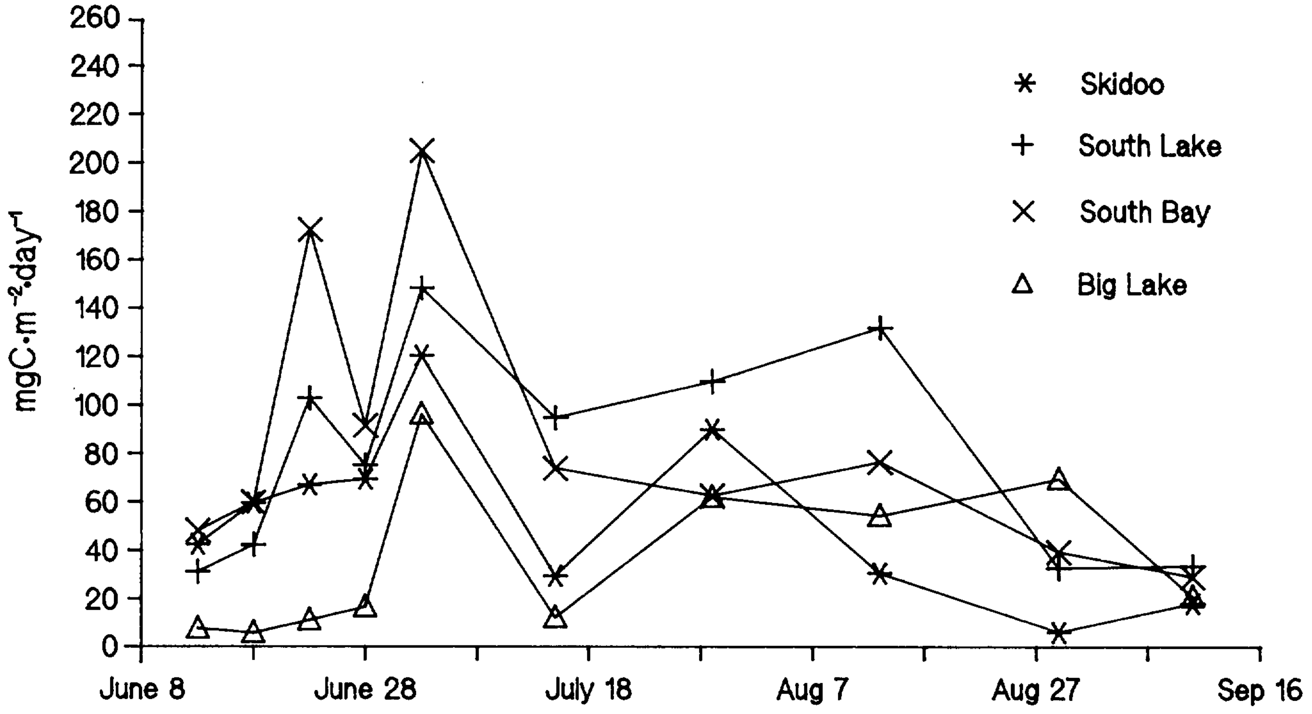


Fig. 26. Daily total photosynthetically available irradiance at Tuktoyaktuk for the 1986 ice-free season. The theoretical (cloudless weather) totals for this latitude (generated by the primary production model of Fee 1984) are shown as a smooth curve.

Daily Integral Primary Production

1985 Delta Lakes (cloudless weather)



1986 Delta Lakes (cloudless weather)

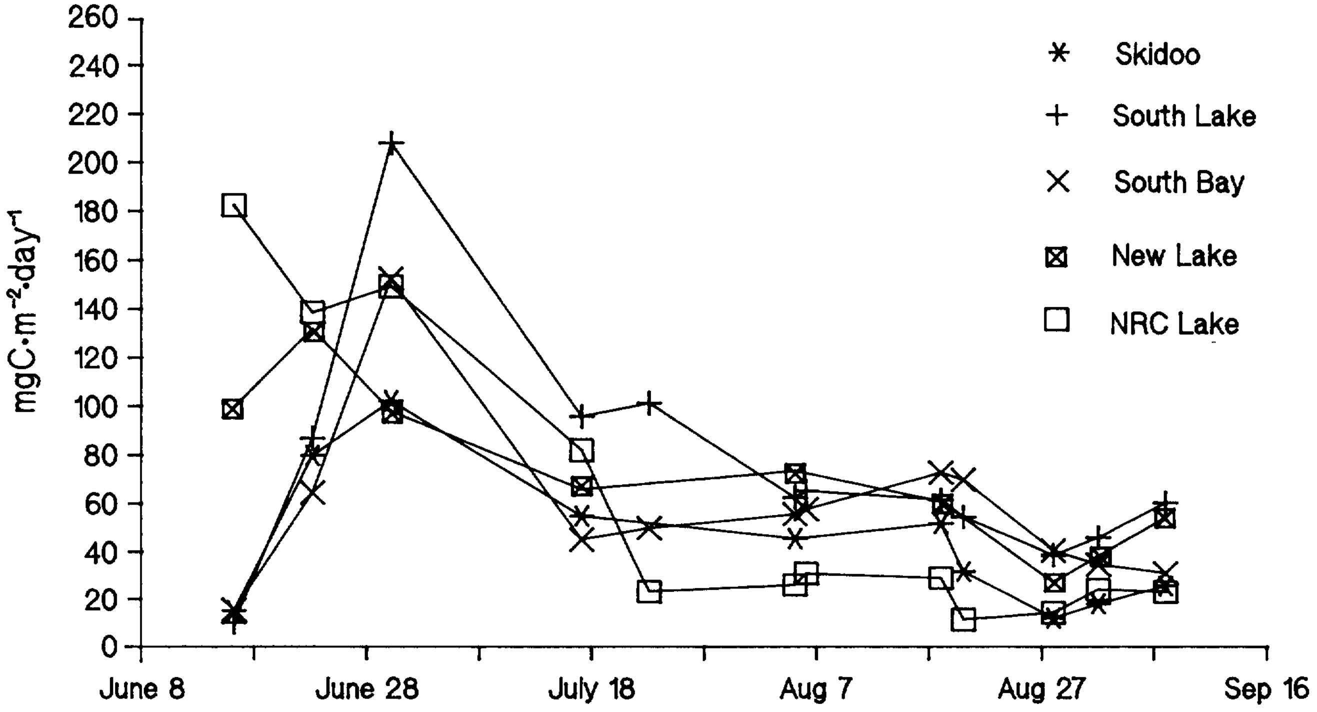
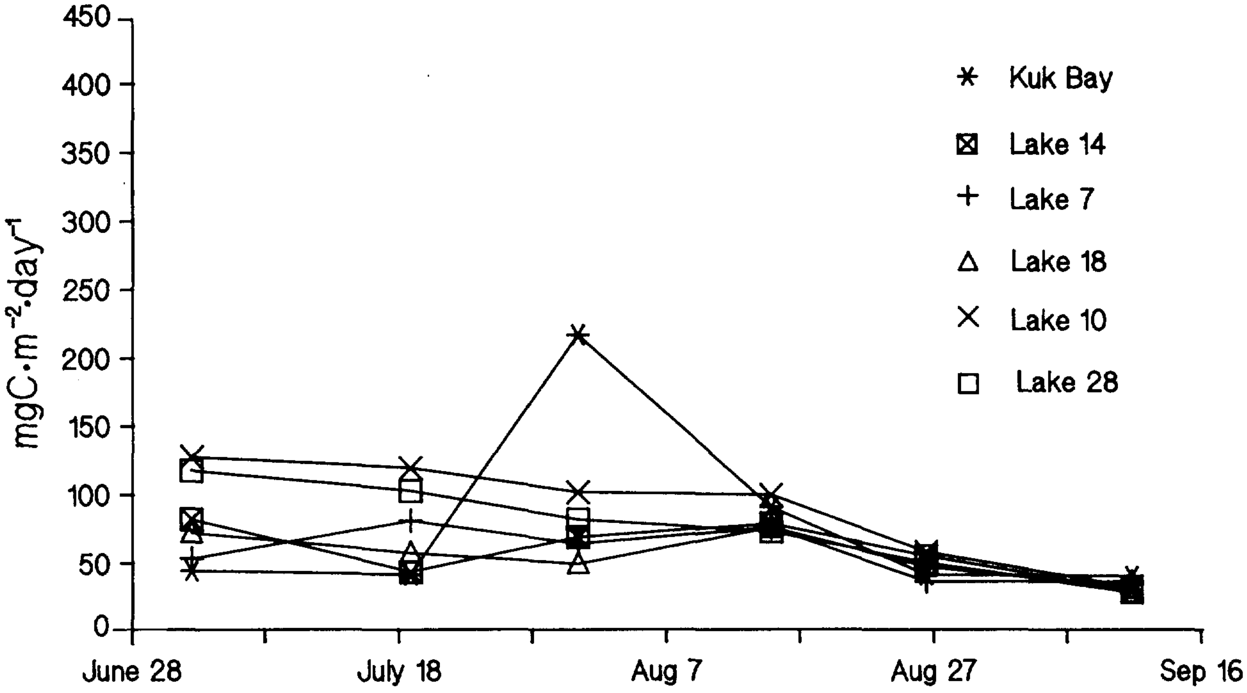


Fig. 27. Variation of daily integral primary production in the Mackenzie Delta lakes in 1985 and 1986.

Daily Integral Primary Production

1985 Kuk Lakes (cloudless weather)



1986 Kuk Lakes (cloudless weather)

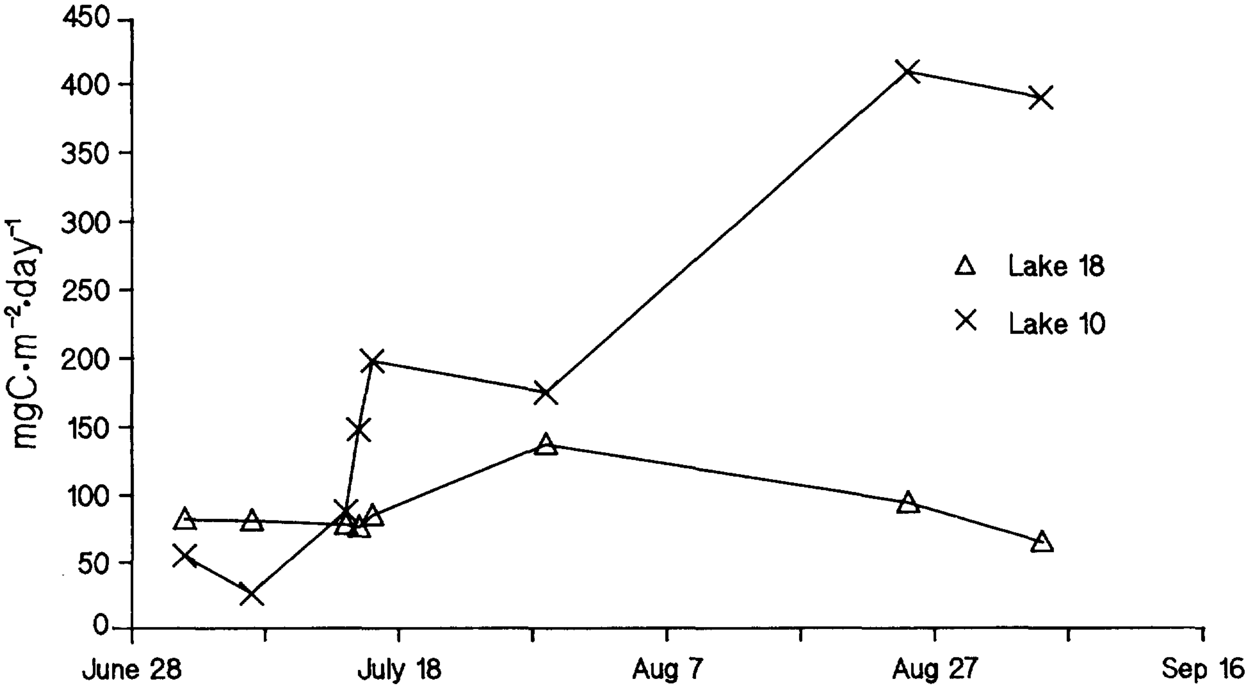
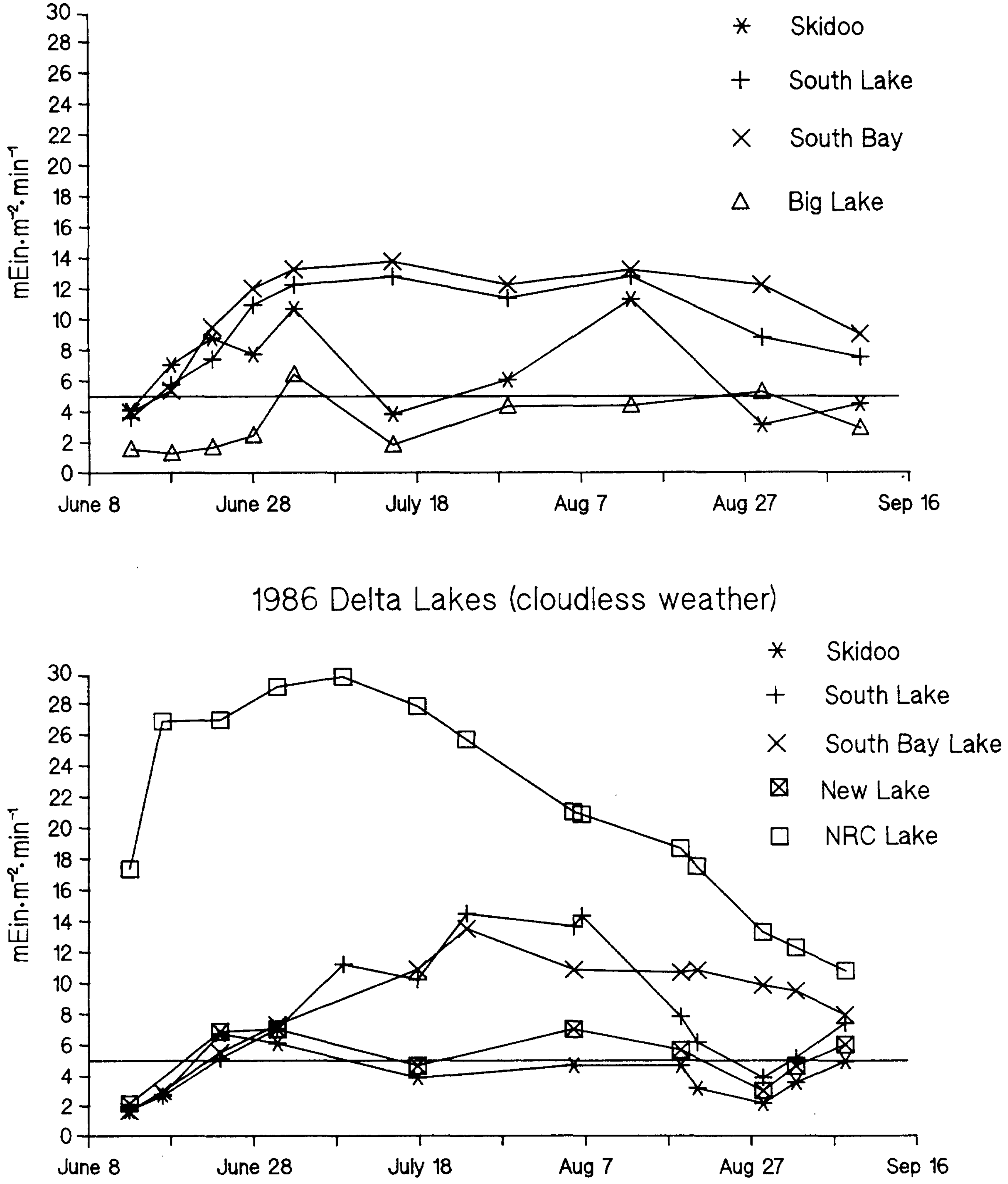


Fig. 28. Variation of daily integral primary production in the Kukjuktuk lakes in 1985 and 1986.

Water Column Mean Irradiances



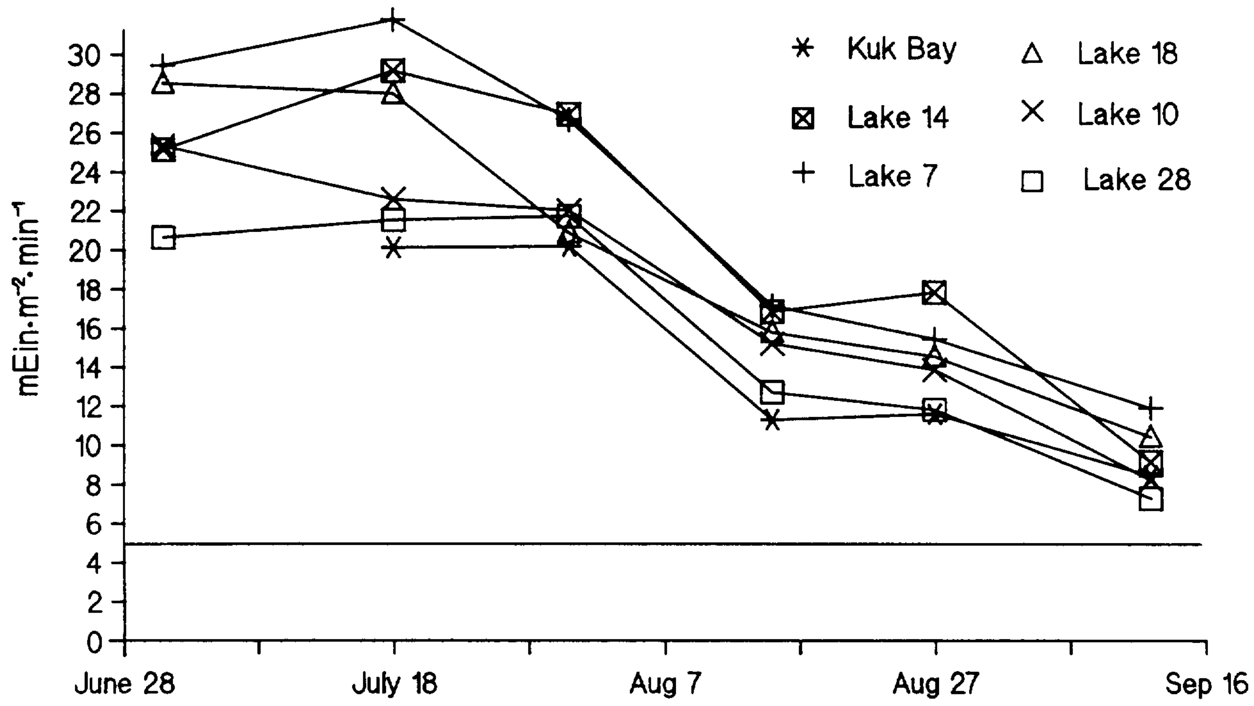
1985 Delta Lakes (cloudless weather)

1986 Delta Lakes (cloudless weather)

Fig. 29. Variation of daily mean water column irradiance in the Mackenzie Delta lakes in 1985 and 1986. The horizontal line at 5 $mE \cdot m^{-2} \cdot min^{-1}$ represents the critical value below which integral productivity is likely to be light limited (Hecky and Guildford 1984).

Water Column Mean Irradiances

1985 Kuk Lakes (cloudless weather)



1986 Kuk Lakes (cloudless weather)

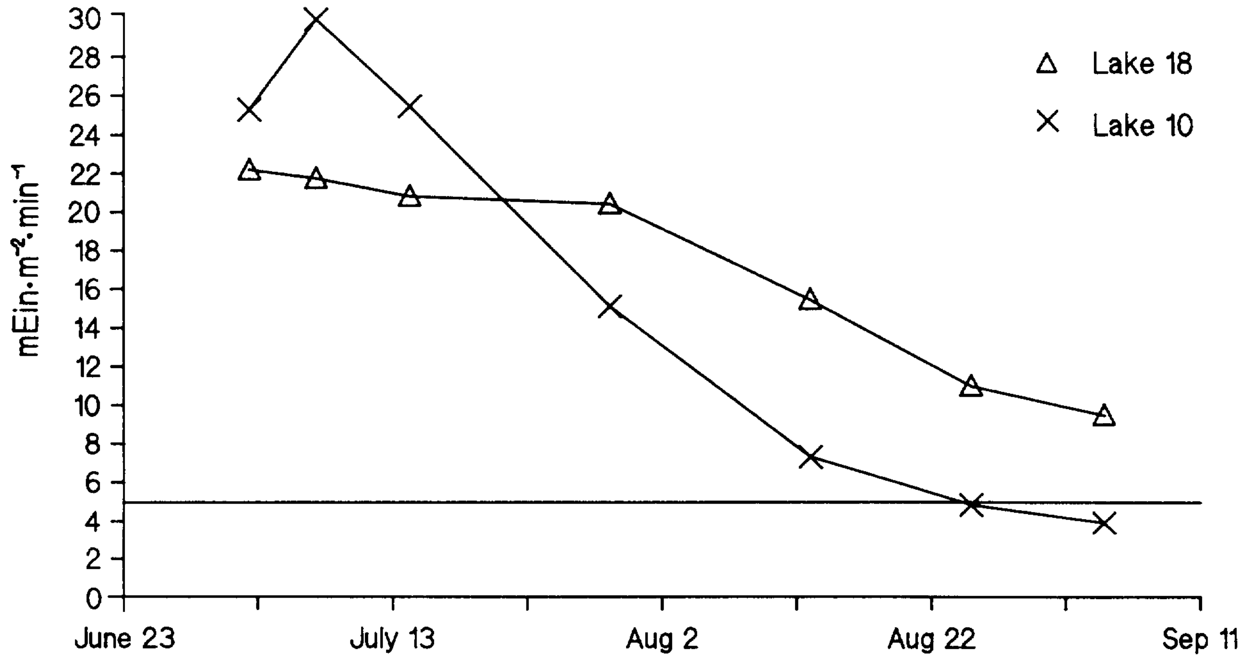


Fig. 30. Variation of daily mean water column irradiance in the Kukjuktuk lakes in 1985 and 1986. The horizontal line at 5 $mE \cdot m^{-2} \cdot min^{-1}$ represents the critical value below which integral productivity is likely to be light limited (Hecky and Guildford 1984).

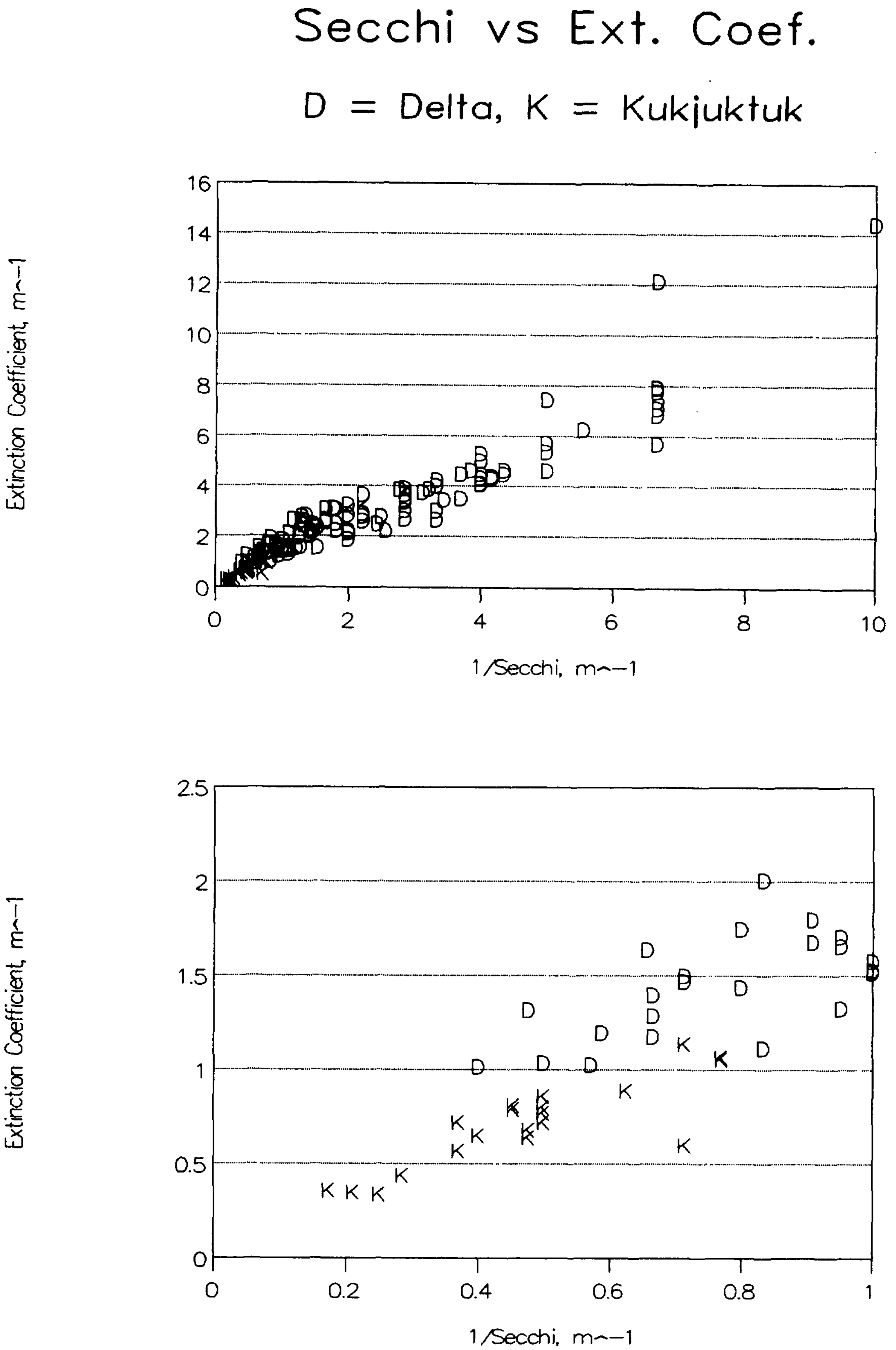


Fig. 31. The relation between the reciprocal of Secchi disk and *in situ* extinction coefficients. The lower panel is an expansion of the lower left corner of the upper panel.

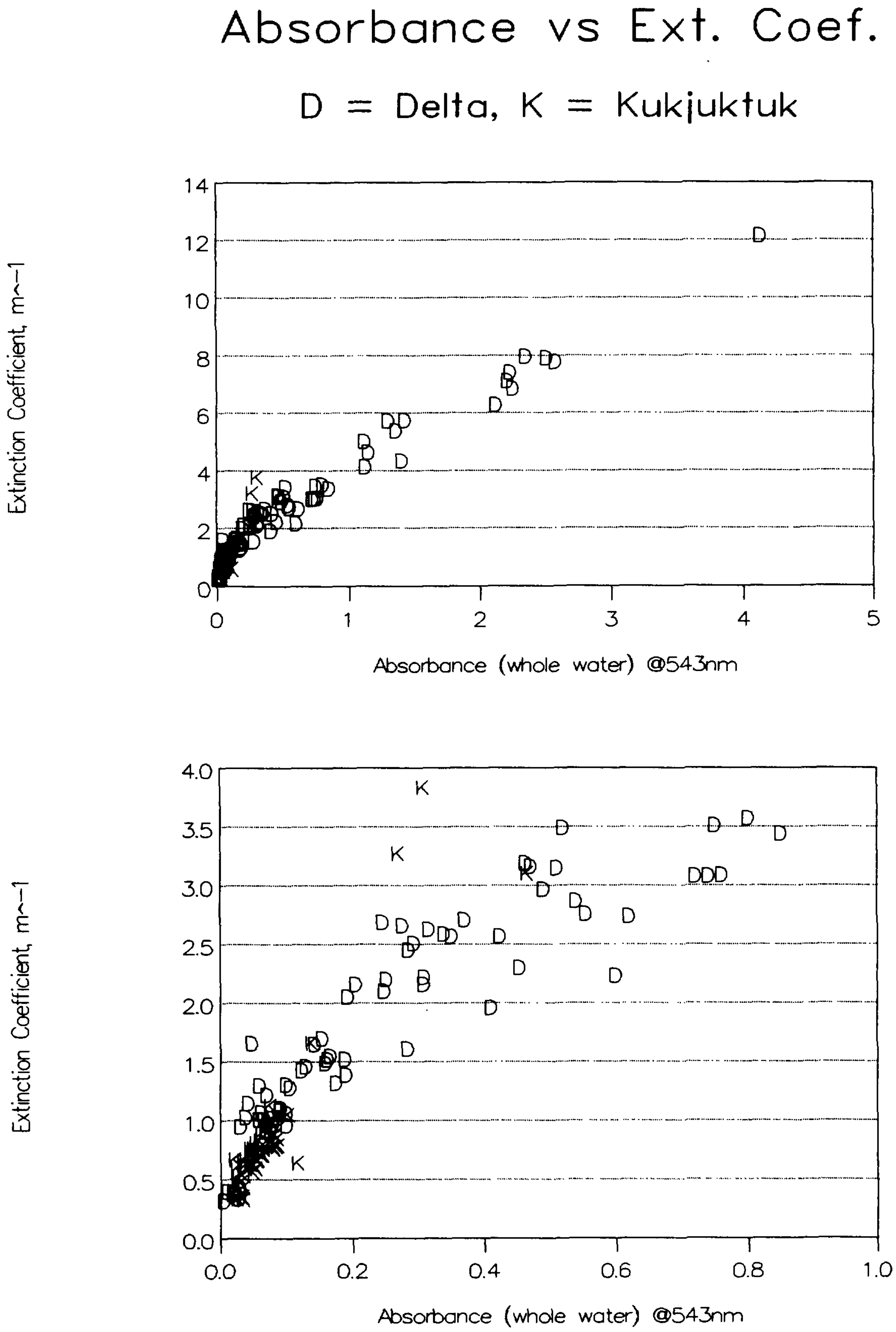
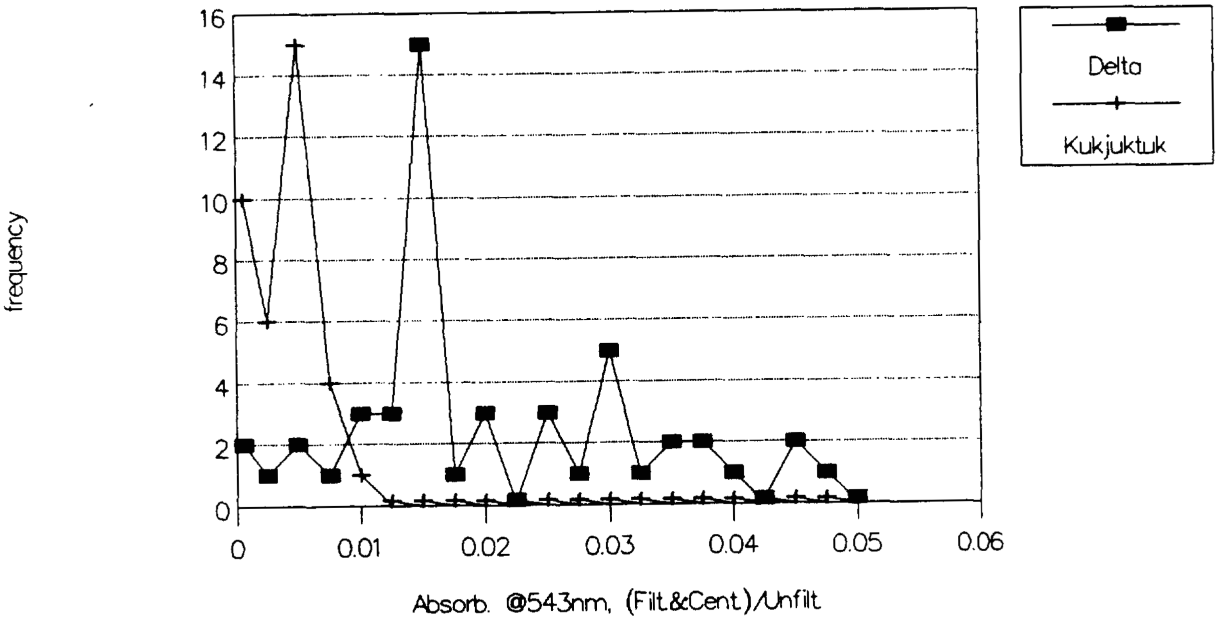


Fig. 32. The relation between absorbance at a wavelength of 543 nm by a whole water sample and the in situ extinction coefficient. The lower panel is an expansion of the lower left corner of the upper panel.

Color

1985 Data



1986 Data

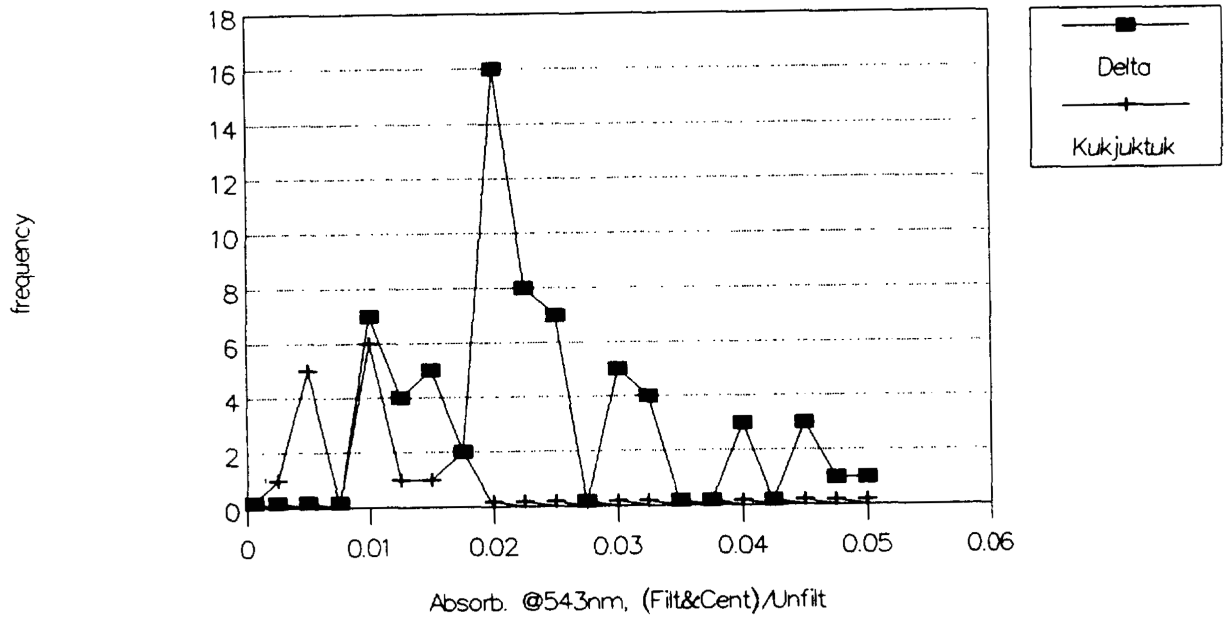


Fig. 33. Frequency distributions of absorbance at 543 nm (filtered and centrifuged water) from Kuk lakes and the Delta.

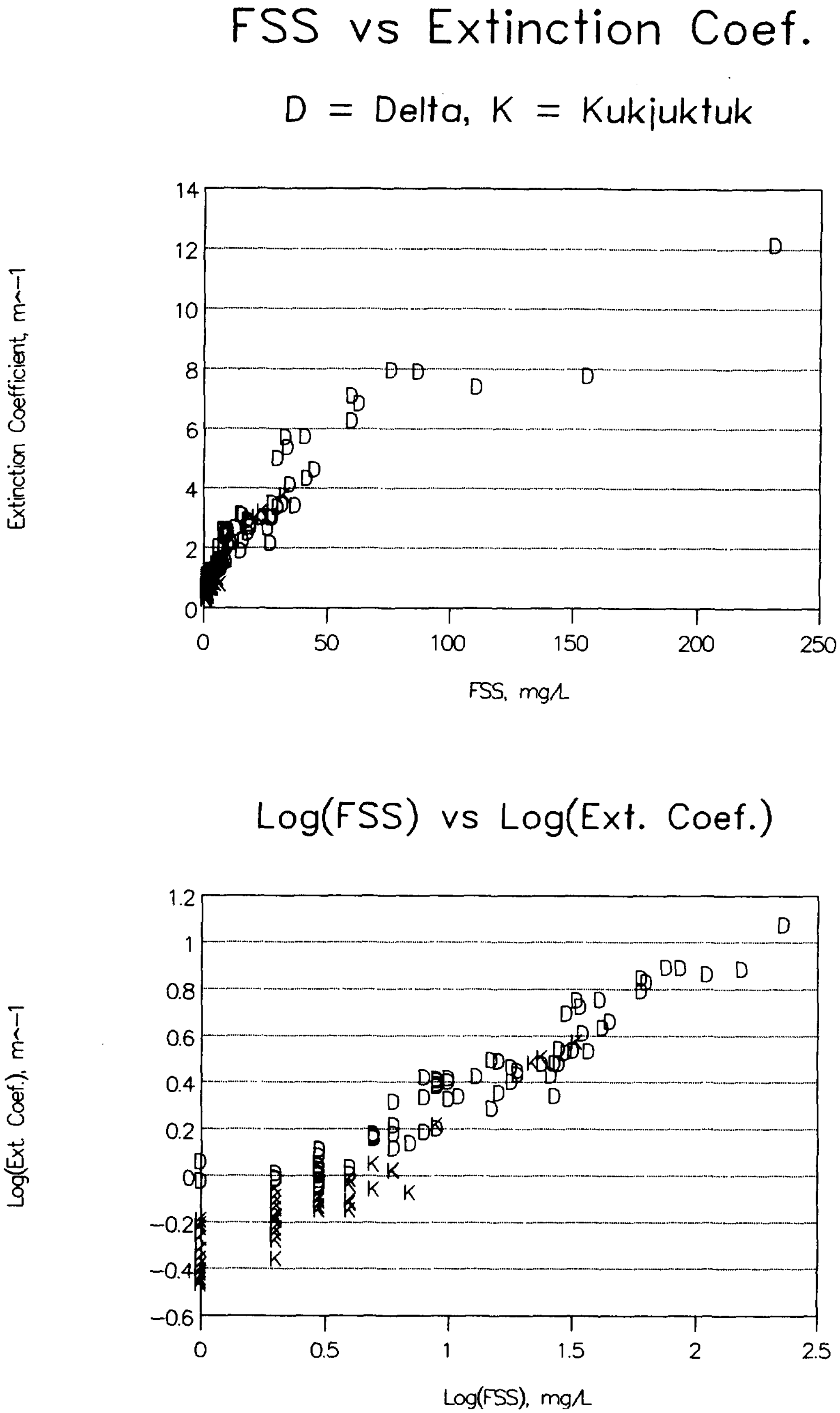


Fig. 34. The relation between the concentration of filtered suspended solids (FSS) and the in situ extinction coefficient. The lower panel shows the same data but plotted in log-log format.

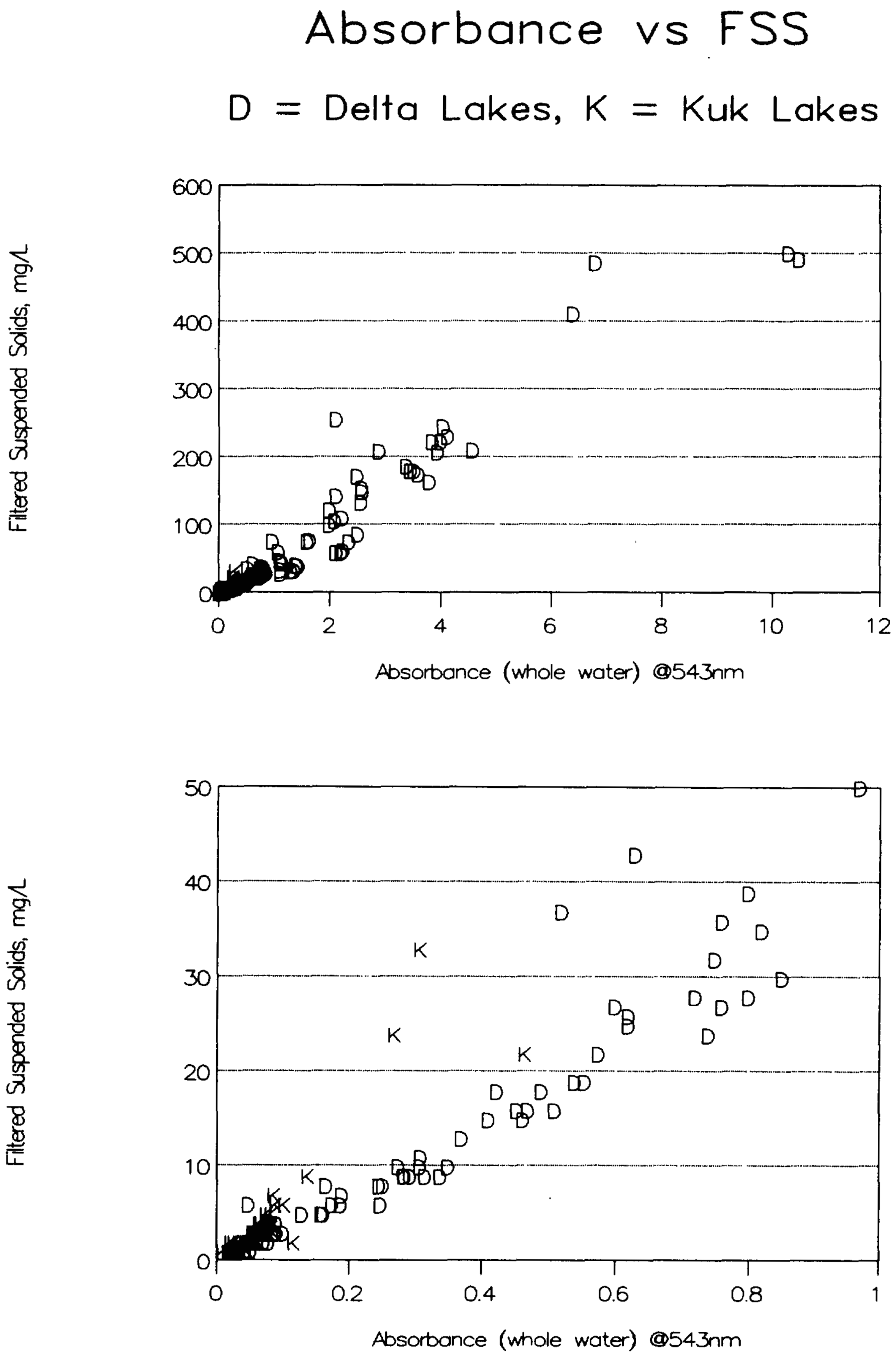


Fig. 35. FSS as a function of absorbance at 543 nm (whole water). The lower panel is an expansion of the data in the lower left corner of the upper panel.

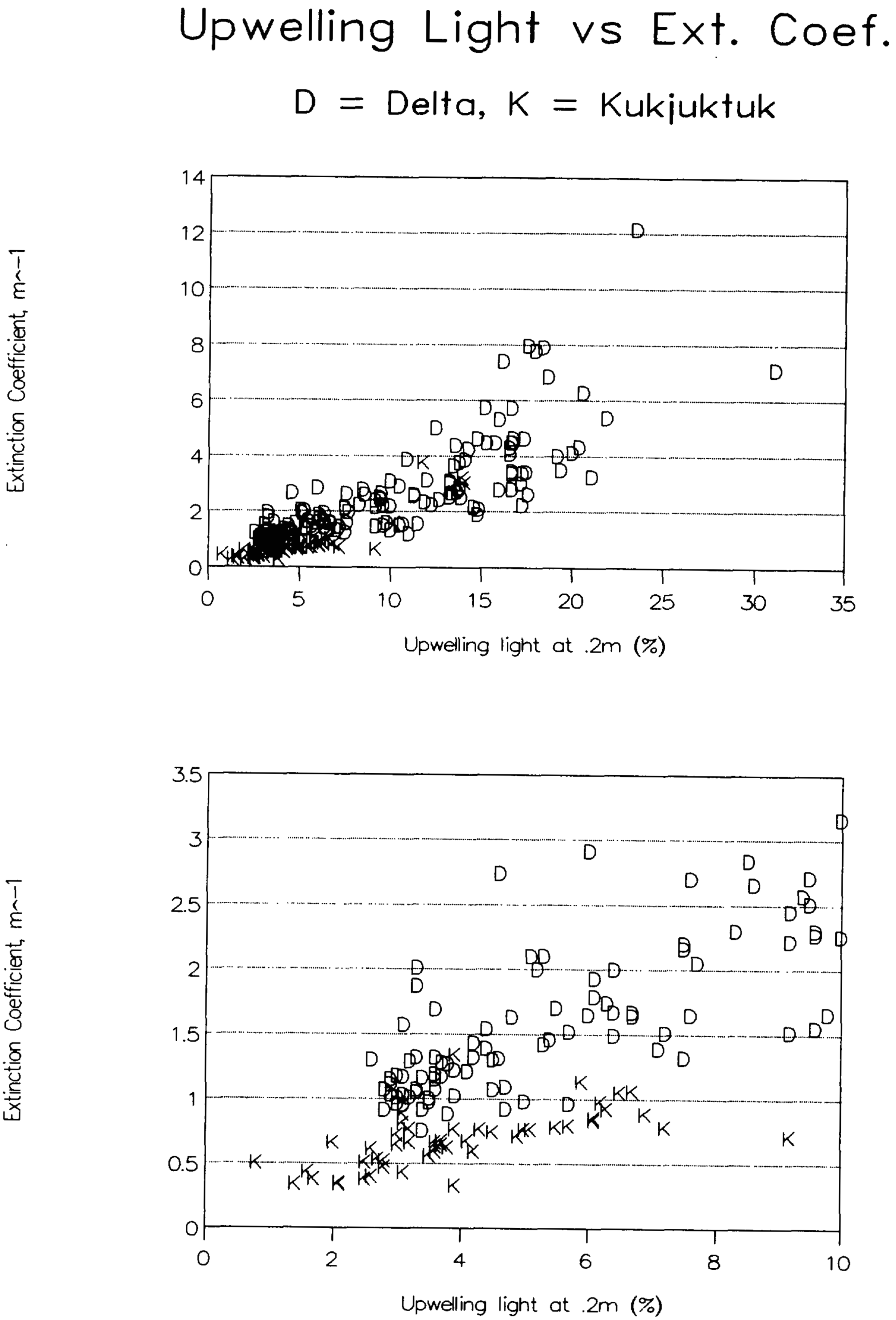


Fig. 36. The relation between the percent of incoming light reflected upward at a depth of 0.2 m and the *in situ* extinction coefficient. The lower panel is an expansion of the lower left corner of the upper panel.

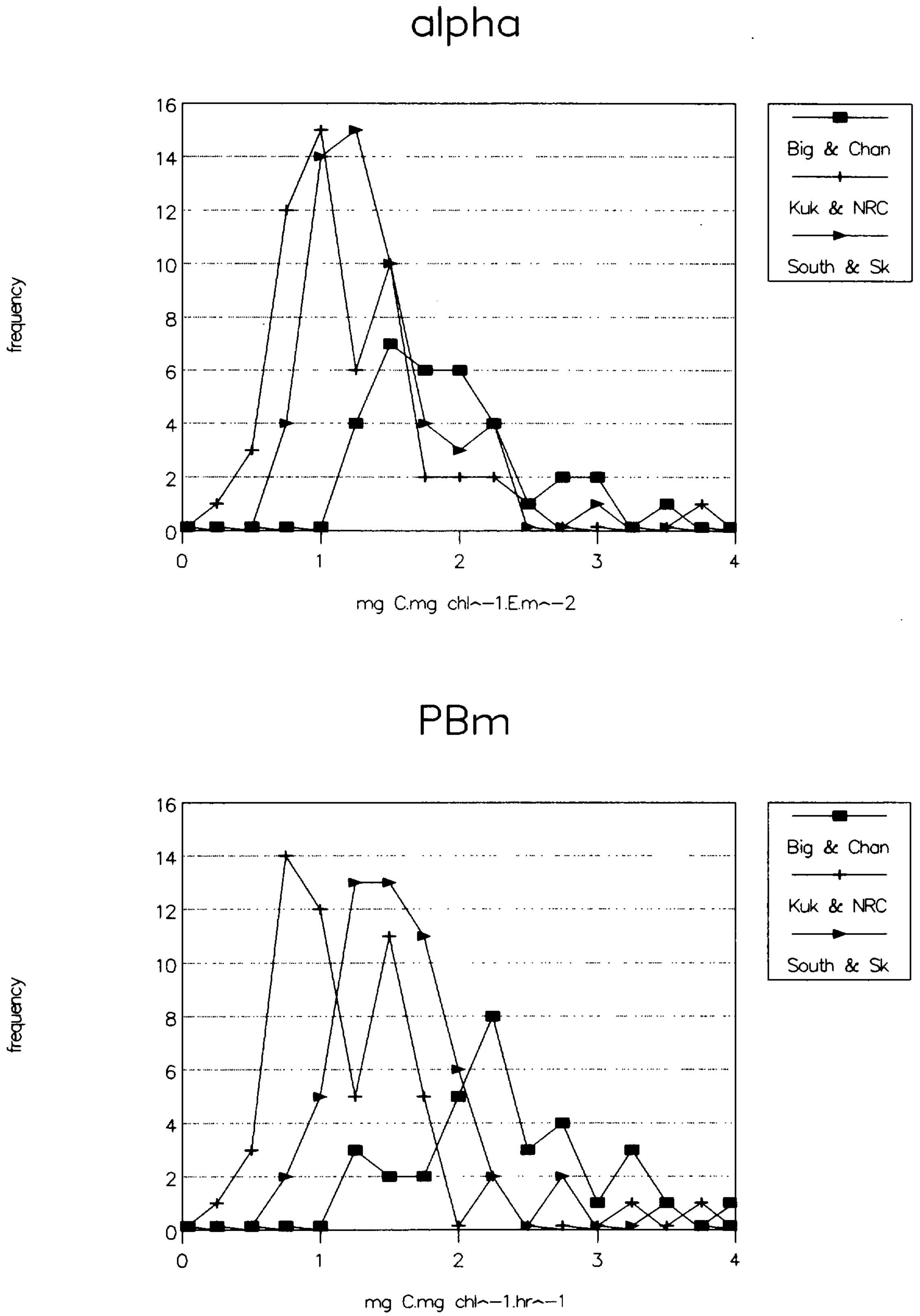


Fig. 37. Frequency distributions of phytoplankton photosynthesis parameters (P_m^B and α) in three groups of lakes: 1) Big Lake and the channels of the Mackenzie River, 2) Kuk lakes and NRC Lake, 3) South, Skidoo, and New Lakes. Data for both 1985 and 1986 are combined. The frequency distributions have been normalized by dividing them by the modal frequency. Total numbers of samples in the three groups are: 1) 33, 2) 57, and 3) 55.

Appendix 1. Summary of data collected in 1985 and 1986. Stations in South Lake, South Lake Bay, and Skidoo Lake labeled A, B, C, D, CH, 2 and 5 are fixed sampling sites where periphyton and epipelon biomass and production were measured. Values for temperature, pH, oxygen, and conductivity are surface values. Key to column headings:

STA	Station number
Depth	Depth at sampling site, (m)
Temp	Water temperature (°C)
pH	*In situ* pH
O_2	Oxygen concentration ($mg \cdot L^{-1}$)
$\%O_2$	Percent saturation of oxygen
Cond	Specific conductance at 25°C ($\mu S \cdot cm^{-1}$)
Secchi	Secchi disk depth; negative values: Secchi on bottom (m)
e	*In situ* extinction coefficient for light (m^{-1})
%upw	Percent of incident light upwelling at 0.2 m
TIC	Total inorganic carbon concentration ($\mu M \cdot L^{-1}$)
Chl	Chlorophyll-a concentration, $mg \cdot m^{-3}$
P_m^B	Rate of phytoplankton photosynthesis at saturating irradiances per unit of chlorophyll ($mg\ C \cdot hr^{-1} \cdot mg\ chl^{-1}$)
α	Slope of phytoplankton photosynthesis vs light curve at irradiances close to zero ($mg\ C \cdot mg\ chl^{-1} \cdot Einstein^{-1} \cdot m^{2}$)

STA	Location	Date	Time	Depth	Temp	pH	O_2	$\%O_2$	Cond	Secchi	e	%upw	TIC	Chl	P_m^B	α
85-001	BIG LAKE	13-Jun-85	--:--	2.0	7.8	8.1	10.0	84	211	0.20	7.53					
85-002	SKIDOO LAKE	13-Jun-85	--:--	3.0	7.1	7.8	9.9	82	220	0.35	3.54					
85-003	NRC CHANNEL	13-Jun-85	--:--		8.7	8.1	9.9	85	212	0.10						
85-004	SOUTH LAKE	13-Jun-85	--:--	3.0	7.3	7.8	9.0	75	213	0.35	3.75					
85-005	SOUTH LAKE BAY	13-Jun-85	--:--	3.0	7.5	7.8	9.4	78	214	0.35	3.99					
85-006	EAST CHANNEL	13-Jun-85	--:--		8.7	7.9	9.6	82	213	0.10						
85-007	BOOT LAKE	15-Jun-85	--:--	3.0	7.5	7.9	9.9	83	184	0.70	2.12	5.1	1061	5.5	1.41	1.29
85-008	EAST CHANNEL	15-Jun-85	--:--		8.9	8.0	9.8	85	209				2016	1.8	1.25	1.53
85-009	BIG LAKE	18-Jun-85	08:10	1.3	10.2	7.8	11.0	98	210	0.15	12.23	23.5	1692	1.8	1.18	1.30
85-010	NRC CHANNEL	18-Jun-85	08:45		10.5	7.6	10.2	91	213				1652	1.7	1.16	1.06
85-011	SKIDOO LAKE	18-Jun-85	09:05	2.0	9.7	7.8	10.6	93	237	0.65	2.47	9.2	1686	5.3	0.94	0.86
85-012	SOUTH LAKE BAY	18-Jun-85	09:33	2.0	10.5	7.5	10.0	90	233	0.55	2.61	13.3	1672	4.0	1.29	1.42
85-013	SOUTH LAKE	18-Jun-85	10:00	2.0	10.2	7.3	10.5	93	230	0.60	2.65	11.3	1628	3.5	1.36	0.90
85-014	EAST CHANNEL	18-Jun-85	10:36		10.6	8.0	10.1	91	213				1803	1.8	1.35	1.21
85-015	BIG LAKE	23-Jun-85	08:10	1.0	12.6	8.0	10.1	95	205	0.15	7.86	18.0	1758	1.8	2.23	1.72
85-016	NRC CHANNEL	23-Jun-85	08:44		12.5	7.9	10.1	95	206	0.15			1709	1.4	2.07	1.83
85-017	SKIDOO LAKE	23-Jun-85	09:00	2.0	15.1	8.1	9.7	96	241	0.55	3.18	10.0	1844	4.5	1.11	1.03
85-018	SOUTH LAKE BAY	23-Jun-85	09:30	2.0	16.3	8.2	9.8	100	237	0.80	2.07	7.7	1818	8.2	1.36	1.25
85-019	SOUTH LAKE	23-Jun-85	09:55	2.3	16.1	8.2	9.5	96	233	0.90	2.18	7.5	1871	7.9	0.90	1.04
85-020	EAST CHANNEL	23-Jun-85	10:40		12.7	8.1	10.0	94	207	0.10			1773	1.5	1.93	1.48
85-021	SOUTH LAKE BAY	24-Jun-85	--:--							0.90						
85-022	SOUTH LAKE	24-Jun-85	--:--							0.85						
85-023	SKIDOO LAKE	24-Jun-85	--:--							0.65						
85-024	BIG LAKE	28-Jun-85	08:09	1.0	14.6	7.9	10.0	98	221	0.15	7.49	16.2	1706	2.4	2.08	1.44
85-025	NRC CHANNEL	28-Jun-85	08:41		14.6	7.8	10.0	98	222	0.10			1540	2.4	2.16	1.56
85-026	SKIDOO LAKE	28-Jun-85	08:53	1.5	15.1	7.9	9.4	93	239	0.40	2.89	16.7	1562	5.1	1.33	1.22
85-027	SOUTH LAKE BAY	28-Jun-85	09:15	1.5	16.6	7.9	9.1	93	249	1.05	1.67	6.0	1672	5.7	1.12	0.76
85-028	SOUTH LAKE	28-Jun-85	09:41	2.5	16.7	7.9	9.1	94	247	1.05	1.72	5.5	1668	5.1	1.16	0.73
85-029	EAST CHANNEL	28-Jun-85	10:22		14.7	8.1	9.7	96	221	0.15			1634	2.6	1.92	1.47
85-030	KUK LAKE 10	01-Jul-85	08:05	1.5	11.6	7.8	10.7	98	112	-1.50	0.69	4.1	706	6.9	0.88	1.16
85-031	KUK LAKE 18	01-Jul-85	09:00	2.1	4.5	7.9	12.0	93	132	-2.10	0.64	3.8	1159	3.4	0.76	0.92
85-032	KUK LAKE 14	01-Jul-85	09:45	2.1	11.1	8.1	10.8	98	108	2.10	0.65	3.6	899	4.9	0.61	1.03
85-033	KUK LAKE 33	01-Jul-85	10:25	2.5	8.9	7.8	11.6	100	82	2.00	0.78	3.9	699	4.5	0.78	1.12
85-034	KUK LAKE 28	01-Jul-85	11:07	7.0	7.5	8.1	12.2	102	197	3.50	0.45	3.1	1605	2.0	1.41	1.33
85-035	KUK LAKE 7	01-Jul-85	11:56	2.5	3.8	7.9	12.1	92	120	-2.50	0.53	2.5	1077	2.5	0.94	0.82
85-036	BIG LAKE	03-Jul-85	09:25	3.8	16.2	8.2	9.2	94	234	0.35	2.78	13.7	1712	3.7	2.62	2.19
85-037	NRC CHANNEL	03-Jul-85	10:07		15.5	8.1	9.4	94	236	0.22			1776	2.7	3.15	2.66
85-038	SKIDOO LAKE	03-Jul-85	10:26	2.0	16.7	8.2	9.1	94	247	0.50	2.24	9.2	1847	4.3	1.61	2.18
85-039	SOUTH LAKE BAY	03-Jul-85	10:55	1.7	17.5	7.8	8.6	90	258	1.50	1.30	3.7	2104	5.2	1.74	1.98
85-040	SOUTH LAKE	03-Jul-85	11:18	2.2	17.5	7.6	8.3	87	255	1.25	1.45	4.2	2177	5.8	1.19	1.46
85-041	EAST CHANNEL	03-Jul-85	12:05		15.7	7.6	9.7	98	236	0.25			1806	2.7	2.41	2.06
85-042	SOUTH LAKE BAYD	10-Jul-85	12:00	1.5	16.8	8.3	9.9	102	274	1.50	1.19	3.7				
85-043	SOUTH LAKE BAYC	10-Jul-85	12:20	1.9	17.2	8.2	10.0	104	275	1.70	1.21	3.6				
85-044	SOUTH LAKE B	10-Jul-85	12:40	2.1	16.1	8.2	9.6	97	267	0.90	1.67	7.6				
85-045	SOUTH LAKE A	10-Jul-85	13:00	1.4	16.4	8.2	9.5	97	268	1.10	1.69	6.7				
85-046	BIG LAKE	15-Jul-85	09:22	2.5	12.2	8.6	10.8	101	242	0.15	7.99	18.4	1640	2.1	1.87	1.77
85-047	NRC CHANNEL	15-Jul-85	09:56		13.5	8.5	10.5	101	237	0.10			1667	1.8	1.89	1.79
85-048	SKIDOO LAKE	15-Jul-85	10:15	1.5	12.6	8.6	10.5	99	248	0.20	4.72	17.4	1661	3.5	1.52	1.48

Appendix 1. Cont'd.

STA	Location	Date	Time	Depth	Temp	pH	O_2	$\%O_2$	Cond	Secchi	e	%upw	TIC	Chl	P^B_m	α
85-049	SOUTH LAKE BAY	15-Jul-85	10:55	2.1	12.3	8.2	10.2	95	275	-2.10	1.24	3.9	1906	4.1	0.73	0.88
85-050	SOUTH LAKE	15-Jul-85	11:15	3.8	12.7	8.4	10.3	97	268	1.40	1.48	5.4	1844	4.1	1.10	1.23
85-051	EAST CHANNEL	15-Jul-85	12:06		13.7	8.3	10.4	100	238	0.05			1695	1.8	2.69	1.84
85-052	KUK BAY	18-Jul-85	10:05	3.0	6.1	8.4	11.7	94	10100	2.00	0.73	9.2	1194	0.9	2.17	1.12
85-053	KUK LAKE 10	18-Jul-85	--:--	1.5	6.8	8.3	12.0	98	125	1.30	1.08	6.7	699	11.0	0.56	0.73
85-054	KUK LAKE 18	18-Jul-85	--:--	1.1	7.7	8.5	11.8	99	160	-1.10	0.78	4.3	1185	3.2	0.73	0.73
85-055	KUK LAKE 14	18-Jul-85	--:--	1.8	7.7	8.7	11.6	97	123	-1.80	0.61	3.6	928	2.5	0.79	0.60
85-056	KUK LAKE 7	18-Jul-85	--:--	1.9	8.0	8.6	11.9	100	130	-1.90	0.54	2.8	1019	5.0	0.72	0.73
85-057	KUK LAKE 28	18-Jul-85	13:47	5.2	8.5	8.6	11.6	99	195	4.75	0.36	2.1	1495	1.8		
85-058	SOUTH LAKE A	23-Jul-85	11:30		11.2	8.4			266	1.25	1.76	6.3				
85-059	SOUTH LAKE BAYC	23-Jul-85	12:40		11.3	8.2			273	-0.90	1.07	3.3				
85-060	SOUTH LAKE BAYD	23-Jul-85	13:30		11.5	8.6	10.3	94	273	-0.90	1.18	3.4				
85-061	SOUTH LAKE B	23-Jul-85	14:30		12.1	8.2	10.0	93	270		1.41	4.4				
85-062	BIG LAKE	29-Jul-85	09:00	2.7	13.8	8.4	10.1	98	245	0.35	3.46	17.3	1838	4.6		
85-063	NRC CHANNEL	29-Jul-85	09:30		14.0		10.0	97	246	0.25			1755	3.2	3.93	1.74
85-064	SKIDOO LAKE	29-Jul-85	09:45	2.0	13.6		11.6	112	258	0.50	2.32	17.3	1643	3.9	2.00	2.86
85-065	SOUTH LAKE BAY	29-Jul-85	10:15	1.8	13.9		10.6	103	289	-1.80	0.94	4.7	1903	3.1	1.75	0.82
85-066	SOUTH LAKE	29-Jul-85	10:35	3.5	13.6		10.3	99	286	2.00	1.05	3.1	1845	3.5		
85-067	EAST CHANNEL	29-Jul-85	11:15		14.0		11.0	107	252	0.15			1747	3.1	2.44	2.78
85-068	KUK BAY	31-Jul-85	09:30	4.0	8.1	8.3	11.7	99	10900	2.70	0.73	4.9	1643	1.3	6.67	5.23
85-069	KUK LAKE 10	31-Jul-85	10:15	1.4	9.6	8.3	11.2	98	133	-1.40	0.99	6.2	705	5.5	1.45	0.83
85-070	KUK LAKE 18	31-Jul-85	10:50	1.8	10.0	8.6	11.0	97	159	-1.80	0.68	3.6	1270	2.6	1.01	0.72
85-071	KUK LAKE 14	31-Jul-85	11:30	2.5	9.8	8.6	11.8	104	122	-2.50	0.83	3.1	1020	2.6	1.42	0.93
85-072	KUK LAKE 7	31-Jul-85	12:00	3.0	10.0	8.4	11.3	100	128	-3.00	0.68	2.0	1035	4.1	0.81	0.66
85-073	KUK LAKE 28	31-Jul-85	12:25	7.0	10.0	8.6	11.2	99	188	5.75	0.37	2.1	1527	1.6	1.22	1.30
85-074	SOUTH LAKE BAYD	05-Aug-85	09:15	1.0	13.0	8.8	10.7	102	270	-1.05	1.44	5.3				
85-075	SOUTH LAKE BAYC	05-Aug-85	10:07	1.0	13.7	8.6	9.9	95	278	-1.00	1.19	3.1				
85-076	SOUTH LAKE B	05-Aug-85	10:50	1.2	13.7	8.4	9.8	94	278	-1.20	1.34	3.6				
85-077	SOUTH LAKE A	05-Aug-85	11:20	1.0	13.7	8.5	9.8	94	278	-1.00	1.56	4.4				
85-078	BIG LAKE	13-Aug-85	09:00	2.6	14.2	8.5	9.7	95	251	0.35	3.51	17.5	1918	4.7	2.01	1.77
85-079	NRC CHANNEL	13-Aug-85	10:00		14.7	8.1	9.3	92	251	0.25			1984	3.5	3.23	2.21
85-080	SKIDOO LAKE	13-Aug-85	10:30	1.4	13.1	8.3	10.2	97	257	0.90	1.57	9.6	1860	2.3	1.40	0.97
85-081	SOUTH LAKE BAY	13-Aug-85	11:15	1.4	13.8	8.9	10.2	99	267	-1.40	1.09	2.8	1999	4.5	1.64	0.91
85-082	SOUTH LAKE	13-Aug-85	12:00	3.0	13.8	8.6	9.8	95	280	1.75	1.04	3.9	2252	3.6	3.47	1.99
85-083	EAST CHANNEL	13-Aug-85	13:00		14.7	8.2	9.7	96	256	0.25			1905	3.5	2.51	2.21
85-084	KUK BAY	15-Aug-85	09:09	1.8	8.5	8.4	11.0	94	11800	1.30	1.07	6.5	1796	1.9	3.22	2.25
85-085	KUK LAKE 10	15-Aug-85	09:53	1.3	9.4	8.3	10.9	95	134	-1.30	0.94	6.3	744	6.1	1.13	1.48
85-086	KUK LAKE 18	15-Aug-85	10:28	3.5	10.0	8.6	10.8	96	154	1.40	0.61	4.2	1229	3.2	1.34	1.28
85-087	KUK LAKE 7	15-Aug-85	11:02	1.7	10.2	8.5	10.7	95	124	-1.70	0.68	3.2	1001	4.4	1.12	0.96
85-088	KUK LAKE 14	15-Aug-85	11:35	1.5	9.6	8.8	10.7	94	122	-1.50	0.76	4.5	961	3.5	1.52	1.11
85-089	KUK LAKE 28	15-Aug-85	12:15	6.0	10.4	8.4	10.5	94	180	4.00	0.35	3.9	1581	2.0	0.94	1.67
85-090	SOUTH LAKE AB	20-Aug-85	12:05	1.3	11.2	8.7	10.0	91	259	1.00	1.53	7.2				
85-091	SOUTH LAKE BAYD	20-Aug-85	12:30	0.8	11.2	9.0	11.5	105	234	-0.80	1.69	6.4				
85-092	SOUTH LAKE BAYC	20-Aug-85	12:55	1.0	11.4	9.1	11.3	103	239	-1.00	0.90	3.8				
85-093	KUK LAKE 28	27-Aug-85	15:15	5.0	8.7	8.9	14.1	121	181	-5.00	0.39		1464	1.8		
85-094	KUK LAKE 14	27-Aug-85	16:07	1.8	7.6	8.4	15.1	126	122	-1.80	0.78	3.2	1000	3.4	1.03	0.80
85-095	KUK LAKE 7	27-Aug-85	16:40	2.8	7.7	9.0	14.0	117	125	-2.80	0.55	2.7	1000	3.5	0.63	0.75
85-096	KUK LAKE 18	27-Aug-85	17:12	4.4	7.8	9.2	14.8	124	155	2.70	0.58	3.5	1220	3.9	0.75	0.67
85-097	KUK LAKE 10	27-Aug-85	17:45	1.8	7.2	8.9	14.2	118	138	-1.80	0.85	6.1	783	5.8	0.84	0.77
85-098	KUK BAY	27-Aug-85	18:17	3.6	6.5	8.5	14.4	117	12840	1.60	0.90	6.9	1653	1.5	1.52	1.38
85-099	BIG LAKE	29-Aug-85	09:40	1.6	11.7	8.5	10.5	97	247	0.50	1.98	14.8	1756	5.9	1.71	1.43
85-100	SKIDOO LAKE	29-Aug-85	10:35	0.6	11.1	8.7	10.3	94	245	-0.60	2.71	11.3	1802	1.9	1.26	0.84
85-101	NRC CHANNEL	29-Aug-85	11:08		12.3	8.3	10.2	95	251	0.35			1776	6.5	2.91	1.95
85-102	SOUTH LAKE BAY	29-Aug-85	11:25	1.1	11.8	9.3	11.3	104	221	-1.10	1.11	4.7	1519	2.9	1.22	0.94
85-103	SOUTH LAKE	29-Aug-85	11:45	2.0	11.8	8.8	10.3	95	255	0.90	1.41	7.1	1937	3.5	1.59	0.68
85-104	EAST CHANNEL	29-Aug-85	12:25		12.5	8.1	10.5	99	251	0.50			1815	6.7	2.14	1.59
85-105	EAST CHANNEL	04-Sep-85	09:40		12.0					0.45			1834		2.32	1.92
85-106	KUK BAY	07-Sep-85	10:00	4.0	3.7	8.7	16.3	123	19550	1.80			1749			
85-107	KUK LAKE 10	07-Sep-85	10:37	1.6	4.3	8.5	14.6	112	137	-1.60			790			
85-108	KUK LAKE 18	07-Sep-85	11:10	2.9	5.2	9.1	14.2	112	154	-2.90			1197			
85-109	KUK LAKE 7	07-Sep-85	11:40	3.1	5.4	8.7	14.2	112	122	-3.10			1027			
85-110	KUK LAKE 14	07-Sep-85	12:05	1.9	4.7	9.7	14.7	114	114	-1.90			896			
85-111	KUK LAKE 28	07-Sep-85	12:25	6.3	6.5	8.9	13.8	112	178	-6.30			1483			
85-112	SKIDOO LAKE	10-Sep-85	09:22	1.2	8.0	8.8	12.6	106	269	0.30	2.76	13.4	1837	2.9	1.30	1.23
85-113	BIG LAKE	10-Sep-85	10:03	1.8	9.4	8.7	13.0	114	270	0.30	3.10	13.3	1731	3.6	1.71	1.24
85-114	NRC CHANNEL	10-Sep-85	10:26		10.3	8.8	13.6	121	277	0.35			1765	2.9	1.96	1.64
85-115	SOUTH LAKE BAY	10-Sep-85	10:49	1.3	8.1	9.3	13.7	116	253	-1.30	1.09	4.5	1593	2.5	1.23	1.08
85-116	SOUTH LAKE	10-Sep-85	11:13	3.0	8.6	8.9	12.9	111	285	1.05	1.34	7.5	1931	3.0	1.33	1.11
85-117	EAST CHANNEL	10-Sep-85	12:00		10.5		13.4	120	276	0.25			1769	3.3	2.01	3.40

Appendix 1. Cont'd.

STA	Location	Date	Time	Depth	Temp	pH	O_2	%O_2	Cond	Secchi	e	%upw	TIC	Chl	P^B_m	α
85-118	KUK BAY	12-Sep-85	10:35	3.6	3.7	8.5	13.0	98	25200	2.00	0.87	6.1	1638	1.3	1.42	3.64
85-119	KUK LAKE 10	12-Sep-85	11:14	1.9	4.2	8.2	12.4	95	146	-1.95	0.80	7.2	844	5.3	0.56	0.82
85-120	KUK LAKE 18	12-Sep-85	11:40	1.9	4.8	8.7	12.3	96	157	-1.90	0.66	3.0	1194	3.1	0.84	0.65
85-121	KUK LAKE 7	12-Sep-85	12:05	1.9	5.0	8.4	12.3	96	126	-1.90	0.63	2.6	1019	3.9	0.64	0.98
85-122	KUK LAKE 14	12-Sep-85	12:36	1.8	4.7	8.4	13.3	103	124	-1.80	0.78	5.1	996	4.4	0.74	0.48
85-123	KUK LAKE 28	12-Sep-85	13:10	4.2	6.1	8.6	11.7	94	183	-4.20	0.49	2.8	1453	1.8	0.63	0.80
85-124	EAST CHANNEL	16-Sep-85	10:35		7.0					-0.90			1705			
86-001	SOUTH LAKE BAY	12-Jun-86	09:30	4.1	4.1	8.1	9.6	73	197	0.15	6.93	18.7	1506	1.2		
86-002	SOUTH LAKE	12-Jun-86	09:50	4.1	3.7	7.9	10.0	76	197	0.15	7.20	31.2	1497	0.9		
86-003	SKIDOO LAKE	12-Jun-86	10:13	4.1	6.2	8.2	10.1	82	208	0.15	8.04	17.6	1525	1.0		
86-004	NRC CHANNEL	12-Jun-86	10:32		7.5	8.3	10.0	83	205	-0.90			1715	1.5		
86-005	NRC LAKE	12-Jun-86	11:12	1.6	4.1	8.0	8.7	67	316	0.90	1.54	5.7	2129	6.0	1.37	1.42
86-006	EAST CHANNEL	12-Jun-86	12:10		7.9	8.2	10.4	88	206	-0.90			1691	1.3		
86-007	EAST CHANNEL	13-Jun-86	16:45							-0.90						
86-008	SOUTH LAKE BAY	16-Jun-86	09:05	3.2	12.8	7.7	9.6	91	214	0.15	5.80	16.7	1549	1.0	2.57	1.90
86-009	SOUTH LAKE	16-Jun-86	09:30	3.2	11.5	8.0	9.2	84	210	0.20	5.46	21.9	1521	0.7	1.63	2.13
86-010	NEW LAKE	16-Jun-86	09:55	3.6	11.5	7.7	9.6	88	220	0.25	5.09	12.5	1482	1.5	1.85	2.21
86-011	SKIDOO LAKE	16-Jun-86	10:12	3.4	12.6	8.1	9.6	90	222	0.20	5.82	15.2	1476	1.1	1.99	2.05
86-012	NRC CHANNEL	16-Jun-86	10:30		9.6	8.3	10.4	91	204	-0.90			1644	0.8	3.05	2.81
86-013	NRC LAKE	16-Jun-86	10:53	1.5	13.5	8.0	9.3	89	335	1.20	1.13	2.9	2214	9.0	1.34	1.32
86-014	EAST CHANNEL	16-Jun-86	12:12		9.6	7.6	10.5	92	205	-0.90			1515	0.6		
86-015	SOUTH LAKE BAY	23-Jun-86	08:39	2.5	18.7	8.1	9.1	98	243	0.60	3.17	13.3	1607	4.4	1.82	1.11
86-016	SOUTH LAKE	23-Jun-86	09:32	2.3	18.3	8.2	9.3	99	240	0.56	3.21	12.0	1617	6.2	1.82	1.08
86-017	NEW LAKE	23-Jun-86	09:56	2.4	17.7	8.2	8.7	91	249	0.75	2.53	9.5	1583	5.3	2.67	1.52
86-018	SKIDOO LAKE	23-Jun-86	10:14	2.2	17.7	8.3	9.3	98	254	0.68	2.59	9.4	1619	5.1	2.03	0.99
86-019	NRC CHANNEL	23-Jun-86	10:34		14.1	8.3	9.9	96	232	-0.90			1563	1.6	3.46	1.40
86-020	NRC LAKE	23-Jun-86	11:00	0.9	19.3	8.0	9.3	101	401		0.99	3.5	2385	5.8	1.72	1.31
86-021	EAST CHANNEL	23-Jun-86	11:45		14.1	8.0	10.5	102	231	-0.90			1570	1.7		
86-022	SOUTH LAKE BAY	30-Jun-86	09:20	2.1	15.9	7.8			235	0.90	2.22	7.5	1588	8.2	1.60	1.21
86-023	SOUTH LAKE	30-Jun-86	09:40	2.8	15.6	7.6			240	0.78	2.68	8.6	1500	11.8	1.58	1.13
86-024	NEW LAKE	30-Jun-86	10:10	2.3	15.7	8.2			249	0.60	2.73	9.5	1398	5.8	1.24	1.36
86-025	SKIDOO LAKE	30-Jun-86	10:30	2.4	15.1	8.2			255	0.45	2.99	10.5	1438	6.2	1.58	1.52
86-026	NRC CHANNEL	30-Jun-86	10:49		15.4	8.2			239	-0.90			1451	1.4	2.21	1.50
86-027	NRC LAKE	30-Jun-86	11:10	1.2	18.4	8.0			405	-1.20	0.93	3.4	2488	3.4	3.69	1.90
86-028	EAST CHANNEL	30-Jun-86	12:00		15.6	8.0			238	-0.90			1588	1.2		
86-029	KUK LAKE 10	02-Jul-86	09:40	1.6	2.4	7.8	12.6	92	72	-1.60	0.90	3.1	691	3.3	0.83	0.95
86-030	NOELL LAKE	02-Jul-86	11:50	5.0	5.4	7.6	14.8	117	47	-5.00	0.45	1.6	342	1.1	0.35	0.56
86-031	SOUTH LAKE BAY	04-Jul-86	--:--		15.5	8.2	9.2	92	249	-0.90						
86-032	SOUTH LAKE	04-Jul-86	--:--		14.6	8.1	8.9	88	248	-0.90						
86-033	NEW LAKE	04-Jul-86	--:--		15.0	8.2	9.3	92	250	-0.90						
86-034	SKIDOO LAKE	04-Jul-86	--:--		14.7	8.2	9.3	92	249	-0.90						
86-035	NRC LAKE	04-Jul-86	--:--		17.0	8.7	10.2	106	390	-0.90						
86-036	NRC CHANNEL	04-Jul-86	--:--		14.6	8.1	9.4	92	218	-0.90						
86-037	KUK LAKE 10	07-Jul-86	10:20	1.7	7.9	7.6	12.5	105	90	-1.75	0.74	3.0	480	2.2	0.59	0.58
86-038	NOELL LAKE	07-Jul-86	12:05	5.5	9.8	7.7	12.2	108	62	-5.50	0.36	1.4	389	2.1	0.26	0.23
86-039	SOUTH LAKE	10-Jul-86	09:20	1.8	17.6	8.3	9.0	94	263	1.50						
86-040	NRC LAKE	10-Jul-86	09:48	0.7	19.0	9.4	12.6	136	328	-0.70						
86-041	SOUTH LAKE	10-Jul-86	13:45	2.4	17.1	8.1	9.4	97	258	1.55						
86-042	NRC LAKE	10-Jul-86	14:21		18.7	9.5	12.6	135	322	-0.90						
86-043	SOUTH LAKE	10-Jul-86	17:30	2.0	16.0	8.0	8.9	90	262	1.30						
86-044	NRC LAKE	10-Jul-86	18:08		18.0	9.6	12.0	127	324	-0.90						
86-045	NOELL LAKE	14-Jul-86	09:05	4.6						-4.60	0.40	1.7	317	3.1	0.23	0.29
86-046	KUK LAKE 10	14-Jul-86	10:30	1.6						-1.60	0.78	5.0	520	0.7	7.17	6.10
86-047	KUK LAKE 18	14-Jul-86	11:10	2.3						2.20	0.80	5.5	1195	5.9		
86-048	KUK LAKE 18	15-Jul-86	12:50	3.5	5.4	8.0	12.8	101	115	-0.90			1193		0.67	0.51
86-049	KUK LAKE 10	15-Jul-86	13:30	1.0	11.7	8.0	10.5	97	91	-0.90						
86-050	NOELL LAKE	15-Jul-86	14:30	5.7	13.7	7.6	10.7	103	50	5.00						
86-051	SOUTH LAKE BAY	17-Jul-86	09:06	2.3	17.8	8.3	8.7	92	272	2.10	1.33	4.6	1909	2.7	1.11	0.65
86-052	SOUTH LAKE	17-Jul-86	09:28	3.3	17.6	8.2	8.8	92	267	1.40	1.51	6.4	1896	4.3	1.40	1.00
86-053	NEW LAKE	17-Jul-86	10:00	2.6	17.1	8.3	8.8	91	249	0.27	3.59	19.4	1755	4.9	1.92	1.46
86-054	SKIDOO LAKE	17-Jul-86	10:17	2.4	16.9	8.3	8.6	89	249	0.25	4.42	20.4	1723	5.4	2.04	1.37
86-055	NRC CHANNEL	17-Jul-86	10:45		16.6	8.1	9.0	92	222	-0.90			1674	0.4		
86-056	NRC LAKE	17-Jul-86	11:05	1.2	19.6	9.6	12.1	132	285	-1.20	0.98	5.7	1088	2.0	0.84	0.61
86-057	EAST CHANNEL	17-Jul-86	12:05		16.8	8.1	8.9	92	233	-0.90			1745	0.7		
86-058	NOELL LAKE	29-Jul-86	09:00	3.0	11.8		10.1	93	48	-3.00	0.40	2.5	380	1.2	0.86	0.98
86-059	KUK LAKE 18	29-Jul-86	10:54	4.2	10.6		11.2	101	159	2.50	0.66	3.7	1303	3.2	2.16	1.83
86-060	KUK LAKE 10	29-Jul-86	11:35	1.6	9.9		10.7	95	105	0.85	1.68	10.2	735	9.2	1.53	1.46
86-061	KUK LAKE 18	24-Jul-86	12:10	2.9	10.9	8.3	11.0	100	160	-0.90						
86-062	KUK LAKE 18	25-Jul-86	--:--		11.5					2.20	0.82					

Appendix 1. Cont'd.

STA	Location	Date	Time	Depth	Temp	pH	O_2	$\%O_2$	Cond	Secchi	e	%upw	TIC	Chl	P^B_m	α
86-063	KUK LAKE 18	08-Aug-86	--:--	2.9	12.0	8.4	9.7	90	172	2.00						
86-064	SOUTH LAKE	28-Jul-86	--:--	2.5	14.0	8.3	9.3	90	274	-0.90						
86-065	SOUTH LAKE BAY	05-Aug-86	09:18	1.8	16.8	8.7	8.8	91	300	-1.78	1.32	2.6	1976	3.6	1.11	0.75
86-066	SOUTH LAKE	05-Aug-86	09:55	1.9	16.1	8.2	9.3	94	279	-1.92	1.03	3.0	1878	3.1	0.86	0.97
86-067	NEW LAKE	05-Aug-86	10:30	2.3	16.3	8.3	8.9	91	261	0.50	2.25	14.6	1780	6.2	0.94	1.15
86-068	SKIDOO LAKE	05-Aug-86	10:49	1.6	16.3	8.3	8.5	87	262	0.29	3.53	16.7	1805	4.7	1.38	1.41
86-069	NRC CHANNEL	05-Aug-86	11:24		16.2	7.8	8.9	91	256	-0.90			1735	1.1	2.73	1.24
86-070	NRC LAKE	05-Aug-86	11:45	1.1	17.4	10.0	11.0	115	294	-1.05	0.97	3.1	739	2.1	1.28	0.94
86-071	EAST CHANNEL	05-Aug-86	12:48		16.2	8.1	10.1	103	261	-0.90			1799	0.9		
86-072	NRC LAKE	11-Aug-86	--:--	1.0	19.6	10.6	12.8	140	306	-0.90						
86-073	SKIDOO LAKE C	11-Aug-86	--:--	1.8	19.3	8.4	9.2	100	273	-0.90						
86-074	STRANGE BAY C	11-Aug-86	--:--	1.0	18.7	8.1	9.3	100	295	-0.90						
86-075	SOUTH LAKE	11-Aug-86	--:--	3.0	18.5	8.6	9.2	98	286	2.00						
86-076	SOUTH LAKE BAY	11-Aug-86	--:--	2.0	18.7	8.5	9.8	105	284	-2.00						
86-077	SOUTH LAKE C	11-Aug-86	--:--							0.20						
86-078	KUK LAKE 18	13-Aug-86	11:45	3.8	13.1	8.5	9.7	92	172	2.10	0.69	3.7		4.0		
86-079	KUK LAKE 10	13-Aug-86	12:45	1.5	13.1	7.9	10.4	99	122	0.45	3.29	14.0		25.5		
86-080	NOELL LAKE	13-Aug-86	13:50	6.8	14.9	7.9	9.7	96	52	-6.80	0.34			1.1		
86-081	SOUTH LAKE BAY	18-Aug-86	09:12	1.5	14.2	9.0	12.5	122	269	-1.75	0.98	3.0	1792	4.2	0.85	0.97
86-082	SOUTH LAKE	18-Aug-86	09:42	2.2	14.4	8.3	11.0	108	272	0.78	1.68	9.8	1896	3.8	1.58	1.06
86-083	NEW LAKE	18-Aug-86	10:14	2.3	13.9	8.4	11.0	106	258	0.41	2.59	13.9	1730	5.0	1.42	1.35
86-084	SKIDOO LAKE	18-Aug-86	10:40	2.2	13.9	8.3	11.1	107	263	0.30	3.11	47.3	1680	5.7	1.19	1.33
86-085	NRC CHANNEL	18-Aug-86	11:13		15.1	8.1	10.5	104	271	-0.90			1820	0.8	2.48	2.61
86-086	NRC LAKE	18-Aug-86	11:51	1.1	14.7	10.5	13.2	130	286	-1.10	1.05	2.9	799	2.0	0.49	0.41
86-087	EAST CHANNEL	18-Aug-86	13:00	1.9	15.2	7.9	10.8	108	275	-1.85			1922	0.6		
86-088	KUK LAKE 18	19-Aug-86	14:30	1.2	10.4	8.5	13.0	116	168	-1.20	1.36	3.9				
86-089	NOELL LAKE	25-Aug-86	10:45	5.5	9.7	7.9	12.9	113	49	-5.50	0.42	2.6	373	1.4	0.70	0.95
86-090	KUK LAKE 10	25-Aug-86	12:00	1.5	4.3	8.2	14.6	112	114	0.35	3.85	11.8	785	46.5	1.40	2.09
86-091	KUK LAKE 18	25-Aug-86	12:35	3.7	5.6	8.4	14.5	115	162	1.40	1.15	5.9	1349	4.6	1.40	1.55
86-092	SOUTH LAKE BAY	28-Aug-86	09:30	1.7	8.3	9.0	14.5	123	258	-1.75	1.03	3.2	1725	3.0	0.71	0.88
86-093	SOUTH LAKE	28-Aug-86	09:58	3.2	8.6	8.2	13.4	115	277	0.35	3.10	17.2	1880	4.4	1.13	1.54
86-094	NEW LAKE	28-Aug-86	10:36	2.7	8.3	8.2	12.1	103	271	0.25	4.20	20.0	1765	4.1	1.23	1.55
86-095	SKIDOO LAKE	28-Aug-86	11:03	2.0	7.9	8.6	13.0	110	270	0.18	6.36	20.6	1772	3.1	1.32	1.11
86-096	NRC CHANNEL	28-Aug-86	11:32		10.3	8.1	12.7	113	279	-0.90			1870	1.6	1.43	2.50
86-097	NRC LAKE	28-Aug-86	11:49	1.0	8.4	10.4	15.1	129	272	-1.01	1.17		877	3.1	0.67	1.14
86-098	EAST CHANNEL	28-Aug-86	12:54		10.4	8.1	12.1	108	281	-0.90			1889	1.6		
96-099	SOUTH LAKE BAY	01-Sep-86	09:30	1.4	9.2	9.2	12.6	110	251	-1.40	1.09	3.3				
86-100	SOUTH LAKE	01-Sep-86	11:00	2.9	8.9	8.5	10.8	93	274	0.55	2.33	12.3				
86-101	SKIDOO LAKE	01-Sep-86	--:--	1.6	9.0	8.4	10.8	93	270	0.30	4.09	19.2				
86-102	NEW LAKE	01-Sep-86	--:--	1.8	9.1	8.3	10.8	94	266	0.40	2.87	16.0				
86-103	NRC CHANNEL	01-Sep-86	--:--		10.5	8.2	10.2	91	263	-0.90						
86-104	NRC LAKE	01-Sep-86	--:--	0.9	10.3	10.1	12.8	114	264	-0.90						
86-105	NOELL LAKE	04-Sep-86	09:10	5.5	9.1	7.6	11.1	96	45	-5.50	0.52	0.8	347	1.6	0.71	0.96
86-106	KUK LAKE 10	04-Sep-86	10:15	1.5	7.2	7.9	12.4	103	119	0.50	3.12	14.1	738	42.1	1.54	2.41
86-107	KUK LAKE 18	04-Sep-86	11:10	4.5	6.9	8.5	12.5	103	162	2.00	0.81	5.7	1243	3.6	1.45	1.34
86-108	SOUTH LAKE BAY	07-Sep-86	11:25	1.4	12.1	9.1	12.6	117	249	-1.40	1.00	5.0	1615	3.6		
86-109	SOUTH LAKE	07-Sep-86	11:40	2.8	11.6	8.6	11.6	107	275	1.00	1.54	9.2	1861	3.3		
86-110	NEW LAKE	07-Sep-86	12:30	1.8	11.5	8.6	11.6	106	265	0.82	1.63	10.7	1742	4.6		
86-111	SKIDOO LAKE	07-Sep-86	12:55	1.5	11.9	8.6	11.4	106	275	0.70	2.18	14.9	1764	4.8		
86-112	NRC CHANNEL	07-Sep-86	13:20		12.2	8.3	10.4	97	270	-0.90			1757	2.5		
86-113	NRC LAKE	07-Sep-86	13:43		13.5	9.8	11.8	113	276	-0.90			1118	1.8		
86-114	EAST CHANNEL	07-Sep-86	14:20		12.3	8.2	10.5	98	273	-0.90			1745	2.6		
86-115	SOUTH LAKE BAY	09-Sep-86	11:00		12.4	9.2	11.8	110	247	-0.90						
86-116	STRANGE BAY C	09-Sep-86	11:15		11.7	8.6	12.7	117	269	-0.90						
86-117	SOUTH LAKE	09-Sep-86	--:--		11.6	8.7	11.2	103	276	-0.90						
86-118	NEW LAKE	09-Sep-86	--:--		11.6	8.7	11.2	103	268	-0.90						
86-119	SKIDOO LAKE	09-Sep-86	--:--		11.7	8.8	11.2	103	276	-0.90						
86-120	NRC CHANNEL	09-Sep-86	--:--		12.3	8.4	11.2	105	278	-0.90						
86-121	NRC LAKE	09-Sep-86	--:--		11.0	9.9	10.8	98	280	-0.90						
86-122	LAKE 274	09-Sep-86	--:--		10.5	9.9	11.8	106	141	-0.90						
86-123	LAKE 522	09-Sep-86	--:--		11.0	9.5	13.5	122	170	-0.90						
86-501	STRANGE BAY A	18-Jun-86	--:--	1.8						0.25	5.39	16.0				
86-502	STRANGE BAY B	18-Jun-86	--:--	1.8						0.27						
86-503	STRANGE BAY C	18-Jun-86	--:--	2.3						0.27						
86-504	STRANGE BAY D	18-Jun-86	--:--	2.3						0.27						
86-505	SOUTH LAKE A	18-Jun-86	--:--	1.8						0.26						
86-506	SOUTH LAKE B	18-Jun-86	--:--	1.9						0.27						
86-507	SOUTH LAKE C	18-Jun-86	--:--	2.3						0.27						
86-508	SOUTH LAKE D	18-Jun-86	--:--	2.4						0.27						

Appendix 1. Cont'd.

STA	Location	Date	Time	Depth	Temp	pH	O_2	$\%O_2$	Cond	Secchi	e	%upw	TIC	Chl	P^B_m	α
86-509	STRANGE BAY A	20-Jun-86	--:--	1.6						0.23	4.56	16.7				
86-510	STRANGE BAY B	20-Jun-86	--:--	1.6						0.23	4.71	14.8				
86-511	STRANGE BAY C	20-Jun-86	--:--	2.2						0.27	4.57	16.8				
86-512	STRANGE BAY D	20-Jun-86	--:--	2.0						0.26	4.72	16.8				
86-513	SOUTH LAKE A	20-Jun-86	--:--	1.5						0.27	4.56	15.8				
86-514	SOUTH LAKE B	20-Jun-86	10:55	1.6						0.25	4.56	15.3				
86-515	SOUTH LAKE C	20-Jun-86	11:05	2.0						0.24	4.38	16.6				
86-516	SOUTH LAKE D	20-Jun-86	11:18	2.1						0.24	4.47	13.6				
86-517	SKIDOO LAKE C	20-Jun-86	11:45	2.2						0.31	3.96	10.9				
86-518	SKIDOO LAKE D	20-Jun-86	11:58	2.1						0.36	3.95	14.1				
86-519	SKIDOO LAKE A	20-Jun-86	12:07	1.6						0.45	3.74	13.5				
86-520	SKIDOO LAKE B	20-Jun-86	12:27	1.6						0.32	3.84	13.8				
86-521	STRANGE BAY A	25-Jun-86	11:25	1.3	14.0					0.76	2.86	8.5				
86-522	STRANGE BAY C	25-Jun-86	12:04	1.9						0.73	2.93	6.0				
86-523	SOUTH LAKE A	25-Jun-86	--:--	1.5						0.85	2.76	4.6				
86-524	SOUTH LAKE C	25-Jun-86	14:25	1.8						0.75	2.72	7.6				
86-525	SOUTH LAKE C	03-Jul-86	10:10	2.0	14.4	8.1	10.3	101	246	0.70	2.32	8.3				
86-526	STRANGE BAY C	03-Jul-86	--:--	2.1	14.8	7.9	9.3	92	246	0.98	1.95	6.1				
86-527	STRANGE BAY A	03-Jul-86	--:--	1.0	14.7	7.9	8.4	83	248	-0.90	2.12	5.3				
86-528	SOUTH LAKE A	03-Jul-86	--:--	1.0	14.5	8.1	9.2	90	249	0.39	2.32	9.6				
86-529	SOUTH LAKE 5	03-Jul-86	12:23	1.0	14.6	8.0	9.7	95	248	0.30	4.33	14.3				
86-530	SKIDOO LAKE A	03-Jul-86	--:--	1.8	14.7	8.1	9.4	93	259	0.68	2.29	9.6				
86-531	NRC LAKE	03-Jul-86	13:30	0.8	16.8	8.8	10.2	105	391	-0.90	0.77	3.4				
86-532	SOUTH LAKE C	03-Jul-86	14:30	2.2	15.0	8.0	9.2	91	248	0.45						
86-533	STRANGE BAY B	04-Jul-86	10:45	1.2						1.10	1.81	6.1				
86-534	SOUTH LAKE C	04-Jul-86	13:08							-0.90	2.28	10.0				
86-535	SOUTH LAKE BAY	08-Jul-86	09:52	2.5	18.5	8.1	10.5	112	254	1.49						
86-536	SOUTH LAKE BAY2	08-Jul-86	10:15	1.5						-1.45						
86-537	STRANGE BAY C	08-Jul-86	10:40	1.6	18.5	7.5	8.2	88	254	1.52	1.65	4.8				
86-538	SOUTH LAKE	08-Jul-86	11:00	2.9	18.2	8.2	9.3	99	254	1.50	1.41	10.0				
86-539	SOUTH LAKE 5	08-Jul-86	11:30	1.0	19.0	8.1	8.7	94	257	-1.00	2.02	5.2				
86-540	SOUTH LAKE C	08-Jul-86	11:50	1.3	18.8	8.2	9.0	97	256	-1.30	1.66	6.7				
86-541	SKIDOO LAKE C	08-Jul-86	14:30	1.9	18.8	8.3	9.4	101	253	0.45	2.70	17.6				
86-542	SOUTH LAKE CH	10-Jul-86	--:--	1.3						1.20	2.02	6.4				
86-543	STRANGE BAY B	21-Jul-86	11:10	1.1						-1.10	2.03	3.3				
86-544	STRANGE BAY C	21-Jul-86	--:--	1.8						-1.80	1.32	4.5				
86-545	SOUTH LAKE BAY	21-Jul-86	--:--	1.4						-1.40	1.29	3.8				
86-546	SOUTH LAKE C	21-Jul-86	--:--							-0.90	1.34	4.2				
86-547	SOUTH LAKE A	21-Jul-86	--:--							-0.90	1.71	3.6				
86-548	SKIDOO LAKE C	21-Jul-86	--:--							-0.90	3.45	16.7				
86-549	SKIDOO LAKE A	21-Jul-86	--:--							0.50	3.34	21.1				
86-550	STRANGE BAY C	21-Jul-86	--:--		15.6		9.4	94	278	-0.90						
86-551	SOUTH LAKE	21-Jul-86	--:--	3.8	15.6	8.1	9.8	98	274	-0.90						
86-552	SKIDOO LAKE C	21-Jul-86	--:--	2.0	15.3	8.3	9.3	93	260	-0.90						
86-553	SOUTH LAKE C	23-Jul-86	--:--							1.60						
86-554	SKIDOO LAKE C	23-Jul-86	--:--							0.40						
86-555	SOUTH LAKE BAY	23-Jul-86	11:30	2.0						-0.90	1.28	11.0				
86-556	SOUTH LAKE	23-Jul-86	12:43	3.6						-0.90	1.31	3.2				
86-557	SOUTH LAKE C	23-Jul-86	13:15	1.5						-0.90	1.23	4.1				
86-558	SOUTH LAKE 5	23-Jul-86	13:36							-0.90	1.59	3.1				
86-559	STRANGE BAY C	06-Aug-86	10:49	1.2						-1.20	1.20	3.0				
86-560	SOUTH LAKE	06-Aug-86	11:09	3.0						2.50	1.03	3.2				
86-561	SOUTH LAKE C	06-Aug-86	11:30	1.2						-1.20	1.17	3.6				
86-562	SOUTH LAKE 5	06-Aug-86	11:48	0.6						-0.60	2.19					
86-563	STRANGE BAY C	07-Aug-86	10:00	1.1						-1.10	1.89	3.3				
86-564	SOUTH LAKE A	08-Aug-86	14:00	0.6	18.0					-0.90	1.34	3.3				
86-565	SKIDOO LAKE C	08-Aug-86	--:--		17.0					-0.90	2.51	12.7				
86-566	SOUTH LAKE BAY	20-Aug-86	09:40	1.9						-1.85	0.93	2.8				
86-567	SOUTH LAKE BAY2	20-Aug-86	10:05	0.8						-0.80	1.02	3.5				
86-568	STRANGE BAY C	20-Aug-86	10:15	1.4						-1.40	1.09	3.6				
86-569	SOUTH LAKE	20-Aug-86	--:--	3.3						0.65	1.65	11.5				
86-570	SOUTH LAKE C	20-Aug-86	--:--	1.4						0.45	2.89	13.8				
86-571	SOUTH LAKE 5	20-Aug-86	11:10	0.7						0.10	14.51					
86-572	SKIDOO LAKE C	20-Aug-86	--:--	2.3						1.00	1.59	10.5				
86-573	SKIDOO LAKE	20-Aug-86	--:--	2.2						0.25	4.16	16.6				
86-574	STRANGE BAY C	01-Sep-86	10:28	0.9	9.1	8.6	12.5	108	265	-0.90	1.17	2.9				
86-575	SOUTH LAKE C	01-Sep-86	11:30	0.9	8.9	8.4	10.2	88	276	0.50	2.94	13.8				
86-576	SOUTH LAKE 5	01-Sep-86	12:00	0.3	9.2	8.3	11.0	96	277	-0.35						
86-577	SKIDOO LAKE C	01-Sep-86	12:55	2.6	9.3	8.4	11.1	97	274	0.65	2.43	11.9				

Appendix 1. Cont'd.

STA	Location	Date	Time	Depth	Temp	pH	O_2	$\%O_2$	Cond	Secchi	e	%upw	TIC	Chl	P^B_m	α
86-567	SOUTH LAKE BAY2	20-Aug-86	10:05	0.8						-0.80	1.02	3.5				
86-568	STRANGE BAY C	20-Aug-86	10:15	1.4						-1.40	1.09	3.6				
86-569	SOUTH LAKE	20-Aug-86	--:--	3.3						0.65	1.65	11.5				
86-570	SOUTH LAKE C	20-Aug-86	--:--	1.4						0.45	2.89	13.8				
86-571	SOUTH LAKE 5	20-Aug-86	11:10	0.7						0.10	14.51					
86-572	SKIDOO LAKE C	20-Aug-86	--:--	2.3						1.00	1.59	10.5				
86-573	SKIDOO LAKE	20-Aug-86	--:--	2.2						0.25	4.16	16.6				
86-574	STRANGE BAY C	01-Sep-86	10:28	0.9	9.1	8.6	12.5	108	265	-0.90	1.17	2.9				
86-575	SOUTH LAKE C	01-Sep-86	11:30	0.9	8.9	8.4	10.2	88	276	0.50	2.94	13.8				
86-576	SOUTH LAKE 5	01-Sep-86	12:00	0.3	9.2	8.3	11.0	96	277	-0.35						
86-577	SKIDOO LAKE C	01-Sep-86	12:55	2.6	9.3	8.4	11.1	97	274	0.65	2.43	11.9				

Appendix 2. Summary of data collected in 1985 and 1986. This appendix contains the same data as Appendix 1, but the data are sorted by location so that all data for each location are together. See the legend to Appendix 1 for the key to the column headings.

STA	Location	Date	Time	Depth	Temp	pH	O_2	$\%O_2$	Cond	Secchi	e	%upw	TIC	Chl	P^B_m	α
85-001	BIG LAKE	13-Jun-85	--:--	2.0	7.8	8.1	10.0	84	211	0.20	7.53					
85-009	BIG LAKE	18-Jun-85	08:10	1.3	10.2	7.8	11.0	98	210	0.15	12.23	23.5	1692	1.8	1.18	1.30
85-015	BIG LAKE	23-Jun-85	08:10	1.0	12.6	8.0	10.1	95	205	0.15	7.86	18.0	1758	1.8	2.23	1.72
85-024	BIG LAKE	28-Jun-85	08:09	1.0	14.6	7.9	10.0	98	221	0.15	7.49	16.2	1706	2.4	2.08	1.44
85-036	BIG LAKE	03-Jul-85	09:25	3.8	16.2	8.2	9.2	94	234	0.35	2.78	13.7	1712	3.7	2.62	2.19
85-046	BIG LAKE	15-Jul-85	09:22	2.5	12.2	8.6	10.8	101	242	0.15	7.99	18.4	1640	2.1	1.87	1.77
85-062	BIG LAKE	29-Jul-85	09:00	2.7	13.8	8.4	10.1	98	245	0.35	3.46	17.3	1838	4.6		
85-078	BIG LAKE	13-Aug-85	09:00	2.6	14.2	8.5	9.7	95	251	0.35	3.51	17.5	1918	4.7	2.01	1.77
85-099	BIG LAKE	29-Aug-85	09:40	1.6	11.7	8.5	10.5	97	247	0.50	1.98	14.8	1756	5.9	1.71	1.43
85-113	BIG LAKE	10-Sep-85	10:03	1.8	9.4	8.7	13.0	114	270	0.30	3.10	13.3	1731	3.6	1.71	1.24
85-007	BOOT LAKE	15-Jun-85	--:--	3.0	7.5	7.9	9.9	83	184	0.70	2.12	5.1	1061	5.5	1.41	1.29
85-006	EAST CHANNEL	13-Jun-85	--:--		8.7	7.9	9.6	82	213	0.10						
85-008	EAST CHANNEL	15-Jun-85	--:--		8.9	8.0	9.8	85	209				2016	1.8	1.25	1.53
85-014	EAST CHANNEL	18-Jun-85	10:36		10.6	8.0	10.1	91	213				1803	1.8	1.35	1.21
85-020	EAST CHANNEL	23-Jun-85	10:40		12.7	8.1	10.0	94	207	0.10			1773	1.5	1.93	1.48
85-029	EAST CHANNEL	28-Jun-85	10:22		14.7	8.1	9.7	96	221	0.15			1634	2.6	1.92	1.47
85-041	EAST CHANNEL	03-Jul-85	12:05		15.7	7.6	9.7	98	236	0.25			1806	2.7	2.41	2.06
85-051	EAST CHANNEL	15-Jul-85	12:06		13.7	8.3	10.4	100	238	0.05			1695	1.8	2.69	1.84
85-067	EAST CHANNEL	29-Jul-85	11:15		14.0		11.0	107	252	0.15			1747	3.1	2.44	2.78
85-083	EAST CHANNEL	13-Aug-85	13:00		14.7	8.2	9.7	96	256	0.25			1905	3.5	2.51	2.21
85-104	EAST CHANNEL	29-Aug-85	12:25		12.5	8.1	10.5	99	251	0.50			1815	6.7	2.14	1.59
85-105	EAST CHANNEL	04-Sep-85	09:40		12.0					0.45			1834		2.32	1.92
85-117	EAST CHANNEL	10-Sep-85	12:00		10.5		13.4	120	276	0.25			1769	3.3	2.01	3.40
85-124	EAST CHANNEL	16-Sep-85	10:35		7.0					-0.90			1705			
86-006	EAST CHANNEL	12-Jun-86	12:10		7.9	8.2	10.4	88	206	-0.90			1691	1.3		
86-007	EAST CHANNEL	13-Jun-86	16:45							-0.90						
86-014	EAST CHANNEL	16-Jun-86	12:12		9.6	7.6	10.5	92	205	-0.90			1515	0.6		
86-021	EAST CHANNEL	23-Jun-86	11:45		14.1	8.0	10.5	102	231	-0.90			1570	1.7		
86-028	EAST CHANNEL	30-Jun-86	12:00		15.6	8.0			238	-0.90			1588	1.2		
86-057	EAST CHANNEL	17-Jul-86	12:05		16.8	8.1	8.9	92	233	-0.90			1745	0.7		
86-071	EAST CHANNEL	05-Aug-86	12:48		16.2	8.1	10.1	103	261	-0.90			1799	0.9		
86-087	EAST CHANNEL	18-Aug-86	13:00	1.9	15.2	7.9	10.8	108	275	-1.85			1922	0.6		
86-098	EAST CHANNEL	28-Aug-86	12:54		10.4	8.1	12.1	108	281	-0.90			1889	1.6		
86-114	EAST CHANNEL	07-Sep-86	14:20		12.3	8.2	10.5	98	273	-0.90			1745	2.6		
85-052	KUK BAY	18-Jul-85	10:05	3.0	6.1	8.4	11.7	94	10100	2.00	0.73	9.2	1194	0.9	2.17	1.12
85-068	KUK BAY	31-Jul-85	09:30	4.0	8.1	8.3	11.7	99	10900	2.70	0.73	4.9	1643	1.3	6.67	5.23
85-084	KUK BAY	15-Aug-85	09:09	1.8	8.5	8.4	11.0	94	11800	1.30	1.07	6.5	1796	1.9	3.22	2.25
85-098	KUK BAY	27-Aug-85	18:17	3.6	6.5	8.5	14.4	117	12840	1.60	0.90	6.9	1653	1.5	1.52	1.38
85-106	KUK BAY	07-Sep-85	10:00	4.0	3.7	8.7	16.3	123	19550	1.80			1749			
85-118	KUK BAY	12-Sep-85	10:35	3.6	3.7	8.5	13.0	98	25200	2.00	0.87	6.1	1638	1.3	1.42	3.64
85-035	KUK LAKE 7	01-Jul-85	11:56	2.5	3.8	7.9	12.1	92	120	-2.50	0.53	2.5	1077	2.5	0.94	0.82
85-056	KUK LAKE 7	18-Jul-85	--:--	1.9	8.0	8.6	11.9	100	130	-1.90	0.54	2.8	1019	5.0	0.72	0.73
85-072	KUK LAKE 7	31-Jul-85	12:00	3.0	10.0	8.4	11.3	100	128	-3.00	0.68	2.0	1035	4.1	0.81	0.66
85-087	KUK LAKE 7	15-Aug-85	11:02	1.7	10.2	8.5	10.7	95	124	-1.70	0.68	3.2	1001	4.4	1.12	0.96
85-095	KUK LAKE 7	27-Aug-85	16:40	2.8	7.7	9.0	14.0	117	125	-2.80	0.55	2.7	1000	3.5	0.63	0.75
85-109	KUK LAKE 7	07-Sep-85	11:40	3.1	5.4	8.7	14.2	112	122	-3.10			1027			
85-121	KUK LAKE 7	12-Sep-85	12:05	1.9	5.0	8.4	12.3	96	126	-1.90	0.63	2.6	1019	3.9	0.64	0.98
85-030	KUK LAKE 10	01-Jul-85	08:05	1.5	11.6	7.8	10.7	98	112	-1.50	0.69	4.1	706	6.9	0.88	1.16
85-053	KUK LAKE 10	18-Jul-85	--:--	1.5	6.8	8.3	12.0	98	125	1.30	1.08	6.7	699	11.0	0.56	0.73
85-069	KUK LAKE 10	31-Jul-85	10:15	1.4	9.6	8.3	11.2	98	133	-1.40	0.99	6.2	705	5.5	1.45	0.83
85-085	KUK LAKE 10	15-Aug-85	09:53	1.3	9.4	8.3	10.9	95	134	-1.30	0.94	6.3	744	6.1	1.13	1.48
85-097	KUK LAKE 10	27-Aug-85	17:45	1.8	7.2	8.9	14.2	118	138	-1.80	0.85	6.1	783	5.8	0.84	0.77
85-107	KUK LAKE 10	07-Sep-85	10:37	1.6	4.3	8.5	14.6	112	137	-1.60			790			
85-119	KUK LAKE 10	12-Sep-85	11:14	1.9	4.2	8.2	12.4	95	146	-1.95	0.80	7.2	844	5.3	0.56	0.82
86-029	KUK LAKE 10	02-Jul-86	09:40	1.6	2.4	7.8	12.6	92	72	-1.60	0.90	3.1	691	3.3	0.83	0.95
86-037	KUK LAKE 10	07-Jul-86	10:20	1.7	7.9	7.6	12.5	105	90	-1.75	0.74	3.0	480	2.2	0.59	0.58
86-046	KUK LAKE 10	14-Jul-86	10:30	1.6						-1.60	0.78	5.0	520	0.7	7.17	6.10
86-049	KUK LAKE 10	15-Jul-86	13:30	1.0	11.7	8.0	10.5	97	91	-0.90						

Appendix 2. Cont'd.

STA	Location	Date	Time	Depth	Temp	pH	O_2	$\%O_2$	Cond	Secchi	e	%upw	TIC	Chl	P^B_m	α
86-060	KUK LAKE 10	29-Jul-86	11:35	1.6	9.9		10.7	95	105	0.85	1.68	10.2	735	9.2	1.53	1.46
86-079	KUK LAKE 10	13-Aug-86	12:45	1.5	13.1	7.9	10.4	99	122	0.45	3.29	14.0		25.5		
86-090	KUK LAKE 10	25-Aug-86	12:00	1.5	4.3	8.2	14.6	112	114	0.35	3.85	11.8	785	46.5	1.40	2.09
86-106	KUK LAKE 10	04-Sep-86	10:15	1.5	7.2	7.9	12.4	103	119	0.50	3.12	14.1	738	42.1	1.54	2.41
85-032	KUK LAKE 14	01-Jul-85	09:45	2.1	11.1	8.1	10.8	98	108	2.10	0.65	3.6	899	4.9	0.61	1.03
85-055	KUK LAKE 14	18-Jul-85	--:--	1.8	7.7	8.7	11.6	97	123	-1.80	0.61	3.6	928	2.5	0.79	0.60
85-071	KUK LAKE 14	31-Jul-85	11:30	2.5	9.8	8.6	11.8	104	122	-2.50	0.83	3.1	1020	2.6	1.42	0.93
85-088	KUK LAKE 14	15-Aug-85	11:35	1.5	9.6	8.8	10.7	94	122	-1.50	0.76	4.5	961	3.5	1.52	1.11
85-094	KUK LAKE 14	27-Aug-85	16:07	1.8	7.6	8.4	15.1	126	122	-1.80	0.78	3.2	1000	3.4	1.03	0.80
85-110	KUK LAKE 14	07-Sep-85	12:05	1.9	4.7	9.7	14.7	114	114	-1.90			896			
85-122	KUK LAKE 14	12-Sep-85	12:36	1.8	4.7	8.4	13.3	103	124	-1.80	0.78	5.1	996	4.4	0.74	0.48
85-031	KUK LAKE 18	01-Jul-85	09:00	2.1	4.5	7.9	12.0	93	132	-2.10	0.64	3.8	1159	3.4	0.76	0.92
85-054	KUK LAKE 18	18-Jul-85	--:--	1.1	7.7	8.5	11.8	99	160	-1.10	0.78	4.3	1185	3.2	0.73	0.73
85-070	KUK LAKE 18	31-Jul-85	10:50	1.8	10.0	8.6	11.0	97	159	-1.80	0.68	3.6	1270	2.6	1.01	0.72
85-086	KUK LAKE 18	15-Aug-85	10:28	3.5	10.0	8.6	10.8	96	154	1.40	0.61	4.2	1229	3.2	1.34	1.28
85-096	KUK LAKE 18	27-Aug-85	17:12	4.4	7.8	9.2	14.8	124	155	2.70	0.58	3.5	1220	3.9	0.75	0.67
85-108	KUK LAKE 18	07-Sep-85	11:10	2.9	5.2	9.1	14.2	112	154	-2.90			1197			
85-120	KUK LAKE 18	12-Sep-85	11:40	1.9	4.8	8.7	12.3	96	157	-1.90	0.66	3.0	1194	3.1	0.84	0.65
86-047	KUK LAKE 18	14-Jul-86	11:10	2.3						2.20	0.80	5.5	1195	5.9		
86-048	KUK LAKE 18	15-Jul-86	12:50	3.5	5.4	8.0	12.8	101	115	-0.90			1193		0.67	0.51
86-059	KUK LAKE 18	29-Jul-86	10:54	4.2	10.6		11.2	101	159	2.50	0.66	3.7	1303	3.2	2.16	1.83
86-061	KUK LAKE 18	24-Jul-86	12:10	2.9	10.9	8.3	11.0	100	160	-0.90						
86-062	KUK LAKE 18	25-Jul-86	--:--		11.5					2.20	0.82					
86-063	KUK LAKE 18	08-Aug-86	--:--	2.9	12.0	8.4	9.7	90	172	2.00						
86-078	KUK LAKE 18	13-Aug-86	11:45	3.8	13.1	8.5	9.7	92	172	2.10	0.69	3.7		4.0		
86-088	KUK LAKE 18	19-Aug-86	14:30	1.2	10.4	8.5	13.0	116	168	-1.20	1.36	3.9				
86-091	KUK LAKE 18	25-Aug-86	12:35	3.7	5.6	8.4	14.5	115	162	1.40	1.15	5.9	1349	4.6	1.40	1.55
86-107	KUK LAKE 18	04-Sep-86	11:10	4.5	6.9	8.5	12.5	103	162	2.00	0.81	5.7	1243	3.6	1.45	1.34
85-034	KUK LAKE 28	01-Jul-85	11:07	7.0	7.5	8.1	12.2	102	197	3.50	0.45	3.1	1605	2.0	1.41	1.33
85-057	KUK LAKE 28	18-Jul-85	13:47	5.2	8.5	8.6	11.6	99	195	4.75	0.36	2.1	1495	1.8		
85-073	KUK LAKE 28	31-Jul-85	12:25	7.0	10.0	8.6	11.2	99	188	5.75	0.37	2.1	1527	1.6	1.22	1.30
85-089	KUK LAKE 28	15-Aug-85	12:15	6.0	10.4	8.4	10.5	94	180	4.00	0.35	3.9	1581	2.0	0.94	1.67
85-093	KUK LAKE 28	27-Aug-85	15:15	5.0	8.7	8.9	14.1	121	181	-5.00	0.39		1464	1.8		
85-111	KUK LAKE 28	07-Sep-85	12:25	6.3	6.5	8.9	13.8	112	178	-6.30			1483			
85-123	KUK LAKE 28	12-Sep-85	13:10	4.2	6.1	8.6	11.7	94	183	-4.20	0.49	2.8	1453	1.8	0.63	0.80
85-033	KUK LAKE 33	01-Jul-85	10:25	2.5	8.9	7.8	11.6	100	82	2.00	0.78	3.9	699	4.5	0.78	1.12
86-122	LAKE 274	09-Sep-86	--:--		10.5	9.9	11.8	106	141	-0.90						
86-123	LAKE 522	09-Sep-86	--:--		11.0	9.5	13.5	122	170	-0.90						
86-010	NEW LAKE	16-Jun-86	09:55	3.6	11.5	7.7	9.6	88	220	0.25	5.09	12.5	1482	1.5	1.85	2.21
86-017	NEW LAKE	23-Jun-86	09:56	2.4	17.7	8.2	8.7	91	249	0.75	2.53	9.5	1583	5.3	2.67	1.52
86-024	NEW LAKE	30-Jun-86	10:10	2.3	15.7	8.2			249	0.60	2.73	9.5	1398	5.8	1.24	1.36
86-033	NEW LAKE	04-Jul-86	--:--		15.0	8.2	9.3	92	250	-0.90						
86-053	NEW LAKE	17-Jul-86	10:00	2.6	17.1	8.3	8.8	91	249	0.27	3.59	19.4	1755	4.9	1.92	1.46
86-067	NEW LAKE	05-Aug-86	10:30	2.3	16.3	8.3	8.9	91	261	0.50	2.25	14.6	1780	6.2	0.94	1.15
86-083	NEW LAKE	18-Aug-86	10:14	2.3	13.9	8.4	11.0	106	258	0.41	2.59	13.9	1730	5.0	1.42	1.35
86-094	NEW LAKE	28-Aug-86	10:36	2.7	8.3	8.2	12.1	103	271	0.25	4.20	20.0	1765	4.1	1.23	1.55
86-102	NEW LAKE	01-Sep-86	--:--	1.8	9.1	8.3	10.8	94	266	0.40	2.87	16.0				
86-110	NEW LAKE	07-Sep-86	12:30	1.8	11.5	8.6	11.6	106	265	0.82	1.63	10.7	1742	4.6		
86-118	NEW LAKE	09-Sep-86	--:--		11.6	8.7	11.2	103	268	-0.90						
86-030	NOELL LAKE	02-Jul-86	11:50	5.0	5.4	7.6	14.8	117	47	-5.00	0.45	1.6	342	1.1	0.35	0.56
86-038	NOELL LAKE	07-Jul-86	12:05	5.5	9.8	7.7	12.2	108	62	-5.50	0.36	1.4	389	2.1	0.26	0.23
86-045	NOELL LAKE	14-Jul-86	09:05	4.6						-4.60	0.40	1.7	317	3.1	0.23	0.29
86-050	NOELL LAKE	15-Jul-86	14:30	5.7	13.7	7.6	10.7	103	50	5.00						
86-058	NOELL LAKE	29-Jul-86	09:00	3.0	11.8		10.1	93	48	-3.00	0.40	2.5	380	1.2	0.86	0.98
86-080	NOELL LAKE	13-Aug-86	13:50	6.8	14.9	7.9	9.7	96	52	-6.80	0.34			1.1		
86-089	NOELL LAKE	25-Aug-86	10:45	5.5	9.7	7.9	12.9	113	49	-5.50	0.42	2.6	373	1.4	0.70	0.95
86-105	NOELL LAKE	04-Sep-86	09:10	5.5	9.1	7.6	11.1	96	45	-5.50	0.52	0.8	347	1.6	0.71	0.96

Appendix 2. Cont'd.

STA	Location	Date	Time	Depth	Temp	pH	O_2	%O_2	Cond	Secchi	e	%upw	TIC	Chl	P^B_m	α
85-003	NRC CHANNEL	13-Jun-85	--:--		8.7	8.1	9.9	85	212	0.10						
85-010	NRC CHANNEL	18-Jun-85	08:45		10.5	7.6	10.2	91	213				1652	1.7	1.16	1.06
85-016	NRC CHANNEL	23-Jun-85	08:44		12.5	7.9	10.1	95	206	0.15			1709	1.4	2.07	1.83
85-025	NRC CHANNEL	28-Jun-85	08:41		14.6	7.8	10.0	98	222	0.10			1540	2.4	2.16	1.56
85-037	NRC CHANNEL	03-Jul-85	10:07		15.5	8.1	9.4	94	236	0.22			1776	2.7	3.15	2.66
85-047	NRC CHANNEL	15-Jul-85	09:56		13.5	8.5	10.5	101	237	0.10			1667	1.8	1.89	1.79
85-063	NRC CHANNEL	29-Jul-85	09:30		14.0		10.0	97	246	0.25			1755	3.2	3.93	1.74
85-079	NRC CHANNEL	13-Aug-85	10:00		14.7	8.1	9.3	92	251	0.25			1984	3.5	3.23	2.21
85-101	NRC CHANNEL	29-Aug-85	11:08		12.3	8.3	10.2	95	251	0.35			1776	6.5	2.91	1.95
85-114	NRC CHANNEL	10-Sep-85	10:26		10.3	8.8	13.6	121	277	0.35			1765	2.9	1.96	1.64
86-004	NRC CHANNEL	12-Jun-86	10:32		7.5	8.3	10.0	83	205	-0.90			1715	1.5		
86-012	NRC CHANNEL	16-Jun-86	10:30		9.6	8.3	10.4	91	204	-0.90			1644	0.8	3.05	2.81
86-019	NRC CHANNEL	23-Jun-86	10:34		14.1	8.3	9.9	96	232	-0.90			1563	1.6	3.46	1.40
86-026	NRC CHANNEL	30-Jun-86	10:49		15.4	8.2			239	-0.90			1451	1.4	2.21	1.50
86-036	NRC CHANNEL	04-Jul-86	--:--		14.6	8.1	9.4	92	218	-0.90						
86-055	NRC CHANNEL	17-Jul-86	10:45		16.6	8.1	9.0	92	222	-0.90			1674	0.4		
86-069	NRC CHANNEL	05-Aug-86	11:24		16.2	7.8	8.9	91	256	-0.90			1735	1.1	2.73	1.24
86-085	NRC CHANNEL	18-Aug-86	11:13		15.1	8.1	10.5	104	271	-0.90			1820	0.8	2.48	2.61
86-096	NRC CHANNEL	28-Aug-86	11:32		10.3	8.1	12.7	113	279	-0.90			1870	1.6	1.43	2.50
86-103	NRC CHANNEL	01-Sep-86	--:--		10.5	8.2	10.2	91	263	-0.90						
86-112	NRC CHANNEL	07-Sep-86	13:20		12.2	8.3	10.4	97	270	-0.90			1757	2.5		
86-120	NRC CHANNEL	09-Sep-86	--:--		12.3	8.4	11.2	105	278	-0.90						
86-005	NRC LAKE	12-Jun-86	11:12	1.6	4.1	8.0	8.7	67	316	0.90	1.54	5.7	2129	6.0	1.37	1.42
86-013	NRC LAKE	16-Jun-86	10:53	1.5	13.5	8.0	9.3	89	335	1.20	1.13	2.9	2214	9.0	1.34	1.32
86-020	NRC LAKE	23-Jun-86	11:00	0.9	19.3	8.0	9.3	101	401		0.99	3.5	2385	5.8	1.72	1.31
86-027	NRC LAKE	30-Jun-86	11:10	1.2	18.4	8.0			405	-1.20	0.93	3.4	2488	3.4	3.69	1.90
86-035	NRC LAKE	04-Jul-86	--:--		17.0	8.7	10.2	106	390	-0.90						
86-040	NRC LAKE	10-Jul-86	09:48	0.7	19.0	9.4	12.6	136	328	-0.70						
86-042	NRC LAKE	10-Jul-86	14:21		18.7	9.5	12.6	135	322	-0.90						
86-044	NRC LAKE	10-Jul-86	18:08		18.0	9.6	12.0	127	324	-0.90						
86-056	NRC LAKE	17-Jul-86	11:05	1.2	19.6	9.6	12.1	132	285	-1.20	0.98	5.7	1088	2.0	0.84	0.61
86-070	NRC LAKE	05-Aug-86	11:45	1.1	17.4	10.0	11.0	115	294	-1.05	0.97	3.1	739	2.1	1.28	0.94
86-072	NRC LAKE	11-Aug-86	--:--	1.0	19.6	10.6	12.8	140	306	-0.90						
86-086	NRC LAKE	18-Aug-86	11:51	1.1	14.7	10.5	13.2	130	286	-1.10	1.05	2.9	799	2.0	0.49	0.41
86-097	NRC LAKE	28-Aug-86	11:49	1.0	8.4	10.4	15.1	129	272	-1.01	1.17		877	3.1	0.67	1.14
86-104	NRC LAKE	01-Sep-86	--:--	0.9	10.3	10.1	12.8	114	264	-0.90						
86-113	NRC LAKE	07-Sep-86	13:43		13.5	9.8	11.8	113	276	-0.90			1118	1.8		
86-121	NRC LAKE	09-Sep-86	--:--		11.0	9.9	10.8	98	280	-0.90						
86-531	NRC LAKE	03-Jul-86	13:30	0.8	16.8	8.8	10.2	105	391	-0.90	0.77	3.4				
85-002	SKIDOO LAKE	13-Jun-85	--:--	3.0	7.1	7.8	9.9	82	220	0.35	3.54					
85-011	SKIDOO LAKE	18-Jun-85	09:05	2.0	9.7	7.8	10.6	93	237	0.65	2.47	9.2	1686	5.3	0.94	0.86
85-017	SKIDOO LAKE	23-Jun-85	09:00	2.0	15.1	8.1	9.7	96	241	0.55	3.18	10.0	1844	4.5	1.11	1.03
85-023	SKIDOO LAKE	24-Jun-85	--:--							0.65						
85-026	SKIDOO LAKE	28-Jun-85	08:53	1.5	15.1	7.9	9.4	93	239	0.40	2.89	16.7	1562	5.1	1.33	1.22
85-038	SKIDOO LAKE	03-Jul-85	10:26	2.0	16.7	8.2	9.1	94	247	0.50	2.24	9.2	1847	4.3	1.61	2.18
85-048	SKIDOO LAKE	15-Jul-85	10:15	1.5	12.6	8.6	10.5	99	248	0.20	4.72	17.4	1661	3.5	1.52	1.48
85-064	SKIDOO LAKE	29-Jul-85	09:45	2.0	13.6		11.6	112	258	0.50	2.32	17.3	1643	3.9	2.00	2.86
85-080	SKIDOO LAKE	13-Aug-85	10:30	1.4	13.1	8.3	10.2	97	257	0.90	1.57	9.6	1860	2.3	1.40	0.97
85-100	SKIDOO LAKE	29-Aug-85	10:35	0.6	11.1	8.7	10.3	94	245	-0.60	2.71	11.3	1802	1.9	1.26	0.84
85-112	SKIDOO LAKE	10-Sep-85	09:22	1.2	8.0	8.8	12.6	106	269	0.30	2.76	13.4	1837	2.9	1.30	1.23
86-003	SKIDOO LAKE	12-Jun-86	10:13	4.1	6.2	8.2	10.1	82	208	0.15	8.04	17.6	1525	1.0		
86-011	SKIDOO LAKE	16-Jun-86	10:12	3.4	12.6	8.1	9.6	90	222	0.20	5.82	15.2	1476	1.1	1.99	2.05
86-018	SKIDOO LAKE	23-Jun-86	10:14	2.2	17.7	8.3	9.3	98	254	0.68	2.59	9.4	1619	5.1	2.03	0.99
86-025	SKIDOO LAKE	30-Jun-86	10:30	2.4	15.1	8.2			255	0.45	2.99	10.5	1438	6.2	1.58	1.52
86-034	SKIDOO LAKE	04-Jul-86	--:--		14.7	8.2	9.3	92	249	-0.90						
86-054	SKIDOO LAKE	17-Jul-86	10:17	2.4	16.9	8.3	8.6	89	249	0.25	4.42	20.4	1723	5.4	2.04	1.37
86-068	SKIDOO LAKE	05-Aug-86	10:49	1.6	16.3	8.3	8.5	87	262	0.29	3.53	16.7	1805	4.7	1.38	1.41
86-084	SKIDOO LAKE	18-Aug-86	10:40	2.2	13.9	8.3	11.1	107	263	0.30	3.11	47.3	1680	5.7	1.19	1.33
86-095	SKIDOO LAKE	28-Aug-86	11:03	2.0	7.9	8.6	13.0	110	270	0.18	6.36	20.6	1772	3.1	1.32	1.11
86-101	SKIDOO LAKE	01-Sep-86	--:--	1.6	9.0	8.4	10.8	93	270	0.30	4.09	19.2				
86-111	SKIDOO LAKE	07-Sep-86	12:55	1.5	11.9	8.6	11.4	106	275	0.70	2.18	14.9	1764	4.8		
86-119	SKIDOO LAKE	09-Sep-86	--:--		11.7	8.8	11.2	103	276	-0.90						
86-573	SKIDOO LAKE	20-Aug-86	--:--	2.2						0.25	4.16	16.6				

Appendix 2. Cont'd.

STA	Location	Date	Time	Depth	Temp	pH	O_2	$\%O_2$	Cond	Secchi	e	%upw	TIC	Chl	P^B_m	α
86-519	SKIDOO LAKE A	20-Jun-86	12:07	1.6						0.45	3.74	13.5				
86-530	SKIDOO LAKE A	03-Jul-86	--:--	1.8	14.7	8.1	9.4	93	259	0.68	2.29	9.6				
86-549	SKIDOO LAKE A	21-Jul-86	--:--							0.50	3.34	21.1				
86-520	SKIDOO LAKE B	20-Jun-86	12:27	1.6						0.32	3.84	13.8				
86-073	SKIDOO LAKE C	11-Aug-86	--:--	1.8	19.3	8.4	9.2	100	273	-0.90						
86-517	SKIDOO LAKE C	20-Jun-86	11:45	2.2						0.31	3.96	10.9				
86-541	SKIDOO LAKE C	08-Jul-86	14:30	1.9	18.8	8.3	9.4	101	253	0.45	2.70	17.6				
86-548	SKIDOO LAKE C	21-Jul-86	--:--							-0.90	3.45	16.7				
86-552	SKIDOO LAKE C	21-Jul-86	--:--	2.0	15.3	8.3	9.3	93	260	-0.90						
86-554	SKIDOO LAKE C	23-Jul-86	--:--							0.40						
86-565	SKIDOO LAKE C	08-Aug-86	--:--		17.0					-0.90	2.51	12.7				
86-572	SKIDOO LAKE C	20-Aug-86	--:--	2.3						1.00	1.59	10.5				
86-577	SKIDOO LAKE C	01-Sep-86	12:55	2.6	9.3	8.4	11.1	97	274	0.65	2.43	11.9				
86-518	SKIDOO LAKE D	20-Jun-86	11:58	2.1						0.36	3.95	14.1				
85-004	SOUTH LAKE	13-Jun-85	--:--	3.0	7.3	7.8	9.0	75	213	0.35	3.75					
85-013	SOUTH LAKE	18-Jun-85	10:00	2.0	10.2	7.3	10.5	93	230	0.60	2.65	11.3	1628	3.5	1.36	0.90
85-019	SOUTH LAKE	23-Jun-85	09:55	2.3	16.1	8.2	9.5	96	233	0.90	2.18	7.5	1871	7.9	0.90	1.04
85-022	SOUTH LAKE	24-Jun-85	--:--							0.85						
85-028	SOUTH LAKE	28-Jun-85	09:41	2.5	16.7	7.9	9.1	94	247	1.05	1.72	5.5	1668	5.1	1.16	0.73
85-040	SOUTH LAKE	03-Jul-85	11:18	2.2	17.5	7.6	8.3	87	255	1.25	1.45	4.2	2177	5.8	1.19	1.46
85-050	SOUTH LAKE	15-Jul-85	11:15	3.8	12.7	8.4	10.3	97	268	1.40	1.48	5.4	1844	4.1	1.10	1.23
85-066	SOUTH LAKE	29-Jul-85	10:35	3.5	13.6		10.3	99	286	2.00	1.05	3.1	1845	3.5		
85-082	SOUTH LAKE	13-Aug-85	12:00	3.0	13.8	8.6	9.8	95	280	1.75	1.04	3.9	2252	3.6	3.47	1.99
85-103	SOUTH LAKE	29-Aug-85	11:45	2.0	11.8	8.8	10.3	95	255	0.90	1.41	7.1	1937	3.5	1.59	0.68
85-116	SOUTH LAKE	10-Sep-85	11:13	3.0	8.6	8.9	12.9	111	285	1.05	1.34	7.5	1931	3.0	1.33	1.11
86-002	SOUTH LAKE	12-Jun-86	09:50	4.1	3.7	7.9	10.0	76	197	0.15	7.20	31.2	1497	0.9		
86-009	SOUTH LAKE	16-Jun-86	09:30	3.2	11.5	8.0	9.2	84	210	0.20	5.46	21.9	1521	0.7	1.63	2.13
86-016	SOUTH LAKE	23-Jun-86	09:32	2.3	18.3	8.2	9.3	99	240	0.56	3.21	12.0	1617	6.2	1.82	1.08
86-023	SOUTH LAKE	30-Jun-86	09:40	2.8	15.6	7.6			240	0.78	2.68	8.6	1500	11.8	1.58	1.13
86-032	SOUTH LAKE	04-Jul-86	--:--		14.6	8.1	8.9	88	248	-0.90						
86-039	SOUTH LAKE	10-Jul-86	09:20	1.8	17.6	8.3	9.0	94	263	1.50						
86-041	SOUTH LAKE	10-Jul-86	13:45	2.4	17.1	8.1	9.4	97	258	1.55						
86-043	SOUTH LAKE	10-Jul-86	17:30	2.0	16.0	8.0	8.9	90	262	1.30						
86-052	SOUTH LAKE	17-Jul-86	09:28	3.3	17.6	8.2	8.8	92	267	1.40	1.51	6.4	1896	4.3	1.40	1.00
86-064	SOUTH LAKE	28-Jul-86	--:--	2.5	14.0	8.3	9.3	90	274	-0.90						
86-066	SOUTH LAKE	05-Aug-86	09:55	1.9	16.1	8.2	9.3	94	279	-1.92	1.03	3.0	1878	3.1	0.86	0.97
86-075	SOUTH LAKE	11-Aug-86	--:--	3.0	18.5	8.6	9.2	98	286	2.00						
86-082	SOUTH LAKE	18-Aug-86	09:42	2.2	14.4	8.3	11.0	108	272	0.78	1.68	9.8	1896	3.8	1.58	1.06
86-093	SOUTH LAKE	28-Aug-86	09:58	3.2	8.6	8.2	13.4	115	277	0.35	3.10	17.2	1880	4.4	1.13	1.54
86-100	SOUTH LAKE	01-Sep-86	11:00	2.9	8.9	8.5	10.8	93	274	0.55	2.33	12.3				
86-109	SOUTH LAKE	07-Sep-86	11:40	2.8	11.6	8.6	11.6	107	275	1.00	1.54	9.2	1861	3.3		
86-117	SOUTH LAKE	09-Sep-86	--:--		11.6	8.7	11.2	103	276	-0.90						
86-538	SOUTH LAKE	08-Jul-86	11:00	2.9	18.2	8.2	9.3	99	254	1.50	1.41	10.0				
86-551	SOUTH LAKE	21-Jul-86	--:--	3.8	15.6	8.1	9.8	98	274	-0.90						
86-556	SOUTH LAKE	23-Jul-86	12:43	3.6						-0.90	1.31	3.2				
86-560	SOUTH LAKE	06-Aug-86	11:09	3.0						2.50	1.03	3.2				
86-569	SOUTH LAKE	20-Aug-86	--:--	3.3						0.65	1.65	11.5				
86-529	SOUTH LAKE 5	03-Jul-86	12:23	1.0	14.6	8.0	9.7	95	248	0.30	4.33	14.3				
86-539	SOUTH LAKE 5	08-Jul-86	11:30	1.0	19.0	8.1	8.7	94	257	-1.00	2.02	5.2				
86-558	SOUTH LAKE 5	23-Jul-86	13:36							-0.90	1.59	3.1				
86-562	SOUTH LAKE 5	06-Aug-86	11:48	0.6						-0.60	2.19					
86-571	SOUTH LAKE 5	20-Aug-86	11:10	0.7						0.10	14.51					
86-576	SOUTH LAKE 5	01-Sep-86	12:00	0.3	9.2	8.3	11.0	96	277	-0.35						
85-045	SOUTH LAKE A	10-Jul-85	13:00	1.4	16.4	8.2	9.5	97	268	1.10	1.69	6.7				
85-058	SOUTH LAKE A	23-Jul-85	11:30		11.2	8.4			266	1.25	1.76	6.3				
85-077	SOUTH LAKE A	05-Aug-85	11:20	1.0	13.7	8.5	9.8	94	278	-1.00	1.56	4.4				
86-505	SOUTH LAKE A	18-Jun-86	--:--	1.8						0.26						
86-513	SOUTH LAKE A	20-Jun-86	--:--	1.5						0.27	4.56	15.8				
86-523	SOUTH LAKE A	25-Jun-86	--:--	1.5						0.85	2.76	4.6				
86-528	SOUTH LAKE A	03-Jul-86	--:--	1.0	14.5	8.1	9.2	90	249	0.39	2.32	9.6				
86-547	SOUTH LAKE A	21-Jul-86	--:--							-0.90	1.71	3.6				
86-564	SOUTH LAKE A	08-Aug-86	14:00	0.6	18.0					-0.90	1.34	3.3				

Appendix 2. Cont'd.

STA	Location	Date	Time	Depth	Temp	pH	O_2	$\%O_2$	Cond	Secchi	e	%upw	TIC	Chl	P_m^B	α
85-090	SOUTH LAKE AB	20-Aug-85	12:05	1.3	11.2	8.7	10.0	91	259	1.00	1.53	7.2				
85-044	SOUTH LAKE B	10-Jul-85	12:40	2.1	16.1	8.2	9.6	97	267	0.90	1.67	7.6				
86-562	SOUTH LAKE 5	06-Aug-86	11:48	0.6						-0.60	2.19					
86-571	SOUTH LAKE 5	20-Aug-86	11:10	0.7						0.10	14.51					
86-576	SOUTH LAKE 5	01-Sep-86	12:00	0.3	9.2	8.3	11.0	96	277	-0.35						
85-045	SOUTH LAKE A	10-Jul-85	13:00	1.4	16.4	8.2	9.5	97	268	1.10	1.69	6.7				
85-058	SOUTH LAKE A	23-Jul-85	11:30		11.2	8.4			266	1.25	1.76	6.3				
85-077	SOUTH LAKE A	05-Aug-85	11:20	1.0	13.7	8.5	9.8	94	278	-1.00	1.56	4.4				
86-505	SOUTH LAKE A	18-Jun-86	--:--	1.8						0.26						
86-513	SOUTH LAKE A	20-Jun-86	--:--	1.5						0.27	4.56	15.8				
86-523	SOUTH LAKE A	25-Jun-86	--:--	1.5						0.85	2.76	4.6				
86-528	SOUTH LAKE A	03-Jul-86	--:--	1.0	14.5	8.1	9.2	90	249	0.39	2.32	9.6				
86-547	SOUTH LAKE A	21-Jul-86	--:--							-0.90	1.71	3.6				
86-564	SOUTH LAKE A	08-Aug-86	14:00	0.6	18.0					-0.90	1.34	3.3				
85-090	SOUTH LAKE AB	20-Aug-85	12:05	1.3	11.2	8.7	10.0	91	259	1.00	1.53	7.2				
85-044	SOUTH LAKE B	10-Jul-85	12:40	2.1	16.1	8.2	9.6	97	267	0.90	1.67	7.6				
85-061	SOUTH LAKE B	23-Jul-85	14:30		12.1	8.2	10.0	93	270		1.41	4.4				
85-076	SOUTH LAKE B	05-Aug-85	10:50	1.2	13.7	8.4	9.8	94	278	-1.20	1.34	3.6				
86-506	SOUTH LAKE B	18-Jun-86	--:--	1.9						0.27						
86-514	SOUTH LAKE B	20-Jun-86	10:55	1.6						0.25	4.56	15.3				
85-005	SOUTH LAKE BAY	13-Jun-85	--:--	3.0	7.5	7.8	9.4	78	214	0.35	3.99					
85-012	SOUTH LAKE BAY	18-Jun-85	09:33	2.0	10.5	7.5	10.0	90	233	0.55	2.61	13.3	1672	4.0	1.29	1.42
85-018	SOUTH LAKE BAY	23-Jun-85	09:30	2.0	16.3	8.2	9.8	100	237	0.80	2.07	7.7	1818	8.2	1.36	1.25
85-021	SOUTH LAKE BAY	24-Jun-85	--:--							0.90						
85-027	SOUTH LAKE BAY	28-Jun-85	09:15	1.5	16.6	7.9	9.1	93	249	1.05	1.67	6.0	1672	5.7	1.12	0.76
85-039	SOUTH LAKE BAY	03-Jul-85	10:55	1.7	17.5	7.8	8.6	90	258	1.50	1.30	3.7	2104	5.2	1.74	1.98
85-049	SOUTH LAKE BAY	15-Jul-85	10:55	2.1	12.3	8.2	10.2	95	275	-2.10	1.24	3.9	1906	4.1	0.73	0.88
85-065	SOUTH LAKE BAY	29-Jul-85	10:15	1.8	13.9		10.6	103	289	-1.80	0.94	4.7	1903	3.1	1.75	0.82
85-081	SOUTH LAKE BAY	13-Aug-85	11:15	1.4	13.8	8.9	10.2	99	267	-1.40	1.09	2.8	1999	4.5	1.64	0.91
85-102	SOUTH LAKE BAY	29-Aug-85	11:25	1.1	11.8	9.3	11.3	104	221	-1.10	1.11	4.7	1519	2.9	1.22	0.94
85-115	SOUTH LAKE BAY	10-Sep-85	10:49	1.3	8.1	9.3	13.7	116	253	-1.30	1.09	4.5	1593	2.5	1.23	1.08
86-001	SOUTH LAKE BAY	12-Jun-86	09:30	4.1	4.1	8.1	9.6	73	197	0.15	6.93	18.7	1506	1.2		
86-008	SOUTH LAKE BAY	16-Jun-86	09:05	3.2	12.8	7.7	9.6	91	214	0.15	5.80	16.7	1549	1.0	2.57	1.90
86-015	SOUTH LAKE BAY	23-Jun-86	08:39	2.5	18.7	8.1	9.1	98	243	0.60	3.17	13.3	1607	4.4	1.82	1.11
86-022	SOUTH LAKE BAY	30-Jun-86	09:20	2.1	15.9	7.8			235	0.90	2.22	7.5	1588	8.2	1.60	1.21
86-031	SOUTH LAKE BAY	04-Jul-86	--:--		15.5	8.2	9.2	92	249	-0.90						
86-051	SOUTH LAKE BAY	17-Jul-86	09:06	2.3	17.8	8.3	8.7	92	272	2.10	1.33	4.6	1909	2.7	1.11	0.65
86-065	SOUTH LAKE BAY	05-Aug-86	09:18	1.8	16.8	8.7	8.8	91	300	-1.78	1.32	2.6	1976	3.6	1.11	0.75
86-076	SOUTH LAKE BAY	11-Aug-86	--:--	2.0	18.7	8.5	9.8	105	284	-2.00						
86-081	SOUTH LAKE BAY	18-Aug-86	09:12	1.5	14.2	9.0	12.5	122	269	-1.75	0.98	3.0	1792	4.2	0.85	0.97
86-092	SOUTH LAKE BAY	28-Aug-86	09:30	1.7	8.3	9.0	14.5	123	258	-1.75	1.03	3.2	1725	3.0	0.71	0.88
86-099	SOUTH LAKE BAY	01-Sep-86	09:30	1.4	9.2	9.2	12.6	110	251	-1.40	1.09	3.3				
86-108	SOUTH LAKE BAY	07-Sep-86	11:25	1.4	12.1	9.1	12.6	117	249	-1.40	1.00	5.0	1615	3.6		
86-115	SOUTH LAKE BAY	09-Sep-86	11:00		12.4	9.2	11.8	110	247	-0.90						
86-535	SOUTH LAKE BAY	08-Jul-86	09:52	2.5	18.5	8.1	10.5	112	254	1.49						
86-545	SOUTH LAKE BAY	21-Jul-86	--:--	1.4						-1.40	1.29	3.8				
86-555	SOUTH LAKE BAY	23-Jul-86	11:30	2.0						-0.90	1.28	11.0				
86-566	SOUTH LAKE BAY	20-Aug-86	09:40	1.9						-1.85	0.93	2.8				
86-536	SOUTH LAKE BAY2	08-Jul-86	10:15	1.5						-1.45						
86-567	SOUTH LAKE BAY2	20-Aug-86	10:05	0.8						-0.80	1.02	3.5				
85-043	SOUTH LAKE BAYC	10-Jul-85	12:20	1.9	17.2	8.2	10.0	104	275	1.70	1.21	3.6				
85-059	SOUTH LAKE BAYC	23-Jul-85	12:40		11.3	8.2			273	-0.90	1.07	3.3				
85-075	SOUTH LAKE BAYC	05-Aug-85	10:07	1.0	13.7	8.6	9.9	95	278	-1.00	1.19	3.1				
85-092	SOUTH LAKE BAYC	20-Aug-85	12:55	1.0	11.4	9.1	11.3	103	239	-1.00	0.90	3.8				
85-042	SOUTH LAKE BAYD	10-Jul-85	12:00	1.5	16.8	8.3	9.9	102	274	1.50	1.19	3.7				
85-060	SOUTH LAKE BAYD	23-Jul-85	13:30		11.5	8.6	10.3	94	273	-0.90	1.18	3.4				
85-074	SOUTH LAKE BAYD	05-Aug-85	09:15	1.0	13.0	8.8	10.7	102	270	-1.05	1.44	5.3				
85-091	SOUTH LAKE BAYD	20-Aug-85	12:30	0.8	11.2	9.0	11.5	105	234	-0.80	1.69	6.4				

Appendix 2. Cont'd.

STA	Location	Date	Time	Depth	Temp	pH	O_2	$\%O_2$	Cond	Secchi	e	%upw	TIC	Chl	P^B_m	α
86-077	SOUTH LAKE C	11-Aug-86	--:--							0.20						
86-507	SOUTH LAKE C	18-Jun-86	--:--	2.3						0.27						
86-515	SOUTH LAKE C	20-Jun-86	11:05	2.0						0.24	4.38	16.6				
86-524	SOUTH LAKE C	25-Jun-86	14:25	1.8						0.75	2.72	7.6				
86-525	SOUTH LAKE C	03-Jul-86	10:10	2.0	14.4	8.1	10.3	101	246	0.70	2.32	8.3				
86-532	SOUTH LAKE C	03-Jul-86	14:30	2.2	15.0	8.0	9.2	91	248	0.45						
86-534	SOUTH LAKE C	04-Jul-86	13:08							-0.90	2.28	10.0				
86-540	SOUTH LAKE C	08-Jul-86	11:50	1.3	18.8	8.2	9.0	97	256	-1.30	1.66	6.7				
86-546	SOUTH LAKE C	21-Jul-86	--:--							-0.90	1.34	4.2				
86-553	SOUTH LAKE C	23-Jul-86	--:--							1.60						
86-557	SOUTH LAKE C	23-Jul-86	13:15	1.5						-0.90	1.23	4.1				
86-561	SOUTH LAKE C	06-Aug-86	11:30	1.2						-1.20	1.17	3.6				
86-570	SOUTH LAKE C	20-Aug-86	--:--	1.4						0.45	2.89	13.8				
86-575	SOUTH LAKE C	01-Sep-86	11:30	0.9	8.9	8.4	10.2	88	276	0.50	2.94	13.8				
86-542	SOUTH LAKE CH	10-Jul-86	--:--	1.3						1.20	2.02	6.4				
86-508	SOUTH LAKE D	18-Jun-86	--:--	2.4						0.27						
86-516	SOUTH LAKE D	20-Jun-86	11:18	2.1						0.24	4.47	13.6				
86-501	STRANGE BAY A	18-Jun-86	--:--	1.8						0.25	5.39	16.0				
86-509	STRANGE BAY A	20-Jun-86	--:--	1.6						0.23	4.56	16.7				
86-521	STRANGE BAY A	25-Jun-86	11:25	1.3	14.0					0.76	2.86	8.5				
86-527	STRANGE BAY A	03-Jul-86	--:--	1.0	14.7	7.9	8.4	83	248	-0.90	2.12	5.3				
86-502	STRANGE BAY B	18-Jun-86	--:--	1.8						0.27						
86-510	STRANGE BAY B	20-Jun-86	--:--	1.6						0.23	4.71	14.8				
86-533	STRANGE BAY B	04-Jul-86	10:45	1.2						1.10	1.81	6.1				
86-543	STRANGE BAY B	21-Jul-86	11:10	1.1						-1.10	2.03	3.3				
86-074	STRANGE BAY C	11-Aug-86	--:--	1.0	18.7	8.1	9.3	100	295	-0.90						
86-116	STRANGE BAY C	09-Sep-86	11:15		11.7	8.6	12.7	117	269	-0.90						
86-503	STRANGE BAY C	18-Jun-86	--:--	2.3						0.27						
86-511	STRANGE BAY C	20-Jun-86	--:--	2.2						0.27	4.57	16.8				
86-522	STRANGE BAY C	25-Jun-86	12:04	1.9						0.73	2.93	6.0				
86-526	STRANGE BAY C	03-Jul-86	--:--	2.1	14.8	7.9	9.3	92	246	0.98	1.95	6.1				
86-537	STRANGE BAY C	08-Jul-86	10:40	1.6	18.5	7.5	8.2	88	254	1.52	1.65	4.8				
86-544	STRANGE BAY C	21-Jul-86	--:--	1.8						-1.80	1.32	4.5				
86-550	STRANGE BAY C	21-Jul-86	--:--		15.6		9.4	94	278	-0.90						
86-559	STRANGE BAY C	06-Aug-86	10:49	1.2						-1.20	1.20	3.0				
86-563	STRANGE BAY C	07-Aug-86	10:00	1.1						-1.10	1.89	3.3				
86-568	STRANGE BAY C	20-Aug-86	10:15	1.4						-1.40	1.09	3.6				
86-574	STRANGE BAY C	01-Sep-86	10:28	0.9	9.1	8.6	12.5	108	265	-0.90	1.17	2.9				
86-504	STRANGE BAY D	18-Jun-86	--:--	2.3						0.27						
86-512	STRANGE BAY D	20-Jun-86	--:--	2.0						0.26	4.72	16.8				