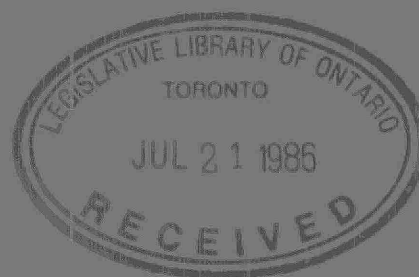


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WATER QUALITY OF LAKES
IN CHANDOS TOWNSHIP,
PETERBOROUGH COUNTY

FIELD WORK 1981, 1982
REPORT 1986



Ontario

Ministry
of the
Environment

G. MIERZYNSKI, Director
Central Region

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WATER QUALITY OF LAKES IN
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893-743-2972

FIELD WORK 1981, 1982
REPORT 1986

PREPARED BY: K. Sherman
Water Scientist
Technical Support Section
CENTRAL REGION

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Mr. V. Rudik
Ministry of the Environment
Central Region
7 Overlea Boulevard
Toronto, Ontario
M4H 1A8

TABLE OF CONTENTS

<u>INTRODUCTION</u>	1
<u>STUDY AREA</u>	2
<u>SURVEY PROCEDURES</u>	5
<u>WATER QUALITY STATUS</u>	6
<u>Physical Factors</u>	6
<u>Basic Chemistry</u>	6
<u>Bottom Water Conditions</u>	11
<u>Nutrient Status</u>	15
<u>Phytoplankton</u>	15
<u>Aquatic Plants</u>	17
<u>Summary</u>	18
<u>NUTRIENT BUDGET</u>	19
<u>LAKE SENSITIVITY FEATURES</u>	22
1. <u>Lake Trout Habitat</u>	22
2. <u>Flushing Rate - Retention Time</u>	22
3. <u>Shoreline Development</u>	22
4. <u>Bottom Water Conditions</u>	23
5. <u>Algae Problems</u>	23
<u>HISTORICAL CHANGES</u>	25
<u>SUMMARY, CONCLUSIONS, RECOMMENDATIONS</u>	26
<u>APPENDICES</u>	27
APPENDIX I Lake Chemistry Results, 1981, 1982	
APPENDIX II Examples of Export Coefficient Calculation for the Inflow From Lasswade Lake (CH5)	
APPENDIX III Phytoplankton Results, 1981, 1982	
APPENDIX IV Aquatic Macrophytes Found in Chandos Lake	
APPENDIX V Phosphorus Budget Calculations	

INTRODUCTION

In 1976, the Township of Chandos retained a consulting firm to conduct a lake capacity study of Chandos Lake. Based on the recommendations of this report, the Township passed a By-law denying any further shoreline development on the lake. In 1980, however, an Ontario Municipal Board decision concerning a small proposed shoreline subdivision on the lake, overturned the By-law and allowed the subdivision to proceed. The major reason for the decision was the inadequate technical basis of the consultant's report. The Township enquired through the Crowe Valley Conservation Authority about further water quality studies on the lake, which would provide a basis for assessing development potential. The Conservation Authority requested assistance from the Ministry of the Environment, Central Region, and a water quality survey resulted.

The purposes of the water quality survey were as follows:

1. To define the existing water quality status of the major lakes in Chandos Township.
2. To establish nutrient budgets for the lakes.
3. To detail the relative sensitivity to further development, or further nutrient input for each lake.
4. To provide recommendations on further development, based on the relative sensitivity.

STUDY AREA

Chandos Township is located approximately 60 km. northeast of the City of Peterborough in the northeast corner of Peterborough County. Lakes selected for study included Tallan, Clydesdale, Lasswade and Chandos (Figure 1). The first three lakes mentioned, discharge to Chandos Lake. Chandos Lake discharges to the Crowe River, which is part of the Trent River system. During the survey, a concrete dam was constructed at the outlet of Lasswade Lake to stabilize water levels. Other upstream lakes have natural water level control. Chandos Lake has a water level that is controlled, to some extent, by the backwater effect of the Crowe River. On occasion, the Crowe River water level exceeds that of Chandos Lake, causing reverse flow into the normal outlet from the lake. According to the Crowe Valley Conservation Authority, there is no way of estimating the amount of water coming into the lake during these periods. However, it is felt that on an annual basis, the amount is not significant.

Table 1 summarizes various characteristics of each lake. The entire area of Chandos Lake is located in the Precambrian Shield. Bedrock underlying Gilmour Bay, South Bay and Lasswade Lake (including much of the immediate drainage basins) is the hard Loon Lake Granite. Clydesdale Lake and much of its immediate drainage basin is underlain by carbonate rich rocks, such as crystalline limestone. Tallan Lake and the majority of Chandos Lake basins are underlain by a combination of rocks, including conglomerate and crystalline limestone. These different rock types contribute to differences in the mineral content of lake water and may affect the phosphorus export from different parts of the land areas draining to the lakes.

Uses of the lakes include swimming, wading, boating, fishing and snowmobiling.

According to the Ministry of Natural Resources, Chandos and Tallan Lakes have resident populations of lake trout. Clydesdale and Lasswade Lakes were considered warm water fisheries and have populations of smallmouth bass.

A solid waste landfill site is located within the Chandos Lake drainage basin (Lot 11, Concession 11, Chandos Township). The site is operating without any reported problem.

Figure 1: Chandos Township Lake Survey Station Locations 1981 & 1982

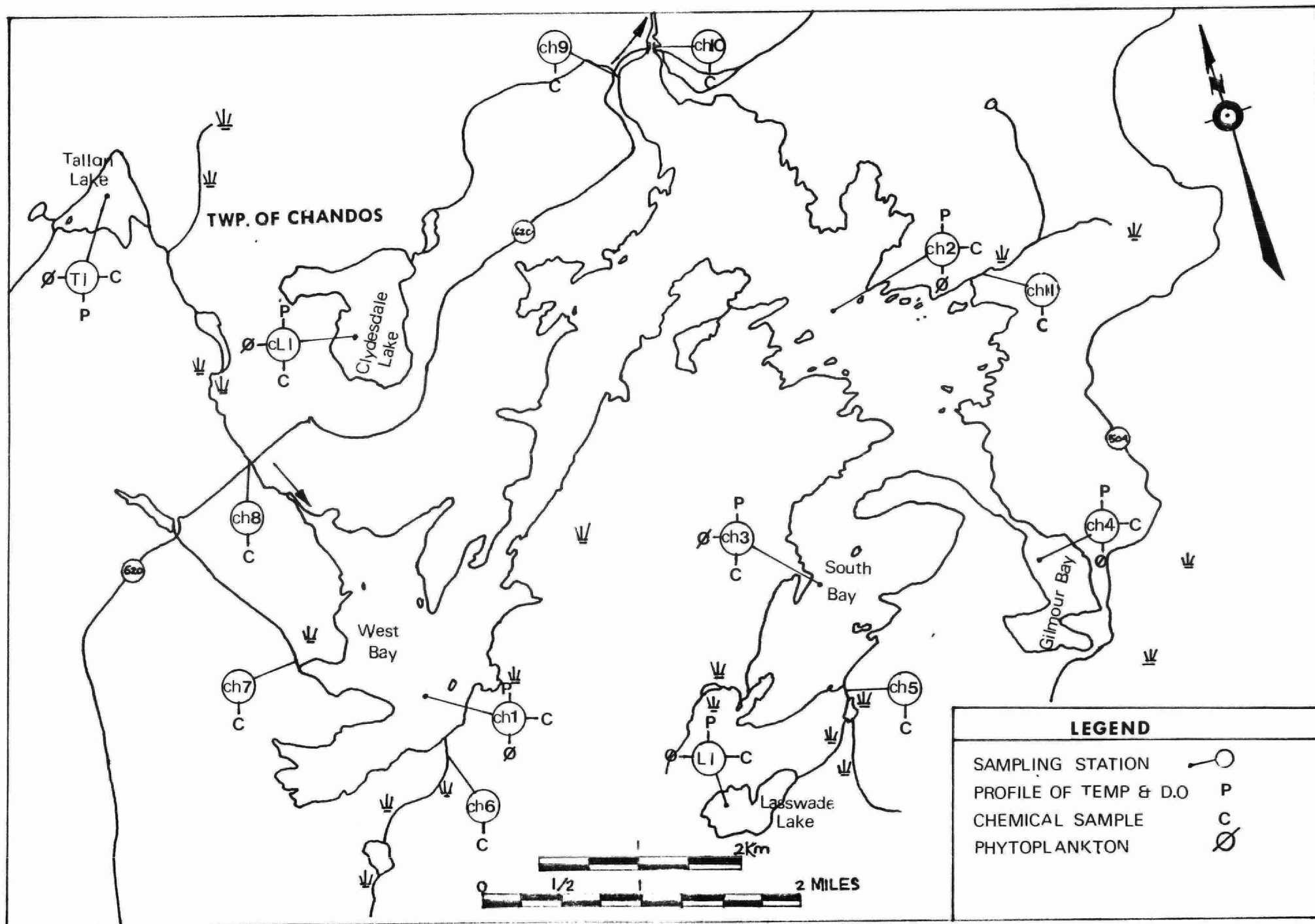


Table 1 Physical characteristics of the study lakes

PHYSICAL CHARACTERISTIC	TALLAN	CLYDESDALE	LASSWADE	GILMOUR BAY	CHANDOS
Volume (V) ($\times 10^6 \text{ m}^3$)	4.46	2.11	0.71	5.53	214.36
Surface Area (A_o) (Km^2)	0.525	1.12	0.31	0.65	16.68
Mean Depth (z) (m)	8.50	1.88	2.29	8.51	12.85
Max. Depth (z_m)	25.9	4.0	9.5	27.4	45.7
Total Drainage Area (A_d) (Km^2)	4.58	3.02	0.99	2.43	75.18
% Watershed Forested	100	100	100	100	100
Bedrock, % Igneous rock	100	100	100	100	100
% Sedimentary rock	0	0	0	0	0
# of Cottages (NC)	11	20	19	63	849
Dwellings (ND)	2	1	1	10	37
Vacant Lots (NVL)	7	17	17	3	77

SURVEY PROCEDURES

Water Quality

Stream stations were sampled to obtain an indication of the input of nutrients to Chandos Lake. Lake stations were selected to represent the open areas of lakes at the deepest point. At each lake station, profiles of temperature and dissolved oxygen concentration were taken with euphotic zone composite samples and bottom water samples (where depth permitted). Stream samples were analysed for nutrients and basic chemistry. Lake sample analyses included nutrients, basic chemistry, phytoplankton biomass and species composition. (See list of analyses in Appendix I.) Laboratory analyses were carried out by staff of Laboratory Services Branch, using standard MOE analytical techniques.

Stream Flow

No flow gauging station was present within the Chandos Lake watershed during the survey. The Water Survey of Canada station on the Crowe River at Glen Alda (Station 02HK005) is located near Chandos Lake. However, the area draining to the station is one order-of-magnitude larger than the entire Chandos Lake drainage basin. It was considered more appropriate to use the flow information for Bob Creek (Station 02HF004 drainage area 21.8 km²) near Minden, to pro-rate mean monthly flows for the study period (May, 1981 to December, 1982). Flows were pro-rated for each Chandos Lake sub-watershed on a unit area basis, using the Bob Creek station.

Phosphorus Export

To calculate phosphorus export for a sub-watershed, the mean monthly total phosphorus concentration was multiplied by the estimated mean monthly flow. Where total phosphorus concentrations were not available for a month, values were interpolated or assumed from other sub-watersheds nearby. Each monthly export value was then summed for the appropriate twelve-month period. The results of this analysis was compared with reported values of Limnology Unit, Water Resources Branch. Export values were interpolated for miscellaneous drainage areas of Chandos Lake that were not monitored during the survey. A sample calculation is shown in Appendix II.

WATER QUALITY STATUS

Table 2 provides a comparison of selected water quality factors found in Chandos Township Lakes during 1980 and 1982. Data for the lake stations is found in Appendix I.

Physical Factors

Water transparency, as measured by Secchi disc, is influenced by suspended algae, dissolved colour and any non-living particles suspended through the water column in a lake. The transparency found in Chandos Lake was moderately good. Based on this measurement alone, the lake was considered to border oligotrophic or unenriched conditions. Tallan Lake had very good water clarity and was considered oligotrophic or unenriched. Clarity was moderate in Clydesdale and Lasswade Lakes. Clydesdale Lake is relatively shallow. The lake may have had better clarity than measured as the Secchi disc was observed on bottom at the deepest point in the lake. Dissolved colour may have also contributed to the poor clarity in Lasswade Lake. Both of these lakes were considered mesotrophic, or moderately enriched, based on this measurement.

All lakes, except Clydesdale Lake, exhibited thermal stratification or layering. Thermoclines, or zones of rapid temperature decline, formed between 5 and 8 m. (Figures 2A to F). In the deeper lakes, Tallan and Chandos, strong thermal stratification resulted in the separation of the waters below the thermocline (the hypolimnion) from the well oxygenated upper waters. This separation has important implications for the depletion of oxygen in the hypolimnion, as explained below.

Basic Chemistry

All lakes in the study area were alkaline with pH greater than 7 units. Lasswade Lake was considered soft water with the lowest alkalinity of the lakes studied (27 mg/L as CaCO_3). None of the lakes was considered sensitive to acidic precipitation because of the buffering capacity represented by the alkalinity in the water and the watershed geology.

The ionic balance or the balance in dissolved salts in the lake water indicated no unusual inputs to the lakes. Clydesdale Lake had a proportionately higher concentration of sodium and chlorides, indicating minor additions of these substances to the lake.

Table 2 A comparison of selected water quality factors found in
Chandos Twp Lakes during 1981 and 1982
(mean values from the lake euphotic zone in mg/L unless otherwise
noted)

Lake/ Area Station	Chandos Lake				Tallan Lake	Clydes- dale L.	Lass- wade L.
	W.Bay	Main	S.Bay	Gilmour			
	CH1	CH2	CH3	CH4	T1	CL1	L1
Physical Characteristics							
Secchi disc (m)	4.4	4.7	4.7	4.3	6.1	3.5	4.0
colour (H.U.)	10.3	9.9	9.2	10.1	13.7	17.4	10.0
Basic chemistry							
alkalinity	47.5	48.5	47.4	44.5	87.4	42.1	24.7
pH	7.91	7.96	7.95	7.71	8.17	7.87	7.54
conductivity*	127	127	126	120	203	130	73
calcium	19.9	19.5	19.6	18.2	36.0	18.8	10.4
magnesium	1.61	1.54	1.44	1.63	1.68	1.18	0.97
sodium	1.68	1.65	1.58	1.68	0.83	3.03	0.92
potassium	1.09	1.09	1.09	1.09	1.53	0.99	0.74
chlorides	2.73	2.70	2.67	2.93	1.36	6.32	1.54
sulphate	9.86	9.99	9.93	9.28	8.51	9.42	7.12
Bottom water conditions							
max.btm.w.temp.(°C)	11.3	6.5	7.7	6.6	5.6	23.4	11.5
min.btm.w.O ₂	0.3	3.6	4.0	0.0	1.0	7.6	0.7
min.btm.w.NO ₂ +NO ₃ †	5	5	25	5	8		5
max.btm.w.ammonium†	52	40	34	760	110		340
btm.w.H ₂ S?	no	no	no	yes	no	no	no
Enrichment status							
tot. phosphorus							
-euphotic zone†	13	12	12	17	11	20	13
-btm.waters†	17	22	26	69	32		34
min. silicates	0.18	0.14	0.10	0.14	1.40	0.18	0.15
chlorophyll a†	2.05	1.55	1.95	2.40	1.10	2.25	2.30
acidified chl.a	68	87	72	81	77	67	74
tot.biovol.(mm ³ /L)	0.71	0.57	0.68	0.68	0.21	0.58	0.67
% blue-green	13	13	13	28	4	14	18

* µmhos/cm @ 25°C

† µg/L

Fig.2A Isotherms (°C) for Station Ch 1 in Chandos Lake, 1982

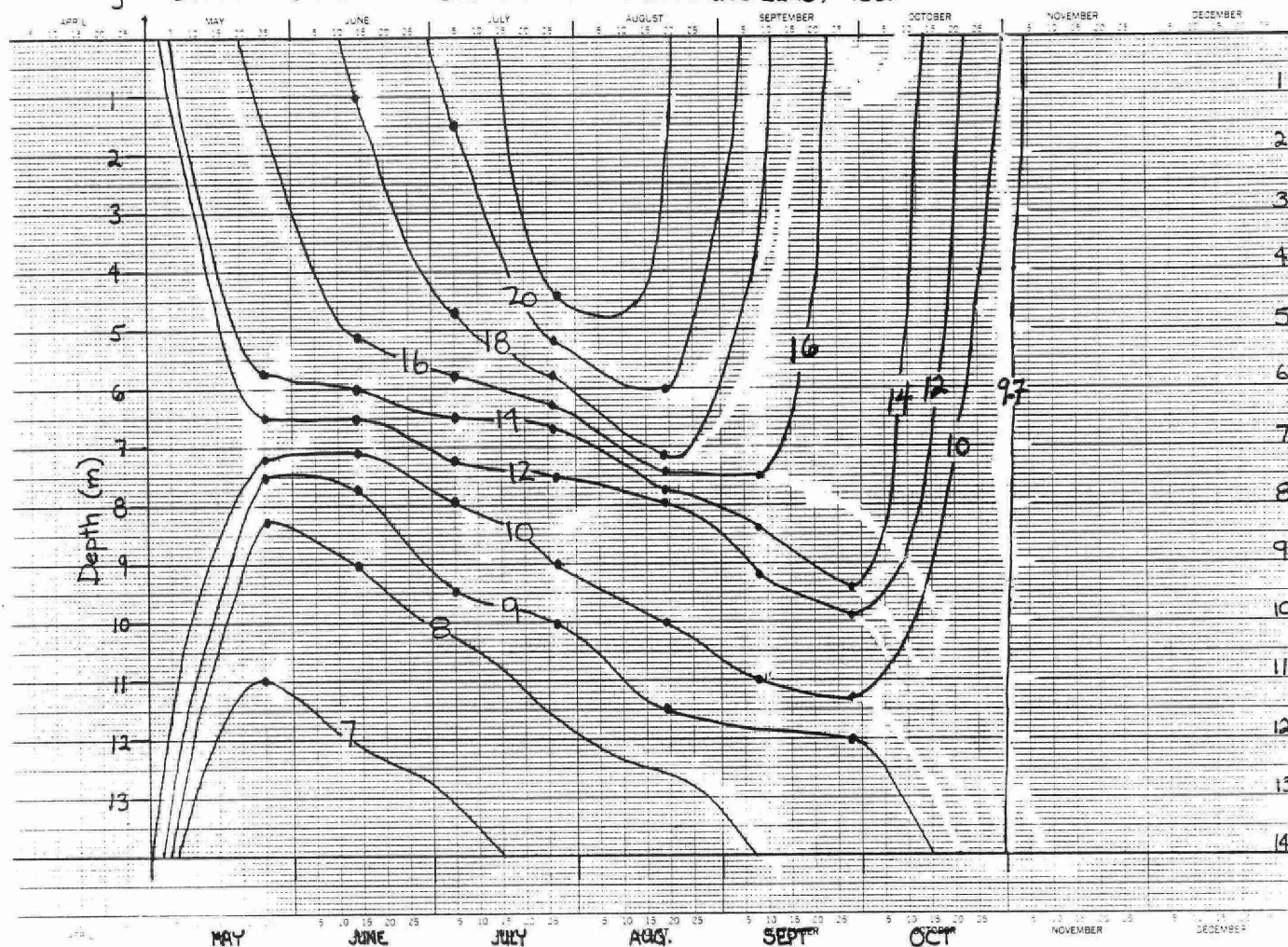


Fig.2B Isotherms (°C) for Station CH2 in Chandos L., 1982

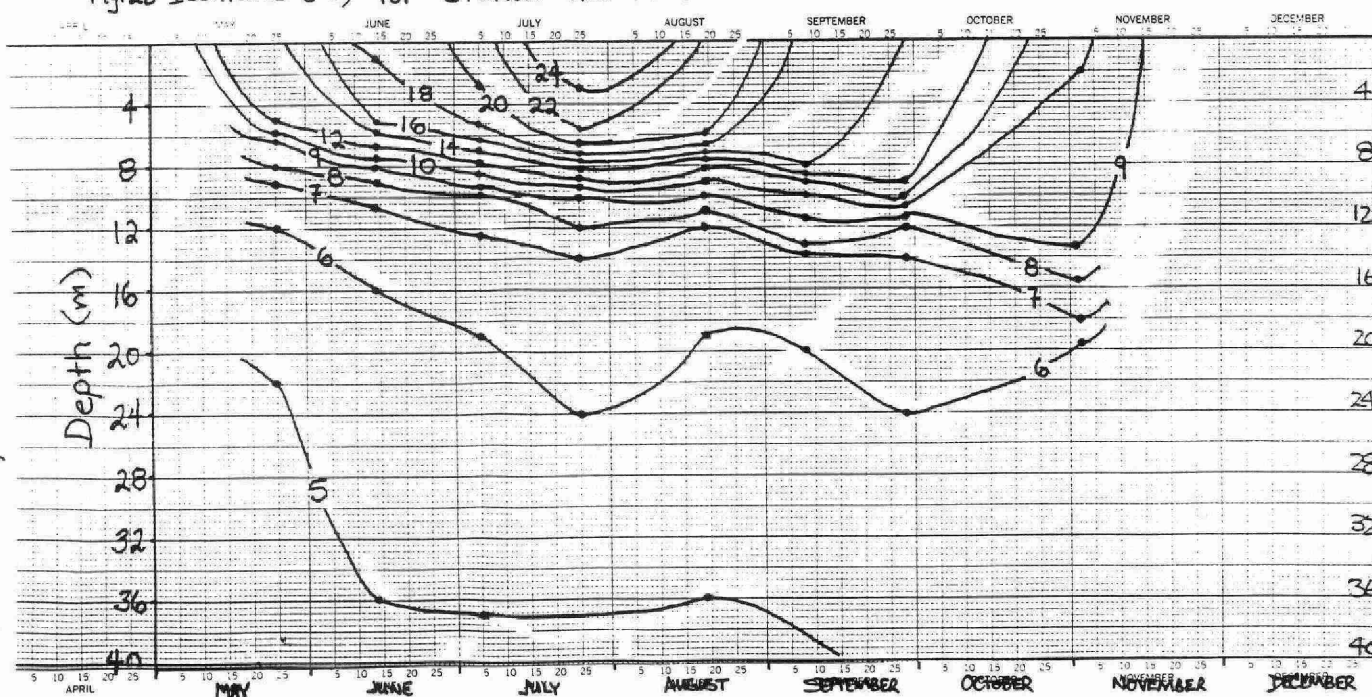


Fig.2C Isotherms (°C) for Station CH3 in Chandos L, 1982

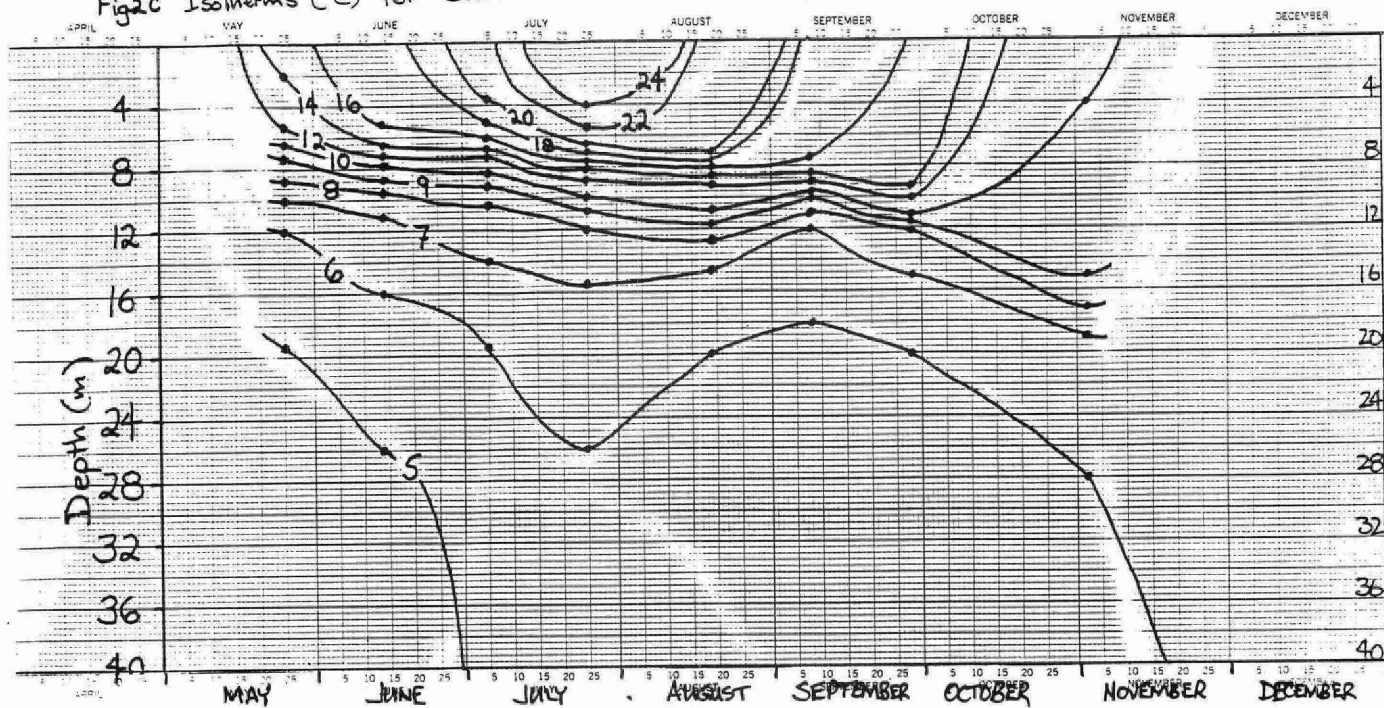


Fig.2D Isotherms (°C) for Station CH4 in Chandos L, 1982

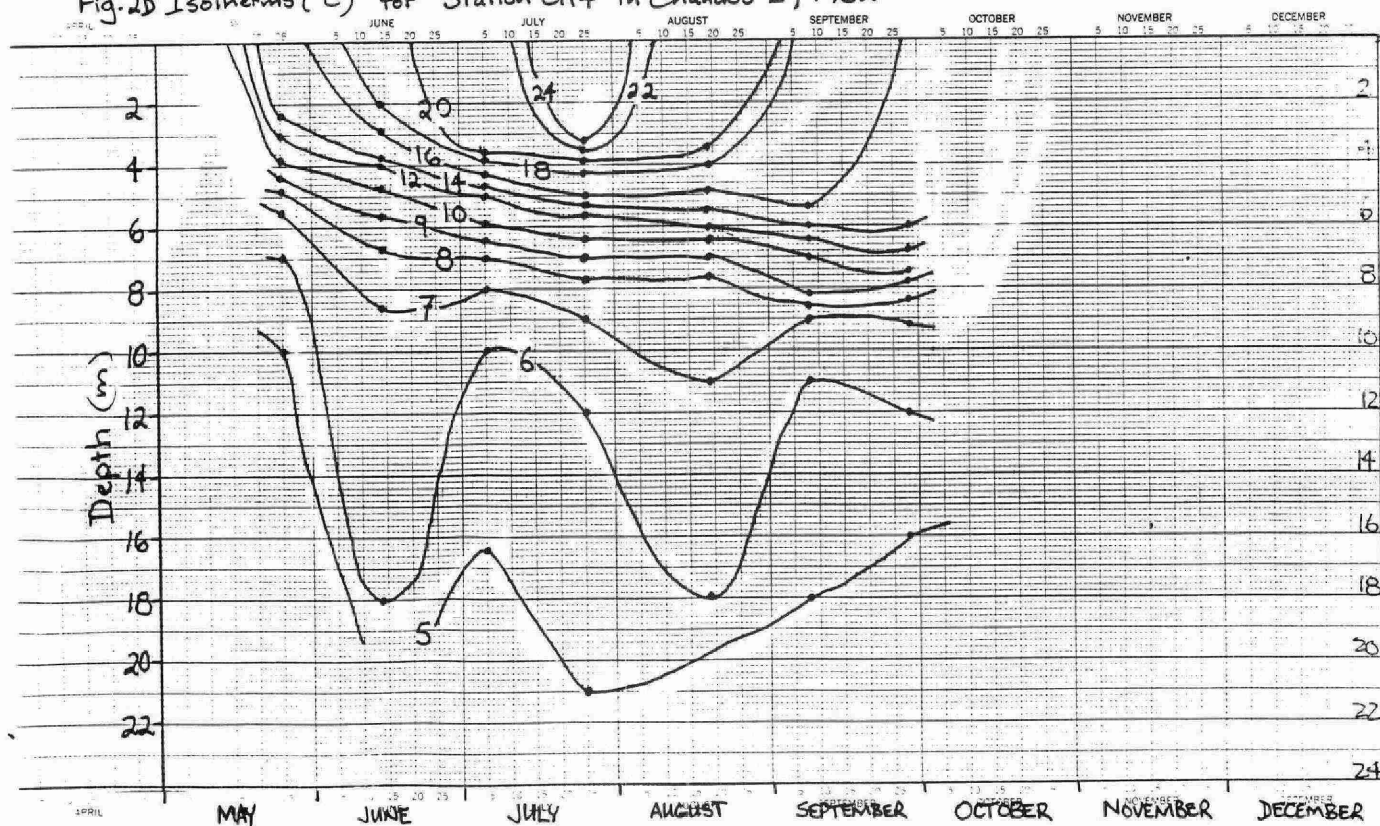


Fig. 2E Isotherms (°C) for Station T1 in Tallan Lake, 1982

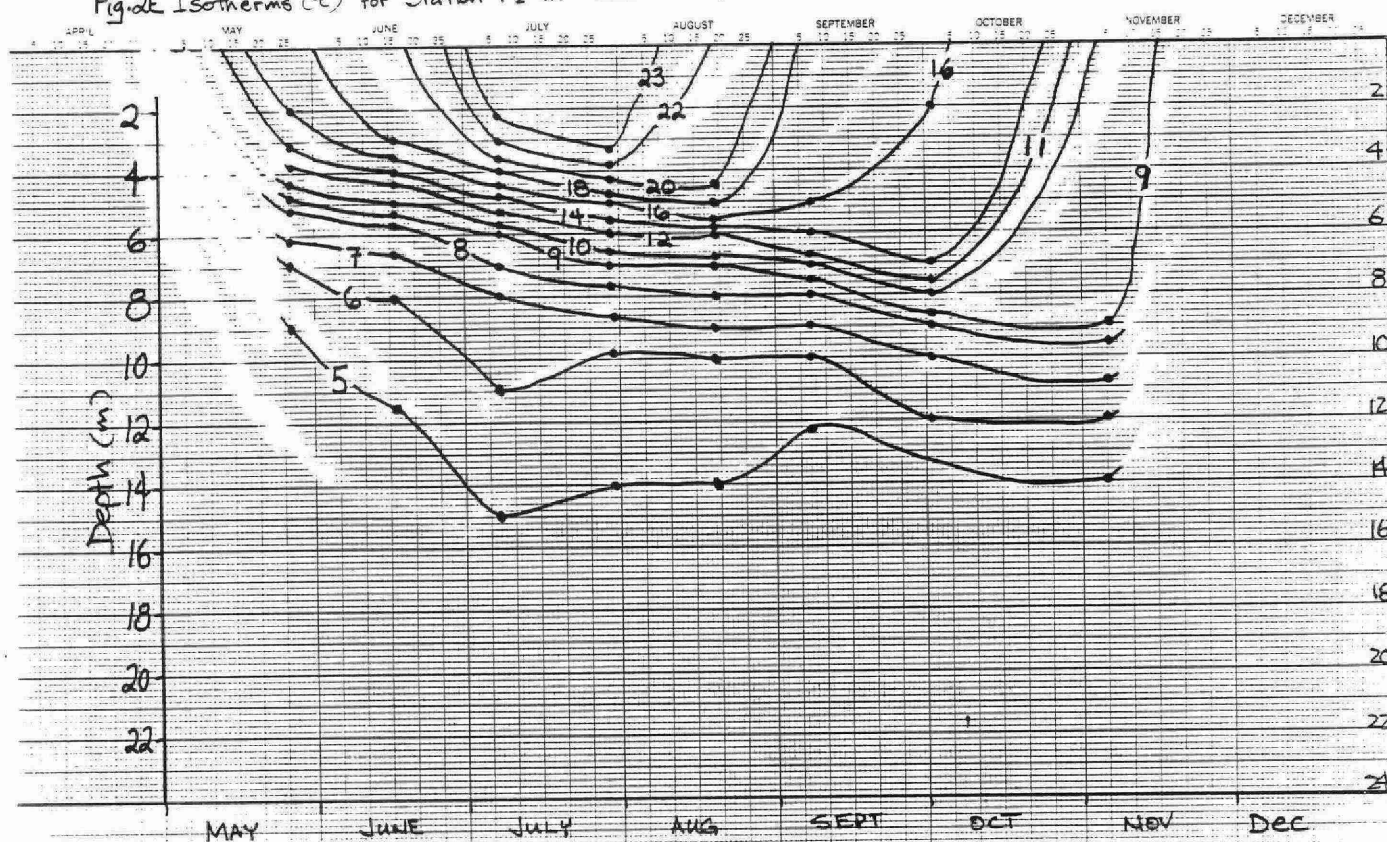
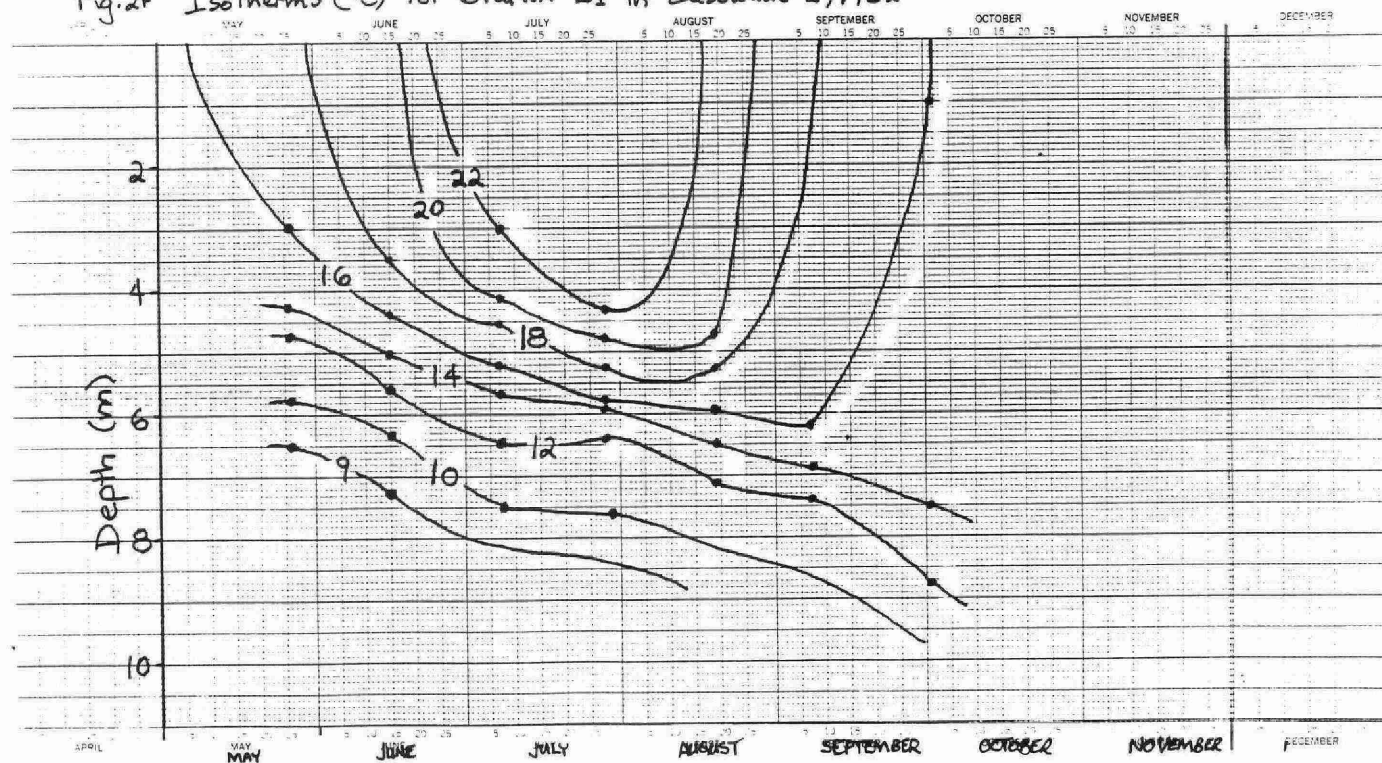


Fig. 2F Isotherms (°C) for Station L1 in Lasswade L, 1982



Bottom Water Conditions

Dissolved oxygen is essential to the life of most organisms in lake systems, especially to coldwater species of fish, such as lake trout. The oxygen below the thermocline during the ice-free period may be depleted by decomposition of organic matter falling into the deeper waters of the lake (the hypolimnion). Fortunately, the oxygen supply is replenished in the fall when lake temperature drops and complete circulation of the water column occurs.

The dissolved oxygen regimes for the lakes other than Clydesdale are illustrated in Figures 3A to F. Only slight oxygen depletion was noted in the main body of Chandos Lake. Complete depletion was noted in the bottom waters of Gilmour Bay. This is likely the result of decomposition occurring in a relatively small volume of water in the deep part of the basin below the thermocline. The small deep hole in Lasswade Lake experienced severe oxygen depletion. Fortunately, incomplete separation of the hypolimnion occurred in this lake resulting in fluctuation in oxygen concentration during the summer. Tallan Lake experienced gradual oxygen depletion leading to near complete depletion in the bottom waters of the lake.

The rate of dissolved oxygen depletion in the hypolimnion was calculated for comparison in Tallan Lake and Gilmour Bay for a similar period of time during 1982 (42 and 41 days respectively). Gilmour Bay was much more rapidly depleted of oxygen than Tallan Lake with depletion rates of 383 mg O_2/m^2 .day and 238 mg O_2/m^2 .day respectively. Based on limits for areal depletion rate suggested by Mortimer (1941, 1942), Tallan Lake was considered oligotrophic and Gilmour Bay was considered mesotrophic or moderately enriched.

The complete depletion of oxygen in the bottom waters near the sediment is also of concern because of the possibility of a build-up of phosphorus and toxic substances, such as ammonia and hydrogen sulphide in the bottom waters. If continued chronic oxygen depletion occurs, phosphorus may be released and accumulate in the bottom waters. Hydrogen sulphide was noted in the bottom waters of Gilmour Bay. In addition, a gradual accumulation of ammonia and total phosphorus occurred in the bottom waters of the bay, accompanied by a gradual depletion of nitrate nitrogen. Only slight accumulation of total phosphorus was noted in the bottom waters of other study lakes.

Fig.3A Dissolved Oxygen Isopleths (mg/L) for Station CH1 in Chandos L., 1982

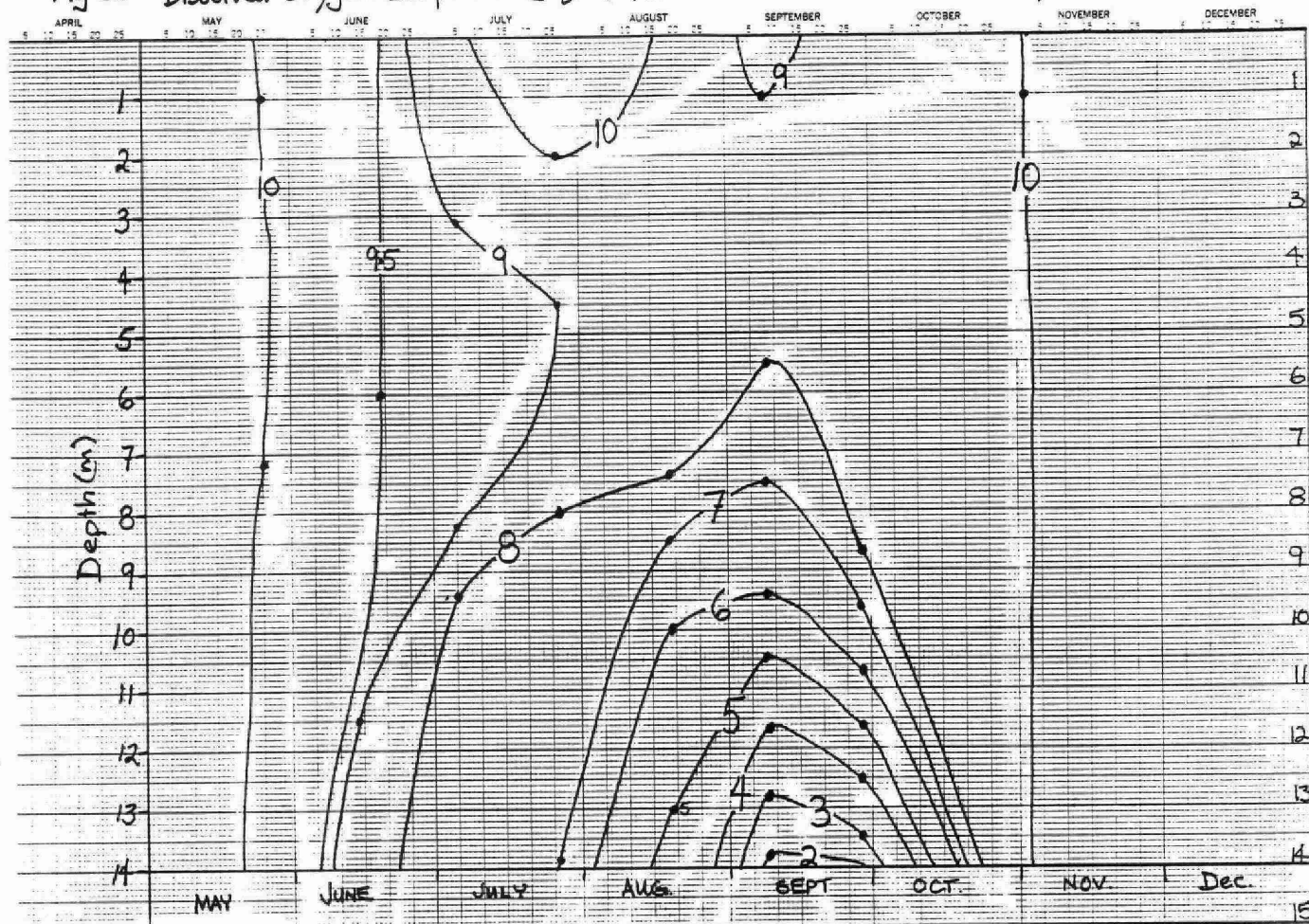


Fig.3B Isopleths of Dissolved Oxygen (mg/L) for station CH2 in Chandos L., 1982

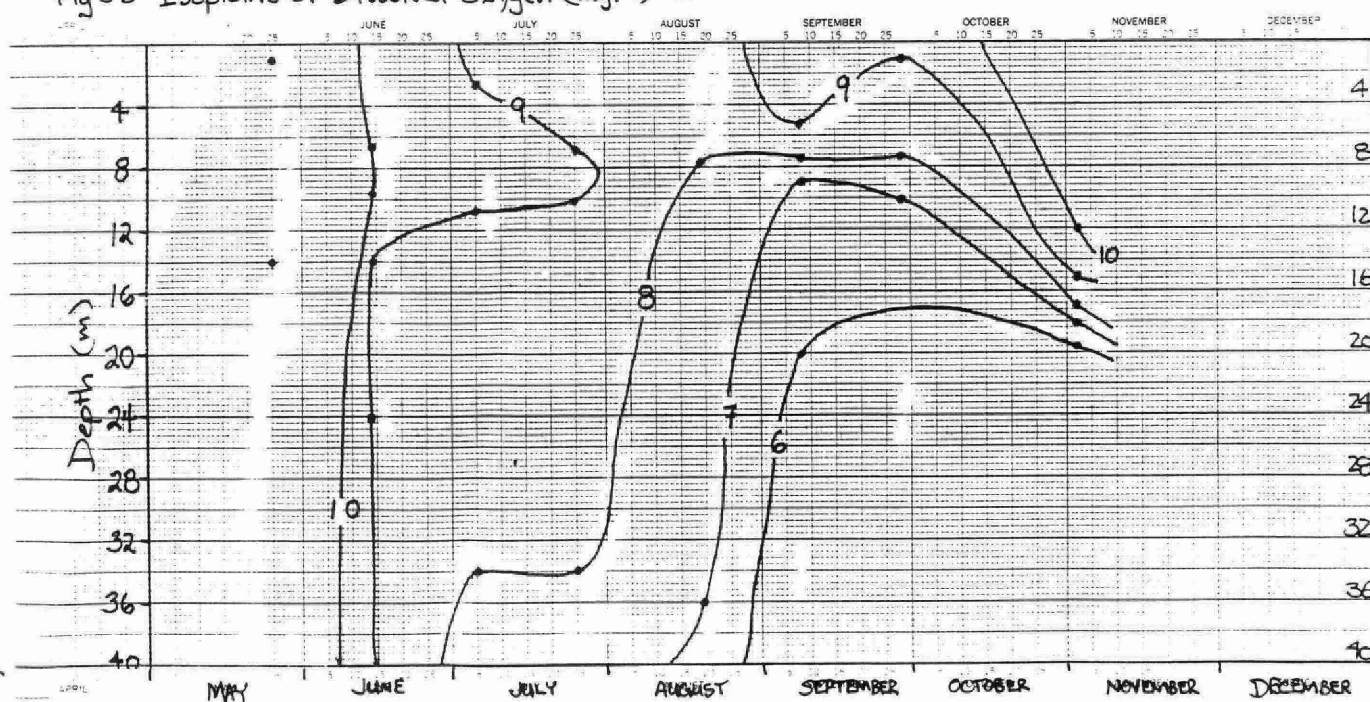


Fig.3C Isopleths of dissolved oxygen (mg/L) for Station CH3 in Chandos L, 1982

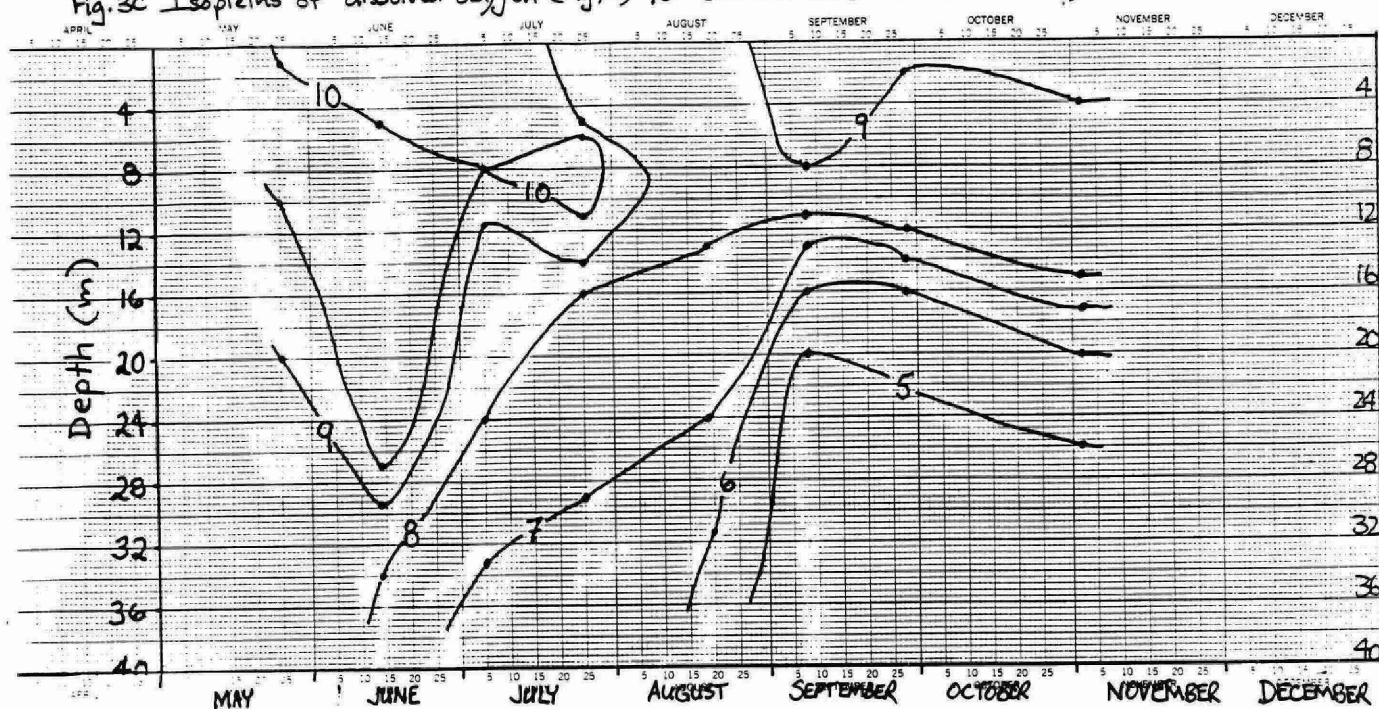


Fig.3D Isopleths of dissolved oxygen (mg/L) for Station CH4 in Chandos L, 1982

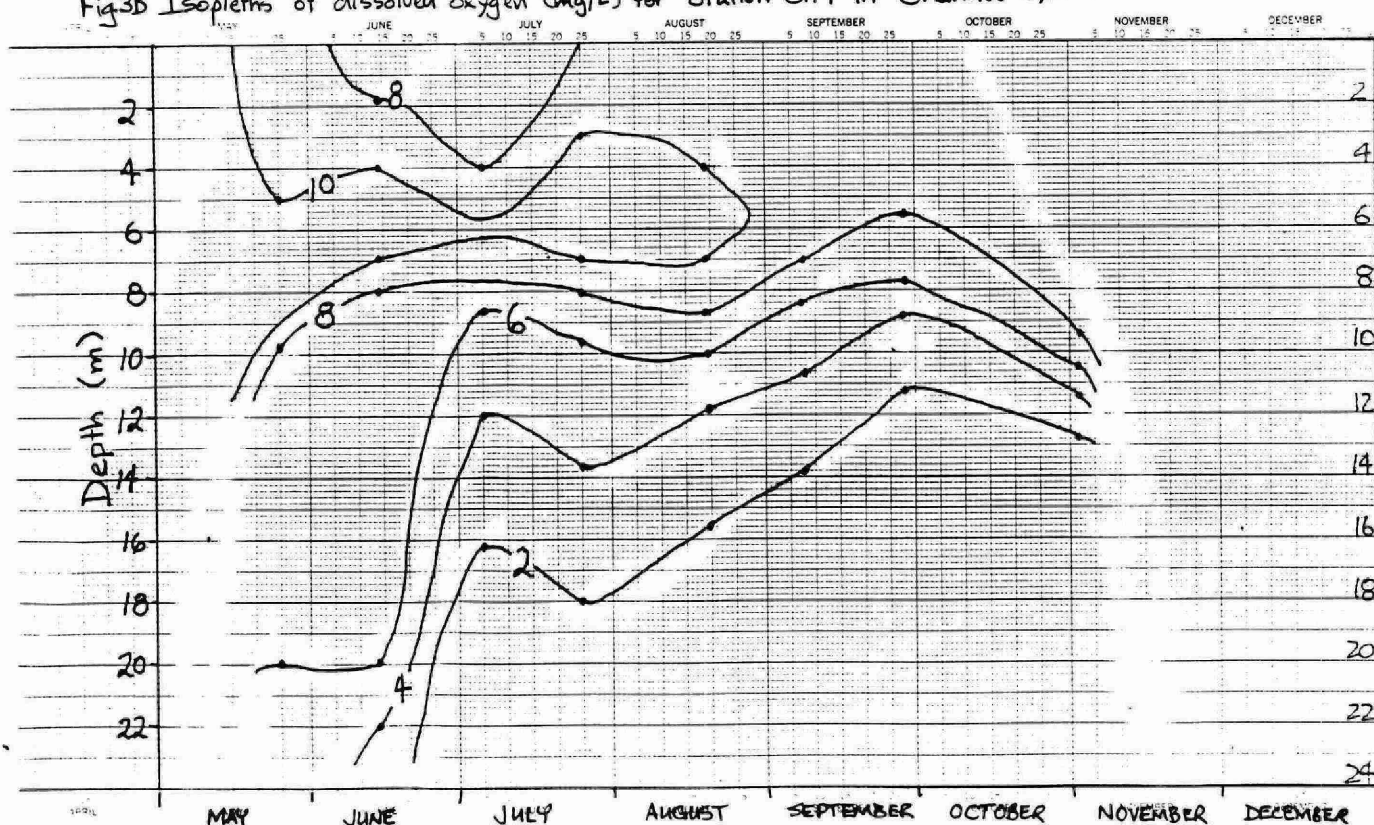


Fig.3E Dissolved Oxygen Isopleths (mg/L) for station T1 in Tallan Lake 1982

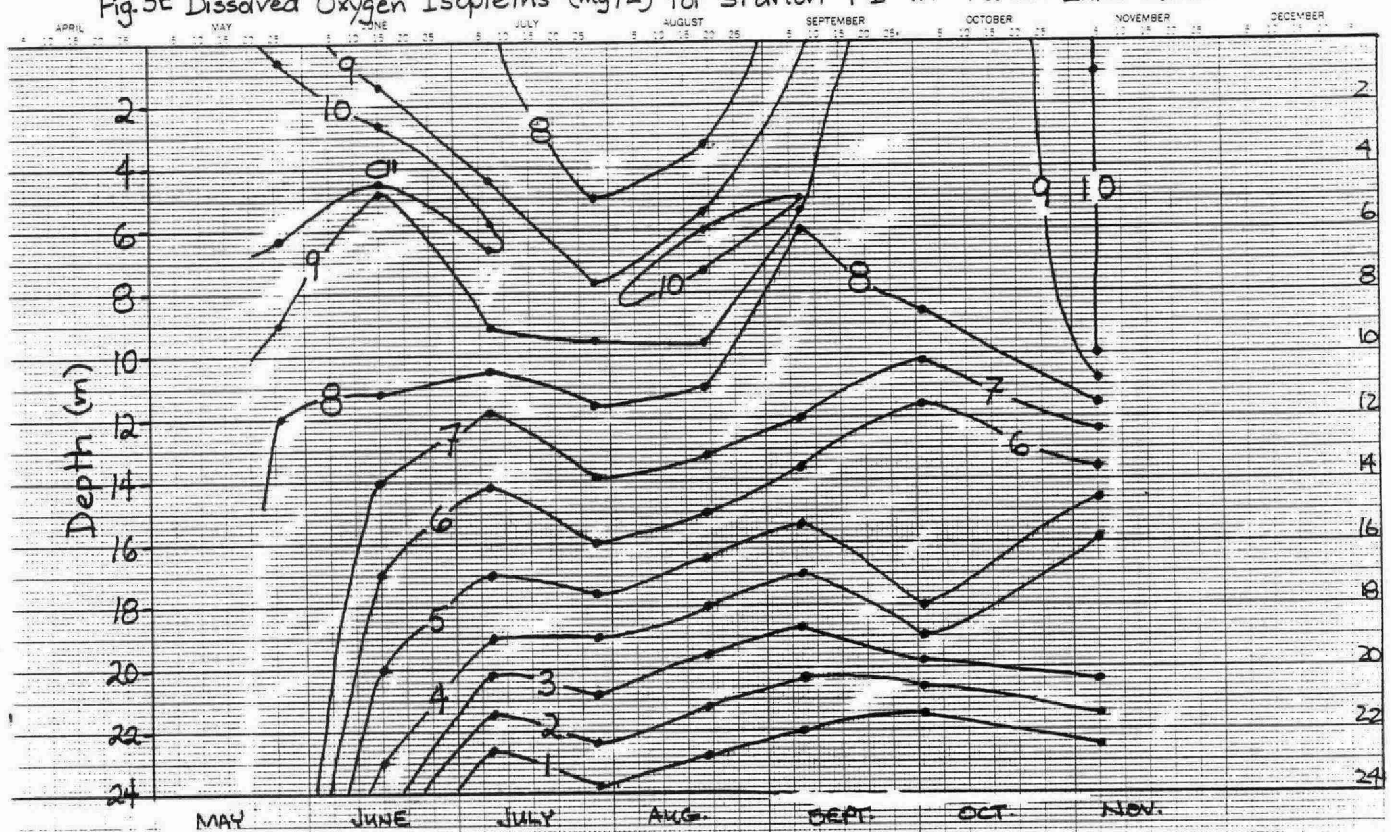
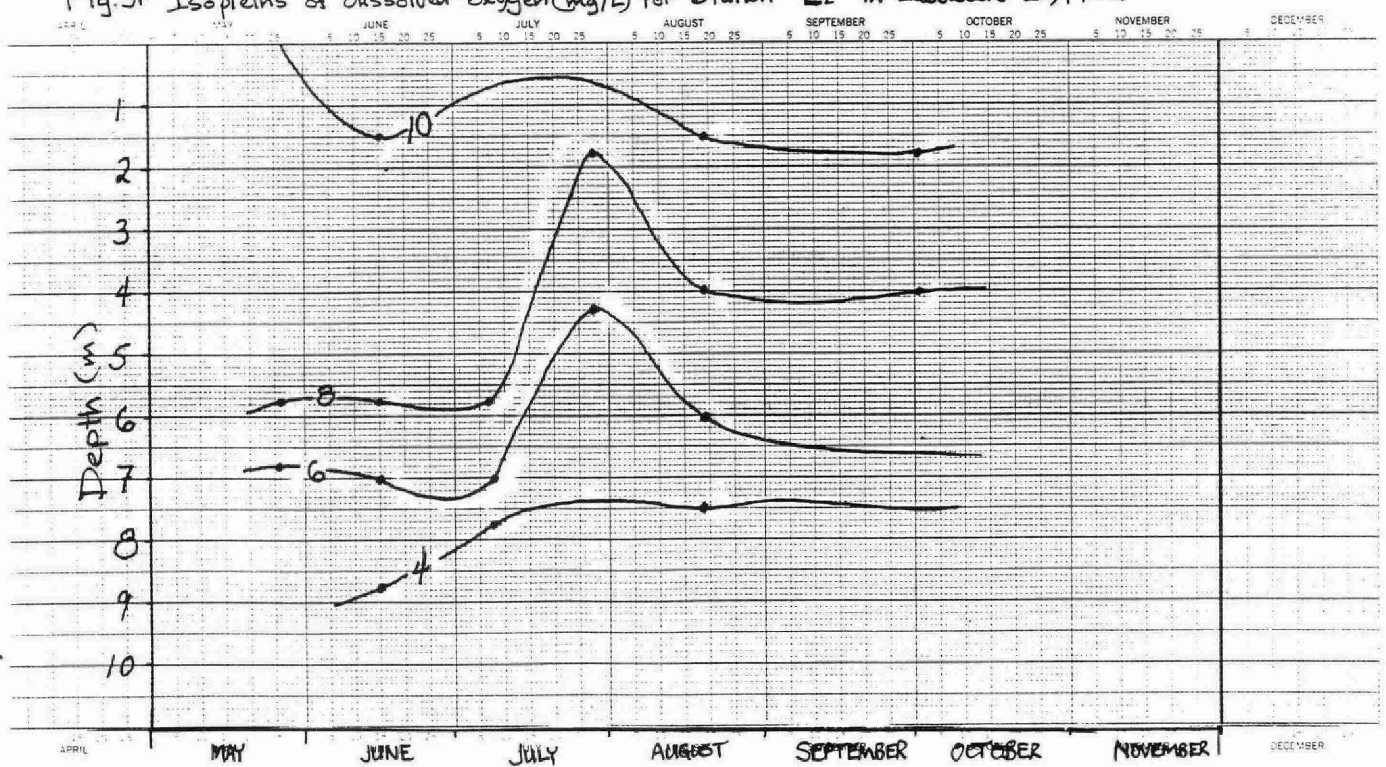


Fig.3F Isopleths of dissolved oxygen (mg/L) for station L1 in Lesswade L., 1982



Nutrient Status

Phosphorus is a key nutrient that often limits the growth of algae in lakes. Generally, when a total phosphorus concentration of 20 ug/L is found in the growth zone or the euphotic zone of the lake, nuisance growths of suspended algae become noticeable. Lakes with total phosphorus concentration less than 10 ug/L do not have common nuisance algae growths and are considered unenriched or oligotrophic. Tallan Lake bordered on oligotrophic conditions based on total phosphorus concentration. Other study lakes were considered moderately enriched or mesotrophic, based on this parameter (i.e. total phosphorus concentration between 10 and 20 ug/L).

Silicates can also limit growth of certain algae, such as diatoms. The concentration in all but Tallan Lake was reduced to near depletion (less than 0.40 mg/L). This indicated that growth of diatoms, a relatively innocuous algae, could have been limited by a depletion of this substance.

Phytoplankton

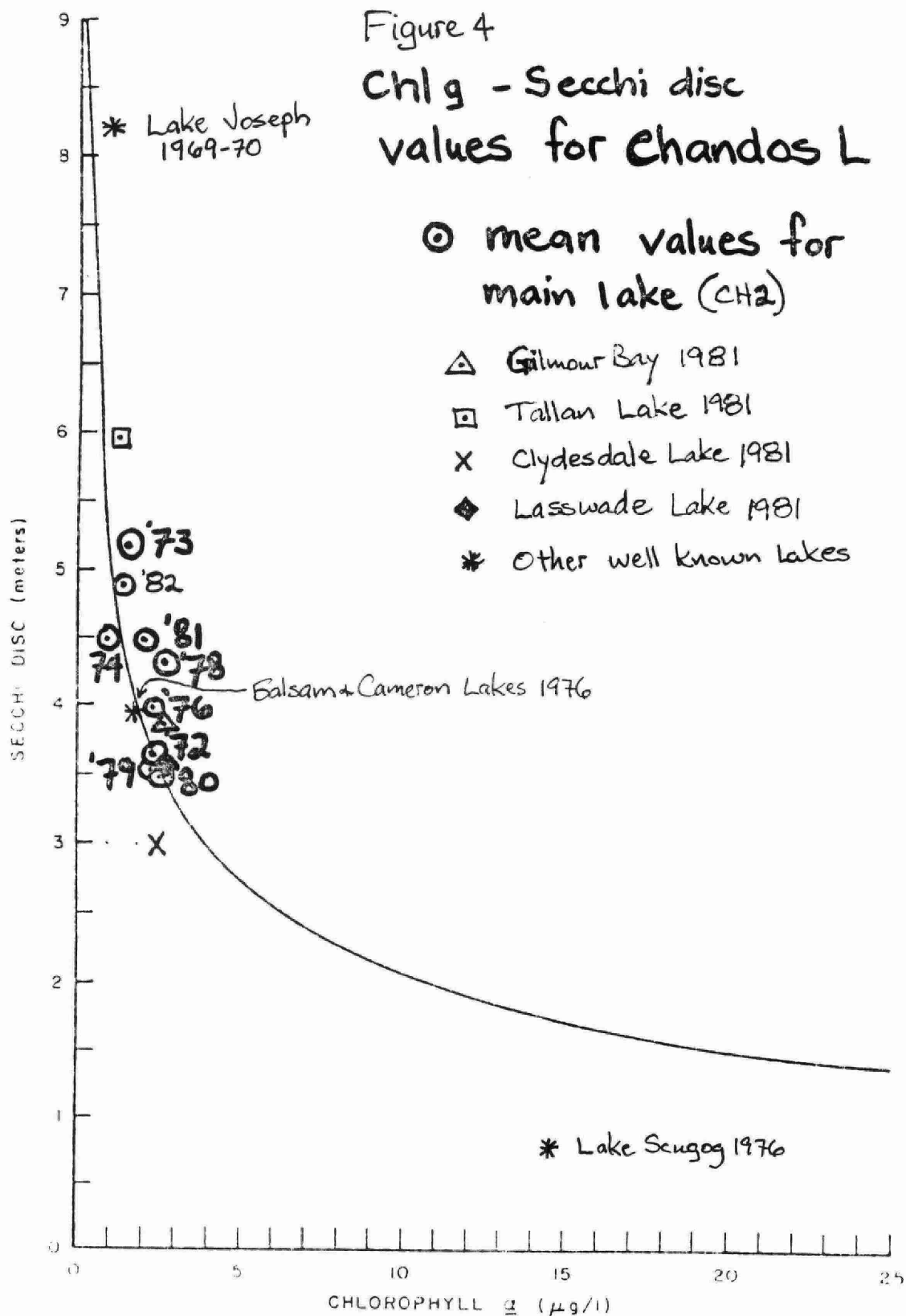
The suspended algae, or phytoplankton, found in the water column of a lake are the most important indicators of water quality conditions. They integrate the nutrients available over a growth season and provide a measure of the productivity of the lake in terms of a crop or biomass. Generally, when the biomass of algae present in the water column of the lake rises to 7 to 10 ug chlorophyll a/L, many people complain of aesthetic problems related to scums of algae, odour and matting of hair after swimming.

Algae densities through the study lakes ranged from favourably low values in Tallan Lake (1.1 ug/L chlorophyll a, bio-volume 0.21 mm³/L) to moderate values in Gilmour Bay (2.4 ug/L chlorophyll a, 0.68 mm³/L). Based on density alone, the main basin of Chandos Lake and Tallan Lake were considered bordering nutrient poor or oligotrophic conditions. Gilmour Bay, Clydesdale Lake and Lasswade Lake were considered moderately enriched with moderate densities of algae.

The relationship between chlorophyll a concentration and Secchi disc visibility is shown in Figure 4 with selected mean values for the study lakes and other well known lakes plotted. The position of Tallan Lake indicated similar quality to nutrient poor lakes, such as Lake Joseph. The remaining study lakes were in a moderate position, similar to Cameron or Balsam Lakes. No lakes were similar to very enriched lakes, such as Rice Lake.

Figure 4

Chl *a* - Secchi disc
values for Chandos L



The proportion of blue-green algae, especially the bloom causing algae in the total algae community in a lake, also indicates the relative condition of the lake. The percentage of blue-green algae was highest in Gilmour Bay (28%) with the percentage being made up largely of Anabaena and Chroococcus. These algae are known to cause bloom problems in lake waters. The lowest percent blue-green algae was found in Tallan Lake (4%).

The species composition was examined in each lake and lake stations with respect to susceptibility to water quality problems. Tallan Lake was dominated by Cyclotella and Cryptomonas. These algae are normally found in lakes with poor nutrient conditions. Lasswade Lake and Clydesdale Lake had similar common forms, including Fragillaria, Tabellaria fenestrata, Dinobryon and Chrysosphaerella. The presence of Tabellaria fenestrata in lake water often indicates nutrient enrichment of the lake. The main basin of Chandos Lake was characterized by a very similar group of common species at each of the three stations, including Cyclotella as the most common species in each of the three stations, Fragillaria and Tabellaria fenestrata. Of special note in the main body of the lake were the presence of significant densities of blue-green algae, including bloom-forming algae, such as Chroococcus and Aphanizomenon. The bloom forming algae were present in favourably low densities in the lake, however, their presence in the algae community is considered a sensitive feature as the appreciable addition of phosphorus to the lake water column would increase the density of these algae and lead to adverse water quality conditions. The algae community in Gilmour Bay most closely conformed to that of enriched conditions. The bloom-forming algae Anabaena dominated the community. Tabellaria fenestrata was also very common, as well as another blue-green algae, Chroococcus. Cyclotella, the form common in the main body of Chandos Lake, was much less dominant. This assemblage of algae in the order of dominance is often associated with enriched conditions. The densities of these algae is still favourably low, however, it is possible that given the right weather conditions that blooms of blue-green algae could occur in Gilmour Bay and an appreciable increase in the total phosphorus concentration could result in aggravated water quality conditions, with much increased possibility of blooms forming.

Aquatic Plants

Aquatic plants were investigated by MOE staff in 1977. Plants found in Chandos Lake are listed in Appendix III. It is interesting to note that the eurasian milfoil Myriophyllum spicatum was not found in Chandos Lake during 1977 and is reportedly still not present in the lake. This invading species grows to the surface in relatively deep water to form dense beds that can cause water use problems. Invasion of Chandos Lake or Chandos Township Lakes with eurasian milfoil

could result in some interference with navigation in areas that are shallow enough to provide suitable growth zones.

Summary

The following listing is meant to indicate the ranking of overall water quality status of the lakes studied in order of decreasing quality.

Tallan Lake
Chandos (Main)
Lasswade Lake
Clydesdale Lake
Gilmour Bay

NUTRIENT BUDGET

A nutrient budget is an important component of a water quality survey that shows the relative importance of various sources of phosphorus entering a lake. The percentage of phosphorus entering from controllable sources, such as shoreline development, is of obvious concern. Moreover, the additional phosphorus represented by registered vacant lots, can also be compared to the existing conditions to determine whether a water quality concern exists prior to any new shoreline development.

Also of interest are the export figures used for land drainage to the lake. These figures may differ, depending on the local geology, soil conditions and land use practices. Generally, cleared land provides more phosphorus per unit area in runoff than does forested land.

The methodology of Dillon (1975) as updated by Limnology Unit was used to derive phosphorus budgets for the study lakes and model the total phosphorus concentration to assess lake sensitivity to further shoreline development.

Tables 3 and 4 summarize the phosphorus budgets for the study lakes and the export measured from the selected stations in the drainage area to Chandos Lake. Appendix IV lists the assumptions and factors used in the calculations.

Assuming the "worst case" that all phosphorus from shoreline sewage disposal systems eventually enters the lake, 34% of the phosphorus supply to the main body of Chandos Lake originates in shoreline development. The lowest percentage was found in Tallan and Clydesdale Lakes (23-25%) and the highest percentage was noted in Gilmour Bay with 60% of the total phosphorus entering the lake from shoreline development. The potential increase represented in the vacant but registered lots is relatively low in all of the lakes, with the exception of Lasswade Lake. If all registered vacant lots were developed on Lasswade Lake, a 21% increase in the total phosphorus supply to the lake would result. This represents a measurable increase in total phosphorus concentration in the lake water column.

Another indication of the relative importance of additional phosphorus through shoreline development can be obtained by looking at the effect of adding 100 additional cottages to the shoreline of the lakes on the nutrient budget (Table 3). The least affect is observed in the main body of Chandos Lake by such an addition with a 3% increase in the overall supply, the highest increase would be caused in Lasswade Lake with 121% increase in the total phosphorus supply to the lake,

Table 3 Phosphorus budgets for the study lakes and predicted total phosphorus concentrations

DILLON'S MODEL (VERSION 2)	TALLAN	CLYDESDALE	LASSWADE	GILMOUR BAY	CHANDOS
Supply from:					
Drainage Area (JE)(Kg/yr)(%)	28.4 (44.4)	32.3 (33.6)	8.5 (20.4)	20.169 (18.0)	544.1 (30.9)
Precipitation (JPR)(kg/yr)(%)	19.6 (30.6)	41.8 (43.4)	11.6 (27.8)	24.2 (21.6)	622.2 (35.3)
Natural (JN) (kg/yr)	48.0	74.1	20.1	44.4	1,166.3
Artificial (JA) (kg/yr)(%)	16.0 (25.0)	22.1 (23.0)	21.6 (51.8)	67.7 (60.4)	594.0 (33.7)
TOTAL (JT)	63.9	96.18	41.66	112.08	1,760.2
+ vacant lots (Kg/yr)(%)	3.5 (5.5)	8.6 (8.9)	8.6 (20.6)	1.5 (1.3)	38.8 (2.2)
+100 lots (Kg/yr)(%)	50.4 (78.8)	50.4 (52.4)	50.4(121.0)	50.4 (45.0)	50.4 (2.9)
Total Phosphorus(mg/m ³)					
- predicted, existing	8.1	6.6	16.5	20.7	15.3
- measured	11	20	13	17	13
- + vacant lots	8.6	7.2	19.9	21.0	15.6
- + 100 lots	14.4	10.0	35.9	29.7	15.7

Table 4 Export coefficients calculated from monitored watersheds in Chandos Township

STATION DESCRIPTION	DRAINAGE AREA(Km ²)	PHOSPHORUS EXPORT(mg/m ² .yr)
CH11 tributary to Chandos L from east	3.30	8.1
CH5 trib. from Lasswade L	3.17	4.6
CH6 trib. from Little Chandos L	3.33	8.6
CH7 trib. to Chandos L from west	3.88	6.2
CH8 trib. from Tallan L	12.16	5.9
CH9 trib. from Clydesdale	11.96	10.7

with obvious degradation of water quality. A significant increase would also result with the addition of 100 cottages to Gilmour Bay, Tallan Lake and Clydesdale Lake.

The supply of phosphorus from the monitored watersheds was highest in the watershed draining Clydesdale Lake ($10.7 \text{ mg/m}^2\text{.yr}$) and lowest in Lasswade Lake ($4.6 \text{ mg/m}^2\text{.yr}$). The difference between these two watersheds may relate to the bedrock geology found in the two respective sub-watersheds to Chandos Lake. The values were generally higher than the average of $5.5 \text{ mg/m}^2\text{.yr}$ found by Limnology Unit. In all, 66% of the drainage basin of Chandos Lake was monitored, while the remaining third was estimated, using appropriate measured export figures from adjacent areas.

The supply of phosphorus that enters the lake through the outflow when the Crowe River causes a reversal into the outlet is unknown. The concentration of the river may not be significantly higher than the concentration in the lake during the time when reversal occurs. The magnitude of the supply from this source to Chandos Lake then was expected to be insignificant.

It is very important to verify the phosphorus model using the calculated phosphorus budget against the measured existing conditions. Verification involves prediction of the existing conditions, using the model in the study lakes and comparing the values predicted to the measured total phosphorus concentration for the study lakes.

Experience has shown that in dealing with very shallow lakes, such as Clydesdale Lake, the model does not predict existing conditions very accurately and is not of much use in accurately predicting conditions in the future. This may relate to the fact that re-suspension of material by wind and wave action brings phosphorus from the lake bottom back into the water column. The model, as modified for use in Chandos Township, predicted the existing total phosphorus concentration reasonably well, with the exception of Clydesdale Lake. An improvement in the prediction was obtained by assuming that some retention of phosphorus occurred in the shoreline sewage disposal systems (see Appendix IV). This suggested that the assumption of using no retention in the modelling to assess the effect of further shoreline development would show "worst case" conditions.

LAKE SENSITIVITY FEATURES

1. Lake Trout Habitat

The optimal requirements of lake trout for temperature and dissolved oxygen are 10°C or cooler (Scott and Crossman, 1974), or 6 mg/L dissolved oxygen or greater (MOE, 1984). Using these values, it is possible to outline the depth zone or slice of water that offers optimal lake trout conditions in the lakes studied. The calculation applies only to Tallan Lake and Chandos Lake where lake trout are known to exist.

West Bay of Chandos Lake provided no optimum conditions for a short period in September of each year (Figure 3A). South Bay of Chandos Lake provided only slight restriction during September in the deepest areas (Figure 3C). Most areas of the open lake provided optimal habitat from the thermocline to the lake bottom (Figure 3B). Only a narrow slice of water (3 to 4 m. thick) provided optimal conditions in Gilmour Bay, due to low dissolved oxygen concentrations (Figure 3D). Tallan Lake exhibited restricted optimal habitat during the summer, because of oxygen depletion in the relatively small volume of the deep area below 16 m. depth (Figure 3F).

2. Flushing Rate - Retention Time

Lakes with low flushing rate are generally more influenced by changes in phosphorus supply. In addition, the lake does not respond to changes in input as quickly. The main body of Chandos Lake has the slowest flushing rate (0.139 times/year or one change in lake volume every 9 years). The calculated response time to register changes in water quality (Limnology Unit) was estimated at 3 years. This means that a change in input to the lake would not register in terms of the overall quality of the lake for 3 years. Gilmour Bay had a similar slow flushing rate, with a very long response time. Tallan Lake was the next most sensitive lake in this regard. It flushes about once every 2 1/2 years, with a response time of 1.5 years. Lasswade and Clydesdale Lakes flush and respond within 1 year, indicating least sensitivity in this regard.

3. Shoreline Development

Discussion of this feature can be found in the Nutrient Budget section. The largest proportionate increase in total supply from vacant lot development would occur in Lasswade Lake (21% Table 5). Development of the vacant lots as cottages would result in a predicted total phosphorus concentration of near 20 ug/L. (from a

predicted existing concentration of 16.5 ug/L). An increase of this magnitude could result in adverse water quality changes in Lasswade Lake. The other lakes were much less influenced by the vacant registered lots around the shoreline.

The percentage increase in total supply from the addition of 100 cottages to the shoreline can be used as an index of relative sensitivity (Table 5). Lakes were ranked in order with respect to this sensitivity feature as shown in Table 5:

TABLE 5

Sensitivity to Changes in Water Quality
Due to Shoreline Development

	<u>% Increase in Total Supply</u>		<u>Predicted Total Phosphorus</u>		
	<u>+Vacant</u>	<u>+100 Lots</u>	<u>Existing</u>	<u>+Vacant</u>	<u>+100 Lots</u>
	<u>Lots</u>			<u>Lots</u>	
Lasswade	21	121	16.5	19.9	35.9
Tallan	5	79	8.1	8.6	14.4
Gilmour Bay	1	45	20.7	21.0	29.7
Clydesdale	9	52	6.6	7.2	10.0
Chandos-Main	2	3	15.3	15.6	15.7

The main body of Chandos Lake shows the least increase in total phosphorus concentration with the addition of 100 more shoreline cottages (3%). At 3% increase in supply, the predicted additional total phosphorus concentration would not be measurable. For other lakes, including Gilmour Bay, undesirable changes in water quality could result from the addition of 100 cottages.

4. Bottom Water Conditions

If complete oxygen depletion is aggravated by increased input of phosphorus to the lake, the bottom waters of the lake, in conjunction with the lake sediments, could act as another important source of nutrient supply to the lake, contributing significantly to the growth of algae each year. The highest potential in this regard is found in Gilmour Bay with the next most sensitive being Tallan Lake and West Bay of Chandos Lake. Lasswade Lake has a small deep area that is not likely to increase in size or in the extent of oxygen depletion, due to the shape of the lake. Clydesdale Lake is not deep enough to stratify and no anaerobic conditions exist in the bottom waters.

5. Algae Problems

Significant increase in nutrient concentrations is accompanied by an increase in suspended algae density.

The algal density will also include a higher proportion of undesirable algae, such as the blue-green bloom-forming varieties. In general, when the concentration of total phosphorus rises to greater than 20 ug/L, adverse water quality problems result, which begin to influence recreational use of the water for aesthetic reasons. Gilmour Bay has the highest potential for algal problems with the addition of phosphorus, since the blue-green algae are already common in the community and would increase with significant increase in total phosphorus concentration in the lake. The algal density in Clydesdale Lake is probably lower than expected because of the presence of significant beds of rooted aquatic plants in the lake. The lakes were ranked with respect to this feature as follows:

Gilmour Bay
Clydesdale Lake
Chandos Lake
Lasswade Lake
Tallan Lake

HISTORICAL CHANGES

The longest period of record for water quality was available for the main basin of Chandos Lake (1972 to 1982). No discernable trend over this period of record was observed in the Chlorophyll Secchi disc data available (see Figure 4). The additional development along the shoreline of the lake over this period was not available, but is suspected to have been very little in relation to the present total shoreline development. The Crowe Valley Conservation Report, Water Wildlife Section (1962, Department of Lands & Forests), indicated that in 1961 there were 500 cottages on Chandos Lake. Assuming that all of the dwellings on the Chandos lakeshore were cottages during 1961 and that the calculated natural supply of phosphorus to the lake during 1961 was the same as the existing study, a phosphorus concentration during the ice-free period of 12 ug/m^3 was predicted. In comparison to the predicted existing conditions of 15 ug/m^3 , the model predictions indicated that little change in the total phosphorus concentration of the main body of Chandos Lake has occurred since 1961.

SUMMARY, CONCLUSIONS, RECOMMENDATIONS1. Tallan Lake

Tallan Lake had the best water quality of the study lakes. The lake was considered nutrient poor or oligotrophic.

In view of the low oxygen concentration in the bottom waters and the high degree of sensitivity of the lake to significant additions of phosphorus supply, Tallan Lake was considered highly sensitive to further shoreline development. Additional shoreline development should be carefully planned.

2. Lasswade Lake

The lake had soft alkaline water and was considered moderately enriched or mesotrophic. Low oxygen conditions were not considered to be of concern because of the small extent of the deep area in the lake basin. Lasswade Lake was the most sensitive lake to additional significant nutrient supply. If all of the existing registered vacant shoreline lots were developed as cottages, a measureable and adverse change in water quality could result. New, proposed shoreline development on the lake shoreline could aggravate water quality conditions further. It is therefore recommended that the Township consider holding any new proposed development until all or most registered vacant lots have been built on or have been confirmed non-building lots.

3. Clydesdale Lake

Clydesdale Lake is a small shallow lake with significant areas of rooted aquatic plants. The lake was considered moderately enriched or mesotrophic. It is not possible to make definite conclusions on the sensitivity of the lake to further significant additions in phosphorus supply as there is no appropriate modelling technique for shallow lakes. However, based on other features of sensitivity, the lake was considered least sensitive of the study lakes to further shoreline development.

4. Gilmour Bay

This isolated Bay of Chandos Lake was considered tributary to the main lake. It has a deep lake basin relative to its small surface area. The Bay was considered moderately enriched or mesotrophic with severe oxygen depletion in the bottom waters and nutrient/algae conditions that could result in occasional aesthetic problems with water quality.

The Bay was considered highly sensitive to significant additions of phosphorus supply. There apparently are few vacant registered lots fronting on the shoreline. New shoreline development should be carefully planned.

5. Chandos Lake

The main body of Chandos Lake is a deep relatively large water body with good water quality. The lake was considered to border unenriched or oligotrophic status. Due to the large volume of the bottom waters, oxygen conditions cause only local restriction of lake trout habitat.

The lake was least sensitive to significant additional phosphorus supply of the study lakes. Based on historical information available on shoreline development and the expected phosphorus concentration with the addition of 100 cottages to the lake, Chandos Lake was not considered very sensitive to additional shoreline development.

6. Shoreline Development Conditions

With the exception of Lasswade Lake, further development around lake shorelines and inflows should be carefully planned to minimize or eliminate added phosphorus input. The following specific recommendations are made:

- a. careful siting of septic tank and tile bed systems on vacant registered lots that must be developed should be carried out by staff of the local Health Unit to maximize the phosphorus retention capabilities of the natural soil and vegetation on the lot;
- b. new proposed development should be planned on the basis of a 100 foot setback of septic tank and tile field systems from shoreline. As parts of some lake shorelines with steep slopes offer no retention of nutrients from tile bed systems, the upper edge of these slopes where land levels off should be considered the start of the 100 foot setback distance;
- c. fill material used for the installation of the tile field systems should be of a reasonably fine nature to encourage the retention of waste materials such as phosphorus;
- d. clearing off the vegetation on lots during development, especially between the tile bed site and the shoreline should be minimized.

APPENDIX I

Lake Chemistry Results, 1981

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-1 bottom

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	pH at lab	pH in field	Conductivity (umhos/cm)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (Fixed End-point)	Alkalinity (Inflection Point)	Chlorides (Cl)	Sulphate (SO ₄)	Colour (Hazen Units)	Turbidity (Formazin Units)
Aug 26/81	10.0	7.29		130	18.8	1.60			50		2.70	10.5	5.8	0.69
Sept 14/81	11.0	7.40		128	19.0	1.50					2.80	11.0	9.9	0.65
Sept 30/81	10.0	7.61		130	18.8	1.45					2.75	12.0	10.3	0.58
Oct 19/81	12.0	8.00		130	19.2	1.50					2.75	12.0	8.5	0.67

KS/cra/Rept 2-L-3

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-1 comp.

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	Secchi Disc Reading (m)	Chlorophyll <u>a</u>	Chlorophyll <u>b</u>	Acidified Chlorophyll <u>a</u>	Total Phosphorus	Filtered Reactive Phosphorus	Filtered Ammonia (NH ₃)	Total Kjeldahl Nitrogen (TKN)	Nitrite (NO ₂)	Nitrate (NO ₃)	Dissolved Organic Carbon (D.O.C.)	Inorganic Carbon (I.C.)	Iron	Silicates
May 26/81	0-6.0	3.0	4.1	0.6	3.5	0.017	-	0.056	0.42	0.001	0.005	5.0	12.0	0.02	1.10
June 16/81	0-10.2	5.1	2.0	1.0	1.7	0.016	0.002	0.020	0.29	0.002	0.010	5.2	13.0	0.02	0.40
July 16/81	0-9.2	4.6	2.8	0.9	2.1	0.015	0.001	0.078	0.35	0.001	0.010	4.8	11.8	0.02	0.75
Aug. 6/81	0-9.4	4.7	1.8	0.5	0.3	0.013	0.001	0.032	0.29	0.001	0.015	4.9	11.4	0.03	1.50
Aug. 26/81	0-10.2	5.1	1.7	0.2	1.6	0.011	0.001	0.036	0.31	0.001	0.005	4.9	10.8	0.01	1.05
Sept. 14/81	0-7.0	3.5	2.1	0.4	1.9	0.010	0.001	0.016	0.29	0.001	0.005	4.5	11.6	0.02	1.35
Sept. 30/81	0-8.8	4.4	2.0	0.1	1.5	0.012	0.002	0.060	0.30	0.001	0.005	4.7	11.0	0.02	1.30
Oct. 19/81	0-8.5	4.2	3.5	0.3	2.6	0.022	0.002	0.036	0.31	0.002	0.005	5.6	13.0	0.04	2.00
Max		5.1	4.1	1.0	3.5	0.022	0.002	0.078	0.42	0.002	0.015	5.6	13.0	0.04	2.00
Min		3.5	1.7	0.1	0.3	0.010	0.001	0.016	0.29	0.001	0.005	4.5	10.9	0.01	0.40
Mean		4.3	2.5	0.5	1.9	0.014	0.001	0.042	0.32	0.001	0.007	4.9	11.8	0.02	1.18

KS/cra/Rept 2-K-2

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-1 comp.

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	pH at Lab	pH in field	Conductivity (umhos/cm)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (Fixed End-point)	Alkalinity (Inflection Point)	Chlorides (Cl)	Sulphate (SO ₄)	Colour (Hazen Units)	Turbidity (Formazin Units)
May 26/81	0-6	8.20			18.6	1.65					2.85	9.5	11.7	0.76
June 16/81	0-10.2	7.96		125	18.2	1.55					2.70	10.5	11.2	0.55
July 15/81		7.75		130	20.0	1.55					2.80	12.0	16.6	0.70
Aug 6/81	0-9.4	7.48		132	18.8	1.50			49		2.60	10.0	11.2	0.62
Aug 26/81	0-10.2	7.80		130	18.8	1.65			51		2.70	11.5	5.8	0.55
Sept 14/81	0-7	8.17		128	19.0	1.55					2.70	10.5	8.5	0.50
Sept 30/81	0-8.8	7.25		138	19.2	1.45					2.80	11.5	9.9	0.76
Oct 21/81		7.94		130	19.6	1.50					2.65	11.0	8.5	0.65
Max		8.20		138	20.0	1.65			51		2.85	12.0	16.6	0.76
Min		7.48		125	18.2	1.45			49		2.60	9.5	5.8	0.50
Mean		7.88		130	19.0	1.55			50		2.72	10.9	10.4	0.64

KS/cra/Rept 2-L-2

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-1 bottom

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	Secchi Disc Reading (m)	Chlorophyll <u>a</u>	Chlorophyll <u>b</u>	Acidified Chlorophyll <u>a</u>	Total Phosphorus	Filtered Reactive Phosphorus	Filtered Ammonia (NH ₃)	Total Kjeldahl Nitrogen (TKN)	Nitrite (NO ₂)	Nitrate (NO ₃)	Dissolved Organic Carbon (D.O.C.)	Inorganic Carbon (I.C.)	Iron	Silicates
Aug. 26/81	10.0					0.001	0.004	0.046	0.29	0.010	0.015	4.5	11.8	0.02	1.75
Sept. 14/81	11.0					0.014	0.003	0.020	0.31	0.001	0.010	4.5	12.4	0.04	1.65
Sept. 30/81	10.0					0.010	0.003	0.018	0.33	0.001	0.060	4.4	10.6	0.02	1.50
Oct. 19/81	12.0					0.024	0.003	0.016	0.31	0.001	0.005	5.6	13.2	0.03	1.60

KS/cra/Rept 2-K-3

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-2 Main Lake comp.

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	pH at lab	pH in field	Conductivity (umhos/cm)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (Fixed End-point)	Alkalinity (Inflection Point)	Chlorides (Cl)	Sulphate (SO ₄)	Colour (Hazen Units)	Turbidity (Formazin Units)
May 5/81	0-6.6	7.82		126	17.8	1.55					2.75	11.0	6.7	0.65
May 26/81	0-6.6	8.17		-	18.0	1.55					2.60	12.0	12.6	0.61
June 16/81	0-10.0	8.10		124	17.2	1.60					2.70	10.5	11.2	0.57
July 15/81	0-9.4	7.90		128	19.8	1.55					2.70	11.5	14.4	0.79
Aug 7/81	0-10.6	7.91		132	18.8	1.50			48		2.60	11.5	13.5	0.52
Aug 26/81	0-10.0	7.82		122	18.6	1.55			49		2.70	11.5	5.8	0.63
Sept 14/81	0-9.0	8.24		127	19.4	1.55					2.75	10.5	8.5	0.48
Sept 30/81	0-10.0	7.76		120	17.2	1.50					2.70	11.5	11.2	0.56
Oct 21/81	0-8.5	7.96		130	20.0	1.55					2.60	12.0	8.5	0.40
Nov 9/81	0-10.0	7.56		128	20.2	1.50					2.70	10.5	8.5	0.53
Max		8.24		132	20.2	1.60			49		2.75	12.0	14.4	0.79
Min		7.56		122	17.2	1.50			48		2.60	10.5	5.8	0.40
Mean		7.92		126	18.7	1.54			48		2.68	11.2	10.1	0.57

KS/cra/Rept 2-L-4

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-2 bottom

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	Secchi Disc Reading (m)	Chlorophyll <u>a</u>	Chlorophyll <u>b</u>	Acidified Chlorophyll <u>a</u>	Total Phosphorus	Filtered Reactive Phosphorus	Filtered Ammonia (NH ₃)	Total Kjeldahl Nitrogen (TKN)	Nitrite (NO ₂)	Nitrate (NO ₃)	Dissolved Organic Carbon (D.O.C.)	Inorganic Carbon (I.C.)	Iron	Silicates
May 5/81	46.0					0.013	0.003	0.020	0.25	0.001	0.100	4.9	12.2	0.01	1.00
May 26/81	45.0					0.013	0.001	0.028	0.31	0.001	0.005	5.1	12.2	0.02	1.10
June 16/81	49.0					0.017	0.012	0.002	0.23	0.001	0.125	4.9	12.8	0.02	1.10
July 15/81	44.0					0.016	0.010	0.006	0.25	0.001	0.135	4.3	11.4	0.02	1.70
Aug. 7/81	42.0					0.015	0.004	0.016	0.32	0.001	0.145	4.6	11.0	0.02	1.75
Aug. 26/81	42.5					0.031	0.025	0.010	0.25	0.001	0.180	4.4	10.4	0.03	1.80
Sept. 14/81	39.0					0.015	0.010	0.004	0.27	0.001	0.105	4.3	11.6	0.02	1.75
Oct. 19/81						0.053	0.033	0.018	0.29	0.001	0.230	5.1	12.6	0.04	2.90
Nov. 9/81	46.0					0.023	0.011	0.006	0.28	0.001	0.105	4.6	13.4	0.04	2.05
Min	39.0					0.013	0.001	0.002	0.23	0.001	0.005	4.3	10.4	0.01	1.00
Max	49.0					0.053	0.033	0.028	0.32	0.001	0.230	5.1	13.4	0.04	2.90
Mean	39.8					0.022	0.021	0.012	0.27	0.001	0.126	4.7	12.0	0.02	1.68

KS/cra/Rept 2-K-5

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-2 bottom

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	pH at lab	pH in field	Conductivity (umhos/cm)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (Fixed End-point)	Alkalinity (Inflection Point)	Chlorides (Cl)	Sulphate (SO ₄)	Colour (Hazen Units)	Turbidity (Formazin Units)
May 5/81	46.0	7.71		124	18.0	1.55					2.70	11.0	13.5	0.55
May 26/81	45.0	8.07		-	19.2	1.50					2.65	11.5	11.2	0.61
Jun 16/81	49.0	7.55		122	17.2	1.60					2.65	10.5	11.2	0.30
July 15/81	44.0	7.47		126	19.4	1.60					2.65	11.5	9.4	0.40
Aug 7/81	42.0	7.39		128	18.4	1.50			47		2.55	12.0	9.9	0.44
Aug 26/81	42.5	7.39		126	18.4	1.55			48		2.65	11.5	5.8	0.52
Sept 14/81	39.0	7.49		126	18.4	1.50					2.70	11.5	9.9	0.55
Oct 19/81	47.0	7.57		125	20.2	1.50					2.65	10.5	9.0	1.47
Nov 9/81	46.0	7.45		128	18.8	1.70					2.75	12.0	7.2	0.90
Max	39.0	7.39		122	17.2	1.50			47		2.55	10.5	7.2	0.30
Min	49.0	8.07		128	20.2	1.70			48		2.75	12.0	13.5	1.47
Mean	44.5	7.57		126	18.7	1.55			47		2.66	11.3	9.7	0.64

KS/cra/Rept 2-L-5

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-3 comp.

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	Secchi Disc Reading (m)	Chlorophyll <u>a</u>	Chlorophyll <u>b</u>	Acidified Chlorophyll <u>a</u>	Total Phosphorus	Filtered Reactive Phosphorus	Filtered Ammonia (NH ₃)	Total Kjeldahl Nitrogen (TKN)	Nitrite (NO ₂)	Nitrate (NO ₃)	Dissolved Organic Carbon (D.O.C.)	Inorganic Carbon (I.C.)	Iron	Silicates
May 5/81	0-6.4	3.0	4.1	0.5	3.2	0.019	0.002	0.044	0.32	0.001	0.040	5.0	12.2	0.01	0.85
May 26/81	0-8.6	4.3	2.6	0.7	1.8	0.015	-	0.070	0.35	0.001	0.005	4.9	11.6	0.02	0.75
June 16/81	0-8.0	4.0	1.6	0.8	1.6	0.015	0.007	0.050	0.30	0.003	0.005	5.2	13.0	0.02	0.20
July 15/81	0-12.2	6.1	1.8	0.2	1.5	0.009	0.004	0.038	0.28	0.001	0.010	4.6	11.2	0.02	0.75
Aug. 7/81	0-11.0	5.5	1.5	0.3	1.2	0.010	0.001	0.026	0.33	0.001	0.040	4.6	11.0	0.02	1.45
Aug. 26/81	0-10.2	5.1	1.6	0.3	1.6	0.010	0.001	0.054	0.32	0.001	0.005	4.9	11.0	0.02	0.95
Sept. 14/81	0-9.8	4.9	2.2	0.7	2.0	0.013	0.009	-	0.29	-	-				0.85
Sept. 30/81	0-9.0	4.5	1.9	0.4	1.8	0.009	0.004	0.022	0.29	0.001	0.010	4.6	10.6	0.02	1.05
Oct. 19/81	0-8.5	4.3	2.3	0.2	1.9	0.022	0.003	0.030	0.29	0.001	0.035	5.1	12.6	0.02	1.45
Nov. 9/81	0-9.0	4.5	2.4	0.4	1.7	0.013	0.007	0.008	0.28	0.001	0.050	4.8	12.4	0.02	2.20
Max		6.1	4.1	0.8	3.2	0.022	0.009	0.070	0.35	0.003	0.050	5.2	13.0	0.02	2.20
Min		3.0	1.5	0.2	1.2	0.009	0.001	0.009	0.28	0.001	0.005	4.6	11.0	0.01	0.20
Mean		4.6	2.2	0.4	1.8	0.013	0.004	0.038	0.30	0.001	0.022	4.8	11.7	0.02	1.05

KS/cra/Rept 2-K-6

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-3 comp.

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	pH at lab	pH in field	Conductivity (umhos/cm)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (Fixed End-point)	Alkalinity (Inflection Point)	Chlorides (Cl)	Sulphate (SO ₄)	Colour (Hazen Units)	Turbidity (Formazin Units)
May 5/81	0-6.4	7.87		120	18.0	1.55					2.65	11.0	9.0	0.70
Ma 26/81	0-8.6	8.20		-	18.2	1.60					2.60	12.0	13.0	0.69
June 16/81	0-8.0	8.26		124	18.0	1.60					2.65	10.5	11.2	0.70
July 16/81	0-12.2	7.86		128	19.6	1.55					2.60	11.5	11.7	0.58
Aug 7/81	0-11.0	8.07		126	19.0	1.50			49		2.60	-	9.9	0.58
Aug 26/81	0-10.2	8.03		130	18.6	1.55			50		2.70	11.5	7.2	0.57
Sept 14/81	0-9.8	8.03		130	18.6	1.65					2.85	12.0	7.2	0.62
Sept 30/81	0-9.0	7.78		128	19.2	1.50					2.75	12.5	9.9	0.43
Oct 19/81	0-8.5	7.67		126	19.6	1.50					2.65	11.0	8.5	0.40
Nov 9/81	0-9.0	8.89		128	20.8	1.55					2.70	10.0	8.5	0.59
Max		8.89		130	20.8	1.65			50		2.85	12.5	13.0	0.70
Min		7.67		120	18.0	1.50			49		2.60	10.0	7.2	0.40
Mean		8.07		127	19.0	1.55			49		2.67	11.3	9.6	0.59

KS/cra/Rept 2-L-6

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-3 bottom

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	Secchi Disc Reading (m)	Chlorophyll <u>a</u>	Chlorophyll <u>b</u>	Acidified Chlorophyll <u>a</u>	Total Phosphorus	Filtered Reactive Phosphorus	Filtered Ammonia (NH ₃)	Total Kjeldahl Nitrogen (TKN)	Nitrite (NO ₂)	Nitrate (NO ₃)	Dissolved Organic Carbon (D.O.C.)	Inorganic Carbon (I.C.)	Iron	Silicates
May 5/81	33.0					0.036	0.004	0.018	0.85	0.001	0.105	4.8	12.2	0.01	1.05
May 26/81	33.0					0.011	-	0.034	0.30	0.001	0.105	4.5	11.4	0.01	1.35
June 16/81	35.0					0.015	0.010	0.014	0.25	0.001	0.025	5.1	13.0	0.02	1.00
July 16/81	34.0					0.042	0.023	0.010	0.40	0.009	0.210	4.4	11.6	0.19	1.80
Aug. 6/81	32.0					0.027	0.017	0.016	0.30	0.005	0.150	4.3	11.0	0.03	2.30
Aug. 26/81	32.0					0.024	0.020	0.010	0.24	0.001	0.180	4.4	11.6	0.01	2.05
Sept. 14/81	32.0					0.022	0.005	0.006	0.25	0.001	0.135	4.3	11.4	0.07	1.35
Sept. 30/81	28.0					0.013	0.011	0.016	0.22	0.001	0.160	4.6	10.8	0.02	2.60
Oct. 19/81	33.0					0.045	0.028	0.008	0.27	0.001	0.195	5.1	12.6	0.03	2.90
Nov. 9/81	33.0					0.026	-	0.006	0.37	0.001	0.025	4.5	13.8	0.03	2.60
Max						0.045	0.028	0.034	0.85	0.009	0.210	5.1	13.8	0.19	2.90
Min						0.011	0.004	0.006	0.22	0.001	0.025	4.3	10.8	0.01	1.00
Mean						0.026	0.015	0.014	0.34	0.002	0.129	4.6	11.3	0.04	1.90

KS/cra/Rept 2-K-7

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-3 bottom

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	pH at lab	pH in field	Conductivity (umhos/cm)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (Fixed End-point)	Alkalinity (Inflection Point)	Chlorides (Cl)	Sulphate (SO ₄)	Colour (Hazen Units)	Turbidity (Formazin Units)
May 5/81	33.0	7.71		122	17.8	1.55					2.60	11.0	12.2	0.80
May 26/81	33.0	7.86		-	18.2	1.60					2.45	12.0	9.9	0.44
June 16/81	35.0	7.51		122	17.8	1.65					2.60	11.0	11.2	0.26
July 16/81	34.0	7.32		124	19.4	1.60					2.65	11.5	14.7	0.98
Aug 6/81	32.0	7.32		128	19.0	1.55			46		2.55	11.5	9.0	0.66
Aug 26/81	32.0	7.28		126	18.4	1.60					5.65	11.0	4.9	0.47
Sept 14/81	32.0	7.48		124	18.6	1.55					2.70	11.5	9.9	0.91
Sept 30/81	28.0	7.38		126	19.0	1.50					2.70	12.5	11.2	0.56
Oct 19/81	33.0	7.81		125	20.2	1.50					2.55	10.5	9.9	1.33
Nov 9/81	33.0	7.12		138	19.6	1.95					2.65	10.5	7.2	1.83
Max		7.86		138	20.2	1.95					2.70	12.0	14.7	1.83
Min		7.12		122	17.8	1.50					2.45	10.5	4.9	0.26
Mean		7.48		126	18.8	1.60			46		2.60	11.3	10.0	0.82

KS/cra/Rept 2-L-7

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-4 comp.

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	Secchi Disc Reading (m)	Chlorophyll <u>a</u>	Chlorophyll <u>b</u>	Acidified Chlorophyll <u>a</u>	Total Phosphorus	Filtered Reactive Phosphorus	Filtered Ammonia (NH ₃)	Total Kjeldahl Nitrogen (TKN)	Nitrite (NO ₂)	Nitrate (NO ₃)	Dissolved Organic Carbon (D.O.C.)	Inorganic Carbon (I.C.)	Iron	Silicates
May 5/81	0-5.6	2.8	4.1	0.5	3.2	0.017	0.002	0.054	0.45	0.001	0.005	5.4	11.0	0.02	0.45
May 26/81	0-8.6	4.3	2.5	0.6	1.5	0.017	-	0.036	0.45	0.004	0.005	4.9	10.6	0.02	0.35
June 16/81	0-10.0	5.0	2.7	0.9	2.2	0.027	0.015	0.078	0.40	0.004	0.005	5.5	12.2	0.03	0.20
July 16/81	0-8.2	4.1	3.6	1.0	2.6	0.013	0.002	0.060	0.37	0.001	0.005	4.9	10.6	0.04	0.60
Aug 6/81	0-7.6	3.8	5.3	1.1	4.3	0.019	0.006	0.120	0.44	0.001	0.005	5.1	10.8	0.04	1.20
Aug 26/81	0-8.2	4.1	3.8	0.5	3.7	0.014	0.002	0.068	0.36	0.001	0.005	5.1	10.4	0.02	0.70
Sept 14/81	0-8.0	4.0	2.7	0.1	2.3	0.016	0.002	0.036	0.37	0.001	0.005	4.6	10.4	0.03	0.60
Sept 30/81	0-8.6	4.3	1.8	0.2	1.5	-	-	0.020	-	0.001	0.005	4.7	10.6	0.01	1.00
Oct 19/81			3.2	0.2	2.6	0.022	0.004	0.052	0.34	0.001	0.010	5.5	11.8	0.02	1.25
Nov 9/81	0-5.0	2.5	5.0	0.4	3.2	0.028	0.019	0.076	0.43	0.001	0.010	5.5	11.8	0.05	1.20
Max		5.0	5.3	1.1	4.3	0.028	0.019	0.120	0.45	0.004	0.010	5.5	12.2	0.05	1.25
Min		2.5	1.8	0.1	1.5	0.013	0.002	0.036	0.34	0.001	0.005	4.6	10.4	0.01	0.20
Mean		3.9	3.5	0.5	2.7	0.019	0.007	0.060	0.40	0.002	0.006	5.1	11.0	0.03	0.75

KS/cra/Rept 2-K-8

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-4 comp.

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	pH at lab	pH in field	Conductivity (umhos/cm)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (Fixed End-point)	Alkalinity (Inflection Point)	Chlorides (Cl)	Sulphate (SO ₄)	Colour (Hazen Units)	Turbidity (Formazin Units)
May 5/81	0-5.6	7.94		114	16.2	1.60					2.95	10.5	9.0	0.90
May 26/81	0-8.6	8.01		-	16.0	1.65					2.85	11.5	12.6	0.75
June 16/81	0-8.7	7.81		120	16.6	1.70					2.95	10.0	10.3	0.65
July 16/81	0-8.2	7.69		120	18.0	1.60					2.85	11.0	11.7	0.98
Aug 7/81	0-7.6	7.90		122	17.6	1.55			47		2.80	11.0	11.2	0.78
Aug 26/81	0-8.2	7.68		120	17.2	1.60			46		2.90	10.5	7.2	0.88
Sept 14/81	0-8.0	8.08		120	17.0	1.75					2.90	10.5	7.2	0.56
Sept 30/81	0-8.6	7.80		128	19.4	1.45					2.80	11.0	9.9	0.38
Oct 19/81		7.63		120	17.6	1.55					2.90	9.5	8.5	0.38
Nov 9/81	0-5.0	7.69		124	18.8	1.65					3.00	11.5	9.9	0.99
Max		8.08		128	19.4	1.75			47		3.00	11.5	12.6	0.98
Min		7.63		114	16.0	1.45			46		2.80	9.5	7.2	0.38
Mean		7.82		121	17.4	1.61			46		2.84	10.7	9.7	0.72

KS/cra/Rept 2-L-8

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-4 bottom

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	Secchi Disc Reading (m)	Chlorophyll <u>a</u>	Chlorophyll <u>b</u>	Acidified Chlorophyll <u>a</u>	Total Phosphorus	Filtered Reactive Phosphorus	Filtered Ammonia (NH ₃)	Total Kjeldahl Nitrogen (TKN)	Nitrite (NO ₂)	Nitrate (NO ₃)	Dissolved Organic Carbon (D.O.C.)	Inorganic Carbon (I.C.)	Iron	Silicates
May 5/81	20.0					0.034	0.004	0.096	0.40	0.001	0.030	5.3	11.4	0.03	0.65
May 26/81	19.5					0.016	-	0.072	0.53	0.125	0.005	4.7	11.2	0.04	1.20
June 16/81	19.5					0.033	0.022	0.204	0.56	0.051	0.030	5.4	13.2	0.05	0.65
July 16/81	15.0					0.029	0.020	0.054	0.35	0.001	0.220	4.5	11.2	0.06	1.15
Aug 6/81	12.0					0.012	0.003	0.026	0.29	0.001	0.080	4.6	11.0	0.04	1.30
Aug 26/81	16.5					0.062	0.052	0.004	0.45	0.230	0.150	4.8	12.6	0.03	1.65
Sept 14/81	16.5					0.028	0.019	0.140	0.42	0.121	0.010	4.5	11.6	0.04	1.55
Sept 30/81	22.0					0.045	0.040	0.014	0.26	0.003	0.235	4.6	10.6	0.05	2.45
Oct 19/81	20.0					0.163	0.086	0.760	1.11	0.001	0.005	5.5	13.4	0.34	2.20
Nov 9/81	18.0					0.023	0.014	0.090	0.41	0.001	0.010	5.0	12.4	0.05	1.25
Max						0.163	0.086	0.760	1.11	0.001	0.235	5.5	13.4	0.34	2.45
Min						0.012	0.003	0.004	0.26	0.230	0.005	4.5	10.6	0.03	0.65
Mean						0.044	0.029	0.146	0.48	0.053	0.077	4.9	11.9	0.07	1.40

KS/cra/Rept 2-K-9

LAKE CHEMISTRY SUMMARY 1981

CHANDOS LAKE

Station: CH-4 bottom

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	pH at lab	pH in field	Conductivity (umhos/cm)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (Fixed End-point)	Alkalinity (Inflection Point)	Chlorides (Cl)	Sulphate (SO ₄)	Colour (Hazen Units)	Turbidity (Formazin Units)
May 5/81	20.0	7.64		116	15.6	1.60					2.95	10.5	16.2	0.90
May 26/81	19.5	7.56		-	17.0	1.60					2.85	11.0	12.6	0.59
June 16/81	19.5	7.46		118	16.4	1.65					2.90	10.0	10.3	0.66
July 15/81	15.0	7.14		118	16.6	1.60					2.95	10.5	16.1	0.70
Aug 7/81	12.0	7.10		130	17.4	1.60			46		2.90	10.5	11.2	0.94
Aug 26/81	16.5	6.96		120	16.8	1.65			47		2.95	10.0	7.2	0.64
Sept 14/81	16.5	6.99		120	16.8	1.65					3.00	10.0	15.3	0.72
Sept 30/81	22.0	7.25		126	19.0	1.45					2.75	11.5	11.2	1.30
Oct 19/81	20.0	7.32		124	18.0	1.55					3.00	9.5	21.1	1.25
Nov 9/81	18.0	7.40		122	18.0	1.65					2.95	9.5	11.2	0.92
Max		7.64		130	19.0	1.65			47		3.00	11.5	21.1	1.30
Min		6.96		116	15.6	1.45			46		2.75	9.5	7.2	0.59
Mean		7.28		121	17.2	1.60			46		2.92	10.3	13.2	0.86

KS/cra/Rept 2-L-9

LAKE CHEMISTRY SUMMARY 1981

CLYDESDALE LAKE

Station: CL1 mid-lake comp.

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	Secchi Disc Reading (m)	Chlorophyll <u>a</u>	Chlorophyll <u>b</u>	Acidified Chlorophyll <u>a</u>	Total Phosphorus	Filtered Reactive Phosphorus	Filtered Ammonia (NH ₃)	Total Kjeldahl Nitrogen (TKN)	Nitrite (NO ₂)	Nitrate (NO ₃)	Dissolved Organic Carbon (D.O.C.)	Inorganic Carbon (I.C.)	Iron	Silicates
June 1/81	0-3.5	2.8	3.6	0.2	2.7	0.020	0.005	0.036	0.42	0.001	0.005	5.6	10.0	0.01	0.35
June 23/81	0-3.0	2.6	3.2	0.9	2.4	0.023	0.001	0.052	0.52	0.001	0.005	5.7	10.2	0.03	0.55
July 15/81	0-3.0	3.0	2.7	1.1	1.6	0.020	0.001	0.052	0.52	0.001	0.005	6.1	9.6	0.02	0.55
Aug 5/81	0-3.5	3.5	3.2	0.6	0.6	0.020	0.001	0.108	0.60	0.013	0.005	6.4	10.0	0.02	1.10
Aug 24/81	0-2.5	2.5	2.2	0.4	2.2	0.013	0.001	0.100	0.56	0.002	0.005	6.7	9.4	0.01	1.35
Sept 15/81	0-2.5	2.7	2.1	0.6	1.4	0.036	0.007	0.340	0.88	0.034	0.015	5.7	9.0	0.03	0.85
Sept 28/81	0-3.5	4.0b	1.4	0.5	1.0	0.005	0.003	0.390	0.85	0.029	0.030	4.6	-	0.05	0.40
Max		4.0b	3.6	1.1	2.7	0.036	0.007	0.390	0.88	0.034	0.030	6.7	10.2	0.05	1.35
Min		2.5	1.4	0.2	0.6	0.005	0.001	0.036	0.42	0.001	0.005	4.6	9.0	0.01	0.35
Mean		3.0	2.6	0.6	1.7	0.020	0.003	0.154	0.62	0.012	0.010	5.8	9.7	0.02	0.74

b = bottom

KS/cra/REPT2-I-10

LAKE CHEMISTRY SUMMARY 1981

CLYDESDALE LAKE

Station: CL1 Mid-lake composite

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	pH at lab	pH in field	Conductivity (umhos/cm)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (Fixed End-point)	Alkalinity (Inflection Point)	Chlorides (Cl)	Sulphate (SO ₄)	Colour (Hazen Units)	Turbidity (Formazin Units)
June 1/81	0-3.5	8.14			15.8	1.00					5.10	10.5	10.8	1.00
June 23/81	0-3.0	7.87		122	15.4	1.30					5.60	10.0	10.3	0.50
July 15/81	0-3.0	7.83		122	18.0	1.15					5.25	11.5	10.7	1.84
Aug 5/81	0-3.5	7.72		126	17.2	1.15			43		5.35	11.0	11.2	0.64
Aug 24/81	0-2.5	7.94		125	17.2	1.20			42		5.35	11.0	9.0	0.86
Sept 15/81	0-2.5	7.80		118	15.6	1.10					5.10	10.5	8.5	0.75
Sept 28/81	0-3.5	7.79		120	16.2	1.00					5.25	13.0	9.9	1.04
Max		8.14		126	18.0	1.30			43		5.60	13.0	11.2	1.84
Min		7.72		118	15.4	1.00			42		5.10	10.0	8.5	0.50
Mean		7.87		122	16.5	1.13			42		5.29	11.1	10.1	0.95

KS/cra/REPT2-J-11

LAKE CHEMISTRY SUMMARY 1981

LASSWADE LAKE

Station: L1 mid-lake comp.

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	Secchi Disc Reading (m)	Chlorophyll <u>a</u>	Chlorophyll <u>b</u>	Acidified Chlorophyll <u>a</u>	Total Phosphorus	Filtered Reactive Phosphorus	Filtered Ammonia (NH ₃)	Total Kjeldahl Nitrogen (TKN)	Nitrite (NO ₂)	Nitrate (NO ₃)	Dissolved Organic Carbon (D.O.C.)	Inorganic Carbon (I.C.)	Iron	Silicates
June 1/81	0-7.6	3.8	4.1	0.8	3.5	0.022	0.001	0.084	0.41	0.002	0.065	4.6	6.6	0.03	0.40
June 23/81	0-6.8	3.4	2.6	0.8	1.9	0.010	0.001	0.016	0.43	0.001	0.020	4.6	6.4	0.03	0.65
July 15/81	0-6.8	3.4	3.2	1.5	2.6	0.012	0.001	0.174	0.52	0.002	0.010	4.7	6.4	0.11	0.55
Aug 5/81	0-8.0	4.0	3.2	0.6	-	0.013	0.001	0.262	0.58	0.001	0.005	4.7	7.2	0.08	0.75
Aug 24/81	0-6.0	3.8	2.3	0.3	2.0	0.012	0.003	0.072	0.39	0.001	0.005	5.0	5.8	0.03	1.10
Sept 15/81	0-6.5	3.5	3.3	1.2	2.7	0.045	0.001	0.050	0.85	0.001	0.015	4.5	6.0	0.03	0.75
Sept 28/81	0-7.0	3.5	3.2	0.9	2.9	0.009	0.002	0.074	0.43	0.001	0.025	-	-	0.04	0.15
Max		4.0	4.1	1.5	3.5	0.045	0.003	0.262	0.85	0.002	0.065	5.0	7.2	0.11	1.10
Min		3.4	2.3	0.3	1.9	0.010	0.001	0.016	0.39	0.001	0.005	4.5	5.8	0.03	0.15
Mean		3.6	3.1	0.9	2.6	0.017	0.001	0.105	0.52	0.001	0.021	4.7	6.4	0.05	0.62

KS/cra/REPT2-I-12

LAKE CHEMISTRY SUMMARY 1981

LASSWADE LAKE

Station: L1 Mid-lake comp.

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	pH at lab	pH in field	Conductivity (umhos/cm)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (Fixed End-point)	Alkalinity (Inflection Point)	Chlorides (Cl)	Sulphate (SO ₄)	Colour (Hazen Units)	Turbidity (Formazin Units)
June 1/81	0-7.6	7.67		72	9.8	1.10					1.60	7.5	10.8	0.70
June 23/81	0-6.8	7.51		74	10.0	0.85					1.65	8.0	8.5	0.40
July 15/81	0-6.8	7.30		78	9.8	1.00					1.70	8.0	8.5	1.56
Aug 5/81	0-8.0	7.11		78	10.2	0.90			26		1.65	7.5	22.9	0.94
Aug 24/81	0-6.0	7.74		80	10.4	1.10			28		1.70	8.5	1.8	0.75
Sept 15/81	0-6.5	7.75		74	10.0	0.95					1.65	7.5	8.5	0.92
Sept 28/81	0-7.0	7.63		78	10.8	0.85					1.65	8.0	9.9	0.81
Max		7.75		80	10.8	1.10			28		1.70	8.5	22.9	1.56
Min		7.11		72	9.8	0.85			26		1.60	7.5	8.5	0.40
Mean		7.53		76	10.1	0.96			27		1.66	7.9	11.5	0.87

KS/cra/REPT2-J-13

LAKE CHEMISTRY SUMMARY 1981

LASSWADE LAKE

Station: L1 bottom

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	Secchi Disc Reading (m)	Chlorophyll <u>a</u>	Chlorophyll <u>b</u>	Acidified Chlorophyll <u>a</u>	Total Phosphorus	Filtered Reactive Phosphorus	Filtered Ammonia (NH ₃)	Total Kjeldahl Nitrogen (TKN)	Nitrite (NO ₂)	Nitrate (NO ₃)	Dissolved Organic Carbon (D.O.C.)	Inorganic Carbon (I.C.)	Iron	Silicates
Aug 24/81	6.5					0.010	0.004	0.048	0.39	0.012	0.005	5.0	6.0	0.03	1.00
Sept 15/81	7.0					0.010	0.001	0.060	0.45	0.001	0.015	4.5	6.0	0.03	1.35
Sept 28/81	7.0					0.036	0.001	0.084	0.62	0.003	0.020	4.5	5.6	0.15	0.97

KS/cra/REPT2-I-13

LAKE CHEMISTRY SUMMARY 1981

LASSWADE LAKE

Station: L1 bottom

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	pH at lab	pH in field	Conductivity (umhos/cm)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (Fixed End-point)	Alkalinity (Inflection Point)	Chlorides (Cl)	Sulphate (SO ₄)	Colour (Hazen Units)	Turbidity (Formazin Turbidity Units)
Aug 24/81	6.5	7.56		74	10.2	1.05			30		1.60	8.0	5.8	0.97
Sept 15/81	7.0	7.63		76	10.2	0.90					1.70	8.0	9.9	0.78
Sept 28/81	7.0	7.39		76	10.2	0.90					2.50	8.5	9.9	0.97

KS/cra/REPT2-J-14

LAKE CHEMISTRY SUMMARY 1981

TALLAN LAKE

Station: T1 Mid-lake comp.

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	Secchi Disc Reading (m)	Chlorophyll <u>a</u>	Chlorophyll <u>b</u>	Acidified Chlorophyll <u>a</u>	Total Phosphorus	Filtered Reactive Phosphorus	Filtered Ammonia (NH ₃)	Total Kjeldahl Nitrogen (TKN)	Nitrite (NO ₂)	Nitrate (NO ₃)	Dissolved Organic Carbon (D.O.C.)	Inorganic Carbon (I.C.)	Iron	Silicates
June 1/81	0- 11.2	5.6	2.4	0.7	1.9	-	-	0.012	0.27	0.001	0.040	5.7	24.6	0.01	2.85
June 23/81	0- 9.4	4.7	2.3	1.0	2.1	0.007	0.001	0.086	0.26	0.002	0.020	5.4	23.8	0.01	2.25
July 15/81	0- 9.8	4.9	1.1	0.2	1.0	0.007	0.001	0.036	0.29	0.001	0.025	5.4	23.2	0.02	2.00
Aug. 5/81	0- 13.0	6.5	1.0	0.1	0.7	0.008	0.001	0.030	0.27	0.001	0.035	5.4	23.4	0.02	2.45
Aug. 24/81	0- 12.0	6.0	0.6	0.1	0.5	0.007	0.002	0.008	0.24	0.001	0.150	5.1	24.4	0.01	3.30
Sept. 15/81	0- 14.0	7.0	0.9	0.4	0.8	0.008	0.001	0.010	0.27	0.001	0.030	4.7	23.4	0.02	2.75
Sept. 28/81	0- 11.4	5.7	0.9	0.7	1.0	0.003	0.001	0.014	0.26	0.001	0.010	4.5	-	0.02	1.40
Oct 21/81	0- 14.0	7.0	1.4	0.1	1.2	0.016	0.001	0.014	0.28	0.001	0.015	5.6	24.8	0.01	2.75
Nov 9/81	0- 13.0	6.5	1.0	0.2	0.8	0.017	0.003	0.010	0.33	0.001	0.030	5.5	24.4	0.02	2.65
Nov 26/81	0- 11.0	5.5	1.1	0.3	0.9	0.018	0.005	0.024	0.32	0.002	0.050	5.4	23.4	0.01	3.10
Max.		7.0	2.4	1.0	2.1	0.018	0.005	0.086	0.33	0.002	0.150	5.7	24.8	0.02	3.10
Min.		4.7	0.6	0.1	0.5	0.003	0.001	0.010	0.24	0.001	0.010	4.5	23.2	0.01	1.40
Mean		5.9	1.3	0.4	1.1	0.010	0.002	0.024	0.28	0.001	0.040	5.3	23.9	0.01	2.55

KS/cra/REPT2-I-8

LAKE CHEMISTRY SUMMARY 1981

TALLAN LAKE

Station: T1 Mid-lake comp.

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	pH at lab	pH in field	Conductivity (umhos/cm)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (Fixed End-point)	Alkalinity (Inflection Point)	Chlorides (Cl)	Sulphate (SO ₄)	Colour (Hazen Units)	Turbidity (Formazin Units)
June 1/81	0-11.2	8.43		210	31.0	1.75					1.60	8.5	14.9	0.50
June 23/81	0- 9.4	8.10		210	37.0	1.65					1.50	9.0	13.9	0.35
July 15/81	0- 9.8	8.23		200	31.0	1.65					1.50	9.0	19.3	0.83
Aug 5/81	0-13.0	7.82		210	30.0	1.70			98		1.50	10.5	18.0	0.47
Aug 24/81	0-12.0	7.44		210	31.4	1.70			98		1.40	9.5	12.6	0.69
Sept 15/81	0-14.0	7.87		210	32.2	1.70					1.40	9.5	11.2	0.44
Sept 28/81	0-11.4	8.14		200	30.0	1.80					1.40	11.5	11.2	0.39
Oct 21/81	0-14.0	8.13		200	29.0	1.65					1.40	8.5	9.9	0.35
Nov 9/81	0-13.0	8.06		205	35.0	1.85					1.50	11.0	9.9	0.40
Nov 26/81	0-11.0	7.83		210	34.0	1.55					1.35	9.0	-	1.06
Max		8.43		210	37.0	1.85			98		1.60	11.5	19.3	1.06
Min		7.44		200	29.0	1.55			98		1.35	8.5	9.9	0.35
Mean		8.00		206	32.1	1.70			98		1.45	9.6	13.4	0.55

KS/cra/REPT2-J-8

LAKE CHEMISTRY SUMMARY 1981

TALLAN LAKE

Station: T1 bottom

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	Secchi Disc Reading (m)	Chlorophyll <u>a</u>	Chlorophyll <u>b</u>	Acidified Chlorophyll <u>a</u>	Total Phosphorus	Filtered Reactive Phosphorus	Filtered Ammonia (NH ₃)	Total Kjeldahl Nitrogen (TKN)	Nitrite (NO ₂)	Nitrate (NO ₃)	Dissolved Organic Carbon (D.O.C.)	Inorganic Carbon (I.C.)	Iron	Silicates
June 1/81	15.0					0.025	0.020	0.010	0.25	0.001	0.120	5.6	25.2	0.01	0.50
June 23/81	13.0					0.008	0.001	0.024	0.28	0.002	0.015	5.3	24.8	0.01	2.70
July 15/81	16.5					0.005	0.002	0.014	0.25	0.001	0.135	5.1	24.0	0.01	2.65
Aug 5/81	18.0					0.013	0.001	0.006	-	0.001	0.125	5.3	23.8	0.01	2.90
Aug 24/81	18.0					0.005	0.003	0.038	0.25	0.001	0.010	5.4	22.8	0.01	2.35
Sept 15/81	16.0					0.011	0.009	0.006	0.31	0.001	0.125	4.9	24.0	0.02	2.95
Sept 28/81	20.0					0.012	0.003	0.038	0.60	0.002	0.190	4.5	-	0.06	2.40
Oct 21/81	23.0					0.032	0.012	0.004	0.34	0.016	0.165	6.4	27.6	0.03	4.10
Nov 9/81	23.0					0.044	0.026	0.100	0.40	0.019	0.110	5.3	27.2	0.05	4.45
Nov 26/81	22.0					0.011	0.005	0.022	0.27	0.002	0.050	5.4	23.4	0.01	3.20
Max						0.044	0.026	0.100	0.60	0.019	0.190	6.4	27.6	0.06	4.45
Min						0.005	0.001	0.004	0.25	0.001	0.010	4.5	22.8	0.01	0.50
Mean						0.017	0.008	0.026	0.33	0.005	0.104	5.3	24.8	0.02	2.82

KS/cra/REPT2-I-9

LAKE CHEMISTRY SUMMARY 1981

TALLAN LAKE

Station: T1 bottom

Results in mg/L unless otherwise noted.

Date	Sample Depth (m)	pH at lab	pH in field	Conductivity (umhos/cm)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Alkalinity (Fixed End-point)	Alkalinity (Inflection Point)	Chlorides (Cl)	Sulphate (SO ₄)	Colour (Hazen Units)	Turbidity (Formazin Units)
June 1/81	15.0	8.13		210	33.0	1.65					1.55	8.5	14.9	0.40
June 23/81	13.0	7.70		210	40.0	1.60					1.50	9.5	16.6	0.25
July 15/81	16.5	7.65		210	32.0	1.65					1.50	9.5	18.0	0.59
Aug 5/81	18.0	7.61		210	27.0	1.65					3.15	10.5	23.3	0.34
Aug 24/81	18.0	8.31		205	32.4	1.65			97		1.35	9.5	11.2	0.44
Sept 15/81	16.0	7.68		210	34.6	1.65					1.50	10.0	15.3	0.53
Sept 28/81	20.0	7.41		210	33.0	1.55					2.05	11.5	15.3	0.67
Oct 21/81	23.0	7.28		210	33.0	1.70					1.40	9.0	13.9	2.70
Nov 9/81	23.0	7.21		215	36.0	1.85					1.95	8.5	18.0	3.40
Nov 26/81	22.0	7.89		210	34.0	1.65					1.70	9.0	12.6	0.93
Max		8.31		215	40.0	1.85					3.15	11.5	23.3	3.40
Min		7.21		205	27.0	1.55					1.35	8.5	11.2	0.25
Mean		7.69		210	33.5	1.66			97		1.76	9.5	15.9	1.02

KS/cra/REPT2-J-10

APPENDIX I

Lake Chemistry Results, 1982

CHANDOS TWP WATER QUALITY DATA 1982

FOR STATION CH1 COMPOSITE SAMPLE

DATE YR MO DA	SAMPLE DEPTH M	SDV M	CHLA TOT UG/L	CHLA ACID UG/L	TOTAL PHOS UG/L	DISS PHOS UG/L	TOT AMMON UGN/L	TOT KJELD UGN/L	NITRITE UGN/L	NITRATE UGN/L	D.O.C. MG/L	D.I.C. MG/L	TOT. IRON MG/L	DISS. SILICA MG/L
82-02-10	10.0	.	1.6	1.4	13.0	5.0	4	290	1.0	145.0	4.9	12.8	0.010	1.55
82-03-03	10.0	.	0.7	0.5	5.0	3.0	6	260	1.0	55.0	5.0	13.0	0.020	0.65
82-05-25	8.0	4.0	1.3	0.8	12.0	3.0	68	340	3.0	5.0	4.7	11.0	0.030	0.70
82-06-14	11.0	5.5	1.7	0.7	21.0	0.5	520	1460	1.0	25.0	4.7	11.0	0.035	0.38
82-07-05	10.0	5.0	1.6	0.4	10.0	1.0	4	270	2.0	25.0	4.4	11.8	0.030	0.22
82-07-26	9.0	4.5	1.7	1.4	10.0	3.0	34	330	1.0	5.0	4.5	11.2	0.025	0.26
82-08-19	7.0	3.5	1.3	1.0	10.0	0.5	28	1050	2.0	8.0	5.0	11.2	0.030	0.18
82-09-08	9.0	4.5	2.0	.	21.0	13.0	22	360	2.0	33.0	4.8	11.5	0.020	0.75
82-09-28	10.0	5.0	1.6	0.6	10.0	2.0	30	310	2.0	5.0	4.6	11.1	0.020	0.35
82-11-02	10.0	5.0	2.5	1.1	14.0	1.5	6	300	2.0	8.0	4.5	12.0	0.045	0.80
SAMPLES		8	10	9	10	10	10	10	10	10	10	10	10	10
MEAN		4.6	1.6	0.9	12.6	3.2	72	497	1.7	31.4	4.7	11.7	0.026	0.58
MAX		5.5	2.5	1.4	21.0	13.0	520	1460	3.0	145.0	5.0	13.0	0.045	1.55
MIN		3.5	0.7	0.4	5.0	0.5	4	260	1.0	5.0	4.4	11.0	0.010	0.18

DATE YR MO DA	SAMPLE DEPTH M	CA MG/L	MG MG/L	NA MG/L	K MG/L	CL MG/L	SULPHATE MG/L	ALK. FEP MG/L	PH AT LAB	COND UMHOS /CM	COLOUR H.U.	TURB FTU
82-02-10	10.0	18.6	1.70	.	.	2.85	11.50	.	7.95	134	5.8	0.52
82-03-03	10.0	19.0	1.70	.	.	2.85	10.50	.	7.89	138	7.2	0.24
82-05-25	8.0	20.6	1.42	.	.	2.75	10.40	.	8.05	127	15.7	0.68
82-06-14	11.0	20.6	1.52	1.75	1.10	2.90	9.30	40.5	7.91	114	11.4	1.96
82-07-05	10.0	20.6	1.90	1.70	1.10	2.70	10.40	47.1	7.81	127	11.5	0.96
82-07-26	9.0	20.0	1.60	.	.	2.65	8.70	47.4	7.91	129	11.8	0.60
82-08-19	7.0	19.8	1.72	1.60	1.08	2.65	9.04	49.6	8.01	126	12.4	1.17
82-09-08	9.0	20.1	1.42	.	.	2.60	9.30	49.2	7.89	126	10.8	0.75
82-09-28	10.0	19.6	1.50	.	.	2.65	9.90	48.0	7.88	126	10.5	0.77
82-11-02	10.0	19.7	1.58	.	.	2.75	9.53	50.8	7.78	126	5.9	0.78
SAMPLES		10	10	3	3	10	10	7	10	10	10	10
MEAN		19.9	1.61	1.68	1.09	2.73	9.86	47.5	7.91	127	10.3	0.84
MAX		20.6	1.90	1.75	1.10	2.90	11.50	50.8	8.05	138	15.7	1.96
MIN		18.6	1.42	1.60	1.08	2.60	8.70	40.5	7.78	114	5.8	0.24

CHANDOS TWP WATER QUALITY DATA 1982

FOR STATION CH1 BOTTOM SAMPLE

DATE YR MO DA	SAMPLE DEPTH M	SDV M	CHLA TOT UG/L	CHLA ACID UG/L	TOTAL PHOS UGP/L	DISS PHOS UGP/L	TOT AMMON UGN/L	TOT KJELD UGN/L	NITRITE UGN/L	NITRATE UGN/L	D.O.C. MG/L	D.I.C. MG/L	TOT. IRON MG/L	DISS. SILICA MG/L
82-02-09	12.0	.	.	.	7.0	3.0	2	270	1.0	50.0	4.7	14.0	0.040	0.60
82-03-03	11.5	.	.	.	12.0	1.0	8	470	2.0	250.0	6.8	13.4	0.240	1.45
82-05-25	12.0	.	.	.	10.0	5.0	38	320	3.0	60.0	4.5	11.4	0.030	0.92
82-06-14	12.0	.	.	.	21.0	7.0	52	300	3.0	75.0	4.5	11.2	0.020	0.86
82-07-05	12.0	.	.	.	10.0	0.5	8	280	1.0	35.0	4.5	11.4	0.025	0.44
82-07-26	13.0	.	.	.	13.0	5.5	34	330	1.0	50.0	4.3	11.0	0.035	0.82
82-08-19	13.0	.	.	.	14.0	7.0	34	250	2.0	48.0	4.6	11.8	0.030	1.02
82-09-08	13.0	.	.	.	20.0	.	30	390	3.0	47.0	4.5	11.7	0.095	1.65
82-09-28	13.0	.	.	.	21.0	7.0	2	430	2.0	8.0	4.5	11.2	0.075	0.50
82-11-02	13.0	.	.	.	90.0	.	.	770	.	.	4.3	12.4	0.035	0.93
SAMPLES		0	0	0	10	8	9	10	9	9	10	10	10	10
MEAN		.	.	.	21.8	4.5	23	381	2.0	69.2	4.7	11.9	0.062	0.92
MAX		.	.	.	90.0	7.0	52	770	3.0	250.0	6.8	14.0	0.240	1.65
MIN		.	.	.	7.0	0.5	2	250	1.0	8.0	4.3	11.0	0.020	0.44

DATE YR MO DA	SAMPLE DEPTH M	CA MG/L	MG MG/L	NA MG/L	K MG/L	CL MG/L	SULPHATE MG/L	ALK. FEP MG/L	PH AT LAB	COND UMHOS /CM	COLOUR H.U.	TURB FTU
82-02-09	12.0	19.6	1.65	.	.	2.90	11.50	.	7.57	140	4.5	0.90
82-03-03	11.5	19.6	1.70	.	.	2.85	10.50	.	7.80	137	23.6	0.62
82-05-25	12.0	20.6	1.44	.	.	2.75	10.70	.	8.01	131	7.1	0.75
82-06-14	12.0	20.7	1.52	1.70	1.10	2.60	9.50	47.1	7.57	127	11.5	0.75
82-07-05	12.0	19.9	1.68	1.55	0.01	2.65	10.70	47.3	7.54	127	11.5	0.58
82-07-26	13.0	19.7	1.56	.	.	2.70	9.00	47.9	7.33	127	12.7	0.60
82-08-19	13.0	20.0	1.60	1.50	1.10	2.60	9.10	49.2	7.27	126	13.5	1.02
82-09-08	13.0	19.9	0.52	.	.	2.66	9.20	50.2	7.94	128	12.0	1.54
82-09-28	13.0	20.2	1.54	.	.	2.65	9.70	48.8	7.46	129	11.0	1.40
82-11-02	13.0	19.8	1.52	.	.	2.71	9.62	49.7	7.88	126	7.4	1.08
SAMPLES		10	10	3	3	10	10	7	10	10	10	10
MEAN		20.0	1.47	1.58	0.74	2.71	9.95	48.6	7.64	130	11.5	0.92
MAX		20.7	1.70	1.70	1.10	2.90	11.50	50.2	8.01	140	23.6	1.54
MIN		19.6	0.52	1.50	0.01	2.60	9.00	47.1	7.27	126	4.5	0.58

CHANDOS TWP WATER QUALITY DATA 1982

FOR STATION CH2 COMPOSITE SAMPLE

DATE YR MO DA	SAMPLE DEPTH M	SDV M	CHLA TOT UG/L	CHLA ACID UG/L	TOTAL PHOS UGP/L	DISS PHOS UGP/L	TOT AMMON UGN/L	TOT KJELD UGN/L	NITRITE UGN/L	NITRATE UGN/L	D.O.C. MG/L	D.I.C. MG/L	TOT. IRON MG/L	DISS. SILICA MG/L
82-02-10	10.0	.	1.7	1.3	6.0	4.0	4	290	1.0	60.0	5.0	12.6	0.010	0.55
82-03-03	10.0	.	1.1	0.7	5.0	5.0	10	270	1.0	65.0	4.9	12.6	0.010	0.45
82-05-25	8.4	4.2	1.4	0.8	10.0	5.0	68	320	2.0	5.0	4.5	10.8	0.020	0.62
82-06-14	11.0	5.5	1.8	1.0	16.0	2.0	18	270	1.0	10.0	4.5	10.8	0.025	0.48
82-07-05	9.0	4.5	1.3	0.4	11.0	.	18	290	1.0	5.0	4.3	11.2	0.025	0.30
82-07-26	10.0	5.0	1.4	1.0	6.0	1.0	46	300	1.0	5.0	4.5	11.0	0.030	0.14
82-08-17	9.0	4.5	1.5	1.3	.	1.5	34	.	2.0	5.0	4.8	11.4	0.015	0.20
82-09-08	9.6	4.8	1.7	.	6.0	3.5	4	300	0.0	5.0	5.2	11.6	0.015	1.19
82-09-28	10.0	5.0	1.8	0.9	10.0	0.5	8	350	2.0	5.0	4.7	11.0	0.020	0.26
82-11-02	10.0	5.0	1.9	0.5	15.0	0.5	2	280	1.0	5.0	4.1	12.0	0.025	0.69
SAMPLES		8	10	9	9	9	10	9	10	10	10	10	10	10
MEAN		4.8	1.6	0.9	9.4	2.6	21	297	1.2	17.0	4.6	11.5	0.019	0.49
MAX		5.5	1.9	1.3	16.0	5.0	68	350	2.0	65.0	5.2	12.6	0.030	1.19
MIN		4.2	1.1	0.4	5.0	0.5	2	270	0.0	5.0	4.1	10.8	0.010	0.14

DATE YR MO DA	SAMPLE DEPTH M	CA MG/L	MG MG/L	NA MG/L	K MG/L	CL MG/L	SULPHATE MG/L	ALK. FEP MG/L	PH AT LAB	COND UMHOS /CM	COLOUR H.U.	TURB FTU
82-02-10	10.0	18.4	1.70	.	.	2.80	11.50	.	7.96	133	7.2	0.56
82-03-03	10.0	19.0	1.65	.	.	2.85	11.00	.	8.05	138	6.5	0.23
82-05-25	8.4	19.8	1.42	.	.	2.70	10.50	.	8.05	125	7.1	0.65
82-06-14	11.0	19.5	1.50	1.70	1.10	2.60	9.30	46.7	8.05	122	12.7	0.58
82-07-05	9.0	19.7	1.56	1.60	1.10	2.70	10.40	48.0	7.90	125	10.8	0.48
82-07-26	10.0	19.8	1.52	.	.	2.65	8.70	47.4	8.03	126	12.1	0.75
82-08-17	9.0	20.3	1.56	1.65	1.08	2.70	8.80	49.6	7.92	126	11.2	0.57
82-09-08	9.6	19.7	1.46	.	.	2.65	10.00	51.6	7.84	127	12.4	0.95
82-09-28	10.0	19.8	1.52	.	.	2.65	10.00	48.4	7.96	127	10.4	0.59
82-11-02	10.0	19.1	1.48	.	.	2.68	9.66	48.0	7.82	125	6.7	0.53
SAMPLES		10	10	3	3	10	10	7	10	10	10	10
MEAN		19.5	1.54	1.65	1.09	2.70	9.99	48.5	7.96	127	9.7	0.59
MAX		20.3	1.70	1.70	1.10	2.85	11.50	51.6	8.05	138	12.7	0.95
MIN		18.4	1.42	1.60	1.08	2.60	8.70	46.7	7.82	122	6.5	0.23

CHANDOS TWP WATER QUALITY DATA 1982

FOR STATION CH2 BOTTOM SAMPLE

DATE YR MO DA	SAMPLE DEPTH M	SDV M	CHLA TOT UG/L	CHLA ACID UG/L	TOTAL PHOS UG/L	DISS PHOS UG/L	TOT AMMON UG/L	TOT KJELD UG/L	NITRITE UG/L	NITRATE UG/L	D.O.C. MG/L	D.I.C. MG/L	TOT. IRON MG/L	DISS. SILICA MG/L
82-02-10	44.0	.	.	.	25.0	13.0	10	310	2.0	150.0	4.7	13.4	0.040	1.75
82-03-03	43.0	.	.	.	18.0	7.0	2	270	1.0	170.0	4.7	13.8	0.050	1.80
82-05-25	45.0	.	.	.	14.0	8.0	16	340	2.0	135.0	4.5	10.6	0.025	1.34
82-06-14	44.0	.	.	.	14.0	5.0	26	270	2.0	95.0	4.5	10.8	0.015	0.82
82-07-05	44.0	.	.	.	16.0	7.0	6	270	1.0	145.0	4.5	11.2	0.025	1.12
82-07-26	45.0	.	.	.	7.0	4.5	40	280	1.0	5.0	4.4	11.0	0.035	0.38
82-08-17	44.0	.	.	.	30.0	.	8	430	1.0	224.0	4.5	11.8	0.010	1.60
82-09-08	44.0	.	.	.	40.0	23.0	10	560	1.0	184.0	4.3	11.6	0.045	1.72
82-09-28	45.0	.	.	.	20.0	10.0	8	270	3.0	67.0	4.4	10.7	0.015	0.69
82-11-02	45.0	.	.	.	47.0	31.5	2	260	2.0	213.0	3.7	12.9	0.002	1.73
SAMPLES		0	0	0	10	9	10	10	10	10	10	10	10	10
MEAN		.	.	.	23.1	12.1	13	326	1.6	138.8	4.4	11.8	0.026	1.29
MAX		.	.	.	47.0	31.5	40	560	3.0	224.0	4.7	13.8	0.050	1.80
MIN		.	.	.	7.0	4.5	2	260	1.0	5.0	3.7	10.6	0.002	0.38

DATE YR MO DA	SAMPLE DEPTH M	CA MG/L	MG MG/L	NA MG/L	K MG/L	CL MG/L	SULPHATE MG/L	ALK. FEP MG/L	PH AT LAB	COND UMHOS /CM	COLOUR H.U.	TURB FTU
82-02-10	44.0	18.6	1.65	.	.	2.80	10.00	.	7.72	135	9.0	2.20
82-03-03	43.0	20.0	1.65	.	.	2.85	10.00	.	7.69	140	14.4	0.36
82-05-25	45.0	20.5	1.50	.	.	2.80	10.50	.	7.99	129	7.3	1.31
82-06-14	44.0	20.1	1.50	1.70	1.14	3.55	9.40	45.9	7.83	124	12.2	0.76
82-07-05	44.0	19.9	1.58	1.60	1.12	2.65	10.20	46.8	7.77	126	9.5	0.62
82-07-26	45.0	19.7	1.54	.	.	2.65	8.90	47.3	7.78	127	12.0	0.59
82-08-17	44.0	20.8	1.58	1.55	1.08	2.55	9.20	48.9	7.10	126	11.0	1.33
82-09-08	44.0	19.4	1.50	.	.	2.60	9.80	48.0	7.67	125	12.1	1.85
82-09-28	45.0	20.0	1.54	.	.	2.65	9.90	47.1	7.75	126	10.4	0.99
82-11-02	45.0	19.5	1.50	.	.	2.70	9.31	47.2	7.76	126	13.8	1.84
SAMPLES		10	10	3	3	10	10	7	10	10	10	10
MEAN		19.8	1.55	1.62	1.11	2.78	9.72	47.3	7.71	128	11.2	1.18
MAX		20.8	1.65	1.70	1.14	3.55	10.50	48.9	7.99	140	14.4	2.20
MIN		18.6	1.50	1.55	1.08	2.55	8.90	45.9	7.10	124	7.3	0.36

CHANDOS TWP WATER QUALITY DATA 1982

FOR STATION CH3 COMPOSITE SAMPLE

DATE YR MO DA	SAMPLE DEPTH M	SDV M	CHLA TOT UG/L	CHLA ACID UG/L	TOTAL PHOS UGP/L	DISS PHOS UGP/L	TOT AMMON UGN/L	TOT KJELD UGN/L	NITRITE UGN/L	NITRATE UGN/L	D.O.C. MG/L	D.I.C. MG/L	TOT. IRON MG/L	DISS. SILICA MG/L
82-02-09	10.0	.	3.0	2.7	11.0	5.0	2	280	1.0	60.0	4.9	12.2	0.010	0.60
82-03-03	10.0	.	1.1	0.9	6.0	5.0	12	260	.	70.0	5.0	12.4	0.020	0.50
82-05-25	8.4	4.2	1.2	0.6	10.0	3.0	56	310	2.0	5.0	4.5	11.0	0.020	0.62
82-06-15	11.6	5.8	2.0	1.0	13.0	2.0	24	300	1.0	10.0	4.6	10.8	0.040	0.56
82-07-06	9.0	4.5	1.8	1.4	8.0	1.0	2	270	1.0	5.0	4.5	11.0	0.025	0.14
82-07-26	8.4	4.2	1.1	0.9	7.0	1.0	10	310	1.0	5.0	4.8	12.0	0.025	0.10
82-08-17	9.0	4.5	1.2	0.8	32.0	1.0	18	380	1.0	5.0	5.0	11.0	0.010	0.10
82-09-08	10.0	5.0	1.8	.	7.0	.	4	320	0.0	5.0	5.0	11.2	0.160	0.57
82-09-28	10.0	5.0	1.8	0.6	.	.	.	.	.	.	.	.	.	.
82-11-02	11.0	5.5	2.1	0.4	15.0	2.0	2	290	2.0	8.0	4.2	11.2	0.010	0.79
SAMPLES		8	10	9	9	8	9	9	8	9	9	9	9	9
MEAN		4.8	1.7	1.0	12.1	2.5	14	302	1.1	19.2	4.7	11.4	0.036	0.44
MAX		5.8	3.0	2.7	32.0	5.0	56	380	2.0	70.0	5.0	12.4	0.160	0.79
MIN		4.2	1.1	0.4	6.0	1.0	2	260	0.0	5.0	4.2	10.8	0.010	0.10

DATE YR MO DA	SAMPLE DEPTH M	CA MG/L	MG MG/L	NA MG/L	K MG/L	CL MG/L	SULPHATE MG/L	ALK. FEP MG/L	PH AT LAB	COND UMHOS /CM	COLOUR H.U.	TURB FTU
82-02-09	10.0	18.2	1.65	.	.	2.80	11.00	.	7.99	134	7.2	0.32
82-03-03	10.0	19.4	0.75	.	.	2.85	11.00	.	8.03	132	6.5	0.23
82-05-25	8.4	19.6	1.50	.	.	2.70	9.80	.	7.99	124	5.3	0.56
82-06-15	11.6	20.1	1.50	1.65	1.10	2.55	10.20	45.7	7.97	123	12.2	0.51
82-07-06	9.0	19.5	1.54	1.55	1.10	2.60	10.00	45.9	7.97	124	9.5	0.53
82-07-26	8.4	20.0	1.52	.	.	2.65	8.60	46.9	8.10	126	10.1	0.63
82-08-17	9.0	20.9	1.56	1.55	1.08	2.60	9.00	49.8	8.26	125	10.2	0.72
82-09-08	10.0	19.4	1.46	.	.	2.63	10.10	49.0	7.82	125	12.0	0.53
82-09-28	10.0	.	.	.	.	.	.	.	.	.	.	.
82-11-02	11.0	19.4	1.50	.	.	2.65	9.66	47.3	7.44	125	6.8	0.95
SAMPLES		9	9	3	3	9	9	6	9	9	9	9
MEAN		19.6	1.44	1.58	1.09	2.67	9.93	47.4	7.95	126	8.9	0.55
MAX		20.9	1.65	1.65	1.10	2.85	11.00	49.8	8.26	134	12.2	0.95
MIN		18.2	0.75	1.55	1.08	2.55	8.60	45.7	7.44	123	5.3	0.23

CHANDOS TWP WATER QUALITY DATA 1982

FOR STATION CH3 BOTTOM SAMPLE

DATE YR MO DA	SAMPLE DEPTH M	SDV M	CHLA TOT UG/L	CHLA ACID UG/L	TOTAL PHOS UG/L	DISS PHOS UG/L	TOT AMMON UG/L	TOT KJELD UG/L	NITRITE UG/L	NITRATE UG/L	D.O.C. MG/L	D.I.C. MG/L	TOT. IRON MG/L	DISS. SILICA MG/L
82-02-09	30.0	.	.	.	10.0	4.0	2	270	1.0	80.0	4.3	11.6	0.010	0.90
82-03-03	33.0	.	.	.	8.0	3.0	10	270	1.0	125.0	4.6	12.6	0.020	1.15
82-05-25	33.0	.	.	.	9.0	5.0	6	240	1.0	120.0	4.3	10.8	0.020	1.10
82-06-15	34.0	.	.	.	24.0	8.0	2	230	1.0	125.0	4.4	10.6	0.025	1.10
82-07-06	34.0	.	.	.	26.0	12.0	4	260	2.0	145.0	4.2	11.0	0.020	1.08
82-07-26	34.0	.	.	.	21.0	.	16	720	6.0	110.0	4.6	11.6	0.020	1.04
82-08-17	34.0	.	.	.	71.0	27.0	8	380	2.0	183.0	4.6	11.2	0.010	1.22
82-09-08	32.0	.	.	.	30.0	.	8	320	2.0	163.0	4.5	11.2	0.020	1.72
82-09-28	34.0	.	.	.	34.0	21.5	2	250	2.0	133.0	4.2	10.7	0.010	1.09
82-11-02	34.0	.	.	.	35.0	22.0	2	260	2.0	173.0	4.5	12.7	0.015	1.39
SAMPLES		0	0	0	10	8	10	10	10	10	10	10	10	10
MEAN		.	.	.	26.8	12.8	6	320	2.0	135.7	4.4	11.4	0.017	1.18
MAX		.	.	.	71.0	27.0	16	720	6.0	183.0	4.6	12.7	0.025	1.72
MIN		.	.	.	8.0	3.0	2	230	1.0	80.0	4.2	10.6	0.010	0.90

DATE YR MO DA	SAMPLE DEPTH M	CA MG/L	MG MG/L	NA MG/L	K MG/L	CL MG/L	SULPHATE MG/L	ALK. FEP MG/L	PH AT LAB	COND UMHOS /CM	COLOUR H.U.	TURB FTU
82-02-09	30.0	17.2	1.60	.	.	2.65	10.50	5.0	7.85	127	5.8	0.64
82-03-03	33.0	18.6	1.60	.	.	2.70	10.00	6.0	7.80	132	6.0	0.25
82-05-25	33.0	20.5	1.52	.	.	2.55	10.00	.	8.03	126	5.3	1.04
82-06-15	34.0	19.8	1.52	1.60	1.12	2.50	9.60	45.7	7.95	123	11.8	0.77
82-07-06	34.0	18.6	1.66	1.65	1.12	2.55	10.90	45.9	7.62	125	10.7	0.42
82-07-26	34.0	17.1	1.22	.	.	2.90	9.00	40.7	7.87	125	10.7	1.22
82-08-17	34.0	20.1	1.56	1.50	1.10	2.55	9.30	48.1	7.20	125	10.4	1.16
82-09-08	32.0	19.2	1.52	.	.	2.55	9.70	49.8	7.56	125	11.5	1.03
82-09-28	34.0	19.7	1.54	.	.	2.65	9.90	46.8	7.56	124	8.3	0.84
82-11-02	34.0	19.6	1.50	.	.	2.67	9.49	46.5	7.81	126	10.4	1.27
SAMPLES		10	10	3	3	10	10	9	10	10	10	10
MEAN		19.0	1.52	1.58	1.11	2.63	9.84	37.2	7.72	126	9.1	0.86
MAX		20.5	1.66	1.65	1.12	2.90	10.90	49.8	8.03	132	11.8	1.27
MIN		17.1	1.22	1.50	1.10	2.50	9.00	5.0	7.20	123	5.3	0.25

CHANDOS TWP WATER QUALITY DATA 1982

FOR STATION CH4 COMPOSITE SAMPLE

DATE YR MO DA	SAMPLE DEPTH M	SDV M	CHLA TOT UG/L	CHLA ACID UG/L	TOTAL PHOS UGP/L	DISS PHOS UGP/L	TOT AMMON UGN/L	TOT KJELD UGN/L	NITRITE UGN/L	NITRATE UGN/L	D.O.C. MG/L	D.I.C. MG/L	TOT. IRON MG/L	DISS. SILICA MG/L
82-02-09	10.0	.	1.2	0.7	12.0	6.0	30	340	2.0	70.0	4.9	12.0	0.020	0.25
82-03-03	10.0	.	1.0	0.4	10.0	6.0	8	320	5.0	130.0	5.3	12.2	0.020	0.35
82-05-25	7.6	3.8	2.3	1.5	17.0	6.0	88	390	13.0	5.0	4.5	9.8	0.030	0.40
82-06-14	9.0	4.5	3.2	2.5	31.0	5.0	455	1470	2.0	20.0	4.7	10.0	0.030	0.18
82-07-05	10.0	5.0	1.7	0.8	13.0	1.5	36	350	3.0	30.0	4.7	10.4	0.030	0.14
82-07-26	9.6	4.8	2.3	1.7	13.0	2.0	30	400	2.0	5.0	5.2	11.4	0.035	0.14
82-08-17	10.0	5.0	2.5	1.7	26.0	4.0	46	400	1.0	5.0	5.0	10.6	0.030	0.14
82-09-07	10.6	5.3	2.2	.	6.0	.	4	320	1.0	14.0	4.9	11.4	0.020	0.24
82-09-28	10.0	5.0	2.3	0.3	11.0	1.5	30	470	2.0	5.0	5.0	9.9	0.020	0.20
82-11-02	10.0	5.0	2.1	1.6	16.0	4.0	6	310	2.0	5.0	5.2	11.0	0.015	0.51
SAMPLES		8	10	9	10	9	10	10	10	10	10	10	10	10
MEAN		4.8	2.1	1.2	15.5	4.0	73	477	3.3	28.9	4.9	10.9	0.025	0.25
MAX		5.3	3.2	2.5	31.0	6.0	455	1470	13.0	130.0	5.3	12.2	0.035	0.51
MIN		3.8	1.0	0.3	6.0	1.5	4	310	1.0	5.0	4.5	9.8	0.015	0.14

DATE YR MO DA	SAMPLE DEPTH M	CA MG/L	MG MG/L	NA MG/L	K MG/L	CL MG/L	SULPHATE MG/L	ALK. FEP MG/L	PH AT LAB	COND UMHOS /CM	COLOUR H.U.	TURB FTU
82-02-09	10.0	16.6	1.70	.	.	3.00	10.00	.	7.82	126	5.8	0.33
82-03-03	10.0	17.4	1.70	.	.	3.10	10.00	.	7.70	129	7.2	0.17
82-05-25	7.6	18.0	1.52	.	.	2.80	9.10	.	7.81	118	9.3	0.81
82-06-14	9.0	18.8	1.58	1.65	1.10	4.05	8.90	43.9	7.88	117	13.6	0.94
82-07-05	10.0	18.2	1.64	1.80	1.08	2.80	9.60	44.0	7.78	119	10.5	0.59
82-07-26	9.6	19.0	1.46	.	.	2.80	8.60	44.6	7.76	120	13.2	1.08
82-08-17	10.0	19.0	1.62	1.60	1.10	2.85	8.60	45.9	7.44	119	12.9	1.04
82-09-07	10.6	17.9	1.56	.	.	2.25	9.20	45.5	7.86	117	13.0	1.00
82-09-28	10.0	18.3	1.96	.	.	2.82	9.60	44.0	7.68	119	9.8	1.04
82-11-02	10.0	18.4	1.56	.	.	2.84	9.17	43.8	7.35	119	10.0	0.68
SAMPLES		10	10	3	3	10	10	7	10	10	10	10
MEAN		18.2	1.63	1.68	1.09	2.93	9.28	44.5	7.71	120	10.5	0.77
MAX		19.0	1.96	1.80	1.10	4.05	10.00	45.9	7.88	129	13.6	1.08
MIN		16.6	1.46	1.60	1.08	2.25	8.60	43.8	7.35	117	5.8	0.17

CHANDOS TWP WATER QUALITY DATA 1982

FOR STATION CH4 BOTTOM SAMPLE

DATE YR MO DA	SAMPLE DEPTH M	SDV M	CHLA TOT UG/L	CHLA ACID UG/L	TOTAL PHOS UGP/L	DISS PHOS UGP/L	TOT AMMON UGN/L	TOT KJELD UGN/L	NITRITE UGN/L	NITRATE UGN/L	D.O.C. MG/L	D.I.C. MG/L	TOT. IRON MG/L	DISS. SILICA MG/L
82-02-09	20.0	.	.	.	54.0	35.0	274	590	2.0	65.0	4.9	12.6	0.110	0.90
82-03-03	22.0	.	.	.	103	80.0	218	790	25.0	295.0	5.5	13.2	0.100	1.15
82-05-25	21.0	.	.	.	15.0	5.0	76	400	23.0	80.0	4.6	10.2	0.050	0.72
82-06-14	22.0	.	.	.	42.0	22.0	346	680	8.0	20.0	4.9	10.2	0.105	1.10
82-07-05	22.0	.	.	.	36.0	18.0	330	650	7.0	15.0	4.6	10.4	0.110	1.00
82-07-26	22.0	.	.	.	127	74.0	620	1190	25.0	45.0	4.8	11.2	0.425	1.34
82-08-17	21.0	.	.	.	23.0	.	4	390	.	.	4.8	12.8	0.315	1.40
82-09-07	21.0	.	.	.	230	79.0	830	1540	3.0	22.0	4.8	11.8	0.420	1.54
82-09-28	21.0	.	.	.	189	83.0	840	1150	2.0	5.0	4.7	10.0	0.550	1.33
82-11-02	21.0	.	.	.	129	61.0	740	1100	2.0	5.0	5.1	16.5	0.450	1.37
SAMPLES		0	0	0	10	9	10	10	9	9	10	10	10	10
MEAN		.	.	.	94.8	50.8	428	848	10.8	61.3	4.9	11.9	0.263	1.18
MAX		.	.	.	230	83.0	840	1540	25.0	295.0	5.5	16.5	0.550	1.54
MIN		.	.	.	15.0	5.0	4	390	2.0	5.0	4.6	10.0	0.050	0.72

DATE YR MO DA	SAMPLE DEPTH M	CA MG/L	MG MG/L	NA MG/L	K MG/L	CL MG/L	SULPHATE MG/L	ALK. FEP MG/L	PH AT LAB	COND UMHOS /CM	COLOUR H.U.	TURB FTU
82-02-09	20.0	16.6	1.75	.	.	2.90	10.00	.	7.47	129	10.1	0.69
82-03-03	22.0	17.4	1.70	.	.	3.05	9.50	.	7.49	133	21.8	0.47
82-05-25	21.0	18.5	1.62	1.80	1.16	2.95	9.10	45.7	7.96	121	9.9	0.88
82-06-14	22.0	18.6	1.62	.	.	2.85	8.40	45.7	7.60	120	13.8	1.34
82-07-05	22.0	18.1	1.68	1.80	1.14	2.60	8.90	42.3	7.27	122	13.2	1.68
82-07-26	22.0	19.3	1.50	.	.	2.95	7.50	51.5	6.93	126	21.9	2.80
82-08-17	21.0	19.4	1.68	1.70	1.34	2.90	7.30	49.2	6.79	126	12.4	3.70
82-09-07	21.0	18.2	1.56	.	.	2.90	7.80	45.1	7.04	126	24.4	3.30
82-09-28	21.0	18.6	1.76	.	.	2.96	8.00	43.9	7.26	126	12.7	3.30
82-11-02	21.0	18.3	1.62	.	.	2.90	8.10	45.9	6.89	121	65.5	6.10
SAMPLES		10	10	3	3	10	10	8	10	10	10	10
MEAN		18.3	1.65	1.77	1.21	2.90	8.46	46.2	7.27	125	20.6	2.43
MAX		19.4	1.76	1.80	1.34	3.05	10.00	51.5	7.96	133	65.5	6.10
MIN		16.6	1.50	1.70	1.14	2.60	7.30	42.3	6.79	120	9.9	0.47

CHANDOS TWP WATER QUALITY DATA 1982

FOR CLYDSEDALE LAKE STATION CL1 COMPOSITE SAMPLE

DATE YR MO DA	SAMPLE DEPTH M	SDV M	CHLA TOT UG/L	CHLA ACID UG/L	TOTAL PHOS UGP/L	DISS PHOS UGP/L	TOT AMMON UGN/L	TOT KJELD UGN/L	NITRITE UGN/L	NITRATE UGN/L	D.O.C. MG/L	D.I.C. MG/L	TOT. IRON MG/L	DISS. SILICA MG/L
82-02-11	2.0	.	2.0	1.5	10.0	1.0	1410	1950	4.0	45.0	6.7	14.2	0.450	0.45
82-03-03	3.0	.	0.7	0.3	9.0	5.0	1630	2300	3.0	25.0	6.6	17.6	0.220	0.80
82-05-26	3.5	4.5	0.7	0.2	13.0	3.0	202	610	8.0	45.0	5.0	7.8	0.015	0.18
82-06-16	3.5	4.5	1.7	1.1	17.0	0.5	90	520	4.0	15.0	5.6	8.8	0.025	0.20
82-07-07	3.5	4.5	2.1	1.2	16.0	0.5	52	570	1.0	5.0	6.0	9.4	0.030	0.22
82-07-28	3.5	4.0	3.0	2.5	81.0	36.0	70	420	1.0	5.0	7.1	10.2	0.055	0.48
82-08-19	3.5	4.0	3.0	2.4	20.0	0.5	106	380	2.0	5.0	7.1	10.6	0.045	0.70
82-09-07	3.0	2.7	1.8	.	15.0	.	16	520	1.0	9.0	7.2	10.2	0.035	0.87
82-10-01	3.0	4.5	2.3	1.8	10.0	0.5	28	490	2.0	5.0	6.3	9.4	0.025	0.49
82-11-05	3.0	4.5	1.5	1.1	10.0	1.5	28	490	3.0	17.0	6.3	10.4	0.055	0.46
SAMPLES		8	10	9	10	9	10	10	10	10	10	10	10	10
MEAN		4.1	1.9	1.3	20.1	5.4	363	825	2.9	17.6	6.4	10.9	0.095	0.48
MAX		4.5	3.0	2.5	81.0	36.0	1630	2300	8.0	45.0	7.2	17.6	0.450	0.87
MIN		2.7	0.7	0.2	9.0	0.5	16	380	1.0	5.0	5.0	7.8	0.015	0.18

DATE YR MO DA	SAMPLE DEPTH M	CA MG/L	MG MG/L	NA MG/L	K MG/L	CL MG/L	SULPHATE MG/L	ALK. FEP MG/L	PH AT LAB	COND UMHOS /CM	COLOUR H.U.	TURB FTU
82-02-11	2.0	20.2	1.45	.	.	6.65	11.50	.	7.67	165	8.5	1.85
82-03-03	3.0	22.0	1.50	.	.	6.70	10.50	.	7.50	175	12.8	0.48
82-05-26	3.5	18.8	1.02	.	.	5.35	9.10	.	7.94	112	9.5	1.22
82-06-16	3.5	17.4	1.02	2.90	0.92	4.90	9.00	36.6	7.90	115	11.6	0.89
82-07-07	3.5	17.3	1.10	3.10	0.94	5.15	9.70	39.6	8.21	119	12.8	1.32
82-07-28	3.5	19.9	1.00	.	.	13.60	8.50	53.9	7.80	124	11.2	1.57
82-08-19	3.5	18.7	1.26	3.10	1.12	5.45	8.60	46.1	7.98	128	11.5	1.91
82-09-07	3.0	18.4	1.32	.	.	5.20	8.70	36.7	8.02	121	157	.
82-10-01	3.0	18.5	1.10	.	.	5.25	9.80	42.2	7.93	122	7.5	1.12
82-11-05	3.0	17.1	1.06	.	.	5.00	8.83	39.8	7.78	118	5.9	1.31
SAMPLES		10	10	3	3	10	10	7	10	10	10	9
MEAN		18.8	1.18	3.03	0.99	6.32	9.42	42.1	7.87	130	24.8	1.30
MAX		22.0	1.50	3.10	1.12	13.60	11.50	53.9	8.21	175	157	1.91
MIN		17.1	1.00	2.90	0.92	4.90	8.50	36.6	7.50	112	5.9	0.48

CHANDOS TWP WATER QUALITY DATA 1982

FOR LASSWADE LAKE, STATION L1 COMPOSITE SAMPLE

DATE YR MO DA	SAMPLE DEPTH M	SDV M	CHLA TOT UG/L	CHLA ACID UG/L	TOTAL PHOS UG/L	DISS PHOS UG/L	TOT AMMON UG/L	TOT KJELD UG/L	NITRITE UG/L	NITRATE UG/L	D.O.C. MG/L	D.I.C. MG/L	TOT. IRON MG/L	DISS. SILICA MG/L
.	5.0	.	0.4	0.1	6.0	1.0	208	560	4.0	50.0	5.0	7.2	0.020	0.20
.	5.0	.	0.5	0.1	4.0	.	256	550	3.0	55.0	4.8	8.0	0.020	0.25
.	7.5	5.5	1.2	0.3	9.0	1.0	110	460	10.0	40.0	4.1	5.6	0.030	0.28
.	9.0	4.5	3.0	1.9	14.0	0.5	132	470	3.0	15.0	4.3	5.2	0.060	0.30
.	8.0	4.0	1.3	0.2	5.0	1.0	16	320	1.0	5.0	4.4	5.4	0.030	0.24
.	8.0	4.5	1.6	1.1	8.0	3.0	44	600	1.0	5.0	5.0	6.2	0.050	0.32
.	7.0	3.5	1.6	0.9	27.0	1.0	100	380	3.0	7.0	4.7	6.0	0.050	0.42
.	7.0	4.5	1.6	.	9.0	.	24	410	0.5	10.0	4.5	5.7	0.040	0.68
.	9.0	4.5	2.1	1.8	10.0	0.5	68	470	2.5	5.0	4.5	5.2	0.020	0.32
.	9.0	4.5	2.2	1.0	6.0	1.0	38	390	2.0	18.0	5.0	6.4	0.070	0.51
SAMPLES		8	10	9	10	8	10	10	10	10	10	10	10	10
MEAN		4.4	1.5	0.8	9.8	1.1	100	461	3.0	21.0	4.6	6.1	0.039	0.35
MAX		5.5	3.0	1.9	27.0	3.0	256	600	10.0	55.0	5.0	8.0	0.070	0.68
MIN		3.5	0.4	0.1	4.0	0.5	16	320	0.5	5.0	4.1	5.2	0.020	0.20

DATE YR MO DA	SAMPLE DEPTH M	CA MG/L	MG MG/L	NA MG/L	K MG/L	CL MG/L	SULPHATE MG/L	ALK. FEP MG/L	PH AT LAB	COND UMHOS /CM	COLOUR H.U.	TURB FTU
.	5.0	9.8	1.15	.	.	1.80	8.00	.	7.39	.	7.0	0.61
.	5.0	10.6	1.25	.	.	1.75	8.50	.	7.31	.	4.9	0.45
.	7.5	10.3	0.96	.	.	1.60	7.30	.	7.67	74	12.1	0.93
.	9.0	10.2	0.94	0.90	0.72	1.50	6.90	23.5	7.60	73	12.3	0.99
.	8.0	9.9	0.92	1.05	0.70	1.55	7.40	23.1	7.65	71	10.5	0.86
.	8.0	10.9	0.82	.	.	1.55	6.20	24.1	7.71	71	10.2	1.12
.	7.0	11.1	0.98	0.80	0.80	1.55	6.20	26.3	7.24	75	13.2	1.31
.	7.0	10.1	0.94	.	.	1.45	6.60	25.9	7.65	73	11.2	1.01
.	9.0	10.4	0.90	.	.	1.51	7.00	24.4	7.55	72	6.8	0.98
.	9.0	10.4	0.84	.	.	1.11	7.11	25.8	7.59	71	6.8	0.94
SAMPLES		10	10	3	3	10	10	7	10	8	10	10
MEAN		10.4	0.97	0.92	0.74	1.54	7.12	24.7	7.54	73	9.5	0.92
MAX		11.1	1.25	1.05	0.80	1.80	8.50	26.3	7.71	75	13.2	1.31
MIN		9.8	0.82	0.80	0.70	1.11	6.20	23.1	7.24	71	4.9	0.45

CHANDOS TWP WATER QUALITY DATA 1982

FOR LASSWADE LAKE, STATION L1 BOTTOM SAMPLE

DATE YR MO DA	SAMPLE DEPTH M	SDV M	CHLA TOT UG/L	CHLA ACID UG/L	TOTAL PHOS UG/L	DISS PHOS UG/L	TOT AMMON UG/L	TOT KJELD UG/L	NITRITE UG/L	NITRATE UG/L	D.O.C. MG/L	D.I.C. MG/L	TOT. IRON MG/L	DISS. SILICA MG/L
.	7.0	.	.	.	6.0	1.0	290	590	4.0	45.0	4.8	7.4	0.030	0.30
.	8.0	.	.	.	8.0	1.0	264	720	22.0	175.0	6.0	8.6	0.120	0.35
.	7.0	.	.	.	15.0	1.0	204	570	30.0	50.0	4.3	6.0	0.035	0.36
.	9.0	.	.	.	16.0	3.0	24	610	.	.	4.3	5.4	0.085	0.38
.	8.0	.	.	.	15.0	.	340	640	7.0	10.0	4.2	6.0	0.070	0.42
.	8.0	.	.	.	19.0	3.0	332	730	2.0	5.0	4.5	6.6	0.085	0.40
.	8.0	.	.	.	27.0	2.0	224	370	35.0	5.0	6.5	6.4	0.080	0.46
.	7.0	.	.	.	8.0	.	28	440	0.5	5.0	4.5	5.8	0.040	0.58
.	8.0	.	.	.	10.0	0.5	82	500	2.0	5.0	4.3	5.8	0.045	0.36
.	9.0	.	.	.	5.0	1.0	44	340	3.0	12.0	4.9	6.5	0.040	0.44
SAMPLES		0	0	0	10	8	10	10	9	9	10	10	10	10
MEAN		.	.	.	12.9	1.6	183	551	11.7	34.7	4.8	6.4	0.063	0.40
MAX		.	.	.	27.0	3.0	340	730	35.0	175.0	6.5	8.6	0.120	0.58
MIN		.	.	.	5.0	0.5	24	340	0.5	5.0	4.2	5.4	0.030	0.30

DATE YR MO DA	SAMPLE DEPTH M	CA MG/L	MG MG/L	NA MG/L	K MG/L	CL MG/L	SULPHATE MG/L	ALK. FEP MG/L	PH AT LAB	COND UMHOS /CM	COLOUR H.U.	TURB FTU
.	7.0	10.4	1.15	.	.	1.80	8.00	.	7.43	84	5.8	0.67
.	8.0	10.6	1.10	.	.	1.65	8.00	.	7.35	90	9.8	0.70
.	7.0	10.5	0.92	.	.	1.65	7.50	.	7.44	73	14.2	0.74
.	9.0	10.5	0.94	0.95	0.72	1.55	6.80	24.0	7.43	73	13.2	1.23
.	8.0	10.5	0.98	0.95	0.80	1.55	7.20	24.8	6.90	76	13.5	1.94
.	8.0	11.6	0.84	.	.	1.65	6.10	27.2	6.98	76	16.9	1.95
.	8.0	11.3	1.00	0.80	0.86	1.60	5.80	30.3	6.90	77	17.2	1.43
.	7.0	10.5	0.90	.	.	1.50	6.50	27.2	7.37	74	14.4	1.14
.	8.0	10.7	0.92	.	.	1.50	6.70	26.2	6.18	75	10.7	0.98
.	9.0	10.2	0.88	.	.	1.55	6.98	23.7	7.48	70	7.4	0.87
SAMPLES		10	10	3	3	10	10	7	10	10	10	10
MEAN		10.7	0.96	0.90	0.79	1.60	6.96	26.2	7.15	77	12.3	1.16
MAX		11.6	1.15	0.95	0.86	1.80	8.00	30.3	7.48	90	17.2	1.95
MIN		10.2	0.84	0.80	0.72	1.50	5.80	23.7	6.18	70	5.8	0.67

CHANDOS TWP WATER QUALITY DATA 1982

FOR TALLAN LAKE, STATION T1 COMPOSITE SAMPLE

DATE YR MO DA	SAMPLE DEPTH M	SDV M	CHLA TOT UG/L	CHLA ACID UG/L	TOTAL PHOS UGP/L	DISS PHOS UGP/L	TOT AMMON UGN/L	TOT KJELD UGN/L	NITRITE UGN/L	NITRATE UGN/L	D.O.C. MG/L	D.I.C. MG/L	TOT. IRON MG/L	DISS. SILICA MG/L
.	10.0	.	.	.	5.0	1.0	2	270	3.0	75.0	5.6	25.0	0.010	1.95
.	10.0	.	0.3	0.2	11.0	.	18	330	3.0	85.0	5.6	25.2	0.010	1.85
.	17.0	8.5	0.4	0.4	7.0	4.0	44	290	2.0	25.0	5.0	21.8	0.020	1.86
.	10.0	5.0	1.3	0.7	9.0	2.0	30	270	5.0	30.0	5.5	22.4	0.035	1.94
.	10.0	5.0	1.6	1.0	29.0	1.5	30	380	1.0	5.0	5.3	22.8	0.030	2.56
.	11.0	5.5	1.5	1.3	5.0	44.0	12	330	1.0	10.0	5.4	23.6	0.025	1.64
.	12.0	6.0	0.7	0.3	22.0	0.5	16	410	2.0	18.0	5.3	23.0	0.015	1.68
.	12.0	.	.	.	5.0	2.0	8	360	1.5	15.0	5.5	23.2	0.020	2.00
.	10.0	7.5	0.8	0.2	16.0	1.0	10	300	2.5	5.0	5.2	22.1	0.025	1.48
.	10.0	7.5	1.5	0.6	9.0	1.5	2	290	2.0	5.0	5.8	24.2	0.035	1.62
SAMPLES		7	8	8	10	9	10	10	10	10	10	10	10	10
MEAN		6.4	1.0	0.6	11.8	6.4	17	323	2.3	27.3	5.4	23.3	0.022	1.86
MAX		8.5	1.6	1.3	29.0	44.0	44	410	5.0	85.0	5.8	25.2	0.035	2.56
MIN		5.0	0.3	0.2	5.0	0.5	2	270	1.0	5.0	5.0	21.8	0.010	1.48

DATE YR MO DA	SAMPLE DEPTH M	CA MG/L	MG MG/L	NA MG/L	K MG/L	CL MG/L	SULPHATE MG/L	ALK. FEP MG/L	PH AT LAB	COND UMHOS /CM	COLOUR H.U.	TURB FTU
.	10.0	33.0	2.05	.	.	1.60	10.50	.	8.26	217	7.2	0.40
.	10.0	37.0	1.75	.	.	1.55	9.50	.	8.29	187	17.8	4.20
.	17.0	37.1	1.62	.	.	1.35	8.40	.	8.32	202	14.1	0.71
.	10.0	36.1	1.64	0.90	1.48	1.25	8.10	77.8	8.05	201	16.4	0.71
.	10.0	37.9	1.72	0.90	1.50	1.55	8.70	94.2	8.06	205	15.3	0.48
.	11.0	33.6	1.46	.	.	1.30	7.90	88.7	8.20	206	14.5	0.63
.	12.0	35.9	1.70	0.70	1.62	1.30	7.50	99.0	7.92	205	16.4	0.66
.	12.0	36.1	1.52	.	.	1.20	7.90	62.8	8.31	203	17.3	0.78
.	10.0	37.7	1.74	.	.	1.25	8.40	95.5	8.19	204	13.5	0.68
.	10.0	35.3	1.62	.	.	1.30	8.22	94.0	8.10	203	7.4	0.52
SAMPLES		10	10	3	3	10	10	7	10	10	10	10
MEAN		36.0	1.68	0.83	1.53	1.36	8.51	87.4	8.17	203	14.0	0.98
MAX		37.9	2.05	0.90	1.62	1.60	10.50	99.0	8.32	217	17.8	4.20
MIN		33.0	1.46	0.70	1.48	1.20	7.50	62.8	7.92	187	7.2	0.40

CHANDOS TWP WATER QUALITY DATA 1982

FOR TALLAN LAKE, STATION T1 BOTTOM SAMPLE

DATE YR MO DA	SAMPLE DEPTH M	SDV M	CHLA TOT UG/L	CHLA ACID UG/L	TOTAL PHOS UGP/L	DISS PHOS UGP/L	TOT AMMON UGN/L	TOT KJELD UGN/L	NITRITE UGN/L	NITRATE UGN/L	D.O.C. MG/L	D.I.C. MG/L	TOT. IRON MG/L	DISS. SILICA MG/L
.	23.0	.	.	.	12.0	6.0	2	240	1.0	160.0	5.3	25.0	0.030	2.70
.	23.0	.	.	.	8.0	3.0	6	270	3.0	135.0	5.5	25.8	0.020	2.45
.	20.0	.	.	.	12.0	3.0	64	320	1.0	110.0	5.3	24.0	0.025	2.56
.	23.0	.	.	.	10.0	0.5	2	270	3.0	125.0	5.4	25.6	0.025	2.46
.	23.0	.	.	.	11.0	1.0	20	290	1.5	20.0	5.4	25.2	0.080	1.64
.	23.0	.	.	.	5.0	2.5	54	300	4.0	175.0	5.3	26.2	0.035	2.74
.	22.0	.	.	.	22.0	4.0	22	350	1.5	195.0	5.2	26.4	0.020	2.86
.	23.0	.	.	.	43.0	9.5	110	500	13.0	67.0	5.4	26.8	0.090	3.15
.	22.0	.	.	.	37.0	14.0	100	370	22.0	33.0	5.1	25.0	0.050	2.76
.	23.0	.	.	.	310	2.0	74	770	12.0	8.0	5.8	29.8	0.080	2.97
SAMPLES		0	0	0	10	10	10	10	10	10	10	10	10	10
MEAN		.	.	.	47.0	4.5	45	368	6.2	102.8	5.4	26.0	0.045	2.63
MAX		.	.	.	310	14.0	110	770	22.0	195.0	5.8	29.8	0.090	3.15
MIN		.	.	.	5.0	0.5	2	240	1.0	8.0	5.1	24.0	0.020	1.64

DATE YR MO DA	SAMPLE DEPTH M	CA MG/L	MG MG/L	NA MG/L	K MG/L	CL MG/L	SULPHATE MG/L	ALK. FEP MG/L	PH AT LAB	COND UMHOS /CM	COLOUR H.U.	TURB FTU
.	23.0	34.0	1.80	.	.	1.45	10.50	.	7.87	220	8.5	1.22
.	23.0	39.0	1.75	.	.	1.55	9.50	.	8.04	194	14.4	2.20
.	20.0	40.2	1.72	.	.	1.50	8.90	.	8.29	220	14.1	0.83
.	23.0	40.3	1.74	0.95	1.56	1.40	8.40	91.7	7.63	223	15.7	1.05
.	23.0	41.0	1.80	1.15	1.62	1.30	8.80	84.6	7.95	227	16.1	0.77
.	23.0	37.7	1.56	.	.	1.50	8.60	96.0	7.37	227	16.9	3.60
.	22.0	38.9	1.78	0.75	1.70	1.45	8.30	106.9	7.33	223	16.3	0.59
.	23.0	41.4	1.56	.	.	1.39	7.30	108.2	7.80	225	17.9	3.08
.	22.0	42.4	1.82	.	.	1.45	8.40	105.9	7.54	226	36.4	4.00
.	23.0	40.2	1.72	.	.	1.10	8.07	105.2	7.49	225	45.6	6.20
SAMPLES		10	10	3	3	10	10	7	10	10	10	10
MEAN		39.5	1.72	0.95	1.63	1.41	8.68	99.8	7.73	221	20.2	2.35
MAX		42.4	1.82	1.15	1.70	1.55	10.50	108.2	8.29	227	45.6	6.20
MIN		34.0	1.56	0.75	1.56	1.10	7.30	84.6	7.33	194	8.5	0.59

Appendix II Example of export coefficient calculation for the inflow from Lasswade Lake (CH5)

1990-1991				
CH5				
3.17				
Year	Waste	Flow	Waste	Flow
1990	3.27	10787	10000	10000
1991	2.48	10000	10000	10000
1992	2.01	10000	10000	10000
1993	1.75	10000	10000	10000
1994	2.44	10000	10000	10000
1995	7.40	10000	10000	10000
1996	7.71	10000	10000	10000
1997	4.95	10000	10000	10000
1998	4.82	10000	10000	10000
1999	2.27	10000	10000	10000
2000	7.294	10000	10000	10000
2001	68.346	10000	10000	10000
Total				
Yr sum	199.346	10000	10000	10000

1990-1991				
CH5				
3.17				
Year	Waste	Flow	Waste	Flow
1990	4.58	10000	10000	10000
1991	2.764	10000	10000	10000
1992	7.294	10000	10000	10000
1993	68.346	10000	10000	10000
1994	2.27	10000	10000	10000
1995	1.75	10000	10000	10000
1996	2.44	10000	10000	10000
1997	7.40	10000	10000	10000
1998	7.71	10000	10000	10000
1999	4.95	10000	10000	10000
2000	4.82	10000	10000	10000
2001	2.27	10000	10000	10000
2002	7.294	10000	10000	10000
2003	68.346	10000	10000	10000
Total				
Yr sum	199.346	10000	10000	10000

Appendix III

PHYTOPLANKTON RESULTS * 1981

	CHANDOS LAKE				Tallen Lake	Clydesdale Lake	Lasswade Lake
	CH-1	CH-2	CH-3	CH-4	T-1	CL-1	L-1
CYANOPHYCEAE							
Anabaena	22	10	22	166		7	
Aphanizomenon		1	13	12			
Aphanothece	12	15	15	20	3	5	7
Chroococcus	34	14	12	58			3
Coelosphaerium	19	5	4	11			
Gomphosphaeria	4		9	8			
Microcystis						16	
Oscillatoria	6	P			P		42
Radiocystis			1				
Sub-total	97	46	75	275	3	28	52
DINOPHYCEAE							
Unidentified Dinophyceae	10		24	70		67	7
CRYPTOPHYCEAE							
Cryptomonas	23	39	31	56	16	60	25
Katablepharis	2	3	5	6	P	3	2
Rhodomonas	11	17	19	23	8	2	6
	36	59	55	85	24	65	33
CHRYSTOPHYCEAE							
Bitrichia			P				
Chrysochromulin							
Breviturrita							6
Chrysochromulin parva	1	2	2	7			
Chrysolyros						P	
Chrysosphaerella			2			53	
Dinobryon	9	1	4		8	67	52
Epipyxis		2	1			2	1
Kephyrion			P	P	P	4	1
Mallomonas	35		14		P	8	14
Salpingoeca				7	1		11
Spiniferomonas				1		4	
Synura	11	4		7		15	4
Uroglena		1	1			15	14
Unidentified Chrysomonads	11	13	9	15	7	39	12
	67	23	33	37	16	207	115

PHYTOPLANKTON RESULTS (Continued)

	CHANDOS LAKE				Tallen Lake	Clydesdale Lake	Lasswade Lake
	CH-1	CH-2	CH-3	CH-4	T-1	CL-1	L-1
CHLOROPHYCEAE							
Ankyra					2		
Carteria					P		
Chlamydomonas	12	1	2	29	1	3	6
Coelastrum			2				
Cosmarium		9					
Crucigenia	1			14		1	9
Dictyosphaerium		P					1
Gleocystis				30	6		26
Guadrigula	15				P		P
Kirchneriella						4	
Koliella		P					
Micractinium						12	
Monoraphidium	1	3	4	1	5	2	28
Oocystis	22	3	4		5	2	28
Pediastrum							10
Pedinomonas		P			P		P
Scenedesmus				1		10	1
Schroederia		9					
Tetraedron		1				1	
Ulothrix	3			34			
	54	23	8	111	15	33	82
BACILLARIOPHYCEAE							
Achnanthes							2
Asterionella	29	6	5	15	3	11	48
Cyclotella	50	114	74	45	153	20	35
Fragilaria	79	8	117	19	1		314
Melosira	31		34				
Stephanodiscus			56				
Synedra	30	6		6		25	
Tabellaria		42	42	50			17
Sub-total	219	176	328	135	157	56	416
Total	483	327	523	713	215	456	705

*Results in $\mu^3/\text{mL} \times 10^3$

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Appendix III PHYTOPLANKTON RESULTS, 1982

Lake/ Area	Chandos Lake				Tallan	Clydes-	Lass-
	W.Bay	Main	S.Bay	Gilmour	Lake	dale	L. wade
	CH1	CH2	CH3	CH4	T1	CL1	L1
CYANOPHYCEAE							
Anabaena	9	12	13	16	2	12	63
Aphanizomenon	18	55	44				
Aphanotheca	14	10	9	34	2	28	91
Chroococcus	5		32	45	8	48	25
Coelosphaerium	3	3	3	9			
Gomphosphaeria	3			3			
Lyngbya	4	5	1	1	1	1	5
Microcystis						63	
Oscillatoria							
Radiocystis							
Rhabdoderma							4
sub-total	56	101	102	108	13	152	188
DINOPHYCEAE							
Ceratium	7			6	12	24	
Peridinium							5
Unidentified							
Dinophyceae	4	10	8	9	1	12	12
sub-total	11	10	8	15	13	36	17
EUGLENOPHYCEAE							
Euglena							2
sub-total							2

Appendix III PHYTOPLANKTON RESULTS, 1982 cont'd.

Lake/ Area	Chandos Lake				Tallan Lake	Clydes- dale L.	Lass- wade L.
	W.Bay	Main	S.Bay	Gilmour			
	CH1	CH2	CH3	CH4			
CRYPTOPHYCEAE							
Cryptomonas	58	67	66	113	31	27	68
Katablepharis	7	15	10	18	1	4	3
Rhodomonas	19	15	30	18	17	9	11
sub-total	84	97	106	149	49	40	85
CHRYSTOPHYCEAE							
Bitrichia							
Chromulina	2		2	2	1	1	2
erkonsis							
Chrysochromulina	8	6	10	35	1	11	3
parva							
Chrysochromulina							
breviturrita							
Chrysolyros							
Chrysosphaerella			1			1	
Dinobryon	5	3	2	9	1	8	13
Dinobryon							
cysts					4	4	1
Epipyxis							
Kephyrion							
Mallomonas		5	20	21	1	29	8
Salpingoeca							
Spiniferomonas				1			
Synura							9
Uroglena				3		4	6
Unidentified							
banana chrysophyte		1				1	
Unidentified							
chrysomonads	18	15	11	25	2	15	14
sub-total	33	30	46	96	10	74	56

Appendix III PHYTOPLANKTON RESULTS, 1982 cont'd.

Lake/ Area	Chandos Lake				Tallan	Clydes-	Lass-
	W.Bay	Main	S.Bay	Gilmour	Lake	dale	L. wade
	CH1	CH2	CH3	CH4	T1	CL1	L1
BACILLARIOPHYCEAE							
Achnanthes							
Asterionella	19	18	4	25	14	3	9
Cyclotella	501	394	392	92	51	70	10
Fragilaria	62	23	43		24	164	25
Melosira	26						
Navicula	3		4			4	
Nitzschia	2						
Rhizosolenia	1					3	
Stephanodiscus							
Synedra	6	5	3	20		20	
Tabellaria	46	94	75	97		40	146
sub-total	666	534	521	234	89	312	190
ZOOPLANKTON							
Ciliates	5	4	9	14	11	9	8
sub-total	5	4	9	14	11	9	8
Total	951	807	845	646	207	698	647

Appendix III PHYTOPLANKTON RESULTS, 1982 cont'd.

Lake/ Area	Chandos Lake				Tallan	Clydes-	Lass-
	W. Bay	Main	S. Bay	Gilmour	Lake	dale L.	wade L.
	CH1	CH2	CH3	CH4	T1	CL1	L1
CHLOROPHYCEAE							
Ankyra							
Botryococcus	35		15	4			
Carteria							
Chlamydomonas	16	12	10	8	2	18	15
Closterium							1
Coelastrum	4				11	15	
Cosmarium	5						8
Crucigenia			1				
Dictyosphaerium							
Gleocystis	8	7	11	13	13	21	7
Guadrigula							
Kirchneriella							
Koliella							
Micractinium							
Monoraphidium							
Oocystis	30	15	22	11	6	19	43
Pediastrum							1
Pedinomonas							
Quadrigula	1		1			3	2
Staurostrum				8			12
Staurodesmus							3
Scenedesmus	1					7	17
Schroederia		1			1		
Tetraedron	1		2			1	
Ulothrix							
sub-total	101	35	62	44	33	84	109

Appendix IV Aquatic macrophytes found in Chandos Lake

(data of Water Resources Branch, 1977)

Genus species	Common name
<u>Chara</u> sp	stonewort
<u>Nitella</u> sp	
<u>Isoetes</u> sp	quillwort
<u>Potamogeton amplifolius</u>	bassweed
<u>P. epihydrus</u>	pondweed
<u>P. gramineus</u>	"
<u>P. praelongus</u>	"
<u>P. pusillus</u>	"
<u>P. richardsonii</u>	"
<u>P. robbinsii</u>	"
<u>P. spirillus</u>	"
<u>P. zosteriformis</u>	"
<u>Najas flexilis</u>	bushy pondweed
<u>Sagittaria cristata</u>	arrowhead
<u>Elodea canadensis</u>	Canada waterweed
<u>Vallisneria americana</u>	tape grass
<u>Eleocharis acicularis</u>	spike rush
<u>Heteranthera dubia</u>	mud plantain

Appendix V Phosphorus budget calculations assuming no retention in the sewage system and using calculated retention coefficient for Chandos Lake

DILLON'S MODEL COMPONENT	TALLAN	CLYDESDALE	LASSWADE	GILMOUR BAY	CHANDOS
Volume (V) ($\times 10^6 \text{ m}^3$)	4.46	2.11	0.71	5.53	214.36
Surface Area (SA) (Km^2)	0.525	1.12	0.31	0.65	16.68
Mean Depth (MD) (metres)	8.50	1.88	2.29	8.51	12.85
Total Unit Runoff (TUR) (m/yr)	0.345	0.345	0.345	0.345	0.345
Total Drainage Area (TDA) (Km^2)	4.58	3.02	0.99	2.43	75.18
Precipitation (PR) (metres)	0.864	0.864	0.864	0.864	0.864
Evaporation (EV) (metres)	0.635	0.635	0.635	0.635	0.635
Oxic(1)/Anoxic(2) (type)	1	1	2	2	1
% Watershed Forested (WF)	100	100	100	100	100
Bedrock, % Igneous (BI)	100	100	100	100	100
% Sedimentary (BS)	0	0	0	0	0
# of Cottages (NC)	11	20	19	63	849
Dwellings (ND)	2	1	1	10	37
Vacant Lots (NVL)	7	17	17	3	77
Factors for NC (FNC)	0.504	0.504	0.504	0.504	0.504
ND (FND)	3.44	3.44	3.44	3.44	3.44
Export (EXP) ($\text{mg}/\text{m}^2/\text{yr}$)	6.2	10.7	8.6	8.3	
Total Outflow Volume (TOV) (m^3/yr)	1.70	1.30	0.41	0.99	29.76
Flushing Rate (FR) (times/yr)	0.381	0.615	0.581	0.179	0.139
Areal Water Load (AWL) (m/yr)	3.239	1.159	1.331	1.519	1.784
Phosphorous Retention (RP)	0.793	0.915	0.844	0.826	0.753
Response Time (RT) (years)	1.506	0.385	0.744	2.705	4.933
Precipitation Loading (LPR)	37.3	37.3	37.3	37.3	37.3
($\text{mg}/\text{m}^2/\text{yr}$)					
Supply: Drainage Area (JE) (Kg/yr)	28.4	32.3	8.514	20.169	544.1
Precipitation (JPR) (kg/yr)	19.6	41.8	11.6	24.2	622.2
Natural (JN) (kg/yr)	48.0	74.1	20.1	44.4	1,166.3
Artificial (JA) (kg/yr)	16.0	22.1	21.6	67.7	594.0
TOTAL (JT)	63.9	96.18	41.66	112.08	1,760.2
J. TRANSFERRED	13.24	8.22	6.50	19.52	
% JE	44.4	33.6	20.4	18.0	30.9
% JPR	30.6	43.4	27.8	21.6	35.3
% JA	25.0	23.0	51.8	60.4	33.7
+ vacant lots (Kg/yr)	3.5	8.6	8.6	1.5	38.8
% + vacant lots	5.5	8.9	20.6	1.3	2.2
+100 lots (Kg/yr)	50.4	50.4	50.4	50.4	50.4
% + 100 lots	78.8	52.4	121.0	45.0	2.9
Loading: Total-existing ($\text{mg}/\text{m}^2.\text{yr}$)	121.8	85.9	134.4	172.4	105.53
Total Phosphorous (TP) (mg/m^3)	8.1	6.6	16.5	20.7	15.3
Sensitivity Index (K)	342	140	1,769	586	7
[Chlorophyll a] (CHL) (mg/m^3)	1.5	1.1	4.2	5.9	3.8
Total phosphorus + vac. lots (mg/m^3)	8.6	7.2	19.9	21.0	15.6
Total phosphorus + 100 lots (mg/m^3)	14.4	10.0	35.9	29.7	15.7



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