LAKE KANASATKA

LAKES LAY MONITORING PROGRAM

1985

Freshwater Biology Group (FBG)

University of New Hampshire

Durham

by

Tracy E. Kenealy

Coauthored and edited by

A.L. Baker J.F. Haney

LAKES LAY MONITORING PROGRAM

To obtain more information about the Lakes Lay Monitoring Program (LLMP) contact the LLMP Coordinator (T. Kenealy) at (603)-862-3848, Dr. Baker at 862-3845 or Dr. Haney at 862-2106.

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This is a LEVEL II report. (See last page for definition.)

All data in this report are available to any person or organization upon request and payment of costs involved.

PREFACE

Importance of long-term monitoring

Lake monitoring carried out weekly over the course of several consecutive summers benefits the lake in a number of ways. The resulting data not only indicate the lake's condition for a particular summer, but they also suggest what it was like in the past, and make it possible to predict its condition in the future.

For this reason, it is important to distinguish between short-term and long-term results. As an example, a 30 year time-span may provide evidence for a long-term trend towards eutrophy (Fig. 1). Yet, if one looks at data over a 1-5 year time-span, one sees only short-term fluctuations; there are no apparent trends nor is it possible to separate the "signal" from "noise". Chlorophyll, water transparency, and phosphorus may fluctuate from year to year in response to annual variations in climate and activity on the lake, and may be unrelated to long-term trends. The more such "noise" in the data, whether due to real or analytical variations, the longer a monitoring program must continue to demonstrate long-term trends.

Use of long-term trends

Long-term trends serve several important functions. From them, past deterioration of the lake can be recognized. They can also be used to forecast the future condition of

They can also be used to forecast the future condition of the lake, and if necessary, management techniques can be implemented to keep potential problems from becoming worse. Finally, long-term trends provide a basis for evaluation of existing management programs so that necessary changes may be brought about.

It takes a great deal of motivation, perseverance, and a love for one's lake to be a lay monitor. Sometimes it may seem to be an inconvenience, or to be discouraging when it's unclear just what a year's worth of hard work means with respect to the "big picture" of the lake. Yet, each observation by a lay monitor is a significant contribution.

Thus, continuation of data collection is important. The LLMP data base is becoming more comprehensive and valuable each year. We are pleased with the interest and commitment of lakeshore volunteers. Keep up the great work!

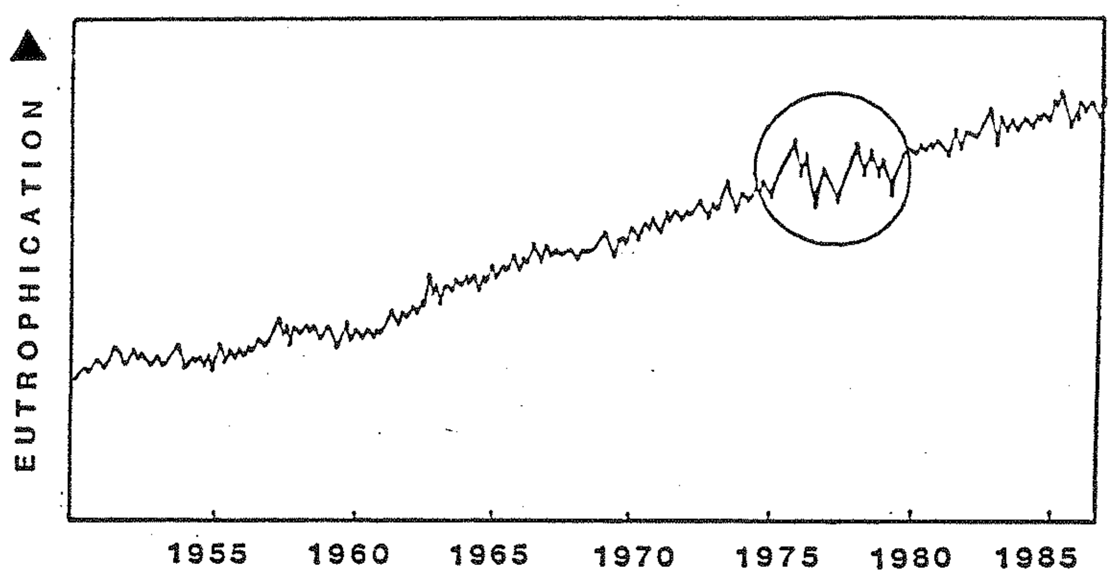

Figure 1. Long-term vs. short-term trends in a hypothetical lake approaching eutrophication.

ACKNOWLEDGEMENTS

The Lakes Lay Monitoring Program (LLMP) was established on Lake Kanasatka in 1983. The program continued in 1985 through the direction of Mr. Hallock Richards, and the efforts of several dedicated monitors. Three sites were monitored weekly on the lake, and additional stream sites were sampled for phosphorus. Lay monitors in 1985 were:

Sites 1 and 2 - Hal Richards, Monna Greenstreet, Richard Goodwin

Site 3 - George Clemow and Tom Rooney

The Freshwater Biology Group congratulates the monitors on the quality of their work and the time and effort put forth. We encourage them and other interested members of the Lake Kanasatka Watershed Association to continue monitoring during the 1986 season. We would also like to thank Mr. Richards for his continued dedication to the maintenance and organization of the LLMP for the lake.

We would also like to recognize the UNH Office of Computer Services for their provision of computer time and data storage space. The final text is available on an IBM-compatible diskette.

NON-TECHNICAL SUMMARY OF LAY MONITOR DATA

1) Both water transparencies and chlorophyll a concentrations indicate that Lake Kanasatka is still oligotrophic. Seasonal readings for secchi disk and chlorophyll a suggest that the lake is nutrient poor and contains relatively few planktonic algae.

2) The seasonal mean for dissolved water color was low, indicating that the water is not highly stained from dissolved humic substances (dark-colored organic matter). Both water color and populations of algae will influence the water transparency; on Lake Kanasatka, the algal populations appear to regulate the secchi disk depth more than the color of the water does.

3) Concentrations of total phosphorus were low in Lake Kanasatka. Levels from two inlets to the lake were slightly higher than from the rest of the lake, suggesting that the streams may be potential sources of phosphorus. However, based on total phosphorus, Kanasatka is oligotrophic, and nutrient inputs into the lake are low.

4) Lake Kanasatka has a high pH (greater than 7). Based on these results, acidification is not a problem on the lake at this time.

5) The water in 1985 was more transparent and contained less green coloring from suspended algae than 1984, but similar to 1983. Short-term fluctuations such as these are common, possibly due to changes in weather from year to year.

COMMENTS AND RECOMMENDATIONS

1) The consistency of data collection by the lay monitors was excellent throughout the 1985 season, and we recommend that the Lake Kanasatka Watershed Association continue its long-term monitoring program in 1986. The Association has established a three-year data base that can be strengthened through further monitoring. A data base resulting from several years of monitoring will be a valuable resource in the future as trends in the chemistry and biology of the lake become evident.

2) The Freshwater Biology Group (FBG) has never made a comprehensive chemical and biological survey of the lake, and we recommend scheduling a trip in 1986. Data from the FBG will support those from the lay monitors as well as provide additional information of parameters such as pH, alkalinity, dissolved oxygen, phytoplankton, and zooplankton.

3) A program of lay monitor alkalinity testing should be initiated to assess the effects of acid precipitation on the lake. Alkalinity indicates the ability of water to buffer acids, and may be more reliable than pH in predicting the effects of acidification on a lake. It is important to establish a data base for alkalinity in order to detect

changes as early as possible. This could be accomplished by the FBG teaching at least one lay monitor the chemical test for alkalinity.

4) Phosphorus sampling should be continued in 1986. While levels in 1985 were low, the phosphorus content of a lake is readily influenced by factors such as precipitation, land runoff, human activities, and sewage, all of which may vary greatly from year to year. Changes in phosphorus levels can come about rapidly, and it is important to detect such changes as they occur. In order to better assess what factors cause levels to be elevated at certain times, monitors should keep a record of circumstances surrounding the sampling period, including information such as the weather preceding the sampling, water level in the lake, appearance of the inlet streams, etc.

5) As a general addition to our Lakes Lay Monitoring Program, we are suggesting that each lake in the Program begin monitoring the condition of the fish taken from the lake. The "Fish Monitoring" will require that at least one lay monitor record the species, length and weight and collect a sample of fish scales for each fish examined. In most lakes this will involve periodic creel census of sport fishermen on the lake. Equipment required will cost approximately $100. Special instruction will be given to the lay monitors who chose to measure this parameter.

Length-to-weight ratios give a measure of the nutritional condition of the fish. Analysis of the fish scales (to be done at UNH) will tell how old each fish is. Together, these data will be extremely useful indicators of the health of the fish populations in the lake, and, of course, the "health" of the lake.

METHODS OF LAY MONITORS

This year data were collected on six parameters: thermal stratification, water clarity (secchi disk depth), chlorophyll a concentration, total phosphorus and dissolved water color, and pH. Whenever possible, testing was done weekly between the hours of 9 am and 3 pm, the period of maximum sunlight penetration into the water. All samples and data were mailed to the FBG at UNH for analysis.

Thermal (temperature) profiles were obtained by collecting lakewater samples at several successive depths using a modified Meyer bottle (Lind, 1979). A weighted, empty bottle with a stopper was lowered to a specific depth. At that depth, the stopper was pulled, allowing the bottle to be filled with water. The bottle was quickly pulled back up to the surface where the temperature of the sample was taken with a Taylor pocket thermometer, and recorded in degrees Celsius. This procedure was repeated at one meter intervals through the epilimnion and hypolimnion, and at one-half meter intervals throughout the metalimnion.

Water clarity was measured by lowering a secchi disk (approximately 20 cm. or 8 inches) through the water off the shady side of the boat, and noting the average depth at which it disappeared upon lowering and reappeared when being raised (the cord attached to the secchi disk was marked in one-half meters). This process was done while holding a view-scope just below the surface to eliminate effects of surface reflection and wave action. This was repeated two or three times, and an average to the nearest one-tenth of a meter was recorded.

Chlorophyll _a_ concentration was used as an index of algal biomass that is useful in determining the trophic state of the lake. A weighted plastic tube (10 meters in length) was lowered through the epilimnion, or "upper lake" to the top of the metalimnion, or "middle lake" (the depths of the epilimnion and metalinmion are determined from the temperature profile). The end of the tube above water is folded to shut off the water flow into or out of the tube. The weighted end of the tube is pulled up out of the water with an attached cord, trapping an integrated sample of water representing the "upper lake" in the tube. This sample is poured into a plastic 2.5 liter bottle and stored for chlorophyll filtration and alkalinity determination.

Water samples for chlorophyll _a_ filtration were filtered through a 0.45 micron membrane filter. Damp filters, containing chlorophyll-bearing algae, were air-dried for at least 15 minutes, out of the sun, to prevent decomposition or bleaching of the chlorophyll on the filter. These filters were sent to UNH where members of the FBG analyzed them for chlorophyll _a_ (see Methods of the Freshwater Biology Group).

Dissolved water color was determined by saving the filtrate from the the chlorophyll filtration and storing it frozen in a 50 ml plastic bottle. The bottles were sent to UNH and the color was analyzed by reading the absorbance of the samples at two different wavelengths (440 and 493).

Samples for total phosphorus analysis were collected in two ways. For determination of epilimnetic phosphorus, water was taken from the integrated sample collected with the tube-sampler. On parts of the lake where it was suspected that phosphorus might be high, (eg. sites along the shoreline, inlets or outlets), surface samples were taken by dipping a bottle into the water and letting it fill. All samples were collected in acid-washed 250 ml bottles, fixed with 1.0 ml of concentrated sulfuric acid, and stored frozen until analysis by the FBG team. (See Methods by the Freshwater Biology Group.)

METHODS OF THE FRESHWATER BIOLOGY GROUP

Laboratory Methods

The Freshwater Biology Group (FBG) was responsible for chlorophyll *a* and phosphorus analysis, as well as filing and analyzing 1985 data, performing statistical tests, and determining possible trends based on past data.

The chlorophyll *a* content was analyzed by extracting the chlorophyll with a 95% acetone solution saturated with magnesium carbonate. The samples were then centrifuged and their light absorbance read at two standard wavelengths (663 and 750 nanometers).

Phosphorus samples were received by the FBG in a cold or frozen state, and were stored refrigerated until they were analyzed. To determine the total phosphorus content, ammonium persulfate and 11 N sulfuric acid was added to digest the total phosphorus, and the samples were autoclaved for one hour. Then, a single-reagent method was employed using potassium antimony tartrate, ammonium molybdate, and a fresh solution of ascorbic acid (E.P.A. 1979). Absorbance of the blue phosphorus complex was measured with a spectrophotometer at 650 nm. Each sample was analyzed twice and an average of the two values taken as the phosphorus content in parts per billion (micrograms per liter).

How the data are analyzed

Incoming data are received through the mail during the sampling season and are first filed in an "incoming data" book. This provides temporary storage until the corresponding chlorophyll and/or phosphorus sample for each data sheet is analyzed. All data, including date, lake, site, secchi disk depth, chlorophyll a and phosphorus content, alkalinity, and color measurements, are filed and stored on a computerized data-management system of the University of New Hampshire. Data can be easily retrieved by lake, sampling station or date, and used for individual reports and for each year.

Statistical treatment of the data for each lake includes a comparison of seasonal tendencies found throughout the year, monthly means for the different parameters tested, and confidence levels for each site. The same comparisons mentioned above are made on a yearly basis if the lake has been in the program for two years or more. If sufficient data are available from several years, regression analyses and other statistical tests are performed. Such analyses may identify trends and help explain variations in the data (eg. secchi disk depth, chlorophyll a, color). In addition, data is compared with other lakes in the program and to published water quality classifications. Trophic boundaries of Forsberg and Ryding (1980) are used to classify each lake.

RESULTS AND DISCUSSION OF LAY MONITOR DATA

Monitoring was done weekly at three sites on Lake Kanasatka. At sites "1 Deep" and "2 Animal", monitoring was done from May 10 to October 22, 1985, and at site "3 Youngs" from July 11 to September 20, 1985. See Figure 2 for 1985 sampling sites and Appendix A for lay monitor data for 1983-1985.

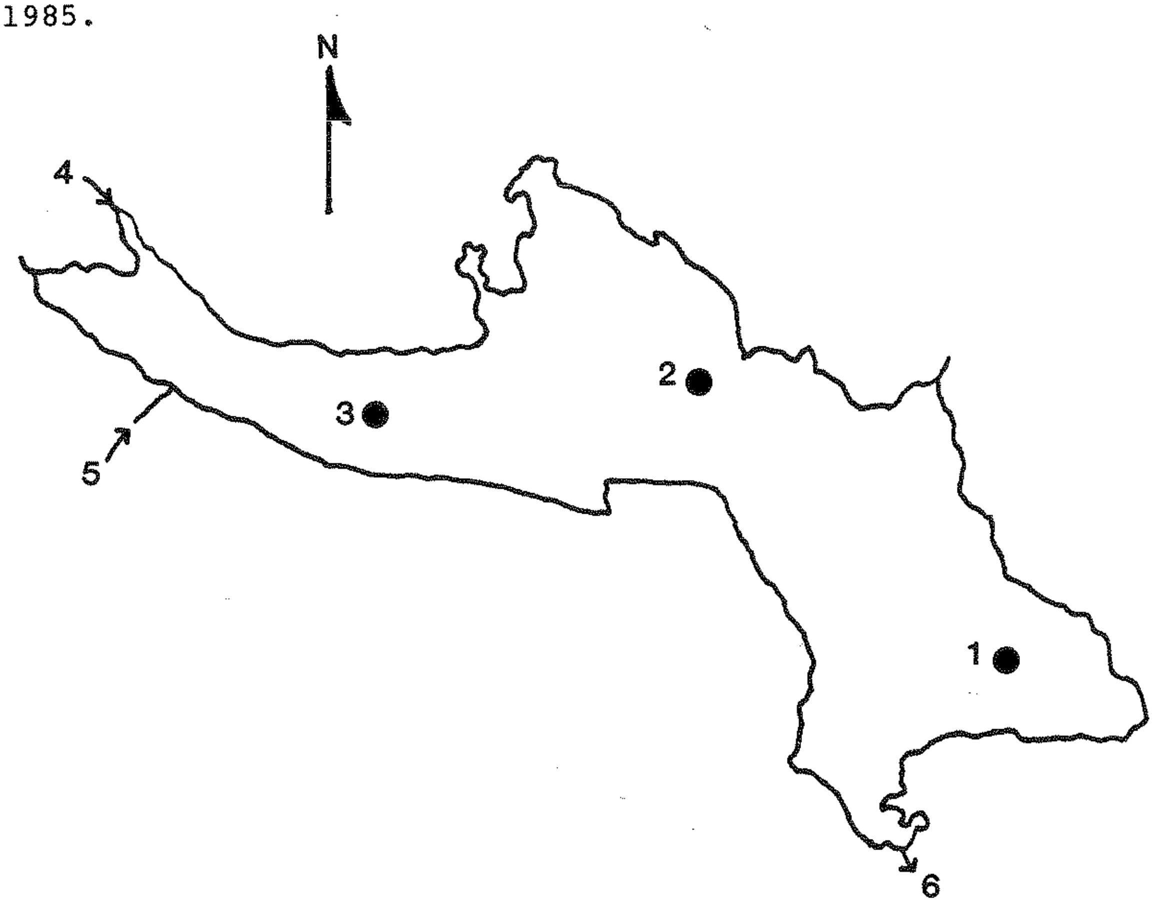

Figure 2. Kanasatka Lake, Town of Moultonboro, New Hampshire. Outline map and location of 1985 sampling sites.

Water Transparency

Water transparency (secchi disk depth) was in the range from 4.5 to 7.5 meters, with an average of 6.3 m. The average secchi disk depths were 6.6 m at site 1, 6.1 m at site 2, and 6.4 m at site 3. At sites 1 and 2, water transparency was highest during June and July, and lowest in May and September. At site 3, data is available only from July through September; based on these data, water transparency was highest in September.

The water transparency on Kanasatka is high, and indicate that the lake is oligotrophic (nutrient poor). In 1985, the water transparency was higher than it was in 1984 (average was 5.4 m) and similar to what it was in 1983 (average 6.1 m). Short-term variations such as these may be due to differences in precipitation during past the three years. Similar results were found for several other lakes in the LLMP.

Chlorophyll a and Dissolved Water Color

Water transparency is affected by three major factor: the numbers of planktonic algae in the water column (assessed by the chlorophyll a concentration), the dissolved water color, and amounts of suspended particulate matter in the water. By measuring tow of these parameters, the chlorophyll concentration and the dissolved water color, the relative influence each has on the secchi disk depth can be estimated.

Chlorophyll _a_ concentrations were in the range of 0.50 to 1.9 milligrams per cubic meter for the three sites, with an average of 1.3. A high value of 4.3 mg per cubic meter was found at site 3 in July. At sites 1 and 2, chlorophyll concentrations were highest during May and June, low in July and August, and increased slightly during September. The low concentrations of chlorophyll found in July and August at sites 1 and 2 correspond to high water transparency during this period. At site 3, chloropyhll was highest in July, and decreased during August and September. Based on chlorophyll _a_, Kanasatka would be classified as oligotrophic.

Dissolved water color is the brown coloring of lakewater due primarily to dissolved humic acids, and is measured as the absorbance of light per 5 centimeters. Water color on Kanasatka was measured at site 1. The average value was 0.02, which was the average for lakes in the LLMP in 1985. Water color remained relatively constant throughout the sampling season, and did not vary inversely to the secchi disk depth. The water transparency on Lake Kanasatka appears to be regulated more by the algal density than by the dissolved water color.

Total Phosphorus

Samples for total phosphorus were taken from the three deep sites on the lake, as well as from two inlet streams and the outlet stream to the lake (Figure 2). Total phosphorus concentrations were in the range from 1.0 to 7.6 micrograms per liter (parts per billion) at the deep sites, with an average of 4.6 ppb. Levels of phosphorus in the inlets were 6.7 ppb from a stream draining Wakondah Pond (site 4), and 8.6 from a stream between lots 63 and 64 (site 5). Concentrations of 6.6 and 3.3 ppb were found at the outlet to the lake (site 6) in April and November, respectively.

Phosphorus concentrations in this range indicate that Lake Kanasatka is oligotrophic. The inlet streams may be a potential source of phosphorus, since levels were slightly higher here than from the outlet. However, all phosphorus concentrations found indicate nutrient poor conditions, suggesting that nutrient loading into the lake is limited.

pH

pH readings were taken frequently on the lake. Epilimnetic pH readings were in the range of 7.1 to 7.6 at site 1, and two readings taken from site 2 were 7.0 and 7.6. Based on these results, Lake Kanasatka may not be in danger of acidification at this time.

REFERENCES

Baker, A.L. 1973. Microstratification of phytoplankton in selected Minnesota lakes. Ph. D. thesis, University of Minnesota.

Carlson, R.E. 1977. A trophic state index for lakes. Limnol. Oceanogr. 22:361-379.

Edmondson, W.T. 1937. Food conditions in some New Hampshire lakes. In: Biological survey of the Androscoggin, Saco and coastal watersheds. (Report of E.E. Hoover.) New Hampshire Fish and Game Commission, Concord, New Hampshire.

Forsberg, C. and S.-O. Ryding. 1980. Eutrophication parameters and trophic state indices in 30 Swedish wastewater receiving lakes. Arch. Hydrobiol. 89:189-207

Gallup, D.N. 1969. Zooplankton distributions and zooplankton-phytoplankton relationships in a mesotrophic lake. Ph.D. Thesis, University of New Hampshire.

Haney, J.F. and D.J. Hall. 1973. Sugar-coated Daphnia: a preservation technique for Cladocera. Limnol. Oceanogr. 18:331-333.

Hoover, E.E. 1936. Preliminary biological survey of some New Hampshire lakes. Survey report no. 1. New Hampshire Fish and Game Department, Concord, New Hampshire.

Hoover, E.E. 1937. Biological survey of the Androcoggin, Saco, and coastal watersheds. Survey report no. 2. New Hampshire and Game Department, Concord, New Hampshire.

Hoover, E.E. 1938. Biological Survey of the Merrimack watershed. Survey report no. 3. New Hampshire and Game Department, Concord, New Hampshire.

Hutchinson, G.E. 1967. A treatise on limnology, vol. 2. John Wiley and Sons, NewYork.

Lind, O.T. 1979. Handbook of common methods in limnology. C.V. Mosby, St. Louis.

Lorenzen, M.W. 1980. Use of chlorophyll-Secchi disk relationships. Limnol. Oceanogr. 25:371-372.

New Hampshire Water Supply and Pollution Control Commission. 1981. Classification and priority listing of New Hampshire lakes. Staff report no. 121. Concord, New Hampshire.

Newell, A.E. 1970. Biological survey of the lakes and ponds in Cheshire, Hillsborough and Rockingham Counties. Survey report no. 8c. New Hampshire Fish and Game Department, Concord, New Hampshire.

Newell, A.E. 1972. Biological survey of the lakes and ponds in Coos, Grafton and Carroll Counties. Survey report no. 8a. New Hampshire Fish and Game Department, Concord, New Hampshire.

Newell, A.E. 1977. Biological survey of the lakes and ponds in Sullivan, Merrimack, Belknap and Strafford Counties. Survey report no. 8b. New Hampshire Fish and Game Department, Concord, New Hampshire.

New Hampshire Water Supply and Pollution Control Commission 1981. Classification and priority listing of New Hampshire Lakes. Staff report no. 121. Concord, New Hampshire.

Schindler, D.W., et al. 1985. Long-term ecosystem stress: Effects of years of experimental acidification on a small lake. Science. 228:1395-1400.

Utermohl, H. 1958. Improvements in the quantitative methods of phytoplankton study. Mitt. int. Ver. Limnol. 9:1-25.

U.S. Environmental Protection Agency. 1979. A Manual of methods for chemical analysis of water and wastes. Office of Technology Transfer, Cincinnati. PA-600/4-79-020.

Wetzel, R.G. 1983. Limnology. Saunders College Publishing, Philadelphia.

APPENDIX A

LLMP -- Lay Monitor Data: Kanasatka Jan-09-86 15:58.44

Date	Lake	Site	SDD	Chl
Sep-09-83	Kanasatka	1 Deep	6.50	1.87
Sep-19-83	Kanasatka	1 Deep	5.70	1.16
Sep-28-83	Kanasatka	1 Deep	6.00	1.70
May-23-84	Kanasatka	1 Deep	5.00	1.43
Jun-09-84	Kanasatka	1 Deep	4.00	2.14
Jun-16-84	Kanasatka	1 Deep	5.25	2.00
Jun-23-84	Kanasatka	1 Deep	5.50	1.57
Jul-04-84	Kanasatka	1 Deep	5.00	1.86
Jul-10-84	Kanasatka	1 Deep	4.75	3.71
Jul-17-84	Kanasatka	1 Deep	5.00	---
Jul-23-84	Kanasatka	1 Deep	5.50	1.71
Jul-31-84	Kanasatka	1 Deep	5.50	.86
Aug-08-84	Kanasatka	1 Deep	5.80	1.57
Aug-17-84	Kanasatka	1 Deep	6.30	1.28
Aug-21-84	Kanasatka	1 Deep	6.20	2.57
Aug-31-84	Kanasatka	1 Deep	6.30	2.28
Sep-10-84	Kanasatka	1 Deep	6.80	.29
Sep-18-84	Kanasatka	1 Deep	5.30	1.00
Sep-28-84	Kanasatka	1 Deep	4.60	1.14
Oct-07-84	Kanasatka	1 Deep	4.80	1.28
Oct-17-84	Kanasatka	1 Deep	6.70	1.36
May-10-85	Kanasatka	1 Deep	5.50	1.43
May-19-85	Kanasatka	1 Deep	6.40	1.50
May-24-85	Kanasatka	1 Deep	6.50	1.07
Jun-02-85	Kanasatka	1 Deep	7.00	1.50
Jun-15-85	Kanasatka	1 Deep	7.50	1.57
Jun-21-85	Kanasatka	1 Deep	7.50	1.86
Jul-14-85	Kanasatka	1 Deep	7.00	.71
Jul-19-85	Kanasatka	1 Deep	7.20	1.43
Jul-27-85	Kanasatka	1 Deep	7.20	.64
Aug-04-85	Kanasatka	1 Deep	7.10	.50
Aug-09-85	Kanasatka	1 Deep	6.60	.50
Aug-18-85	Kanasatka	1 Deep	6.80	.93
Sep-01-85	Kanasatka	1 Deep	5.80	1.14
Sep-08-85	Kanasatka	1 Deep	6.30	1.28
Sep-16-85	Kanasatka	1 Deep	5.20	1.57
Sep-22-85	Kanasatka	1 Deep	6.80	1.86
Sep-30-85	Kanasatka	1 Deep	6.30	1.07

Oct-07-85	Kanasatka	1 Deep	6.30	.86
Oct-22-85	Kanasatka	1 Deep	6.20	.79
Sep-05-83	Kanasatka	2 Animal	6.50	1.61
Sep-12-83	Kanasatka	2 Animal	6.40	1.96
Sep-19-83	Kanasatka	2 Animal	5.80	1.52
Sep-28-83	Kanasatka	2 Animal	6.00	1.43
May-23-84	Kanasatka	2 Animal	5.00	1.14
Jun-10-84	Kanasatka	2 Animal	4.50	2.14
Jun-16-84	Kanasatka	2 Animal	5.25	2.14
Jun-27-84	Kanasatka	2 Animal	4.70	2.93
Jul-03-84	Kanasatka	2 Animal	4.75	2.71
Jul-10-84	Kanasatka	2 Animal	4.50	2.86
Jul-24-84	Kanasatka	2 Animal	4.60	1.57
Jul-31-84	Kanasatka	2 Animal	5.50	1.64
Aug-06-84	Kanasatka	2 Animal	5.00	1.78
Aug-13-84	Kanasatka	2 Animal	5.10	2.28
Aug-20-84	Kanasatka	2 Animal	5.70	1.86
Aug-27-84	Kanasatka	2 Animal	5.60	1.21
Sep-05-84	Kanasatka	2 Animal	5.50	.43
Sep-19-84	Kanasatka	2 Animal	5.80	1.57
Sep-28-84	Kanasatka	2 Animal	4.50	.86
Oct-07-84	Kanasatka	2 Animal	5.40	1.43
Oct-17-84	Kanasatka	2 Animal	6.90	1.28
May-11-85	Kanasatka	2 Animal	5.50	1.57
May-19-85	Kanasatka	2 Animal	6.50	1.43
May-24-85	Kanasatka	2 Animal	6.00	1.50
Jun-02-85	Kanasatka	2 Animal	7.00	1.00
Jun-15-85	Kanasatka	2 Animal	7.20	1.86
Jun-21-85	Kanasatka	2 Animal	6.90	1.28
Jun-29-85	Kanasatka	2 Animal	6.00	1.57
Jul-05-85	Kanasatka	2 Animal	7.00	1.43
Jul-11-85	Kanasatka	2 Animal	6.50	1.21
Jul-20-85	Kanasatka	2 Animal	6.50	1.00
Jul-27-85	Kanasatka	2 Animal	---	---
Jul-28-85	Kanasatka	2 Animal	6.50	.71
Aug-02-85	Kanasatka	2 Animal	6.50	.78
Aug-09-85	Kanasatka	2 Animal	6.00	.86
Aug-17-85	Kanasatka	2 Animal	6.00	.78
Aug-23-85	Kanasatka	2 Animal	5.50	1.71
Sep-01-85	Kanasatka	2 Animal	4.50	1.43
Sep-08-85	Kanasatka	2 Animal	5.40	1.21
Sep-15-85	Kanasatka	2 Animal	4.50	.86
Oct-07-85	Kanasatka	2 Animal	6.30	1.00
Oct-22-85	Kanasatka	2 Animal	6.00	1.07
Nov-02-85	Kanasatka	2 Animal	---	---
Aug-03-84	Kanasatka	3 Youngs	5.20	2.28
Aug-10-84	Kanasatka	3 Youngs	5.50	1.43
Aug-20-84	Kanasatka	3 Youngs	5.50	1.43
Aug-25-84	Kanasatka	3 Youngs	5.50	1.86
Sep-05-84	Kanasatka	3 Youngs	6.00	2.14
Oct-29-84	Kanasatka	3 Youngs	7.30	1.71

May-11-85	Kanasatka	3 Youngs	---	---
Jul-11-85	Kanasatka	3 Youngs	6.60	1.28
Jul-18-85	Kanasatka	3 Youngs	5.70	4.28
Jul-29-85	Kanasatka	3 Youngs	6.50	---
Aug-07-85	Kanasatka	3 Youngs	5.30	1.57
Aug-09-85	Kanasatka	3 Youngs	---	---
Aug-28-85	Kanasatka	3 Youngs	5.00	1.71
Sep-09-85	Kanasatka	3 Youngs	5.80	.57
Sep-20-85	Kanasatka	3 Youngs	7.00	1.71
Apr-07-85	Kanasatka	4 Culvl	---	---
Oct-07-85	Kanasatka	4 Culvl	---	---
Apr-07-85	Kanasatka	5 Lotl	---	---
Apr-07-85	Kanasatka	6 DamO	---	---
Nov-01-85	Kanasatka	6 DamO	---	---

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A-4

APPENDIX B

LLMP -- Lay Monitor Data: Kanasatka   Feb-21-86   12:06.19

Date	Lake	Site	Alk (ppm)	Tot-P
May-10-85	Kanasatka	1 Deep	---	6.6
Oct-07-85	Kanasatka	1 Deep	---	2.8
May-23-84	Kanasatka	2 Animal	---	.0
May-11-85	Kanasatka	2 Animal	---	4.9
Jun-29-85	Kanasatka	2 Animal	---	1.0
Jul-27-85	Kanasatka	2 Animal	---	1.0
Sep-01-85	Kanasatka	2 Animal	---	2.0
Nov-02-85	Kanasatka	2 Animal	---	3.6
May-11-85	Kanasatka	3 Youngs	---	7.6
Jul-29-85	Kanasatka	3 Youngs	---	1.0
Aug-09-85	Kanasatka	3 Youngs	---	6.1
Apr-07-85	Kanasatka	4 Culvl	---	6.6
Oct-07-85	Kanasatka	4 Culvl	---	6.9
Apr-07-85	Kanasatka	5 Lotl	---	8.6
Apr-07-85	Kanasatka	6 DamO	---	6.6
Nov-01-85	Kanasatka	6 DamO	---	3.3

>>> END OF LIST <<<

NOTE

There are three levels of reports available to participating lake associations in the LLMP. They are differentiated as follows:

LEVEL I - This is a basic report that includes sections on the methods employed, comments and recommendations, and a brief summary of results. It also contains an appendix listing data from the present and past years.

LEVEL II - This is a mid-level report that includes methods employed, a non-technical summary of lay monitor and FBG data, comments and recommendations and an in-depth results and discussion section. It contains an appendix listing data from the present and past years.

LEVEL III - This is a full report which includes the following sections: methods employed, a non-technical summary, comments and recommendations, a technical summary, and a complete results and discussion section supplemented by computerized graphics. It also contains 3-4 appendixes: a listing of present-year and past data, limnological concepts and technical terms, and a glossary.