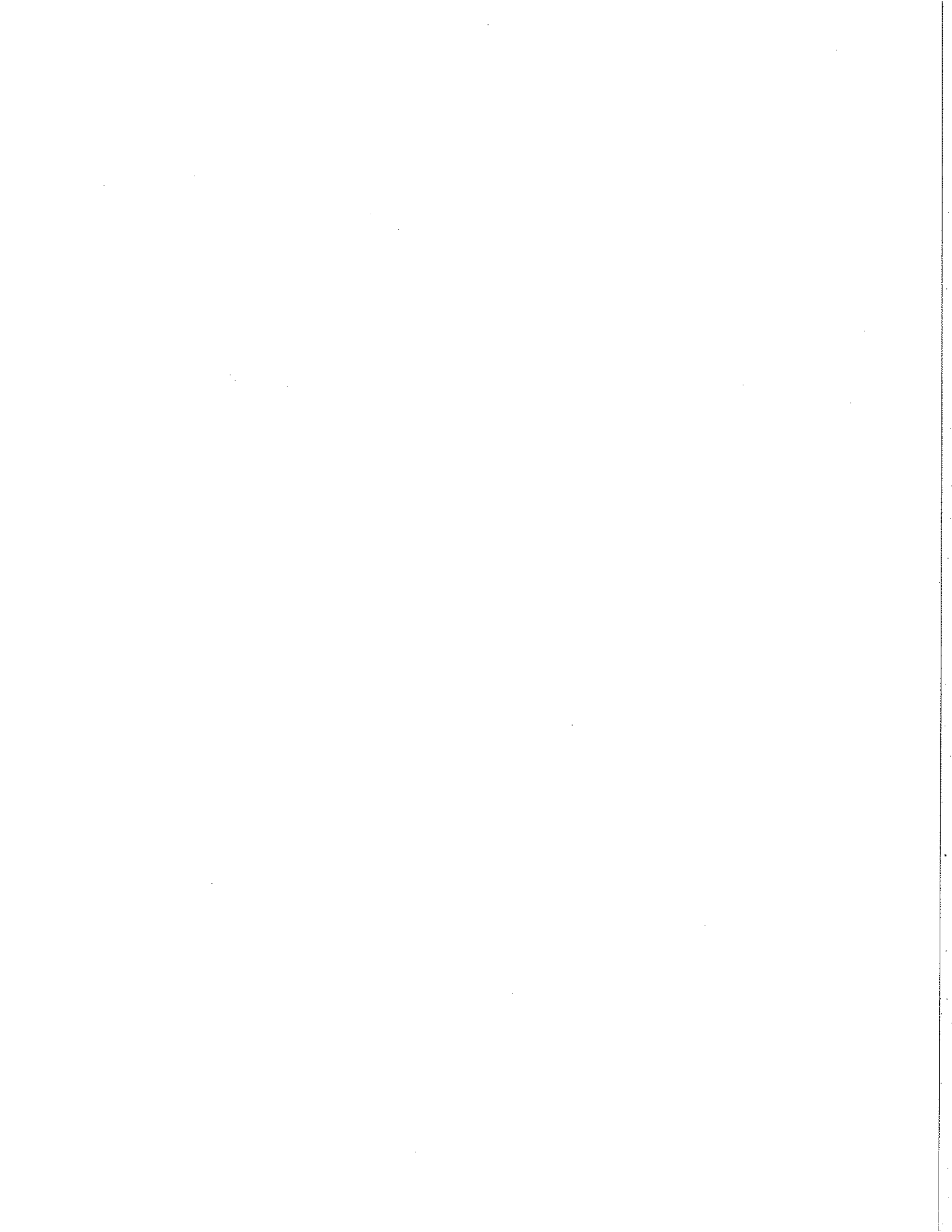


*Water Quality  
and  
Phosphorus Loading Analysis  
of  
Platte Lake  
1970 - 1978*

*Water Quality Division  
Michigan Department of Natural Resources  
State of Michigan  
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## INTRODUCTION

Biological surveys of Platte Lake were conducted by staff of the Water Quality Division on June 23-25, 1970, August 24, 1976 and June 26, 1978. The objective of the studies was to document the influence of the Platte River Hatchery discharge on Platte Lake. Aquatic animals were utilized as indicators of environmental quality since they reflect long-term water quality to which they have been exposed. An assessment of phosphorus loadings to Platte Lake was also completed using a mathematical model to formulate an optimum water management strategy for the lake. No previous benthological studies have been conducted on Platte Lake. Results of biological monitoring conducted on the Platte River 1970 to 1975 will be reported separately.

## SUMMARY AND CONCLUSIONS

1. Benthic macroinvertebrate data from June, 1970 indicated good-excellent water quality in Platte Lake.
2. Benthic macroinvertebrate data from August, 1976 indicated lower water quality, fewer pollution intolerant macroinvertebrate species and lower densities than in 1970. The extended period of lake stratification prior to the sampling data probably accounted for some of the differences.
3. Benthic macroinvertebrate data from June, 1978 revealed midge and oligochaete densities comparable with the 1970 data. However, mayfly, caddisfly and amphipod numbers were reduced as had occurred in August, 1976. Good water quality was still indicated but it was lower than 1970.
4. Bottom sediments had elevated levels of zinc, copper, nickel, lead, chromium, phthalate and oils. Contaminant sources are unknown. Chlorinated hydrocarbons were not detected.
5. Analysis of the Platte Lake water chemistry and phosphorus loading indicated that the lake is mesotrophic.
6. Phosphorus loadings from the Platte River Anadromous State Fish Hatchery for 1977 and 1978 averaged approximately 3305 pounds per year. This comprised 41% of the lake's total phosphorus budget. Phosphorus modeling showed that theoretical in-lake overturn phosphorus concentrations could be reduced from 0.012 mg/l to 0.007 mg/l without the hatchery load. If the hatchery phosphorus was reduced to 1745 pounds per year water quality would improve and the lake would be maintained at a transitional rate of eutrophication between the oligotrophic and mesotrophic states. Additional phosphorus reductions from the hatchery would put Platte Lake phosphorus levels within the oligotrophic range (<0.01 mg/l).

## RECOMMENDATIONS

1. It is recommended that the Platte River Anadromous State Fish Hatchery NPDES permit include a phosphorus limitation of not greater than 1400 pounds

per year net total phosphorus to achieve a 0.009 mg/l spring overturn phosphorus concentration in Platte Lake.

2. Sediments in Platte Lake and Platte River should be resampled.
3. Primary monitoring stations above and below the hatchery should be continued for at least one year after the final NPDES permit limitations are effective.

## BACKGROUND

Platte Lake is located in Benzie County, Michigan and its watershed includes parts of Benzie and Grand Traverse Counties. Figure 1a and Table I give the location and drainage area characteristics of the lake.

Since 1970 the Michigan Department of Natural Resources has monitored the Platte River and Platte Lake to study the influence of the Platte River Anadromous State Fish Hatchery which is the only point source waste discharger in the watershed. From 1928 to 1969 this facility was utilized as a rainbow trout rearing station. Wastes were discharged directly to the Platte River. The existing hatchery complex was completed in 1969 and that fall received its first salmon eggs for incubation. In 1970 a small number of salmon fingerlings were held in the old rearing ponds. The new outside raceways were used for fish production for the first time in 1971, however, they did not receive a heavy load of fish until 1972. The Platte River Hatchery waste treatment facility was completed and placed in operation January, 1972.

## WATER CHEMISTRY

Water chemistry data for Platte Lake obtained from STORET is contained in Tables 2, 3 and 4. Water samples were collected by the Inland Lakes Management Unit on five occasions in the three basins of Platte Lake (Figure 1b) for vertical physical-chemical profiles from 1974 to 1977. Samples were analyzed by the Environmental Services Division (ESD) laboratory.

Figure 2 portrays the temperature and dissolved oxygen data for August 24, 1976. At that time the lake was stratified with the hypolimnion beginning at about 40 feet. In the deeper basins (II and III) dissolved oxygen was severely depressed below 40 feet to 0.8 mg/l. Hypolimnetic oxygen deficits are due primarily to oxidation of organic matter that is photosynthetically produced in the lake (Hutchinson, 1975). Evidence exists that Platte Lake has exhibited a hypolimnetic oxygen deficit to some degree since 1940 (Brown and Funk, 1940).

Total phosphorus levels when the lake was stratified (August 24, 1976) and at spring turnover (April 14, 1976) are graphically shown in Figure 3. Values during stratification in the three basins averaged 0.013 mg/l at the surface, 0.009 mg/l at the metalimnion and 0.012 mg/l at the bottom. At spring turnover phosphorus levels averaged 0.011 mg/l throughout the entire lake. Phosphorus levels for the lake fall within the mesotrophic range of 0.010 - 0.020 mg/l.

Inorganic nitrogen levels, including nitrate, nitrite and ammonia for August 24, 1976 and April 14, 1976 are shown in Figure 4. Concentrations throughout the lake during spring overturn averaged 0.34 mg/l. Summer inorganic nitrogen levels at the surface and in the hypolimnion averaged 0.015 mg/l and 0.39 mg/l, respectively.

Chlorophyll a and secchi disc determinations for August 24, 1976 averaged 4.7 mg/l and 80 inches, respectively, over the entire lake. Both parameters indicated Platte Lake as being mesotrophic (EPA, 1974).

All the water quality indicators, including dissolved oxygen depletion in the hypolimnion, relatively high inorganic nitrogen, phosphorus, chlorophyll a and low secchi disc measurements, indicate Platte Lake is mesotrophic. One reason for Platte Lake's mesotrophic status is that the lake has received a significant nutrient load from the Platte River Hatchery since 1929.

## SEDIMENT CHEMISTRY

### Methods

Organic sediments were collected on August 24, 1976 at those stations shown on Figure 5. Samples were taken with a "Petite Ponar" dredge. The upper portion was removed from the sample and placed in a 250 ml glass container, refrigerated and returned to the Environmental Services Laboratory in Lansing for analysis of heavy metals, chlorinated hydrocarbons and phthalates.

### Results and Discussion

Results of Platte Lake sediment analysis are given in Table 5a. The present pollutional classification of sediments by the U.S. Environmental Protection Agency is provided in Table 5b.

The heavy metal data shows that zinc in particular, and copper, nickel and lead values were above the EPA non-polluted limit. Total chromium levels were extremely elevated above Michigan background levels whereas arsenic and mercury results were low. Sources causing the elevated heavy metal values are unknown. No real differences in concentrations of heavy metals existed between these two stations. Further sampling should be undertaken including river sediments.

## MACROINVERTEBRATE STUDIES

### Methods

On ~~July~~ <sup>June</sup> 23-25, 1970, replicate benthos samples were collected at 36 stations (Figure 6) in Platte Lake with a 9 inch by 9 inch "Ponar" dredge. Macroinvertebrate samples were again taken in Platte Lake on August 24, 1976. Replicate samples were taken with a 6 inch by 6 inch weighted "Petite Ponar"

dredge at 25 stations shown on Figure 7. Twenty of the 25 stations were the same locations as 1970. Replicate samples at 16 stations were also taken with a "Petite Ponar" on June 26, 1978 (Figure 8). During all trips samples were washed on board through a U.S. Standard No. 30 mesh sieve bucket. All remaining material was placed in wide mouth quart jars, labeled and preserved with formalin. Upon return to the Water Quality Division's biological laboratory in Lansing, samples were sorted and preserved in a 25 percent ethanol solution. Later, the benthos was identified and the data tabulated.

## Results and Discussion

The evaluation of water quality by an analysis of biological conditions is the most reliable method known (Wilhm and Dorris, 1968). Aquatic organisms and their community structure are particularly useful in evaluating water quality since some species of animals spend their entire life cycle associated with the lake while other species have life stages (egg, larvae and/or pupa) dependent on the aquatic environment for varying periods (from as short as two weeks or more than a year).

Within a lake the littoral and littoriprofundal zone (nearshore) and profundal (deepwater) zone each have their own characteristic assemblages of bottom fauna. Communities within the nearshore areas of oligotrophic and mesotrophic lakes will commonly consist of a diverse fauna with high oxygen requirements. Substrate variability is high in the littoral zone and species diversity and competitive interactions are complex. By contrast the profundal zone is more homogeneous with a less diverse macroinvertebrate community and sediments.

If lakes become extremely enriched, to the point that phytoplankton densities become so great that they shade out the submerged macrophytes, then the habitat and animal diversity of the nearshore zone decreases. This also decreases diversity and the abundance of the nearshore zone macroinvertebrates.

Increasing the supply of organic material to the hypolimnion can cause oxygen deficits or prolonged periods with lack of oxygen. This lowers macroinvertebrate activity, reduces periods of growth and has an adverse impact on the profundal bottom fauna and its survival. As lakes become eutrophic, shifts occur in the percentage composition of the two dominant groups of benthic animals in the profundal zone, the chironomids (midges) and the oligochaetes (aquatic worms). Generally, there is a reduction in the number of chironomids and other benthic animals and a concurrent increase in oligochaetes (worms) among more productive lakes. If deoxygenation becomes too severe or toxic products are allowed to accumulate, then even the worms will be killed (Wetzel, 1975).

## 1970 Study

Results of the June, 1970 benthos sampling are contained in Table 6 (condensed from original data). Table 7 contains a detailed work-up of the chironomids (midges).

The macroinvertebrate community throughout almost the entire lake was diverse and indicated good-excellent water quality. Table 8 and Figures 9 and 10 summarize the data for each transect and depth. In general, stations with similar water depths throughout the lake contained relatively comparable benthic communities. Only the area in the immediate vicinity of the river mouth had different conditions. These river mouth samples contained more organisms and a higher number of oligochaetes than other parts of the lake with comparable depths. The reason is probably the large amount of silt or organic material in the substrate. Aquatic macrophytes were also abundant in this area. Variations in macroinvertebrate composition throughout the lake appeared to be more a function of substrate differences than water quality.

Platte Lake's littoral and littoriprofundal zone (less than 40 feet) contained an average of about 21 species/station and 1700 organisms/m<sup>2</sup>. Midges, caddisflies, mayflies, amphipods and other organisms were abundant in relation to the relatively small numbers of pollution tolerant oligochaetes. Midges comprised about 43 percent of the community (individuals) whereas oligochaetes and the caddisfly-mayfly group comprised 11 percent and 10 percent, respectively. Many pollution intolerant and few tolerant forms were found. Caenis and Hexagenia, two pollution intolerant mayfly genera, were common as well as the intolerant midges Stictochironomus and Microtendipes. A pollution tolerant midge that responds positively to enriched conditions, Chironomus plumosus, was found in very low numbers.

Maximum stratification occurs at approximately 40 feet in Platte Lake, thus samples taken at water depths greater than or equal to 40 feet were taken in the profundal zone. Within this area of the lake the number of species averaged 10 per station and the organisms 785/m<sup>2</sup>. Oligochaetes and midges comprised 22 and 49 percent of the profundal zone community, respectively. The dominant midges were Chironomus and Procladius. Mayflies were found at all the stations sampled at the 40 foot contour. None were found at deeper depths. The only other organisms found below 40 feet were chaoborids, which are extremely pollution tolerant and exhibit diurnal migrations to the epilimnion. This suggests that areas in the profundal zone deeper than 40 feet exhibit low dissolved oxygen levels during summer stratification.

#### 1976 Study

Results of the August 24, 1976 benthos sampling are given in Table 9. Table 10 and Figures 11 and 12 summarize the data for each transect and depth. At the time of the study the lake was stratified at approximately 40 feet. Benthos communities sampled at this depth or deeper had probably been subjected to very low dissolved oxygen levels since early summer.

The macroinvertebrate composition in the lake's littoral and littoriprofundal zone was dependent on substrate as in 1970. The average number of species per station and individuals per square meter were 7 and 404, respectively. The numbers were much lower than in 1970. The intolerant mayfly, Hexagenia, was found at stations on transects B, C, D and E in depths up to 20 feet. Chironomids dominated the macroinvertebrates (numbers of individuals) at all stations. Facultative midge genera that were abundant included Cryptochironomus, Cryptotendipes, Cladotanytarsus, Polypedilum and Micropectra Chironomus (a pollution tolerant midge) was abundant at most stations.

In the profundal zone an average of 3 taxa per station and 319 individuals per meter squared were found at 40 feet. Chironomus dominated the benthos and oligochaetes were sparse. The benthos at 70 feet (D-3) contained three taxa and a mean of 645 organisms per square meter of which midges (Chironomus) and oligochaetes comprised 53 to 37 percent, respectively. Limnodrilus hoffmeisteri (pollution tolerant) was the only worm identified. Only at Station E-3 which was located in 80 feet of water were all organisms except oligochaetes eliminated.

In summary, the 1976 benthos collection from less than 40 feet in Platte Lake portrayed a relatively sparse macroinvertebrate community. Part of this poor representation can be related to the time of sampling. By late summer, when the samples were collected, many insects could have emerged. Generally, the data would indicate fair-good water quality with moderate enrichment. The profundal zone benthos indicated depressed dissolved oxygen conditions.

### 1978 Study

Results of the June 26, 1978 benthos sampling are given in Table 11. Table 12 and Figures 13 and 14 summarize the data for each transect and depth. In the nearshore zone 12 species and 1221 organisms/m<sup>2</sup> per station were estimated to occur. Midges were dominant comprising 72% of the organisms collected. Slightly less than 5% of the individuals were caddisflies or mayflies. As in other years, variation in macroinvertebrate composition throughout the lake was a function of substrate.

The profundal zone contained an average 5 species/station and 1109 organisms/m<sup>2</sup>. Midges dominated the benthos at the 40 and 65 foot contours but the station in 85 feet of water was predominately oligochaetes and the pollution tolerant midge, Procladius (11%). It is significant to note that no mayflies were found at the 40 foot contour as in 1970. Several samples from 40 feet were also analyzed in the field but no mayflies were observed.

### Comparison of 1970, 1976 and 1978 Macroinvertebrate Data

Data from 1976 is not directly comparable to the 1970 and 1978 information because of the difference in sampling date. The samples for June 1970 and June, 1978 would naturally contain more larger sized organisms than the lake August, 1976 samples. Fewer insects species would have emerged by early summer and the exposure period of the organisms in the profundal zone to depressed dissolved oxygen levels would be less. The smaller immature insects are not sampled as effectively in lake summer. However, some general conclusions can be made from these comparisons.

Figure 15 displays the abundance of oligochaetes, chironomids, and other organisms at various depths for 1970, 1976 and 1978. Midge and oligochaete abundance and species composition in the 1970 and 1978 data is not too dissimilar. The most obvious difference is the lack of "other" organisms in 1978. Amphipods, mayflies, caddisflies and snails were common in areas of the lake with 40 feet or less water depth in 1970 but sparse in 1976 and 1978. Mayflies in particular,

were found to the 40 foot contour in 1970 but were absent below 20 feet in the two later studies. The reduction of these groups, especially the mayflies, since 1970 indicates that the rate of eutrophication in Platte Lake has increased. Nutrient loadings to the lakes need to be reduced to reestablish more acceptable lake and water quality.

## PHOSPHORUS LOADING ANALYSIS

### Methods

A quantitative assessment of the phosphorus loading to Platte Lake was done by using techniques given in a lake management manual by Reckhow, 1978. In-lake phosphorus concentrations were estimated by the Dillon-Rigler-Kirchner model which is:

$$P = \frac{Lt}{z} (1 - R_{KD})$$

Where P = in-lake phosphorus concentrations (mg/l)  
L = phosphorus loading to lake (g/m<sup>2</sup>/yr)  
t = retention time (years)  
z = mean depth (meters)  
R<sub>KD</sub> = phosphorus retention coefficient  
R<sub>KD</sub> = 0.426 exp (-0.271 z/t) + 0.574 exp (-0.00949 z/t)

"Critical" loading (the transitional loading between oligotrophic and mesotrophic) to the lake was derived by solving the above equation for "L" with "P" equal to 0.010 mg/l (critical phosphorus concentration).

Nutrient data used in the models included monthly operating reports from the Platte Hatchery and STORET information collected by Comprehensive Studies Section and the Inland Lakes Management Unit. Water Management Division supplied the stream flow data needed for loading estimates.

## RESULTS AND DISCUSSION

Lake and drainage area characteristics for Platte Lake are given in Table 1. Platte River total phosphorus concentrations for 1977 and 1978 are contained in Table 13. The phosphorus loading to Platte Lake from the Platte River and Platte Hatchery was estimated as follows:

1. 1977 and 1978 average TP concentration in Platte River above the hatchery = 0.012 mg/l. Brundage Creek was assumed to be the same concentration.
2. 1977 and 1978 average TP concentration in Platte River below hatchery = 0.033 mg/l.
3. Average 50% exceedence flow for Platte River below hatchery = 51.7 mgd.

4. TP load in Platte River, Brundage Creek and Brundage Spring above hatchery = 1889 lbs/yr.
5. TP load in Platte River below hatchery = 5194 lbs/yr.
6. Hatchery input for 1977 and 1978 = 5194 - 1889 = 3305 lbs/yr. It was assumed that 90% or 2975 lbs/yr of this phosphorus eventually reaches Platte Lake. Substantial amounts of phosphorus can be assimilated in a stream but this process is temporary (Keup, 1968).
7. Platte River flow increases 33.3 mgd between hatchery and Platte Lake at 0.012 mg/l TP = 1216 lbs/yr.
8. Total Platte River TP load with hatchery = 6080 lbs/yr.  
Total Platte River TP without hatchery = 3105 lbs/yr.

Monthly operating reports from the Platte Hatchery were disregarded as means of calculating the phosphorus load from the facility. The data for 1977 and 1978 was very inconsistent with phosphorus loadings from the hatchery amounting to 2573 and 1302 lbs/yr, respectively. The total annual budget for Platte Lake is presented in Table 14.

The Dillon-Rigler-Kirchner model was applied to Platte Lake to determine its effectiveness at predicting in-lake phosphorus concentrations by comparing calculated values with measured values.

$$\begin{aligned}
 z &= 8.8 \text{ m} & L &= 7196 \text{ lbs/yr} = 0.321 \text{ g/m}^2/\text{yr} \\
 t &= 0.72 \text{ years} & P \text{ in} &= \frac{Lt}{z} = 0.026 \text{ mg/l} \\
 z/t &= qs = 12.22 \text{ m/yr} & R_{KD} &= 0.5268 \\
 P &= 0.012 \text{ mg/l}
 \end{aligned}$$

The theoretical in-lake phosphorus level (0.012 mg/l) agrees well with measured total phosphorus concentrations for Platte Lake. Average spring overturn levels were measured as 0.011 mg/l. It can be concluded that the model can be used to predict in-lake phosphorus values.

A graphical expression of Dillon's phosphorus loading criterion is given in Figure 16. When  $Lt(1-R_{KD})$  is plotted against mean depth for Platte Lake, a mesotrophic condition is indicated.

The model was applied to Platte Lake to predict lake conditions prior to the hatchery expansion in 1970. A rainbow trout rearing station existed at the present hatchery site from 1928 to 1969. It is difficult to predict the phosphorus loading from this facility because no chemical monitoring data is available. However, Harry Westers of Fisheries Division (Personal communication, 1979) estimates a yearly production of 50,000 lbs. of fish. If a ratio of fish to food of 1:1.5 is assumed and 1,000 lbs. of food contains about 15 lbs. of phosphorus, an annual phosphorus discharge from the facility would be approximately 1,125 lbs. This estimate is based on dry pellets which have been used since the mid-fifties. Prior to this, liver was the primary fish food and it is not known how these two sources compare in relation to the phosphorus discharge. Therefore, it appears that the hatchery loading has comprised about 21% of Platte Lake's phosphorus budget for many years.

Applying the model to Platte Lake with loading values prior to the new hatchery complex yielded the following:

$$\begin{aligned} z &= 8.8 \text{ m} & L &= 5346 \text{ lbs/yr} = 0.238 \text{ g/m}^2/\text{yr} \\ t &= 0.72 \text{ yrs.} & P \text{ in} &= \frac{Lt}{z} = 0.019 \\ z/t &= 12.22 \text{ m/yr.} & R_{KD} &= 0.5268 \\ P &= \underline{0.009 \text{ mg/l}} \end{aligned}$$

The theoretical in-lake phosphorus concentration of 0.009 mg/l would indicate that Platte Lake has been at the upper oligotrophic-lower mesotrophic state for many years.

The model was also applied to Platte Lake assuming complete removal of the hatchery phosphorus loading.

$$\begin{aligned} z &= 8.8 \text{ m} & L &= 4221 \text{ lbs/yr} = 0.188 \text{ g/m}^2/\text{yr} \\ t &= 0.72 \text{ yrs.} & P \text{ in} &= \frac{Lt}{z} = 0.015 \text{ mg/l} \\ z/t &= q_s = 12.22 \text{ m/yr} & R_{KD} &= 0.5268 \\ P &= \underline{0.007 \text{ mg/l}} \end{aligned}$$

It is apparent that removal of the hatchery loading would substantially reduce the phosphorus concentrations in Platte Lake. A plot of this loading rate on Figure 16 shows that without the phosphorus from the hatchery, Platte Lake would be well within the oligotrophic range.

The critical loading level calculated for Platte Lake was 5,792 lbs/yr. This means that for 1977 and 1978 Platte Lake received phosphorus at 1,404 lbs/yr. in excess of this critical rate. Since the hatchery is the only controllable point source of phosphorus and its discharge of 3,304 lbs./yr. comprises 41% of Platte Lake's phosphorus budget, the maximum loading from this facility could equal no more than 1,745 lbs/yr. to maintain Platte Lake at the "critical" level (Figure 16). A loading value even less than this would be needed to maintain Platte Lake phosphorus levels within the oligotrophic range (<0.01 mg/l).

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FIGURE 1a

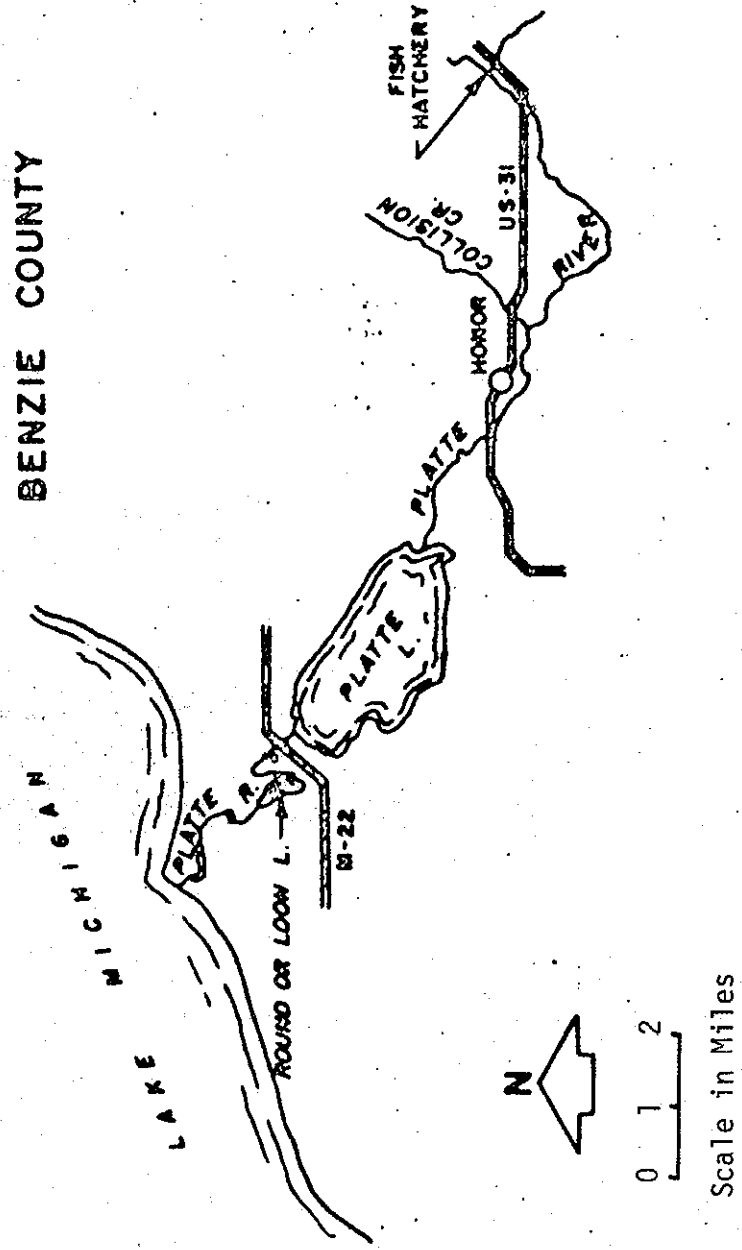




Figure 1b. Water chemistry sampling locations on Platte Lake, April 14, 1976 and August 24, 1976.

Figure 2. Dissolved oxygen concentrations and temperature in the three basins of Platte Lake, August 24, 1976.

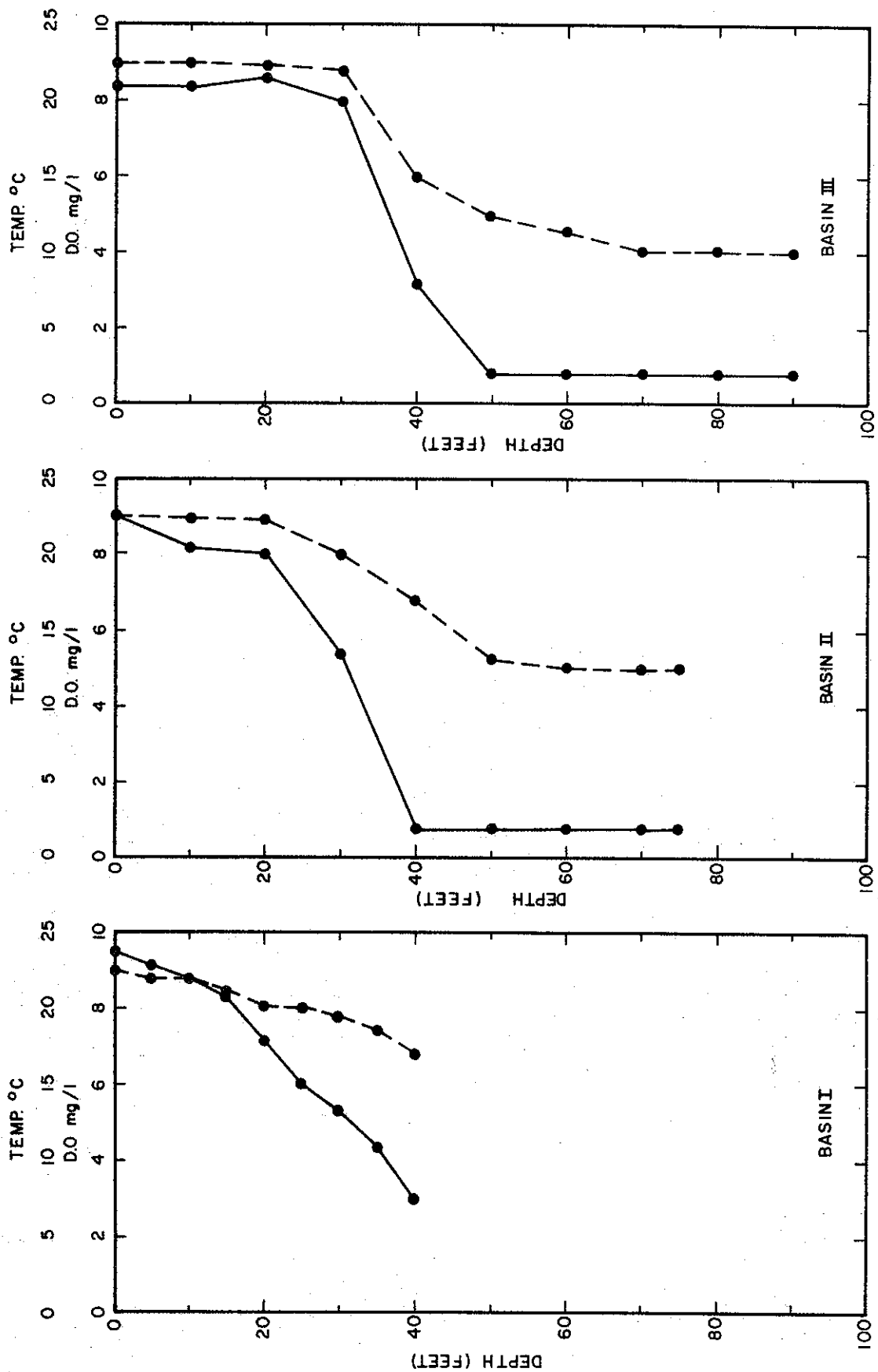
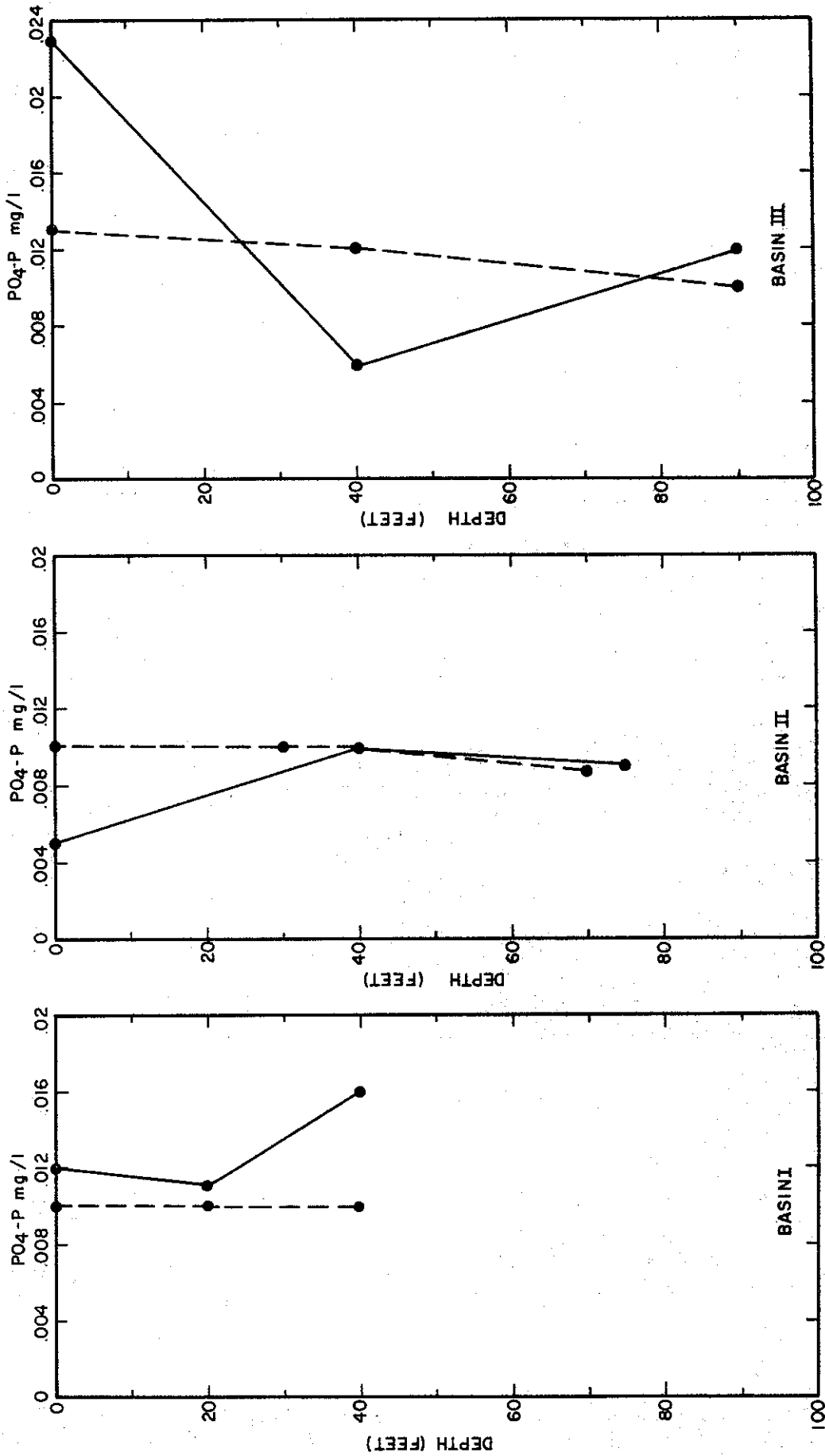


Figure 3. Total phosphorus concentrations in the three basins of Platte Lake, April 14, and August 24, 1976.



APRIL 14, 1976  
AUGUST 24, 1976

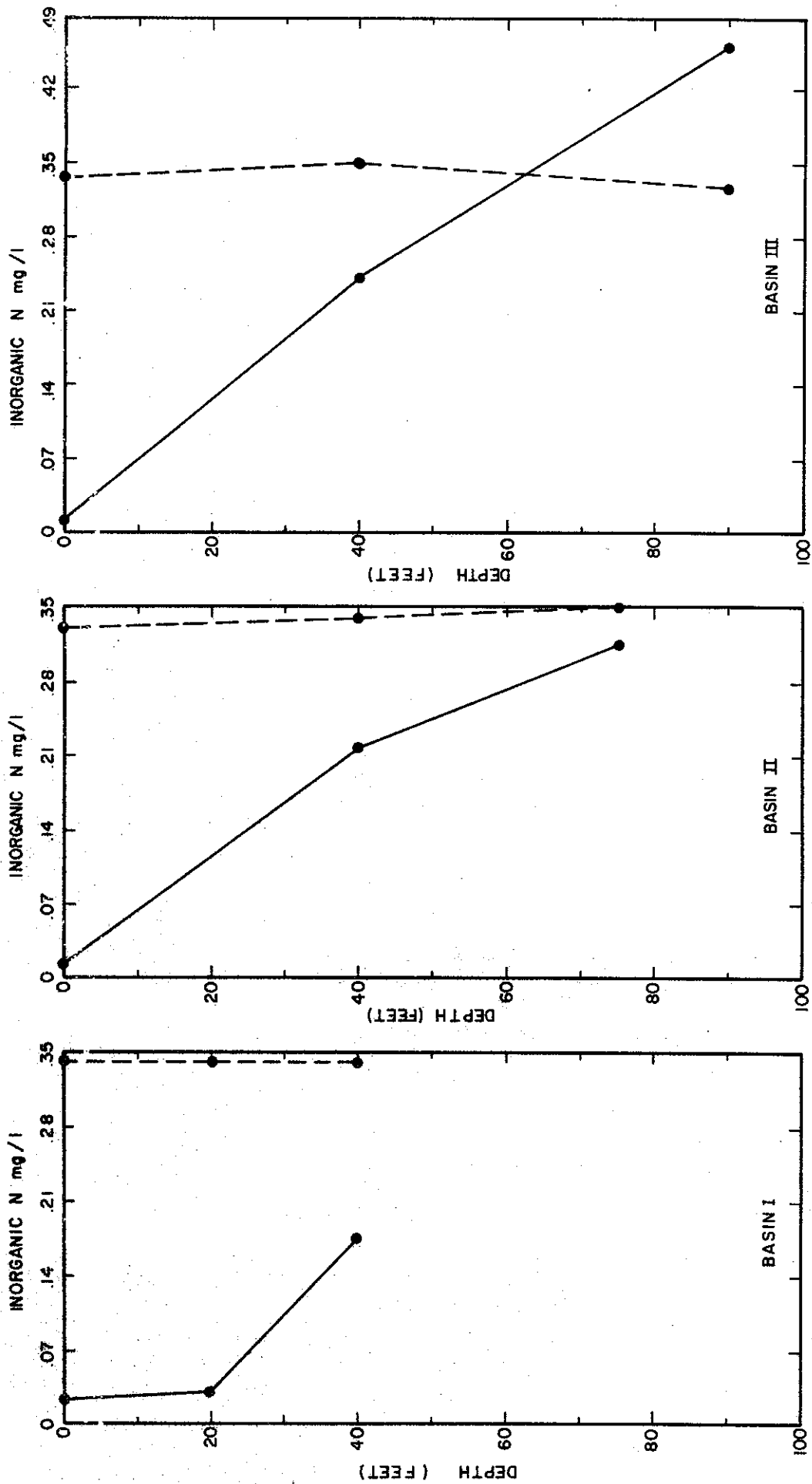


Figure 4. Inorganic nitrogen concentrations in the three basins of Platte Lake, April 14 and August 24, 1976.

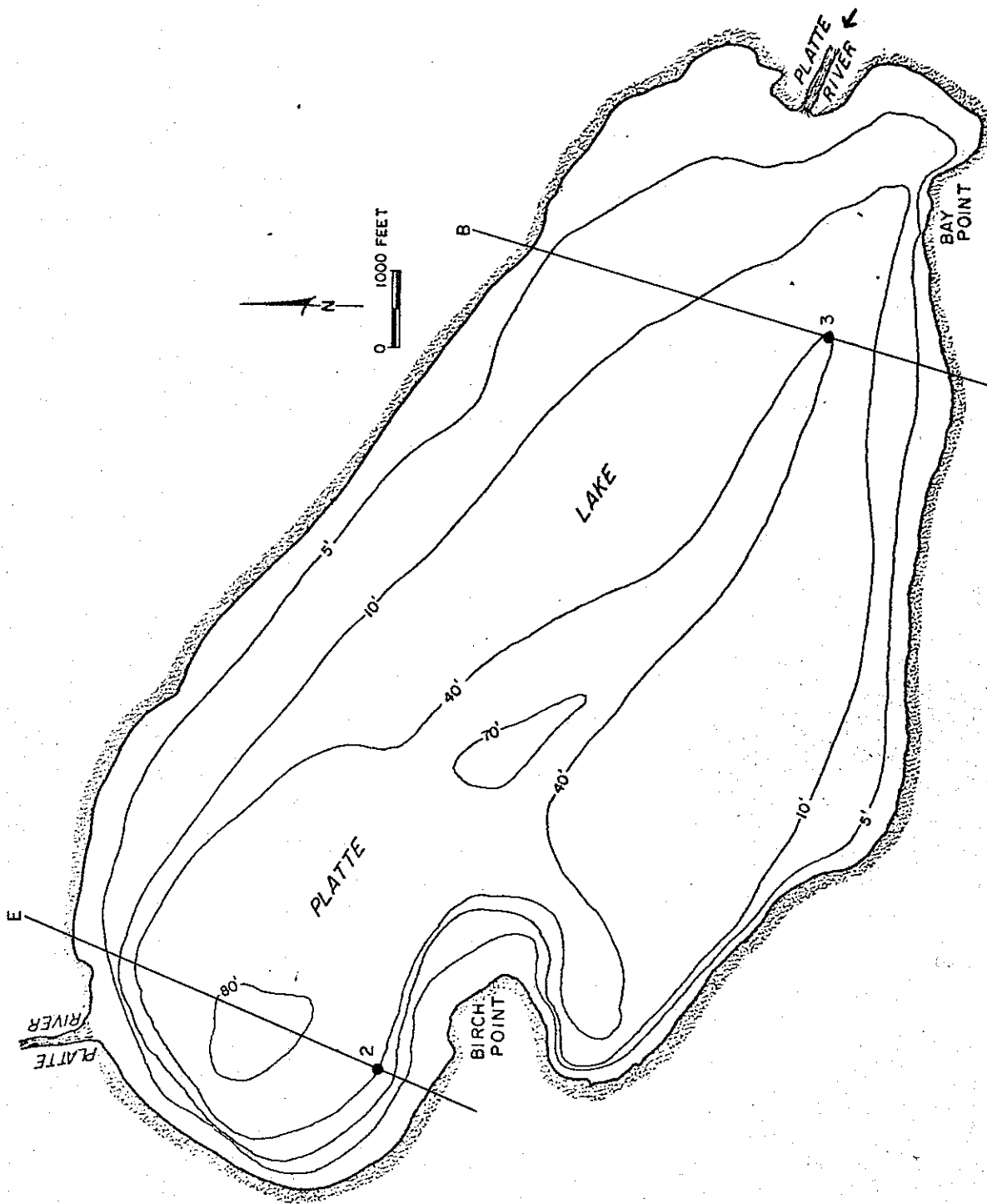


Figure 5. Sediment sampling locations on Platte Lake, August 24, 1976.

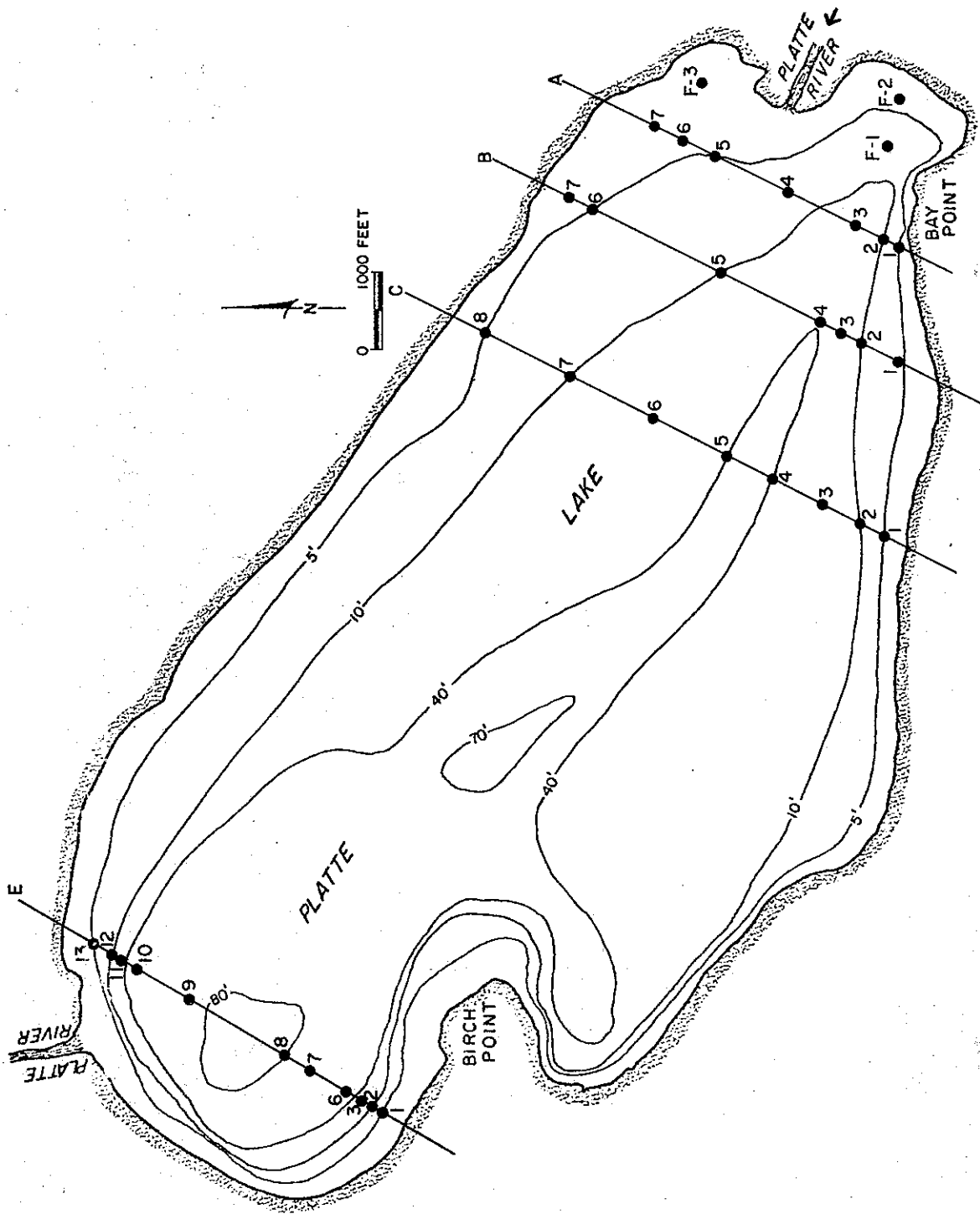


Figure 6. Macroinvertebrate sampling locations on Platte Lake, June 23-25, 1970.

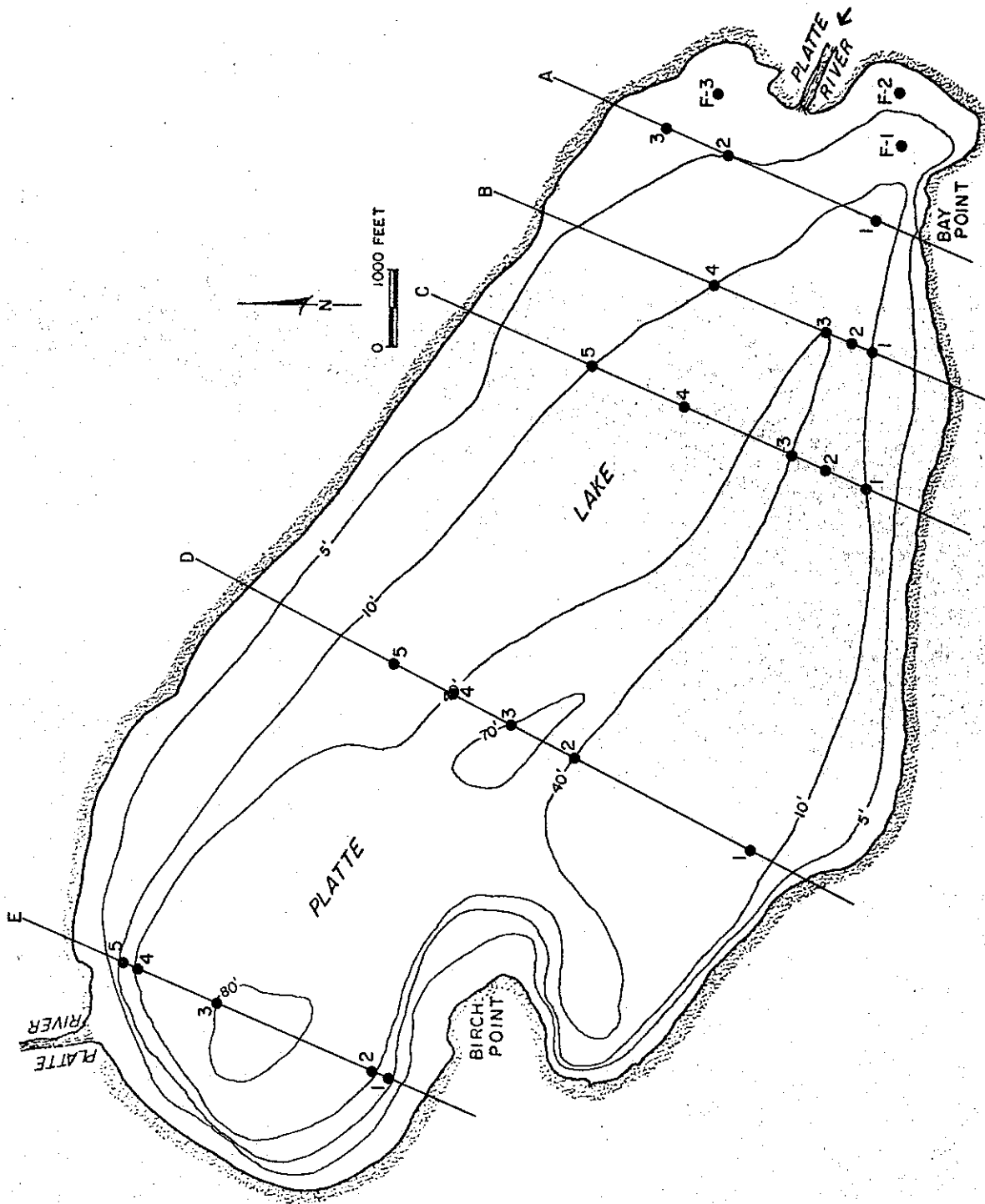


Figure 7. Macroinvertebrate sampling locations on Platte Lake, August 24, 1976.

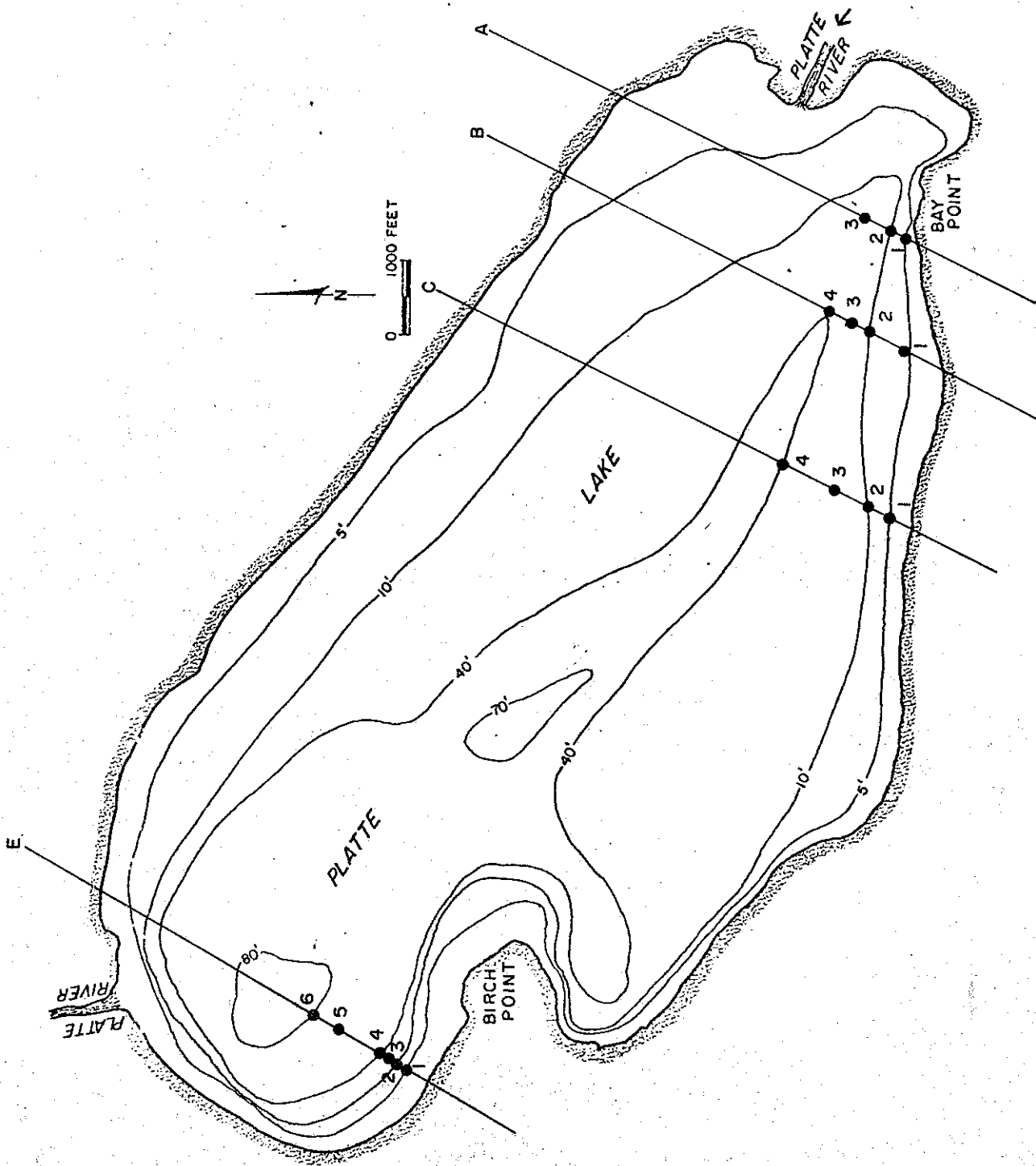


Figure 8. Macroinvertebrate sampling locations on Platte Lake, June 26, 1978.

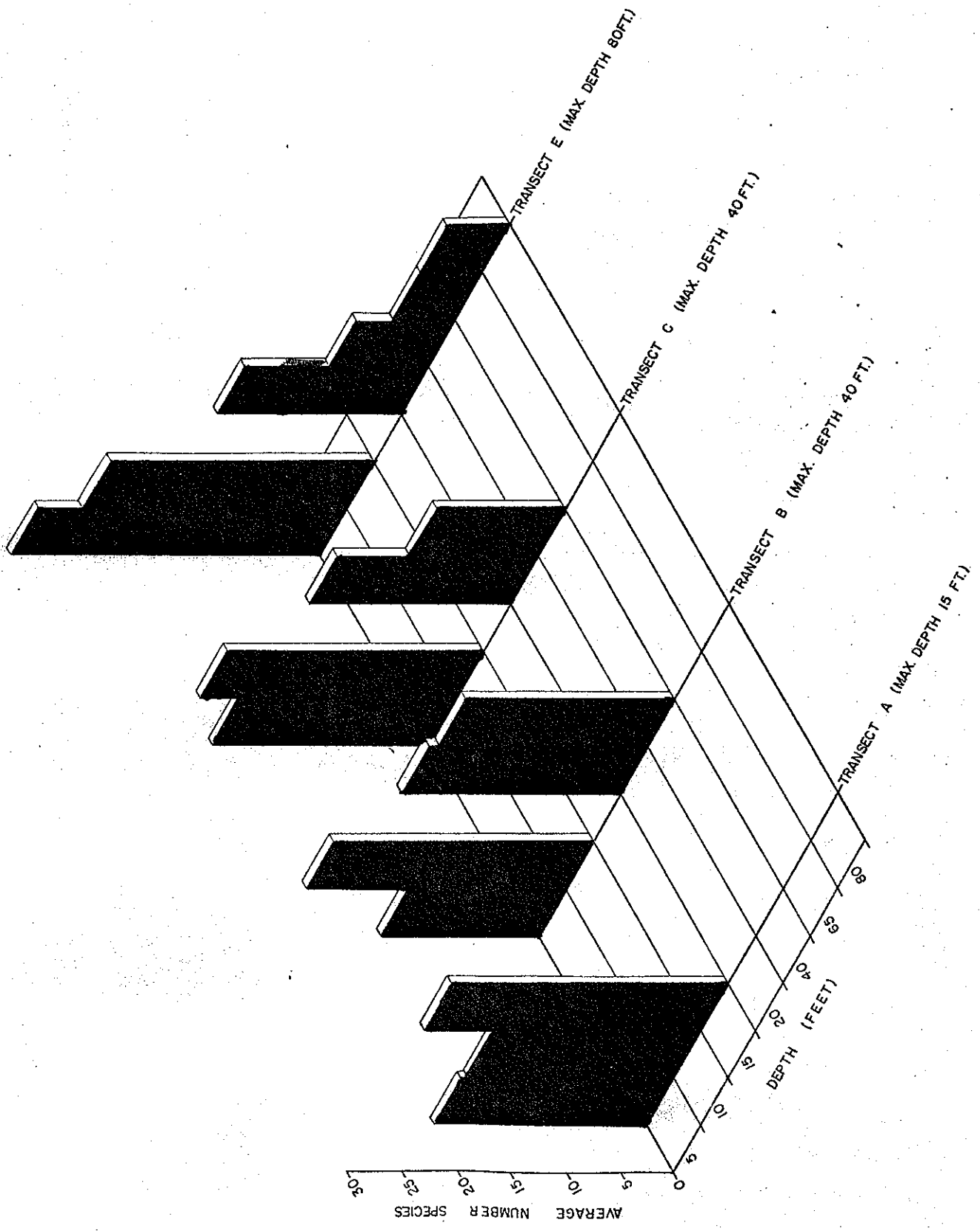


Figure 9. Average number of species for each transect and depth in Platte Lake, June 23-25, 1970.

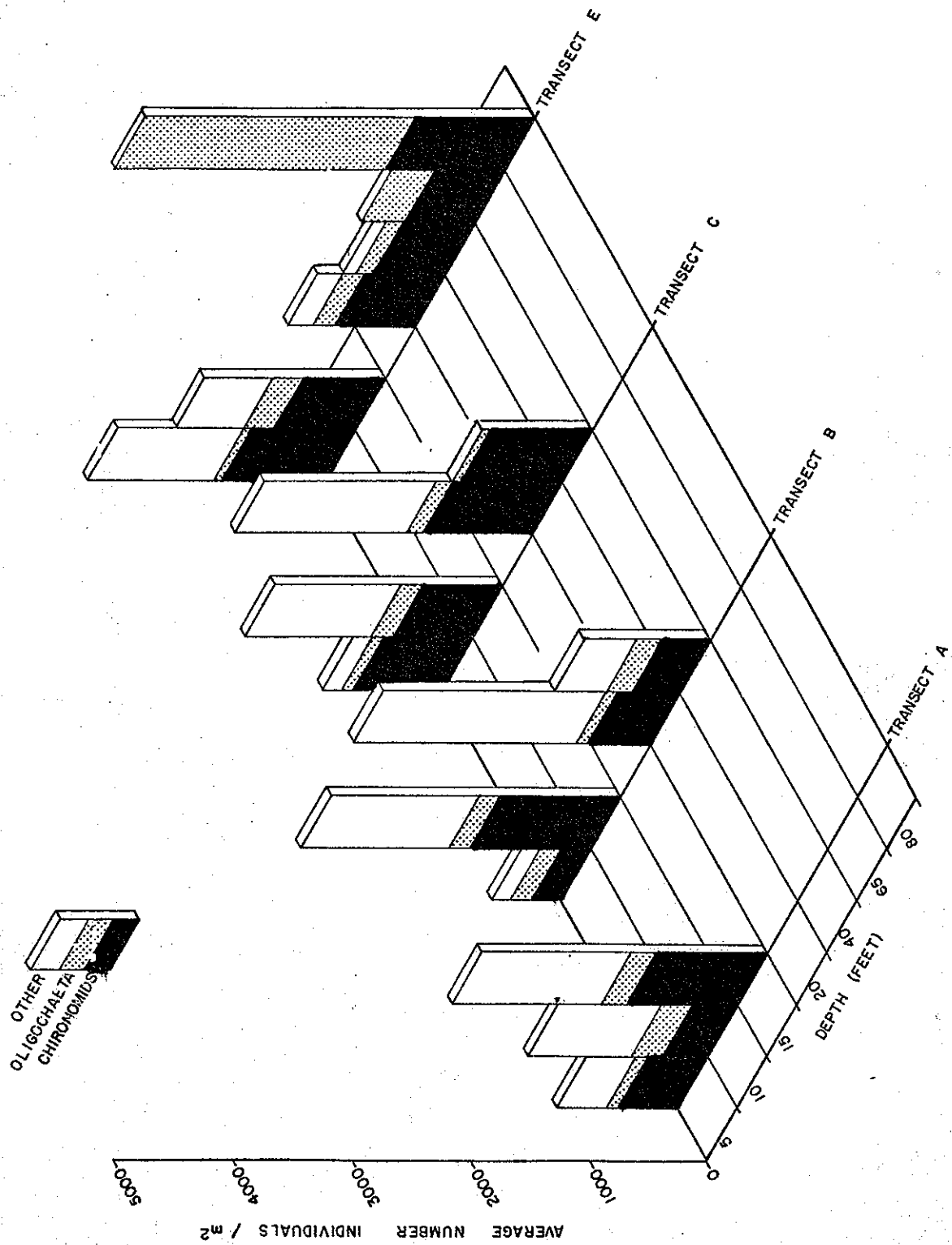


Figure 10. Macroinvertebrate abundance for each transect and depth for Platte Lake, June 23-25, 1970.

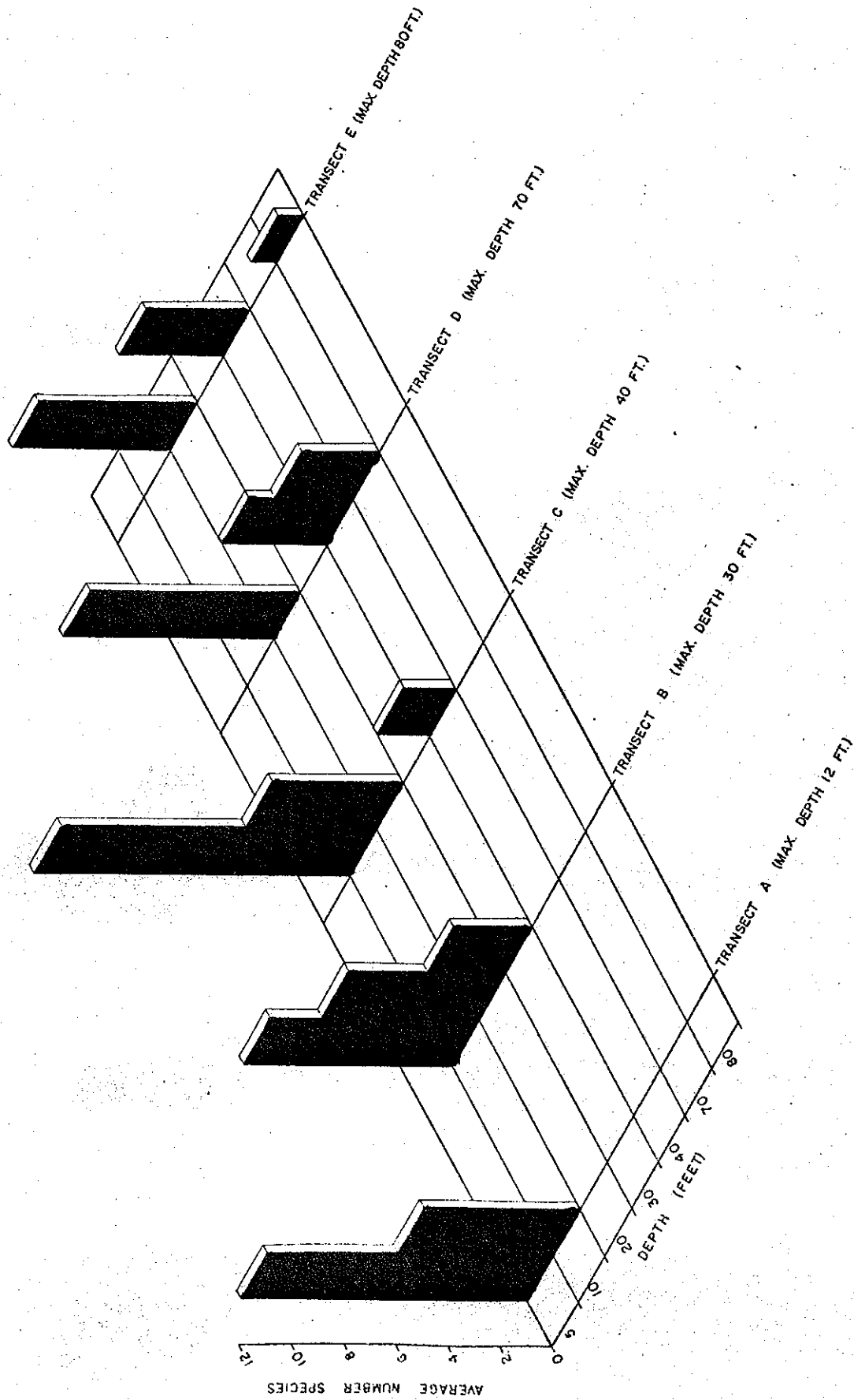


Figure 11. Average number of species for each transect and depth in Platte Lake, August 24, 1976.

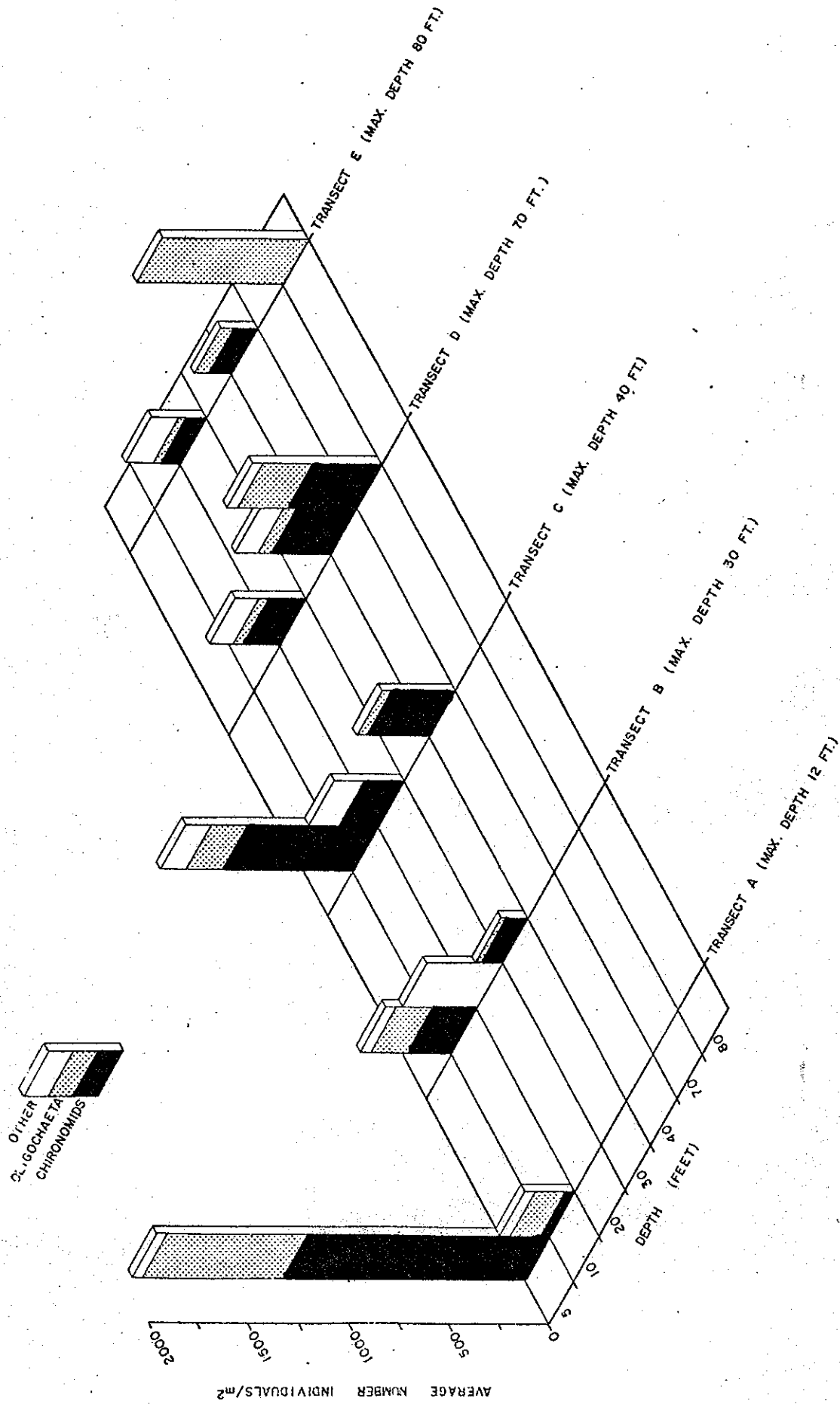


Figure 12. Macroinvertebrate abundance for each transect and depth for Platte Lake, August 24, 1976.

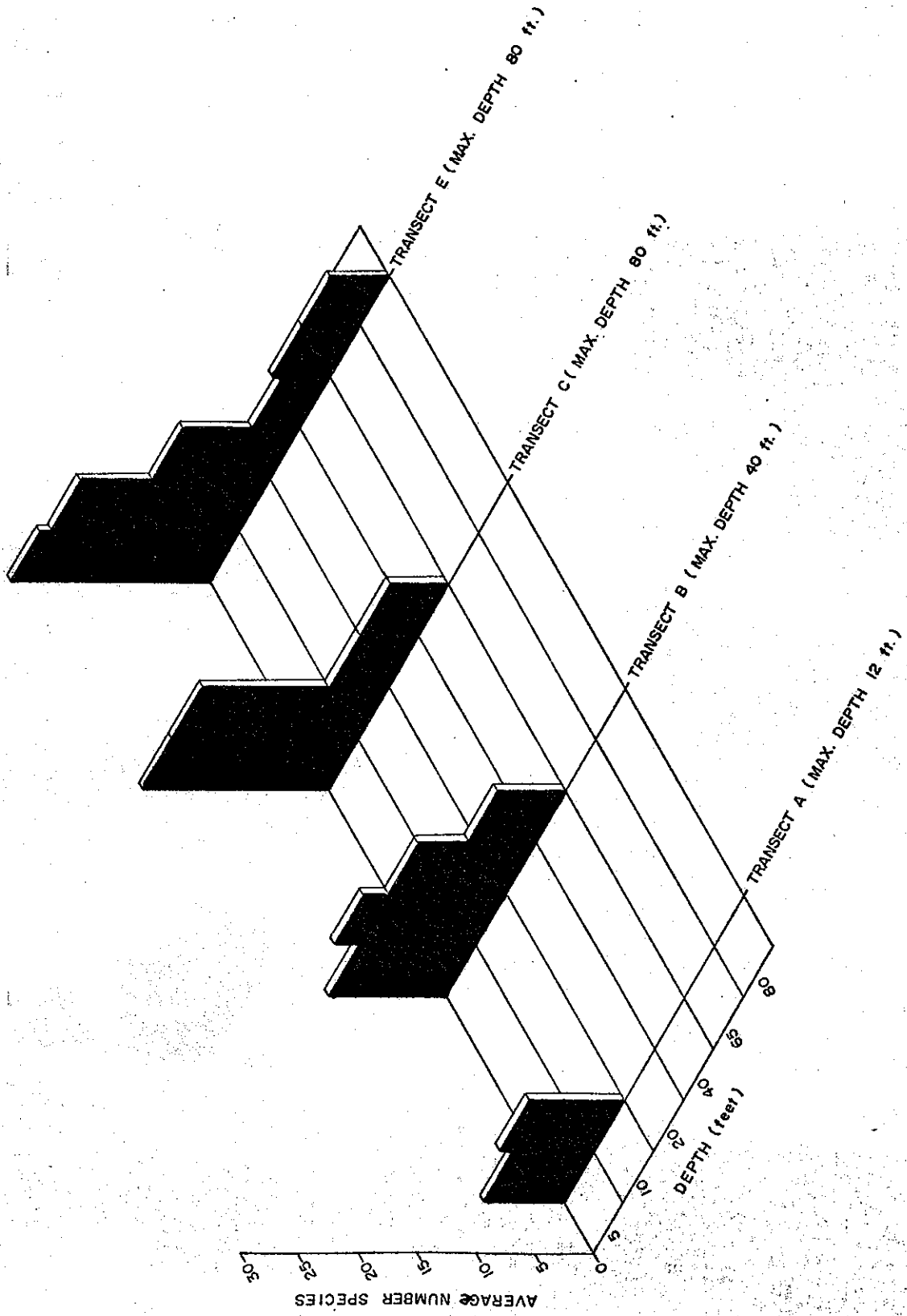


Figure 13. Average number of species for each transect and depth in Platte Lake, June 26, 1978.

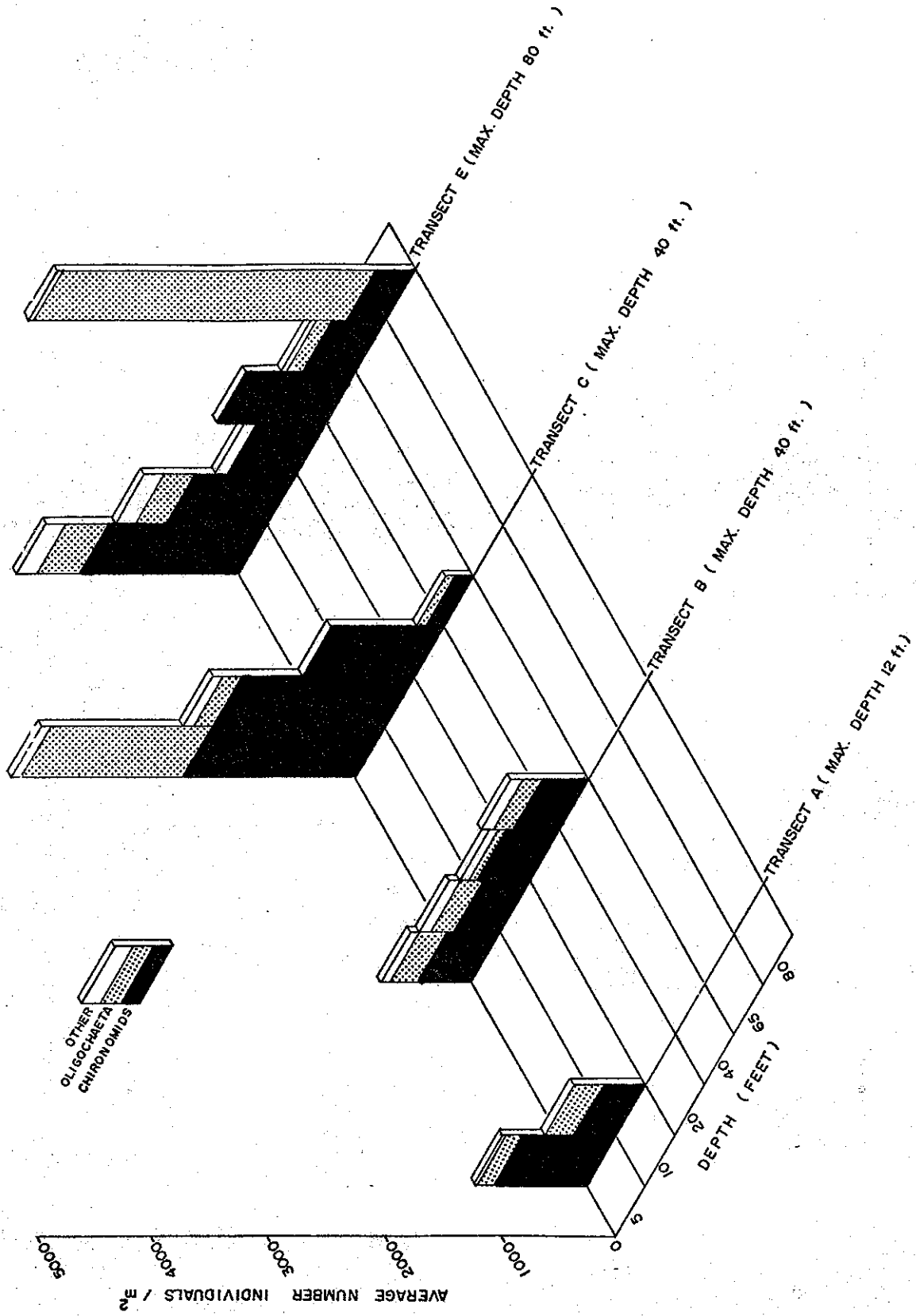


Figure 14. Macroinvertebrate abundance for each transect and depth for Platte Lake, June 26, 1978.

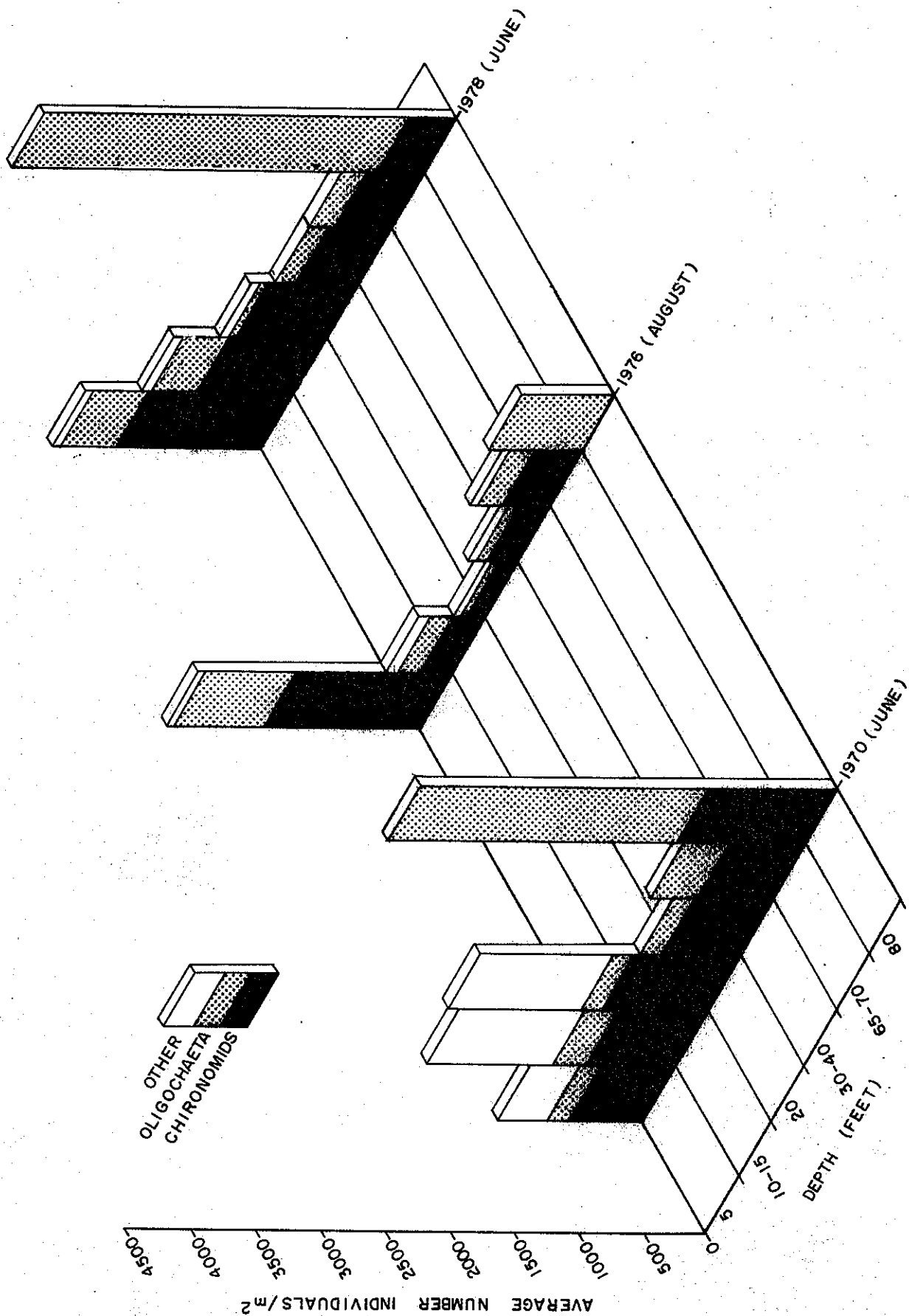


Figure 15. Comparison of 1970, 1976 and 1978 macroinvertebrate data for various depths in Platte Lake.

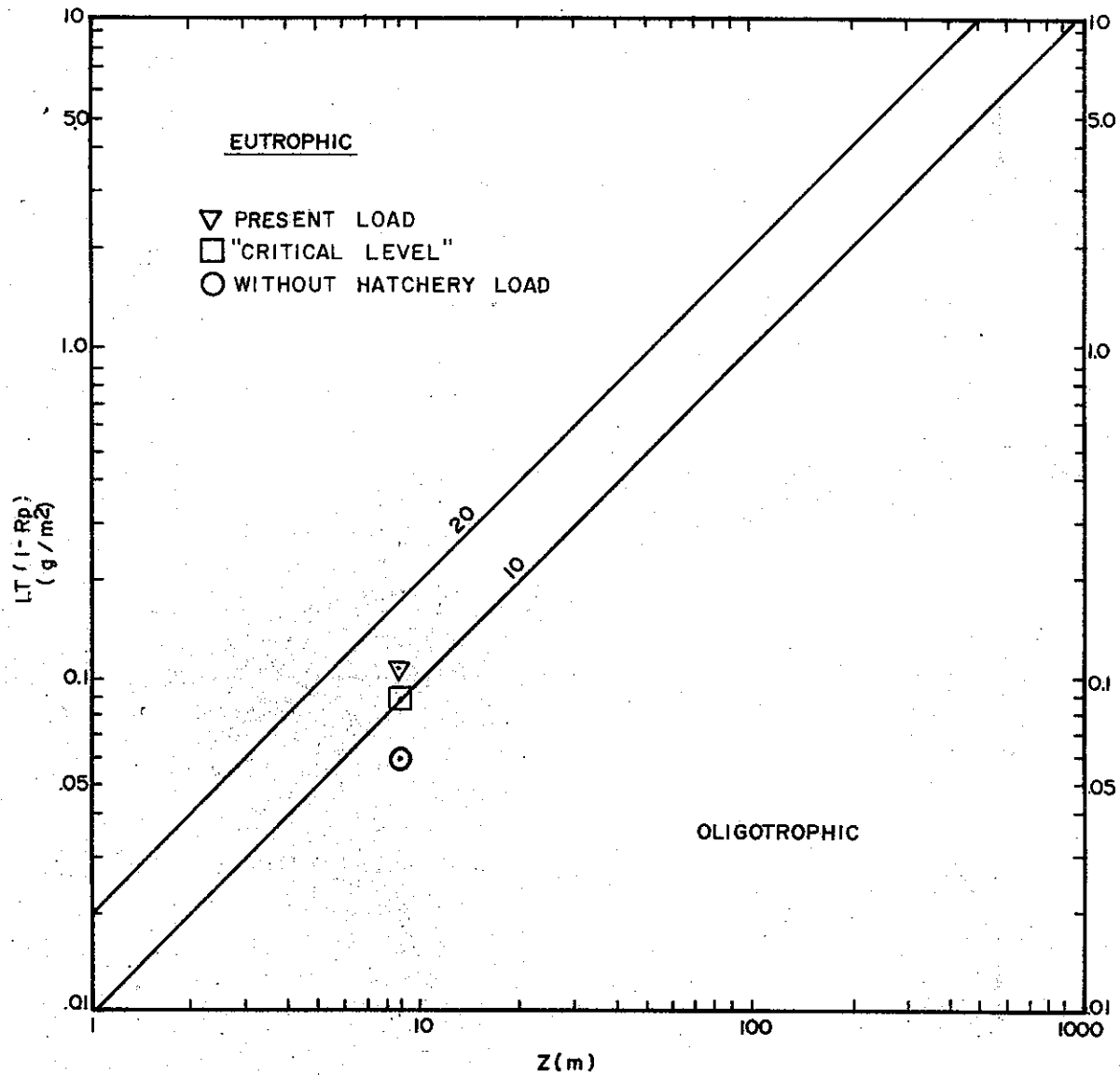


Figure 16. Dillon's Phosphorus Loading Criterion, With Lines of Constant Phosphorus Concentration (in  $\mu\text{g/l}$ ) Distinguishing Trophic States (From Dillon, 1975)

Table 1 Lake and drainage area characteristics for Platte Lake

I. Lake Morphometry

1. Surface area: 2516 acres
2. Mean depth: 28.8 feet
3. Maximum depth: 90 feet
4. Volume: 73,590 acre-feet
5. Mean hydraulic retention time: 263 days

II. Tributary Information

	<u>Drainage area</u>	<u>Mean flow</u>
Platte River	150 sq. mi.	132 cfs
Immediate drainage <sup>1</sup>	11.4 sq. mi.	5.7 cfs

III. Other Flow Sources

Precipitation

Annual precipitation	31 inches
Annual evaporation	<u>19.6 inches</u>
	11.4 inches

<sup>1</sup> assumes 0.5 cfs/sq. mi.

Table 2

100110 AC02516.2  
 44 40 49.0 086 04 40.0 2  
 PLATTE LAKE IN EASTERN BASIN  
 26019 BENZIE CD., MI.  
 RENZONIA IMP., SEC. 1 0817  
 PLATTE RIVER BASIN  
 21MICH 770715 04001002  
 0045 FEET DEPTH CLASS 00

/TYPA/AMBT/LAKE

DATE FROM TO	TIME OF DAY	DEPTH FEET	00300 DO MG/L	00010 WATER TEMP CENT	00680 T DRG C MG/L	00400 PH SU	00410 T ALK CAC03 MG/L	00900 TOT HARD CAC03 MG/L	00095 CONDUCTVY AT 25C MICRUMHO	00076 TURB TRBDNTR HACH FTU	00630 NO2EN03 N-TOTAL MG/L	00610 NHE-N TOTAL MG/L
76/04/14	11 00	0000	12.0	5.8	2.9	8.00	142	163	295	1.1	0.340	0.006
	11 02	0010	12.0	5.5								
	11 04	0020	12.0	5.5	3.2	8.00	145	164	290	0.7	0.340	0.004
	11 06	0030	12.0	5.5								
	11 08	0038	12.1	5.5	3.0	8.00	143	163	290	1.2	0.340	0.002
76/08/24	10 30	0000	9.5	22.5	3.6	8.30	138	151	275	2.5	0.020	0.001
	10 31	0005	9.1	22.0								
	10 32	0010	8.9	22.0								
	10 34	0015	8.3	21.0								
	10 36	0020	7.1	20.5	4.4	8.10	141	152	280	2.8	0.030	0.003
	10 38	0025	6.0	20.5								
	10 40	0030	5.3	19.5								
	10 42	0035	4.4	18.5								
	10 44	0040	3.0	17.0	3.4	7.60	148	157	295	17.0	0.080	0.102

DATE FROM TO	TIME OF DAY	DEPTH FEET	00605 ORG N MG/L	00665 PHDS-TOT MG/L P	70507 PHOS-T ORTHO MG/L P	00500 RESIDUE TOTAL MG/L	70301 DISS SOL SUM MG/L	00530 RESIDUE TOT NFLT MG/L	00958 SILICATE UNF REAT MG/L SI	00955 SILICA DISSOLVED MG/L	00940 CHLORIDE CL MG/L	00080 COLOR PT-CO UNITS
76/04/14	11 00	0000	0.210	0.010	0.005	197	184	13		7.00	4.0	6
	11 04	0020	0.210	0.011	0.003	202	186	16		7.00	4.2	6
	11 08	0038	0.210	0.010	0.003	195	186	9		7.00	4.0	6
76/08/24	10 30	0000	0.300	0.012	0.002	179	167	12		1.06	3.7	3
	10 36	0020	0.290	0.011	0.004	179	171	8		1.70	3.7	3
	10 44	0040	0.330	0.016	0.002	216	180	36		4.60	3.7	4

DATE FROM TO	TIME OF DAY	DEPTH FEET	00915 CALCIUM CA,DISS MG/L	01045 IRON FE,TOT UG/L	00925 MGNSIUM MG,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00930 SODIUM NA,DISS MG/L	00946 SULFATE SO4-DISS MG/L	32209 CHLRPHYL A UG/L	00077 TRANSP SECCHI INCHES
76/04/14	11 00	0000	44.0	44	12.0	0.68	3.40	17.0		
	11 04	0020	44.0	49	12.0	0.65	3.40	17.0		
	11 08	0038	44.0	69	13.0	0.67	3.50	17.0		72
76/08/24	10 30	0000	38.0	27	12.1	0.58	3.50	15.0		
	10 36	0020	39.0	36	12.0	0.59	3.40	16.0		
	10 44	0040	41.0	150	12.1	0.63	3.60	15.0		

CP(S)-01  
 76/08/24 10 47

Table 3

100109 ACO2516.1  
 44 41 40.0 086 06 05.0 2  
 PLATIE LAKE IN CENTRAL BASIN  
 26019 BENZIE CO., MI. 0817  
 LAKE IMP., SEC. 34  
 PLATIE RIVER BASIN 04001002  
 21MICH 770715  
 0072 FEET DEPTH CLASS 00

DATE FROM TO	TIME OF DAY	DEPTH FEET	00300 DO MG/L	00010 WATER TEMP CENT	00680 T DRG C C	00400 PH SU	00410 T ALK CACO3 MG/L	00900 TOT HARD CACO3 MG/L	00095 CONDUCTIVITY AT 25C MICRONHD	00076 TURB IDIR HACH FTU	00630 ND2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L
76/02/24		14 00 0002	10.4	0.2	2.4	7.70	140	170	290	0.6	0.350	0.110
		14 02 0045	8.8	1.8	2.4	7.70	158	190	335	0.6	0.290	0.037
		14 04 0075	5.0	2.8	2.8	7.50	164	190	345	1.6	0.340	0.115
		10 15 0000	11.7	5.5	2.9	7.90	144	163	295	0.6	0.330	0.003
		10 17 0010	11.6	5.3								
76/04/14		10 19 0020	11.8	5.1	2.9	7.90	143	163	295	1.0	0.340	0.006
		10 21 0030	11.8	5.0								
		10 23 0040	12.0	5.0								
		10 25 0050	11.8	5.0								
		10 27 0060	11.8	5.0								
76/08/24		10 29 0070	11.9	5.0	3.0	7.90	142	162	295	1.2	0.340	0.006
		10 00 0000	9.0	22.0	3.5	8.30	135	145	275	2.0	0.010	0.002
		10 02 0010	8.2	22.0								
		10 04 0020	8.0	22.0	3.0	7.60	150	155	295	1.4	0.100	0.121
		10 06 0030	5.4	19.5								
77/04/19		10 08 0040	0.8	17.0								
		10 10 0050	0.8	13.0								
		10 12 0060	0.8	12.5								
		10 14 0070	0.8	12.0	2.9	7.40	158	165	305	2.1	0.160	0.159
		10 16 0075	0.8	12.0		8.50	148	157	295	1.2	0.310	0.001K
		12 30 0000	13.1	10.6								
		12 32 0010		7.8								
		12 34 0020		6.1								
		12 36 0030	12.6	5.6								
		12 38 0040		5.3								
		12 40 0050		5.0								
		12 42 0060		5.0								
		12 44 0070		5.0								
12 46 0078		4.7										

Table 3 (continued)

100109 AC02516.1  
 44 41 40.0 086 06 05.0 2  
 PLATTE LAKE IN CENTRAL BASIN  
 26019 BENZIE CO., MI.  
 LAKE TWP., SEC. 34 0817  
 PLATTE RIVER BASIN  
 21MICH 770715 04001002  
 0072 FEET DEPTH CLASS 00

/TYPE/AMBT/LAKE

DATE FROM TO	TIME OF DAY	DEPTH FEET	00605 ORG. N. N. MG/L	00665 PHOS-TOT MG/L P	70507 PHOS-T ORTHO. MG/L P	00500 RESIDUE TOTAL MG/L	70301 DISS SOL SUM MG/L	00530 RESIDUE TOT NFLY MG/L	00958 SILICATE UNF REAT MG/L SI	00955 SILICA DISSOLVED MG/L	00940 CHLORIDE CL MG/L	00080 COLOR PT-CO UNITS
76/02/24	14 00	0002	0.180	0.036	0.001	177	176	1		6.40	3.6	4
	14 02	0045	0.150	0.015	0.001	199	199	1K		7.60	3.9	5
	14 04	0075	0.170	0.014	0.001K	207	207	1K		10.70	4.1	5
76/04/14	10 15	0000	0.200	0.010	0.003	198	184	14		7.00	3.9	7
	10 21	0030	0.180	0.010	0.004	198	185	13		7.00	4.0	6
	10 29	0070	0.200	0.009	0.004	200	184	16		7.00	4.0	6
76/08/24	10 00	0000	0.220	0.005	0.002	173	161	12		0.60	3.8	3
	10 08	0040	0.220	0.010	0.002	194	185	9		5.50	3.7	4
	10 16	0075	0.220	0.009	0.004	202	195	7	2.30	8.00	3.9	5
77/04/19	12 30	0000	0.300	0.009	0.001	189	188	1	2.40		3.9	6
	12 36	0030	0.310	0.014	0.001	187	186	1	2.60		3.9	5
	12 46	0078	0.280	0.011	0.008	193	192	1			3.8	5

DATE FROM TO	TIME OF DAY	DEPTH FEET	00915 CALCIUM CA, DISS MG/L	01045 IRON FE, TOT UG/L	00925 MANGNIUM MG, DISS MG/L	00935 PTSSIUM K, DISS MG/L	00930 SODIUM NA, DISS MG/L	00946 SULFATE SO4-DISS MG/L	32209 CHLRPHYL A UG/L	00077 TRANSP SECCHI INCHES
76/02/24	14 00	0002	42.0	19	12.0	0.68	3.80	13.0		
	14 02	0045	48.0	25	14.0	0.74	4.00	14.0		
	14 04	0075	49.0	95	14.0	0.84	3.80	14.0		
76/04/14	10 15	0000	44.0	54	12.0	0.64	3.30	16.0		
	10 21	0030	44.0	58	12.0	0.64	3.60	17.0		
	10 29	0070	44.0	50	12.0	0.64	3.40	17.0		
76/08/24	10 00	0000	38.0	39	12.1	0.57	3.50	12.0		84
	10 08	0040	44.0	49	12.1	0.63	2.90	15.0		
	10 16	0075	46.0	130	12.1	0.64	3.40	15.0		
CP(S)-01									4.6	
76/08/24	10 19									
77/04/19	12 30	0000	49.0	30	11.7	0.68	3.80	15.0		
	12 36	0030	50.0	29	11.6	0.68	3.80	15.0		
	12 46	0078	51.0	34	12.0	0.69	3.80	15.0		
CP(S)-01									8.4	
77/04/19	12 49									



Table 4 (continued)

100086 AC02516.0  
 44 41 59.0 086 06 48.0 2  
 BIG PLATTE LAKE IN A NW BASIN  
 25019 BENZIE CO.  
 BENZONIA TWP. SEC. 34 081892  
 PLATTE RIVER BASIN; USES: A2B1C20E  
 21MICH 04001002  
 0090 FEET DEPTH CLASS 00

/TYPE/AMBNT/LAKE

DATE FROM TO	TIME OF DAY	DEPTH FEET	00605 ORG N	00665 PHOS-TOT	70507 PHOS-T CRTHO	00500 RESIDUE TOTAL	70301 DISS SOL SUM	00530 RESIDUE TOT NFLT	00958 SILICATE UNF REAT	00955 SILICA DISSOLVED	00940 CHLORIDE CL	00080 COLOR PT-CO UNITS
			MG/L	MG/L P	MG/L P	MG/L	MG/L	MG/L	MG/L SI	MG/L	MG/L	
74/09/15	11 00	0000	0.170	0.020	0.010K	174	174	1K	1K	6.90	4.3	10
	11 00	0040	0.160	0.010	0.010	177	177	1K	1K	7.10	4.4	10
	11 00	0065	0.210	0.040	0.020	203	198	5	5	11.40	4.6	15
76/02/24	10 00	0002	0.230	0.022	0.001K	186	186	1K	1K	6.70	3.8	4
	10 02	0040	0.150	0.011	0.001K	196	195	1	1	7.70	3.7	5
	10 04	0084	0.190	0.013	0.001K	199	199	1K	1K	9.40	3.7	5
76/04/14	09 00	0000	0.240	0.013	0.003	188	185	3	3	6.90	3.9	8
	09 08	0040	0.210	0.012	0.002	191	186	7	7	7.00	3.9	6
	09 18	0065	0.200	0.010	0.002	192	184	8	8	6.90	3.9	7
76/08/24	09 00	0000	0.460	0.023	0.001K	172	165	7	7	0.49	3.7	3
	09 08	0040	0.210	0.006	0.003	194	188	6	6	6.80	3.6	4
	09 18	0090	0.180	0.012	0.002	202	196	6	6	9.30	3.6	6

DATE FROM TO	TIME OF DAY	DEPTH FEET	00915 CALCIUM CA,DISS	01045 IRON FE,TOT	00925 MGNESIUM MG,DISS	00935 PTSSIUM K,DISS	00930 SODIUM NA,DISS	00946 SULFATE SO4-DISS	32209 CHLRPHYL A	00077 TRANSP SECCHI
			MG/L	UG/L	MG/L	MG/L	MG/L	MG/L	UG/L	INCHES
74/09/15	11 00	0000		50K				11.0		156
	11 00	0040		50K				11.0		
	11 00	0085		440				8.4		
CP(S)-01	11 00								2.9	
74/09/15	11 01									
76/02/24	10 00	0002	45.0	20	14.0	0.84	4.50	14.0		
	10 02	0040	48.0	38	14.0	0.73	3.70	13.0		
	10 04	0084	48.0	90	12.0	0.77	3.80	12.0		
76/04/14	09 00	0000	44.0	41	12.0	0.69	3.40	17.0		
	09 08	0040	44.0	52	12.0	0.69	3.40	17.0		
	09 18	0085	44.0	69	12.0	0.67	3.40	17.0		
76/08/24	09 00	0000	37.0	19	12.1	0.59	3.60	16.0		84
	09 08	0040	43.0	43	12.1	0.64	4.00	14.0		
	09 18	0090	44.0	200	12.1	0.66	3.50	14.0		
CP(S)-01	09 20									
76/08/24	09 21								4.4	

Table 5a Concentrations of heavy metals, chlorinated hydrocarbons and phthalates in sediments from Platte Lake, Benzie County, August 24, 1976. Mean Michigan background levels are included (Values based on dry weight).

Station Number	B-3	E-2	Michigan Background**
Total Solids (%)	25	29	
Volatile Solids (%)	2.8	8.0	
Total Kjeldahl Nitrogen (mg/kg)	1280 *	1280 *	
Total Phosphorus (mg/kg)	400	380	
Heavy Metals (mg/kg)			
Arsenic	1.8	1.2	0.04
Copper	19	36 *	
Mercury	0.12	0.04	0.17
Cadmium	< 0.01	< 0.01	4.2
Total Chromium	19	21	1.6
Zinc	440 *	500 *	31
Nickel	36 *	57 *	
Lead	53 *	65 *	37
Chlorinated Hydrocarbons and Phthalates (µg/kg)			
Aldrin	< 4	< 4	
Dieldrin	< 10	< 10	
Chlordane	< 20	< 20	
DDD	< 10	< 10	
DDE	< 10	< 10	
o, p - DDT	< 10	< 10	
p, p - DDT	< 10	< 10	
1242 PCB	< 500	< 500	
1254 PCB	< 500	< 500	
1260 PCB	< 500	< 500	
DEHP	3600	3310	
DBP	< 1000	< 1000	
Oil (mg/kg)	3880 *	4380 *	

\* Exceeds respective EPA non-polluted limit

\*\* Hesse and Evans, 1972

Table 5b. U.S. Environmental Protection Agency pollutional classification of sediments (1977). All values in mg/kg dry weight except where indicated.

PARAMETERS	Non Polluted	Moderately Polluted	Heavily Polluted
Volatile Solids (%)	<5	5-8	>8
Oil and Grease	<1,000	1,000-2,000	>2,000
COD	<40,000	40,000-80,000	>80,000
Phosphorus	<420	420-650	>650
Ammonia	<75	75-200	>200
TKN	<1,000	1,000-2,000	>2,000
Cyanide	<0.10	0.10-0.25	>0.25
Iron	<17,000	17,000-25,000	>25,000
Manganese	<300	300-500	>500
Barium	<20	20-60	>60
Lead	<40	40-60	>60
Mercury	≤1.0	≥1.0	≥1.0
Nickel	<20	20-50	>50
Arsenic	<3	3-8	>8
Cadmium	*	*	>6
Chromium	<25	25-75	>75
Copper	<25	25-50	>50
Zinc	<90	90-200	>200
PCB	≥10	≥10	≥10

\* Lower limits not established

Table 6

Macroinvertebrates collected with a Ponar dredge from Platte Lake, Benzie County, Michigan, June 23-25, 1970.  
(Average of 2 samples and midge species list is abbreviated)

TS	Scientific Name	F-1		F-2		F-3		A-1		A-2		A-3	
		Shells Detritus Silt	Shells Detritus Silt	Shells Sand Silt	Shells Sand Silt	Sand Clay	Organic Muck	Shells Silt Clay					
F	Turbellaria (flatworms)												
F	Planariidae		47										
T	Oligochaeta (aquatic earthworms)	411	258	1952		134	622					383	
F	Hirudinea (leeches)	162	76	210		19	86					9	
F	Gastropoda (snails)					182							
F	Amnicola	28											
F	Ferrissia	162		67		153	191					48	
F	Lymnaea						67					201	
F	Physa						67						
F	Planorbidae			19									
F	Valvatidae												
F	Viviporidae												
F	Pelecypoda (clams)												
F	Anodonta					9							
F	Lampisilis												
F	Sphaeriidae	57		76		28	76					67	
F	Unionidae												
T	Isopoda (sowbugs)	2424	9	15,254									
F	Asellus												
F	Amphipoda (scuds)	344	325	5129		9	229					507	
F	Hyalella azteca												
F	Decapoda (crayfish)	9	9	383									
F	Orconectes			19									
F	Hydracarina (water mites)												
F	Ephemeroptera (mayflies)	1607		2641		28	28					19	
F	Caenis												
I	Heptagenia												
I	Hexagenia limbata	28	28										
I	Leptophlebiidae												
I	Siphonurus												
F	Stenonema												
F	Odonata (dragonflies, damselflies)												
F	Caenagrionidae												
F	Dromogomphus	28		67									
F	Megatoptera (dobsonflies)			9									
F	Sialis												
I	Trichoptera (caddisflies)												
I	Banksiola	9											
I	Helicopsyche												
I	Hesperophylax												
I	Hydroptilidae	9											
I	Leptocella (=Nectopsyche) diarina												
I	Leptoceridae												
I	Limnephiliidae												
I	Molana												
I	Phryganeidae	28											
I	Polycentropus	28											
I	Pupae												
I	unidentified												9



Table 6 (continued)

TS	Scientific Name	A-4		A-5		A-6		A-7		B-1		B-2	
		Organic Silt	Shells Silt	Shells Silt	Silt Sand	Shells Silt Sand	Shells Silt Sand	Shells Silt Sand	Shells Silt Sand				
	Turbellaria (flatworms)												
F	Planariidae												
T	Oligochaeta (aquatic earthworms)	86				115		153		76			
	Hirudinea (leeches)	9				28							
	Gastropoda (snails)												
F	Amnicola												
F	Ferriassia			38		28		9				48	
F	Lymnaea												
T	Physa			19		19		9				9	
F	Planorbidae			28									
F	Valvatidae												
F	Viviporidae							19					38
	Pelecypoda (clams)												
F	Anodonta			9		9							
F	Lampsilis			57		19		57					
F	Sphaeriidae												
F	Unionidae												
	Isopoda (sowbugs)	86		19									
T	Asellus												
	Amphipoda (scuds)												
F	Hyalella azteca	430		19		296		57		28		48	
	Decapoda (crayfish)												
	Orconectes												
F	Hydracarina (water mites)												
F	Ephemeroptera (mayflies)												
F	Caenis	105		9		67				9		9	
I	Heptagenia			28									
I	Hexagenia limbata			19		76		9		9		9	
I	Leptophlebiidae	19											
I	Siphonurus							19					
F	Stenonema												
	Odonata (dragonflies, damselflies)												
F	Caenagrionidae												
F	Dromogomphus												
F	Megaloptera (dobsonflies)									9			
F	Sialis												
	Trichoptera (caddisflies)												
I	Banksiola												
I	Helicopsyche												
I	Hesperocnylix												
I	Hydroptilidae												
I	Leptocella (=Nectopsyche) diarina											28	
I	Leptoceridae												
I	Limnephilidae												
I	Molana			19								9	
I	Phryganeidae												
I	Polycentropus												
I	Pupae												
I	unidentified												19





Table 6 (continued)

Station Number: Sample Depth (feet):	B-3		B-4		B-5		B-6		B-7		C-1	
	Shells Clay Sand	20	Clay Silt	40	Shells Clay Sand	10	Shells Sand Clay	5	Sand Silt	5	Shells Sand Clay	5
Substrate Type:												
Coleoptera (beetles)												
Stenelmis												
Diptera (true flies)												
Atherix variegata												
Ceratopogonidae												
Chironomidae (midges)												
Ablabesmyia	9											
Brillia						67						
Chironomus						19						
Cladotanytarsus			38					28				
Clinotanytarsus	95					57						
Corynoneura												
Cricotopus												
Cryptocladopelma				9								
Cryptochironomus												
Cryptotendipes						19						
Dicrotendipes												
D. modestus	9			9								9
Epicoladus						67						38
Glyptotendipes												
Harnischia												
Kiefferulus												
Labrundinia				48								
Lauterborniella												
Micropectra												
Microtendipes												
Nilothauma						9						9
Parachironomus												
Paracladopelma												
Paralauterborniella												
Paratanytarsus												
Paratendipes												
Phaenopsectra												
Polypedium	48			9		19						
Pseudochironomus												
Stictochironomus	9			9		478						287
Tanytarsus				19								19
Thienemannimyia (gr.)	19											9
Zavreliella												
Procladius	382			316		153						77
Chaoborus	9*			162*								
Number Species/Station	19			15		23						12
Mean Number Individuals/m <sup>2</sup>	2499			1100		4065						612

\* Not used in any calculations

Table 6 (continued)

TS	Scientific Name	C-2		C-3		C-4		C-5		C-6		C-7	
		Station Number: Sample Depth (Feet):	Shells Sand Clay	Shells Clay	Shells Sand Clay	Sand Clay	Shells Sand Clay	Shells Sand Clay	Shells Sand Clay				
Substrate Type:		10	20	40	40	20	40	20	40	20	40	20	40
F	<u>Turbellaria</u> (Flatworms)												
F	<u>Planariidae</u>												
T	<u>Oligochaeta</u> (aquatic earthworms)	86	9	163	28	76						306	
T	<u>Hirudinea</u> (leeches)	48	9									28	
F	<u>Gastropoda</u> (snails)												
F	<u>Amnicola</u>												
F	<u>Ferrissia</u>												
F	<u>Lymnaea</u>		19										
T	<u>Physa</u>												
F	<u>Planorbidae</u>												
F	<u>Valvatidae</u>												
F	<u>Viviporidae</u>												9
F	<u>Pelecypoda</u> (clams)												
F	<u>Anodonta</u>	9											
F	<u>Lampsilis</u>												
F	<u>Sphaeriidae</u>		201	172		38							
F	<u>Unionidae</u>												
F	<u>Isopoda</u> (sowbugs)		57										
T	<u>Aseillus</u>												
F	<u>Amphipoda</u> (scuds)												
F	<u>Hyalella azteca</u>	794		57		373						468	
F	<u>Decapoda</u> (crayfish)	48										19	
F	<u>Orconectes</u>		9										
F	<u>Hydracarina</u> (water mites)												
F	<u>Ephemeroptera</u> (mayflies)		67									57	
F	<u>Caenis</u>	181											
I	<u>Heptagenia</u>												
I	<u>Hexagenia limbata</u>		239	28	57	105						210	
I	<u>Leptophlebiidae</u>												
I	<u>Siphonurus</u>												
F	<u>Stenonema</u>												
F	<u>Odonata</u> (dragonflies, damselflies)												
F	<u>Caenagrionidae</u>	9											
F	<u>Dromogomphus</u>	9											
F	<u>Megaloptera</u> (dobsonflies)												
F	<u>Sialis</u>		28	67									
I	<u>Trichoptera</u> (caddisflies)												
I	<u>Banksiola</u>												
I	<u>Helicopsyche</u>												
I	<u>Hesperophylax</u>												
I	<u>Hydroptilidae</u>												
I	<u>Leptocella</u> (=Nectopsyche) <u>diarina</u>												
I	<u>Leptoceridae</u>												
I	<u>Limnephilidae</u>	9										9	
I	<u>Molanna</u>												
I	<u>Phryganeidae</u>												
I	<u>Polycentropus</u>		9										
I	<u>Pupae</u>												
I	unidentified												

Table 6 (continued)

	Sample Depth (Feet):						
	C-2	C-3	C-4	C-5	C-6	C-7	
	10	20	40	40	20	11	
Substrate Type:	Shells Sand Clay	Shells Clay	Shells Sand Clay	Sand Clay	Shells Sand Clay	Shells Sand Clay	Shells Sand Clay
Coleoptera (beetles)							
<i>Stenelmis</i>							
Diptera (true flies)							
<i>Atherix variegata</i>	19				9	19	
Ceratopogonidae							
Chironomidae (midges)							
<i>Ablabesmyia</i>		77				28	
<i>Brillia</i>							
Chironomus	19		19	76			
<i>Cladotanytarsus</i>		86					
<i>Clinotanytus</i>							
<i>Corynoneura</i>							
<i>Cricotopus</i>							
<i>Cryptocladapelmia</i>			48			28	
<i>Cryptochironomus</i>			9	19		28	
<i>Cryptotendipes</i>		9			19		
<i>D. modestus</i>	9				9	38	
<i>Epoicoladius</i>						9	
<i>Glyptotendipes</i>						153	
<i>Harnischia</i>						19	
<i>Kiefferius</i>							
<i>Labrundinia</i>		38					
<i>Lauterborniella</i>							
<i>Microsectra</i>							
<i>Microtendipes</i>	19				9	19	38
<i>Nitthauma</i>							
<i>Parachironomus</i>							
<i>Paracladopelmia</i>							
<i>Paralauterborniella</i>							
<i>Paratanytarsus</i>							
<i>Paratendipes</i>							
<i>Phaenopsectra</i>		248					
<i>Polypedilum</i>	77		9	9	19	258	
<i>Pseudochironomus</i>	229				115	182	
<i>Stictochironomus</i>	77						
<i>Tanytarsus</i>			9	9		9	
<i>Thienemannimyia</i> (gr.)							
<i>Zavreliella</i>	19	1005	765	268	182	134	
<i>Procladius</i>		9*	478*	115*			
<i>Chaoborus</i>							
Number Species/Station	17	17	11	6	16	25	
Mean Number Individuals/m <sup>2</sup>	1664	3990	1349	450	1014	2113	

Table 6 (continued)

TS	Scientific Name	C-8		E-1		E-2		E-3		E-6		E-7	
		Sand	Shells	Clay	Shells	Clay	Shells	Clay	Clay	Shells	Clay	Clay	Shells
	Station Number:	5		5		10		20		40		65	
	Sample Depth (Feet):	5		5		10		20		40		65	
	Substrate Type:	Sand		Clay		Clay		Clay		Clay		Clay	
F	<u>Turbellaria</u> (flatworms)												
F	Planariidae												
T	Oligochaeta (aquatic earthworms)	124		48		172		95		38		344	
F	Hirudinea (leeches)	9		19		28		9					
F	Gastropoda (snails)												
F	<u>Amnicola</u>												
F	<u>Ferriisia</u>												
F	<u>Lymnaea</u>												
T	<u>Physa</u>												
F	Planorbidae												
F	Valvatidae												
F	Viviporidae												
F	Pelecypoda (clams)												
F	Anodonta												
F	<u>Lampsilis</u>												
F	<u>Sphaeriidae</u>	9		19		9		9		57			
F	Unionidae												
T	Isopoda (sowbugs)												
F	<u>Asellus</u>	48		38		9							
F	Amphipoda (scuds)												
F	<u>Hyalella azteca</u>	19		1398		555		19		86			
F	Decapoda (crayfish)												
F	Orconectes												
F	Hydracarina (water mites)												
F	Ephemeroptera (mayflies)												
F	Caenis	67		172		57							
F	<u>Heptagenia</u>												
F	<u>Hexagenia limbata</u>												
F	<u>Leptophlebiidae</u>	9		38		86		19					
F	<u>Siphonurus</u>												
F	Stenonema	76											
F	Odonata (dragonflies, damselflies)												
F	Caenagrionidae												
F	Dromogomphus												
F	Megoptera (dobsonflies)	9		9									
F	<u>Sialis</u>												
F	Trichoptera (caddisflies)												
F	<u>Banksiola</u>												
F	<u>Helicopsyche</u>												
F	<u>Hesperophylax</u>												
F	<u>Hydroptilidae</u>												
F	<u>Leptocella (=Nectopsyche) diarina</u>												
F	<u>Leptoceridae</u>												
F	<u>Limnephilidae</u>												
F	<u>Moianna</u>												
F	<u>Phryganeidae</u>												
F	<u>Polycentropus</u>												
F	Pupae												
F	unidentified												



Table 6 (continued)

Station Number:		E-8	E-9	E-10	E-11	E-12	E-13
Sample Depth (Feet):		80	65	42	20	10	5
Substrate Type:		Black Silt	Clay	Clay	Clay	Silt Shells	Shells Sand Silt
TS	Scientific Name						
F	Turbellaria (flatworms)						
	Planariidae						
T	Oligochaeta (aquatic earthworms)	2230	306	172	315	229	57
	Hirudinea (leeches)			9		19	57
F	Gastropoda (snails)						
F	Amnicola						
F	Ferrissia						
F	Lymnaea					9	
T	Physa						
F	Planorbidae						
F	Valvatidae						
F	Viviporidae						
F	Pelecypoda (clams)						
F	Anodonta						
F	Lampsilis				9		
F	Sphaeriidae					9	
F	Unionidae				105	28	
F	Isopoda (sowbugs)						
T	Aseillus						
F	Amphipoda (scuds)						77
F	Hyaletia azteca	9					
F	Decapoda (crayfish)					201	
F	Orconectes						
F	Hydracarina (water mites)						9
F	Ephemeroptera (mayflies)						9
F	Caenis						
I	Heptagenia					19	172
I	Hexagenia limbata						
I	Leptophlebiidae						
I	Siphonurus			48	354	86	9
F	Stenonema						
F	Odonata (dragonflies, damselflies)						38
F	Caenagrionidae						
F	Dromogomphus						
F	Megaloptera (dobsonflies)						
F	Sialis						
F	Trichoptera (caddisflies)						
I	Banksiola						
I	Helicopsyche						
I	Hesperophylax						
I	Hydroptilidae						
I	Leptocella (=Nectopsyche) diarina						
I	Leptoceridae						
I	Limnephilidae						
I	Molania						
I	Phryganeidae					9	9
I	Polycentropus						
I	Pupae						
I	unidentified						19

Table 6 (continued)

	Station Number:	E-8	E-9	E-10	E-11	E-12	E-13
	Sample Depth (feet):	80	65	42	20	10	5
	Substrate Type:	Black Silt	Clay	Clay	Clay	Silt Shells	Shells Sand Silt
F	Coleoptera (beetles)						
	<u>Stenelmis</u>	861	430	220	19		
I	Diptera (true flies)						
F	<u>Atherix variegata</u>			48	57	67	9
F	<u>Ceratopogonidae</u>						19
F	Chironomidae (midges)						
F	<u>Ablabesmyia</u>				86	9	
I	<u>Brillia</u>						
T	<u>Chironomus</u>				19		
F	<u>Cladotanytarsus</u>						
F	<u>Clinotanypus</u>						
F	<u>Corynoneura</u>						
F	<u>Cricotopus</u>				57		
F	<u>Cryptocladapeima</u>						28
F	<u>Cryptochironomus</u>				19	9	
F	<u>Cryptotendipes</u>						182
F	<u>D. modestus</u>						9
F	<u>Epoicoladius</u>				28		
F	<u>Glyptotendipes</u>				19		
F	<u>Harnischia</u>						
T	<u>Kiefferiulus</u>						
I	<u>Labrundinia</u>						
I	<u>Lauterborniella</u>						
F	<u>Microsepectra</u>						
F	<u>Microtendipes</u>				9		163
I	<u>Nilothauma</u>						
F	<u>Parachironomus</u>						
I	<u>Paracladopelma</u>				9		
I	<u>Paralauterborniella</u>						
F	<u>Paratanytarsus</u>						
F	<u>Paratendipes</u>						
F	<u>Phaenopsectra</u>						
F	<u>Polypedilum</u>						
I	<u>Pseudochironomus</u>					143	
I	<u>Stictochironomus</u>						
F	<u>Tanytarsus</u>		9				38
F	<u>Thienemannimyia (gr.)</u>	19					
F	<u>Zavrellella</u>	86	105	287			9
F	<u>Procladius</u>	765*	478*	48*	325	95	
F	<u>Chaoborus</u>						
	Number Species/Station	5	4	6	16	15	24
	Mean Number Individuals/m <sup>2</sup>	3293	852	746	1578	1167	1606

\* not used in any calculations

Table 7

Complete midge data from samples collected with a Ponar dredge from Platte River, Benzie County, Michigan, June 23-25, 1970.

Station:		F-1	F-1	F-2	F-2	F-3	F-3	A-1	A-2	A-3	A-3
		A	B	A	B	A	B	A, B	A, B	A	B
Chironomidae											
Tanypodinae											
F	<i>Abalosmyia annulata</i>		38								
F	<i>A. mallochii (ornata)</i>									38	19
F	<i>A. monilis</i>	19							19	38	
F	<i>A. parajanto (janto)</i>	191	38			210					19
F	<i>A. peleensis</i>					38	210	19			
F	<i>A. ramphe</i>						77				
F	<i>Abalosmyia</i>										
T	<i>Clinotanypus</i>	19	19			19			19	96	38
T	<i>Conchapelopia</i>	153	115	19		517	364				
T	<i>Conchapelopia/Arctopelopia</i>	115	19				96	19	19		
I	<i>Labrundinia neopilosella</i>					19					
F	<i>Procladius</i>		134		19	383	421	115	804	459	536
Orthoclaadiinae											
I	<i>Brillia</i>										
I	<i>Corynonocora scutellata</i>		38		19						
F	<i>Cricotopus</i> sp. 2 of Roback										
I	<i>Epoicocladus ephemerae</i>										
Chironominae											
Tanytarsini											
F	<i>Cladotanytarsus</i>	19									
F	<i>C. conversus</i>										
F	<i>C. sp. nr. dispersopilesus</i>							96			
F	<i>Microsetra polita</i>					19	19				
F	<i>M. sp. 2 of Roback</i>					19					
F	<i>M. sp. nr. 7 of Roback</i>										
F	<i>Paratanytarsus dissimilis</i>			38	134	38					
F	<i>Tanytarsus glabrescens</i>							19			
F	<i>T. sp. nr. glabrescens</i>	19							19		19
F	<i>T. guerla</i>										
F	<i>T. sp. 1</i>										
F	<i>T. sp. 2</i>										
F	<i>Tanytarsus (gp A of Roback)</i>										
F	<i>Zavrelia</i>									15	
Chironomini											
T	<i>Chironomus</i>										
T	<i>C. decorus</i>			421	172	19				38	77
T	<i>C. plumosus</i>										
T	<i>C. riparius</i>										
T	<i>C. Staegeri</i>										
T	<i>C. tentans</i>										
T	<i>C. sp. 2</i>										
F	<i>Cryptochironomus blarina</i>							96			
F	<i>C. fulvus</i>	19	77			19	19		38	38	38
F	<i>Cryptochironomus</i>										
F	<i>Cryptocladopelma</i>										19
F	<i>C. sp. nr. amachaerus</i>										
F	<i>Cryptotendipes</i>			134							
F	<i>Dicrotendipes</i>										
F	<i>D. sp. nr. fumidus</i>		96								
F	<i>D. modestus</i>	153	191	19	19	1,129	325				
F	<i>D. nervosus</i>	96									
T	<i>Glyptotendipes</i>	172									
T	<i>G. lobiferus</i>										
T	<i>G. sp. nr. senilis</i>										
F	<i>Harnischia curtamelata</i>										
T	<i>Kiefferulus</i>										
I	<i>Lauterborniella varipennis</i>										
F	<i>Microtendipes caducus</i>		19			153	746				
F	<i>Microtendipes</i>										
F	<i>M. sp. nr. tarsalis</i>										
I	<i>Nilothauma</i>										
F	<i>Parachironomus carinatus</i>	38			19						
F	<i>P. direches</i>								19		
I	<i>Paracladopelma</i>							19			
I	<i>Paralauterborniella nigronalterale</i>										
F	<i>Paratendipes albimanis</i>						19				19
F	<i>Phaenopsectra</i>										
I	<i>Pseudochironomus prosinatus</i>							57			
F	<i>Polypedilum</i>	134		1,014			249				
F	<i>P. halterale</i>		38	632			593	230			19
F	<i>P. nr. halterale</i>					574					
F	<i>P. scalaenum</i>								19		
F	<i>P. sp. nr. Eritum</i>										
I	<i>Stictochironomus</i>							1,302	19	172	153

Table 7 (continued)

Station:		A-4	A-4	A-5	A-6	A-6	A-7	A-7	B-1	B-1	B-2
		A	B	A,B	A	B	A	B	A	B	A
Chironomidae											
Tanyptodinae											
F	<i>Abiabetesmyia annulata</i>	19									
F	<i>A. mallochii (ornata)</i>										
F	<i>A. monilis</i>										
F	<i>A. parajanto (janto)</i>										
F	<i>A. peleensis</i>	19									
F	<i>A. ramphie</i>										
F	<i>Abiabetesmyia</i>										
T	<i>Clinotanyptus</i>										
T	<i>Conchapelopia</i>										
T	<i>Conchapelopia/Arctopelopia</i>			19	19	325			19		
I	<i>Labrundinia neopilosella</i>										
F	<i>Procladius</i>	19		19							
Orthocladinae											
I	<i>Brillia</i>			19							
I	<i>Corymonocora scutellata</i>										
F	<i>Cricotopus</i> sp. 2 of Roback				19						
I	<i>Epicoccladius ephemeræ</i>										
Chironominae											
Tanytarsini											
F	<i>Cladotanytarsus</i>										
F	<i>C. conversus</i>									19	
F	<i>C. sp. nr. dispersopileus</i>										
F	<i>Microsetra polita</i>					172	153	249			
F	<i>M. sp. 2 of Roback</i>										
F	<i>M. sp. nr. 7 of Roback</i>										
F	<i>Paratanytarsus dissimilis</i>										
F	<i>Tanytarsus glabrescens</i>										
F	<i>T. sp. nr. glabrescens</i>										
F	<i>T. querla</i>										
F	<i>T. sp. 1</i>										
F	<i>T. sp. 2</i>										
F	<i>Tanytarsus</i> (gp A of Roback)										
F	<i>Zavrelia</i>										
Chironomini											
T	<i>Chironomus</i>			19	57						
T	<i>C. decorus</i>										
T	<i>C. plumosus</i>										
T	<i>C. riparius</i>										
T	<i>C. Staegeri</i>										
T	<i>C. lentans</i>										
T	<i>C. sp. 2</i>										
F	<i>Cryptochironomus blarina</i>										
F	<i>C. fulvus</i>	38	38		19	57					
F	<i>Cryptochironomus</i>										
F	<i>Cryptocladopeima</i>										
F	<i>C. sp. nr. amachaerus</i>					19					
F	<i>Cryptotendipes</i>										
F	<i>Dicrotendipes</i>										
F	<i>D. sp. nr. fumidus</i>	134	57								
F	<i>D. modestus</i>			38	115	268		19		77	
F	<i>D. nervosus</i>										
T	<i>G. vptotendipes</i>										
T	<i>G. lobiferus</i>	38	38								
T	<i>G. sp. nr. senilis</i>										
F	<i>Harnischia curtelamellata</i>				77						
I	<i>Kieferulus</i>										
I	<i>Lauterborniella varipennis</i>										
F	<i>Microtendipes caducus</i>			38							
F	<i>Microtendipes</i>										
F	<i>M. sp. nr. tarsalis</i>	19				172		38	57	19	
I	<i>Nilothauma</i>										
F	<i>Parachironomus carinatus</i>										
F	<i>P. direches</i>	19									
I	<i>Paracladopeima</i>										
I	<i>Paralauterborniella nigronalterale</i>		19								
F	<i>Paratendipes albimanis</i>										
F	<i>Phaenopsectra</i>										
I	<i>Pseudochironomus prasinatus</i>						19		134	77	
F	<i>Polypedium</i>										
F	<i>P. halterale</i>		19			153	19	57			
F	<i>P. nr. halterale</i>										
F	<i>P. scalaenum</i>					38				57	134
F	<i>P. sp. nr. tritum</i>										
I	<i>Stictochironomus</i>				19		172	77	19		

Table 7 (continued)

		B-2	B-3	B-3	B-4	B-4	B-5	B-5	B-6	B-6	B-7
		B	A	B	A	B	A	B	A	B	A
Chironomidae											
Tanypodinae											
F	<i>Ablabesmyia annulata</i>		19								
F	<i>A. mallochii (ornata)</i>										
F	<i>A. monilis</i>						19				
F	<i>A. parajanto (janto)</i>										
F	<i>A. peleensis</i>										
F	<i>A. rampho</i>						19				
F	<i>Ablabesmyia</i>						96				
T	<i>Clinotanytus</i>		134	57			115				
T	<i>Conchapelopia</i>			38							19
T	<i>Conchapelopia/Arctopelopia</i>										
I	<i>Labrundinia neopilosella</i>										
F	<i>Procladius</i>	134	459	306	96	536	134	172	96		
Orthoclaadiinae											
I	<i>Brillia</i>										
I	<i>Corynonocora scutellata</i>										
F	<i>Cricotopus</i> sp. 2 of Roback										
I	<i>Epicocladus ephemerae</i>						115	19			
Chironominae											
Tanytarsini											
F	<i>Cladotanytarsus</i>	19									
F	<i>C. conversus</i>										
F	<i>C. sp. nr. dispersopilesus</i>								38	19	77
F	<i>Microsetra polita</i>										
F	<i>M. sp. 2 of Roback</i>										
F	<i>M. sp. nr. 7 of Roback</i>										
F	<i>Paratanytarsus dissimilis</i>										
F	<i>Tanytarsus glabrescens</i>										
F	<i>T. sp. nr. glabrescens</i>										
F	<i>T. querla</i>										
F	<i>T. sp. 1</i>										
F	<i>T. sp. 2</i>					38					
F	<i>Tanytarsus</i> (gp A of Roback)										
F	<i>Zavrelia</i>										
Chironomini											
T	<i>Chironomus</i>	19				19	19	19			57
T	<i>C. decorus</i>										
T	<i>C. plumosus</i>										
T	<i>C. riparius</i>										
T	<i>C. Staegeri</i>										
T	<i>C. tentans</i>				38						
T	<i>C. sp. 2</i>					19					
F	<i>Cryptochironomus blarina</i>										
F	<i>C. fulvus</i>							38			19
F	<i>Cryptochironomus</i>										
F	<i>Cryptocladopelma</i>										
F	<i>C. sp. nr. amachaerus</i>										
F	<i>Cryptotendipes</i>										
F	<i>Dicrotendipes</i>										
F	<i>D. sp. nr. fumidus</i>										
F	<i>D. modestus</i>	38		19	19						
F	<i>D. nervosus</i>										
T	<i>Glyptotendipes</i>										
T	<i>G. lobiferus</i>										
T	<i>G. sp. nr. senilis</i>										
F	<i>Harnischia curtelamellata</i>										
T	<i>Kiefferulus</i>						96				
I	<i>Lauterborniella varipennis</i>										
F	<i>Microtendipes caducus</i>										
F	<i>Microtendipes</i>							19			
F	<i>M. sp. nr. tarsalis</i>	19									
I	<i>Nilothauma</i>	19									
F	<i>Parachironomus carinatus</i>										
F	<i>P. direches</i>										
I	<i>Paracladopelma</i>										
I	<i>Paralauterborniella nigronalterale</i>										
F	<i>Paratendipes albimanis</i>										
F	<i>Phaenopsectra</i>										
I	<i>Pseudochironomus prasinatus</i>	383							96		
F	<i>Polypedium</i>						19				
F	<i>P. halterale</i>		19	77	19			19	57	38	115
F	<i>P. nr. halterale</i>										
F	<i>P. scalaenum</i>									57	57
F	<i>P. sp. nr. tritum</i>										
I	<i>Stictochironomus</i>	96		19		19	287	670		57	38

Table 7 (continued)

Station:		B-7	C-1	C-1	C-2	C-2	C-3	C-3	C-4	C-4	C-5
		B	A	B	A	B	A	B	A	B	A
Chironomidae											
Tanyptodinae											
F	<i>Ababesmyia annulata</i>						115	38			
F	<i>A. mallochii (ornata)</i>										
F	<i>A. manilis</i>										
F	<i>A. parajanto (janto)</i>										
F	<i>A. peleensis</i>										
F	<i>A. rauphe</i>										
F	<i>Ababesmyia</i>										
T	<i>Clinetanyptus</i>						153	19			
T	<i>Conchapelopia</i>		38								
T	<i>Conchapelopia/Arctopelopia</i>										
I	<i>Labrundinia neopilosella</i>						19	57			
F	<i>Procladius</i>	77		77	38		1206	804	325	206	134
Orthoclaadiinae											
I	<i>Brillia</i>										
I	<i>Corynonocora scutellata</i>										
F	<i>Cricotopus</i> sp. 2 of Roback										
I	<i>Epoicocladus ephemerae</i>			77							
Chironominae											
Tanytarsini											
F	<i>Cladotanytarsus</i>										
F	<i>C. conversus</i>										
F	<i>C. sp. nr. dispersopilesus</i>										
F	<i>Microsectra polita</i>										
F	<i>M. sp. 2 of Roback</i>										
F	<i>M. sp. nr. 7 of Roback</i>										
F	<i>Paratanytarsus dissimilis</i>										
F	<i>Tanytarsus glabrescens</i>										
F	<i>T. sp. nr. glabrescens</i>			19							
F	<i>T. quera</i>										19
F	<i>T. sp. 1</i>							19			
F	<i>T. sp. 2</i>										
F	<i>Tanytarsus</i> (gp A of Roback)										
F	<i>Zavrelia</i>										
Chironomini											
T	<i>Chironomus</i>	77			38				38		
T	<i>C. decorus</i>										
T	<i>C. plumosus</i>										
T	<i>C. riparius</i>										77
T	<i>C. Staegeri</i>										
T	<i>C. tentans</i>										
T	<i>C. sp. 2</i>										
F	<i>Cryptochironomus blarina</i>										
F	<i>C. fuivus</i>	19									19
F	<i>Cryptochironomus</i>										
F	<i>Cryptocladopelma</i>										
F	<i>C. sp. nr. amachaerus</i>								19		
F	<i>Cryptotendipes</i>						19			77	
F	<i>Dicrotendipes</i>										
F	<i>D. sp. nr. fumidus</i>										
F	<i>D. modestus</i>	19			19						
F	<i>D. nervosus</i>										
T	<i>Glyptotendipes</i>										
T	<i>G. lobiferus</i>										
T	<i>G. sp. nr. senilis</i>										
F	<i>Harnischia curtelanellata</i>										
T	<i>Kiefferulus</i>										
I	<i>Lauterborniella varipennis</i>										
F	<i>Microtendipes caducus</i>										
F	<i>Microtendipes</i>				19	19					
F	<i>M. sp. nr. tarsalis</i>	19									
I	<i>Nilothauma</i>										
F	<i>Parachironomus carinatus</i>										
F	<i>P. direches</i>										
I	<i>Paracladopelma</i>										
I	<i>Paralauterborniella nigronalterale</i>										
F	<i>Paratendipes albimanis</i>										
F	<i>Phaenopsectra</i>										
I	<i>Pseudochironomus prasinatus</i>	287	287		153	306					
F	<i>Polypedilum</i>										
F	<i>P. halterale</i>				38	115	344	153	19		
F	<i>P. nr. halterale</i>										
F	<i>P. scalaenum</i>	19									
F	<i>P. sp. nr. tritum</i>										
I	<i>Stictochironomus</i>	38		38	19	134					

Table 7 (continued)

Station:		C-5	C-6	C-6	C-7	C-7	C-8	C-8	E-1	E-1	E-2
		B	A	B	A	B	A	B	A	B	A
Chironomidae											
Tanypodinae											
F	<i>Ablabesmyia annulata</i>				38						
F	<i>A. mallochii</i> (ornata)							38			38
F	<i>A. monilis</i>					19					
F	<i>A. parajanto</i> (janto)										
F	<i>A. peleensis</i>										
F	<i>A. ranphe</i>										
F	<i>Ablabesmyia</i>										
T	<i>Clinotanypus</i>							19			
T	<i>Conchapelopia</i>			19	19		134				38
T	<i>Conchapelopia/Arctopelopia</i>										19
I	<i>Labrundinia neopilosella</i>										
F	<i>Procladius</i>	402	77	287	134	134		172			96
Orthocladinae											
I	<i>Brillia</i>										
I	<i>Corynonocora scutellata</i>										
F	<i>Cricotopus</i> sp. 2 of Roback										
I	<i>Epicoccladius ephemerae</i>					19	19		19		
Chironominae											
Tanytarsini											
F	<i>Cladotanytarsus</i>										
F	<i>C. conversus</i>										
F	<i>C. sp. nr. dispersopileus</i>						77		19		
F	<i>Microsectra polita</i>										
F	<i>M. sp. 2 of Roback</i>										
F	<i>M. sp. nr. 7 of Roback</i>										
F	<i>Paratanytarsus dissimilis</i>										
F	<i>Tanytarsus glabrescens</i>										
F	<i>T. sp. nr. glabrescens</i>				19				19		
F	<i>T. queria</i>										
F	<i>T. sp. 1</i>										
F	<i>T. sp. 2</i>							77			
F	<i>Tanytarsus</i> (gp A of Roback)										
F	<i>Zavrelia</i>										
Chironomini											
T	<i>Chironomus</i>										
T	<i>C. decorus</i>	38									
T	<i>C. plumosus</i>										
T	<i>C. riparius</i>	38									
T	<i>C. Staegeri</i>										
T	<i>C. tentans</i>										
T	<i>C. sp. 2</i>										
F	<i>Cryptochironomus blarina</i>										
F	<i>C. fulvus</i>		38		19	38		19			
F	<i>Cryptochironomus</i>										
F	<i>Cryptocladopeima</i>										
F	<i>C. sp. nr. amachaerus</i>										
F	<i>Cryptotendipes</i>		19	19	38	19					
F	<i>Dicrotendipes</i>										
F	<i>D. sp. nr. fumidus</i>							19			
F	<i>D. modestus</i>		19		77						
F	<i>D. nervosus</i>										
T	<i>Glyptotendipes</i>							191			
T	<i>G. lobiferus</i>				57						
T	<i>G. sp. nr. senilis</i>				115	134			19		38
F	<i>Harnischia curtelamellata</i>				38						
T	<i>Kiefferulus</i>										
I	<i>Lauterborniella varipennis</i>										
F	<i>Microtendipes caducus</i>				19		364	421	96		
F	<i>Microtendipes</i>										
F	<i>M. sp. nr. tarsalis</i>					19	153				
I	<i>Nilothauma</i>		19		38	38	19				
F	<i>Parachironomus carinatus</i>										
F	<i>P. direches</i>										
I	<i>Paracladopeima</i>										
I	<i>Paralauterborniella nigronalterale</i>								77		
F	<i>Paratendipes albinianis</i>										
F	<i>Phaenopsectra</i>										
I	<i>Pseudochironomus prasinatus</i>	230			115	249	230	115			19
F	<i>Polypedilum</i>						38	57		13	
F	<i>P. halterale</i>		19	19	249	268		459			
F	<i>P. nr. halterale</i>							134	38		230
F	<i>P. scalaenum</i>										
F	<i>P. sp. nr. tritum</i>										
I	<i>Stictochironomus</i>	19							38		191

Table 7 (continued)

Station:		E-2	E-3	E-3	E-6	E-6	E-7	E-7	E-8	E-8	E-9
		B	A	B	A	B	A	B	A	B	A
Chironomidae											
Tanyptodinae											
F	<i>Ablabesmyia annulata</i>					19					
F	<i>A. mallochii (ornata)</i>										
F	<i>A. monilis</i>										
F	<i>A. parajanto (janto)</i>										
F	<i>A. peleensis</i>										
F	<i>A. rampho</i>										
F	<i>Ablabesmyia</i>										
T	<i>Clinotanyptus</i>		57	19							
T	<i>Conchapelopia</i>										
T	<i>Conchapelopia/Arctopelopia</i>										
I	<i>Labrundinia neopilosella</i>										
F	<i>Procladius</i>	210	153	459		612	96	134	96	77	115
Orthoclaadiinae											
I	<i>Brillia</i>										
I	<i>Corynonocora scutellata</i>										
F	<i>Cricotopus</i> sp. 2 of Roback	19									
I	<i>Epicocladus ephemerae</i>										
Chironominae											
Tanytarsini											
F	<i>Cladotanytarsus</i>										
F	<i>C. conversus</i>	19									
F	<i>C. sp. nr. dispersopileus</i>	96									
F	<i>Microsectra polita</i>										
F	<i>M. sp. 2 of Roback</i>										
F	<i>M. sp. nr. 7 of Roback</i>										
F	<i>Paratanytarsus dissimilis</i>										
F	<i>Tanytarsus glabrescens</i>										
F	<i>T. sp. nr. glabrescens</i>										
F	<i>T. querla</i>							38			
F	<i>T. sp. 1</i>										
F	<i>T. sp. 2</i>					19					
F	<i>Tanytarsus</i> (gp A of Roback)						19			19	
F	<i>Zavrelia</i>								19		19
Chironomini											
T	<i>Chironomus</i>	19			19	19					
T	<i>C. decorus</i>										
T	<i>C. plumosus</i>		19								
T	<i>C. riparius</i>										
T	<i>C. Staegeri</i>		19		402	440	517	593	689	1034	402
T	<i>C. tentans</i>										
T	<i>C. sp. 2</i>										
F	<i>Cryptochironomus blarina</i>										
F	<i>C. fulvus</i>			19							
F	<i>Cryptochironomus</i>										
F	<i>Cryptocladopelma</i>										
F	<i>C. sp. nr. amachaerus</i>										
F	<i>Cryptotendipes</i>		19								
F	<i>Dicrotendipes</i>										
F	<i>D. sp. nr. fumidus</i>	19									
F	<i>D. modestus</i>										
F	<i>D. nervosus</i>										
T	<i>Glyptotendipes</i>										
T	<i>G. lotiferus</i>										
F	<i>G. sp. nr. senilis</i>										
T	<i>Harnischia curtelamellata</i>	19									
T	<i>Kiefferulus</i>										
I	<i>Lauterborniella varipennis</i>	38									
F	<i>Microtendipes caducus</i>	19									
F	<i>Microtendipes</i>										
F	<i>M. sp. nr. tarsalis</i>										
I	<i>Nilothama</i>										
F	<i>Parachironomus carinatus</i>										
F	<i>P. direches</i>										
I	<i>Paracladopelma</i>										
I	<i>Paralauterborniella nigronalterale</i>	57									
F	<i>Paratendipes albimanis</i>										19
F	<i>Phaenosectra</i>										
I	<i>Pseudochironomus prasinatus</i>	440		19							
F	<i>Polypedilum</i>	19									
F	<i>P. halterale</i>	249	57	57							
F	<i>P. nr. halterale</i>										
F	<i>P. scalaenum</i>										
F	<i>P. sp. nr. tritum</i>										
I	<i>Stictochironomus</i>										

Table 7 (continued)

Station:		E-9	E-10	E-10	E-11	E-11	E-12	E-12	E-13	E-13
		B	A	B	A	B	A	B	A	B
Chironomidae										
Tanypodinae										
F	<i>Ablabesmyia annulata</i>				57	115	19			
F	<i>A. mallochii</i> (ornata)									
F	<i>A. monilis</i>									
F	<i>A. parajanto</i> (janto)									
F	<i>A. peleensis</i>									
F	<i>A. rampe</i>									
F	<i>Ablabesmyia</i>									
T	<i>Clinotanypus</i>				19	96				
T	<i>Conchapelopia</i>									
T	<i>Conchapelopia/Arctopelopia</i>								57	96
I	<i>Labrundinia neopiloseila</i>									
F	<i>Procladius</i>	96	287	287	383	268	96	96		
Orthocladinae										
I	<i>Brillia</i>									
I	<i>Corynocora scutellata</i>									
F	<i>Cricotopus</i> sp. 2 of Roback								19	
I	<i>Epicocladus ephemerae</i>						57			19
Chironominae										
Tanytarsini										
F	<i>Cladotanytarsus</i>									
F	<i>C. conversus</i>									
F	<i>C. sp. nr. dispersopileus</i>								478	115
F	<i>Microsectra polita</i>									
F	<i>M. sp. 2 of Roback</i>									
F	<i>M. sp. nr. 7 of Roback</i>									
F	<i>Paratanytarsus dissimilis</i>									
F	<i>Tanytarsus glabrescens</i>									
F	<i>T. sp. nr. glabrescens</i>									
F	<i>T. querla</i>								38	38
F	<i>T. sp. 1</i>	19								
F	<i>T. sp. 2</i>									
F	<i>Tanytarsus</i> (gp A of Roback)									
F	<i>Zavrelia</i>									
Chironomini										
T	<i>Chironomus</i>		19	38						
T	<i>C. decorus</i>									
T	<i>C. plumosus</i>					19				
T	<i>C. riparius</i>									
T	<i>C. Staegeri</i>	459	96	287	19					
T	<i>C. tentans</i>									
T	<i>C. sp. 2</i>									
F	<i>Cryptochironomus blarina</i>									
F	<i>C. fulvus</i>									
F	<i>Cryptochironomus</i>					38	19		19	19
F	<i>Cryptocladopelma</i>								19	
F	<i>C. sp. nr. amachaerus</i>									
F	<i>Cryptotendipes</i>									
F	<i>Dicrotendipes</i>									
F	<i>D. sp. nr. fumidus</i>									
F	<i>D. modestus</i>								77	57
F	<i>D. nervosus</i>									
T	<i>Glyptotendipes</i>								230	
T	<i>G. lobiferus</i>									
T	<i>G. sp. nr. senilis</i>									
F	<i>Harnischia curtellamellata</i>									
T	<i>Kiefferulus</i>					38				
I	<i>Lauterborniella varipennis</i>									
F	<i>Microtendipes caducus</i>									
F	<i>Microtendipes</i>					19			249	77
F	<i>M. sp. nr. tarsalis</i>									
I	<i>Nitthauma</i>									
F	<i>Parachironomus carinatus</i>									
F	<i>P. direches</i>									
I	<i>Paracladopelma</i>									
I	<i>Paralauterborniella nigronalterale</i>					19				
F	<i>Paratendipes albimanis</i>									
F	<i>Phaenopsectra</i>									
I	<i>Pseudochironomus prasinatus</i>									
F	<i>Polypedilum</i>						57	230		
F	<i>P. halterale</i>						19		115	38
F	<i>P. nr. halterale</i>				57	249	249	191	230	
F	<i>P. scalaenum</i>									
F	<i>P. sp. nr. tritum</i>									
I	<i>Stictochironomus</i>									57

Table 8 Summary of Platte Lake macroinvertebrate data for each transect and a lake average for the littoral and profundal zones, June 23-25, 1970.

	Species	Individuals/m <sup>2</sup>	% Oligochaete Individuals	% Midge Individuals	% Mayfly-Caddisfly Individuals
Transect A	5 ft.	1037	9	49	12
	10 ft.	1545	20	23	7
	15 ft.	2400	11	38	8
Transect B	5 ft.	592	32	41	7
	10 ft.	2372	3	43	12
	20 ft.	2499	2	23	9
	40 ft.	1100	15	40	16
Transect C	5 ft.	1020	7	73	14
	10 ft.	1889	10	36	13
	20 ft.	2502	4	38	9
	40 ft.	900	10	68	8
Transect E	5 ft.	1970	3	44	13
	10 ft.	1535	15	45	9
	20 ft.	1099	18	59	13
	40 ft.	851	14	75	8
	65 ft.	947	36	64	0
	80 ft.	3293	68	32	0
Lake Average	< 40 ft.	1708	11	43	10
	≥ 40 ft.	1785	29	56	6

Table 9

Macroinvertebrates collected with a Petite Ponar from Platte Lake, Benzie County, Michigan, August 24, 1976. Organisms recorded as estimated numbers per meter squared.

Station Number:		F-1		F-2		F-3		A-1		A-2	
Depth (Feet):		7		5		6		12		5	
Substrate:		Sand Plants		Sand Plants		Sand Shells		Sand Silt		Sand Shells	
Sample:		A	B	A	B	A	B	A	B	A	B
TS	Scientific Name										
	Oligochaeta (aquatic earthworms)										
F	<i>Aulodrilus americanus</i>										
F	<i>A. piqueti</i>					86					
F	<i>A. pluriseta</i>										
F	<i>Dero nivea</i>			43							
T	<i>Limnodrilus hoffmeisteri</i>	43	43					43			43
	Naididae		43								
F	<i>Piquetiella michiganensis</i>				43						
F	<i>Potamothrix moldaviensis</i>										86
	<i>Stylaria lacustris</i>		43	43	86						
	immature w/o capilliforms		516	172	43	387	301	172	43	258	1,204
	undetermined	129	43	43	43	43	86			172	129
	Gastropoda (snails)										
F	<i>Ammicola</i>										
F	<i>Helisoma antrosa</i>			43							
F	<i>H. campanulata</i>						43				
T	<i>Physa</i>										43
F	<i>Valvata trica</i>										
	Pelecypoda (clams)							43			
F	<i>Anodonta grandis</i>										
F	<i>Lampsilis siliquoidea</i>										
F	<i>Pisidium</i>										
F	<i>Sphaerium</i>			43			43	43			
	Amphipoda (scuds)										
F	<i>Hyalella azteca</i>	43	172	387	86		43			86	
	Ephemeroptera (mayflies)										
I	<i>Hexagenia limbata</i>					43					
	Megaloptera (dobsonflies)										
F	<i>Sialis</i>							43			
	Chironomidae (midges)										
	pupae										
F	<i>Ablabesmyia</i>						43			43	
T	<i>Chironomus</i>						86				
F	<i>Cladotanytarsus</i>					43				129	731
F	<i>Cryptocladopelma</i>			43		215	215	43	43	86	516
F	<i>Cryptochironomus</i>										
F	<i>Cryptotendipes</i>										
F	<i>Dicortendipes</i>										
F	<i>D. modestus</i>	43		43						43	
F	<i>Endochironomus</i>				43						
T	<i>Glyptotendipes</i>										
F	<i>Micropsectra</i>					301	172			43	
F	<i>Parachironomus</i>			43							
I	<i>Paracladopelma</i>										
I	<i>Paralauterborniella</i>										
F	<i>Paratanytarsus</i>										86
F	<i>Phaenopsectra</i>									86	
F	<i>Polypedilum</i>		43								
F	<i>P. halterale</i>				43	516	215			430	43
F	<i>P. scalaenum</i>									473	1,462
I	<i>Pseudochironomus</i>										
T	<i>Procladius</i>					172	86				
I	<i>Stictochironomus</i>										
F	<i>Tanytarsus</i>									215	
	pupae *					43	43			129	215
	Total Number of Species/sample	3	6	8	7	7	11	6	2	12	7
	Total Number of Individuals/m <sup>2</sup>	258	1,032	860	387	1,849	1,419	430	86	2,236	4,513
	Combined Samples-Total Species/ station	7		12		14		6		15	
	Combined Samples-Mean Individuals/m <sup>2</sup>	645		623		1,634		258		3,325	
	% Oligochaeta Individuals/station	66.7		37.9		29		50		28	
	% Chironomid Individuals/station	6.7		17.3		65.8		25		70.1	
	% Mayfly Individuals/station	0		0		1.3		0		0	
	% Other Individuals/station	26.6		44.8		3.9		25		1.9	

\* Immature and undetermined Oligochaetes and Chironomid pupae are not included in species counts

Table 9 (continued)

Station Number:		A-3		B-1		B-2		B-3		D-4	
Depth (feet):		4		10		20		30		10	
Substrate:		Sand Shells		Sand Silt		Sand Silt		Clay Silt		Clay Silt	
Sample:		A	B	A	B	A	B	A	B	A	B
TS	Scientific Name										
	Oligochaeta (aquatic earthworms)										
F	<i>Aulodrilus americanus</i>				43						
F	<i>A. piqueti</i>			43							
F	<i>A. pluriseti</i>				43						
	<i>Dero nivea</i>										
T	<i>Limnodrilus hoffmeisteri</i>				43						
	Naididae										
F	<i>Piquetiella michiganensis</i>										
	<i>Potamothrix moldaviensis</i>										
	<i>Stylaria lacustris</i>										43
	Immature w/o capilliforms undetermined	129	387	86	86			43		43	43
	Gastropoda (snails)										
F	<i>Amnicola</i>										
F	<i>Helisoma antrosa</i>					86		129			
F	<i>H. campanulata</i>										
T	<i>Physa</i>										
F	<i>Valvata trica</i>										
	Pelecypoda (clams)										
F	<i>Anodonta grandis</i>										
F	<i>Lampsilis siliquoidea</i>										
F	<i>Pisidium</i>					129					
F	<i>Sphaerium</i>					215	43				
	Amphipoda (scuds)										
F	<i>Hyalella azteca</i>										
I	Ephemeroptera (mayflies)				43						
I	<i>Hexagenia limbata</i>							43			
F	Megaloptera (dobsonflies)										43
	<i>Stalis</i>							43			
	Chironomidae (midges)										
	pupae										
F	<i>Ablabesmyia</i>										
T	<i>Chironomus</i>							129	86	43	43
F	<i>Cladotanytarsus</i>		43							43	43
F	<i>Cryptocladopelma</i>									43	43
F	<i>Cryptochironomus</i>	172	86					43		215	215
F	<i>Cryptotendipes</i>			43	172					129	86
F	<i>D. modestus</i>										
F	<i>Endochironomus</i>										
T	<i>Glyptotendipes</i>										
F	<i>Micropsectra</i>		43								
F	<i>Parachironomus</i>									43	43
I	<i>Paracladopelma</i>	43									
I	<i>Paralauterborniella</i>										
F	<i>Paratanytarsus</i>										
F	<i>Phaenopsectra</i>										
F	<i>Polypedilum</i>										
F	<i>P. hulterae</i>	43	172								
F	<i>P. scabra</i>									172	172
I	<i>Pseudochironomus</i>										
T	<i>Procladius</i>			86	43						
I	<i>Stictochironomus</i>										
F	<i>Tanytarsus</i>										
	pupae *				43					43	
	Total Number of Species/sample	4	5	3	7	3	4	2	2	8	8
	Total Number of Individuals/m <sup>2</sup>	387	731	258	559	430	344	172	129	731	731
	Combined Samples-Total Species/station	6		7		6		3		9	
	Combined Samples-Mean Individuals/m <sup>2</sup>	559		408		387		150		731	
	% Oligochaeta Individuals/station	46.2		42.1		0		14.3		8.8	
	% Chironomid Individuals/station	53.8		52.6		0		85.7		88.2	
	% Mayfly Individuals/station	0		5.3		5.6		0		3.0	
	% Other Individuals/station	0		0		94.4		0		0	

\* Immature and undetermined Oligochaetes and Chironomid pupae are not included in species counts.

Table 2 (continued)

Station Number:		C-1		C-2		C-3		C-4		C-5	
Depth (feet):		10		20		40		20		10	
Substrate:		Sand Silt		Clay Sand		Clay		Clay Shells		Clay Sand	
Sample:		A	B	A	B	A	B	A	B	A	B
TS	Scientific Name										
	Oligochaeta (aquatic earthworms)										
F	<i>Audriulus americanus</i>										43
F	<i>A. piqueti</i>										
F	<i>A. plurisetus</i>										
	<i>Dero nivea</i>										
T	<i>Limnodrilus hoffmeisteri</i>										
	Naididae										
F	<i>Piquetiella michiganensis</i>										43
	<i>Potamothenis moldaviensis</i>										
	<i>Stylaria lacustris</i>										
	immature w/o capilliforms	86				86					
	undetermined										344
	Gastropoda (snails)										
F	<i>Ammicola</i>										
F	<i>Helisoma antrosa</i>								43		
F	<i>H. campanulata</i>										
T	<i>Physa</i>										
F	<i>Valvata trica</i>										
	Pelecypoda (clams)										
F	<i>Anodonta grandis</i>										
F	<i>Lampsilis siliquoidea</i>										43
F	<i>Pisidium</i>										
F	<i>Sphaerium</i>										
	Amphipoda (scuds)			86	172			129		86	
F	<i>Hyalella azteca</i>										
	Ephemeroptera (mayflies)										
I	<i>Hexagenia limbata</i>	172	86								
	Megaloptera (dobsonflies)										
F	<i>Sialis</i>										
	Chironomidae (midges)										
	pupae										
F	<i>Ablabesmyia</i>										
T	<i>Chironomus</i>	43		86	86	301	301	172	172		
F	<i>Cladotanytarsus</i>	43	43								
F	<i>Cryptocladapeima</i>	43									86
F	<i>Cryptochironomus</i>										
F	<i>Cryptotendipes</i>	387	258	86	86						86
F	<i>Dicrotendipes</i>									43	43
F	<i>D. modestus</i>										
F	<i>Endochironomus</i>										
T	<i>Glyptotendipes</i>										
F	<i>Micropectra</i>	301	86								86
F	<i>Parachironomus</i>										
I	<i>Paraladapeima</i>										
I	<i>Paralauterborniella</i>	43	43						43		43
F	<i>Paratanytarsus</i>										
F	<i>Phaenopsectra</i>										
F	<i>Polypedilum</i>										
F	<i>P. halterale</i>										
F	<i>P. scalaenum</i>										
I	<i>Pseudochironomus</i>										
I	<i>Procladius</i>	172	43							86	86
I	<i>Stictochironomus</i>	172	43		43				86		43
F	<i>Tanytarsus</i>	215	86								
F	pupae*	129	43							43	129
	Total Number of Species/sample	11	9	3	4	2	1	3	4	2	11
	Total Number of Individuals/m <sup>2</sup>	1,806	731	258	387	387	301	301	344	172	1,075
	Combined Samples - Total Species/ station	11		4		2		5		12	
	Combined Samples - Mean Individuals/m <sup>2</sup>	1,268		322		344		322		623	
	% Oligochaeta Individuals/station	3.4		0		12.5		0		34.5	
	% Chironomid Individuals/station	86.4		60		87.5		78.3		55.2	
	% Mayfly Individuals/station	10.2		0		0		0		0	
	% Other Individuals/station	0		40		0		26.7		10.3	

\* Immature and undetermined Oligochaetes and Chironomid pupae are not included in species counts.

Table C (continued)

Station Number:		D-1		D-2		D-3		D-4		D-5	
Depth (feet):		20		40		70		40		20	
Substrate:		Shells		Clay		Clay		Clay		Clay	
Sample:		A	B	A	B	A	B	A	B	A	B
TS	Scientific Name										
	Oligochaeta (aquatic earthworms)										
F	<i>Allodrilus americanus</i>										
F	<i>A. piqueti</i>										
F	<i>A. pluriseti</i>										
	<i>Dero nivea</i>										
T	<i>Limnodrilus hoffmeisteri</i>			43		43	43	86	43		86
	Naididae										
	<i>Piquetiella michiganensis</i>										
F	<i>Potamothrix moldaviensis</i>										
	<i>Stylaria lacustris</i>										
	immature w/o capilliforms					129	258	172	172		43
	undetermined										
	Gastropoda (snails)										
F	<i>Amnicola</i>										
F	<i>Helisoma antrosa</i>			43							
F	<i>H. campanulata</i>										
T	<i>Physa</i>										
F	<i>Vivata trica</i>										
	Pelecypoda (clams)										
F	<i>Anodonta grandis</i>										
F	<i>Lampsilis siliquoidea</i>		43								
F	<i>Pisidium</i>										
F	<i>Subaerium</i>	86	86	86		129			86	43	
	Amphipoda (scuds)										
F	<i>Hyalella azteca</i>										
	Ephemeroptera (mayflies)										
I	<i>Hexagenia limbata</i>	43									215
	Megaloptera (dobsonflies)										
F	<i>Sialis</i>										
	Chironomidae (midges)										
	pupae										
F	<i>Abiaesmyia</i>										
T	<i>Chironomus</i>		215	215	43	645	43	301	516		
F	<i>Cladotanytarsus</i>										
F	<i>Cryptocladapeima</i>										
F	<i>Cryptochironomus</i>										43
F	<i>Cryptotendipes</i>	43	86								86
F	<i>Dicrotendipes</i>		43								
F	<i>D. modestus</i>										
F	<i>Endochironomus</i>										
F	<i>Glyptotendipes</i>										
F	<i>Hicropsectra</i>										
F	<i>Parachironomus</i>										
I	<i>Paracladopelma</i>										
I	<i>Paraleuterborniella</i>										
F	<i>Paratanytarsus</i>										
F	<i>Phaenopsectra</i>	43									
F	<i>Polypedilum</i>										
F	<i>P. halterale</i>										
F	<i>P. scalaenum</i>										
F	<i>Pseudochironomus</i>										
I	<i>Procladius</i>	43	43								
I	<i>Stictochironomus</i>										43
F	<i>Tanytarsus</i>										
	pupae *		43								
	Total Number of Species/sample	5	7	2	3	3	2	2	3	4	3
	Total Number of Individuals/m <sup>2</sup>	258	559	301	129	946	344	559	817	215	344
	Combined Samples-Total Species/station	9		4		3		4		6	
	Combined Samples-Mean Individuals/station	408		215		645		688		280	
	% Oligochaeta Individuals/station	0		10		36.7		34.4		23.1	
	% Chironomid Individuals/station	68.4		60		53.3		59.4		30.8	
	% Mayfly Individuals/station	5.3		0		0		0		0	
	% Other Individuals/station	26.3		30		10		6.2		46.1	

\* Immature and undetermined Oligochaetes and Chironomid pupae are not included in species counts.

Table 9 (continued)

Station Number:		E-1		E-2		E-3		E-4		E-5	
Depth (Feet):		20		40		80		40		20	
Substrate:		Clay		Clay		Clay		Clay		Clay Shells	
Sample:		A	B	A	B	A	B	A	B	A	B
TS	Scientific Name										
	Oligochaeta (aquatic earthworms)										
F	<u>Aulodrilus americanus</u>	172									
F	<u>A. piqueti</u>										
F	<u>A. pluriseta</u>	43									
	<u>Dero nivea</u>										
T	<u>Limnodrilus hoffmeisteri</u>			43		129	43			43	
	Naididae										
	<u>Piquetiella michiganensis</u>										
F	<u>Potamothrix moldaviensis</u>		43								
	<u>Stylaria lacustris</u>										
	immature w/o capilliforms undetermined	43		43	43	602	516		86		
	Gastropoda (snails)					86	43				
F	<u>Amnicola</u>										
F	<u>Helisoma antrosa</u>										
F	<u>H. campanulata</u>										
T	<u>Physa</u>										
F	<u>Valvata trica</u>										
	Pelecypoda (clams)										
F	<u>Anodonta grandis</u>										
F	<u>Lampsilis siliquoidea</u>										
F	<u>Pisidium</u>										
F	<u>Sphaerium</u>		43								
	Amphipoda (scuds)										129
F	<u>Hyalella azteca</u>										
	Ephemeroptera (mayflies)										
I	<u>Hexagenia limbata</u>		43								
	Megaloptera (dobsonflies)										
F	<u>Sialis</u>										43
	Chironomidae (midges)										
	pupae										
F	<u>Ablabesmyia</u>										
T	<u>Chironomus</u>	129	129	43	129				215		
F	<u>Cladotanytarsus</u>										
F	<u>Cryptocladopelma</u>										
F	<u>Cryptochironomus</u>		43								
F	<u>Cryptotendipes</u>										
F	<u>Dicrotendipes</u>										
F	<u>D. modestus</u>										
F	<u>Endochironomus</u>		43								
T	<u>Glyptotendipes</u>										
F	<u>Micropsectra</u>										
F	<u>Parachironomus</u>										
I	<u>Paracladopelma</u>										
I	<u>Paralauterborniella</u>										
F	<u>Paratanytarsus</u>										
F	<u>Phaenopsectra</u>										
F	<u>Polypedilum</u>										
F	<u>P. halterale</u>										
F	<u>P. scalaenum</u>										
I	<u>Pseudochironomus</u>										
T	<u>Procladius</u>		43								
I	<u>Stictochironomus</u>										
F	<u>Tanytarsus</u>		86								
	pupae *		43								
	Total Number of Species/sample	7	4	2	2	1	1				
	Total Number of Individuals/m <sup>2</sup>	645	258	86	215	817	602				
	Combined Samples-Total Species/station	10		3		1		2		2	
	Combined Samples-Mean Individuals/m <sup>2</sup>	451		150		710		172		86	
	% Oligochaeta Individuals/station	33.3		42.9		100		37.5		0	
	% Chironomid Individuals/station	57.1		57.1		0		62.5		0	
	% Mayfly Individuals/station	4.8		0		0		0		25	
	% Other Individuals/station	4.8		0		0		0		75	

\* Immature and undetermined Oligochaetes and Chironomid pupae are not included in species counts.

Table 10

Summary of Platte Lake macroinvertebrate data for each transect and a lake average for the littoral and profundal zones, August 24, 1976.

	Species	Individuals/m <sup>2</sup>	% Oligochaete Individuals	% Midge Individuals	% Mayfly-Caddisfly Individuals
Transect A	5 ft.	1958	37	62	0
	12 ft.	258	50	25	0
Transect B	10 ft.	408	42	53	5
	20 ft.	387	0	0	6
	30 ft.	150	14	86	0
Transect C	10 ft.	945	9	70	5
	20 ft.	322	0	66	0
	40 ft.	344	12	88	0
Transect D	20 ft.	344	12	50	3
	40 ft.	451	22	60	0
	70 ft.	645	37	53	0
Transect E	20 ft.	268	17	30	15
	40 ft.	161	40	60	0
	80 ft.	710	100	0	0
Lake Average	< 40 ft.	560	21	49	4
	≥ 40 ft.	462	42	52	0



Table 11 (continued)

Taxa	B-4		C-1		C-2		C-3		C-4	
	A	B	A	B	A	B	A	B	A	B
Oligochaeta (aquatic earthworms)	258	43	559	2236	172	43	20	40		
Hirudinea (leeches)										
Gastropoda (snails, limpets)										
Phyla										
Pelecypoda (clams)										
Lamprolaima										
Pisidium										
Amphipoda (scuds)										
Hyalella azteca										
Ephemeroptera (mayflies)										
Caenis										
Hexagenia										
Megaloptera (dobsonflies, fishflies)										
Sialis										
Trichoptera (caddisflies)										
Leptoceridae (pupae)										
Oecetis										
Diptera (flies, midges)										
Ceratopogonidae										
Chaoborus										
Chironomidae (true midges)										
pupae										
Abiabetesmyia										
Chironomus										
Cladotanytarsus										
Coelotanytarsus										
Cryptochironomus										
Cryptocladopelema										
Cryptotendipes										
Dicrotendipes										
Endochironomus										
Harnischia (gr.)										
Microtendipes										
Nanocladius										
Paraccladopelema										
Paralauterborniella										
Phaenopsectra										
Polypedilum										
Procladius										
Stenochironomus										
Stictochironomus										
Tanytarsus										

\*not used in species calculations

\*\*not used in any calculations



Table 12 Summary of Platte Lake macroinvertebrate data for each transect and a lake average for the littoral and profundal zones, June 26, 1978.

	Species	Individuals/m <sup>2</sup>	% Oligochaete Individuals	% Midge Individuals	% Mayfly-Caddisfly Individuals
Transect A	5 ft.	1010	17	81	0
	10 ft.	645	53	47	0
Transect B	5 ft.	774	30	64	6
	10 ft.	731	28	60	6
	20 ft.	602	3	77	10
	40 ft.	602	21	61	0
Transect C	5 ft.	2967	47	48	4
	10 ft.	1742	6	86	6
	20 ft.	989	0	100	0
	40 ft.	258	17	75	0
Transect E	5 ft.	1956	20	69	7
	10 ft.	1290	15	70	8
	20 ft.	731	0	94	3
	40 ft.	989	0	100	0
	65 ft.	623	23	74	0
	85 ft.	3074	87	11	0
Lake Average	< 40 ft.	1221	20	72	4.5
	> 40 ft.	1109	29.5	64	0

Table 13. Total phosphorus concentrations in the Platte River immediately above and below the Platte Hatchery. (Data from STORET)

Station Number:	100051		100015	
Station Location:	Above Platte Hatchery		Below Platte Hatchery (US-31)	
	<u>1977</u>	<u>1978</u>	<u>1977</u>	<u>1978</u>
January	.014	.009	.036	.018
February	.015	.011	.037	.018
March	.006	.016	.025	.041
April	.004	.007	.012	.047
May	.012	.014	.031	.029
June	.012	.015	.020	.031
July	.025	.013	.037	.049
August	.037	.013	.030	.041
September	.009	.010	.030	.043
October	.007	.009	.023	.042
November	.010	.009	.046	.051
December	.007	.011	.020	.032
1977-78 Mean	0.012 mg/l		0.33	

Table 14 Annual total phosphorus loading to Platte Lake based on data from January 1977 to December 1978.

<u>Source</u>	<u>lbs P/yr</u>	<u>% total</u>
A. Tributary Platte River (without hatchery)	3105	43
B. Immediate Drainage <sup>1</sup>	236	3
C. Septic Tanks <sup>2</sup>	125	2
D. Precipitation and Dry Fallout <sup>3</sup>	755	11
E. Hatchery <sup>4</sup>	2915	41
Total	<u>7196</u>	<u>100</u>

<sup>1</sup> Based on ratio of immediate drainage area to total river drainage area

<sup>2</sup> See EPA Working Paper No. 1 (200 dwellings)

<sup>3</sup> Tague, 1972 (0.3 lbs/acre)

<sup>4</sup> Total hatchery load was 3305 lbs/yr. River assimilation of 10% was assumed.