Ohio Sea Grant

Fish productivity in large lakes: A numerical model for estimating annual rates

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ABSTRACT

Factors influencing lake productivity could be grouped into three categories: climatic, edaphic and morphometric factors. These factors are represented by latitude, circulation type and mean depth in this study. The productivity index (PI) was formulated in the following equation: $PI = LC/M$ where C = circulation type, L = latitude code, M = log (mean depth + 1). Forty-one large lakes (surface area > 500 km^2) throughout the world were tested with this model. The regression equation describing the linear relation between fish productivity (P) and fish productivity index (PI) is $P = 1.65\ PI - 13.41$ where $N = 41$, $r^2 = 0.84$, $p < 0.0001$. The non-linear relationship was also obtained from utilizing general linear regression between selected variables and fish productivity in the following equation: $\text{Log}(P) = 0.38L + 0.009C^2 + 0.52M^{-1} - 1.02$ where $N = 41$, $r^2 = 0.85$, $p < 0.0001$. Both index and model should have application to nearly 200 large freshwater lakes worldwide.

ACKNOWLEDGMENTS

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CHAPTER 1

INTRODUCTION

Approximately 250 large lakes (lakes with surface areas in excess of 500 km^2) account for 88 percent of the worlds lakes total volume and cover 1,456,149 km^2 in surface area. Sixty-four countries, latitudes ranging from 74° north to 54° south, contain or share one or more of these large lakes (Figure 1). Out of the 253 lakes, 122 large lakes located in North America occupy only one-third of the total surface area. In contrast, Asia has less than one-fourth the number of the lakes that North America has, but large lakes account for over 42 percent of the Asian lake area. The large areal coverage is due to the presence of the Caspian Sea which accounts for over one-fourth of the area of all large lakes. Africa, the only other major area for large lakes, accounts for less than one-seventh of the total by area (Herdendorf, 1982). Reliable data is available for morphological and physical aspects of large lakes, but biological data is scarce for many. For the 253 lakes, less than 20 percent have the fish productivity data.

These enormous bodies of water serve many purposes including municipal and industrial water supplies, transportation, irrigation, waste assimilation, recreation and food supplies for people throughout the world. For most of the large lakes, utilization of food sources from the lakes is a minor exploitation compared with other previously mentioned uses, serving as prime food sources for only small communities adjacent to them. Development and management of these natural resources is essential to obtain maximum sustainable productivity, e.g. annual fish yield and to expand the range of lake utilization as a national or international prime food source. Lake management programs can be performed effectively for a specific lake if an adequate data base exists for that lake, or if experience gained on another but similar lake, can be transferred. Successful fishery management programs will lead to the maximum yield for both commercial and recreational utilization.

A measure of annual fish production is necessary at this point as a reference for a suitable selection in developing sites for the fishery management programs, but annual fish harvest data is scarce for most of the large lakes. Collection of fish productivity data from commercial fisherman shows that lakes with commercially valuable species located close to major markets is usually exploited intensively. On the other hand, the harvest data for remote lakes is seldom available. For example, the Laurentian Great Lakes fish productivity data can be traced back nearly 100 years (Rawson, 1955) in China or the Soviet Union.

In a case where a fish productivity data base is not present for undeveloped resources, two alternatives are available. First, a data base can be established by preliminary field collection of data on primary productivity, annual fish yield and chemical characteristics of lake water. However, this method is costly and not practical in the remote sites where most large lakes are located.

The second alternative is to use models and/or indices which relate many abiotic parameters, e.g. mean depth, total dissolved solids, latitude and air temperature, to estimate the desired annual fish production. This alternative can provide estimates of essential fish yield data which can then be used as a preliminary reference for resource managers in making decisions on future development sites at minimal cost for data collection. However, the accuracy of the predicted fish yield is obviously not as high as the one obtained by the conventional collecting procedure which is the best way to gather the productivity information.

The purpose of this study is to analyze existing schemes and develop an improved model for annual fish production estimation of large lakes throughout the world using easily gathered data on morphological and physical parameters as specific characters for each lake. This newly developed model will be an improvement in terms of reducing the existing restriction of model usage only to the narrow latitude range. By utilizing the new model, the annual fish production of large lakes at different latitude range, e.g. African Rift Lakes and Laurentian Great Lakes, can be predicted without any complicated modifications of the essential components of the model.

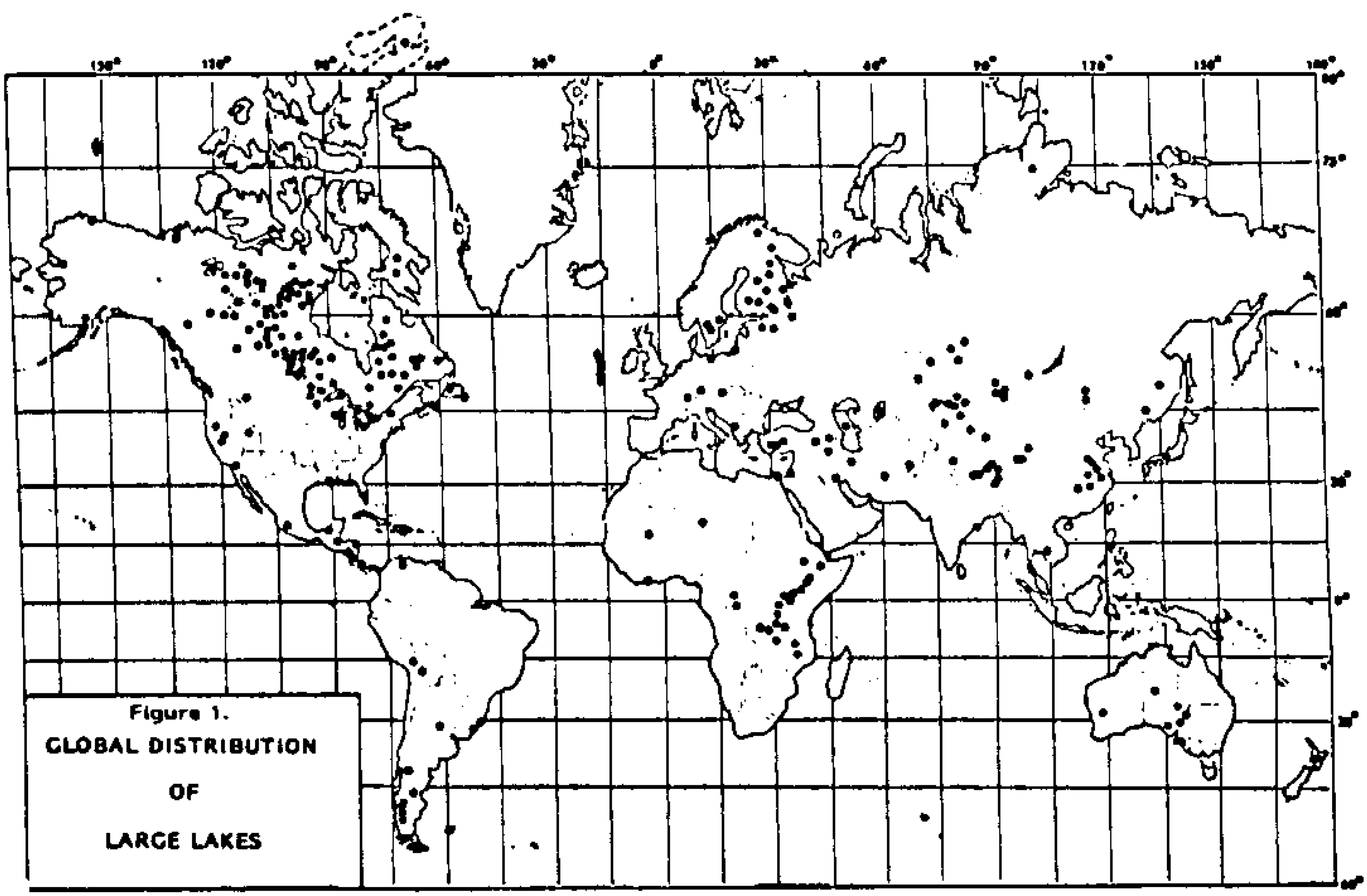

FIGURE 1 Global distribution of large lakes.

CHAPTER 2

LITERATURE REVIEW

The development of simple models and/or indices useful in estimating potential fish productivity of a particular freshwater system is an important goal of resource management and fishery biologists. A number of studies have attempted to identify the variables describing the morphological, chemical and physical characteristics of lakes with the objective to use them to estimate lake productivity (Table 1). In this section, review of the existing models will be presented, but the assessment of each approach will be discussed in Chapter 5.

Throughout this study, the term productivity, primary and secondary productivity will be used repeatedly. In order to avoid confusion, the definition of these terms (McNaughton and Wolf, 1979) are listed below.

productivity: total rate of energy input into an ecosystem

primary productivity: the rate of energy inputs to ecosystems involving the transformation of solar energy into chemical energy by producers

secondary productivity: the rate of energy outputs from the secondary consumers

TABLE 1 Variables studied in productivity model construction and authors who have used them.

Variable	
air temp	1, 9
altitude	1, 5
alkalinity (carbonate)	1, 4, 13
alkalinity (total)	4
total phosphate	1, 4
total nitrogen	1, 4
TDS	5, 8
limiting nutrients	9
latitude	1
lake area	5, 7
mean depth	1, 5, 6, 8, 12
max depth	2
mixing type	1, 3, 10

1. Brylinsky and Mann (1973)
2. Carlander (1955)
3. Findernegg (1965)
4. Moyle (1956)
5. Northcote and Larkin (1956)
6. Rawson (1952, 1955)
7. Rousefell (1946)
8. Ryder (1974)
9. Schlesinger and Regier (1982)
10. Schindler (1971)
11. Talling (1969)
12. Thienemann (1929)
13. Turner (1960)

Rawson (1955) stated the factors influencing lake productivity could be grouped into three categories: (1) edaphic, e.g. total dissolved solids, nutrients; (2) morphometric, e.g. mean depth, lake surface area; and (3) climatic, e.g. air temperature, latitude. He proposed that given adequate edaphic, morphometric and climatic information, a multiple correlation analysis would demonstrate a relationship between fish production and physical parameters.

Ryder (1982) presented a schematic representation of a lake showing the major energetic and material pathways (Figure 2). In the climatic realm, he identified solar energy as the most important factor due to its effect on autotrophic production which is the base of the aquatic food webs. For the edaphic realm, nutrients and oxygen are the prominent representatives of the material input to lake ecosystem. The morphometric factors play an important role not only by channelling energy and matter in predictable patterns, but also acting as a sink for both nutrients and energy. It is from a conceptual model of this type that a practical, numerical model must be constructed.

Upon examining the literature, it is evident that mean depth is the most frequently used morphometric variable in constructing a productivity model. Mean depth was first suggested by Thienemann (1927) as the important morphometric factor in determining lake productivity but he was unable to provide quantitative evidence to support his theory. This concept was further developed by Rawson (1952, 1955), as he considered lake depth to be important primarily for its association with thermal stratification, circulation and dilution of nutrients. It was demonstrated that plankton and benthos biomass had an inverse hyperbolic relationship with mean depth (Figure 3).

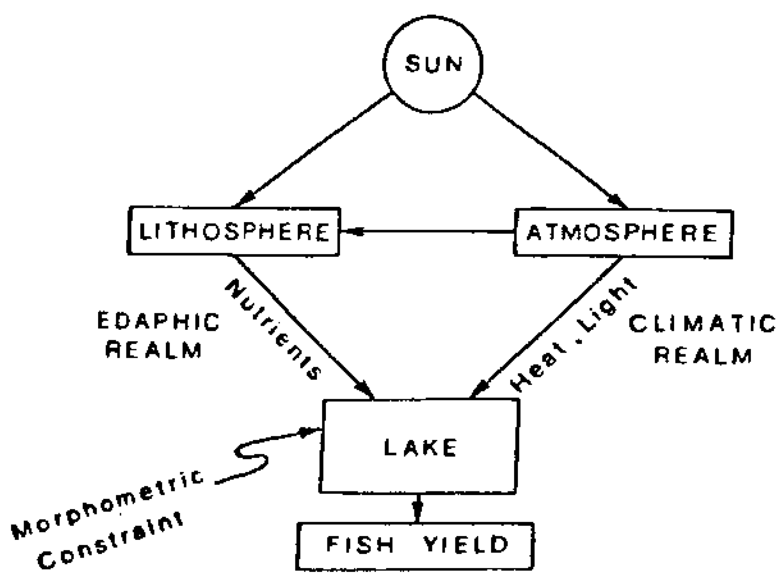

FIGURE 2 A schematic representation of an aquatic ecosystem showing the major energetic and material pathways and one principle biotic output, fish yield (Ryder, 1982).

Another approach related lake surface area to fish productivity. Rounsefell (1946) obtained an inverse relation between fish yield and lake surface area due to the reduction in fish production per unit area in large lakes compared to small ones. Shallow smaller lakes generally contain a large proportion of area occupied by the littoral zone and since this zone is often the most productive area for both primary and secondary productivity, the average production per unit area decreases as surface area increases (Larkin, 1964). Large lakes are generally deeper than small lakes for any given bottom configuration (Hayes, 1957). Therefore, a more convincing relationship could have been demonstrated by Rounsefell (1946) if he had performed a regression between yield and mean depth rather than yield with area. However, Carlander (1955), reanalyzed Rounsefell's data and found no correlation between standing crops of fishes (biomass per unit area) and lake areas. He also found that biomass per unit area decreased with an increase in maximum depth. Ryder (1974) also suggested that a better relation would have been obtained by substituting mean depth for surface area.

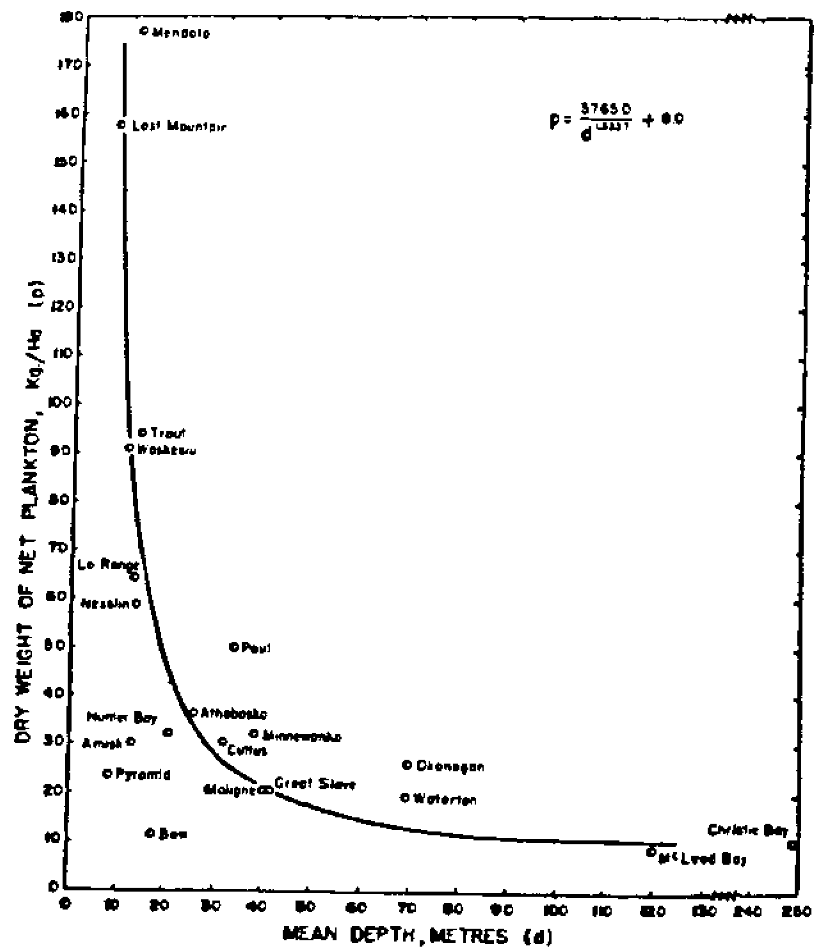

FIGURE 3 Mean depth and the average standing crop of plankton in twenty lakes (Rawson, 1955).

The edaphic factors, e.g. alkalinity, total dissolved solids (TDS) and total phosphorus, were viewed as also contributing to lake production by Carlander (1955), Moyle (1956), Turner (1960) and Ryder (1965). The importance of nutrients and carbonate alkalinity is mainly through enhancing phytoplankton growth in lake ecosystems. These producers serve as a prime food source in the food web. Therefore, the increase in the abundance of the producers could result in increased numbers of secondary and tertiary consumers. Carlander (1955) demonstrated a significant fish biomass increase with an increase of carbonate content (measured as methyl orange alkalinity). Moyle (1956), using data from a number of Minnesota lakes, related fish yield to four independent variables--total phosphorus, total nitrogen, total alkalinity and carbonate alkalinity. Moyle also obtained close graphical correlations between these variables. In addition, Turner (1960) demonstrated a significant positive correlation between fish standing crop and carbonate alkalinity in a study of 22 Kentucky ponds.

Northcote and Larkin (1956) showed interrelation between various physical and chemical variables (e.g. altitude, lake area, mean depth, TDS) and plankton standing crop, benthic fauna and fish for 100 lakes in British Columbia. Individual relations between these variables were not found to be strong. However, a "bio-index" concept, developed by combining relative measures of plankton, bottom fauna and fish abundance was used in a multiple regression analysis, with total dissolved solids and mean depth as independent variables. This analysis did demonstrate a significant correlation. The total dissolved solids (TDS) content of waters appeared to be the most important factor in determining the secondary productivity level in these lakes.

Another important factor in controlling lake productivity is the circulation pattern. Findenegg (1955) demonstrated that lake stratification may lead to nutrient depletion in the epilimnion during summer. Oligomixis (unusual, irregular and short duration mixing) and meromixis (incomplete circulation of lake water) can lower lake production. The importance of mixing types earned further support by Talling (1969), Brylinsky and Mann (1973) and Imboden et al. (1981). Talling (1969) emphasized the importance of annual mixing cycle in governing the productivity of tropical lakes. He explained that in tropic regions, the seasonal variations in temperature and solar radiation were minimal. Therefore, the growth of phytoplankton in tropical areas can be enhanced by the vertical mixing which transports accumulated nutrients to the surface.

Brylinsky and Mann (1973) concluded, from statistical analysis of lake and reservoir data distributed from tropical to polar regions, that variables related to solar energy, e.g. latitude and air temperature, have a greater influence on both primary and secondary production than variables related to nutrient concentration. However in the study of lakes within a narrow range of latitude, e.g. temperate and tropical zones, nutrient-related variables assume greater importance. In addition, mixing type, which is governed by water temperature and lake morphometry, was positively correlated with productivity (Brylinsky and Mann, 1969). Imboden et al. (1981) stated that long term lake biological development was influenced by both continuous vertical mixing (i.e. eddy diffusion) and partial or complete turnover. Vertical mixing acts as a nutrient transport agent to surface water which reduces the nutrient gradient between the epilimnion and hypolimnion eventually eliminating them at the end of the turnover period.

Schindler (1971) proposed that the supply rate of limiting nutrient to a lake ecosystem is directly proportional to watershed area and inversely proportional to lake volume. He assumed that the supply rate of the limiting nutrient per unit volume of lake water and the precipitation were homogeneous over the set of experimental headwater lakes in his study area and the resulting runoff was the major source of limiting nutrients. His assumption is acceptable for the experimental lake area due to small lake size and because atmospheric input of nutrients is not significant compared to the runoff input. Schindler's (1971) model predicted the limiting nutrient supply rate from the area of the lake's watershed, lake surface area and lake volume.

Productivity estimation involves a large number of variables. Therefore, a model describing the relationships between variables influencing lake production is essential. The hierarchical model is the most often used. Brylinsky and Mann (1973) developed this type of model based on the importance of individual variables influencing phytoplankton production. They grouped such variables into those related to 1) solar energy availability and 2) nutrient availability (Figure 4). The energy related variables were subdivided into intensity and duration of incident radiation, both of which included latitude categories. In addition, the phytoplankton production was estimated by using a linear regression model involving abiotic and biotic variables. For example.

Phytoplankton production = -468.9 altitude -78.8 annual precipitation + 29.0 conductivity + 96.5 thermocline depth + 33563.

$r^2 = 0.699$
N = 61

or

Phytoplankton production = 136.8 phytoplankton chlorophyll a -3911 altitude - 106.8 precipitation + 131 thermocline depth + 30389.4

$r^2 = 0.884$
N = 23

Secondary production was divided into 4 major groups: herbivorous zooplankton, carnivorous zooplankton, herbivorous benthos and carnivorous benthos. Estimates were made by utilizing related biotic and abiotic variables, e.g. phytoplankton chlorophyll a, mean depth, mean epilimnion temperature and duration of stratification. From this study, the categories of productivity controlling factors and the utilization of multiple regression analyses in predicting lake productivity were introduced, from which concepts were very useful in model construction.

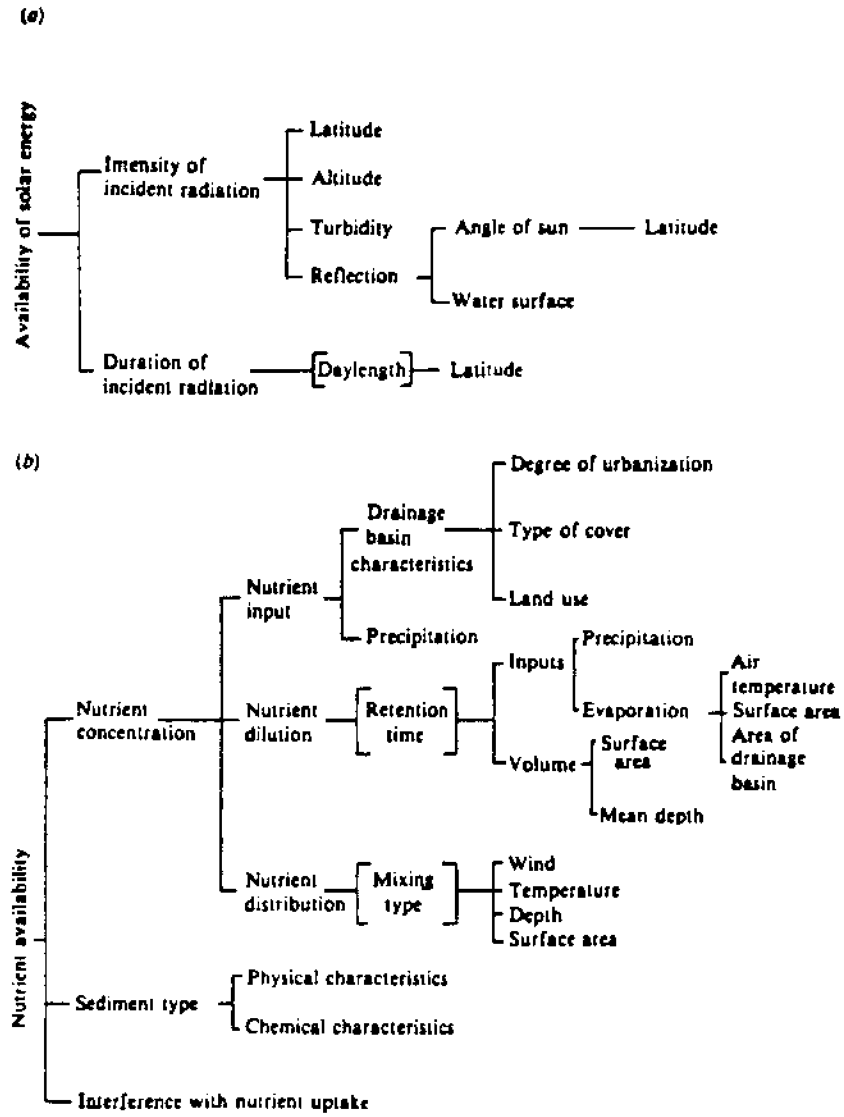

FIGURE 4a. Hierarchical model of factors influencing phytoplankton production through solar energy availability.
b. Hierarchical model of factors influencing phytoplankton production through nutrient availability (Brylinsky and Mann, 1973).

The success for estimating fish production is greater when abiotic factors are combined to produce more complex indices. The greater the number of variables presented in the model, the more details of the environment are represented. Therefore, a more accurate prediction can be expected. Ryder (1965) presented a "morphoedaphic index" (MEI) which was successful when applied to the potential fish yield estimation of temperate and African large lakes and reservoirs. The morphoedaphic index can be calculated as the ratio of TDS to mean depth and thus combines lake chemistry and morphometry data. In

Ryder's index, mean depth and TDS represented morphometric and edaphic factors respectively. His regression analyses resulted in the following equation.

$Y = 5.616X1.^{0.288}\ X_2^{-0.509}$ $\quad r = 0.872$
Y = fish production
X1 = total dissolved solids
X2 = mean depth
4 = correlation coefficient

After obtaining the MEI, the convenient approximation of fish production can be calculated by solving this equation (Ryder, 1982).

Y = MEI

In the above index, climate was not taken into account, so the MEI is applicable only in the narrow range of latitude over which climatic differences are minimal. On the other hand, Schlesinger and Regier (1982) have presented a "climatic index" utilizing mean annual air temperature as the only standard for the index. From stepwise regression analyses, the climatic index (TEMP) accounted for 74 percent of the variability of maximum sustainable fish yield (MSY) using the equation shown below.

$\text{Log MSY} = 0.061\ \text{TEMP} + 0.043$
$r^2 = 0.744$

The correlation of determination was improved after the addition of MEI to the model (Schlesinger and Regier, 1982).

$\text{Log MSY} = 0.05\ \text{TEMP} + 0.28\ \text{Log MEI} + 0.236$
$r^2 = 0.81$

Multiple regression analyses have been shown to provide reliable estimates of potential fish yield. Hayes and Anthony (1964) derived a "productivity index" for 41 Kentucky ponds and lakes based on fish standing stock, angler harvest and fish yield. By computing a series of multiple regressions relating fish productivity to morphological and chemical variables, they accounted for 67 percent of the fish standing crop variability. Carlson (1977) used multiple regression to construct a numerical trophic state index (TSI) for lakes which can be calculated by using several parameters, including Secchi disc transparency, chlorophyll and total phosphorus. According to Carlson (1977), TSI can be utilized as a predictive tool in lake-management programs and as a biological condition estimator.

The perfection of a productivity model for large lakes is of particular importance due to the large field measurement effort needed to describe large bodies of water. From the previous and present studies in fishery management, it is clearly demonstrated that a universal fish productivity estimating model is essential. The model application will be very useful in providing a fish yield approximation for the interested lakes on a worldwide basis with a relatively small information requirement.

CHAPTER 3

MATERIALS AND METHODS

The objective of this study is to develop a fish productivity index using easily gathered data on morphological and physical variables as specific characters of each lake. In order to utilize these variables as tools for fish productivity estimation, the variables that are closely related to lake productivity had to be selected. In this study, 41 lakes (Table 2) were included as the data base because of their large areal coverage (surface area > 500 km^2), their large range of geographical locations and their abundant available information about physical (latitude, longitude, elevation, annual precipitation, annual evaporation and circulation type), morphological (area, drainage basin, maximum depth, mean depth, volume, length, breadth, shoreline length and shoreline development) and biological variables (fish productivity). A portion of information about large lakes was obtained through a literature search. Another part of the data was contributed by approximately 50 limnologists throughout the world by returning the inventory forms with information about large lake(s) in their countries. The data base for the total of 253 large lakes (Herdendorf, 1984), is shown in Appendices A through E.

Lake Distribution

Sources of information on geographic coordinates of the large lakes, with the exception of the Canadian lakes, was obtained from the table prepared by Showers (1977). The Canadian lakes inventory published by Environmental Canada, Inland Water Directorate (Gilliland et al. 1973) served as source of information for Canadian lakes. All locations were confirmed on 1:1,000,000 scale maps published by the U.S. Defense Mapping Agency. Geographic coordinates (latitude and longitude) are given to the center of the lake area. For the irregularly shaped lakes, this point does not necessarily lie within the lake outline.

TABLE 2 Lake characteristics utilized for model development.

lake	area (km**2)	latitude (degree)	mean depth (m)	circulation type	fish yield (kg/hectare.y)
Albert	5590	1.67 n	25.00	polymictic	50.40 (17)
Athabasca	7935	59.18 n	26.00	dimictic	0.88 (14)
Baikal	31500	54.00 n	680.00	meromictic	2.30 (12)
Balaton	590	46.83 n	4.00	monomictic	23.50 (4)
Big trout	661	53.77 n	15.80	dimictic	0.73 (16)
Churchill	559	56.00 n	8.96	dimictic	4.28 (1)
Constance	540	47.58 n	90.00	dimictic	12.00 (8)
Cree	1434	57.48 n	14.90	dimictic	1.46 (1)
Cross	755	54.72 n	5.10	dimictic	3.79 (1)
Edward	2150	0.35 s	34.00	polymictic	69.70 (17)
Erie	25657	42.15 n	19.00	monomictic	9.72 (7)
Frobisher	516	56.37 n	5.49	dimictic	2.20 (17)
Geneva	580	46.42 n	150.00	dimictic	25.20 (10,21)

lake	(km**2)	(degree)	(m)	type	(kg/hectare.y)
G.bear	31326	66.00 n	143.00	dimictic	0.30 (16)
G.slave	28568	61.78 n	234.00	dimictic	1.31 (11)
Huron	59500	45.00 n	59.00	monomictic	2.90 (20)
Kyoga	4430	1.50 n	6.00	polymictic	181.00 (17)
L.slave	1169	55.43 n	11.70	dimictic	7.50 (13)
Malaren	1140	59.50 n	21.50	monomictic	3.40 (17)
Manitoba	4625	50.92 n	8.96	dimictic	5.32 (13)
Michigan	57750	44.00 n	85.00	monomictic	2.24 (2)
Nipigon	4848	49.83 n	53.80	dimictic	1.56 (18)
Ontario	19000	42.65 n	86.00	monomictic	1.25 (16)
Peterpond	778	55.95 n	13.70	dimictic	8.80 (14)
Rainy	940	48.70 n	11.90	dimictic	5.26 (5)
Red	1170	48.02 n	3.90	dimictic	4.14 (19)
Reindeer	6650	57.30 n	17.00	dimictic	1.12 (14)
Ronge	1413	55.13 n	14.60	dimictic	2.71 (14)
St.Clair	1113	42.47 n	4.11	dimictic	7.12 (9)
Scutari	600	42.17 n	5.00	dimictic	50.00 (3)
Seul	1658	50.38 n	10.70	dimictic	1.59 (16)
Superior	82100	47.55 n	149.00	monomictic	1.19 (2)
Tanganyika	32000	6.00 s	574.00	meromictic	22.00 (22)
Upemba	530	8.60 s	1.00	polymictic	226.00 (17)
Vanern	5580	58.92 n	31.30	monomictic	3.50 (17)
Vattern	1910	58.40 n	41.90	dimictic	1.57 (6)
Victoria	62940	1.00 s	40.00	polymictic	49.05 (15)
Winnipeg	24387	52.52 n	12.90	dimictic	2.98 (13)
Winnipegosis	5375	52.58 n	4.00	dimictic	4.35 (13)
Wollaston	2681	58.23 n	17.40	dimictic	5.58 (11)
Woods	4350	49.25 n	7.70	dimictic	6.28 (11)

1. Atton (?) 2. Baldwin and Saalfeld (1962) 3. Beeton (1983) 4. Biro (1970) 5. Chevalier (1977) 6. Grimas (1972) 7. Hartman (1972) 8. Hartmann and Numann (1972) 9. Johnston (1977) 10. Laurent (1972) 11. Matuszek (1978) 12. Moskalenko (1972) 13. Rawson (1952) 14. Rawson (1960) 15. Regier (1971) 16. Ryder (1965) 17. Schlesinger and Regier (1982) 18. Schupp and Macins (1977) 19. Smith (1977) 20. Spangler (1973) 21. Vivier (1975) 22. Welcomme (1972)

Regier et al. (1971) reported that fish productivity in the tropics is roughly greater than Canadian lakes by a factor of 8 due to latitude. Accepting this concept, latitude information was manipulated to be more compatible with other model variables by being categorized into 9 arbitrary classes in the following manner:

class 1 from 80-89°
class 2 from 70-79°
class 3 from 60-69°
class 4 from 50-59°
class 5 from 40-49°
class 6 from 30-39°
class 7 from 20-29°
class 8 from 10-19°
class 9 from 0- 9°

For the 41 large lakes in this study, latitude code were correlated with average air temperature (data from Pearce and Smith, 1984) and solar energy (data from Perry and Walker, 1977) at ground level. Latitude code demonstrated significant positive correlations with both variables (Figure 5 and 6).

Morphometric Data

The area of the large lakes in Appendix A is the total area enclosed within the lake outline, including islands. Many lakes, particularly those with no outlet, are subjected to wide seasonal water level fluctuations. Therefore, their area and depth vary depending on climatic conditions.

Reliable data is available for surface area and elevation for most lakes, but depth is scarce for many. For the 253 large lakes, only 20 percent have the mean depth data. Without such information, calculations of productivity index are impossible because mean depth is one of the selected variables. A simple plot of maximum depth versus mean depth for large lakes with compete bathymetric surveys shows the following relationships (Herdendorf, 1984):

Maximum depth range (m)	Ratio of maximum to mean depth
0 - 250	1 : 0.32
250 - 500	1 : 0.35
500 - 1500	1 : 0.38
1500 - 2000	1 : 0.40

The correlation coefficient of 0.901 ($p < 0.001$) was obtained between the actual and predicted mean depth data ($N = 26$) (Figure 7). The standard deviation of + 4.317** was calculated from the difference between predicted and actual mean depth values. In the presence of maximum depth, mean depth can be calculated from this equation:

Mean Depth = 0.39 Maximum Depth -4.98 $r = 0.901$

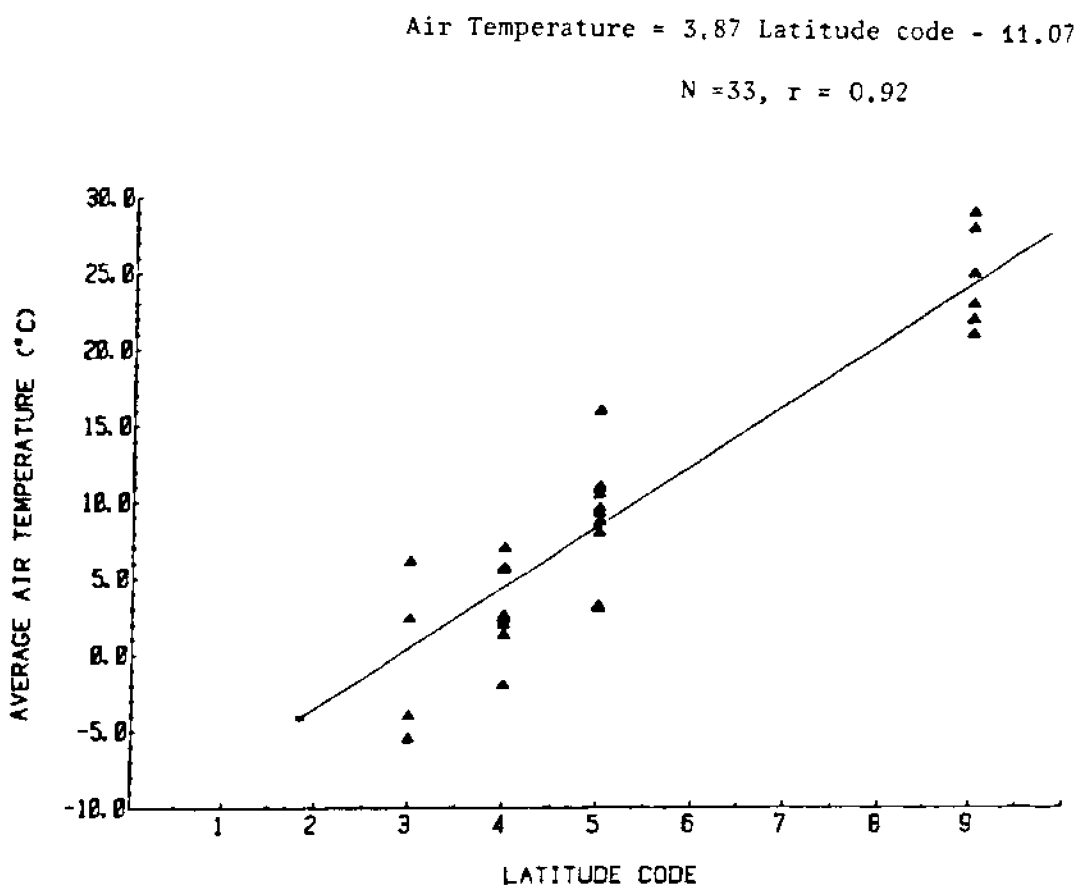

FIGURE 5 The relationship between latitude code and annual air temperature in large lakes.

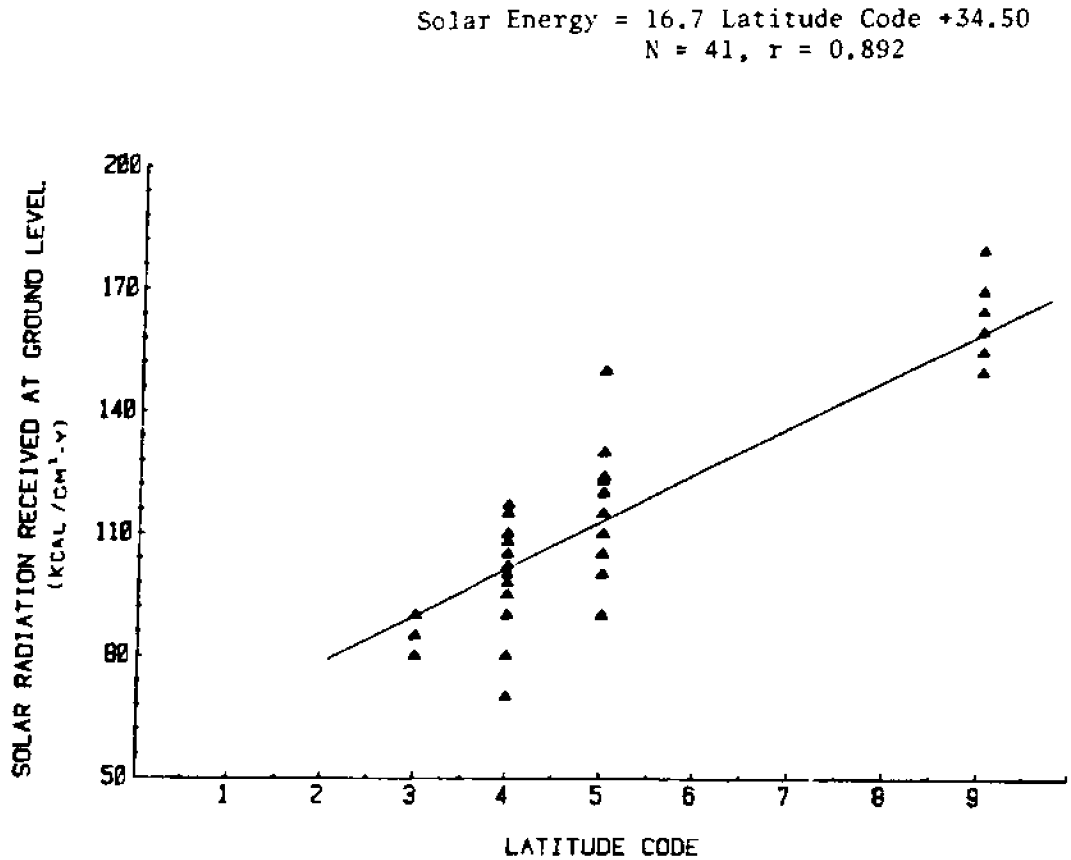

FIGURE 6 The relationship between latitude code and solar energy received at ground level.

Drainage basin area, the area of the catchment basin of the surface area of the lake, is missing for more than half of the large lakes. Shoreline lengths were obtained by using a Hewlett-Packard electronic digitizer and maps (1:5000,000 scale aeronautical charts). Shoreline development, a measure of the irregularity of the shore based on the ratio of length to the circumference of a circle that has the same area as the lake, was calculated for each lake (Lind, 1979). Therefore, a perfect circle lake has a value of 1 and as the irregularity increased, the value departs from 1.

Length and breadth measurements were gathered from a variety of sources and it is difficult to determine what criterion each author used. Breadth or width is normally considered as the maximum length of a straight line connecting points on the lake shoreline at approximately right angles to the line of maximum length.

Edaphic Data

Annual precipitation and annual evaporation are grouped in this category because of their relation in nutrient input and nutrient dilution as shown in Figure 4. Precipitation ranges from 2,000 to 3,000 mm/y for tropical lakes.

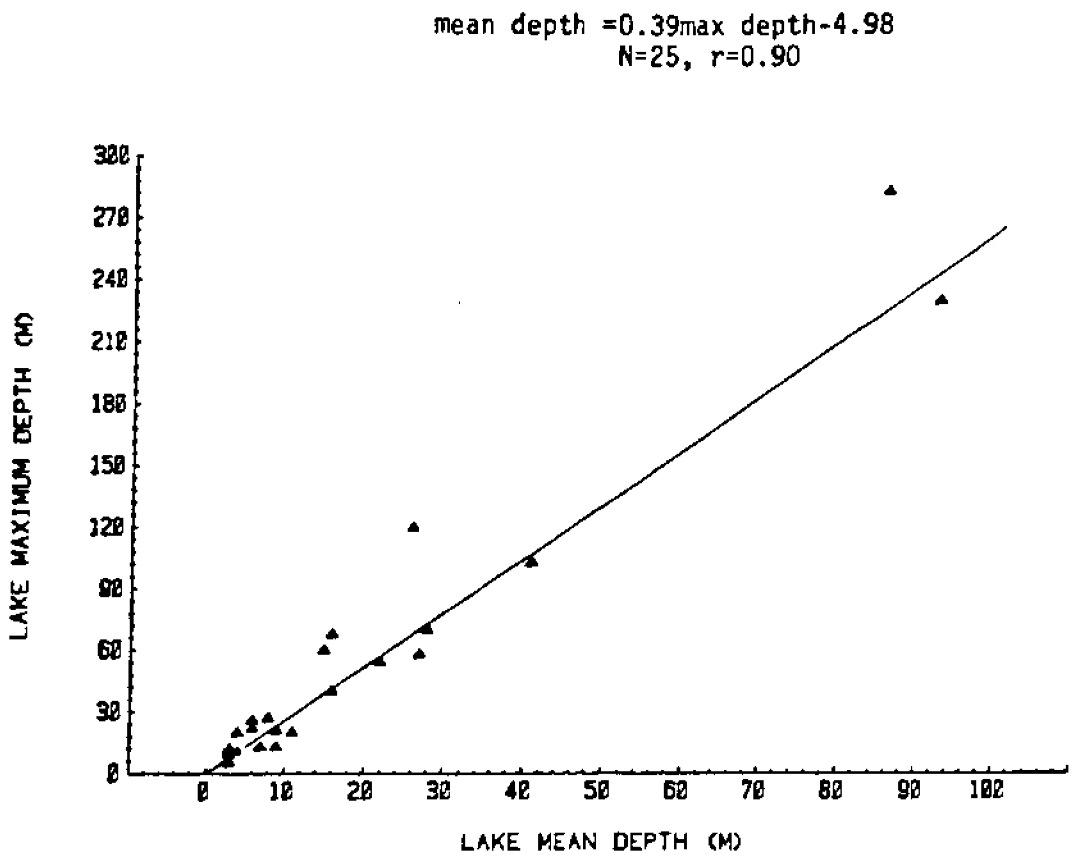

FIGURE 7 The relationship between mean depth and maximum depth in large lakes.

Hutchinson and Loffler (1975) presented a classification of circulation types (amictic, monomictic, etc.) in relation to lake mean depth and geographic location (latitude) (Figure 8). Sources of information on circulation types include Upchurch (1976) and Wetzel (1975).

The circulation types were recorded on a scale which was:

code 1 = amictic (no circulation, continuously stratified)
code 2 = meromictic (partial circulation)
code 3 = monomictic (one circulation per year)
code 4 = dimictic (two circulations per year)
code 5 = polymictic (more than two circulations per year)

Biological Data

Mean fish production was obtained from catch records spanning several years, or from published estimates based on intensive fishery surveys (Table 2). Fish productivity is expressed as the average annual yield (usually the commercial harvest) in kilograms per hectare (kg/ha-y).

Index Development

The relationships among each variable and fish production for 41 lakes were determined by simple correlation and regression analysis. The statistical analyses were performed by utilizing programs (PROC CORR - for simple correlation, PROC GLM - for general linear model, PROC STEPWISE - for multiple regression) contained in Statistical Analysis Systems Packages (SAS) (Helwig, 1985). The utilization of multiple regression assures that the variables entered to the model will have at least 0.15 significant level with fish production, otherwise the variables will be rejected. The correlation coefficient and correlation of determinations from these analyses were used as criteria for screening the representative variables utilized in fish productivity index and model. The productivity index will be presented in form of combined selected variables and treated as a single entity. On the other hand, selected variables will be entered simultaneously as an individual in the productivity model development. The comparison of predictive ability among this newly developed index and the existing models are presented in Chapter 5.

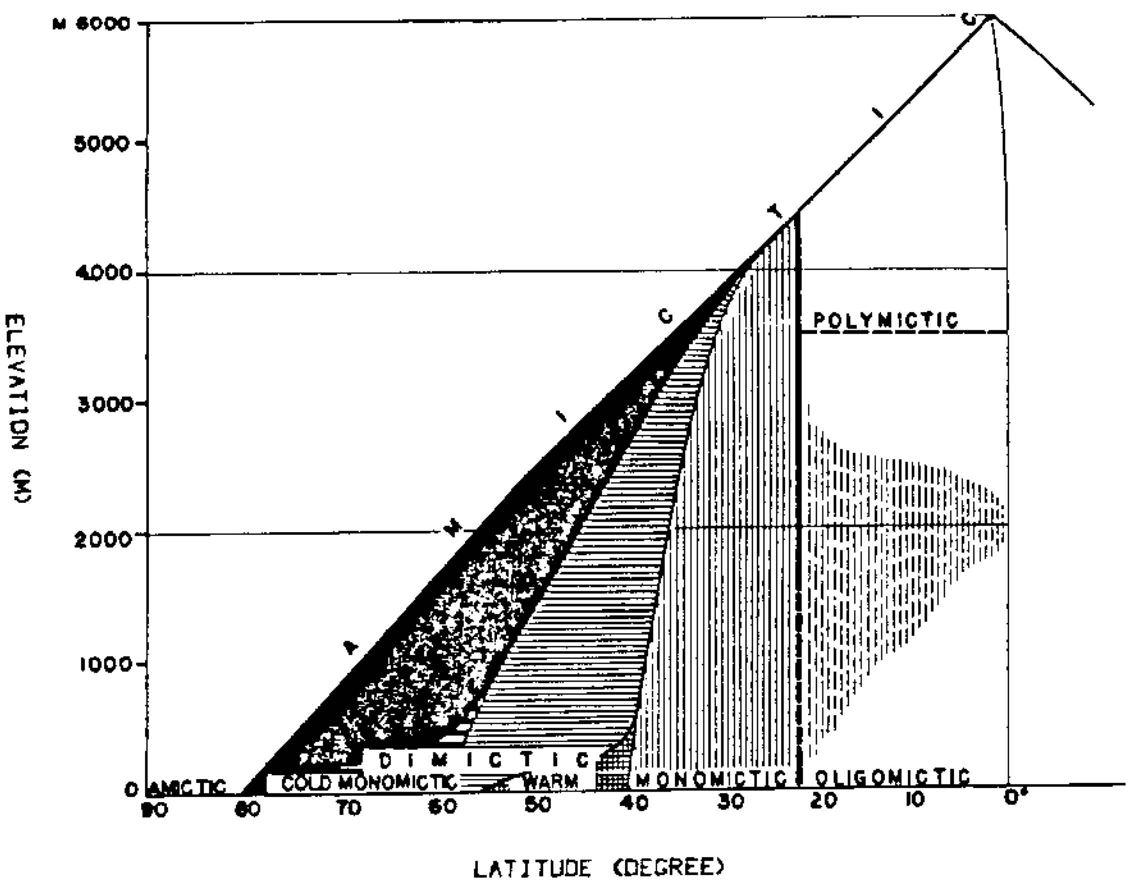

FIGURE 8 Schematic arrangement of the thermal lake types. (Hutchinson and Loffler, 1956)

CHAPTER 4

RESULTS

An array of correlation coefficients among fish productivity and variables were demonstrated in Table 3. The correlation coefficients can be ranked from highest to lowest in this category: latitude code (Figure 9), latitude (Figure 10), square of 1/log (mean depth + 1), 1/log (mean depth + 1) (Figure 22), longitude (Figure 11), circulation type (Figure 12), elevation (Figure 13), annual precipitation (Figure 14), length (Figure 15), annual evaporation (Figure 16), area (Figure 17), breadth (Figure 18), maximum depth (Figure 19) and area of drainage basin (Figure 20).

Upon examining the literature and the statistical outcome, three variables have been carefully selected to represent the lake productivity controlling factors (Table 4). Latitude, representing the climatic factor, correlated well with the solar energy input (Brylinsky and Mann, 1973) which influenced the producer photosynthetic process and can affect the higher level consumers at the end of food web. Furthermore, temperature, which affects metabolic rate of organisms in every trophic level, is also influenced by latitude.

The next selected variable was mean depth which represented the morphometric factor. Rawson (1955) stated that the water mass below the 18 meter level served as a nutrient sink and removed nutrients from the trophogenic zone in the form of settling phytoplankton. The last variable, circulation type, acted in the opposite way with mean depth, the nutrient distributor. During the stratification period, nutrient depletion may occur in the epilimnion zone which can result in slower producer growth rate. This occurance may affect the lake's total productivity.

TABLE 3 Correlation coefficients among variables utilized in the fish productivity models and annual fish yield (normal and logarithmic values). (N = 41)

	fish productivity		log (fish productivity)	
	r	p	r	p
annual evaporation	0.218	0.1214	0.331	0.0167
annual precipitation	0.320	0.0207	0.490	0.0002
area	-0.197	0.1667	-0.273	0.0523
breadth	-0.161	0.2579	-0.313	0.0252
circulation type	0.459	0.0001 *	0.352	0.0067
drainage basin	-0.019	0.0001	0.404	0.0721
elevation	0.375	0.0062	0.462	0.0006
latitude	-0.705	0.0001	-0.787	0.0001
latitude code	0.764	0.0001 *	0.873	0.0001
length	-0.226	0.1079	-0.219	0.1180
log (Z + 1)	0.632	0.0001 *	0.478	0.0001

	fish productivity		log (fish productivity)	
	r	p	r	p
longitude	-0.462	0.0006	-0.484	0.0003
max.depth	-0.094	0.5155	0.004	0.9764
shoreline development	-0.170	0.2524	-0.161	0.2805
shoreline length	-0.201	0.1708	-0.332	0.0213
square circulation	0.579	0.0061	0.449	0.0004
square log (Z + 1)	0.670	0.0001	0.479	0.0001
volume	-0.184	0.2757	-0.194	0.2494

Key
p = probability
r = correlation coefficient

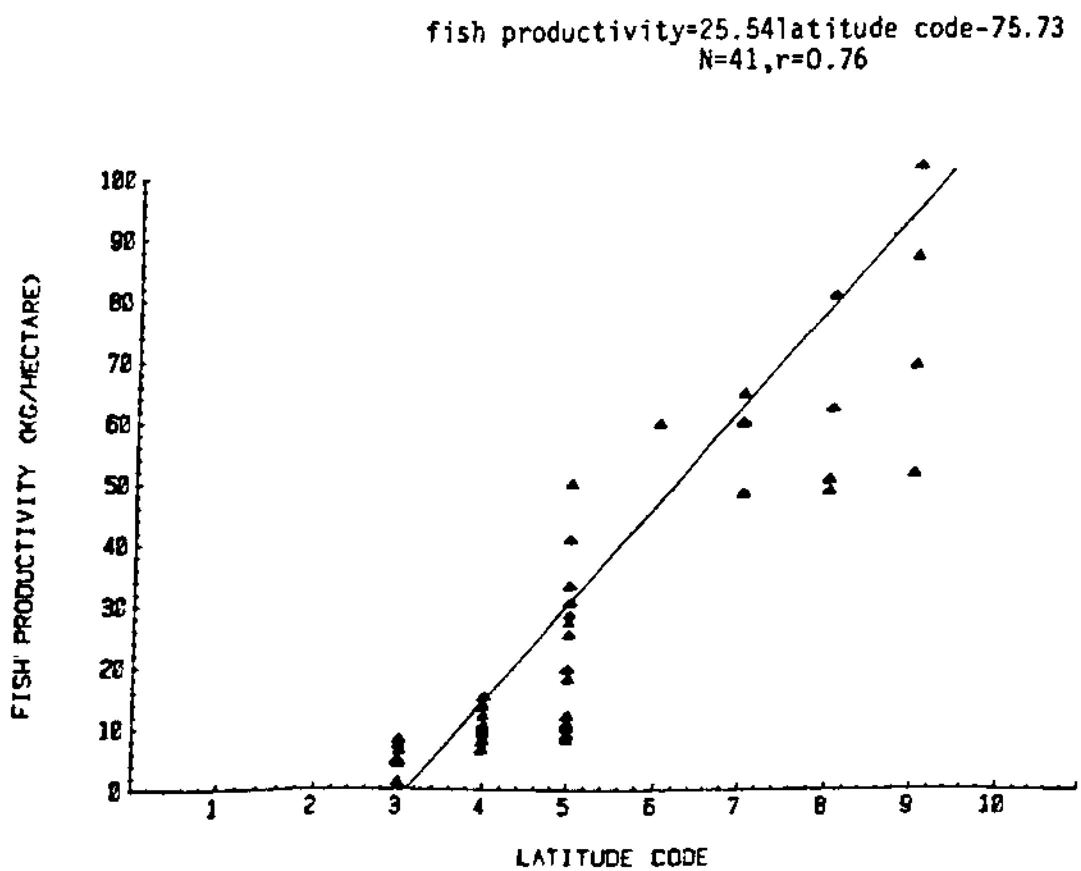

FIGURE 9 The relationship between fish productivity and latitude code. (arctic zone: 1–3, temperate zone: 4–6 and equatorial zone: 7–9)

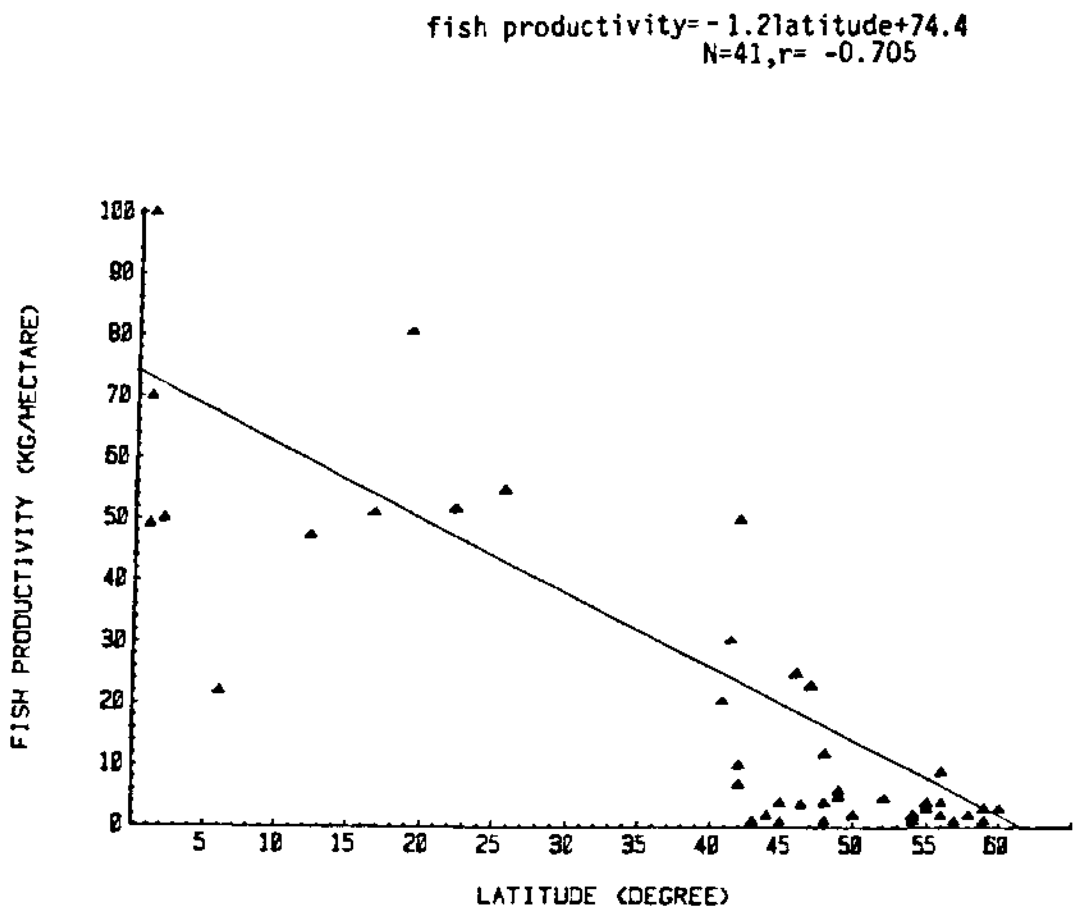

FIGURE 10 The relationship between fish productivity and latitude.

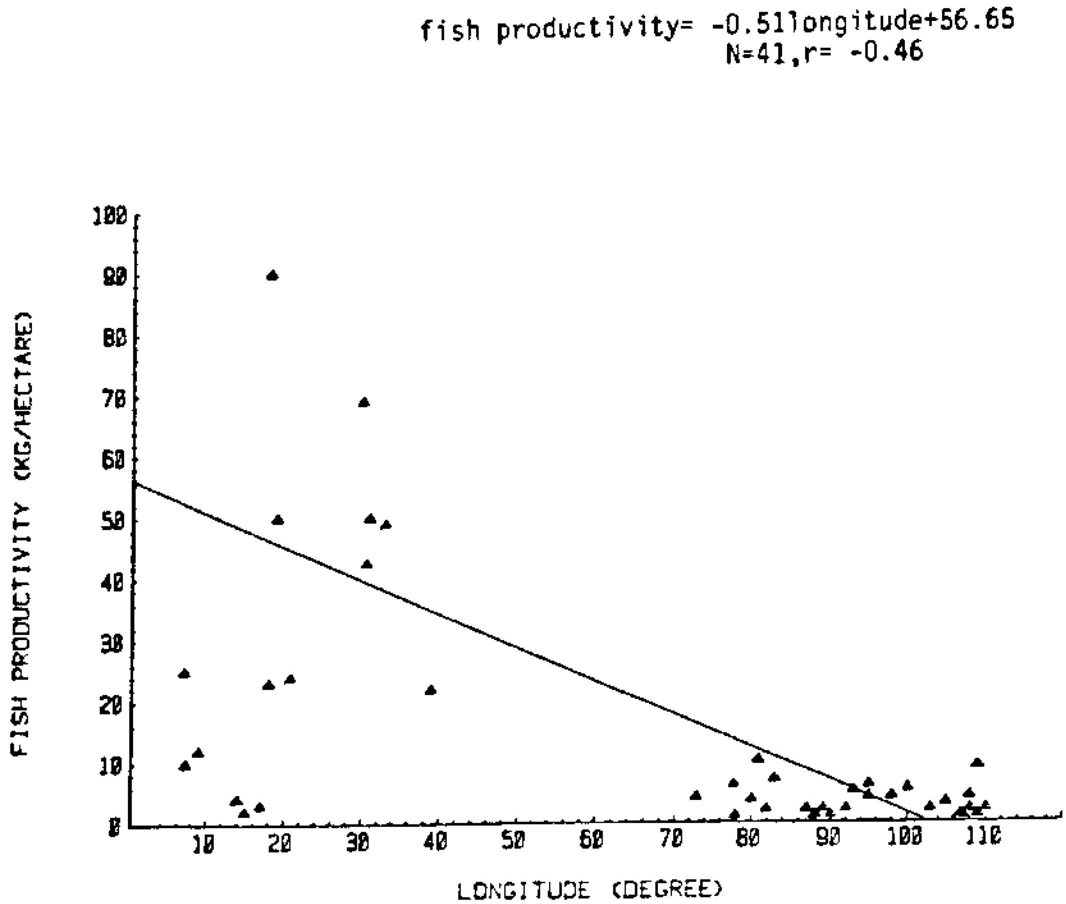

FIGURE 11 The relationship between fish productivity and longitude.

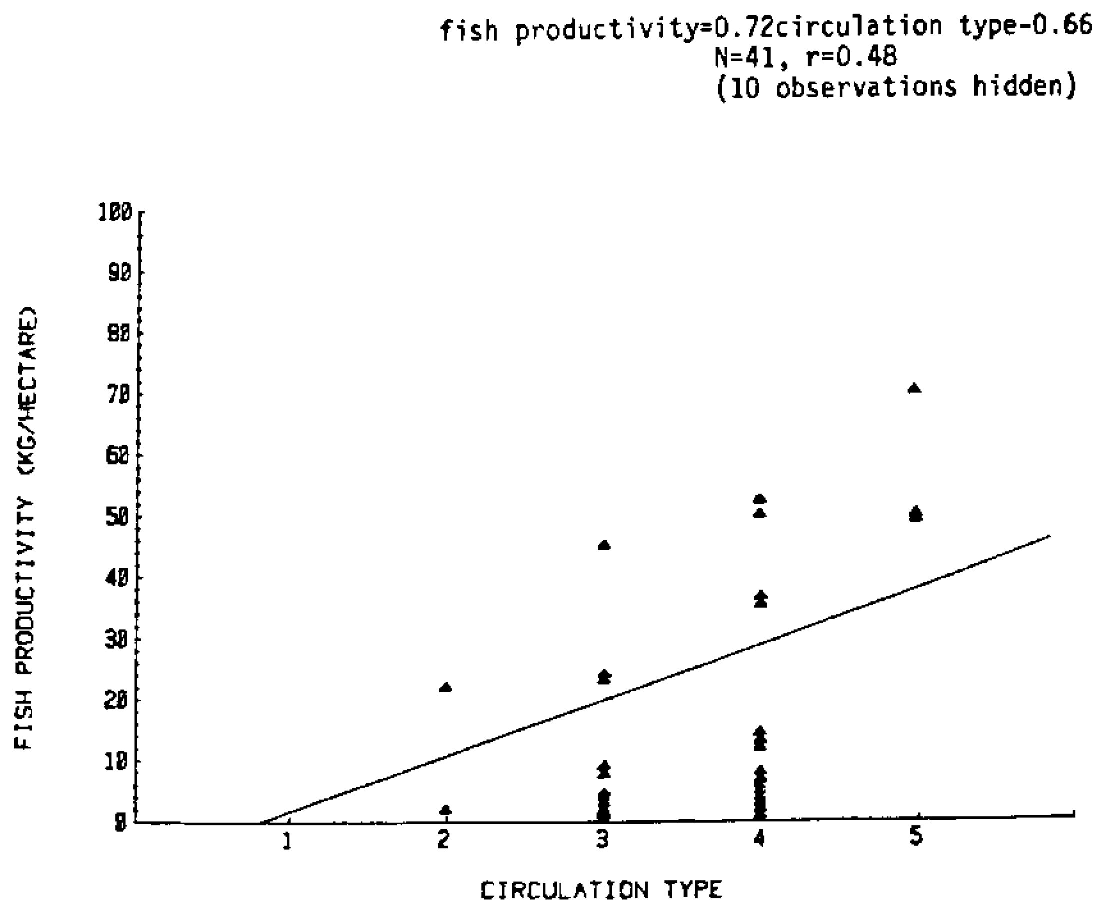

FIGURE 12 The relationship between fish productivity and circulation type. (1-amictic, 2-meromictic, 3-monomictic, 4-dimictic, 5-polymictic)

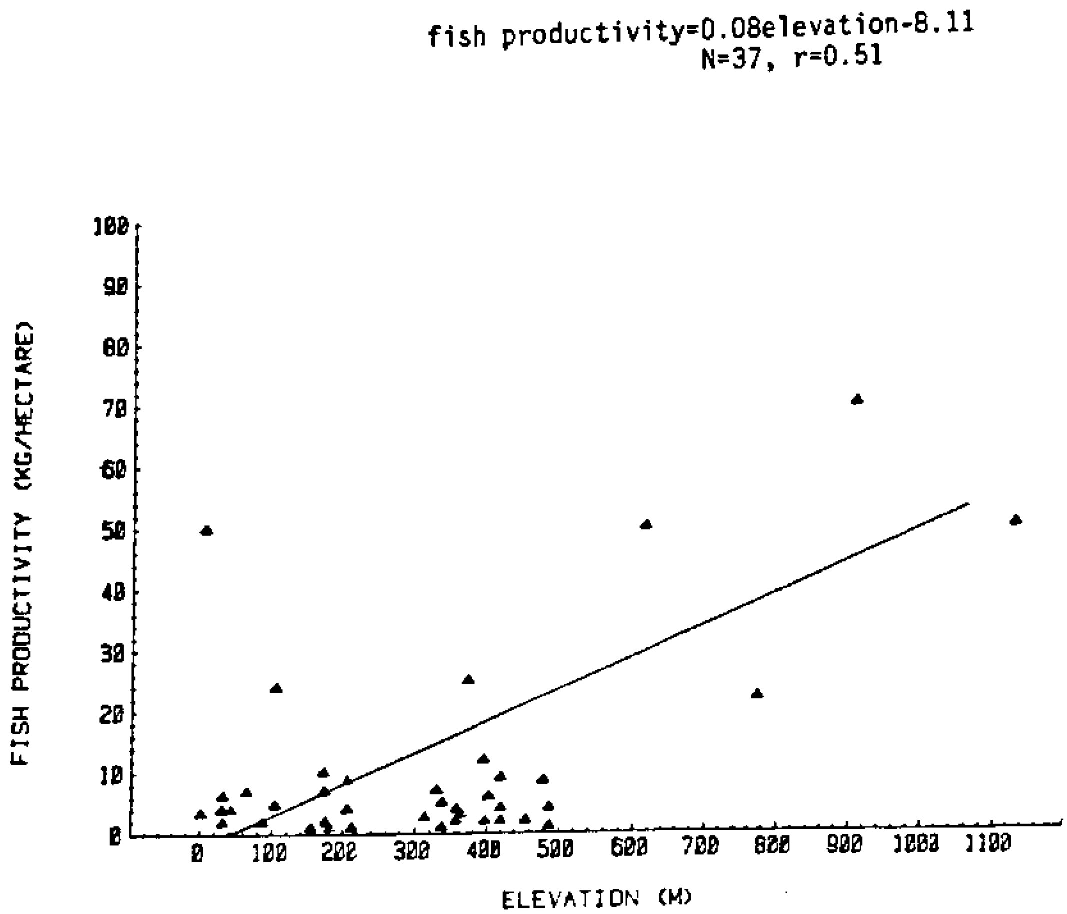

FIGURE 13 The relationship between fish productivity and elevation.

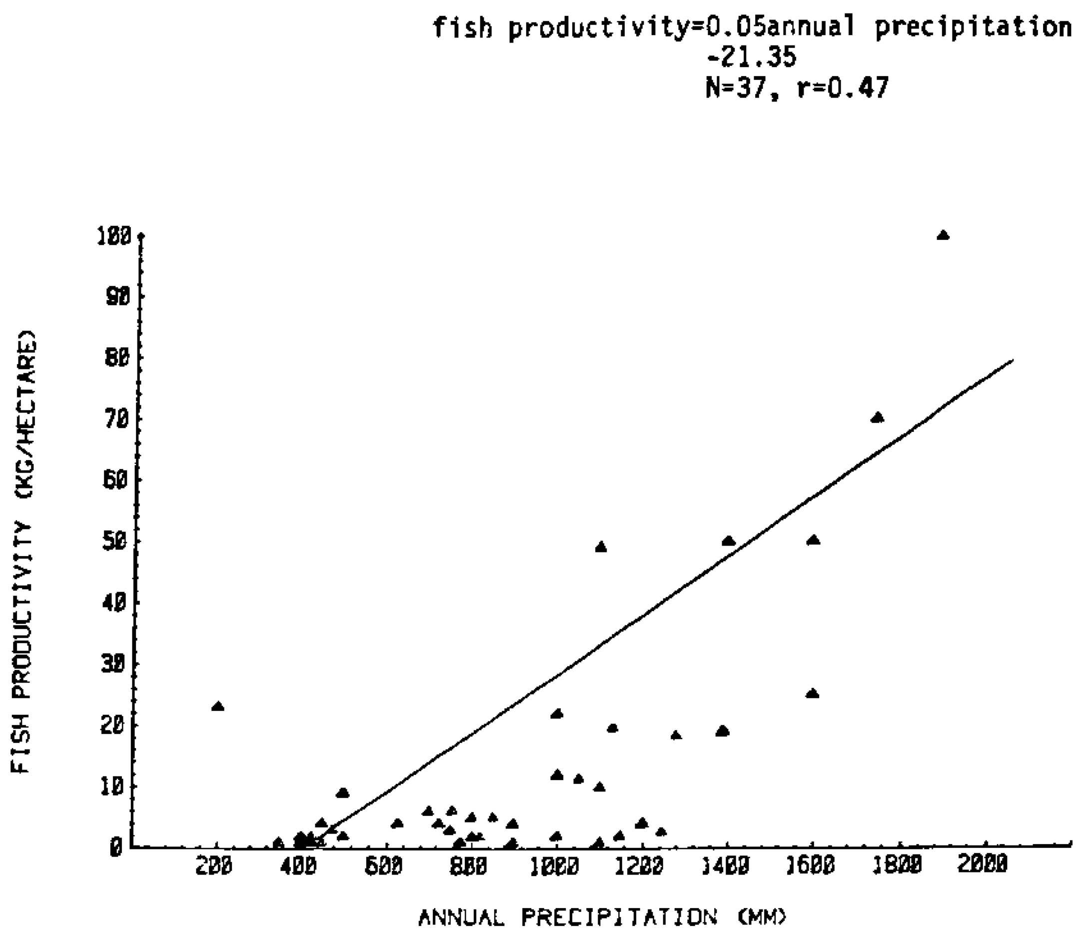

FIGURE 14 The relationship between fish productivity and annual precipitation.

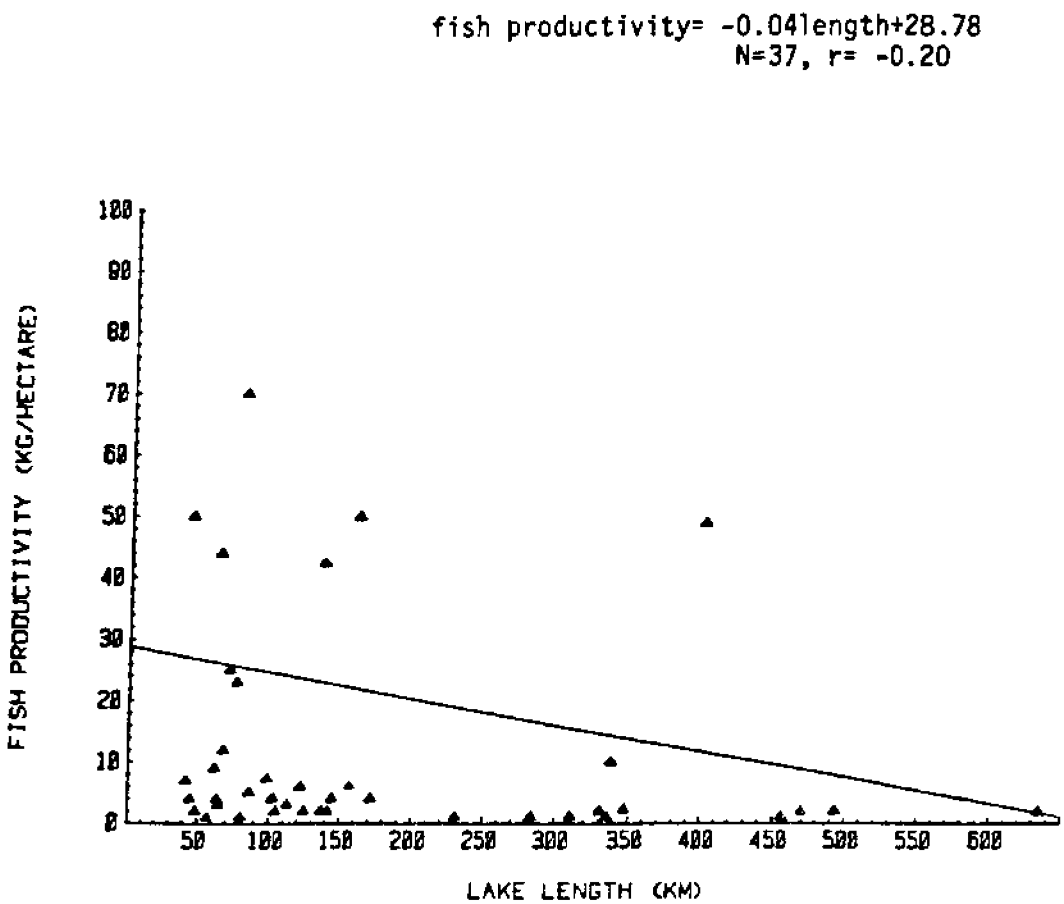

FIGURE 15 The relationship between fish productivity and lake length.

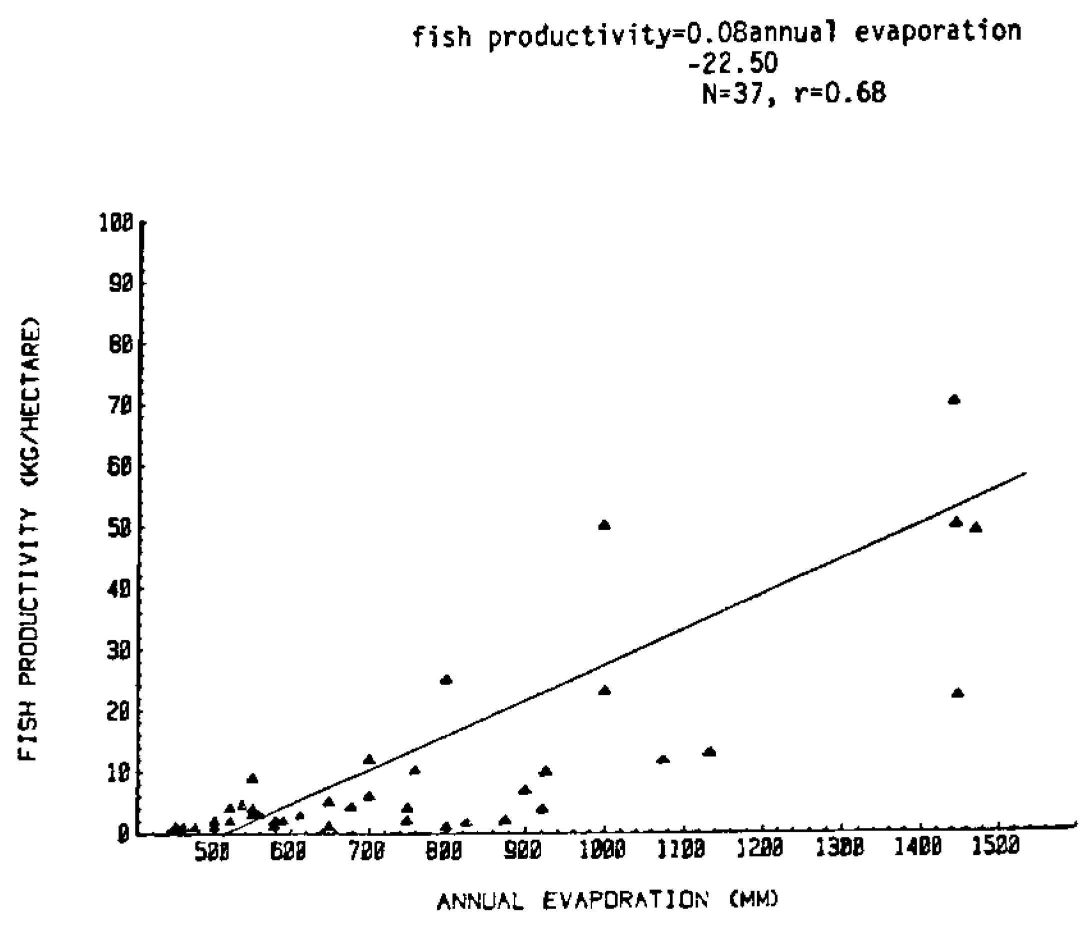

FIGURE 16 The relationship between fish productivity and annual evaporation.

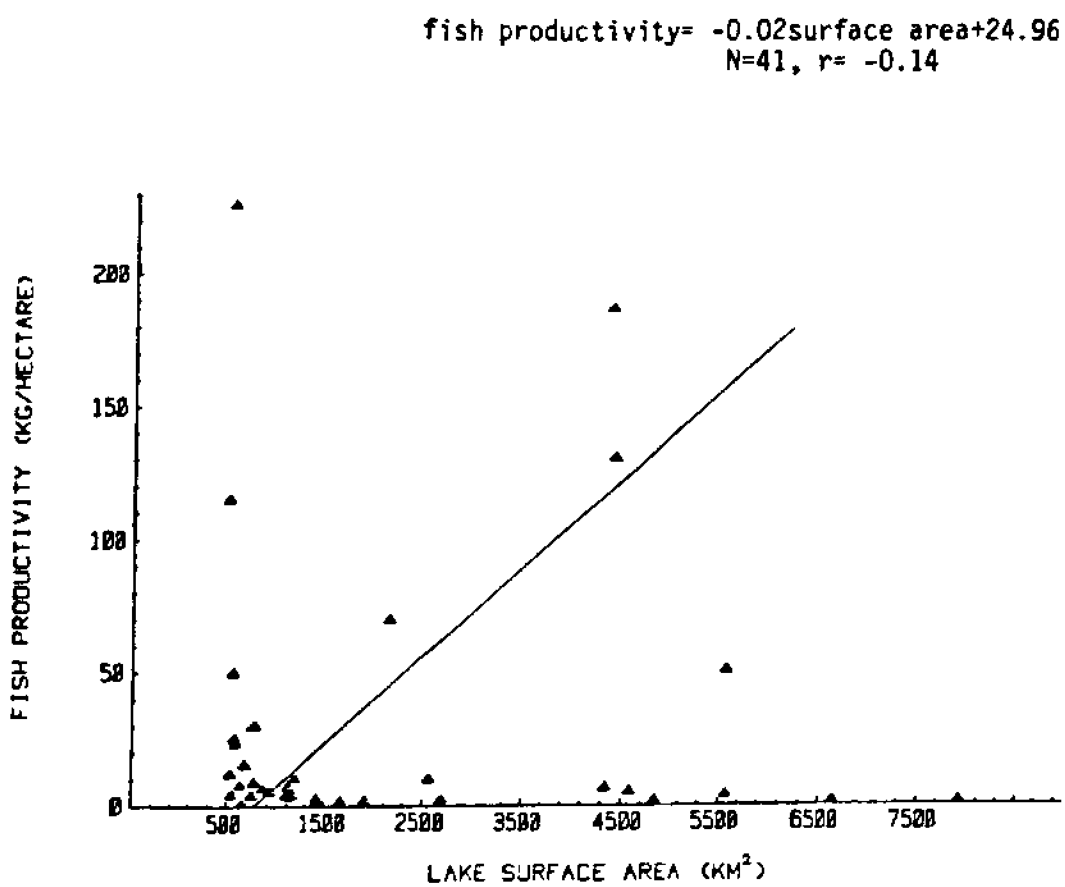

FIGURE 17 The relationship between fish productivity and lake surface area.

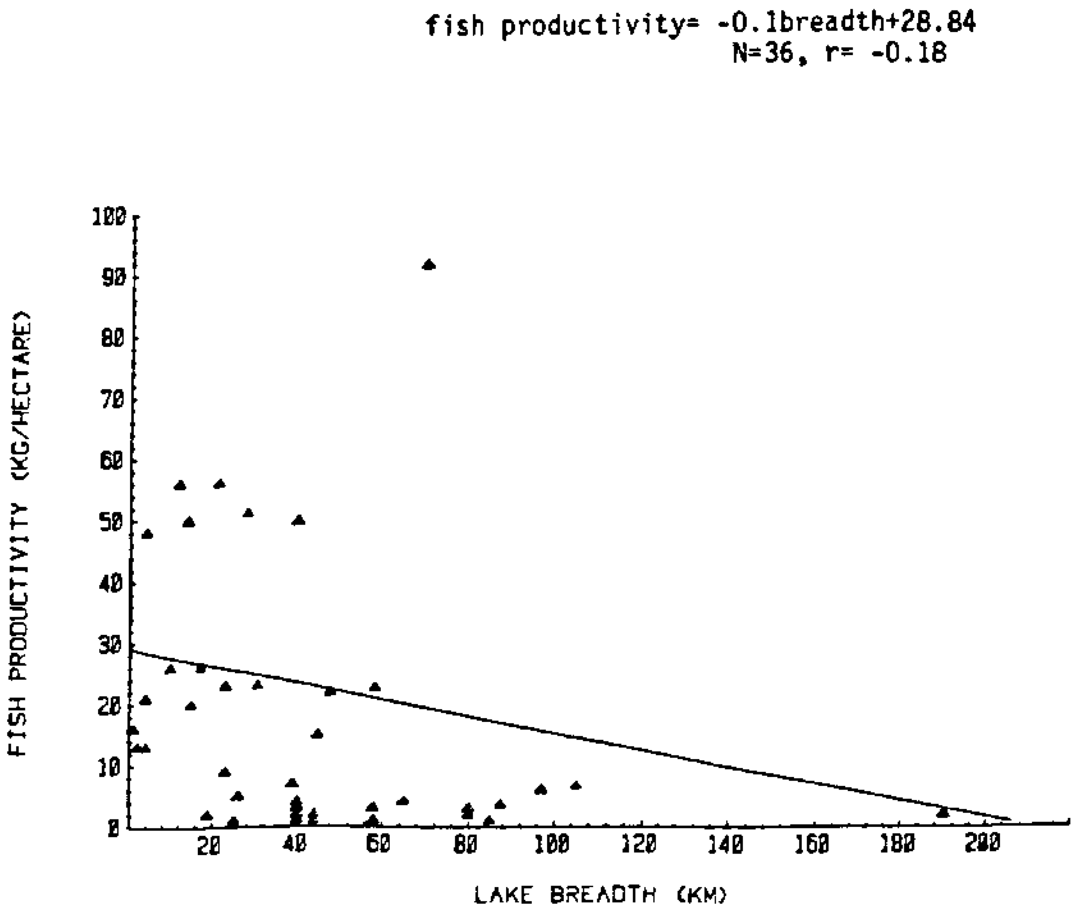

FIGURE 18 The relationship between fish productivity and lake breadth.

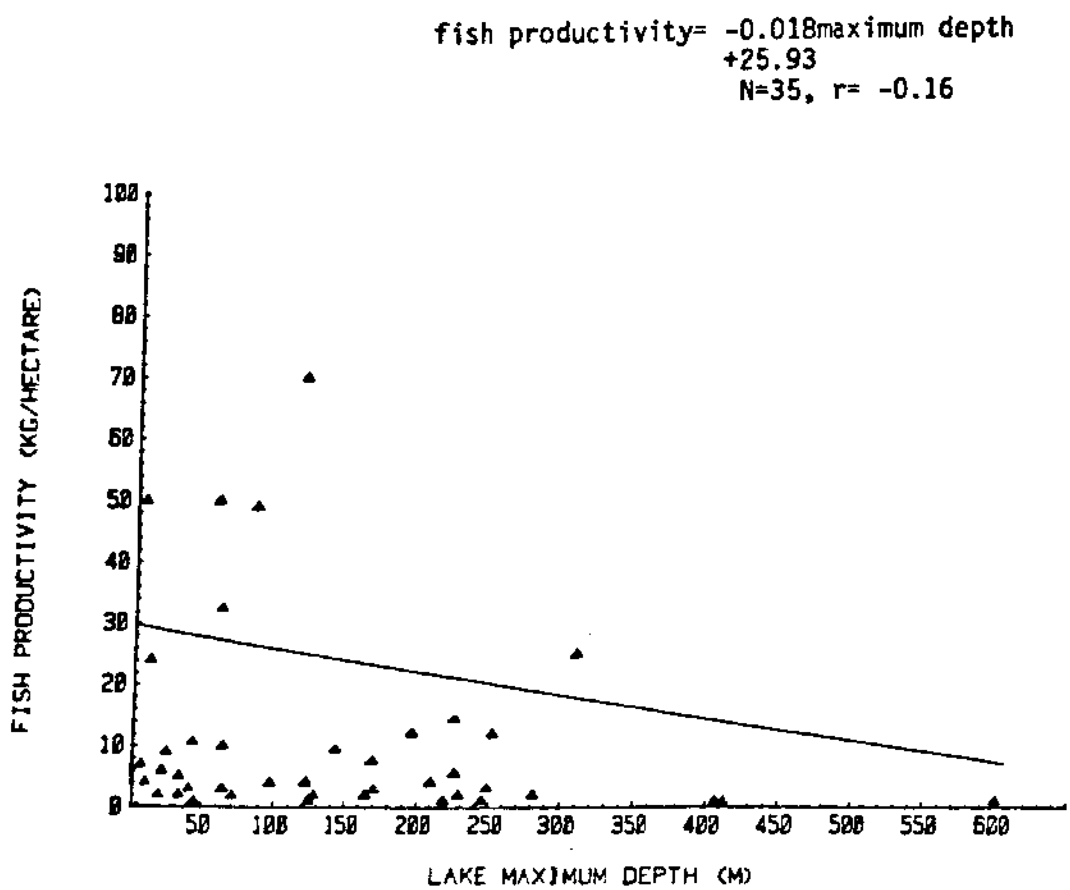

FIGURE 19 The relationship between fish productivity and lake maximum depth.

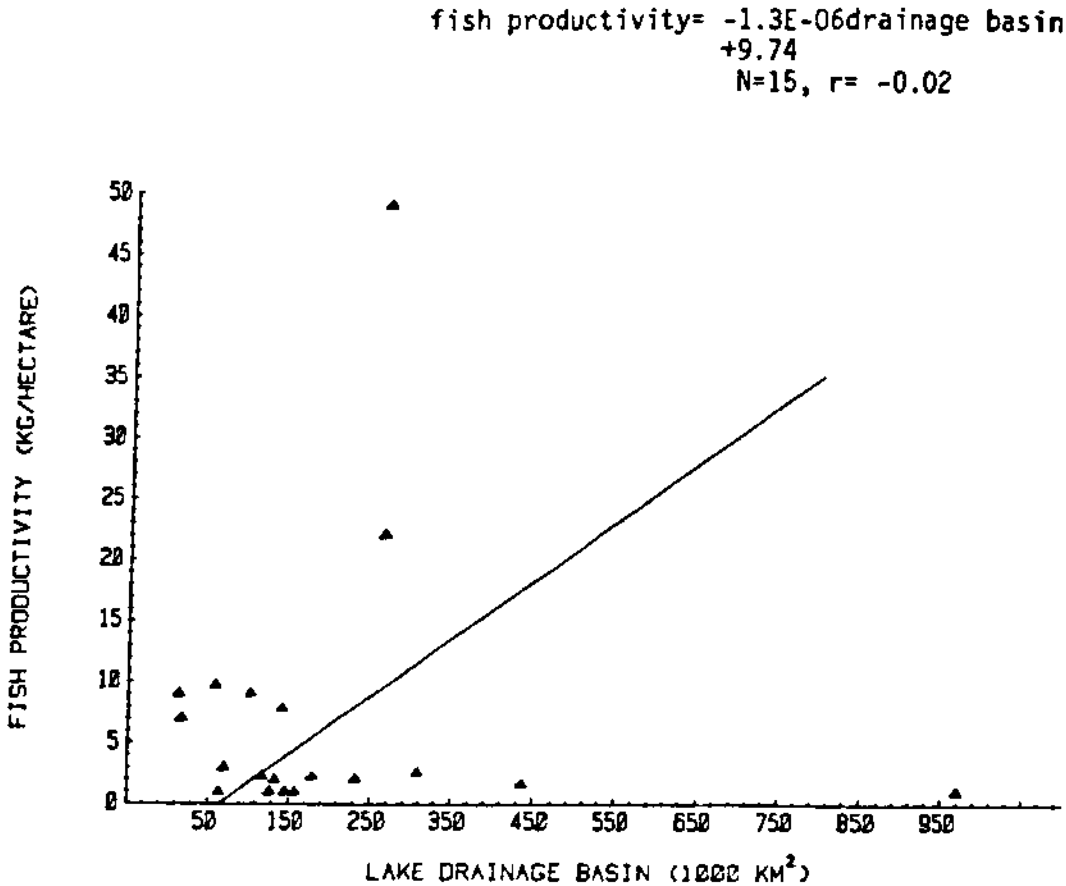

FIGURE 20 The relationship between fish productivity and area of lake drainage basin.

TABLE 4 Coded lake data utilized for productivity model.

lake	latitude code	circulation type code	log (z + 1)	productivity index	fish yield kg/hectare/y
Albert	9	5	1.41	31.05	50.4
Athabasca	3	4	1.43	8.40	0.88
Baikal	4	2	2.83	2.80	2.3
Balaton	5	3	0.70	31.35	23.5
Big trout	4	4	1.22	13.12	0.73
Champlain	5	4	1.61	12.40	4.0
Churchill	4	4	0.99	16.80	4.28
Constance	5	4	1.96	10.00	12.0
Cree	4	4	1.20	13.28	1.46
Cross	4	4	0.71	22.40	3.76
Edward	9	5	1.54	29.25	69.7
Erie	5	3	1.30	11.70	9.72
Frobisher	4	4	0.81	19.68	2.20
Geneva	5	4	2.22	21.22	25.2
G.bear	3	4	2.17	5.52	0.3
G.slave	3	4	1.79	6.72	1.31

lake	latitude code	circulation type code	log (z + 1)	productivity index	fish yield kg/hectare/y
Huron	5	3	1.82	8.25	1.55
Kyoga	9	5	0.85	53.10	130.0
L.slave	4	4	1.10	14.56	7.5
Malaren	3	3	1.33	7.83	3.4
Manitoba	4	4	1.00	16.00	5.32
Michigan	5	3	1.93	7.80	2.24
Nipigon	4	4	1.73	9.12	1.56
Ontario	5	3	1.94	7.80	1.25
Peter pond	4	4	1.17	13.76	8.8
Rainy	5	4	1.07	19.20	5.26
Red	5	4	0.59	24.60	4.14
Reindeer	4	4	1.85	12.64	1.12
Ronge	4	4	1.11	14.08	2.71
St.Clair	5	4	0.71	34.00	7.21
Scutari	5	4	0.78	25.80	50.0
Seul	4	4	1.06	15.04	1.59
Superior	5	3	2.17	6.90	1.19
Tanganyika	9	2	2.78	6.48	22.0
Tumba	9	5	0.40	112.50	115.0
Upemba	9	5	0.30	149.40	226.0
Vanern	4	3	1.51	7.92	3.5
Vattern	4	4	1.62	9.92	1.57
Victoria	9	5	1.59	28.35	49.05
Winnipeg	4	4	1.15	13.92	2.98
Winnipegosis	4	4	0.70	22.88	4.35
Wollaston	4	4	1.33	12.00	1.90
Woods	5	4	0.95	21.00	6.28

Correlation Between the Selected Variables

Circulation type showed significant relation to lake surface area ($r = -0.39$, $p < 0.018$) (Table 5). This negative correlation indicated that lakes with a large surface area and which are generally deeper than small lakes, tend to circulate less often than smaller size lakes. Negative correlation between lake volume and maximum depth with circulation type was also found from this study ($r = -0.69$ and -0.65 respectively).

It is clear that the mean depth influenced the mode of circulation type. The correlation coefficient (r) equals 0.33 ($p < 0.0334$) which means that about 10 percent of the variability in the circulation type can be explained by the change of 1/log (mean depth + 1) (percent variability equaled to $100*r^2$). This finding relates very well with limnological principles. For two lakes of equivalent area but different depths, the depth of well-mixed upper layer of water will be the same if there is a constant mixing force (e.g. wind). The additional hypolimnetic volume in the deeper lake makes the thorough mixing very difficult, so the circulation type can be shifted from monomictic to meromictic if the lake depth increases. The correlation coefficients among all independent variables and latitude code are relatively low. This was anticipated because the variables are in the different categories (e.g. climatic vs. edaphic) and should not have influence on each other. The only relatively high r is between latitude code and circulation type ($r = 0.3$, $p < 0.055$). This finding can be explained by the partial utilization of latitude and elevation to determine circulation pattern (Hutchinson and Loffler, 1957). These relatively low values of correlation coefficients between the variables shows there is no multicollinearity (high correlation of independent variables (Arayaskul, 1982)). In case of multicollinearity, the efficiency of the model will not be affected but the standard errors tend to be large as the degree of collinearity between variables increases (Gujarathi, 1978). It is clearly demonstrated in Table 9 that the multicollinearity condition does not occur in this present study due to the low standard errors and the high significance level of the estimate coefficients.

TABLE 5 Correlation coefficients between variables related to fish productivity. (N = 41)

	ELEV	VOL	MAXD	LENGTH	BREADTH	SLENGTH
AREA	0.04245	0.53860	0.37524	0.81759	0.89775	0.93423
	0.8087	0.0031	0.0314	0.0001	0.0001	0.0001
	35	28	33	35	35	33
DBASIN	0.08426	0.21797	0.47223	0.24141	0.48009	0.31501
	0.7396	0.3849	0.0478	0.3345	0.0511	0.2029
	18	18	18	18	17	18
ELEV	1.00000	0.19010	0.11500	-0.11585	-0.05486	0.14988
	0.0000	0.3233	0.5172	0.5010	0.7543	0.3975
	36	29	34	36	35	34
VOL	0.19010	1.00000	0.92176	0.55234	0.27173	0.50636
	0.3233	0.0000	0.0001	0.0019	0.1619	0.0060
	29	29	29	29	28	28
MAXD	0.11500	0.92176	1.00000	0.50778	0.17611	0.33471
	0.5172	0.0001	0.0000	0.0022	0.3269	0.0611
	34	29	34	34	33	32
LENGTH	-0.11585	0.55234	0.50778	1.00000	0.64967	0.44392
	0.5010	0.0019	0.0022	0.0000	0.0001	0.0085
	36	29	34	36	35	34
BREADTH	-0.05486	0.27173	0.17611	0.64967	1.00000	0.90112
	0.7543	0.1619	0.3269	0.0001	0.0000	0.0001
	35	28	33	35	35	33
SLENGTH	0.14988	0.50636	0.33471	0.44392	0.90112	1.00000
	0.3975	0.0060	0.0611	0.0085	0.0001	0.0000
	34	28	32	34	33	34
LONG	-0.17485	0.14393	0.10746	-0.05603	0.23979	0.21154
	0.3078	0.4564	0.5452	0.7455	0.1653	0.2297
	36	29	34	36	35	34

	ELEV	VOL	MAXD	LENGTH	BREADTH	SLENGTH
ANPREC	0.37504	-0.03759	-0.07646	-0.25996	-0.03348	0.11470
	0.0242	0.8465	0.6673	0.1257	0.8486	0.5183
	36	29	34	36	35	34
ANEVAP	0.68791	0.08486	0.00109	-0.16447	-0.03645	0.14317
	0.0001	0.6616	0.9951	0.3378	0.8353	0.4192
	36	29	34	36	35	34
SHDEV	-0.15872	-0.06656	-0.12378	0.63651	0.12951	-0.07997
	0.3699	0.7365	0.4997	0.0001	0.4725	0.6530
	34	28	32	34	33	34

Correlation coefficients between variables related to fish productivity. (N = 41)

	LATCODE	CIRCODE	LMDEPTH	FISHPROD	AREA	DBASIN
LATCODE	1.00000	0.30577	0.20951	0.72491	0.12085	-0.00031
	0.0000	0.0550	0.1945	0.0001	0.4892	0.9990
	40	40	40	40	35	18
CIRCODE	0.30577	1.00000	0.33711	0.47942	-0.39719	0.01433
	0.0550	0.0000	0.0334	0.0018	0.0181	0.9550
	40	40	40	40	35	18
LMDEPTH	0.20951	0.33711	1.00000	0.63114	-0.40261	-0.40613
	0.1945	0.0334	0.0000	0.0001	0.0165	0.0945
	40	40	40	40	35	18
AREA	0.12085	-0.39719	-0.40261	-0.13682	1.00000	0.28141
	0.4892	0.0181	0.0165	0.4332	0.0000	0.2739
	35	35	35	35	35	17
DBASIN	-0.00031	0.01433	-0.40613	-0.01954	0.28141	1.00000
	0.9990	0.9550	0.0945	0.9387	0.2739	0.0000
	18	18	18	18	17	18
ELEV	0.77010	0.42610	0.01415	0.51019	0.04245	0.08426
	0.0001	0.0096	0.9347	0.0015	0.8087	0.7396
	36	36	36	36	35	18
VOL	0.13823	-0.68802	-0.32771	-0.12439	0.53860	0.21797
	0.4745	0.0001	0.0827	0.5203	0.0031	0.3849
	29	29	29	29	28	18
MAXD	0.02556	-0.64671	-0.40719	-0.15937	0.37524	0.47223
	0.8859	0.0001	0.0168	0.3680	0.0314	0.0478
	34	34	34	34	33	18
LENGTH	-0.01792	-0.44691	-0.38475	-0.19727	0.81759	0.24141
	0.9174	0.0063	0.0205	0.2488	0.0001	0.3345
	36	36	36	36	35	18

	ELEV	VOL	MAXD	LENGTH	BREADTH	SLENGTH
BREADTH	-0.02969	-0.22059	-0.37615	-0.18137	0.89775	0.48009
	0.8656	0.2029	0.0259	0.2971	0.0001	0.0511
	35	35	35	35	35	17
SLENGTH	0.15215	-0.32727	-0.40096	-0.10653	0.93423	0.31501
	0.3903	0.0588	0.0188	0.5487	0.0001	0.2029
	34	34	34	34	33	18
LONG	-0.54971	-0.15169	-0.15111	-0.45634	0.11742	0.13397-
	0.0005	0.3772	0.3790	0.0052	0.5017	0.5961-
	36	36	36	36	35	18-

Key
Parameter Correlation Coefficient
Probability
Number (N)

Correlations Between Actual Annual Fish Production and Selective Variables

A positive correlation between latitude code and annual fish yield was found ($r = 0.76$, $p < 0.0001$) (Table 4). However, the correlation was enhanced by substituting the logarithmic value of the fish yield ($r = 0.87$, $p < 0.0001$) (Figure 9 and 21), indicating that the relationship between these two specific variables is not linear. Thus when the latitude is decreased, moving closer to equator from north or south, the expected annual fish production is increased in a non-linear manner. This increase of the lake productivity (primary and secondary) in the equatorial region is due to increased availability of solar radiation and a longer growing season. This effect will definitely influence the fish productivity at the top of the food web.

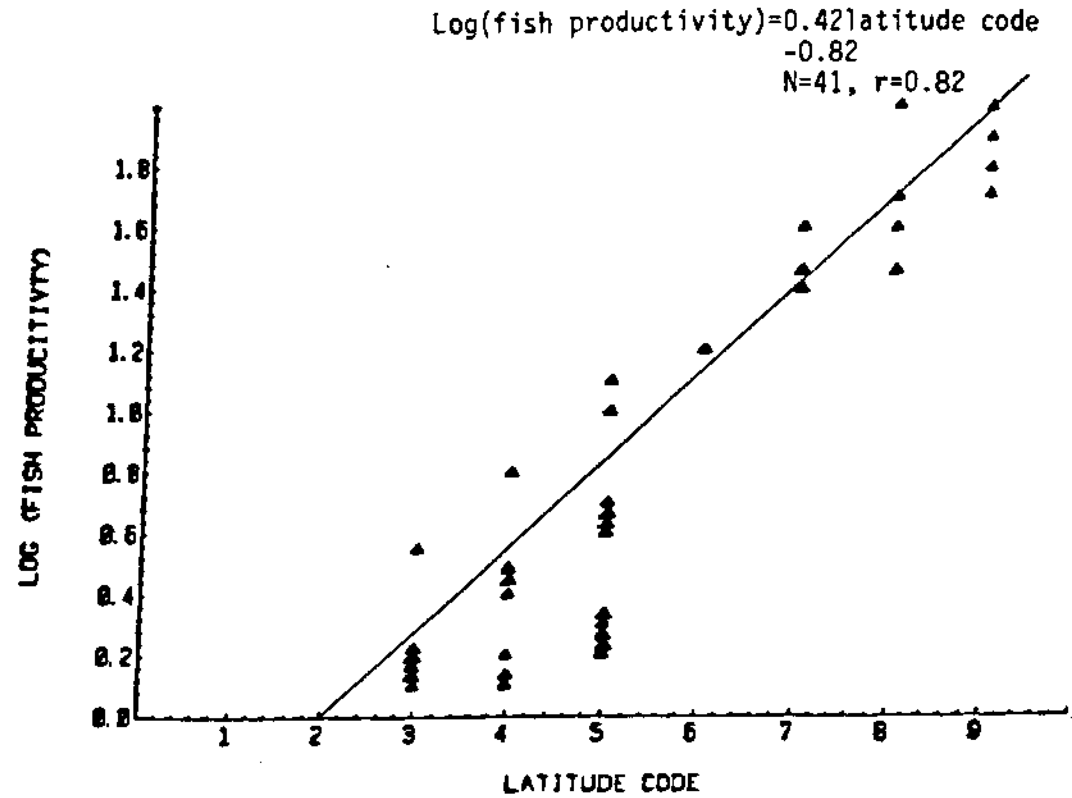

FIGURE 21 The relationship between log (fish productivity) and latitude code. (arctic zone: 1-3, temperate zone: 4-6 and equatorial zone: 7-9)

Circulation type was also non-linearly related to the fish productivity data (Figure 12). Only 30.5 percent of fish productivity can be explained by circulation type alone. However, the r^2 was improved to 67 percent when fish production was correlated with the square of circulation type ($p < 0.0001$). Clearly, more frequent lake circulation favors higher annual fish yield.

The best correlation between lake mean depth and annual fish yield was found for 1/log (mean depth + 1) ($r = 0.67$, $p < 0.0001$) (Figure 22). The strength of the correlation decreased when substituting fish productivity with the logarithmic value of the same data ($r = 0.52$, $p < 0.0001$) (Figure 23). This relationship indicates that in the deep lake, the expected fish production is declined in non-linear fashion. Rawson (1955) also obtained a non-linear relationship between the plankton standing crop and mean depth for large temperate lakes.

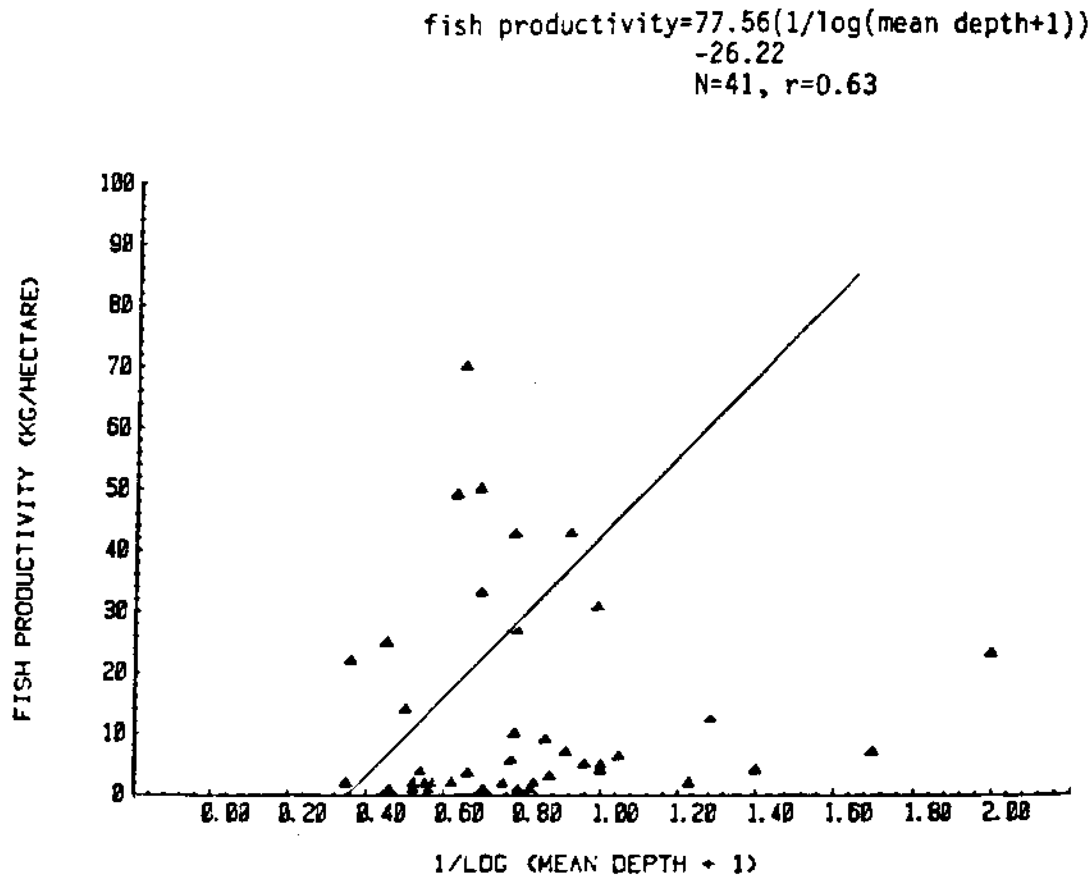

FIGURE 22 The relationship between fish productivity and 1/log (mean depth + 1).

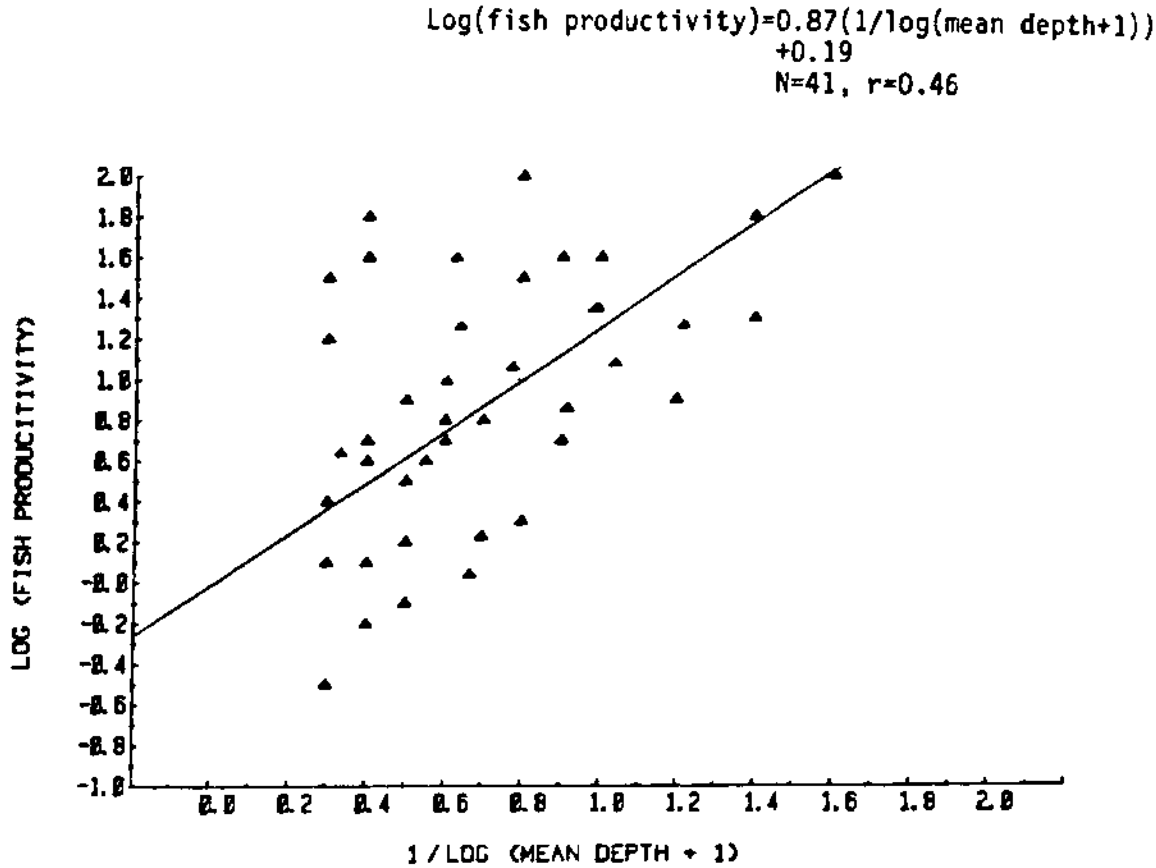

FIGURE 23 The relationship between log (fish productivity) and 1/log (mean depth + 1).

Correlations Between Fish Productivity Model and the Annual Fish Yield

The highest coefficient of determination found ($r^2 = 0.85$) was for a general linear model using log (fish productivity) and 3 variables: latitude code, circulation code and 1/log (mean depth + 1) (Table 6). In this equation, circulation code squared was utilized and resulted in the improvement of r^2.

In the next case, the productivity model will be treated as a single complex variable. This index, which the formulation showing below, yielded a different coefficient of determination from the general linear regression technique.

$$PI = \frac{(C)(L)}{\log (Z + 1)}$$

Key
C = circulation type (1-5)
L = latitude code (1-9)
PI = fish productivity index
Z = mean depth (m)

The fish productivity index showed a high correlation with the fish productivity ($r = 0.92$, $p < 0.0001$). The fish productivity index accounts for 84 percent of the variability in the annual fish production (Table 6, equation 7) (Figure 24).

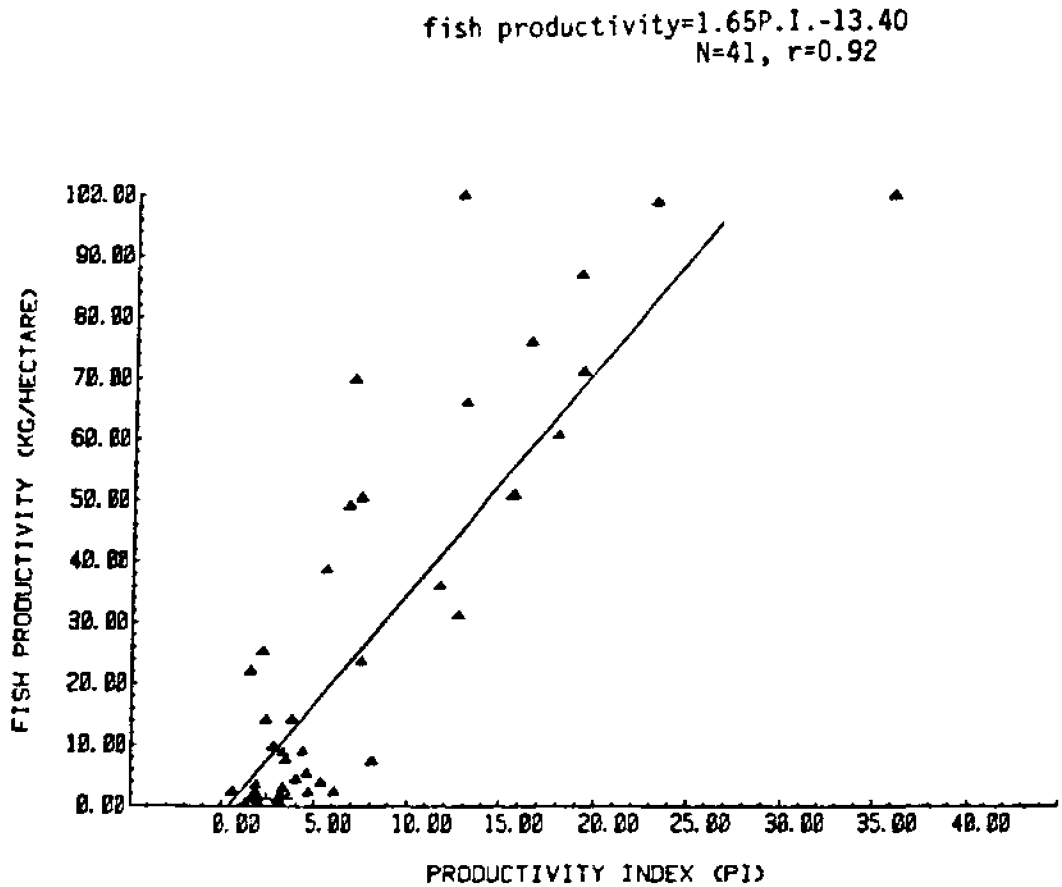

FIGURE 24 The relationship between productivity index (PI) and actual fish productivity.

TABLE 6 General linear regression equations and coefficients of determination (r^2) showing interrelationship among the weighted variables and annual fish production. ($N = 41$)

Model	coefficient of determination
1. $P = 25.54L-75.73$	0.58
2. $P = 58.49C-75.63$	0.25
3. $P = 90.77M-19.95$	0.40
4. $P = 3.36L + 2.16L^2-26.25$	0.53

Model	coefficient of determination
5. $P = -428.91C + 136.43C^2 + 325.22$	0.67
6. $P = -13.21M + 55.70M^2 + 15.58$	0.45
7. $P = 1.65P.I. - 13.41$	0.84
8. $LP = 0.38L + 0.009C^2 + 0.52M - 1.02$	0.85

Key
C = circulation type code
L = latitude code
LP = log (fish productivity)
M = 1/log (mean depth + 1)
P = fish productivity
P.I. = fish productivity index

Multiple Regression Analysis

A stepwise multiple regression analysis (Helwig et al. 1985) was performed on the morphological and physical variables to formulate another practical and predictive model, using available data from the 41 large lakes. The first model using only latitude code yielded an r^2 of 0.58 ($p < 0.0001$) (Table 7, equation 1). In an attempt to construct a more precise estimate of annual fish yield, a second model containing an additional variable, weighted log (mean depth + 1), was utilized. This model gave a coefficient of determination of 0.78 ($p < 0.0001$) (Table 7, equation 2), yielding approximately 30 percent improvement in r^2 from equation 1 to 2. A third equation was developed by the addition of a weighted circulation type code. This model showed an r^2 of 0.79 ($p < 0.0001$) which was the highest determination coefficient of all three models (Table 7, equation 3).

The next set of multiple regression analysis used the logarithmic value of annual fish production as a dependent variable instead of the regular value of annual fish production. When utilizing only the latitude code, an r^2 equaled 0.76 ($p < 0.0001$) (Table 7, equation 4). Approximately 10 percent improvement was obtained after the addition of 1/log (mean depth + 1) to the model. This latter model yielded r^2 of 0.825 ($p < 0.0001$) (Table 7, equation 5).

In order to provide a more precise estimate of the fish productivity, a model containing square of circulation type and 1/log (mean depth + 1) was utilized. As clearly demonstrated in Table 6, the addition of circulation type square to the general linear model yielded a higher correlation of determination than the first order alone ($r^2 = 0.67$ instead of 0.25). The same result was obtained from the correlation between square of 1/log (mean depth + 1) and annual fish yield ($r^2 = 0.45$ instead of 0.40). This latest model displayed a coefficient of determination $r^2 = 0.81$ ($p < 0.0001$) with the variable latitude (L) the most important (Table 7, equation 6).

TABLE 7 Multiple regression equations and coefficients of determination showing interrelationship among weighted variables and annual fish productivity. (N = 41)

Model	coefficient of determination
1. $P = 25.54L - 75.73$	0.58
2. $P = 21.41L + 65.99M - 98.72$	0.78
3. $P = 20.97L + 56.88M + 14.33C - 118.65$	0.79
4. $LP = 0.42L - 0.82$	0.76
5. $LP = 0.38L + 0.54M - 1.00$	0.82
6. $P = 18.96L + 29.30M + 6.21C^2 - 86.40$	0.81

Key
C = circulation type code
L = latitude code
LP = log (fish productivity)
M = 1/log (mean depth + 1)
P = fish productivity

CHAPTER 5

DISCUSSION

Assessment of Existing Models

In the previous section, the large lakes productivity index and models were developed. Other researchers have also attempted to construct similar productivity indicies and/or models (Ryder, 1965; Schindler, 1971; Brylinsky and Mann, 1973; and Schlesinger and Regier, 1982) (Table 8). The similarities and differences between the newly developed model and the previously constructed ones will be discussed in this following section.

After the model development study, it can be summarized that MEI is an empirically derived formula that was first described as a method to rapidly calculate potential fish yield of unexploited north temperate lakes. As previously mentioned, this index does not include any climatic differences between latitudes, therefore; application is limited to a narrow range of latitude in which climatic variability is minimal. Henderson (1973) presented a set of curvilinear demonstrations that represented the relationship between MEI and annual fish yield for various climatic zones. This graphic demonstration helps to extend the MEI application to a worldwide scale.

Brylinsky and Mann (1973) provided a large reference of relationships between both abiotic and biotic variables and lake productivity (primary and secondary productivity). In the formulation of productivity models, detailed variables, e.g. thermocline depth, epilimnion temperature and phytoplankton chlorophyll a, which are relatively more difficult to obtain than principle variables, e.g. latitude, mean depth, were included in the models. This occurrence explained the inconvenience and limitation in the application of these models compared to MEI.

TABLE 8 List of equations and variables related to productivity models.

Author	equations	variables
Ryder (1965)	$Y = 5.616X1^{0.288}\ X2^{-0.509}$	Y -fish production (pd/acre/y) X1-total dissolved solid X2-mean depth (ft)
	Y = 2 X**	X -MEI $\frac{(X1)}{X2}$
Schindler (1971) and Ryder (1974)	$MEI = TDS/Z = \frac{K\ (As + Ad)As}{V}$	MEI-morphoedaphic index TDS-total dissolved solids Z -mean depth K -dimensional correction coef As -lake surface area Ad -lake drainage basin V -lake volume

Author	equations	variables
Brylinsky and Mann (1973)	Phytoplankton prod = -468.9latitude-78.7 annual precip + 29 conductivity + 96.5 thermocline depth + 33563	
	Phytoplankton prod = 136.8 phytoplankton chlorophyll a -391 latitude-106.8 annual precipitation + 131 thermocline depth + 30389.4	
Schlesinger and Regier (1982)	Log MSY = 0.061TEMP + 0.043 Log MSY = 0.05 TEMP + 0.28 Log MEI + 0.236	MSY-fish production TEMP-mean annual air temp
Liang et.al. (1981)	Log FYn = 0.047PGv + 2.44	FYn-net annual fish yield PGv-gross photosynthetic rate of surface water (volume)

The climatic index (Schlesinger and Regier, 1982) is a very rapid and convenient method to estimate the fish productivity. Only climatic factor (annual air temperature) is taken into account for the change of annual fish yield.

All of the previously mentioned models and the models in this study have the common characters that each covered at least one out of three factors that influence lake productivity: climatic, edaphic and morphometric factors. In Ryder's index, edaphic and morphometric factors, were represented by TDS and mean depth respectively. Brylinsky and Mann (1973) presented latitude as a climatic factor, conductivity as an edaphic factor and thermocline depth as a morphometric factor. Schlesinger and Regier (1982) utilized mean air temperature as a climatic factor. In this present study, latitude, circulation type and log (mean depth + 1) were used as climatic, edaphic and morphometric factors respectively. The climatic factor included in this study will enhance the versatility of model utilization on global scale.

Assessment of Proposed Index and Model

Latitude, which showed the highest correlation with phytoplankton production (Brylinsky and Mann, 1973), is one of the variables related to solar energy input having a large influence on biological production of lake ecosystem. It was also demonstrated from this study that latitude code correlated significantly with both average air temperature and solar radiation (Figure 5 and 6). The most obvious reason for a solar radiation influence on productivity is the energy source for photosynthesis. Temperature also plays a very important role in controlling metabolism of organisms in every trophic level. In equatorial zone, the average temperature is relatively high and the seasonal fluctuations are very small resulting in an expanded growing season which in turn enhances the annual production. Coulter (1980) found that the tropical zone fishes usually mature at the earlier age and undergo more rapid succession of generations than the temperate zone fishes. Moreover, solar radiation can also have an effect on lake circulation and stratification which also influences the non-biological aspects of nutrient cycling. Therefore, yields from commercial fisheries are generally higher in tropical regions than elsewhere.

Circulation type represented an edaphic factor involving nutrient distribution of lake ecosystem. Rawson (1955) indicated that the water mass below 18 meter depth served as "nutrient sink" and removed nutrients from the trophogenic zone through settling seston and phytoplankton. For this reason, the mixing pattern will aid organisms in lake ecosystem to encounter the higher level of nutrients and dissolved oxygen which can result in the increase of lake productivity. An excellent example supporting this idea was demonstrated in Lake Victoria (Fish, 1957). During several months before circulation period, the inshore zones were stratified and several nutrients increased in the deeper water. At the same period, population of diatom, *Nitzchia acicularis*, in the shallow water decreased. After the period of circulation, a striking increase in this diatom population was found.

Mean depth was emphasized by Rawson (1955) as the most important morphometric feature because of the wide range effects on lake productivity. Mean depth always shows an inverse relationship with shoreline development (Ryder, 1982). This occurrence reflects the reduction of the lake's most productive zone with the increase in depth. The deeper lake occupies a higher proportion of tropholytic to trophogenic zones and is lower in productivity because most of the lake volume is occupied by the cool and dark hypolimnion zone. In addition, mean depth may also be related to the epilimnion depth which is characterized by uniform temperature and the most productive stratum (Hutchinson, 1975). This mixing depth is probably more useful as a biological process indicator than mean depth in lake and reservoir ecosystems because this specific depth actually represents the active layer of aquatic organisms (Jenkins, 1967).

Correlation of Selected Variables

Correlation between latitude code, circulation code and log (mean depth + 1) with fish productivity were first examined individually. Latitude code, representing climatic factors, can alone explain 58 percent of the variability in the annual fish production (Table 6). It correlated well with both average air temperature and solar energy input (Figure 5 and 6). This was supported by Brylinsky and Mann (1973) and Schlesinger and Regier (1982) in showing that productivity in the lower latitude zone is higher than in the higher latitude zone. This outcome is due mainly to the higher amount of available solar radiation and longer growing seasons in the tropical zone.

A positive correlation between fish productivity and square circulation type code was demonstrated. The r of 0.58 ($p = 0.0001$) indicates that the fish yield tends to be higher in the more frequently circulated lake. However, the relationship is non-linear. The view that annual mixing cycle acts as a nutrient distributor which in turn enhances the production was also supported by Talling (1969) and Imboden et al. (1981). Studies showing increases in the growth of producers that can result in an increase in fish production have been demonstrated by Melack (1976), Oglesby (1977) and Liang et al. (1981), A strong correlation between fish yields and phytoplankton production can also be observed.

The positive correlation between fish productivity index and the annual fish yield was also found in this study ($r = 0.92$, $p = 0.0001$). This means that 84.3 percent of the variability in the annual fish yield can be explained by the fish productivity index. Figure 25 shows the plot between observed and predicted values of fish productivity obtained from the fish productivity index. The good correlation between predicted and observed values was demonstrated by the significantly high r value from the linear equation ($r = 0.95$, $p < 0.0001$). The observed values formed a narrow interval over the predicted values demonstrating the low variability in estimation. The plot between residual values (observed values minus predicted fish productivity) and productivity index also shows a random scatter of the coordinates around the reference line (residual value = 0) (Figure 26). This random distribution of the residual values suggests a constant variable variance and lack of autocorrelation which can enhance the accuracy of the index's prediction (Ott, 1984).

The general linear model was also performed simultaneously between log fish productivity and selected variables (latitude code, square circulation code and log (mean depth + 1)) (Table 9). A high coefficient of determination ($r^2 = 0.85$) was obtained from this model. The plot between predicted fish productivity and the log of actual values clearly demonstrated the linear relationship (Figure 27) and the residual plot also showed the constant variance of the variables (Figure 28).

Multiple Regression Analysis and Evaluation

The variables selected for the fish productivity model are all positively correlated with the annual fish production (Table 3). The latitude code reflects the importance of the climatic factors, e.g. air temperature, day length and length of growing seasons, on the lake productivity. Figure 29 shows the plot of the residual against the latitude code and demonstrates the randomness of the residuals. Circulation type represents an edaphic factor as a nutrient distributor to lake ecosystem. The square of circulation type is applied in this model because of the non-linear relationship between circulation type and annual fish yield detected in the earlier correlations. The remaining variable in this model is 1/log (mean depth + 1), clearly reflecting the specific morphometric character of individual lakes. The square of 1/log (mean depth + 1) is also applied for this variable because of the non-linear relationship between mean depth and fish productivity as earlier demonstrated in figure 3. The residual plot of this variable is also shown in figure 30.

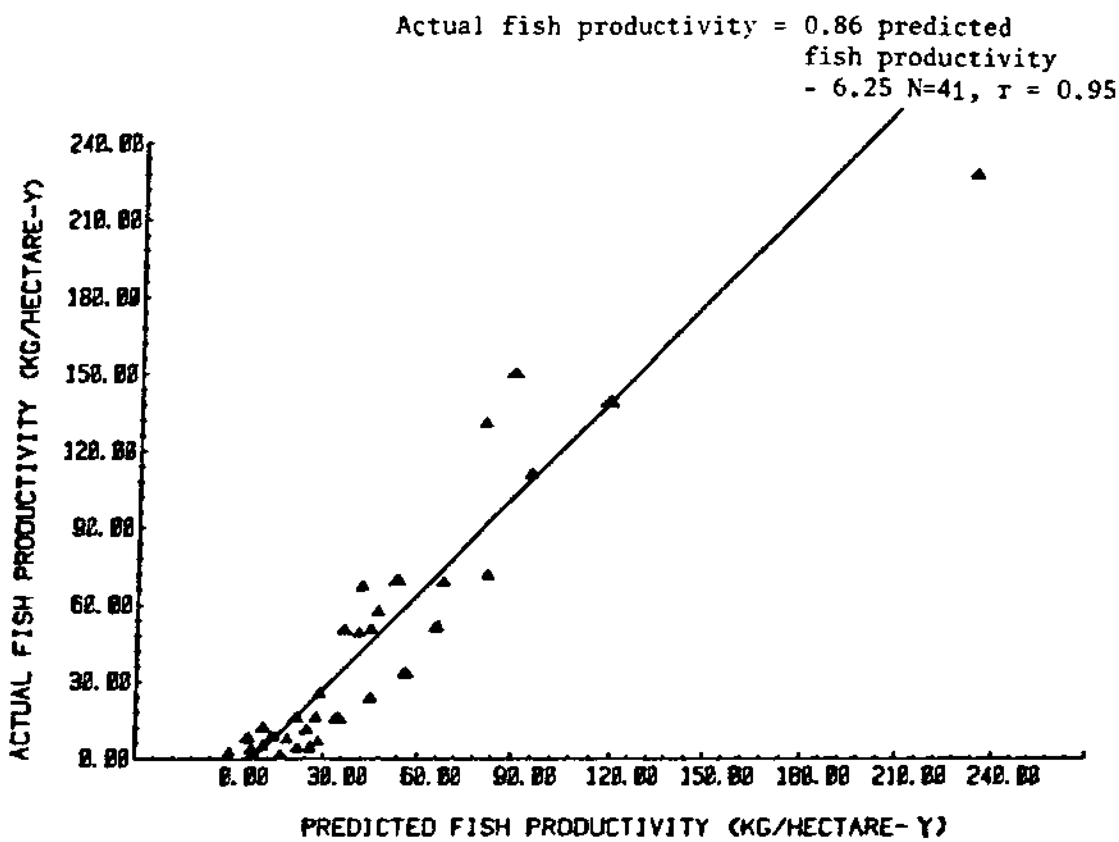

FIGURE 25 The relationship between predicted values from fish productivity index and actual fish productivity.

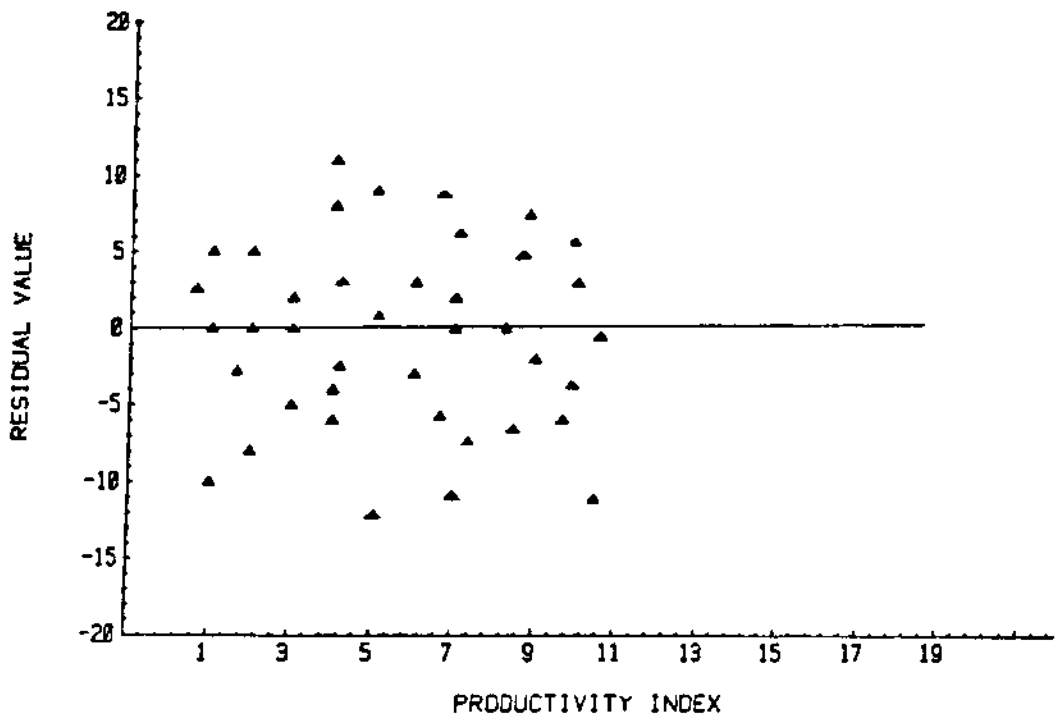

FIGURE 26 Residual values against fish productivity index.

TABLE 9 General linear model between log (fish productivity) and latitude code, square circulation code and 1/Log (Mean Depth + 1).

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: LFPROD

SOURCE	OF	SUM OF SQUARES		MEAN SQUARE
MODEL	3	27.61411496		9.20470499
ERROR	54	5.84774503		0.10829157
CORRECTED TOTAL	57	33.46185998		
MODEL F =	85.00			PR > F = 0.0001
R-SQUARE	C.V.	ROOT MSE		LFPROD MEAN
0.825241	32.5300	0.32907685		1.01161154
SOURCE	OF	TYPE I SS	F VALUE	PR > F
WLATCODE	1	25.47504427	235.24	0.0001
WCIRCODE*WCIRCODE	1	0.70734764	6.53	0.0134
WLMDEPTH	1	1.43172304	13.22	0.0006
SOURCE	OF	TYPE III	F VALUE	PR > F
WLATCODE	1	18.40419190	169.95	0.0001
WCIRCODE*WCIRCODE	1	0.00836233	0.08	0.7822
WLMDEPTH	1	1.43172304	13.22	0.0006

PARAMETER	ESTIMATE	T FOR HO: PARAMETER =)	PR > T	STD ERROR OF ESTIMATE
INTERCEPT	-1.01780421	-7.13	0.0001	0.14265947
WLATCODE	0.37973220	13.04	0.0001	0.02912838
WCIRCODE*WCIRCODE	0.00925371	0.28	0.7822	0.03330039
WLMDEPTH	0.51580987	3.64	0.0006	0.14185919

Log(Fish productivity) =0.38 Latitude Code+0.009 (Circulation type) +0.52(1/log(mean depth+1))

N= 25, r = 0.93

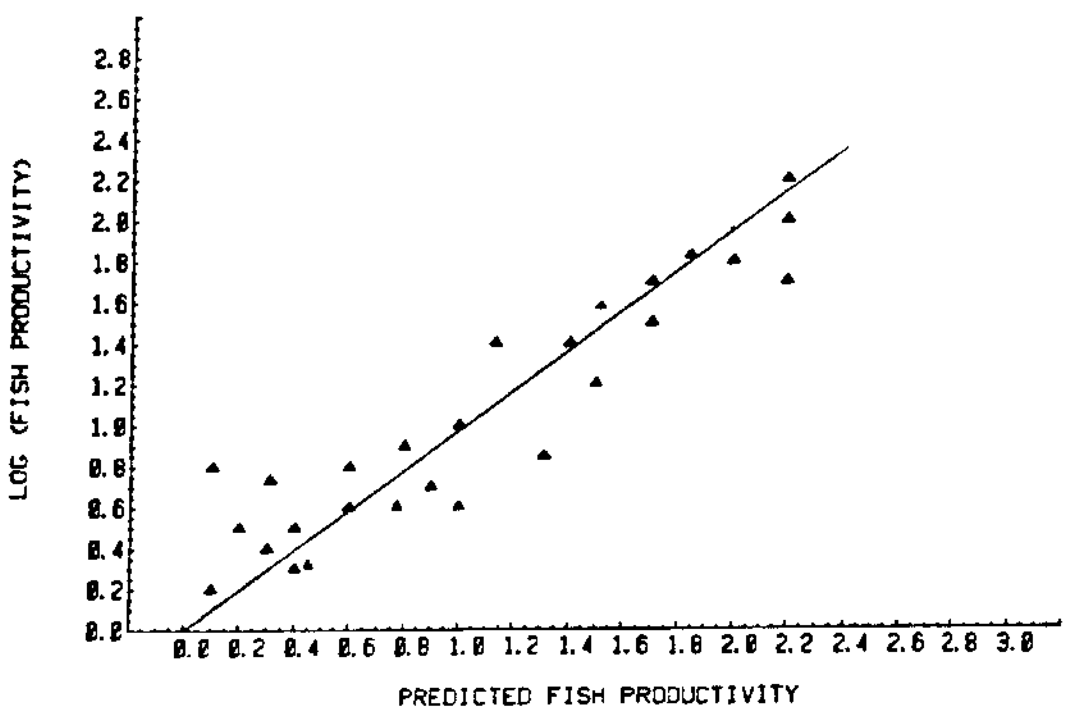

FIGURE 27 The relationship between predicted values from fish productivity model and log (fish productivity).

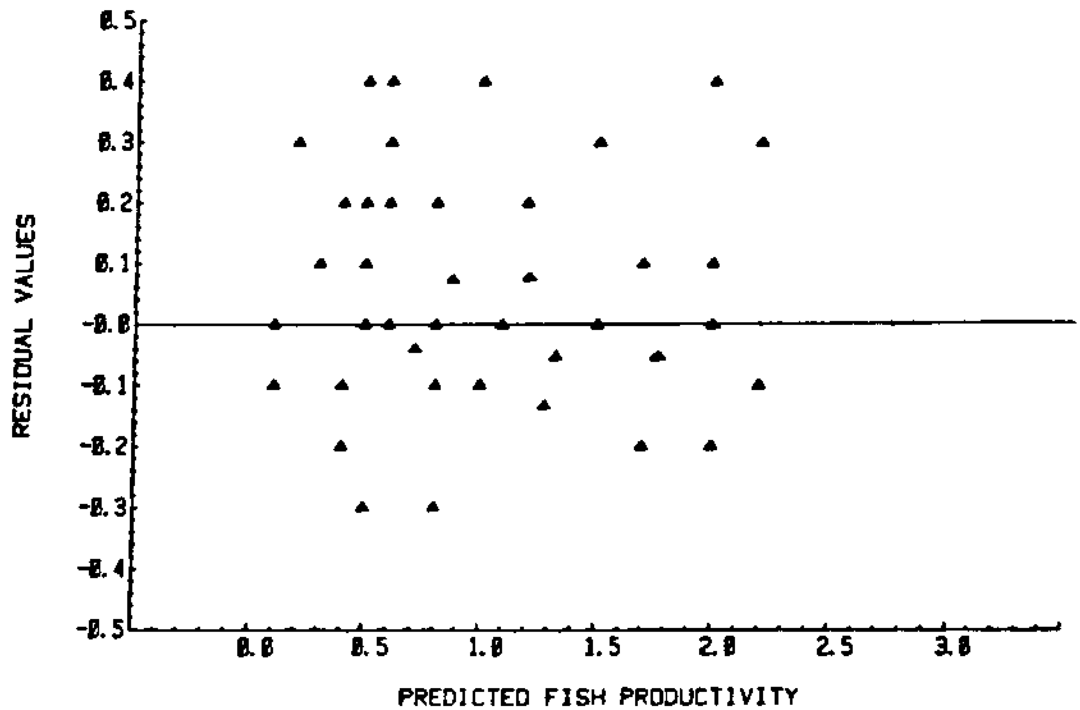

FIGURE 28 Residual values against predicted fish productivity obtained from fish productivity model.

Application and Restrictions of the Model

The fish productivity index and model are expected to be used as estimators of fish productivity in large lakes. Furthermore, they may be applicable in comparing fish productivity levels for lakes in the same latitude range. In this case, the lakes will share the same latitude code because of the close latitude range, but the circulation code and mean depth will be different from one another.

In Table 10, the predicted fish productivity values obtained from the fish productivity index were demonstrated for 41 lakes with known annual fish yield and 10 large lakes with unknown fish yield data. After comparing the actual and predicted fish productivity, these estimations suggested that the index performs better when fish productivity exceeds 10 kg/hectare-y) which explains the previously mentioned occurrence. The clump of data at the left end of the line impairs the estimation accuracy at the relatively low fish productivity level.

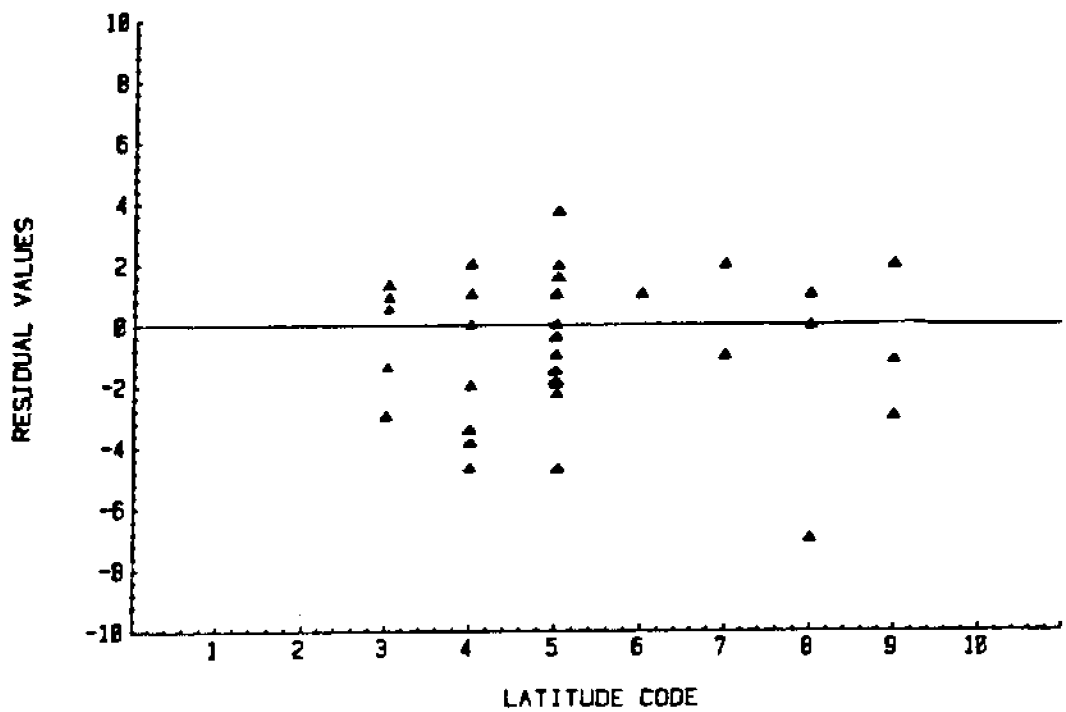

FIGURE 29 Residual plot between residual values and latitude code. (arctic zone: 1-3, temperate zone: 4-6 and equatorial zone: 7-9)

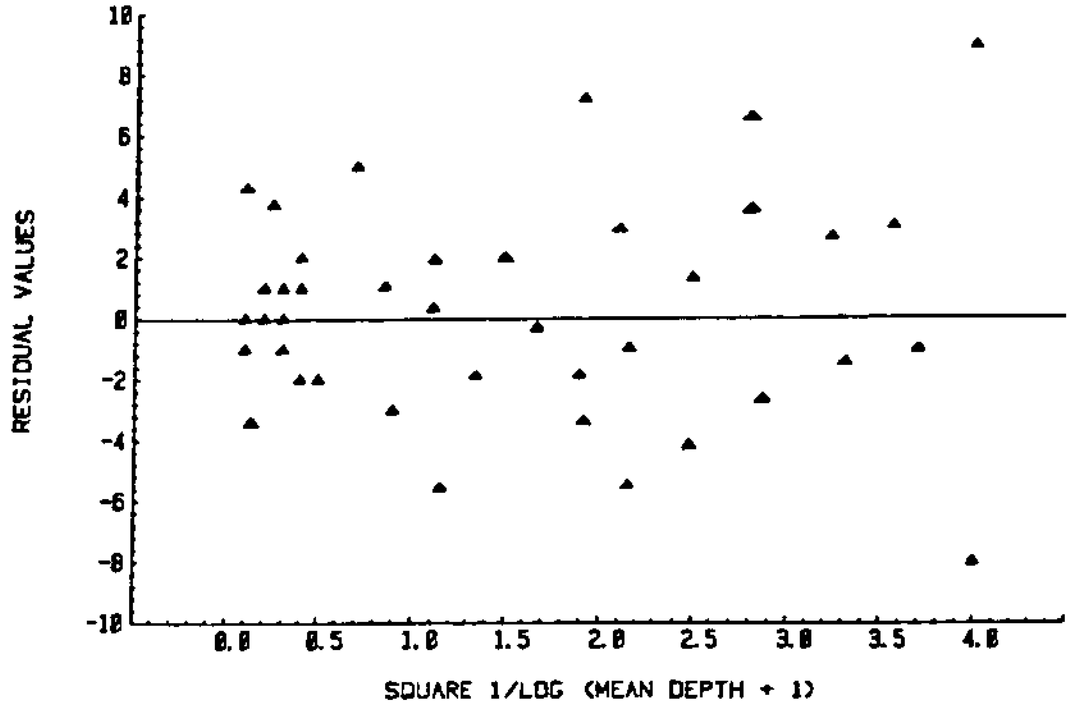

FIGURE 30 Residual plot between residual values and square 1/log (mean depth + 1).

TABLE 10 Application of productivity index in linear relationship.

lake	latitude	L	C	M	PI	predicted P	actual P
Albert	1.67 N	9	5	1.41	31.05	44.73	50.40
Athabasca	59.18 N	3	4	1.43	8.40	8.01	0.88
Baikal	54.00 N	4	2	2.83	2.80	0.48	2.30
Balaton	46.83 N	5	3	0.70	31.35	44.94	23.50
Big trout	53.77 N	4	4	1.22	13.12	15.66	0.73
Churchill	56.00 N	4	4	0.99	16.80	21.61	4.28
Constance	47.58 N	5	4	1.96	10.00	10.73	12.00
Cree	57.48 N	4	4	1.20	13.28	15.93	1.46
Edward	0.35 S	9	5	1.54	29.25	41.89	67.70
Erie	42.15 N	5	3	1.30	11.70	13.43	9.72
Geneva	46.42 N	5	4	2.22	9.00	28.67	25.20
G.bear	66.00 N	3	4	2.17	5.52	3.43	0.30
G.slave	61.78 N	3	4	1.79	6.72	5.22	1.31
Huron	45.00 N	5	3	1.82	8.25	7.30	1.55
Kyoga	1.50 N	9	5	0.85	53.10	81.29	130.00
L.slave	55.43 N	4	4	1.10	14.56	18.09	7.50

lake	latitude	L	C	M	PI	predicted P	actual P
Malaren	59.50 N	3	3	1.33	7.83	7.17	3.40
Michigan	44.00 N	5	3	1.93	7.83	7.17	2.24
Ontario	42.65 N	5	3	1.94	7.80	5.25	1.25
Peterpond	55.95 N	4	4	1.17	13.76	13.73	8.80
Ronge	55.13 N	4	4	1.11	14.08	14.67	2.71
St.Clair	42.47 N	5	4	0.71	34.00	41.46	7.21
Scutari	42.17 N	5	4	0.78	25.80	36.28	50.00
Seul	50.38 N	4	4	1.06	6.48	5.25	1.59
Shamo	5.83 N	9	5	0.72	56.78	95.70	110.00
Superior	47.55 N	5	3	2.17	6.90	3.56	1.99
Tanganyika	6.00 S	9	2	2.78	6.48	5.18	22.00
Upemba	8.60 S	9	5	0.30	149.40	236.10	226.00
Vanern	58.92 N	4	3	1.51	7.92	7.30	3.50
Vattern	58.40 N	4	4	1.62	9.92	9.18	1.57
Victoria	1.00 S	9	5	1.59	28.35	40.81	49.05
Wollaston	58.23 N	4	4	1.33	12.21	13.83	5.58
Woods	49.25 N	5	4	0.95	21.00	28.48	6.28
Abaya	06.33 N	9	5	0.90	49.98	75.01	
Beloye	60.25 N	3	1	0.85	3.53	0.25	
Caspian	42.00 N	5	2	2.26	4.41	1.67	
Flathead	47.85 N	5	3	3.07	11.09	12.41	
Issykkul	42.42 N	5	2	2.51	3.99	0.99	
Ladoga	61.00 N	3	3	1.72	5.25	3.02	
Poyang	29.00 N	7	5	0.87	40.19	59.26	
Sap	13.00 N	8	5	0.68	58.80	89.21	
Tana	12.17 N	8	5	0.95	90.72	140.59	
Titicaca	15.89 S	8	3	2.03	27.55	38.92	

Key
(P = 1.65PI -13.41) r = 0.84
P = fish productivity (kg/hectare/y)
PI = fish productivity index (L)(C)/M
C = circulation type code (1-5)
L = latitude code (1-9)
M = log (mean depth + 1)

From Table 11, the estimated fish productivity values obtained from one of the fish productivity models were shown for the same set of large lakes as in Table 10. This model displayed a curvilinear relationship with annual fish yield. The prediction results show that this model yields a better estimation at the relatively low productivity level. From Figure 31, the relationship between actual and predicted fish yield is clearly in quadratic form. The high correlation of determination obtained from quadratic equation also supports this demonstration. Because of the non-linear relationship between these two variables, the predicted fish productivity drastically increases toward the right side of the curve while the actual fish yields increase only slightly. The combination of the productivity index and model usage will compensate for the disadvantages of using the productivity index or model alone and enhance the accuracy in annual fish yield prediction over the whole range of productivity.

TABLE 11 Application of productivity model in curvilinear relationship ($0.38^{**} = 0.009Q^2 + 0.52M^{**} - 1.02$)

lake	latitude	L	C	M	predicted P	actual P
Albert	1.67 N	9	5	1.41	85.31	50.40
Athabasca	59.18 N	3	4	1.43	1.84	0.88
Baikal	54.00 N	4	2	2.83	2.71	2.30
Balaton	46.83 N	5	3	0.70	27.10	23.50
Big trout	53.77 N	4	4	1.22	4.47	0.73
Churchill	56.00 N	4	4	0.99	6.02	4.28
Constance	47.58 N	5	4	1.96	7.49	12.00
Cree	57.48 N	4	4	1.20	4.46	1.46
Edward	0.35 S	9	5	1.54	91.20	69.70
Erie	42.15 N	5	3	1.30	11.83	9.72
Geneva	46.42 N	5	4	2.22	6.56	25.20
G.bear	66.00 N	3	4	2.17	1.17	0.30
G.slave	61.78 N	3	4	1.79	1.41	1.31
Huron	45.00 N	5	3	1.82	5.12	2.90
Kyoga	1.50 N	9	5	0.85	245.47	130.00
L.slave	55.43 N	4	4	1.10	8.09	7.50
Malaren	59.50 N	3	3	1.33	1.93	3.40
Michigan	44.00 N	5	3	1.933	4.86	2.24
Ontario	42.65 N	5	3	1.94	3.89	1.25
Peter pond	55.95 N	4	4	1.17	4.68	8.80
Rounge	55.13 N	4	4	1.19	4.36	2.71
St.Clair	42.47 N	5	4	0.71	22.41	7.21
Scutari	42.17 N	5	4	0.76	34.36	50.00
Seul	50.38 N	4	4	1.06	4.89	1.59
Superior	47.55 N	5	3	2.17	3.98	1.99
Tanganyika	6.00 S	9	2	2.78	39.81	22.00
Upemba	9.60 S	8	5	0.30	235.50	226.00
Vanern	58.92 N	4	3	1.51	3.09	3.50
Vattern	58.40 N	4	3	1.62	2.88	1.57
Victoria	1.00 S	9	5	1.59	89.12	49.05
Wollaston	58.23 N	4	4	1.33	3.87	5.58
Woods	49.25 N	5	4	0.95	12.58	6.28
Abaya	6.33 N	9	5	0.90	93.32	
Beloye	60.25 N	3	1	0.85	3.63	
Caspian	42.00 N	5	2	2.26	4.07	
Flathead	47.85 N	5	3	2.07	6.89	
Issykkul	42.42 N	5	2	2.51	3.57	
Ladoga	61.00 N	3	3	1.72	2.11	
Poyang	29.00 N	7	5	0.87	60.26	
Sap	13.00 N	8	5	0.68	214.78	
Tana	12.17 N	8	5	0.95	167.53	
Titicaca	15.80 S	8	3	2.03	51.69	

Key
$\overline{P} = 10$ $r^2 = 0.8252$
P = fish productivity (kg/hectare/y)
L = latitude code (1-9)
C = circulation type code (1-5)
M = log (mean depth + 1)

FIGURE 31 The relationship between predicted values from fish productivity model and actual fish productivity.

The predictive abilities of the newly developed index and model are compared with the existing indices (MEI and Climatic Index) (Table 12). It is clearly demonstrated that PI is more powerful than the Productivity model when the annual fish is > 10 kg/hectare-y. A similar tendency can be obtained in the comparison between PI, MEI and Climatic Index, but only for the whole range of fish productivity.

In the process of index and model development, the quantification of latitude code and circulation code was applied. The arbitrary latitude classes may not be the best approach to quantified latitude, but the correlation coefficient between latitude code and fish productivity demonstrated that this idea is acceptable. The modification of both latitude and circulation type quantification may result in the improvement of index and model predictive abilities.

In order to obtain a better picture of the whole ecosystem, annual fish yield is one of the important measurements for most natural resource and wildlife studies. Different fish species occupy different trophic levels and, consequent changes in the number of fish at one trophic level usually affect species at other levels. Carlander (1955) stated that in Lake Michigan, the decrease in piscivorous lake trout corresponded with the increase in planktivorous deep water ciscoes. Consequently, overall catch remained approximately the same. This effect of the trophic level interaction on catch is the type considered in this study. Not only can this model estimate fish productivity, but with some modification, this model can possibly be utilized as the primary productivity estimator. Liang et al. (1981) and Sreenivasan (1972) presented the close relationship between primary production and annual fish yield which support the possibility of utilizing the same numerical model for estimation of both types of productivity.

TABLE 12 Comparison of predictive abilities among productivity index (PI) productivity model (PM), morphoedaphic index (MEI) and climatic index (CI).

		Proposed models		Existing models	
		(1)	(2)	(3)	(4)
	Actual fish yield	PI	PM	MEI	CI
Albert	50.40	44.73	75.19	190.00	40.23
Athabasca	0.88	0.45	1.30	1.49	0.70
Balaton	23.50	38.31	13.77	11.55	5.03
Constance	12.00	10.73	4.29	3.82	3.80
Edward	69.70	44.73	72.95	90.00	40.23
Erie	9.72	5.95	5.11	2.81	4.13
Geneva	25.20	28.67	6.56	1.03	4.69
G.Slave	1.31	2.32	1.17	1.48	0.59
Upemba	226.00	233.00	549.50	200.00	36.93
Wollaston	5.58	6.39	2.65	1.30	0.53

1) $FY = 1.65PI - 13.41$ $r^2 = 0.84$

2) $FY = 10^{0.38L + 0.009C + 0.52M - 1.02}$ $r^2 = 0.85$

3) FY = **TDS/Z (Ryder, 1965) $r^2 = 0.76$

4) $FY = 10^{0.061TEMP + 0.043}$ (Schlesinger and Regier, 1982) $r^2 = 0.74$

Key
C = circulation code (1-5)
FY = fish productivity (kg/hectare-y)
L = latitude code (1-9)
M = log (mean depth + 1)
PI = productivity index (LC/M)
r = correlation coefficient
TDS = total dissolved solids
TEMP = air temperature
Z = mean depth

In Appendix C, the calculated productivity index is available for 121 large lakes from the total of 253. The missing values of PI are mostly due to the non-availability mean depth data. In the presence of mean depth, the estimation of annual fish yield can be conveniently calculated by either the productivity index or the model. This estimation will be very helpful in a remote, large lake study which has no prior fish productivity data reference. Most of these large lakes serve as an important food source for local communities. The availability of fish productivity data can enhance the progress in developing suitable sites for management programs which will be highly beneficial for both commercial and recreational utilization.

Although this model seems to be very versatile, the specific criteria for the model and index usage that still must be followed in order to obtain the accurate fish productivity estimation are.

1) The lake must be at least 500 km^2 in surface area. This size limitation will exclude the small lakes and farm ponds in order to minimize the influence of the littoral zone. As previously mentioned, the small lake occupies a more extensive littoral zone which is the zone of high productivity. On the other hand, a large lake is usually greater in depth than the smaller one and this huge volume of water acts as nutrient sink which results in lower lake productivity.

2) The lake must not be subjected to unusual environmental conditions, e.g. extensive pollution or extreme turbidity, otherwise the deviation of fish productivity will be drastically high which can affect the accuracy of the model.

CONCLUSIONS

1. Fish productivity is affected by 3 principal factors--climatic, edaphic and morphometric factors.

2. In this study, latitude code, circulation type and mean depth were selected to represent climatic, edaphic and morphometric factors respectively in the index and model development.

3. From the variables included in this study, latitude code demonstrated the highest correlation with fish productivity ($r = 0.76$, $p < 0.0001$, $N = 41$).

4. Mean depth can be estimated in the presence of maximum depth by utilizing this equation:

$$\text{Mean depth} = 0.39 \text{ Maximum Depth} - 4.98 \quad r = 0.901 \quad N = 25$$

5. Productivity Index (PI) was formulated as: $PI = LC/M$

Key
C = circulation code
L = latitude code
M = log (mean depth + 1)
PI = productivity index

6. Given the PI for a large lake, fish productivity (FY) can be obtained by using this equation:

$$FY = 1.65PI - 13.41 \quad r^2 = 0.84, \; p < 0.0001, \; N = 41$$

7. Another approach to obtain fish productivity (FY) is by using the equation generated from general linear regression as shown below:

$$FY = 10^{0.38L + 0.009C + 0.52M - 1.02^{**}} \quad r^2 = 0.85, \; p < 0.0001, \; N = 41$$

8. The equation from No. 6 demonstrates a linear relationship for fish productivity. This index is therefore suitable for large lakes with FY > 10 kg/hectare-year.

9. The equation from No. 7 demonstrates a curvilinear relationship for fish productivity. This model is more suitable for large lakes with FY < ** kg/hectare-year.

10. The predictive ability of the productivity index and model can be enhanced as more and more reliable fish productivity data for large lakes become available.

APPLICATIONS AND RECOMMENDATIONS

The fish productivity index and model developed in this study will provide an approximation of the average annual fish yield for large lakes by acquiring easily gathered data. Furthermore, this index is applicable on the worldwide basis without any modifications with the only restrictions being:

1) lake surface area must exceed 500 km^2 and

2) lake must not be subject to extreme environmental conditions, e.g. pollution or turbidity.

Estimation of fish productivity is necessary for lake development and management. Given this information, management programs can be effectively achieved and can lead to the maximum sustainable yield for both commercial and recreational utilizations.

The proposed index and model may have applications for other aspects of limnological predictions. Possible areas for future consideration include:

1) application of the proposed index may have utility for other biological variables, e.g. phytoplankton and zooplankton productivity.

2) Application of the proposed index and model may be useful with smaller lakes and reservoirs.

Better predictive capability of both index and model should be obtained as a result of variable quantification adjustments.

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APPENDIX A

Large Lakes Data Base
Lake Surface Area, Drainage Basin, Elevation, Mean Depth, Maximum Depth and Volume

	NAME	AREA KM**2 LAKE BASIN MIN	AREA KM**2 LAKE BASIN MAX	AREA KM**2 DRAINAGE BASIN	ELEVATION M.	DEPTH M. MEAN MIN	DEPTH M. MEAN MAX	DEPTH M. MAXIMUM MIN	DEPTH M. MAXIMUM MAX	VOLUM KM**3
1	ABAYA	1160.00	1160.00	17300.00	1268.00	7.00	7.00	13.00	13.00	8
2	ABE	280.00	780.00	N 0.00	310.00	N 0.00	N 0.00	N 0.00	0.00	N 0
3	ABERDEEN	1100.00	1100.00	N 0.00	80.00	N 0.00	N 0.00	N 0.00	I 0.00	N 0
4	ABITIBI	931.00	931.00	N 0.00	265.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
5	ABY	780.00	780.00	N 0.00	1.00	N 0.00	N 0.00	N 0.00	N 0.00	N [illegible]
6	ALAKOL	2650.00	2650.00	N 0.00	347.00	N 0.00	N 0.00	54.00	54.00	[illegible]
7	ALBERT	5590.00	5590.00	N 0.00	617.00	25.00	25.00	58.00	58.00	64
8	ALEXANDRINA	570.00	570.00	N 0.00	1.00	N 0.00	N 0.00	5.00	5.00	N 0
9	AMADEUS	0.00	880.00	N 0.00	460.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
10	AMADJUAK	3115.00	3115.00	N 0.00	113.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
11	ANGIKUNI	510.00	510.00	N 0.00	257.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
12	ARAL	64500.00	64500.00	625000.00	53.00	16.00	16.00	67.00	67.00	1451
13	ARGENTINO	1410.00	1410.00	N 0.00	200.00	N 0.00	N 0.00	300.00	300.00	N 0
14	ARTILLERY	551.00	551.00	25900.00	364.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
15	ASHUANIPI	597.00	597.00	N 0.00	529.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
16	ATHABASCA	7935.00	7935.00	158000.00	213.00	26.00	26.00	124.00	124.00	110
17	ATLIN	775.00	775.00	6530.00	668.00	85.70	86.00	283.00	283.00	50
18	AUSTIN	0.00	829.00	N 0.00	460.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
19	AYLMER	847.00	847.00	N 0.00	375.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
20	BAGHRASH	1390.00	1380.00	N 0.00	1038.00	N 0.00	N 0.00	N 0.00	N 0.00	N [illegible]
21	BAIKAL	31500.00	31500.00	N 0.00	456.00	680.00	680.00	1741.00	1741.00	22995
22	BALCE	1887.00	1887.00	N 0.00	2.00	N 0.00	N 0.00	230.00	230.00	N 0
23	BALATON	590.00	590.00	N 0.00	104.00	4.00	4.00	11.00	11.00	1
24	BALKHASH	17000.00	22000.00	N 0.00	343.00	7.00	7.00	26.00	26.00	112
25	BANGWEULU	4000.00	15100.00	100800.00	1140.00	4.00	4.00	10.00	10.00	[illegible]
26	BAY	890.00	890.00	2750.00	2.00	3.00	3.00	6.00	6.00	2
27	BECHAROF	1190.00	1190.00	N 0.00	4.00	N 0.00	N 0.00	92.00	92.00	N 0
28	BELOYE	1120.00	1120.00	N 0.00	113.00	N 0.00	N 0.00	20.00	20.00	5
29	BEYSEHIR	650.00	650.00	N 0.00	1116.00	N 0.00	N 0.00	9.00	9.00	N 0
30	BIENVILLE	1249.00	1249.00	17600.00	426.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
31	BIG-TROUT	661.00	661.00	N 0.00	213.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
32	BINA	688.00	688.00	N 0.00	87.00	N 0.00	N 0.00	103.00	103.00	20
33	BRAS-D'OR	1099.00	1099.00	N 0.00	1.00	N 0.00	N 0.00	70.00	70.00	N 0
34	BUENOS-AIRES	2240.00	2240.00	N 0.00	217.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
35	BUFFALO	612.00	612.00	N 0.00	265.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
36	BUYR	610.00	610.00	N 0.00	583.00	N 0.00	N 0.00	11.00	11.00	N 0
37	CARATASCA	1110.00	1110.00	N 0.00	1.00	N 0.00	N 0.00	5.00	5.00	N 0
38	CASPIAN	374000.00	374000.00	1400000.00	-28.00	182.00	182.00	1025.00	1025.00	78200
39	CEDAR	1353.00	1353.00	339000.00	253.00	2.00	2.00	N 0.00	N 0.00	N 0
40	CHAD	10360.00	25200.00	2500000.00	240.00	N 0.00	N 0.00	4.00	11.00	24
41	CHAMPLAIN	1100.00	1100.00	N 0.00	30.00	N 0.00	N 0.00	122.00	122.00	N 0
42	CHANY	2500.00	5000.00	N 0.00	105.00	N 0.00	N 0.00	7.00	12.00	4
43	CHAO	900.00	900.00	N 0.00	15.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
44	CHAPALA	1140.00	1140.00	N 0.00	1525.00	N 0.00	N 0.00	13.00	13.00	10
45	CHILKA	910.00	1170.00	N 0.00	1.00	N 0.00	N 0.00	3.00	3.00	4
46	CHILWA	1040.00	1040.00	N 0.00	550.00	2.00	2.00	5.00	5.00	N 0
47	CHIQUITA	1850.00	1850.00	N 0.00	70.00	N 0.00	N 0.00	3.00	4.00	N 0
48	CHIEFDUIT	900.00	900.00	N 0.00	1.00	N 0.00	N 0.00	N 0.00	N 0.00	N 0
49	CHURCHILL	559.00	559.00	5960.00	421.00	8.96	8.96	210.00	210.00	4
50	CLAIRE	1436.00	1436.00	19200.00	213.00	1.20	1.00	2.00	2.00	1

	NAME	AREA KM**2 LAKE-BASIN MIN	AREA KM**2 LAKE-BASIN MAX	AREA KM**2 DRAINAGE BASIN	ELEVATION M.	DEPTH M. MEAN MIN	DEPTH M. MEAN MAX	DEPTH M. MAXIMUM MIN	DEPTH M. MAXIMUM MAX	VOLUM KM***
51	CLINTON-COLDEN	737.00	737.00 N	0.00	375.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
52	COLHUE-HUAPI	800.00	800.00 N	0.00	265.00 N	0.00 N	0.00	4.00	4.00 N	0
53	CONSTANCE	540.00	540.00 N	0.00	396.00	90.00	90.00	252.00	252.00	48
54	CONTWOYTO	978.00	978.00 N	0.00	564.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
55	CREE	1434.00	1434.00	6320.00	487.00	14.90	14.90	45.00	45.00	18
56	CROSS	755.00	755.00 N	0.00	207.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
57	DAUPHIN	519.00	519.00 N	0.00	260.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
58	DEAD	1070.00	1020.00	12000.00	-393.00	149.00	149.00	433.00	433.00	198
59	DESCHAMBAULT	542.00	542.00	7360.00	324.00	6.19	6.19	22.40	22.40	3
60	DORE	640.00	640.00	2430.00	459.00	10.90	10.90	20.00	20.00	6
61	DUBAWNT	3833.00	3833.00 N	0.00	236.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
62	EAU-CLAIRE	1383.00	1383.00 N	0.00	241.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
63	EBI	1070.00	1070.00 N	0.00	213.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
64	EDWARD	2150.00	2150.00 N	0.00	912.00	34.00	34.00	117.00	117.00	78
65	EGRIDIR	520.00	520.00 N	0.00	924.00 N	0.00 N	0.00	13.00	13.00 N	0
66	ENNADAI	681.00	681.00 N	0.00	311.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
67	ENRIQUILLO	500.00	500.00 N	0.00	-44.00 N	0.00 N	0.00	2.00	2.00 N	0
68	ERIE	25657.00	25657.00	58800.00	174.00	19.00	19.00	64.00	64.00	483
69	ESKIMO-NORTH	838.00	838.00 N	0.00	1.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
70	ESKIMO-SOUTHERN	628.00	628.00 N	0.00	1.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
71	EVANS	547.00	547.00	15800.00	232.00 N	0.00 N	0.00	13.00	13.00 N	0
72	EVORON	590.00	590.00 N	0.00	100.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
73	EYRE	0.00	7690.00	550000.00	-12.00	0.00	3.00	0.00	4.00 N	0
74	FAGNANO	590.00	590.00 N	0.00	140.00 N	0.00 N	0.00	442.00	442.00 N	0
75	FAGUIBINE	590.00	590.00 N	0.00	280.00 N	0.00 N	0.00	10.00	10.00	4
76	FERGUSON	588.00	588.00 N	0.00	11.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
77	FLATHEAD	510.00	510.00 N	0.00	881.00 N	0.00 N	0.00	67.00	67.00 N	0
78	FROBISHER	516.00	516.00	7180.00	421.00	5.49	5.49	19.30	19.30	2
79	FROME	0.00	2410.00 N	0.00	49.00 N	0.00 N	0.00	0.00	1.00 N	0
80	GAIRDNER	0.00	4770.00 N	0.00	34.00 N	0.00 N	0.00	0.00	1.00 N	0
81	GARRY	976.00	967.00 N	0.00	148.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
82	GENEVA	580.00	580.00 N	0.00	372.00 N	0.00 N	0.00	310.00	310.00	90
83	GODS	1151.00	1151.00	25900.00	178.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
84	GOOSE	160.00	503.00 N	0.00	1437.00 N	0.00 N	0.00	7.00	7.00 N	0
85	GRAND	537.00	537.00	5020.00	85.00 N	0.00 N	0.00	110.00	110.00 N	0
86	GRAS	633.00	633.00 N	0.00	396.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
87	GREAT-BEAR	31326.00	31326.00	146000.00	156.00 N	0.00 N	0.00	413.00	413.00	2292
88	GREAT-SALT	4360.00	4360.00	21000.00	1280.00	4.00	4.00	15.00	15.00	17
89	GREAT-SLAVE	28568.00	28568.00	971000.00	156.00 N	0.00 N	0.00	614.00	614.00	2088
90	GUILLAUME-DELISLE	700.00	700.00 N	0.00	1.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
91	HAMMER	1940.00	1940.00 N	0.00	10.00 N	0.00 N	0.00	2.00	2.00 N	0
92	HAR	530.00	530.00 N	0.00	1104.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
93	HAR-US	1760.00	1760.00 N	0.00	1153.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
94	HAZEN	542.00	542.00 N	0.00	158.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
95	HELMAND	1165.00	3000.00	350000.00	488.00 N	0.00 N	0.00	11.00	11.00	510
96	HOTTAH	918.00	918.00 N	0.00	180.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
97	HOVSGOL	2620.00	2620.00 N	0.00	1624.00 N	0.00 N	0.00	246.00	246.00	480
98	HULUN	1590.00	1590.00 N	0.00	1275.00 N	0.00 N	0.00	2.00	2.00 N	0
99	HUNGTZE	2700.00	2700.00 N	0.00	15.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0
00	HURON	59500.00	59500.00	133900.00	177.00	59.00	59.00	229.00	229.00	3537

NO.	NAME	AREA KM**2 LAKE-BASIN MIN	AREA KM**2 LAKE-BASIN MAX		AREA KM**2 DRAINAGE BASIN		ELEVATION M.		DEPTH M. MEAN MIN		DEPTH M. MEAN MAX		DEPTH M. MAXIMUM MIN		DEPTH M. MAXIMUM MAX		VOL[illegible] KM**
101	HYARGAS	1360.00	1360.00	N	0.00		1028.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
102	ILIAMNA	2590.00	2590.00	N	0.00		15.00	N	0.00	N	0.00		229.00		229.00		
103	ILMEN	600.00	2100.00	N	0.00		18.00	N	0.00	N	0.00		3.00		11.00		
104	IMANDRA	810.00	810.00	N	0.00		127.00	N	0.00	N	0.00		67.00		67.00		1
105	INARI	1000.00	1000.00	N	0.00		114.00	N	0.00	N	0.00		80.00		80.00		
106	ISLAND	1223.00	1223.00	N	0.00		227.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
107	ISSYKKUL	6240.00	6240.00	N	0.00		1608.00		320.00		320.00		702.00		702.00		17
108	ISTADA	520.00	520.00	N	0.00		2135.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
109	IZABAL	590.00	590.00	N	0.00		8.00	N	0.00	N	0.00		18.00		18.00	N	
110	KAMILUKUAK	638.00	638.00	N	0.00		266.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
111	KAMINAK	600.00	600.00	N	0.00		53.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
112	KAMINURIAK	550.00	550.00	N	0.00		92.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
113	KAOYU	700.00	700.00	N	0.00		15.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
114	KASBA	1341.00	1341.00	N	0.00		336.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
115	KHANKA	4000.00	4400.00	N	0.00		69.00	N	0.00	N	0.00		10.00		10.00		1
116	KIVU	2220.00	2270.00	N	0.00		1460.00		240.00		240.00		480.00		480.00		3
117	KOKO	4460.00	4460.00	N	0.00		3197.00	N	0.00	N	0.00		38.00		38.00		
118	KULUNDINSKOE	728.00	728.00	N	0.00		95.00	N	0.00	N	0.00		5.00		5.00	N	
119	KURISHES	1620.00	1620.00	N	0.00	<	1.00	N	0.00	N	0.00		10.00		10.00	N	
120	KYARING	670.00	670.00	N	0.00		4708.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
121	KYOGA	4430.00	4430.00	N	0.00		1036.00		6.00		6.00		8.00		8.00	N	
122	LADOGA	18130.00	18130.00	N	0.00		4.00		52.00		52.00		230.00		230.00		9
123	LESSER-SLAVE	1169.00	1169.00		13900.00		577.00		11.70		11.70		21.00		21.00		1
124	LLANQUIHUE	800.00	800.00	N	0.00		52.00	N	0.00	N	0.00		350.00		350.00	N	
125	LOBSTICK	511.00	511.00		5440.00		457.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
126	LOP	3010.00	3010.00	N	0.00		768.00	N	0.00	N	0.00		2.00		2.00		
127	LOWER-SEAL	576.00	576.00	N	0.00		290.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
128	LUANG	1290.00	1290.00	N	0.00	<	1.00	N	0.00	N	0.00		1.00		1.00	N	
129	MACKAY	1061.00	1061.00	N	0.00		431.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
130	MAI-NDOMBE	2070.00	8210.00	N	0.00		340.00		5.00		5.00		10.00		12.00		
131	MALAREN	1140.00	1140.00	N	0.00	<	1.00	N	0.00	N	0.00		64.00		64.00		
132	MANAGUA	1040.00	1040.00	N	0.00		37.00	N	0.00	N	0.00		80.00		80.00	N	
133	MANITOBA	4625.00	4625.00	N	0.00		248.00	N	0.00	N	0.00		28.00		28.00		1
134	MANOUANE	584.00	584.00		5000.00		500.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
135	MANZALA	1360.00	1360.00	N	0.00	<	1.00	N	0.00	N	0.00		1.00		1.00	N	
136	MARACAIBO	13010.00	13010.00	N	0.00	<	1.00	N	0.00	N	0.00		60.00		60.00		2
137	MARTRE	1776.00	1776.00	N	0.00		265.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
138	MELVILLE	3069.00	3069.00	N	0.00	<	1.00	N	0.00	N	0.00		256.00		256.00		3
139	MICHIGAN	57750.00	57750.00		118100.00		177.00		85.00		85.00		282.00		282.00		49
140	MICHIKAMAU	2030.00	2030.00	N	0.00		460.00	N	0.00	N	0.00		80.00		80.00		
141	MILLE-LACS	540.00	540.00	N	0.00		381.00	N	0.00	N	0.00		11.00		11.00	N	
142	MINTO	761.00	761.00		5540.00		190.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
143	MIRIM	2970.00	2970.00	N	0.00	<	1.00	N	0.00	N	0.00		10.00		10.00	N	
144	MISTASSINI	2335.00	2335.00		18100.00		372.00	N	0.00	N	0.00		183.00		183.00		1
145	MOOSE	1367.00	1367.00	N	0.00		255.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
146	MWERU	4350.00	4350.00	N	0.00		922.00		7.00		7.00		17.00		17.00		
147	NAHUEL-HUAPI	550.00	550.00	N	0.00		767.00	N	0.00	N	0.00		438.00		438.00	N	
148	NAKNEK	630.00	630.00	N	0.00		10.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
149	NAM	2500.00	2500.00	N	0.00		4627.00	N	0.00	N	0.00	N	0.00	N	0.00	N	
150	NAMAK	750.00	750.00	N	0.00		790.00	N	0.00	N	0.00		1.00		1.00	N	

NO.	NAME	AREA KM**2 LAKE-BASIN MIN	AREA KM**2 LAKE-BASIN MAX	AREA KM**2 DRAINAGE BASIN	ELEVATION M.	DEPTH M. MEAN MIN	DEPTH M. MEAN MAX	DEPTH M. MAXIMUM MIN	DEPTH M. MAXIMUM MAX	VOLU KM**3
151	NETILLING	5542.00	5542.00 N	0.00	30.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
152	NGOSING	650.00	650.00 N	0.00	4270.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
153	NICARAGUA	8150.00	8150.00 N	0.00	32.00 N	0.00 N	0.00	70.00	70.00	10
154	NIPIGON	4848.00	4848.00 N	0.00	320.00 N	0.00 N	0.00	165.00	165.00	[illegible]
155	NIPISSING	833.00	833.00 N	0.00	196.00 N	0.00 N	0.00	[illegible]	[illegible] N	
156	NONACHO	784.00	784.00 N	0.00	354.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
157	NUELTIN	2279.00	2279.00 N	0.00	278.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
158	NYASA	22490.00	22490.00	65000.00	475.00	273.00	273.00	706.00	706.00	614
159	OHIS	700.00	700.00 N	0.00	1.00 N	0.00 N	0.00	9.00	9.00 N	
160	OKEECHOBEE	1810.00	1810.00 N	0.00	6.00 N	0.00 N	0.00	6.00	6.00 N	
161	OLING	570.00	570.00 N	0.00	4270.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
162	ONEGA	9700.00	9700.00 N	0.00	33.00 N	0.00 N	0.00	120.00	120.00	29
163	ONTARIO	19000.00	19000.00	70700.00	75.00	86.00	86.00	245.00	245.00	[illegible]
164	OULU	900.00	900.00 N	0.00	122.00 N	0.00 N	0.00	38.00	38.00 N	
165	PAIJANNE	1090.00	1090.00 N	0.00	78.00 N	0.00 N	0.00	93.00	93.00 N	
166	PANGONG	600.00	600.00 N	0.00	4248.00 N	0.00 N	0.00	43.00	43.00 N	
167	PATOS	10140.00	10140.00 N	0.00	1.00 N	0.00 N	0.00	5.00	5.00 N	
168	PAYNE	533.00	533.00	8260.00	130.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
169	PEIPUS	4300.00	4300.00 N	0.00	30.00 N	0.00 N	0.00	15.00	15.00	2
170	PETER-POND	778.00	778.00	13600.00	421.00	13.70	13.70	24.00	24.00	1
171	PIELINEN	850.00	850.00 N	0.00	94.00 N	0.00 N	0.00	45.00	42.00 N	
172	PLAYGREEN	657.00	657.00 N	0.00	217.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
173	POINT	701.00	701.00	20300.00	375.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
174	POMO	880.00	980.00 N	0.00	4936.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
175	PONTCHARTRAIN	1620.00	1620.00 N	0.00	1.00 N	0.00 N	0.00	5.00	5.00 N	
176	POOPO	1340.00	1340.00 N	0.00	3686.00 N	0.00 N	0.00	3.00	3.00	
177	POYANG	3350.00	3350.00 N	0.00	10.00 N	0.00 N	0.00	20.00	20.00 N	
178	PRINCESS-MARY	524.00	524.00 N	0.00	116.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
179	PYA	660.00	660.00 N	0.00	101.00 N	0.00 N	0.00	49.00	49.00 N	
180	PYRAMID	450.00	570.00	2650.00	1159.00	54.00	54.00	101.00	101.00 N	
181	RAINY	940.00	940.00 N	0.00	338.00 N	0.00 N	0.00	34.00	34.00 N	
182	RED	1170.00	1170.00 N	0.00	358.00 N	0.00 N	0.00	9.00	9.00 N	
183	REINDEER	6650.00	6650.00	64800.00	337.00	17.00	17.00	219.00	219.00	59
184	RONGE	1413.00	1413.00 N	0.00	364.00	14.60	14.60	41.00	41.00	1
185	RUDOLF	6400.00	6400.00 N	0.00	427.00 N	0.00 N	0.00	73.00	73.00	18
186	RUKWA	250.00	3000.00 N	0.00	793.00 N	0.00 N	0.00	1.00	1.00 N	
187	SAIMAA	1760.00	1760.00 N	0.00	76.00 N	0.00 N	0.00	82.00	82.00	3
188	SAINT-CLAIR	1113.00	1113.00	17900.00	175.00	4.11	4.11	6.00	6.00	
189	SAINT-JEAN	1003.00	1003.00	73000.00	98.00 N	0.00 N	0.00	62.00	62.00 N	
190	SAKAMI	592.00	592.00	9890.00	195.00 N	0.00 N	0.00	110.00	110.00 N	
191	SALTON	950.00	950.00 N	0.00	-70.00 N	0.00 N	0.00	15.00	15.00 N	
192	SAN-MARTIN	1010.00	1010.00 N	0.00	200.00 N	0.00 N	0.00	170.00	170.00 N	
193	SANDY	527.00	527.00 N	0.00	276.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
194	SAP	2700.00	30000.00 N	0.00	5.00 N	0.00 N	0.00	12.00	12.00	4
195	SASYKKOL	740.00	740.00 N	0.00	350.00 N	0.00 N	0.00	5.00	5.00 N	
196	SCUTARI	340.00	600.00	5490.00	5.00	5.00	5.00	60.00	60.00	
197	SEG	910.00	910.00 N	0.00	114.00 N	0.00 N	0.00	97.00	97.00 N	
198	SELAWIK	1400.00	1400.00 N	0.00	1.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
199	SELETITENIZ	780.00	780.00 N	0.00	64.00 N	0.00 N	0.00	3.00	3.00	
200	SELWYN	717.00	717.00 N	0.00	398.00 N	0.00 N	0.00 N	0.00 N	0.00 N	

ID.	NAME	AREA KM**2 LAKE-BASIN MIN	AREA KM**2 LAKE-BASIN MAX	AREA KM**2 DRAINAGE BASIN	ELEVATION M.	DEPTH M. MEAN MIN	DEPTH M. MEAN MAX	DEPTH M. MAXIMUM MIN	DEPTH M. MAXIMUM MAX	VOL KM**
201	SEUL	1658.00	1658.00	N 0.00	357.00	N 0.00	N 0.00	34.00	34.00	N
202	SEVAN	1360.00	1360.00	N 0.00	1900.00	N 0.00	N 0.00	95.00	95.00	
203	SHAMO	550.00	550.00	N 0.00	1235.00	N 0.00	N 0.00	13.00	13.00	N
204	SIMCOE	744.00	744.00	N 0.00	219.00	N 0.00	N 0.00	41.00	41.00	N
205	SNOWBIRD	505.00	505.00	N 0.00	359.00	N 0.00	N 0.00	N 0.00	N 0.00	N
206	SOUTHERN-INDIAN	2247.00	2247.00	N 0.00	254.00	N 0.00	N 0.00	18.00	18.00	N
207	SOUTH-HENIK	513.00	513.00	N 0.00	184.00	N 0.00	N 0.00	N 0.00	N 0.00	N
208	SUPERIOR	82100.00	82100.00	127700.00	183.00	149.00	149.00	407.00	407.00	122
209	TAHOE	500.00	500.00	N 0.00	1899.00	249.00	249.00	501.00	501.00	1
210	TAI	2210.00	2210.00	N 0.00	3.00	N 0.00	N 0.00	5.00	5.00	N
211	TAKIYUAK	1080.00	1080.00	N 0.00	381.00	N 0.00	N 0.00	N 0.00	N 0.00	N
212	TANA	3600.00	3600.00	N 0.00	1840.00	8.00	8.00	14.00	14.00	
213	TANGANYIKA	32000.00	32000.00	263000.00	774.00	572.00	572.00	1471.00	1471.00	178
214	TANGRA	1400.00	1400.00	N 0.00	4724.00	N 0.00	N 0.00	N 0.00	N 0.00	N
215	TATHLINA	573.00	573.00	N 0.00	280.00	N 0.00	N 0.00	N 0.00	N 0.00	N
216	TAUPO	610.00	610.00	N 0.00	357.00	N 0.00	N 0.00	152.00	152.00	N
217	TAYMYR	4000.00	5000.00	N 0.00	3.00	N 0.00	N 0.00	26.00	26.00	1
218	TEBESJUAK	575.00	575.00	N 0.00	146.00	N 0.00	N 0.00	N 0.00	N 0.00	N
219	TENGIZ	1590.00	1590.00	N 0.00	304.00	N 0.00	N 0.00	8.00	8.00	N
220	TELINAN	810.00	810.00	N 0.00	4684.00	N 0.00	N 0.00	N 0.00	N 0.00	N
221	TERMINOS	1550.00	1550.00	N 0.00	1.00	N 0.00	N 0.00	1.00	1.00	N
222	TESHEKPUK	820.00	820.00	N 0.00	2.00	N 0.00	N 0.00	N 0.00	N 0.00	N
223	TITICACA	8030.00	8030.00	N 0.00	3809.00	N 0.00	N 0.00	304.00	304.00	9.
224	TOBA	1150.00	1150.00	N 0.00	906.00	N 0.00	N 0.00	529.00	529.00	N
225	TOE	990.00	990.00	N 0.00	109.00	N 0.00	N 0.00	56.00	56.00	N
226	TORRENS	0.00	5780.00	N 0.00	30.00	N 0.00	N 0.00	0.00	1.00	N
227	TROUT	504.00	504.00	N 0.00	503.00	N 0.00	N 0.00	N 0.00	N 0.00	N
228	TULEMALU	668.00	668.00	N 0.00	279.00	N 0.00	N 0.00	N 0.00	N 0.00	N
229	TUMBA	500.00	500.00	N 0.00	340.00	N 0.00	N 0.00	5.00	5.00	N
230	TUNGTING	3100.00	12000.00	N 0.00	11.00	N 0.00	N 0.00	10.00	10.00	
231	TUZ	1640.00	1640.00	4400.00	925.00	1.00	1.00	1.00	1.00	N
232	UBINSKOE	559.00	559.00	N 0.00	120.00	N 0.00	N 0.00	N 0.00	N 0.00	N
233	ULUNGUR	830.00	830.00	N 0.00	468.00	N 0.00	N 0.00	N 0.00	N 0.00	N
234	UPEMBA	530.00	530.00	N 0.00	580.00	1.00	1.00	4.00	4.00	
235	URMIA	3880.00	5960.00	20000.00	1275.00	5.00	5.00	16.00	16.00	
236	UVS	3350.00	3350.00	N 0.00	759.00	N 0.00	N 0.00	1.00	1.00	N
237	VAN	3740.00	3740.00	6000.00	1646.00	57.00	57.00	145.00	145.00	2
238	VANERN	5580.00	5580.00	N 0.00	44.00	N 0.00	N 0.00	98.00	98.00	1
239	VATTERN	1910.00	1910.00	N 0.00	88.00	N 0.00	N 0.00	128.00	128.00	
240	VICTORIA	62940.00	62940.00	263000.00	1134.00	40.00	40.00	85.00	85.00	25
241	VIEDMA	1090.00	1090.00	N 0.00	250.00	N 0.00	N 0.00	N 0.00	N 0.00	N
242	VYG	1250.00	1250.00	N 0.00	89.00	N 0.00	N 0.00	24.00	24.00	
243	WEISHAN	1000.00	1000.00	N 0.00	15.00	N 0.00	N 0.00	N 0.00	N 0.00	N
244	WHOLDAIA	678.00	678.00	N 0.00	364.00	N 0.00	N 0.00	N 0.00	N 0.00	N
245	WINNEBAGO	560.00	560.00	N 0.00	228.00	N 0.00	N 0.00	7.00	7.00	
246	WINNIPEG	24387.00	24387.00	N 0.00	217.00	13.00	13.00	28.00	28.00	3
247	WINNEPEGOSIS	5375.00	5375.00	N 0.00	254.00	N 0.00	N 0.00	12.00	12.00	
248	WOLLASTON	2681.00	2681.00	23300.00	398.00	17.40	17.40	71.00	71.00	
249	WOODS	4350.00	4350.00	N 0.00	323.00	N 0.00	N 0.00	21.00	21.00	N
250	YAMDROK	800.00	800.00	N 0.00	4374.00	N 0.00	N 0.00	N 0.00	N 0.00	N

N.	NAME	AREA KM**2 LAKE-BASIN MIN	AREA KM**2 LAKE-BASIN MAX	AREA KM**2 DRAINAGE BASIN	ELEVATION M.	DEPTH M. MEAN MIN	DEPTH M. MEAN MAX	DEPTH M. MAXIMUM MIN	DEPTH M. MAXIMUM MAX	VOLU KM**
251	YATHKYED	1449.00	1449.00 N	0.00	140.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
252	ZAYSAN	1800.00	1800.00 N	0.00	386.00 N	0.00 N	0.00	10.00	10.00	5.
253	ZILING	1860.00	1860.00 N	0.00	4495.00 N	0.00 N	0.00	8.00	8.00 N	
254		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
255		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
256		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
257		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
258		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
259		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
260		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
261		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
262		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
263		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
264		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
265		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
266		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
267		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
268		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
269		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
270		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
271		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
272		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
273		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
274		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
275		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
276		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
277		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
278		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
279		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
280		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
281		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
282		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
283		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
284		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
285		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
286		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
287		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
288		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
289		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
290		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
291		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
292		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
293		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
294		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
295		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
296		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
297		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
298		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
299		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	
300		0.00	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	0.00 N	

APPENDIX B

Large Lakes Data Base
Lake Length, Water Quality, Orientation, Latitude and Longitude

	NAME	VOLUME KM**3	LENGTH KM.	BREADTH KM.	SHORELINE LENGTH KM.	WATER QUALITY (F=FRESH) (S=SALT)	ORIENTATION DEGREES.	LATITUDE DEGREES.	LATITUDE HEMISPHERE	LONGITUDE DEGREES.
1	ABAYA	8.00	72.00	23.00	225.00	F	N 0.00	6.33	N	37.92
2	ABE	N 0.00	24.00	24.00	94.00	S	N 0.00	11.17	N	41.75
3	ABERDEEN	N 0.00	90.00	26.00	368.00	F	97.00	64.53	N	89.90
4	ABITIBI	N 0.00	70.00	27.00	364.00	F	110.00	48.75	N	79.79
5	ABY	N 0.00	51.00	19.00	236.00	S	N 0.00	5.25	N	3.23
6	ALAKOL	57.00	92.00	49.00	322.00	S	N 0.00	46.17	N	81.83
7	ALBERT	64.00	161.00	40.00	486.00	F	N 0.00	1.67	N	31.00
8	ALEXANDRINA	N 0.00	37.00	21.00	249.00	F	N 0.00	35.43	S	139.17
9	AMADEUS	N 0.00	122.00	19.00	523.00	S	N 0.00	24.50	S	131.47
10	AMADJUAK	N 0.00	115.00	45.00	688.00	F	148.00	64.90	N	71.23
11	ANGIKUNI	N 0.00	41.00	27.00	274.00	F	68.00	62.27	N	99.97
12	ARAL	1451.00	430.00	280.00	2300.00	S/F	N 0.00	45.00	N	60.00
13	ARGENTINO	N 0.00	105.00	28.00	643.00	F	N 0.00	50.22	S	72.42
14	ARTILLERY	N 0.00	80.00	15.00	234.00	F	36.00	63.17	N	107.82
15	ASHUANIPI	N 0.00	70.00	30.00	399.00	F	164.00	52.65	N	66.13
16	ATHABASCA	110.00	284.00	58.00	897.00	F	81.00	59.18	N	109.37
17	ATLIN	50.50	103.00	23.00	306.00	F	179.00	59.45	N	133.82
18	AUSTIN	N 0.00	69.00	10.00	258.00	S	N 0.00	27.75	S	117.50
19	AYLMER	N 0.00	61.00	41.00	528.00	F	16.00	64.13	N	108.50
20	BAGHRASH	N 0.00	82.00	38.00	201.00	S	N 0.00	42.00	N	87.00
21	BAIKAL	22995.00	635.00	78.00	2200.00	F	N 0.00	54.00	N	109.00
22	BAKER	N 0.00	105.00	31.00	339.00	F	111.00	64.15	N	95.27
23	BALATON	1.90	77.00	13.00	197.00	F	N 0.00	46.83	N	17.75
24	BALKHASH	112.00	600.00	88.00	2384.00	S/F	N 0.00	46.00	N	74.00
25	BANGWEULU	5.00	97.00	40.00	490.00	F	N 0.00	11.08	S	29.75
26	BAY	2.50	18.00	40.00	192.00	S	N 0.00	14.38	N	121.25
27	BECHAROF	N 0.00	64.00	19.00	227.00	F	N 0.00	57.93	N	156.38
28	BELOYE	5.20	43.00	32.00	131.00	F	N 0.00	60.25	N	37.67
29	BEYSEHIR	N 0.00	45.00	24.00	245.00	F	N 0.00	37.67	N	31.50
30	BIENVILLE	N 0.00	88.00	15.00	446.00	F	77.00	55.08	N	72.83
31	BIG-TROUT	N 0.00	57.00	23.00	236.00	F	94.00	53.77	N	90.00
32	BIWA	28.00	64.00	19.00	201.00	F	N 0.00	35.25	N	136.08
33	BRAS-D'OR	N 0.00	91.00	30.00	597.00	S	46.00	45.92	N	60.78
34	BUENOS-AIRES	N 0.00	129.00	21.00	262.00	F	N 0.00	46.50	S	72.00
35	BUFFALO	N 0.00	51.00	22.00	166.00	F	69.00	60.23	N	115.43
36	BUYR	N 0.00	40.00	10.00	98.00	F	N 0.00	47.80	N	117.70
37	CARATASCA	N 0.00	56.00	13.00	332.00	S	N 0.00	15.38	N	83.92
38	CASPIAN	78200.00	1207.00	483.00	6000.00	S	N 0.00	42.00	N	50.00
39	CEDAR	N 0.00	63.00	51.00	438.00	F	132.00	53.30	N	100.07
40	CHAD	24.00	274.00	144.00	1000.00	F	N 0.00	13.33	N	14.00
41	CHAMPLAIN	N 0.00	172.00	23.00	464.00	F	N 0.00	44.58	N	73.33
42	CHANY	4.30	105.00	56.00	723.00	S	N 0.00	54.83	N	77.50
43	CHAO	N 0.00	51.00	29.00	143.00	F	N 0.00	31.52	N	117.55
44	CHAPALA	10.00	77.00	16.00	208.00	F	N 0.00	20.25	N	103.00
45	CHILKA	45.00	64.00	16.00	244.00	S	N 0.00	19.75	N	85.75
46	CHILWA	N 0.00	48.00	26.00	196.00	S	N 0.00	15.20	S	35.83
47	CHIQUITA	N 0.00	71.00	24.00	255.00	S	N 0.00	30.70	S	62.60
48	CHIRIQUI	N 0.00	51.00	21.00	191.00	S	N 0.00	9.08	N	82.08
49	CHURCHILL	4.88	45.00	21.00	176.00	F	170.00	56.00	N	108.32
50	CLAIRE	1.70	64.00	46.00	448.00	F	172.00	58.58	N	112.93

NO.	NAME	VOLUME KM**3	LENGTH KM.	BREADTH KM.	SHORELINE LENGTH KM.	WATER QUALITY (F=FRESH) (S=SALT)	ORIEN-TATION DEGREES.	LATITUDE DEGREES.	LATITUDE HEMISPHERE	LONGITUDE DEGREES.
51	CLINTON-COLDEN	N 0.00	47.00	30.00	409.00	F	163.00	63.97	N	107.42
52	COLHUE-HAUPI	N 0.00	76.00	24.00	203.00	F	N 0.00	45.50	S	68.00
53	CONSTANCE	48.00	69.00	13.00	234.00	F	N 0.00	47.58	N	9.42
54	CONTWOYTO	N 0.00	110.00	24.00	553.00	F	136.00	65.60	N	110.42
55	CREE	18.30	81.00	56.00	476.00	F	55.00	57.48	N	106.55
56	CROSS	N 0.00	103.00	16.00	491.00	F	65.00	54.72	N	97.57
57	DAUPHIN	N 0.00	43.00	19.00	111.00	F	154.00	51.25	N	99.77
58	DEAD	188.00	79.00	16.00	212.00	S	N 0.00	31.50	N	35.50
59	DESCHAMBAULT	3.29	57.00	27.00	346.00	F	20.00	54.77	N	103.47
60	DORE	6.88	38.00	30.00	167.00	F	93.00	54.77	N	107.30
61	DUBAWNT	N 0.00	111.00	72.00	760.00	F	10.00	63.12	N	101.40
62	EAU-CLAIRE	N 0.00	68.00	32.00	411.00	F	132.00	56.15	N	74.40
63	EBI	N 0.00	64.00	24.00	153.00	S	N 0.00	44.92	N	82.92
64	EDWARD	78.00	80.00	48.00	N 0.00	F	N 0.00	0.35	S	29.58
65	EGRIDIR	N 0.00	35.00	16.00	134.00	F	N 0.00	38.03	N	30.88
66	ENNADAI	N 0.00	78.00	23.00	452.00	F	31.00	60.95	N	101.30
67	ENRIQUILLO	N 0.00	48.00	10.00	76.00	S	N 0.00	18.45	N	71.65
68	ERIE	483.00	338.00	92.00	1377.00	F	72.00	42.15	N	81.15
69	ESKIMO-NORTH	N 0.00	69.00	24.00	382.00	F	35.00	69.38	N	131.90
70	ESKIMO-SOUTHERN	N 0.00	46.00	29.00	346.00	F	80.00	68.88	N	133.00
71	EVANS	N 0.00	54.00	15.00	285.00	F	46.00	50.88	N	76.93
72	EVORON	N 0.00	26.00	22.00	65.00	F	N 0.00	51.47	N	136.50
73	EYRE	N 0.00	209.00	64.00	1382.00	S	N 0.00	28.50	S	137.33
74	FAGNANO	N 0.00	97.00	8.00	221.00	F	N 0.00	54.63	S	68.00
75	FAGUIBINE	4.00	72.00	12.00	165.00	F	N 0.00	16.75	N	3.90
76	FERGUSON	N 0.00	76.00	13.00	27.00	F	78.00	67.42	N	105.25
77	FLATHEAD	N 0.00	48.00	24.00	166.00	F	N 0.00	47.85	N	114.12
78	FROBISHER	2.19	49.00	26.00	377.00	F	145.00	56.32	N	108.25
79	FROME	N 0.00	6.00	3.00	263.00	S	N 0.00	30.33	S	139.80
80	GAIRDNER	N 0.00	141.00	48.00	550.00	S	N 0.00	31.58	S	136.00
81	GARRY	N 0.00	83.00	36.00	514.00	F	79.00	65.90	N	100.13
82	GENEVA	90.00	72.00	13.00	166.00	F	N 0.00	46.42	N	6.50
83	GODS	N 0.00	89.00	31.00	397.00	F	60.00	54.68	N	94.22
84	GOOSE	N 0.00	45.00	14.00	101.00	S	N 0.00	41.92	N	120.42
85	GRAND	N 0.00	90.00	11.00	220.00	F	56.00	48.97	N	57.57
86	GRAS	N 0.00	56.00	27.00	441.00	F	96.00	64.50	N	110.52
87	GREAT-BEAR	2292.00	336.00	177.00	2295.00	F	93.00	66.00	N	120.93
88	GREAT-SALT	19.00	171.00	80.00	N 0.00	S	N 0.00	41.17	N	112.50
89	GREAT-SLAVE	2088.00	456.00	225.00	2087.00	F	61.00	61.78	N	117.72
90	GUILLAUME-DELISLE	N 0.00	31.00	29.00	N 0.00	S	N 0.00	56.25	N	76.33
91	HAMMER	N 0.00	113.00	24.00	417.00	F	N 0.00	30.83	N	47.17
92	HAR	N 0.00	29.00	24.00	157.00	F	N 0.00	48.10	N	93.20
93	HAR-US	N 0.00	80.00	26.00	265.00	F	N 0.00	48.00	N	92.17
94	HAZEN	N 0.00	74.00	19.00	175.00	F	65.00	81.78	N	71.15
95	HELMAND	519.00	165.00	100.00	467.00	F	25.00	31.00	N	61.17
96	HOTTAH	N 0.00	63.00	25.00	379.00	F	147.00	65.07	N	118.48
97	HOVSGOL	480.00	130.00	40.00	382.00	F	N 0.00	51.00	N	100.50
98	HULUN	N 0.00	56.00	16.00	180.00	F	N 0.00	49.00	N	117.45
99	HUNGIZE	N 0.00	105.00	48.00	347.00	F	N 0.00	33.30	N	118.68
100	HURON	3537.00	331.00	294.00	3120.00	F	110.00	45.00	N	82.25

NO.	NAME	VOLUME KM***3	LENGTH KM.	BREADTH KM.	SHORELINE LENGTH KM.	WATER QUALITY (F=FRESH) (S=SALT)	ORIEN-TATION DEGREES.	LATITUDE DEGREES.	LATITUDE HEMISPHERE	LONGITUDE DEGREES.
101	HYARGAS	N 0.00	84.00	32.00	307.00	S	N 0.00	49.20	N	93.40
102	ILIAMNA	N 0.00	121.00	40.00	401.00	F	N 0.00	59.50	N	155.00
103	ILMEN	12.00	42.00	34.00	279.00	F	N 0.00	58.28	N	31.37
104	IMANDRA	11.00	80.00	24.00	362.00	F	N 0.00	67.50	N	33.00
105	INARI	28.00	80.00	40.00	794.00	F	N 0.00	69.00	N	28.00
106	ISLAND	N 0.00	97.00	38.00	728.00	F	106.00	53.82	N	94.50
107	ISSYK-KUL	1738.00	169.00	56.00	760.00	S/F	N 0.00	42.42	N	77.25
108	ISTADA	N 0.00	72.00	11.00	57.00	S	N 0.00	32.53	N	67.95
109	IZABAL	N 0.00	49.00	24.00	138.00	F	N 0.00	15.50	N	89.17
110	KAMILUKUAK	N 0.00	43.00	32.00	222.00	F	143.00	62.33	N	101.60
111	KAMINAK	N 0.00	60.00	22.00	495.00	F	19.00	62.18	N	95.09
112	KAMINURIAK	N 0.00	90.00	23.00	456.00	F	14.00	62.98	N	95.68
113	KAOYU	N 0.00	40.00	24.00	365.00	F	N 0.00	32.83	N	119.25
114	KASBA	N 0.00	80.00	38.00	344.00	F	145.00	60.30	N	102.18
115	KHANKA	18.50	97.00	64.00	352.00	F	N 0.00	45.00	N	132.40
116	KIVU	333.00	97.00	48.00	N 0.00	F	N 0.00	2.00	S	29.17
117	KOKO	62.00	105.00	64.00	346.00	S	N 0.00	37.00	N	100.11
118	KULUNDINSKOE	N 0.00	38.00	29.00	171.00	S	N 0.00	53.00	N	79.60
119	KURISCHES	N 0.00	90.00	45.00	N 0.00	S	N 0.00	55.00	N	21.00
120	KYARING	N 0.00	64.00	16.00	153.00	F	N 0.00	31.17	N	88.25
121	KYOGA	N 0.00	90.00	25.00	1830.00	F	N 0.00	1.50	N	33.00
122	LADOGA	908.00	209.00	129.00	930.00	F	N 0.00	61.00	N	31.50
123	LESSER-SLAVE	13.60	97.00	19.00	264.00	F	104.00	55.43	N	115.40
124	LLANQUIHUE	N 0.00	35.00	40.00	164.00	F	N 0.00	41.11	S	72.80
125	LOBSTICK	N 0.00	45.00	20.00	246.00	F	131.00	54.03	N	64.98
126	LOP	5.00	97.00	40.00	N 0.00	S	N 0.00	40.50	N	90.50
127	LOWER-SEAL	N 0.00	71.00	16.00	639.00	F	71.00	56.52	N	73.70
128	LUANG	N 0.00	80.00	24.00	302.00	S	N 0.00	7.50	N	100.25
129	MACKAY	N 0.00	119.00	24.00	592.00	F	62.00	63.97	N	111.07
130	MAI-NDOMBE	41.00	145.00	40.00	N 0.00	F	N 0.00	2.00	S	18.33
131	MALAREN	10.00	113.00	40.00	N 0.00	F	N 0.00	59.50	N	17.20
132	MANAGUA	N 0.00	61.00	26.00	207.00	F	N 0.00	12.35	N	86.25
133	MANITOBA	17.00	198.00	48.00	810.00	F	152.00	50.97	N	98.57
134	MANOUANE	N 0.00	54.00	28.00	297.00	F	161.00	50.72	N	70.77
135	MANZALA	N 0.00	56.00	23.00	375.00	S	N 0.00	31.25	N	32.00
136	MARACAIBO	280.00	224.00	121.00	592.00	S	N 0.00	9.67	N	71.50
137	MARTRE	N 0.00	76.00	35.00	352.00	F	108.00	63.32	N	117.95
138	MELVILLE	313.00	193.00	36.00	528.00	S	61.00	53.75	N	59.43
139	MICHIGAN	4920.00	494.00	190.00	2670.00	F	N 0.00	44.00	N	87.00
140	MICHIKAMAU	45.00	102.00	48.00	629.00	F	115.00	54.12	N	64.10
141	MILLE-LACS	N 0.00	29.00	23.00	99.00	F	N 0.00	46.23	N	93.65
142	MINTO	N 0.00	98.00	24.00	343.00	F	58.00	57.27	N	74.85
143	MIRIM	N 0.00	177.00	40.00	523.00	S	N 0.00	32.75	S	52.83
144	MISTASSINI	170.00	158.00	26.00	770.00	F	39.00	50.93	N	73.57
145	MOOSE	N 0.00	60.00	48.00	573.00	F	175.00	53.97	N	100.17
146	MWERU	32.00	113.00	48.00	340.00	F	N 0.00	9.00	S	28.75
147	NAHUEL-HUAPI	N 0.00	72.00	8.00	359.00	F	N 0.00	40.97	S	71.50
148	NAKNEK	N 0.00	64.00	13.00	163.00	F	N 0.00	58.43	N	155.87
149	NAM	N 0.00	80.00	56.00	288.00	S	N 0.00	30.75	N	90.50
150	NAMAK	N 0.00	64.00	50.00	193.00	S	N 0.00	34.50	N	51.93

NO.	NAME	VOLUME KM**3	LENGTH KM.	BREADTH KM.	SHORELINE LENGTH KM.	WATER QUALITY (F=FRESH) (S=SALT)	ORIENTATION DEGREES.	LATITUDE DEGREES.	LATITUDE HEMISPHERE	LONGITUDE DEGREES.
151	NETTILLING	N 0.00	123.00	105.00	1004.00	F	8.00	66.50	N	70.50
152	NGORING	N 0.00	41.00	33.00	149.00	F	N 0.00	34.92	N	98.00
153	NICARAGUA	108.00	161.00	72.00	785.00	F	N 0.00	11.50	N	85.50
154	NIPIGON	320.00	105.00	80.00	720.00	F	167.00	49.83	N	88.52
155	NIPISSING	N 0.00	71.00	56.00	245.00	F	91.00	46.27	N	79.77
156	NONACHO	N 0.00	97.00	27.00	716.00	F	18.00	61.78	N	109.42
157	NUELTIN	N 0.00	143.00	44.00	430.00	F	13.00	60.20	N	99.58
158	NYASA	6140.00	579.00	80.00	1500.00	F	N 0.00	12.00	S	34.50
159	ODER	N 0.00	24.00	48.00	425.00	S	N 0.00	53.77	N	14.23
160	OKEECHOBEE	N 0.00	56.00	48.00	263.00	F	N 0.00	26.95	N	80.82
161	OLING	N 0.00	41.00	25.00	118.00	F	N 0.00	34.87	N	97.50
162	ONEGA	292.00	245.00	90.00	1139.00	F	N 0.00	61.50	N	35.75
163	ONTARIO	1637.00	311.00	85.00	1168.00	F	68.00	43.67	N	77.78
164	OULU	N 0.00	64.00	29.00	272.00	F	N 0.00	64.33	N	27.25
165	PAIJANNE	N 0.00	137.00	32.00	N 0.00	F	N 0.00	61.58	N	25.50
166	PANGONG	N 0.00	209.00	16.00	161.00	S/F	N 0.00	33.75	N	79.72
167	PATOS	N 0.00	260.00	60.00	959.00	S/F	N 0.00	31.10	S	51.25
168	PAYNE	N 0.00	84.00	16.00	408.00	F	107.00	59.43	N	74.15
169	PEIPUS	25.00	77.00	48.00	N 0.00	F	N 0.00	57.32	N	27.87
170	PETER-POND	10.60	62.00	23.00	180.00	F	138.00	55.95	N	108.83
171	PIELINEN	N 0.00	100.00	29.00	N 0.00	F	N 0.00	63.25	N	29.67
172	PLAYGREEN	N 0.00	79.00	19.00	317.00	F	173.00	54.05	N	98.07
173	POINT	N 0.00	99.00	23.00	445.00	F	99.00	65.28	N	113.27
174	POMO	N 0.00	32.00	14.00	151.00	F	N 0.00	28.58	N	90.33
175	PONTCHARTRAIN	N 0.00	66.00	40.00	227.00	S	N 0.00	30.22	N	90.12
176	POOPO	2.00	90.00	32.00	N 0.00	S	N 0.00	18.75	S	67.12
177	POYANG	N 0.00	145.00	64.00	1307.00	F	N 0.00	29.00	N	116.42
178	PRINCESS-MARY	N 0.00	45.00	25.00	181.00	F	144.00	63.95	N	97.65
179	PYA	N 0.00	48.00	24.00	177.00	F	N 0.00	66.08	N	30.97
180	PYRAMID	N 0.00	48.00	19.00	100.00	S	N 0.00	40.03	N	119.83
181	RAINY	N 0.00	87.00	26.00	747.00	F	101.00	48.70	N	93.17
182	RED	N 0.00	64.00	40.00	N 0.00	F	N 0.00	48.02	N	94.92
183	REINDEER	585.00	231.00	40.00	1528.00	F	21.00	57.30	N	102.37
184	RONGE	19.50	65.00	58.00	496.00	F	54.00	55.13	N	104.93
185	RUDOLF	187.00	298.00	60.00	684.00	S	N 0.00	3.50	N	36.00
186	RUKWA	N 0.00	145.00	16.00	181.00	S	N 0.00	8.00	S	32.42
187	SAIMAA	36.00	100.00	80.00	N 0.00	F	N 0.00	61.25	N	28.25
188	SAINT-CLAIR	4.00	42.00	39.00	272.00	F	71.00	42.47	N	82.67
189	SAINT-JEAN	N 0.00	52.00	34.00	170.00	F	103.00	48.58	N	72.03
190	SAKAMI	N 0.00	62.00	19.00	520.00	F	27.00	53.25	N	76.75
191	SALTON	N 0.00	48.00	16.00	140.00	S	N 0.00	33.22	N	115.85
192	SAN-MARTIN	N 0.00	103.00	22.00	N 0.00	F	N 0.00	48.87	S	72.67
193	SANDY	N 0.00	77.00	12.00	470.00	F	82.00	53.07	N	93.05
194	SAP	40.00	116.00	37.00	382.00	F	N 0.00	13.00	N	104.00
195	SASYKKOL	N 0.00	51.00	23.00	322.00	S	N 0.00	46.58	N	81.00
196	SCUTARI	1.90	44.00	14.00	207.00	F	135.00	42.17	N	19.33
197	SEG	N 0.00	32.00	32.00	N 0.00	F	N 0.00	63.30	N	33.75
198	SELAWIK	N 0.00	72.00	32.00	223.00	S	N 0.00	66.50	N	160.15
199	SELLETYTENIZ	1.70	57.00	26.00	303.00	S	N 0.00	[illegible]	N	[illegible]
200	SELWYN	N 0.00	78.00	33.00	406.00	F	34.00	60.03	N	104.47

ID	NAME	VOLUME KM**3	LENGTH KM.	BREADTH KM.	SHORELINE LENGTH KM.	WATER QUALITY (F=FRESH) (S=SALT)	ORIEN- TATION DEGREES.	LATITUDE DEGREES.	LATITUDE HEMISPHERE	LONGITUDE DEGREES.
201	SEUL	N 0.00	125.00	44.00	1045.00	F	110.00	50.38	N	92.42
202	SEVAN	38.00	64.00	40.00	119.00	F	N 0.00	40.13	N	45.33
203	SHAMO	N 0.00	37.00	27.00	105.00	F	N 0.00	5.83	N	37.67
204	SIMCOE	N 0.00	42.00	29.00	184.00	F	11.00	44.42	N	79.38
205	SNOWBIRD	N 0.00	64.00	18.00	270.00	F	23.00	60.67	N	102.93
206	SOUTHERN-INDIAN	N 0.00	145.00	26.00	962.00	F	39.00	57.10	N	98.77
207	SOUTH HENIK	N 0.00	59.00	20.00	239.00	F	155.00	61.45	N	97.37
208	SUPERIOR	17230.00	563.00	259.00	4795.00	F	178.00	47.55	N	87.77
209	TAHOE	124.00	35.00	19.00	175.00	F	N 0.00	39.10	N	120.03
210	TAI	N 0.00	64.00	56.00	367.00	F	N 0.00	31.25	N	120.17
211	TAKIYUAK	N 0.00	61.00	34.00	430.00	F	176.00	66.30	N	113.08
212	TANA	28.00	85.00	64.00	333.00	F	N 0.00	12.17	N	37.33
213	TANGANYIKA	17827.00	676.00	48.00	1900.00	F	N 0.00	6.00	S	29.50
214	TANGRA	N 0.00	67.00	20.00	186.00	S	N 0.00	31.00	N	86.67
215	TATHLINA	N 0.00	44.00	29.00	119.00	F	80.00	60.53	N	117.55
216	TAUPO	N 0.00	35.00	28.00	138.00	F	N 0.00	38.83	S	175.93
217	TAYMYR	13.00	201.00	110.00	880.00	F	N 0.00	74.50	N	102.50
218	TEHEKJUAK	N 0.00	39.00	32.00	204.00	F	23.00	63.77	N	99.00
219	TENGIZ	N 0.00	85.00	52.00	401.00	S	N 0.00	50.40	N	68.95
220	TERINAM	N 0.00	38.00	14.00	145.00	S	N 0.00	31.10	N	85.50
221	TERMINOS	N 0.00	70.00	24.00	383.00	S	N 0.00	18.62	N	91.55
222	TESHEKPUK	N 0.00	50.00	22.00	184.00	F	N 0.00	70.58	N	153.43
223	TITICACA	827.00	209.00	56.00	N 0.00	F	N 0.00	15.80	S	69.40
224	TOBA	N 0.00	89.00	29.00	269.00	F	N 0.00	2.58	N	98.67
225	TOP	N 0.00	76.00	25.00	361.00	F	N 0.00	65.67	N	32.00
226	TORRENS	N 0.00	209.00	49.00	678.00	S	N 0.00	31.00	S	137.83
227	TROUT	N 0.00	46.00	17.00	168.00	F	32.00	60.57	N	121.27
228	TULEMALU	N 0.00	50.00	26.00	188.00	F	26.00	62.95	N	99.45
229	TUMBA	N 0.00	40.00	29.00	203.00	F	N 0.00	0.80	S	18.05
230	TUNGTING	48.00	129.00	72.00	N 0.00	F	N 0.00	29.30	N	112.75
231	TUZ	N 0.00	80.00	51.00	246.00	S	N 0.00	38.75	N	33.42
232	UBINSKOE	N 0.00	45.00	16.00	98.00	S	N 0.00	55.50	N	80.08
233	ULUNGUR	N 0.00	54.00	29.00	169.00	S	N 0.00	47.33	N	87.17
234	UPEMBA	0.90	29.00	26.00	109.00	F	N 0.00	8.60	S	26.43
235	URMIA	45.00	145.00	49.00	478.00	S	N 0.00	37.67	N	45.50
236	UVS	N 0.00	84.00	79.00	322.00	S	N 0.00	50.33	N	92.75
237	VAN	217.00	129.00	56.00	493.00	S	N 0.00	38.55	N	42.77
238	VANERN	180.00	145.00	80.00	691.00	F	N 0.00	58.92	N	13.50
239	VATTERN	72.00	132.00	19.00	351.00	F	N 0.00	58.40	N	14.60
240	VICTORIA	2518.00	402.00	241.00	3440.00	F	N 0.00	1.00	S	33.00
241	VIEDMA	N 0.00	72.00	22.00	241.00	F	N 0.00	49.58	S	72.59
242	VYG	7.10	72.00	32.00	212.00	F	N 0.00	63.67	N	34.67
243	WEISHAN	N 0.00	112.00	29.00	275.00	F	N 0.00	34.58	N	117.22
244	WHOLDAIA	N 0.00	68.00	28.00	519.00	F	63.00	60.72	N	104.12
245	WINNEBAGO	4.10	48.00	16.00	N 0.00	F	N 0.00	44.00	N	88.42
246	WINNIPEG	371.00	416.00	89.00	1365.00	F	157.00	52.52	N	97.28
247	WINNIPEGOSIS	16.00	195.00	27.00	957.00	F	151.00	52.58	N	100.15
248	WOLLASTON	75.00	142.00	40.00	1026.00	F	10.00	58.23	N	103.28
249	WOODS	N 0.00	122.00	97.00	1133.00	F	63.00	49.25	N	94.65
250	[illegible]	N 0.00	45.00	47.00	440.00	F	N 0.00	27.00	N	90.67

NO.	NAME		VOLUME KM**3	LENGTH KM.	BREADTH KM.		SHORELINE LENGTH KM.	WATER QUALITY (F=FRESH) (S=SALT)		ORIEN-TATION DEGREES.	LATITUDE DEGREES.	LATITUDE HEMISPHERE	LONGITUDE DEGREES.
251	YATHKYED	N	0.00	74.00	34.00		386.00	F		119.00	62.67	N	[illegible]1.87
252	ZAYSAN		53.00	150.00	18.00		318.00	F	N	0.00	48.00	N	84.00
253	ZILLING	N	0.00	70.00	38.00		231.00	S	N	0.00	31.83	N	89.00
254		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
255		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
256		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
257		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
258		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
259		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
260		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
261		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
262		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
263		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
264		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
265		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
266		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
267		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
268		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
269		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
270		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
271		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
272		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
273		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
274		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
275		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
276		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
277		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
278		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
279		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
280		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
281		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
282		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
283		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
284		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
285		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
286		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
287		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
288		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
289		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
290		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
291		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
292		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
293		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
294		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
295		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
296		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
297		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
298		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
299		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00
300		N	0.00	0.00	0.00	N	0.00		N	0.00	0.00		0.00

APPENDIX C

Large Lakes Data Base
Lake Geological Origin, Annual Precipitation, Annual Evaporation, TDS, Latitude Code, Circulation Type Code and Annual Precipitation Code

NO.	NAME	GEOLOGICAL ORIGIN CODE (HUTCH)	ANNUAL PRECIPI-TATION CM.	ANNUAL EVAPORA-TION CM.	TOTAL DISSOLVED SOLIDS MG/L.	LATITUDE CODE	CIRCULA-TION TYPE CODE	ANNUAL PRECIPI-TATION CODE	LOG (MEAN DEPTH+1)	SHORELINE DEVELOP-MENT
1	ABAYA	N 0.00	N 0.00	N 0.00	N 0.00	9.	5.	5.	0.99	1.96
2	ABE	N 0.00	N 0.00	N 0.00	N 0.00	8.	N 0.	2.	N 0.00	0.25
3	ABERDEEN	26.00	20.30	10.20	N 0.00	3.	4.	2.	N 0.00	3.17
4	ABITIBI	26.00	81.30	45.70	N 0.00	5.	4.	4.	N 0.00	3.37
5	ABY	N 0.00	N 0.00	N 0.00	N 0.00	9.	5.	5.	N 0.00	2.18
6	ALAKOL	N 0.00	N 0.00	N 0.00	N 0.00	5.	3.	3.	1.26	1.76
7	ALBERT	9.00	N 0.00	N 0.00	N 0.00	9.	5.	5.	1.41	1.83
8	ALEXANDRINA	N 0.00	N 0.00	N 0.00	N 0.00	6.	5.	2.	0.48	2.94
9	AMADEUS	N 0.00	N 0.00	N 0.00	N 0.00	7.	N 0.	2.	N 0.00	4.97
10	AMADJUAK	26.00	35.40	10.20	N 0.00	3.	3.	2.	N 0.00	3.49
11	ANGIKUNI	26.00	27.90	20.30	N 0.00	3.	3.	2.	N 0.00	3.42
12	ARAL	1.00	N 0.00	N 0.00	N 0.00	5.	2.	2.	1.23	2.55
13	ARGENTINO	N 0.00	N 0.00	N 0.00	N 0.00	4.	2.	4.	2.63	4.93
14	ARTILLERY	26.00	25.40	20.30	N 0.00	3.	4.	2.	N 0.00	2.81
15	ASHUANIPI	26.00	88.90	35.60	N 0.00	4.	4.	5.	N 0.00	4.61
16	ATHABASCA	26.00	38.10	38.10	N 0.00	3.	4.	3.	1.43	2.94
17	ATLIN	26.00	27.90	40.60	N 0.00	3.	4.	2.	1.94	3.10
18	AUSTIN	N 0.00	N 0.00	N 0.00	N 0.00	7.	N 0.	2.	N 0.00	2.53
19	AYLMER	26.00	25.40	20.30	N 0.00	3.	4.	2.	N 0.00	5.04
20	BAGHRASH	N 0.00	N 0.00	N 0.00	N 0.00	5.	N 0.	1.	N 0.00	1.53
21	BAIKAL	9.00	N 0.00	N 0.00	N 0.00	4.	2.	3.	2.83	3.40
22	BAKER	26.00	20.30	12.70	N 0.00	3.	4.	2.	1.99	2.20
23	BALATON	9.00	N 0.00	N 0.00	N 0.00	5.	3.	2.	0.20	2.29
24	BALKHASH	9.00	N 0.00	N 0.00	N 0.00	5.	3.	1.	0.90	5.08
25	BANGWEULU	N 0.00	N 0.00	N 0.00	N 0.00	8.	5.	5.	0.70	1.41
26	BAY	N 0.00	N 0.00	N 0.00	N 0.00	8.	5.	5.	0.69	1.82
27	BECHAROF	N 0.00	N 0.00	N 0.00	N 0.00	4.	4.	3.	1.49	1.96
28	BELOYE	N 0.00	N 0.00	N 0.00	N 0.00	3.	1.	4.	0.85	1.10
29	BEYSEHIR	N 0.00	N 0.00	N 0.00	N 0.00	6.	4.	3.	0.60	2.71
30	BIENVILLE	26.00	66.00	25.40	N 0.00	4.	4.	3.	N 0.00	3.56
31	BIG-TROUT	26.00	61.00	30.50	N 0.00	4.	4.	3.	1.22	2.59
32	BIWA	N 0.00	N 0.00	N 0.00	N 0.00	6.	3.	5.	1.53	2.16
33	BRAS-D'OR	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	3.	N 0.00	5.08
34	BUENOS-AIRES	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	5.	N 0.00	1.56
35	BUFFALO	26.00	33.00	40.60	N 0.00	3.	4.	2.	N 0.00	1.89
36	BUYR	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	2.	0.66	1.12
37	CARATASCA	N 0.00	N 0.00	N 0.00	N 0.00	8.	5.	5.	0.42	2.91
38	CASPIAN	1.00	N 0.00	N 0.00	N 0.00	5.	2.	2.	2.26	2.77
39	CEDAR	26.00	45.70	50.80	N 0.00	4.	4.	2.	0.65	3.36
40	CHAD	9.00	N 0.00	N 0.00	N 0.00	8.	5.	1.	0.29	2.76
41	CHAMPLAIN	3.00	N 0.00	N 0.00	N 0.00	5.	4.	3.	1.61	3.94
42	CHANY	N 0.00	N 0.00	N 0.00	N 0.00	4.	4.	2.	0.61	4.09
43	CHAO	N 0.00	N 0.00	N 0.00	N 0.00	6.	4.	5.	N 0.00	1.34
44	CHAPALA	N 0.00	N 0.00	N 0.00	N 0.00	7.	5.	5.	0.71	1.74
45	CHILKA	N 0.00	N 0.00	N 0.00	N 0.00	7.	5.	5.	0.29	2.28
46	CHILWA	N 0.00	N 0.00	N 0.00	N 0.00	8.	5.	5.	0.48	1.71
47	CHIQUITA	N 0.00	N 0.00	N 0.00	N 0.00	6.	5.	5.	0.33	1.67
48	CHIRIQUI	N 0.00	N 0.00	N 0.00	N 0.00	8.	5.	5.	N 0.00	1.89
49	CHURCHILL	26.00	45.70	50.80	N 0.00	4.	4.	2.	0.99	2.09
50	CLAIRE	26.00	40.60	45.70	N 0.00	4.	4.	2.	0.33	3.34

NO.	NAME	GEOLOGICAL ORIGIN CODE (HUTCH)	ANNUAL PRECIPI-TATION CM.	ANNUAL EVAPORA-TION CM.	TOTAL DISSOLVED SOLIDS MG/L.	LATITUDE CODE	CIRCULA-TION TYPE CODE	ANNUAL PRECIPI-TATION CODE	LOG (MEAN DEPTH+1)	SHORELINE DEVELOP-MENT
51	CLINTON-COLDEN	26.00	25.40	20.30	N 0.00	3.	4.	2.	N 0.00	4.25
52	COLHUE-HUAPI	N 0.00	N 0.00	N 0.00	N 0.00	5.	5.	3.	0.36	2.07
53	CONSTANCE	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	3.	1.96	2.84
54	CONTWOYTO	26.00	25.40	17.80	N 0.00	3.	4.	2.	N 0.00	5.04
55	CREE	26.00	48.30	40.60	N 0.00	4.	4.	2.	1.20	3.55
56	CROSS	26.00	N 0.00	N 0.00	N 0.00	4.	4.	2.	0.71	5.04
57	DAUPHIN	26.00	45.70	38.10	N 0.00	4.	4.	2.	N 0.00	1.37
58	DEAD	9.00	N 0.00	N 0.00	N 0.00	6.	2.	2.	2.18	1.97
59	DESCHAMBAULT	26.00	48.30	50.80	N 0.00	4.	4.	2.	0.86	4.19
60	DORE	26.00	43.20	55.90	N 0.00	4.	4.	2.	1.00	1.86
61	DUBAWNT	26.00	25.40	17.80	N 0.00	3.	4.	2.	N 0.00	3.46
62	EAU-CLAIRE	26.00	N 0.00	N 0.00	N 0.00	4.	4.	2.	N 0.00	3.12
63	EDI	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	3.	N 0.00	1.32
64	EDWARD	9.00	N 0.00	N 0.00	N 0.00	9.	3.	5.	1.54	N 0.00
65	EGRIDIR	N 0.00	N 0.00	N 0.00	N 0.00	6.	5.	1.	0.71	1.66
66	ENNADAI	26.00	27.90	25.40	N 0.00	3.	4.	2.	N 0.00	4.82
67	ENRIQUILLO	N 0.00	N 0.00	N 0.00	N 0.00	8.	5.	5.	0.21	0.96
68	ERIE	28.00	N 0.00	N 0.00	N 0.00	5.	3.	3.	1.30	2.93
69	ESKIMO-NORTH	N 0.00	20.30	12.70	N 0.00	2.	4.	2.	N 0.00	3.72
70	ESKIMO-SOUTHERN	N 0.00	20.30	15.70	N 0.00	2.	4.	2.	N 0.00	3.89
71	EVANS	26.00	71.10	35.60	N 0.00	4.	4.	3.	N 0.00	3.44
72	EVORON	N 0.00	N 0.00	N 0.00	N 0.00	4.	N 0.	3.	N 0.00	0.75
73	EYRE	3.00	N 0.00	N 0.00	N 0.00	7.	5.	2.	0.60	6.28
74	FAGNANO	N 0.00	N 0.00	N 0.00	N 0.00	4.	2.	3.	2.20	2.57
75	FAGUIBINE	N 0.00	N 0.00	N 0.00	N 0.00	8.	5.	2.	0.62	1.92
76	FERGUSON	N 0.00	12.70	7.60	N 0.00	2.	4.	2.	N 0.00	N 0.00
77	FLATHEAD	N 0.00	N 0.00	N 0.00	N 0.00	5.	3.	3.	1.35	2.07
78	FROBISHER	26.00	45.70	50.80	N 0.00	4.	4.	2.	0.81	4.68
79	FROME	3.00	N 0.00	N 0.00	N 0.00	6.	5.	2.	0.06	2.14
80	GAIRDNER	N 0.00	N 0.00	N 0.00	N 0.00	6.	5.	2.	0.06	3.18
81	GARRY	26.00	20.30	10.20	N 0.00	3.	4.	2.	N 0.00	4.64
82	GENEVA	28.00	N 0.00	N 0.00	N 0.00	5.	3.	4.	2.04	1.24
83	GODS	26.00	48.30	30.50	N 0.00	4.	4.	2.	N 0.00	3.30
84	GOOSE	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	4.	0.51	1.27
85	GRAND	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	3.	1.56	2.68
86	GRAS	26.00	25.40	25.40	N 0.00	3.	4.	2.	N 0.00	4.24
87	GREAT-BEAR	28.00	25.40	25.40	N 0.00	3.	4.	2.	2.16	3.66
88	GREAT-SALT	9.00	N 0.00	N 0.00	N 0.00	5.	4.	4.	0.70	N 0.00
89	GREAT-SLAVE	28.00	30.50	38.10	N 0.00	3.	4.	2.	2.37	3.48
90	GUILLAUME-DELISLE	26.00	N 0.00	N 0.00	N 0.00	4.	4.	3.	N 0.00	N 0.00
91	HAMMER	N 0.00	N 0.00	N 0.00	N 0.00	6.	5.	2.	0.21	2.67
92	HAR	N 0.00	N 0.00	N 0.00	N 0.00	5.	3.	2.	N 0.00	1.92
93	HAR-US	N 0.00	N 0.00	N 0.00	N 0.00	5.	3.	2.	N 0.00	1.78
94	HAZEN	N 0.00	15.20	7.60	N 0.00	1.	1.	2.	N 0.00	2.17
95	HELMAND	N 0.00	N 0.00	N 0.00	N 0.00	6.	5.	2.	0.66	2.09
96	HOTTAH	26.00	25.40	27.90	N 0.00	3.	4.	2.	N 0.00	3.53
97	HOVSGOL	N 0.00	N 0.00	N 0.00	N 0.00	4.	4.	3.	1.90	2.11
98	HULUN	N 0.00	N 0.00	N 0.00	N 0.00	5.	5.	3.	0.21	1.27
99	HUNGTZE	N 0.00	N 0.00	N 0.00	N 0.00	6.	5.	4.	N 0.00	1.89
100	HURON	28.00	N 0.00	N 0.00	N 0.00	5.	3.	3.	1.79	5.97

NO.	NAME	GEOLOGICAL ORIGIN CODE (HUTCH)	ANNUAL PRECIPI- TATION CM.	ANNUAL EVAPORA- TION CM.	TOTAL DISSOLVED SOLIDS MG/L.	LATITUDE CODE	CIRCULA- TION TYPE CODE	ANNUAL PRECIPI- TATION CODE	LOG (MEAN DEPTH+1)	SHORELIN DEVELOP- MENT
101	HYARGAS	N 0.00	N 0.00	N 0.00	N 0.00	4.	N 0.	3.	N 0.00	2.75
102	ILIAMNA	N 0.00	N 0.00	N 0.00	N 0.00	3.	3.	3.	2.02	2.77
103	ILMEN	N 0.00	N 0.00	N 0.00	N 0.00	4.	3.	3.	0.53	1.83
104	IMANDRA	26.00	N 0.00	N 0.00	N 0.00	3.	1.	3.	1.35	3.59
105	INARI	N 0.00	N 0.00	N 0.00	N 0.00	3.	1.	3.	1.47	2.64
106	ISLAND	26.00	48.30	35.60	N 0.00	4.	4.	2.	N 0.00	5.83
107	ISSYKKUL	9.00	N 0.00	N 0.00	N 0.00	5.	2.	2.	2.51	2.80
108	ISTADA	N 0.00	N 0.00	N 0.00	N 0.00	6.	3.	2.	N 0.00	0.79
109	IZABAL	N 0.00	N 0.00	N 0.00	N 0.00	8.	5.	7.	0.81	1.60
110	KAMILUKUAK	26.00	27.90	20.30	N 0.00	3.	4.	2.	N 0.00	2.49
111	KAMINAK	26.00	27.90	17.80	N 0.00	3.	4.	2.	N 0.00	5.70
112	KAMINURIAK	26.00	25.40	15.20	N 0.00	3.	4.	2.	N 0.00	5.42
113	KAOYU	N 0.00	N 0.00	N 0.00	N 0.00	6.	3.	1.	N 0.00	1.91
114	KASBA	26.00	N 0.00	N 0.00	N 0.00	3.	4.	2.	N 0.00	2.65
115	KHANKA	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	3.	0.62	1.57
116	KIVU	18.00	N 0.00	N 0.00	N 0.00	9.	2.	5.	2.39	N 0.00
117	KOKO	N 0.00	N 0.00	N 0.00	N 0.00	6.	3.	2.	1.12	1.46
118	KULUNDINSKOE	N 0.00	N 0.00	N 0.00	N 0.00	4.	4.	2.	0.41	1.27
119	KURISCHES	N 0.00	N 0.00	N 0.00	N 0.00	4.	4.	3.	0.62	N 0.00
120	KYARING	N 0.00	N 0.00	N 0.00	N 0.00	6.	4.	3.	N 0.00	1.67
121	KYOGA	3.00	N 0.00	N 0.00	N 0.00	9.	5.	5.	0.95	7.70
122	LADOGA	28.00	N 0.00	N 0.00	N 0.00	3.	3.	3.	1.77	1.95
123	LESSER-SLAVE	26.00	45.70	55.90	N 0.00	4.	4.	2.	1.19	2.19
124	LLANQUIHUE	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	4.	2.02	1.44
125	LOBSTICK	26.00	86.40	35.60	N 0.00	4.	4.	3.	N 0.00	3.47
126	LOP	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	1.	0.21	N 0.00
127	LOWER-SEAL	26.00	N 0.00	N 0.00	N 0.00	4.	4.	2.	N 0.00	7.51
128	LUANG	N 0.00	N 0.00	N 0.00	N 0.00	9.	5.	5.	0.12	2.37
129	MACKAY	26.00	25.40	25.40	N 0.00	3.	4.	2.	N 0.00	5.13
130	MAI-NDOMBE	N 0.00	N 0.00	N 0.00	N 0.00	9.	5.	5.	0.78	N 0.00
131	MALAREN	N 0.00	N 0.00	N 0.00	N 0.00	3.	3.	3.	1.33	N 0.00
132	MANAGUA	N 0.00	N 0.00	N 0.00	N 0.00	8.	3.	5.	1.42	1.83
133	MANITOBA	26.00	50.80	58.40	N 0.00	4.	4.	2.	0.99	3.36
134	MANOUANE	N 0.00	91.40	35.60	N 0.00	4.	4.	3.	N 0.00	3.47
135	MANZALA	N 0.00	N 0.00	N 0.00	N 0.00	6.	5.	1.	0.12	2.87
136	MARACAIBO	N 0.00	N 0.00	N 0.00	N 0.00	8.	3.	5.	1.31	1.46
137	MARTRE	26.00	27.90	35.60	N 0.00	3.	4.	2.	N 0.00	2.36
138	MELVILLE	26.00	N 0.00	N 0.00	N 0.00	4.	4.	3.	1.96	2.69
139	MICHIGAN	28.00	N 0.00	N 0.00	N 0.00	5.	3.	3.	1.93	3.13
140	MICHIKAMAU	26.00	81.30	30.50	N 0.00	4.	4.	3.	1.42	3.94
141	MILLE-LACS	26.00	N 0.00	N 0.00	N 0.00	5.	4.	3.	0.66	1.26
142	MINTO	N 0.00	50.80	20.30	N 0.00	4.	4.	3.	N 0.00	3.51
143	MIRIM	26.00	N 0.00	N 0.00	N 0.00	6.	5.	4.	0.62	2.71
144	MISTASSINI	N 0.00	83.80	35.60	N 0.00	4.	4.	3.	1.77	4.49
145	MOOSE	N 0.00	45.70	50.80	N 0.00	4.	4.	2.	N 0.00	4.37
146	MWERU	N 0.00	N 0.00	N 0.00	N 0.00	9.	5.	3.	0.70	1.45
147	NAHUEL-HUAPI	N 0.00	N 0.00	N 0.00	N 0.00	5.	3.	5.	2.19	4.32
148	NAKNEK	N 0.00	N 0.00	N 0.00	N 0.00	4.	4.	3.	N 0.00	1.83
149	NAM	N 0.00	N 0.00	N 0.00	N 0.00	6.	4.	3.	N 0.00	1.62
150	NAMAK	N 0.00	N 0.00	N 0.00	N 0.00	6.	5.	3.	0.12	1.99

N.	NAME	GEOLOGICAL ORIGIN CODE (HUTCH)	ANNUAL PRECIPITATION CM.	ANNUAL EVAPORATION CM.	TOTAL DISSOLVED SOLIDS MG/L.	LATITUDE CODE	CIRCULATION TYPE CODE	ANNUAL PRECIPITATION CODE	LOG (MEAN DEPTH+1)	SHORELINE DEVELOPMENT
151	NETILLING	26.00	27.90	10.20	N 0.00	3.	4.	2.	N 0.00	3.90
152	NGORING	N 0.00	N 0.00	N 0.00	N 0.00	6.	3.	2.	N 0.00	1.65
153	NICARAGUA	18.00	N 0.00	N 0.00	N 0.00	8.	4.	5.	1.37	2.44
154	NIPIGON	26.00	73.70	48.30	N 0.00	4.	4.	3.	1.73	2.92
155	NIPISSING	26.00	88.90	58.40	N 0.00	5.	4.	3.	0.91	2.85
156	NONACHO	26.00	27.90	30.50	N 0.00	3.	4.	2.	N 0.00	2.21
157	NUELTIN	26.00	33.00	25.40	N 0.00	3.	4.	2.	N 0.00	2.74
158	NYASA	9.00	N 0.00	N 0.00	N 0.00	8.	2.	5.	2.44	2.82
159	OPER	N 0.00	N 0.00	N 0.00	N 0.00	4.	4.	2.	0.59	3.99
160	OKEECHOBEE	2.00	N 0.00	N 0.00	N 0.00	7.	5.	4.	0.47	1.74
161	OLING	N 0.00	N 0.00	N 0.00	N 0.00	6.	3.	2.	N 0.00	1.39
162	ONEGA	26.00	N 0.00	N 0.00	N 0.00	3.	4.	3.	1.60	3.26
163	ONTARIO	28.00	N 0.00	N 0.00	N 0.00	5.	3.	3.	1.94	2.80
164	OULU	N 0.00	N 0.00	N 0.00	N 0.00	3.	3.	3.	1.12	2.54
165	PAIJANNE	N 0.00	N 0.00	N -0.00	N 0.00	3.	3.	3.	1.49	N 0.00
166	PANGONG	N 0.00	N 0.00	N 0.00	N 0.00	6.	4.	3.	1.17	1.85
167	PATOS	N 0.00	N 0.00	N 0.00	N 0.00	6.	5.	5.	0.41	2.69
168	PAYNE	26.00	43.70	15.20	N 0.00	3.	4.	2.	N 0.00	4.22
169	PEIPUS	N 0.00	N 0.00	N 0.00	N 0.00	4.	4.	3.	0.76	N 0.00
170	PETER-POND	26.00	45.70	50.90	N 0.00	4.	4.	2.	1.17	1.92
171	PIELINEN	N 0.00	N 0.00	N 0.00	N 0.00	3.	3.	3.	1.22	N 0.00
172	PLAYGREEN	26.00	45.70	40.60	N 0.00	4.	4.	2.	N 0.00	3.49
173	POINT	26.00	25.40	20.30	N 0.00	3.	4.	2.	N 0.00	4.74
174	POMO	N 0.00	N 0.00	N 0.00	N 0.00	7.	3.	3.	N 0.00	1.44
175	PONTCHARTRAIN	53.00	N 0.00	N 0.00	N 0.00	6.	4.	4.	0.41	1.59
176	POOPO	N 0.00	N 0.00	N 0.00	N 0.00	8.	5.	4.	0.29	N 0.00
177	POYANG	52.00	N 0.00	N 0.00	N 0.00	7.	5.	5.	0.87	6.37
178	PRINCESS-MARY	26.00	22.90	12.70	N 0.00	3.	4.	2.	N 0.00	2.23
179	PYA	N 0.00	N 0.00	N 0.00	N 0.00	3.	1.	3.	1.22	1.94
180	PYRAMID	9.00	N 0.00	N 0.00	N 0.00	5.	2.	3.	1.24	1.31
181	RAINY	26.00	61.00	48.30	N 0.00	5.	4.	2.	1.07	6.87
182	RED	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	3.	0.52	N 0.00
183	REINDEER	26.00	45.70	38.10	N 0.00	4.	4.	2.	1.85	3.28
184	RONGE	26.00	45.70	50.80	N 0.00	4.	4.	2.	1.11	3.72
185	RUDOLF	N 0.00	N 0.00	N 0.00	N 0.00	9.	5.	5.	1.79	2.41
186	RUKWA	7.00	N 0.00	N 0.00	N 0.00	9.	5.	5.	0.12	1.29
187	SAIMAA	N 0.00	N 0.00	N 0.00	N 0.00	3.	N 0.	3.	1.42	N 0.00
188	SAINT-CLAIR	26.00	71.10	43.20	N 0.00	5.	4.	2.	0.71	2.30
189	SAINT-JEAN	26.00	86.40	45.70	N 0.00	5.	4.	3.	1.32	1.51
190	SAKAMI	26.00	77.10	27.90	N 0.00	4.	4.	3.	1.56	6.03
191	SALTON	N 0.00	N 0.00	N 0.00	N 0.00	6.	N 0.	2.	0.76	1.28
192	SAN-MARTIN	N 0.00	N 0.00	N 0.00	N 0.00	5.	N 0.	4.	1.74	N 0.00
193	SANDY	26.00	N 0.00	N 0.00	N 0.00	4.	4.	3.	N 0.00	5.77
194	SAP	N 0.00	N 0.00	N 0.00	N 0.00	8.	5.	5.	0.68	2.12
195	SASYKKOL	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	3.	0.41	3.34
196	SCUTARI	44.00	N 0.00	N 0.00	N 0.00	5.	4.	4.	0.78	2.67
197	SEG	N 0.00	N 0.00	N 0.00	N 0.00	3.	N 0.	3.	1.51	N 0.00
198	SELAWIK	N 0.00	N 0.00	N 0.00	N 0.00	3.	1.	3.	N 0.00	1.69
199	SELETYTENIZ	N 0.00	N 0.00	N 0.00	N 0.00	4.	N 0.	2.	0.79	3.06
200	SELWYN	26.00	35.60	30.50	N 0.00	3.	4.	2.	N 0.00	4.28

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201	SEUL	26.00	61.00	30.50	N 0.00	4.	4.	3.	1.07	2.27
202	SEVAN	N 0.00	N 0.00	N 0.00	N 0.00	5.	N 0.	3.	1.44	N 0.00
203	SHAMO	N 0.00	N 0.00	N 0.00	N 0.00	9.	5.	4.	0.71	1.26
204	SIMCOE	26.00	53.30	43.20	N 0.00	5.	4.	2.	1.15	1.99
205	SNOWBIRD	26.00	27.90	25.40	N 0.00	3.	4.	2.	N 0.00	2.26
206	SOUTHERN-INDIAN	26.00	43.20	33.00	N 0.00	4.	4.	2.	0.83	5.72
207	SOUTH-HENIK	26.00	27.90	20.30	N 0.00	3.	4.	2.	N 0.00	2.29
208	SUPERIOR	78.00	83.80	55.90	N 0.00	5.	3.	3.	2.18	2.25
209	TAHOE	9.00	N 0.00	N 0.00	N 0.00	6.	N 0.	3.	2.40	1.58
210	TAI	N 0.00	N 0.00	N 0.00	N 0.00	6.	5.	4.	0.41	2.21
211	TAKIYUAK	26.00	22.90	17.80	N 0.00	3.	4.	2.	N 0.00	3.96
212	TANA	N 0.00	N 0.00	N 0.00	N 0.00	8.	5.	5.	0.25	1.57
213	TANGANYIKA	9.00	N 0.00	N 0.00	N 0.00	9.	2.	5.	2.76	3.10
214	TANGRA	N 0.00	N 0.00	N 0.00	N 0.00	6.	N 0.	3.	N 0.00	1.40
215	TATHLINA	26.00	33.00	43.20	N 0.00	3.	3.	2.	N 0.00	1.40
216	TAUPO	16.00	N 0.00	N 0.00	N 0.00	6.	3.	5.	1.72	1.58
217	TAYMYR	N 0.00	N 0.00	N 0.00	N 0.00	2.	1.	3.	0.97	3.70
218	TEBESJUAK	26.00	22.90	15.70	N 0.00	3.	4.	2.	N 0.00	2.39
219	TENGIZ	N 0.00	N 0.00	N 0.00	N 0.00	4.	3.	2.	0.55	2.93
220	TERINAM	N 0.00	N 0.00	N 0.00	N 0.00	6.	N 0.	3.	N 0.00	1.64
221	TERMINOS	N 0.00	N 0.00	N 0.00	N 0.00	8.	5.	5.	0.12	2.74
222	TESHEKPUK	N 0.00	N 0.00	N 0.00	N 0.00	2.	1.	3.	N 0.00	1.81
223	TITICACA	N 0.00	N 0.00	N 0.00	N 0.00	8.	3.	5.	2.03	N 0.00
224	TOBA	16.00	N 0.00	N 0.00	N 0.00	9.	3.	5.	2.31	2.24
225	TOE	26.00	N 0.00	N 0.00	N 0.00	3.	N 0.	2.	1.20	1.27
226	TORRENS	9.00	N 0.00	N 0.00	N 0.00	6.	5.	2.	0.06	3.56
227	TROUT	26.00	35.60	40.60	N 0.00	3.	4.	2.	N 0.00	2.11
228	TULEMALU	26.00	25.40	17.80	N 0.00	3.	4.	2.	N 0.00	2.05
229	TUMBA	N 0.00	N 0.00	N 0.00	N 0.00	9.	5.	5.	0.41	2.56
230	TUNGTING	52.00	N 0.00	N 0.00	N 0.00	6.	5.	4.	0.62	N 0.00
231	TUZ	N 0.00	N 0.00	N 0.00	N 0.00	6.	5.	3.	0.19	1.71
232	URINGKOR	N 0.00	N 0.00	N 0.00	N 0.00	4.	N 0.	3.	N 0.00	1.17
233	ULUNGUR	N 0.00	N 0.00	N 0.00	N 0.00	5.	N 0.	2.	N 0.00	1.65
234	UREMBA	N 0.00	N 0.00	N 0.00	N 0.00	9.	5.	5.	0.18	1.33
235	URMIA	9.00	N 0.00	N 0.00	N 0.00	6.	5.	3.	0.78	1.36
236	UVS	N 0.00	N 0.00	N 0.00	N 0.00	4.	5.	2.	0.12	1.57
237	VAN	N 0.00	N 0.00	N 0.00	N 0.00	6.	N 0.	3.	1.76	2.27
238	VANERN	N 0.00	N 0.00	N 0.00	N 0.00	4.	3.	3.	1.51	2.61
239	VATTERN	N 0.00	N 0.00	N 0.00	N 0.00	4.	4.	3.	1.62	2.27
240	VICTORIA	N 0.00	N 0.00	N 0.00	N 0.00	9.	5.	5.	1.61	3.87
241	VIEDMA	N 0.00	N 0.00	N 0.00	N 0.00	4.	N 0.	4.	N 0.00	2.06
242	VYG	N 0.00	N 0.00	N 0.00	N 0.00	3.	N 0.	3.	0.94	1.69
243	WEISHAN	N 0.00	N 0.00	N 0.00	N 0.00	6.	N 0.	3.	N 0.00	2.01
244	WHOLDAIA	26.00	30.50	27.90	N 0.00	3.	4.	2.	N 0.00	5.62
245	WINNEBAGO	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	3.	0.51	N 0.00
246	WINNIPEG	28.00	48.30	45.70	N 0.00	4.	4.	2.	1.15	2.47
247	WINNEPEGOSIS	26.00	48.30	50.80	N 0.00	4.	4.	2.	0.68	3.68
248	WOLLASTON	26.00	N 0.00	N 0.00	N 0.00	4.	4.	3.	1.26	5.58
249	WOODS	26.00	61.00	61.00	N 0.00	4.	4.	2.	0.89	4.05
250	YAMDROK	N 0.00	N 0.00	N 0.00	N 0.00	7.	N 0.	3.	N 0.00	4.32

NO.	NAME	GEOLOGICAL ORIGIN CODE (HUTCH)	ANNUAL PRECIPI- TATION CM.	ANNUAL EVAPORA- TION CM.	TOTAL DISSOLVED SOLIDS MG/L.	LATITUDE CODE	CIRCULA- TION TYPE CODE	ANNUAL PRECIPI- TATION CODE	LOG (MEAN DEPTH+1)	SHORELINE DEVELOP- MENT
251	YATHKYED	26.00	25.40	17.80	N 0.00	3.	4.	2.	N 0.00	2.86
252	ZAYSAN	N 0.00	N 0.00	N 0.00	N 0.00	5.	4.	3.	0.62	2.11
253	ZILING	N 0.00	N 0.00	N 0.00	N 0.00	6.	5.	3.	0.56	1.71
254		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
255		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
256		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
257		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
258		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
259		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
260		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
261		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
262		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
263		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
264		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
265		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
266		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
267		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
268		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
269		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
270		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
271		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
272		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
273		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
274		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
275		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
276		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
277		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
278		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
279		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
280		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
281		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
282		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
283		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
284		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
285		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
286		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
287		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
288		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
289		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
290		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
291		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
292		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
293		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
294		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
295		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
296		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
297		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
298		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
299		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00
300		N 0.00	N 0.00	N 0.00	N 0.00	N 0.	N 0.	N 0.	N 0.00	N 0.00

APPENDIX D

Large Lakes Water Balance Data
Annual Precipitation, Annual Evaporation, Mean Annual River Runoff, Runoff Coefficient and River Water Reserve

NUMBER	NAME	ANNUAL PRECIPI-TATION MM.	ANNUAL EVAP-TRANS POTENTIAL MM.	ANNUAL EVAP-TRANS ACTUAL MM.	MEAN ANNUAL RIVER RUNOFF(MM)	RUNOFF COEF.	RIVER WATER RESERVE +(MM)	RIVER WATER RESERVE -(MM)
1	ABAYA	750	1500	725	100	0.15	0	800
2	ABE	400	1875	200	10	0.05	0	1400
3	ABERDEEN	380	190	180	250	0.50	200	0
4	ABITIBI	1000	580	500	500	0.45	400	0
5	ABY	1700	1375	850	150	0.20	0	0
6	ALAKOL	400	900	300	5	0.05	0	500
7	ALBERT	1400	1450	950	150	0.15	0	100
8	ALEXANDRINA	450	1000	400	10	0.05	0	300
9	AMADEUS	280	2000	275	1	0.01	0	1500
10	AMADJUAK	480	200	175	375	0.70	300	0
11	ANGIKUNI	400	300	270	200	0.45	120	0
12	ARAL	200	1250	200	1	0.01	0	1000
13	ARGENTINO	2000	500	325	2000	0.60	1000	0
14	ARTILLERY	325	350	350	150	0.35	50	0
15	ASHUANIPI	1100	450	400	700	0.75	700	0
16	ATHABASCA	400	440	310	100	0.25	0	100
17	ATLIN	350	450	280	75	0.20	0	100
18	AUSTIN	300	1750	250	3	0.01	0	1500
19	AYLMER	350	300	240	125	0.35	50	0
20	BAGHRASH	100	1000	100	1	0.10	0	1000
21	BAIKAL	500	500	300	300	0.50	50	0
22	BAKER	775	950	600	100	0.15	0	0
23	BALATON	200	1000	200	5	0.03	0	500
24	BALKHASH	1225	1475	775	275	0.20	0	500
25	BANGWEULU	400	225	200	200	0.50	200	0
26	BAY	2400	1500	1000	2000	0.60	2000	0
27	BECHAROF	1400	425	300	1000	0.70	300	0
28	BELOYE	800	475	420	300	0.40	250	0
29	BEYSEHIR	400	1250	400	50	0.20	0	500
30	BIENVILLE	900	350	350	550	0.60	500	0
31	BIG-TROUT	775	500	460	250	0.35	180	0
32	BIWA	2000	900	900	1000	0.60	1000	0
33	BRAS-D'OR	1600	600	600	500	0.30	1400	0
34	BUENOS-AIRES	1600	600	325	1000	0.60	1000	0
35	BUFFALO	450	400	310	75	0.20	0	100
36	BUYR	300	700	300	10	0.04	0	300
37	CARATASCA	3000	1250	1000	1500	0.55	1000	0
38	CASPIAN	1000	1100	400	100	0.30	0	300
39	CEDAR	550	500	400	100	0.20	0	50
40	CHAD	400	2225	350	7	0.08	0	1750
41	CHAMPLAIN	1200	750	650	500	0.45	450	0
42	CHANY	400	550	400	10	0.03	0	100
43	CHAO	1400	1000	600	600	0.40	200	0
44	CHAPALA	875	1500	650	100	0.10	0	600
45	CHILKA	1600	1750	700	200	0.25	0	750
46	CHILWA	1150	1500	750	50	0.03	0	800
47	CHIQUITA	900	1500	800	8	0.01	0	750
48	CHIRIQUI	3000	1250	1000	2000	0.70	1000	0
49	CHURCHILL	450	550	375	125	0.20	0	100
50	CLAIRE	400	510	325	75	0.20	0	100

NUMBER	NAME	ANNUAL PRECIPI-TATION MM.	ANNUAL EVAP-TRANS POTENTIAL MM.	ANNUAL EVAP-TRANS ACTUAL MM.	MEAN ANNUAL RIVER RUNOFF (MM)	RUNOFF COEF.	RIVER WATER RESERVE +(MM)	RIVER WATER RESERVE -(MM)
1	CLINTON-COLDEN	400	750	240	150	0.35	50	0
2	[illegible]	250	1000	300	8	0.05	0	500
[illegible]	CONSTANCE	1000	700	300	500	0.60	400	0
[illegible]	CONTWOYTO	350	280	225	125	0.45	50	[illegible]
[illegible]	CREE	425	500	330	125	0.25	0	25
[illegible]	CROSS	625	520	400	150	0.25	50	0
[illegible]	DAUPHIN	600	410	450	20	0.25	0	200
[illegible]	DEAD	200	1750	100	9	0.03	0	1500
[illegible]	DES-CHAMBAULT	[illegible]	570	400	100	0.20	0	50
40	DORE	500	550	300	100	0.20	0	100
41	DUBAWNT	400	290	240	200	0.40	150	0
42	EAU-CLAIRE	800	330	330	350	0.55	400	0
43	[illegible]	200	800	200	5	0.05	0	[illegible]
[illegible]	EDWARD	1250	1450	1200	180	0.30	0	0
45	EGRIDIR	400	1250	400	200	0.30	0	200
46	ENNADAI	425	360	290	175	0.40	50	0
47	ENRIQUILLO	1600	1500	1000	500	0.30	100	0
48	ERIE	1100	925	740	350	0.30	200	0
49	ESKIMO-NORTH	280	220	180	100	0.50	100	0
50	ESKIMO-SOUTHERN	250	220	180	150	0.40	100	0
51	EVANS	1200	570	570	600	0.40	600	0
52	[illegible]	600	400	350	500	0.50	200	0
53	EYRE	150	2000	150	1	0.01	0	1800
74	FAGNANO	1000	450	400	500	0.60	500	0
75	FAGUIBINE	275	2075	300	1	0.01	0	2000
76	FERGUSON	275	180	160	100	0.40	100	0
[illegible]	FLATHEAD	350	850	280	300	0.45	0	300
[illegible]	FROBISHER	500	520	360	25	0.20	0	125
[illegible]	FROME	200	1200	200	4	0.02	0	[illegible]
[illegible]	GAIRDNER	300	1500	300	5	0.02	0	1250
91	GARRY	300	200	200	175	0.50	125	0
92	GENEVA	1600	300	700	800	0.50	700	0
[illegible]	GODS	525	500	400	200	0.35	100	0
94	GORGE	800	1450	275	300	0.40	0	900
95	GRAND	1400	500	450	1000	0.60	1000	0
97	GRAS	350	300	230	125	0.35	50	0
[illegible]	GREAT-BEAR	350	350	225	150	0.40	50	0
99	GREAT-SALT	300	1300	300	1	0.01	1025	0
[illegible]	GREAT-SLAVE	600	450	280	100	0.25	0	25
70	GUILLAUME-DELISLE	900	350	280	500	0.50	375	0
[illegible]	HAMMER	100	1750	150	1	0.07	0	1500
[illegible]	HAR	100	550	175	10	0.10	0	200
[illegible]	HAR-US	100	550	175	10	0.10	0	200
[illegible]	HAZEN	400	100	50	200	1.00	150	0
[illegible]	HELMAND	100	1750	100	5	0.05	0	1500
[illegible]	HOTTAH	750	350	225	100	0.50	25	0
[illegible]	HOVSGOL	400	500	275	150	0.30	0	0
[illegible]	HULUN	300	700	275	10	0.40	0	300
[illegible]	HUNGIZE	800	1000	700	500	0.40	300	0
100	HURON	1000	750	625	325	0.35	200	0

NUMBER	NAME	ANNUAL PRECIPITATION MM.	ANNUAL EVAP.-TRANS. POTENTIAL MM.	ANNUAL EVAP.-TRANS. ACTUAL MM.	MEAN ANNUAL RIVER RUNOFF(MM)	RUNOFF COEFF.	RIVER WATER [illegible] (MM)	RIVER WATER [illegible] (MM)
101	[illegible]	300	550	200	10	0.10	0	200
102	ILIAMNA	250	420	300	1000	0.20	500	0
103	ILMEN	300	525	425	200	0.10	200	0
104	IMANDRA	700	400	300	500	0.45	300	0
105	INARI	600	460	300	300	0.55	350	0
106	ISLAND	600	500	410	200	0.30	100	0
107	ISSYK-KUL	400	1000	400	100	0.40	0	0
108	[illegible]	100	1750	100	5	0.05	0	1500
109	IZABAL	2000	1350	1000	1000	0.50	1000	0
110	KAMILUKUAK	425	300	280	160	0.40	75	0
111	KAMINAK	450	275	250	200	0.50	150	0
112	KAMINURIAK	400	275	250	150	0.50	150	0
113	KAOYU	1200	1000	750	900	0.50	250	0
114	KARIBA	400	380	280	175	0.40	50	0
115	KHANKA	600	700	450	100	0.30	200	0
116	KIVU	1500	1450	1100	300	0.30	0	200
117	KORD	300	1000	200	10	0.05	0	350
118	KULUNDINSKOE	400	600	375	10	0.03	0	200
119	KUBENSKOE	800	575	500	300	0.30	200	0
120	KYARING	350	1000	275	800	0.40	500	0
121	KYOGA	1400	1475	925	75	0.12	0	250
122	LADOGA	800	475	425	350	0.40	350	0
123	LESSER SLAVE	525	540	390	75	0.15	0	150
124	LLANQUIHUE	3200	500	290	2000	0.60	2000	0
125	LOBSTICK	1000	375	350	700	0.65	700	0
126	LOP	50	1000	100	1	0.02	0	1000
127	LOWER-SEAL	800	400	400	700	0.70	450	0
128	LUANG	2000	1500	1100	1000	0.50	500	0
129	MACKAY	350	350	250	100	0.35	25	0
130	MAI-NDOMBE	1700	1275	1125	550	0.40	100	0
131	MALAREN	750	550	450	200	0.35	300	0
132	MANAGUA	1600	1300	1000	500	0.40	400	0
133	MANITOBA	600	630	450	50	0.10	0	100
134	MANOUANE	1200	690	460	725	0.60	600	0
135	MANZALA	225	1750	150	1	0.03	0	1400
136	MARACAIBO	1000	1100	850	100	0.20	0	0
137	MARTRE	375	420	260	90	0.30	0	25
138	MELVILLE	1200	375	250	800	0.70	400	1100
139	MICHIGAN	1150	875	700	250	0.30	100	0
140	MICHIKAMAU	925	375	350	700	0.65	200	0
141	MILLE-LACS	900	820	620	150	0.20	0	0
142	MINTO	750	280	260	350	0.55	125	0
143	MIRIM	1300	1250	900	400	0.40	200	0
144	MISTASSINI	1100	500	450	650	0.65	600	0
145	MOOSE	525	520	420	100	0.20	0	100
146	MWERU	1150	1450	875	200	0.10	0	750
147	NAHUEL-HUAPI	1600	600	300	150	0.60	2000	0
148	NAKNEK	1100	420	300	1500	0.70	800	0
149	NAM	400	1000	275	50	0.20	0	500
150	NAMAK	100	1750	100	5	0.01	0	1500

NUMBER	NAME	ANNUAL PRECIPI-TATION MM.	ANNUAL EVAP-TRANS POTENTIAL MM.	ANNUAL EVAP-TRANS ACTUAL MM.	MEAN ANNUAL RIVER RUNOFF(MM)	RUNOFF COEF.	RIVER WATER RESERVE +(MM)	RIVER WATER RESERVE -(MM)
151	NETTILLING	400	200	160	400	0.70	300	0
152	NGOURING	400	1000	350	100	0.10	0	500
153	NICARAGUA	2000	1300	1000	1000	0.40	800	0
154	NIPIGON	880	590	480	300	0.40	200	0
155	NIPISSING	1000	700	640	400	0.40	300	0
156	NONACHO	400	400	290	100	0.25	0	50
157	NUELTIN	425	350	280	200	0.45	125	0
158	NYASA	1175	1425	675	80	0.05	0	900
159	OBIR	700	500	500	250	0.35	300	0
160	OKEECHOBEE	1600	1500	1000	250	0.45	0	200
161	OLING	400	1000	250	5	0.05	0	500
162	ONEGA	750	450	375	350	0.45	300	0
163	ONTARIO	1100	800	675	400	0.35	350	0
164	OULU	700	425	350	325	0.45	300	0
165	PAIJANNE	700	475	350	300	0.40	300	0
166	PANGONG	300	1000	250	800	0.50	750	0
167	PATOS	1500	1250	900	450	0.40	250	0
168	PAYNE	675	220	190	400	0.70	400	0
169	PEIPUS	700	450	400	350	0.45	300	0
170	PETER-POND	500	550	375	100	0.20	0	100
171	PIELINEN	700	450	350	350	0.45	200	0
172	PLAYGREEN	525	520	400	150	0.25	50	0
173	POINT	350	260	210	100	0.40	50	0
174	POMO	400	1000	300	300	0.40	0	200
175	PONTCHARTRAIN	1600	1500	1000	600	0.25	50	0
176	POOPO	350	1000	250	75	0.20	0	500
177	POYANG	1600	1000	800	800	0.45	500	0
178	PRINCESS-MARY	400	250	220	200	0.50	150	0
179	PYA	700	450	350	300	0.50	300	0
180	PYRAMID	400	1450	275	20	0.40	0	800
181	RAINY	900	650	520	200	0.25	50	0
182	RED	725	750	540	100	0.20	0	75
183	REINDEER	450	475	330	150	0.30	25	0
184	RONGE	475	560	380	125	0.20	0	100
185	RUDOLF	700	1600	700	30	0.05	0	100
186	RUKWA	1000	1475	650	80	0.10	0	250
187	SAIMAA	700	475	350	250	0.40	300	0
188	SAINT-CLAIR	1000	900	725	280	0.30	100	0
189	SAINT-JEAN	1200	560	550	600	0.55	575	0
190	SAKAMI	925	430	410	500	0.55	400	0
191	SALTON	200	1700	200	5	0.05	0	1400
192	SAN-MARTIN	1600	800	325	2000	0.20	0	100
193	SANDY	775	575	425	200	0.70	75	0
194	SAR	1600	1500	1050	300	0.30	0	100
195	SARYKKOL	400	800	300	5	0.05	0	500
196	SCUTARI	1600	1000	700	800	0.60	600	0
197	SEG	750	425	350	300	0.50	300	0
198	SELAWIK	400	250	200	100	0.50	100	0
199	SELETYTENIZ	400	600	375	5	0.03	0	300
200	SELWYN	400	380	290	100	0.35	50	0

NUMBER	NAME	ANNUAL PRECIPI-TATION MM.	ANNUAL EVAP-TRANS POTENTIAL MM.	ANNUAL EVAP-TRANS ACTUAL MM.	MEAN ANNUAL RIVER RUNOFF(MM)	RUNOFF COEF.	RIVER WATER RECEIVED (MM)	RIVER WATER [illegible] (MM)
201	SEUL	820	580	475	225	0.30	75	0
202	SEVAN	600	1100	400	200	0.40	0	400
203	SHAMO	725	1475	675	100	0.15	0	900
204	SIMCOE	1200	750	640	500	0.40	300	0
205	SNOWBIRD	425	380	300	150	0.40	50	0
206	SOUTHERN INDIAN	450	450	330	200	0.30	75	0
207	SOUTH HENIK	450	340	325	200	0.45	150	0
208	SUPERIOR	900	650	575	350	0.35	175	0
209	TAHOE	700	1450	280	500	0.40	0	100
210	TAI	1400	1000	750	500	0.40	500	0
211	TAI YUAN	325	290	280	100	0.40	50	0
212	TANA	1250	1450	700	200	0.15	0	[illegible]
213	TANGANYIKA	1000	1450	870	180	0.15	0	400
214	TANGRA	700	1000	275	10	0.07	0	[illegible]
215	TATHLINA	475	600	310	25	0.20	0	[illegible]
216	TAUPO	2000	1100	600	1000	0.50	900	0
217	TAYMYR	500	200	150	300	0.40	250	0
218	TERES HIAR	400	250	225	200	0.50	175	0
219	TENGIZ	325	900	300	10	0.05	0	[illegible]
220	TESHINAM	500	1000	275	10	0.03	0	[illegible]
221	TERMINOS	1200	1750	1000	1	0.01	0	[illegible]
222	TESHEKPUK	200	190	150	100	0.40	100	0
223	TITICACA	750	1000	350	150	0.35	0	[illegible]
224	TOBA	2400	1500	1250	1500	0.60	1000	0
225	TOE	700	450	325	750	0.40	300	0
226	TORRENS	200	1900	200	1	0.01	0	1450
227	TROUT	500	500	310	200	0.30	0	
228	TULEMALU	425	320	260	200	0.45	120	0
229	TUMBA	1925	1300	1125	500	0.75	500	0
230	TUNGTING	1600	1000	800	500	0.40	500	0
231	TUZ	400	1250	200	50	0.20	0	[illegible]
232	URINSKOE	500	550	400	50	0.05	0	[illegible]
233	ULUNGUR	400	900	200	5	0.03	0	[illegible]
234	UREMBA	1125	1400	975	200	0.15	0	[illegible]
235	URMIA	300	1500	300	50	0.40	0	450
236	UVS	200	500	200	20	0.30	0	50
237	VAN	400	1500	350	500	0.40	0	750
238	VANERN	900	550	450	300	0.40	225	0
239	VATTERN	800	550	450	200	0.75	175	0
240	VICTORIA	1100	1475	900	100	0.10	0	300
241	VIEDMA	1600	500	350	2000	0.60	1000	0
242	VYG	700	450	350	300	0.45	300	0
243	WEISHAN	800	1000	650	200	0.25	0	0
244	WHOLDAIA	400	375	300	150	0.40	150	0
245	WINNEBAGO	1000	900	700	250	0.25	75	0
246	WINNIPEG	500	550	425	100	0.15	0	50
247	WINNIPEGOSIS	575	575	425	50	0.10	0	100
248	WOLLASTON	425	450	320	150	0.30	25	0
249	WOODS	700	700	480	200	0.30	0	0
250	YAMDROK	400	1000	650	50	0.10	0	500

NUMBER	NAME	ANNUAL PRECIPI-TATION MM.	ANNUAL EVAP-TRANS POTENTIAL MM.	ANNUAL EVAP-TRANS ACTUAL MM.	MEAN ANNUAL RIVER RUNOFF(MM)	RUNOFF COEF.	RIVER WATER RESERVE +(MM)	RIVER WATER RESERVE -(MM)
251	YATHKYED	425	375	275	200	0.45	150	0
252	ZAYSAN	300	800	300	20	0.20	0	500
253	ZILING	500	1000	275	10	0.03	0	500

APPENDIX E

Large Lakes Water Quality Data
TDS, Conductivity, Total Phosphorus, Chlorophyll a, Transmission, Primary Productivity, Fish Productivity and Temperature

NUMBER	NAME	CONDUCTIVITY UMHO/CM.	TOTAL DISSOLVED SOLID PPM	TOTAL PHOSPHORUS UG/L	CHLOROPHYLL A MG/M	TRANSMISSION M.	PRIMARY PRODUCTIVITY GC/M**2/Y	FISH PRODUCTIVITY KG/HA/Y	DEGREES CELCIUS
1	ABACO	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
2	ABI	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
3	ABERDEEN	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
4	ABITIBI	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
5	ABY	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
6	ALAKOL	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
7	ALBERT	N 0.00	545.0	N 0.0	N 0.00	N 0.00	N 0.00	41.940	0.0
8	ALEXANDRINA	480.00	445.1	143.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
9	AMADEUS	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
10	AMADJUAK	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
11	ANGIKUNI	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
12	ARAL	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	24.0
13	ARGENTINO	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
14	ARTILLERY	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
15	ASHUANIPI	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
16	ATHABASCA	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	1.490	0.0
17	ATLIN	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
18	AUSTIN	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
19	AYLMER	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
20	BAGHRASH	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
21	BAIKAL	N 0.00	100.0	60.0	N 0.00	N 0.00	127.00	20.000	12.1
22	BAKER	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
23	BALATON	445.00	400.0	120.0	54.00	65.00	2600.00	N 0.000	0.0
24	BALKHASH	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
25	BANGWEULU	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
26	BAY	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
27	BECHAROF	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
28	BELDYE	N 0.00	N 0.0	5.0	N 0.00	0.80	3.80	N 0.000	0.0
29	BEYSEHIR	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
30	BIENVILLE	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
31	BIG-TROUT	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	0.198	0.0
32	BIWA	N 0.00	N 0.0	N 0.0	4.50	3.45	150.00	N 0.000	18.0
33	BRAS-D'OR	N 0.00	N 0.0	0.1	N 0.00	N 0.00	55.00	N 0.000	0.0
34	BUENOS-AIRES	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
35	BUFFALO	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
36	BUYR	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
37	CARATASCA	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
38	CASPIAN	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
39	CEDAR	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
40	CHAD	180.00	123.1	N 0.0	N 0.00	N 0.00	2700.00	N 0.000	27.0
41	CHAMPLAIN	190.00	129.9	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	20.0
42	CHANY	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
43	CHAO	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
44	CHAPALA	0.54	0.7	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
45	CHILKA	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
46	CHILWA	9300.00	*****	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
47	CHIQUITA	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
48	CHIPITOUI	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
49	CHURCHILL	N 0.00	136.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
50	CLAIRE	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0

NUMBER	NAME	CONDUCTIVITY UMHO/CM.	TOTAL DISSOLVED SOLID PPM	TOTAL PHOSPHORUS UG/L	CHLOROPHYLL A MG/M	TRANSMISSION M.	PRIMARY PRODUCTIVITY GC/M**2/Y	FISH PRODUCTIVITY KG/HA/Y	DEGREE CELCIUS
51	CLINTON-COLDEN	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
52	COLHUE-HAUPI	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
53	CONSTANCE	260.00	190.0	25.1	13.15	N 0.00	N 0.00	N 0.000	22.0
54	CONTWOYTO	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
55	CREE	N 0.00	27.0	N 0.0	N 0.00	N 0.00	N 0.00	2.240	14.9
56	CROSS	N 0.00	185.0	N 0.0	N 0.00	N 0.00	N 0.00	3.340	17.5
57	DAUPHIN	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
58	DEAD	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
59	DESCHAMBAULT	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
60	DORE	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
61	DUBAWNT	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
62	EAU-CLAIRE	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
63	EBI	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
64	EDWARD	925.00	521.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
65	EGRIDIR	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
66	ENNADAI	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
67	ENRIQUILLO	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
68	ERIE	742.00	146.0	N 0.0	N 0.00	4.50	310.00	8.182	0.0
69	ESKIMO-NORTH	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
70	ESKIMO-SOUTHERN	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
71	EVANS	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
72	EUDRON	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
73	EYRE	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
74	FAGNANO	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
75	FAGUIBINE	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
76	FERGUSON	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
77	FLATHEAD	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
78	FROBISHER	25.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	2.200	17.0
79	FROME	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
80	GAIRDNER	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
81	GARRY	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
82	GENEVA	300.00	163.0	100.0	10.13	N 0.00	0.70	N 0.000	21.0
83	GODS	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
84	GOOSE	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
85	GRAND	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
86	GRAS	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
87	GREAT-BEAR	N 0.00	99.0	N 0.0	N 0.00	N 0.00	N 0.00	0.303	0.0
88	GREAT-SALT	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	12.0
89	GREAT-SLAVE	N 0.00	150.0	N 0.0	N 0.00	10.70	N 0.00	1.614	14.0
90	GUILLAUME-DELISLE	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
91	HAMMER	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
92	HAR	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
93	HAR-US	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
94	HAZEN	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
95	HELMAND	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
96	HOTTAH	100.00	N 0.0	5.0	N 0.00	5.50	N 0.00	9.700	18.0
97	HOVSGOL	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
98	HULUN	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
99	HUNGTZE	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
100	HURON	168.00	108.0	N 0.0	N 0.00	9.50	100.00	1.547	0.0

NUMBER	NAME		CONDUCTIVITY UMHO/CM.		TOTAL DISSOLVED SOLID PPM		TOTAL PHOSPHORUS UG/L		CHLOROPHYLL A MG/M		TRANSMISSION M.		PRIMARY PRODUCTIVITY GC/M**2/Y		FISH PRODUCTIVITY KG/HA/Y	DEGREE CELCIUS
101	HYARGAS	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
102	ILIAMNA	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
103	ILMEN	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
104	IMANDRA	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
105	INARI	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
106	ISLAND	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
107	ISSYKKUL	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
108	ISTADA	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
109	IZABAL		185.00	N	0.0	N	0.0	N	0.00	N	0.00		1400.00		50.000	25.2
110	KAMILUKUAK	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
111	KAMINAK	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
112	KAMINURIAK	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
113	KAOYU	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
114	KASBA	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
115	KHANKA	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
116	KIVU	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00		850.00	N	0.000	0.0
117	KOKO	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
118	KULUNDINSKOE	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
119	KURISHES	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
120	KYARING	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
121	KYOGA	N	0.00		258.0	N	0.0	N	0.00	N	0.00	N	0.00		170.100	0.0
122	LADOGA	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
123	LESSER-SLAVE	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
124	LLANQUIHUE	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
125	LOBSTICK	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
126	LOP	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
127	LOWER-SEAL	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
128	LUANG		5245.00		*****		290.0		2.50	N	0.00		379.00	N	0.000	35.8
129	MACKAY	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
130	MAI-NDOMBE	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
131	MALAREN		156.00		111.0		40.0		6.70		3.10		750.00	N	0.000	77.0
132	MANAGUA	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
133	MANITOBA	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
134	MANOUANE	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
135	MANZALA	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
136	MARACAIBO	N	0.00	N	0.0		1.4	N	0.00	N	0.00	N	0.00	N	0.000	30.0
137	MARTRE	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
138	MELVILLE	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
139	MICHIGAN		226.00		134.0	N	0.0	N	0.00		4.00		130.00		1.782	0.0
140	MICHIKAMAU	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
141	MILLE-LACS	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
142	MINTO	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
143	MIRIM	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
144	MISTASSINI	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
145	MOOSE	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
146	MWERU	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
147	NAHUEL-HUAPI	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
148	NAKNEK	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
149	NAM	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
150	NAMAK	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0

NUMBER	NAME		CONDUCT-IVITY UMHO/CM.		TOTAL DISSOLVED SOLID PPM		TOTAL PHOSPHORUS UG/L		CHLORO-PHYLL A MG/M		TRANS-MISSION M.		PRIMARY PRODUC-TIVITY GC/M**2/Y		FISH PRODUC-TIVITY KG/HA/Y	DEGREE CELCIUS
151	NETTILLING	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
152	NGORING	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
153	NICARAGUA	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
154	NIPIGON	N	0.00		98.0	N	0.0	N	0.00	N	0.00	N	0.00		1.122	0.0
155	NIPISSING	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
156	NONACHO	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
157	NUELTIN	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
158	NYASA		210.00		143.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
159	OHRID	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
160	OKEECHOBEE	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
161	OLING	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
162	ONEGA	N	0.00	N	0.0	N	0.0		0.50	N	0.00		25.00	N	0.000	13.0
163	ONTARIO		372.00		148.0	N	0.0	N	0.00		5.50		100.00		1.119	0.0
164	OULU	N	0.00	N	0.0		15.0		7.00	N	0.00	N	0.00	N	0.000	14.0
165	PAIJANNE	N	0.00	N	0.0		22.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
166	PANGONG	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
167	PATOS	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
168	PAYNE	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
169	PEIPUS	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
170	PETER-POND	N	0.00		138.0	N	0.0	N	0.00	N	0.00	N	0.00		5.400	0.0
171	PIELINEN	N	0.00	N	0.0		11.0		3.00	N	0.00		35.00	N	0.000	14.0
172	PLAYGREEN	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
173	POINT	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
174	POMO	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
175	PONTCHARTRAIN	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
176	POOPO	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
177	POYANG	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
178	PRINCESS-MARY	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
179	PYA	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
180	PYRAMID		8470.00	N	0.0		0.1		3.70	N	0.00		130.00	N	0.000	21.4
181	RAINY	N	0.00		57.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
182	RED	N	0.00		191.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
183	REINDEER	N	0.00		39.0	N	0.0	N	0.00	N	0.00	N	0.00		8.240	14.7
184	RONGE		214.00		149.0	N	0.0	N	4.50		4.50	N	0.00		1.100	15.6
185	RUDOLF		2700.00		*****	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
186	RUKWA	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
187	SAIMAA	N	0.00	N	0.0		12.0		3.00	N	0.00		7.00	N	0.000	17.0
188	SAINT-CLAIR	N	0.00		116.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
189	SAINT-JEAN	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
190	SAKAMI	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
191	SALTON	N	0.00	N	0.0		120.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
192	SAN-MARTIN	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
193	SANDY	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
194	SAP	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
195	SARYKFOL	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
196	SCUTARI		330.00	N	0.0		2200.0	N	0.00	N	0.00	N	0.00		50.000	13.6
197	SEG	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
198	SELAWIK	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
199	SELETYTENIZ	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0
200	SELWYN	N	0.00	N	0.0	N	0.0	N	0.00	N	0.00	N	0.00	N	0.000	0.0

NUMBER	NAME	CONDUCT- IVITY UMHO/CM.	TOTAL DISSOLVED SOLID PPM	TOTAL PHOSPHORUS UG/L	CHLORO- PHYLL A MG/M	TRANS- MISSION M.	PRIMARY PRODUC- TIVITY GC/M**2/Y	FISH PRODUC- TIVITY KG/HA/Y	DEGREE CELCIUS
[illegible]	YATHKYED	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
[illegible]	ZAYSON	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0
[illegible]	ZILING	N 0.00	N 0.0	N 0.0	N 0.00	N 0.00	N 0.00	N 0.000	0.0