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Macroscopic Benthos Populations and Taxonomy of the Family Chironomidae in Lake Poinsett, South Dakota

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MACROSCOPIC BENTHOS POPULATIONS AND TAXONOMY OF THE FAMILY CHIRONOMIDAE IN LAKE POINSETT, SOUTH DAKOTA

BY

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This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable as meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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ABSTRACT

Benthos samples were collected in Lake Poinsett, a highly eutrophic eastern South Dakota lake, from March 1970 through February 1971. The lake bottom was divided into three substrate types (sand, sand-sapropel mixture and sapropel) and the percent of each substrate type was calculated. Nineteen macroscopic genera were taken from ten sampling stations located throughout the lake. The family Chironomidae was the most abundant group in the lake. Descriptions are presented for organisms in this group. Diversity of organisms was greatest in the sand substrates, in that all 19 genera were collected. *Chironomus* spp. (*Chironomus plomosus*, *Chironomus attenuatus* and six unidentified species) was the most abundant group of organisms and occurred most frequently in the sapropel (mud) substrate. Forty percent (514.2/m^2) of mean annual numbers and 77% (0.9961 gm/m^2) of mean annual dry weight from all substrates consisted of organisms from these eight species of *Chironomus*. The mean annual standing crop (1.28 gm/m^2) in Lake Poinsett was approximately average in comparison to other lakes.

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INTRODUCTION

Lake Poinsett is in the advanced stages of eutrophication and appears to be highly productive. The lake has large numbers of fish (Congdon, 1968), dense blue-green algae blooms (Applegate, 1971), high concentrations of zooplankton (Applegate, unpublished data), and high amounts of nutrients (Skille, 1971).

Diversity and quantity of benthic populations can be related to quality of water, state of eutrophication, and with some insight, future conditions of the lake (Stahl, 1969). Work on benthos in natural lakes in eastern South Dakota, however, has been limited to Lake Kampeska (Hartung, 1968) located 30 miles north of Lake Poinsett.

The objectives of this study were to describe macroscopic benthos composition and standing crops in Lake Poinsett. Since the family Chironomidae was the major group of benthic organisms in the lake, its taxonomy is considered in more detail than other groups. This study will serve as a basis for further work on benthic communities and productivity of Lake Poinsett.

STUDY AREA

Lake Poinsett, located in southern Hamlin County and northwest Brookings County, is the largest natural lake (3184.6 hectares) in South Dakota. Drainage is received from a lake system to the northwest and the Big Sioux River via Dry Lake immediately north of Lake Poinsett. An outlet drains to the Big Sioux River from the northeast corner of Lake Poinsett. The lake lies at an elevation of about 502.9 m (1650 ft) above sea level. Its maximum length is 8.89 km (5.52 miles) with a maximum width of 4.83 km (3.0 miles). The lake is eliptical and the shoreline is uniform with a development of 1.6 and has a maximum depth of 6.0 m (19.7 ft) (Figure 1).

Lake Poinsett is located in the tall grass prairie with little topographical variation of modify the wind. Since the lake is shallow, the wind action keeps the water in an almost continual state of mixis. Lake Poinsett appears to be highly eutrophic. There is no higher aquatic vegetation but during the summer months filimentous algae grows on the rocks in the shallower areas and dense blooms of blue-green and green algae occur throughout the lake. Reid's (1961) description of sapropel best fits the mud bottom of Lake Poinsett. The organically rich mud under anaerobic conditions forms a blue black substance containing hydrogen sulfide and methane.

The gravel portion of the sediments extends noticeably further into the lake on the north side near the inlets (Figure 2). This gravel extension into the lake was probably developed by currents

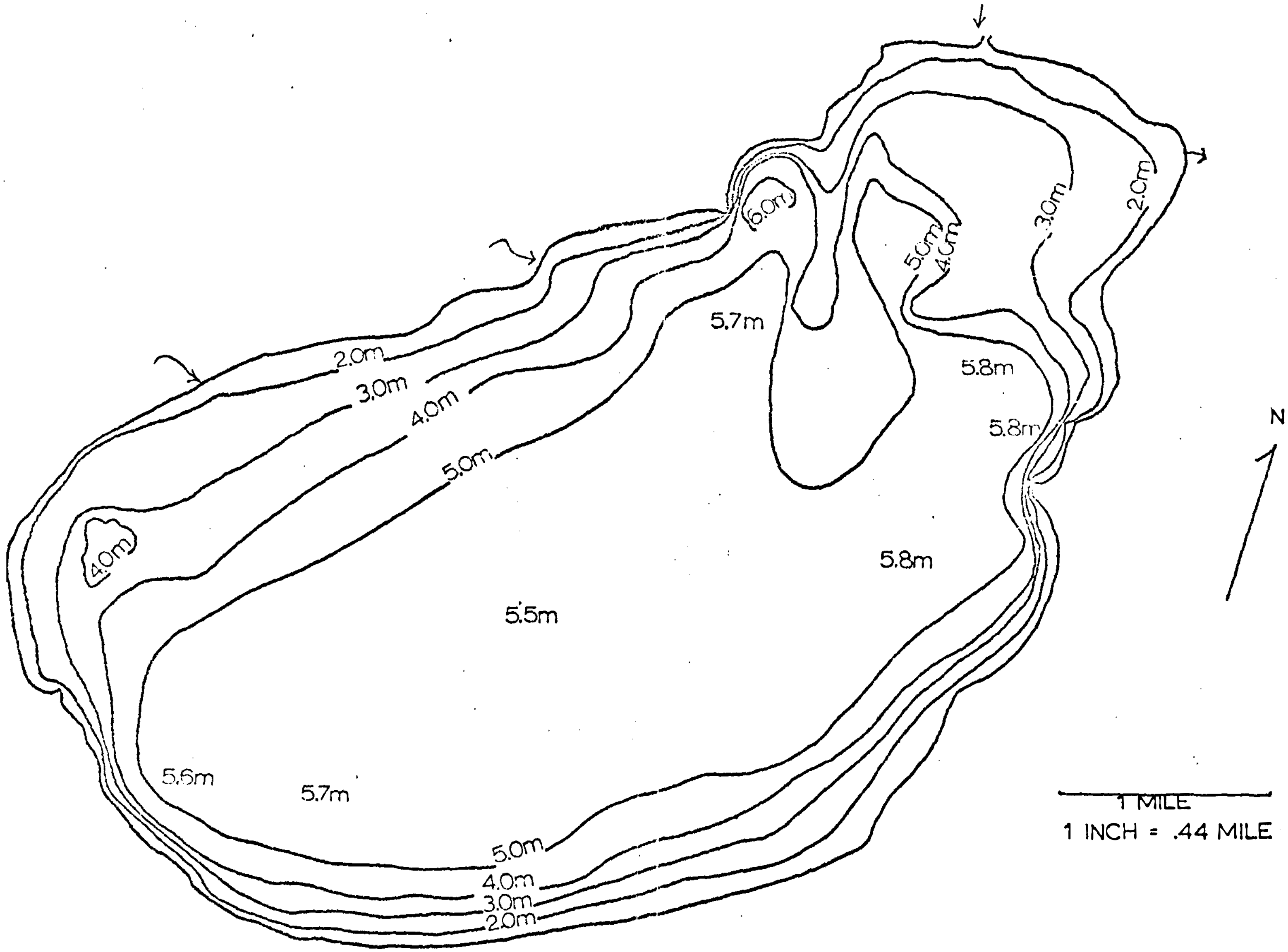

Figure 1 Depth contours (meters) of Lake Poinsett, South Dakota

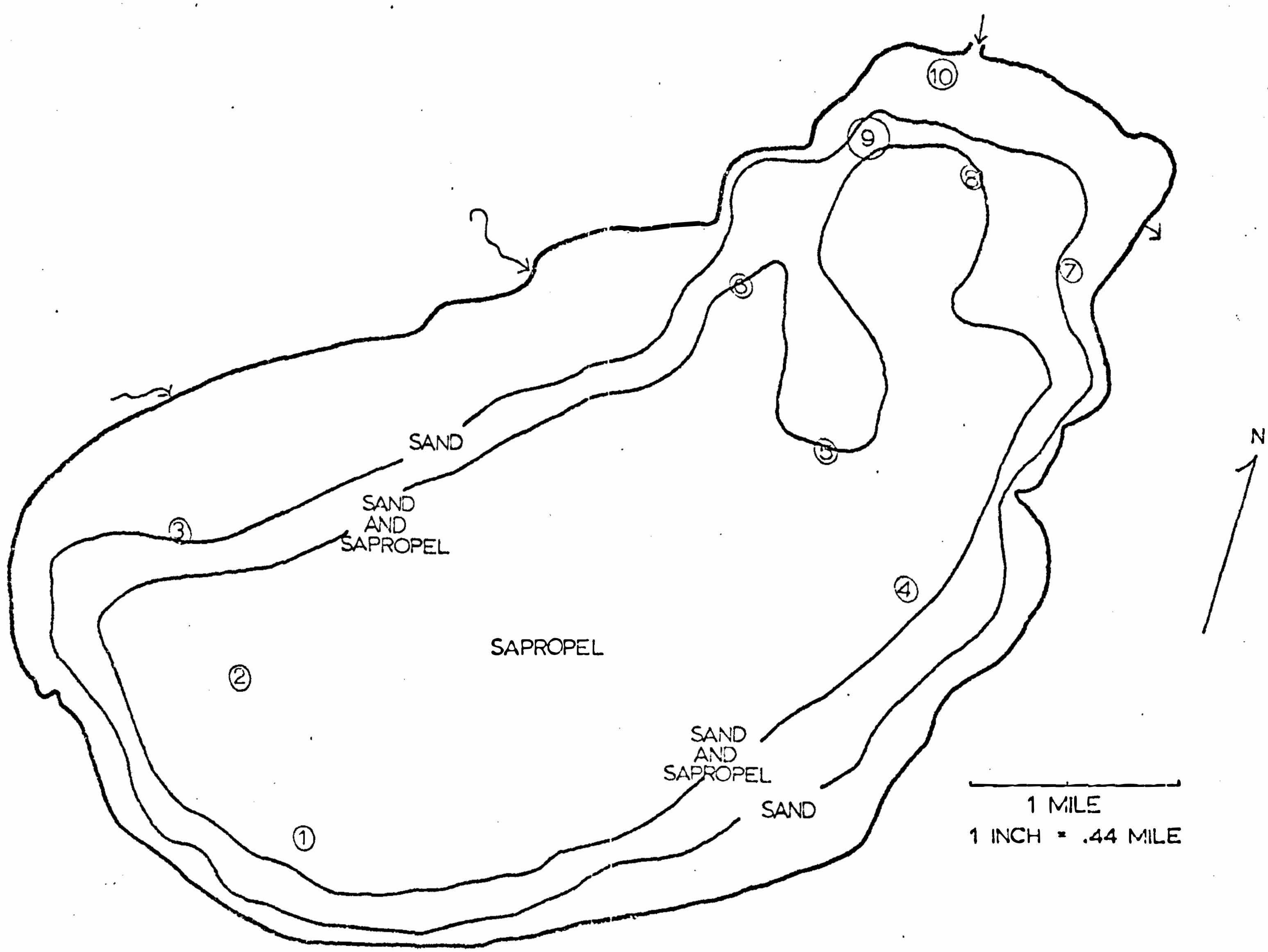

Figure 2 Substrate types and location of sampling stations on Lake Poinsett, South Dakota

carrying the fine sediments further out into the lake leaving original glacial gravel exposed. At the south end of Lake Poinsett, the water depth increases quickly and the ooze occurs much closer to the shore. In the northeast sector the sand ridge which extends into the lake is possibly due to the combination of incoming water from Dry Lake into Lake Poinsett and the prevailing southwest wind in the summer causing a swirling effect and piling the sand into that portion of the lake.

There are large quantities of autocthonous sediments as well as allocthonous materials in the lake. Bottom samples from deeper portions of the lake had large amounts of organic materials. The sediments of Lake Poinsett consisted of sand, sapropel (mud) and a mixture of sand and sapropel.

The bottom area consisted of 27% (855 hectares) sand substrate, 22% (692 hectares) sand-sapropel mixture and 51% (1518 hectares) sapropel.

Sand substrates were located in areas from the shoreline outward to water depths of 4 m in the areas where inlets flow into the lake. Sediments greater than 2 mm is considered gravel and less than 2 mm but greater than 0.05 mm is considered sand (Dapples, 1959). By this definition, the sand substrate consisted of approximately 19% gravel and 77% sand.

Area of the mixed sand-sapropel covered 22% (692 hectares) of the lake substrate. The ratio of sand to sapropel in the sand-sapropel substrate differed from station to station and from date to date.

Fifty-one percent of the substrate in the lake consisted of mud (sapropel). It covered an area of 1518 hectares. The sapropel (mud) substrate had varying amounts of detritus depending upon the area of the lake sampled. Very little organic material was found in the southwest portion of the lake, whereas samples taken from the north and east sides contained large amounts of detritus.

Ranges of monthly means for physical and chemical parameters from March 1970 - February 1971 in Lake Poinsett are: temperature, 1.8-27.5 C; dissolved oxygen, 2.4-12.8 mg/1; pH, 8.2-9.3; carbonate alkalinity, 0-56 mg/1; bicarbonate alkalinity, 150-242 mg/1; total hardness, 356-454 mg/1; copper, 0.18-0.50 mg/1; chloride, 36-48 mg/1; and specific conductance, 859-1134 mmhos/cm at 25 C (Table 1, Figures 3 and 4, Appendix A). Analyses of water chemistry were made with a Hach DR-EL field laboratory kit (Instruction Manual, 7th edition). Specific conductance was measured with a Beckman specific conductance meter Model RB-3338.

Table 1. Means ($\bar{x}$) and ranges (r) of chemical data from Lake Poinsett, South Dakota (March 1970 - February 1971)

Sampling period	Dissolved Oxygen		Temperature		pH		Specific Conductance		Hardness: Calcium		Hardness: Magnesium		Hardness: Total		Chloride		Copper		Alkalinity: Carbonate		Alkalinity: Bicarbonate	
	r	$\bar{x}$	r	$\bar{x}$	r	$\bar{x}$	r	$\bar{x}$	r	$\bar{x}$	r	$\bar{x}$	r	$\bar{x}$	r	$\bar{x}$	r	$\bar{x}$	r	$\bar{x}$	r	$\bar{x}$
1970																								
March	.8-5.6	2.4	2.5-5	3.7	7.9-8.4	8.2	950-1000	991	120-240	143	190-305	274	405-440	422							190-250	222
April	10.8-14.4	12.8	5-11	6.2	>8.4	>8.4	800-900	859	105-125	114	205-310	252	310-425	366					20-90	56	100-220	160
May	8.8-9.3	8.95	13	13	8.6-8.8	8.7	890-960	917	120-135	126	255-280	268	380-405	393					10-40	21	150-210	184
June 1*	4.3-10.2	8.06	19-22.5	20.6	8.3-8.6	8.5	950-1010	972	100-130	116	190-320	260	300-450	377							210-235	220
June 2**	6.6-9.2	7.5	21-22	21.6	8.6-8.8	8.6	850-950	914	110-130	121	250-270	266	375-390	386					20-60	40	160-220	192
July 1	5.4-11.0	9.22	25-27	25.5	8.8-9.2	9.0	900-920	909	110-215	146	165-295	230	330-410	376					40-80	56	140-175	156
July 2	7.6-9.6	8.6	26-29	27.5	9.0-9.6	9.3	825-910	872	105-130	114	235-260	252	355-375	366					20-60	48	140-185	158
Aug. 1	3.0-9.8	6.24	26-29	26.6	8.9-9.4	9.1	850-900	885	90-125	112	225-275	245	340-370	356	32-40	36	.12-.42	.36	10-60	40	140-180	158
Aug. 2	5.8-8.7	7.38	22-24	23.2	9.1-9.2	9.1	900-930	918	150-200	172	170-235	206	355-420	377	38	38	.23-.50	.38	30-80	49	125-175	150
Sept. 1	7.8-10	8.84	13-18.5	14.8	8.8-9.1	9.0	900-980	931	120-210	175	165-230	192	350-375	367	38-42	38	.37-.70	.50	30-90	48	115-165	153
Sept. 2	8.0-11.0	8.9	14-17	15.2	8.8-9.0	8.9	910-960	930	160-270	232	120-215	150	360-410	382	28-38	34	.28-.50	.38	30-50	41	145-170	158
October	6.6-11.2	9.13	8.5-11.5	9.8	8.8-8.9	8.9	910-1010	948	160-250	216	140-230	173	365-415	390			.13-.41	.26	10-50	37	140-185	158
November	5.0-11.2	9.34	1.5-3.5	2.1	8.7-8.8	8.8	825-940	896	155-260	218	120-255	168	380-410	386			.06-.38	.20	10-30	21	160-185	170
December	1.8-12.6	7.68	1-4	2.06	8.4-8.8	8.6	1020-1190	1082	150-240	194	200-280	234	400-440	424	35-45	39	.11-.36	.23	10	1	210-240	222
1971																								
January	3.0-11.4	6.56	1-3	1.75	8.4-8.8	8.6	860-1275	1102	160-320	266	140-260	178	410-460	440	42-52	46	.20-.32	.24	10	1	195-245	228
February	1.0-5.2	3.0	2-4	3.1	8.3-8.6	8.5	1020-1210	1134	130-270	230	185-320	224	440-480	454	42-58	48	.12-.25	.18	30	3	230-250	242

* First sampling period of month.

** Second sampling period of month.

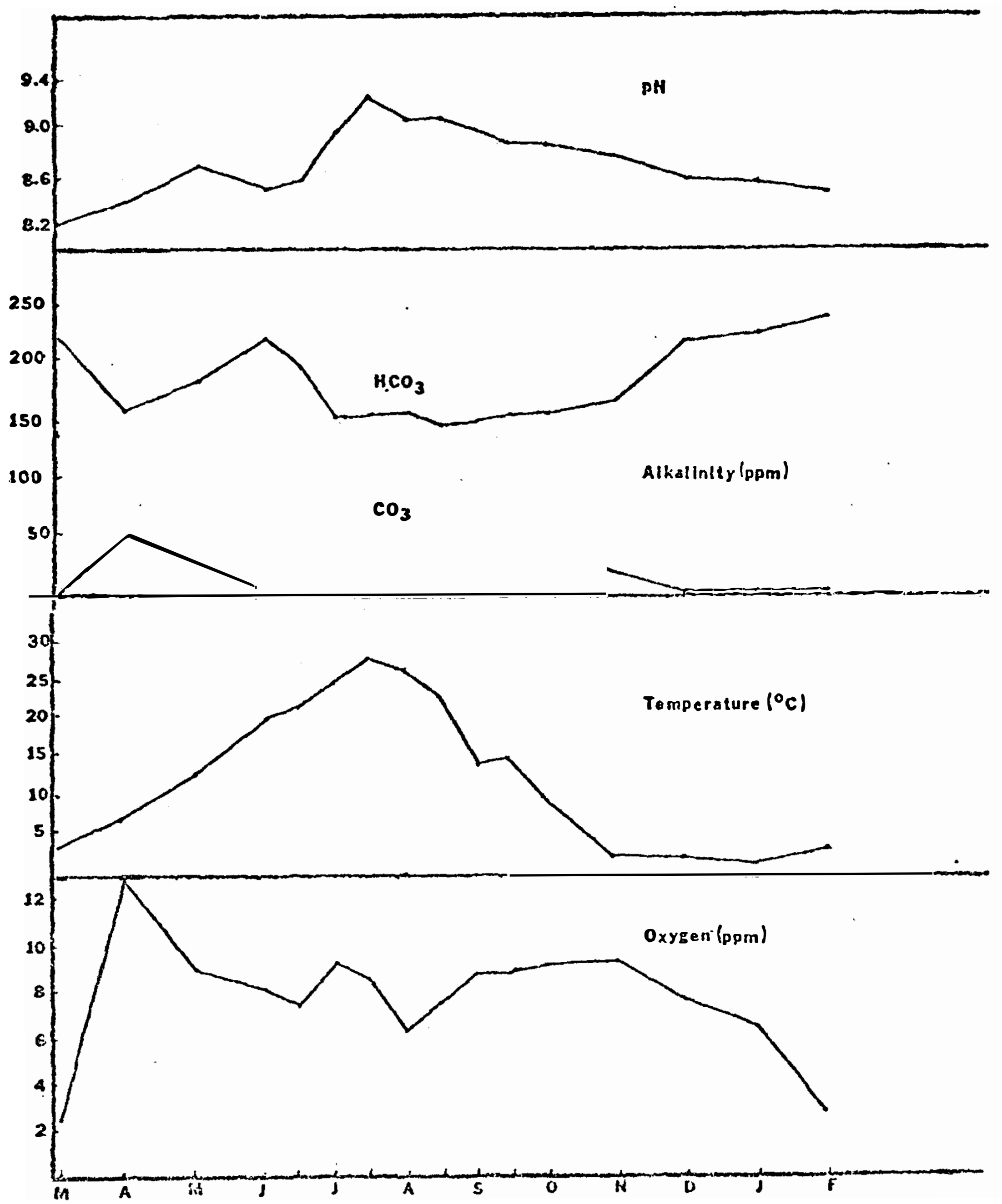

Figure 3 Monthly means of pH, alkalinity, temperature and oxygen from March 1970 through February 1971 in Lake Poinsett, South Dakota

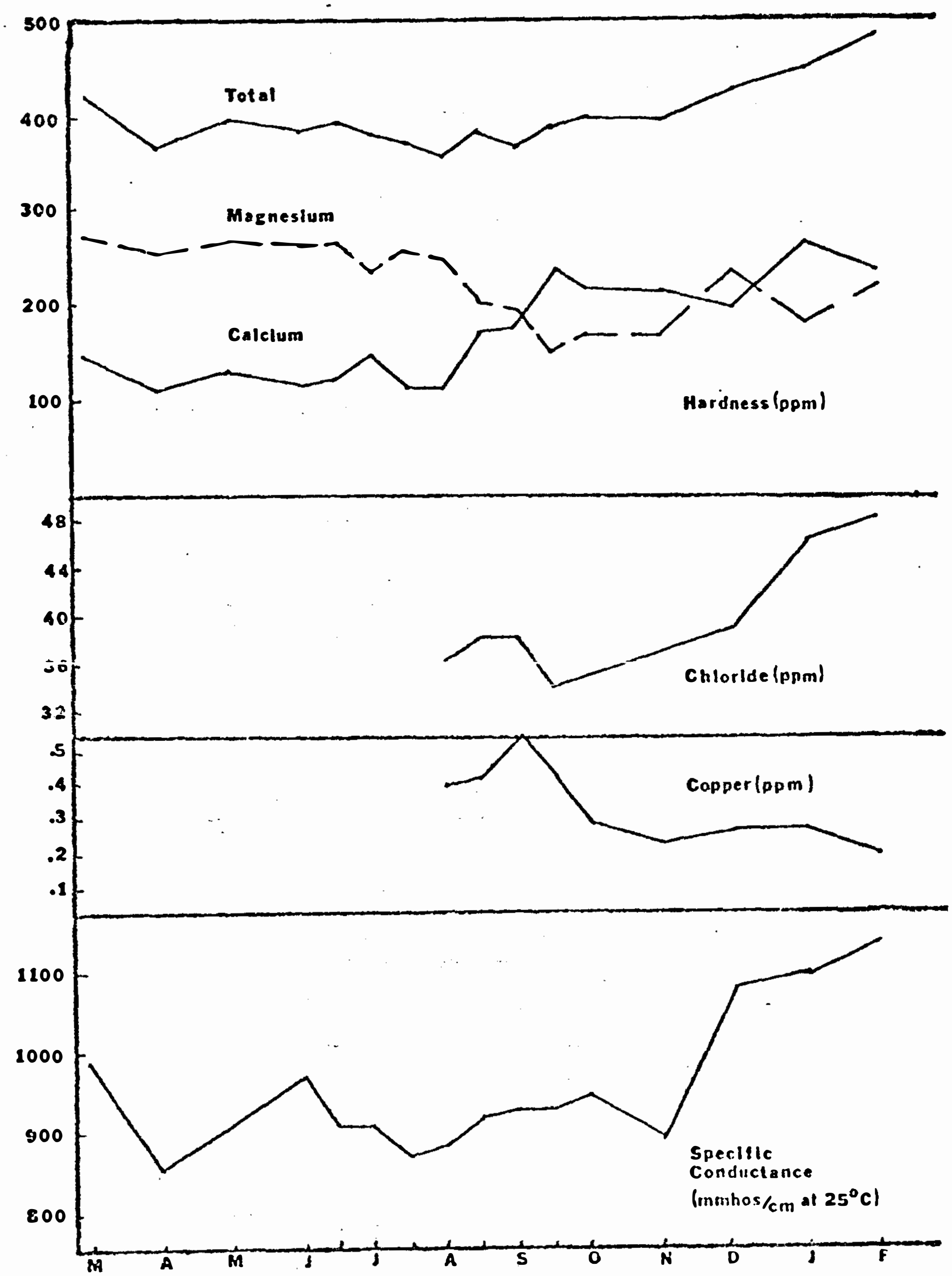

Figure 4 Monthly means of specific conductance, hardness, chloride and copper from March 1970 through February 1971 in Lake Poinsett, South Dakota

METHODS AND MATERIALS

Ten sampling stations were established on transects running from southeast to northwest across the lake (Figure 2). Water depths ranged from 1.8 m (5.8 ft) at the north stations to 5.8 m (19.0 ft) at the south stations. Sampling was conducted from March 1970 through February 1971. Samples were taken biweekly during the summer months (June through September) and monthly during the remainder of the year except for interruptions during periods of thin ice. By April 15, 1970, the lake was clear of ice and ice formed again November 22, 1970.

Benthic organisms were sampled with an Eckman dredge (Area = 202.5 cm^2) and an Orange Peel dredge (Area = 171.1 cm^2). Two dredge hauls, which constituted a sample, were taken at each of the ten stations, giving a total of 160 dredge samples (320 dredge hauls) taken throughout the study period. The samples were placed in a washing bucket containing 30 mesh per inch sieve screen. Hudson (1970) found that only organisms with a head diameter larger than 0.516 mm will be retained by the 30 mesh per inch sieve screen. Remaining organisms and large substrate material were then washed into a plastic bag and taken to the laboratory for separation.

Organisms were separated from the substrate by the sugar floatation method (Anderson, 1959). A check of the method was made by hand sorting some samples. The few additional organisms found by hand sorting did not warrant the extra time involved.

Organisms were separated into taxonomic groups and the numbers in each group were recorded. Representative specimens were selected and preserved in 70% alcohol for identification and the remainder were preserved in 10% formalin for weighing.

Organisms were separated from the preservative by filtration on previously weighed filter paper. The organisms on the filter paper were then dried in an oven at 85-95 C for 24 hours. After drying, the organisms and paper were reweighed. Correction filter papers (without organisms) were also run through identical procedures to find initial water moisture in the filter papers. Weights of the organisms were then calculated and expanded to grams per square meter.

Keys by Mason (1968) were used for identifying chironomid larvae. Keys by Johannsen (1936a, 1936b), Brooks (1966), Ross (1966), James (1966), Darby (1962), Pennak (1953), Beck (1968) and Hilsenhoff and Narf (1968) were also used for some chironomids and for other groups of organisms. Permanent slides of organisms were made using CMC media and photomicrographs were taken.

RESULTS AND DISCUSSION

Abundance, habitats and collection dates of macroscopic benthic Discussion. Taxonomic subdivisions are given to show the relationship of the groups to the overall taxonomic scheme.

Class: Oligochaeta   Oligochaetes comprised 8.6% ($112/m^2$) of the mean annual numbers and 5.8% ($0.0725\ gm/m^2$) of the mean annual weight for all organisms in all substrates. Oligochaetes were found most often in the sandy substrates at 2-3 m depths but were occasionally observed from the mud.

Class: Hirudinea   Leeches were found only on three occasions, March, June and July 1970, at the north side of the lake (Stations 3 and 10) in sand substrates. They comprised 0.12% ($1.6/m^2$) of the mean annual numbers and 0.13% ($0.0017\ gm/m^2$) of the mean annual weight for all substrates.

No live clams or snails were collected during this study, but it is evident that they were previously abundant since shells were collected in both sand and sand-sapropel substrates. Snails, however, were observed along the shoreline by other workers. The genera described are represented only by shells present.

Class: Pelecypoda   Shells of the genus *Anadonta* and the genus *Pisidium* were found in both the sapropel (Station 4) and the sand-sapropel substrates.

Class: Gastropoda   This class was represented by four genera:

Helisoma campanulata (Say), *Helisoma antrosa* (Conrad), *Velvata tricainatata* (Say), *Amnicola* sp. and *Physa* sp. These snail shells were all located in the concentration zone of the sand-sapropel mixture substrate.

Class: Crustacea

Order: Cladocera Cladocerans were occasionally observed in samples collected from water near the lake bottom rather than from the substrate. One specimen of *Lydigia quadrangularis* (Leydig) was found October 22, 1970 in sand at Station 10.

Order: Amphipoda One specimen of *Hyella azteca* (Saussure) was collected from sand substrate (Station 3) in July. Other Amphipods were collected from Lake Poinsett in late May, but not in benthos samples.

Class: Arachnoidea

Order: Hydroacarina Water mites first appeared in samples collected in the latter part of July and continued in the samples until December. The highest concentration occurred in late September ($74/m^2$). The mean annual number comprised 0.53% ($6.9/m^2$) and the mean annual weight comprised 0.66% (0.0083 gm/m^2) of the totals for all substrates. Water mites were most abundant in the sand substrates but some were taken in samples from the sapropel.

Class: Insecta

Order: Ephemeroptera Naiads of *Caenis* sp. made up 1.6% ($20.6/m^2$) of the mean annual number and 0.67% (0.0084 gm/m^2) of the mean annual weight for all substrates. *Caenis* sp. was found in sand substrates every month except May, June and December. Maximum numbers were observed September 28 (141.5/m^2) and October 22 (123.5/m^2) in the sand at Station 9.

Order: Coleoptera

Family: Haliplidae One specimen of *Halipus* sp. was taken September 28 in the sand substrate (Station 10).

Order: Hemiptera

Family: Corixidae One specimen of *Palmocorixa buenoi* Abbott was collected on September 28, 1970 in sand at approximately 1.8 m depth (Station 9).

Order: Trichoptera *Polycentropis* sp. and *Genus "A"* in the family Psychomyiidae were found March 20, 1971 on wood submerged in the lake but were never taken in the bottom samples.

Order: Diptera

Family: Chironomidae Since the family Chironomidae was the most important benthic group, it will be considered in greater detail than the other groups. Identification which was based on larval characteristics and the quantitative aspects of this family will be considered separately.

Subfamily: Tanypodinae Retractile antennae and a forked shaped lingua are characteristic of the subfamily Tanypodinae. The paralabial combs (Figure 6) and the five black teeth on the lingua (Figures 5 and 6) are the distinguishing features of the genus *Procladius* (Mason, 1968).

Procladius sp. was the only representative collected from this group. This predaceous genus was found in all substrates on all

Figure 5 Lingua of *Procladius* sp.

Figure 6 Paralabial combs (1) and lingua of *Procladius* sp.

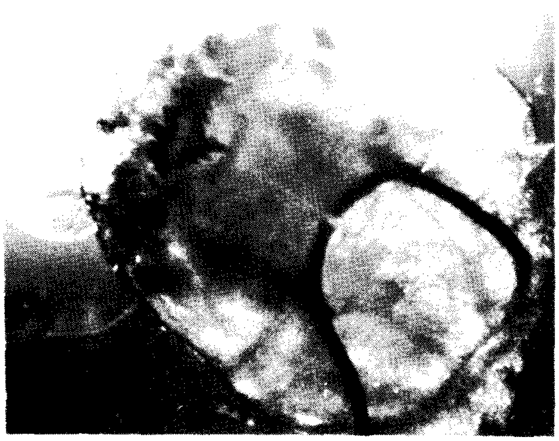

Figure 7 Entire head of *Chironomus* sp.

sampling dates, which does not coincide with Johannsen's (1936a) observation that substrate appears to be the most important factor determining the number of organisms present during any one time of the length of 6.3 mm.

Subfamily: Chironominae This group is distinguished by the striated paralabial plates (Figure 20). Two tribes of the subfamily Chironominae, Chironomini and Tanytarsini, were represented in Lake Poinsett. Genera in each tribe will be discussed separately.

Tribe: Chironomini Larvae of the subgenus *Chironomus* are blood red in color with the head being yellow to brown. The labial plate, which shows some variation in form with species, has an uneven number of teeth (Figure 7). Ventral gills are present on segment 11 and segment 10 shows a caudolateral process.

Chironomus (*Chironomus*) *plomosus* Linnaeus was collected throughout the sampling period. Individuals were more numerous and larger in the sapropel substrate. Lengths of *Chironomus plomosus* ranged from 4 to 28 mm with a mean length of 15.4 mm. On the basis of length, Czeczuga *et al.* (1968) described the following instars: I (0-10 mm), II (10-15 mm), III (15-20 mm) and IV (above 20 mm). According to this description, all four instars were present in Lake Poinsett and were represented on the same sampling date only twice (July 24 and December 30).

The antennae of *Chironomus plomosus* (Figure 8) has five segments and the segment lengths have a ratio of 40:10:3:5:1. The antennae also have a sensorium in the proximal one-third of the first segment (Rempel, 1936). Johannsen (1936b) states that the teeth of the mandibles, including the basal tooth, are black. The labial plate has 13 teeth with a moddle trilobed tooth (Figure 9). Rempel (1936) wrote that the lateral teeth of *Chironomus plomosus* are all of similar height so that a straight line might be drawn through their apecies.

Chironomus (*Chironomus*) *attenuatus* (Walker) was another of the large blood red chironomids found in Lake Poinsett. Specimens were collected more frequently than *Chironomus plomosus* and were found at all stations sometime throughout the study period. *Chironomus attenuatus* showed a definite preference for sapropel and mixture substrates, and were occasionally collected in the sand. Lengths of *Chironomus attenuatus* had a range from 3 to 18 mm with a mean length of 10.0 mm. Johannsen (1936b) reported the length of the mature larvae of *Chironomus decorus* (*attenuatus*) to be 18 mm. Since lengths ranged from 3 to 18 mm, it would appear that all instars were present.

The antennae are five segmented but the basal segment is longer in proportion to the remaining segments (Figure 10). The ratio of segment lengths from specimens in this study are close to that described by Johannsen (1936b) of 80:22:8:10:5. The labial plate has a trilobed middle tooth (characteristic of *Chironomus*) but in *Chironomus attenuatus* the fifth tooth projects above the fourth and sixth teeth (Hilsenhoff and Narf, 1968). The mandible has three dark teeth with a lighter colored basal tooth (Figure 11).

Sublette (1957), Hamilton (1965) and Johannsen (1936b) reported

Chironomus (*Chironomus*) *decorus* Johannsen as having these same characteristics described above. Hilsenhoff and Narf (1968) used *Chironomus attenuatus* in their discussion of different species of *Chironomus*. Darby (1962) stated that *Chironomus decorus* and *Chironomus attenuatus* are synonymous.

Several authors have described differentiation of species of *Chironomus* by differing colors on the labial plate and mandible. Unidentified species collected during this study in Lake Poinsett with varying colors on the labial plate and mandible are: *Chironomus* species "A", entire labial plate light colored; *Chironomus* species "B", only middle tooth light colored; *Chironomus* species "C", mandible with only end tooth being dark (Figure 12); *Chironomus* species "D", all four teeth on mandible light colored (Figure 13); *Chironomus* species "E", two end teeth on mandible dark, other two light (Figure 14); and *Chironomus* species "F", all teeth on labial plate light colored and all teeth on mandible light colored (Figure 15). Although all of these characteristics are different from each other, most of the distinguishing features appear to fit the description for either *Chironomus plomosus* or *Chironomus attenuatus*. The labial plate for *Chironomus* species "E" is different from the other species described because it is flat, not lying at an angle (Figure 14). The median tooth even though being trilobed is much rounder and does not reach an apex. *Chironomus* species "F" has a concave shaped labial plate near the median tooth which is trifid but with deep notches separating nearly to the base of the tooth.

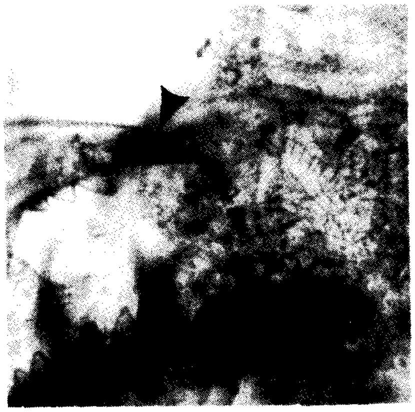

Figure 12 Mandible of *Chironomus* sp. "C" with only end tooth dark.

Figure 13 Mandible of *Chironomus* sp. "D" with all teeth light colored.

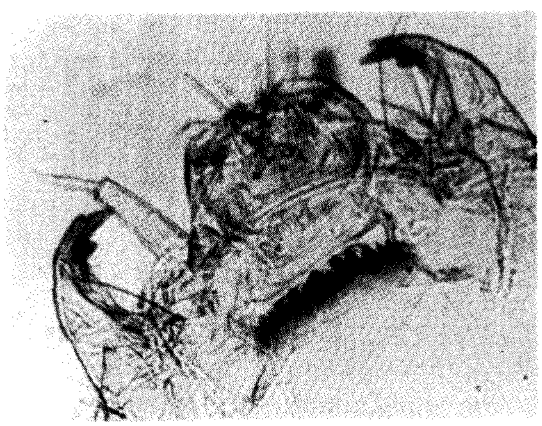

Figure 14 Mandible of *Chironomus* sp. "E" with two light and two dark colored teeth and flat labial plate.

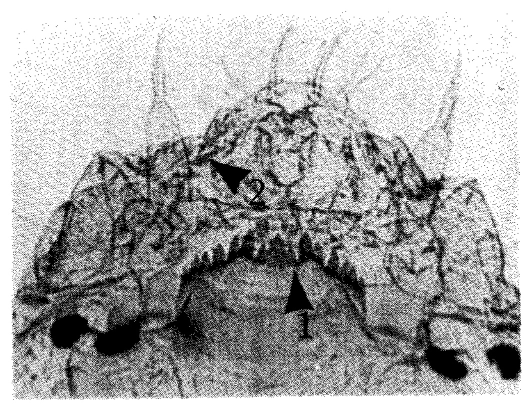

Figure 15 Labial plate of *Chironomus* sp. "F" is (1) concave near middle tooth and (2) all light colored teeth on mandible.

One specimen taken from sapropel (Station 4) on September 16, 1970 showed a new labial plate being formed behind the already present plate (Figure 16). This specimen was identified as *Chironomus attenuatus*. The organism was only 4 mm in length and apparently molting. Since the organisms with the light colored teeth occurred only from May to October, it would appear that most of these happened to be sampled immediately after molting.

Chironomus (*Cryptochironomus*) sp. showed a definite preference for the sand substrates and was present in every sample at Station 10. Occasionally an organism was found in the sapropel (Station 4) and the mixture substrates. Occurrence seemed to be limited to the north and east sides of the lake. Lengths of *Cryptochironomus* sp. ranged from 3 to 14 mm with the maximum length of 14 mm obtained by one organism on June 22, 1970 in the mixture substrate at Station 6.

Cryptochironomus sp. specimens collected in Lake Poinsett appeared similar to those described by Johannsen (1936b), Mason (1968) and Darby (1962). The median portion of the labial plate is colorless (Figure 17), with the lateral tooth portion of the labial plate black, and black teeth on the mandibles.

Polypedilum sp. was found only in sand substrates and was most common at the north end of the lake (Station 10). *Polypedilum* sp. was found from April through November. The organisms were very small, less than 5 mm. The most common length was approximately 3 mm.

Mason (1968) and Johannsen (1936b) described the labial plate of the genus *Polypedilum* as having the middle and second lateral teeth

Figure 16 *Chironomus attenuatus* with (1) new labial plate forming below (2) present labial plate.

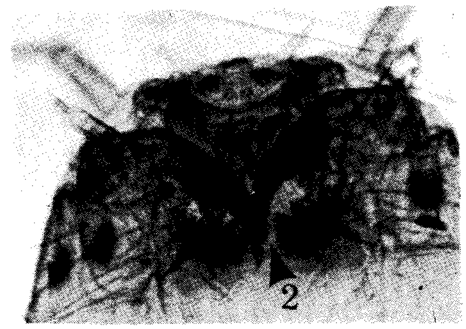

Figure 17 Head of *Cryptochironomus* sp. with (1) dark colored mandibles covering (2) light colored median portion of labial plate.

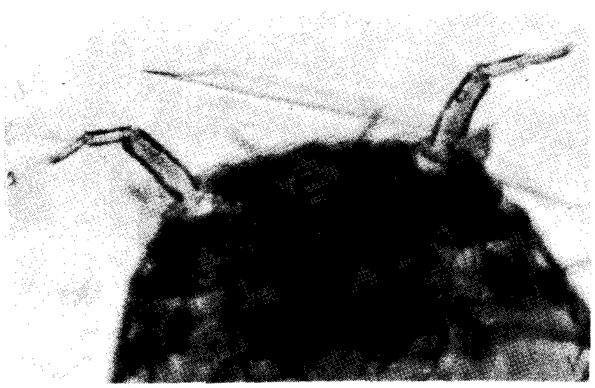

Figure 18 Antennae of *Cryptochironomus* sp.

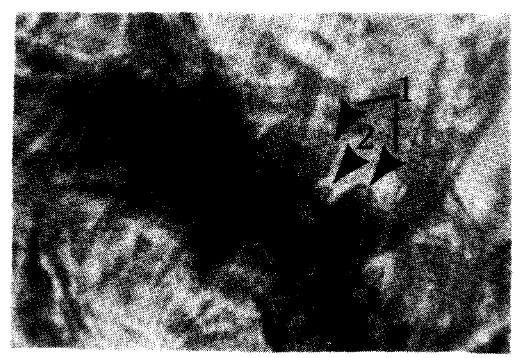

Figure 19 Labial plate of *Polypedilum* sp. with (1) middle and second laterals longer than (2) first laterals.

nearly even in height and much larger than the first laterals (Figure 19).

One unidentified genus having characteristics of the tribe Chironomini was collected at five different times during the study period. The paralabial plates were striated and fan shaped (Figure 20). The labial plate had 15 teeth with the middle tooth low and flattened. The first lateral was shorter than either the middle tooth or the second lateral. The sixth lateral tooth is higher than either the fifth or the seventh tooth (Figure 20). The antennae had five segments (Figure 21). Four dark teeth were on the mandible and the epipharyngeal plate had 15 teeth (Figure 22).

The genus was found in the sandy substrates, except on one occasion when it was collected with *Cryptochironomus* sp. in sapropel (Station 4). These small (4 mm) larvae occurred from June through August. The unidentified specimen possibly belongs to the genus *Polypedilum* with an abbrated labial plate from the sand where it was found.

Glyptotendipes sp. was found on wood submerged in the lake but was never collected in the bottom samples. It was taken on March 20, 1971 from sand and gravel substrate in two to three meters of water in the northeast part of the lake (Figure 23).

One specimen of *Harnischia* sp. was collected (August 1970) in sand (Station 3).

Tribe: Tanytarsini *Cladotanytarsus* sp., the only genus found from this tribe was collected every month except January and was found

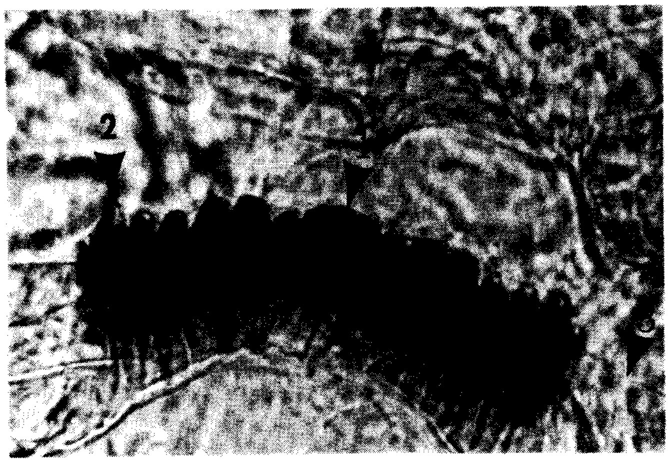

Figure 20 Labial plate and paralabial plate of unidentified genus with (1) low flattened middle tooth, (2) high sixth lateral tooth on labial plate and (3) fan shaped paralabial plate.

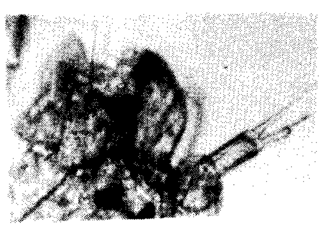

Figure 21 Antennae of unidentified genus.

Figure 22 Mandible and epipharyngeal plate of unidentified genus.

exclusively in sand. The tribe is distinguished by the antennae being set on definite peduncles (Figure 25). All *Cladotanytarsus* sp. collected were less than 5 mm in length. The genus has paralabial plates that nearly touch at the midline (Figure 24) with large, almost sessile lauterborn organs on a petiole about two-thirds as long as the organ (Figure 25).

Since emergence traps were not used, a specific emergence pattern for the family Chironomidae cannot be demonstrated; but pupae occurring in samples appear to indicate emergence trends (Table 2). Based on the number of stations when pupae appeared, a general emergence occurred throughout the summer. The highest numbers of pupae (>200/m^2) occurred in May and early June.

Table 2. Number of stations from March 1970 - February 1971 when pupae were collected in Lake Poinsett, South Dakota

	Sampling date										
	May	June 1*	June 2**	July 1	July 2	Aug. 1	Aug. 2	Sept. 1	Sept. 2	Oct.	Nov.
No. of stations	4	7	4	4	6	7	2	3	4	0	1

* First sampling period of the month.
** Second sampling period of the month.

Tanypodinae (*Procladius* sp.) and Chironominae other than *Chironomus* (*Cryptochironomus* sp., *Polypedilum* sp., *Cladotanytarsus* sp. and unidentified species) comprised respectively 20.6% (269/m^2) and 27% (354.8/m^2) of the mean annual numbers and respectively 7.4% (0.0934 gm/m^2) and 3.9% (0.0489 gm/m^2) of the mean annual weight of all the benthic

Figure 23 Labial plate (1), paralabial plate (2) and
mandible (3) of *Glyptotendipes* sp.

Figure 24 Labial plate and paralabial plates which
(1) almost meet at midline of *Cladotanytarsus*.

Figure 25 Antennae on (1) peduncle
and (2) short petiole of lauterborn
organ of *Cladotanytarsus*.

organisms. The differences between the mean numbers and mean weights indicate that although Tanypodinae and Chironominae other than *Chironomus* were rather numerous, the organisms were small and did not comprise much of the total weight. The *Chironomus* spp. made up the majority (39.5% and 514/m^2) of the mean annual numbers and three-fourths (77% and 0.9961 gm/m^2) of the mean annual weight of all the benthos (Table 3).

Table 3. Mean annual numbers and weights and percents of the family Chironomidae for all substrates in Lake Poinsett, South Dakota (March 1970 - February 1971)

	Family		Subfamily				Genus			
	Chironomidae		Chironominae		Tanypodinae		*Chironomus**		Chironominae other than *Chironomus***	
	Org./m^2	%	Org./m^2	%	Org./m^2	%	Org./m^2	%	Org./m^2	%
No.	1138	87	870	67	269	21	514	39.5	355	27
Wt.(gm)	1.1084	88	1.0150	81	0.0934	7.4	0.9961	77	0.0489	3.9

* *Chironomus plomosus*, *Chironomus attenuatus*, *Chironomus* sp. "A-F".
** *Cryptochironomus* sp., *Polypedilum* sp., *Cladotanytarsus* sp., unidentified genus.

Substrates

Sand. The mean numbers and mean weights of organisms collected from the sand substrate from March 1970 through February 1971 are presented in Table 4. Chironominae other than *Chironomus* (*Cryptochironomus*, *Polypedilum*, *Cladotanytarsus* and one unidentified genus) made up 56% (942.5/m^2) of the mean numbers in the sand. Oligochaetes and Tanypodinae were the next most abundant groups in sand with a mean

Table 4. Mean number (no.) and mean weight (gm) of organisms (per square meter) present in sand in Lake Poinsett, South Dakota (March 1970 - February 1971)

Sampling period	Chironomus		Chironominae (not Chironomus)		Tanypodinae		Unidentified Pupae		Oligochaetae		Caenidae		Hirunidae		Hydroacarinae		Total	
	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm
1970																		
March	215.3	.1556	658.4	.6683	223.8	.0036			140.8	.2344	444.3	.0448	41.2	.0206			1723.7	1.1273
April	58.2	1.4506	135.8	.1135	407.4	.2530			1345.7	1.7490	61.7	.0185					2530.9	3.5847
May	12.4	.0353	2006.1	.1104	833.4	.0507			654.3	.1630							3506.1	.3694
June 1*	49.4	.0790	3069.7	.2469	971.2	.1917	205.7	.1884	279.8	.0741	139.9	.1465	8.2	.0055			4724.2	.9322
June 2**	135.7	.4483	1432.0	.1518	246.8	.0825	49.3	.2506	296.2	.0789							2160.1	.6589
July 1	8.2	.0253	1242.8	.0996	255.1	.0482	16.4	.0477	131.6	.0346	41.1	.0428	41.1	.0386	8.2	.0074	1761.2	.3451
July 2	16.4	.0132	600.8	.0649	98.7	.0165	139.9	.1524	312 7	.0625	8.2	.0082					1176.9	.3177
August 1	6.2	.0176	1425.9	.0771	43.2	.0107	117.3	.0660	98.8	.0034							1691.3	.1749
August 2	24.7	.0083	2263.3	.0380	32.9	.0047	82.3	.0194			24.7	.0173					2427.9	.0876
September 1	16.4	.0301	551.5	.0749	41.2	.0139	8.2	.0107	55.9	.0247	8.2	.0086			8.2	.0235	749.0	.1580
September 2	61.7	.1234	1753.1	.1414	6.2	.0002	30.8	.0401	432.1	.1370	30.9	.0321			43.2	.0537	2697.5	.6043
October	24.7	.0327	1345.7	.0888					370.4	.0661	30.9	.0321			12.3	.0111	1783.9	.2234
November	57.6	.0364	98.8	.0180	757.2	.0205			98.7	.0197	8.2	.0086			16.4	.0148	1037.0	.1303
December	57.6	.0576	493.8	.0699	57.6	.0147			32.9	.0065					16.4	.0148	658.3	.1637
1971																		
January	68.2	.1623	302.1	.0312					58.5	.0116	9.7	.0102					438.5	.2727
February	204.6	.1615	95.0	.0584	21.9	.0009			43.9	.0046	14.6	.0153					380.1	.3819

* First sampling period of month.

** Second sampling period of month.

number of 259.7/m^2 (18%) and 262.2/m^2 (16%), respectively. Oligochaetes however, had the highest mean annual weight with 0.2052 gm/m^2 (33%) for the sand substrate. Organisms of *Chironomus* spp. and Chironominae other than *Chironomus* comprised 29% (0.1796 gm/m^2) and 21% (0.1333 gm/m^2) respectively of the mean annual weight. Even though organisms of *Chironomus* spp. comprised 29% of the mean weight, they made up only 3% (0.1796/m^2) of the mean numbers, indicating that the size of the other organisms in the sand were very small (Figure 26).

Mean numbers of organisms in sand substrates gradually increased from March 1970 (1723.7/m^2) to the highest for the year in early June 1970 (4124.2/m^2). In May samples the numbers increased, while weights decreased to 0.3694 gm/m^2. As the numbers continued the increase to the high in early June, the weights increased only slightly to 0.9322 gm/m^2 in early June (Figure 27). This continual increase in numbers with only a small increase in weights may indicate a new crop of first instar organisms after an emergence. The lowest weight occurred in August, the lowest numbers in February 1971.

The diversity of organisms appeared to be highest in sand substrates. All of the 18 genera represented in collections from Lake Poinsett were observed in sand and 10 were found exclusively in the sand substrate (*Lydigia*, *Hyellela*, *Palmocorixa*, *Halipus*, *Polycentropis*, *Psychomyiid genus A*, *Polypedilum*, *Glyptotendipes*, *Harnischia* and *Cladotanytarsus*).

The mean annual standing crop of benthic organisms in the sand substrate (855 hectares) of Lake Poinsett was approximately 1.47 × 10^6

organisms (550 gm). Forty-three percent of all the organisms (17% by weight) occurred in the sand substrate (23% of lake bottom). The high percentage by number and low percentage by weight indicated many small organisms were present.

Sand-Sapropel Mixture. *Chironomus* spp. was the most abundant benthic group found in the sand-sapropel substrate. Organisms of *Chironomus* spp. had a mean annual number of 414.8/m^2 and accounted for 56% of the mean number of organisms in the mixture. Organisms of Tanypodinae and Chironominae other than *Chironomus* had a mean number of 157.2/m^2 and 118.6/m^2, respectively. These two groups accounted for 21% and 16%, respectively, of the mean number of specimens in this substrate. *Chironomus* spp. had the most weight (87% and 0.8807 gm/m^2) with Tanypodinae and Hydroacarina having a mean weight of 0.0756 gm/m^2 (7%) and 0.0171 gm/m^2 (1.7%), respectively (Table 5 and Figure 26).

The greatest mean number and mean weight of organisms occurred in March 1970 with 1950.6/m^2 and 6.1036 gm/m^2. In April the numbers and weights decreased but in May numbers increased with a continual decrease in weights, possibly indicating an emergence and hatch between late April and May. Fluctuations continued until the lowest number (197.5/m^2) and lowest weight (0.0553 gm/m^2) were reached simultaneously in late August. Numbers and weights increased until ice was formed on the lake in late November. The December sample showed a decrease from 1209.8/m^2 and 1.0591 gm/m^2 in November to 320.9/m^2 and 0.3457 gm/m^2 in December (Figure 27).

The diversity of organisms in sand-sapropel substrate was not as

Table 5. Mean number (no.) and mean weight (gm) of organisms (per square meter) present in sapropel and sand mixture in Lake Poinsett, South Dakota (March 1970 - February 1971)

Sampling period	Chironomus		Chironominae (not Chironomus)		Tanypodinae		Unidentified Pupae		Oligochaetae		Caenidae		Hydroacarinae		Total	
	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm
1970																
March	1876.5	6.0518			74.1	.0518									1950.6	6.1036
April	386.8	.9671			617.3	.3827					16.5	.0031			1020.5	1.4535
May	12.4	.0353	1296.3	.0969	61.7	.0353			197.5	.0320					1567.9	.1995
June 1*	172.8	.6148			543.2	.1531	148.1	.2148							864.1	.9827
June 2**	641.9	.1876			246.9	.1950			98.7	.1161					987.6	.1586
July	790.1	.2732	41.2	.0066	1004.1	.1394	41.1	.0388							1876.5	.5113
August 1	222.2	.2864			98.8	.0074	49.3	.0927							370.3	.3765
August 2	197.5	.0553													197.5	.0553
September 1	57.6	.0362	189.3	.0386	90.5	.0346			90.5	.0230	41.2	.0432			469.2	.1756
September 2	395.1	.1975	24.7	.0148	123.5	.0864	24.7	.0716					74.1	.1851	642.1	.5554
November	641.9	.8883			444.4	.0567							123.5	.1136	1209.8	1.0591
December	197.5	.3161			123.5	.0296									320.9	.3457
1971																
January	302.2	.7777			9.7	.0039									311.9	.6422
February	321.6	.7075			102.3	.0453									423.9	.7528

* First sampling period of month.

** Second sampling period of month.

great as in the sand. Only six genera were represented and none of these was found exclusively in the mixture substrate. The mean number and weight of organisms in the sand-sapropel mixture was approximately 5.3×10^5 and 700 gm, respectively. Nineteen percent of the mean number and 27% of the mean weight occupied the 692 hectares in the sand-sapropel mixture substrate.

Sapropel. *Chironomus* spp. was the most important organisms in the sapropel substrate. Mean annual numbers of *Chironomus* was 1056.4/m^2 (70.5%) with a mean weight of 1.8380 gm/m^2 (86.5%). Members of Tanypodinae and Oligochaeta were the next highest in both numbers and weights. These accounted for 26% (388.1/m^2) and 1.1% (16.1/m^2) in mean annual numbers, respectively, and 8% (0.1608 gm/m^2) and .17% (0.0038 gm/m^2) of the mean annual weight, respectively (Table 6 and Figure 26).

Numbers and weights of organisms were high in May (2948.1/m^2) (5.4673 gm/m^2), but decreased sharply in early June (1604.5/m^2) (1.9864 gm/m^2), indicating a possible emergence. The numbers then increased in late June to the greatest number for the year (4168.9/m^2) with only a slight increase in the weight from 1.9869 gm/m^2 in early June to 2.5241 gm/m^2 in late June. This small increase (0.5372 gm/m^2) in weight with the large increase in numbers indicates a hatch of first instar organisms. The lowest mean weight of organisms was observed in late August (0.1695 gm/m^2) and the lowest mean numbers were found in early August (339.9 m^2). A second decrease in numbers and weight occurred in February (Figure 27).

Table 6. Mean number (no.) and mean weight (gm) of organisms (per square meter) present in sapropel in Lake Poinsett, South Dakota (March 1970 - February 1971)

Sampling period	Chironomus		Chironominae (not Chironomus)		Tanypodinae		Unidentified Pupae		Oligochaetae		Hydroacarinae		Total	
	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm
1970														
March	1953.1	3.8549			879.9	.5573			4.9	.0039			2862.5	4.4130
April	1881.5	4.6543			725.9	.4496							2607.4	5.1039
May	1465.9	4.3617			926.3	.2936	275.8	1.1320	148.3	.0321			2849.1	5.4673
June 1*	661.8	1.3791			773.2	.2412	135.8	.3096	16.5	.0043			1604.5	1.9869
June 2**	3636.6	2.2655	56.4	.0624	451.5	.1664	10.5	.0296	49.4	.0113			4168.9	2.5421
July 1	1765.3	.9124			512.4	.1120	37.1	.0710					2314.9	1.0952
July 2	680.7	.5558	10.6	.0007	197.5	.0606	17.6	.0412					906.5	.6584
August 1	256.8	.3189			118.5	.0417	24.7	.0582					399.9	.4188
August 2	304.5	.1088			197.5	.0487	4.1	.0119					506.0	.1695
September 1	524.6	.1777			123.4	.0769	6.2	.0179					672.5	.2534
September 2	587.6	.1832	9.8	.0039	241.9	.0625	4.9	.0143	4.9	.0004	4.9	.0044	883.9	.2960
October	761.3	.8094			267.5	.0555					4.1	.0037	1033.7	.8692
November	720.1	1.4534	4.1	.0004	189.3	.0452	4.1	.0119	8.2	.0086	4.1	.0037	929.9	1.6362
December	533.3	1.1229			227.1	.0657					4.9	.0044	765.4	1.1929
1971														
January	921.0	2.1768			65.8	.0391			7.3	.0006			994.1	2.2165
February	226.6	.6717			73.1	.0197							299.7	.6914

* First sampling period of month.

** Second sampling period of month.

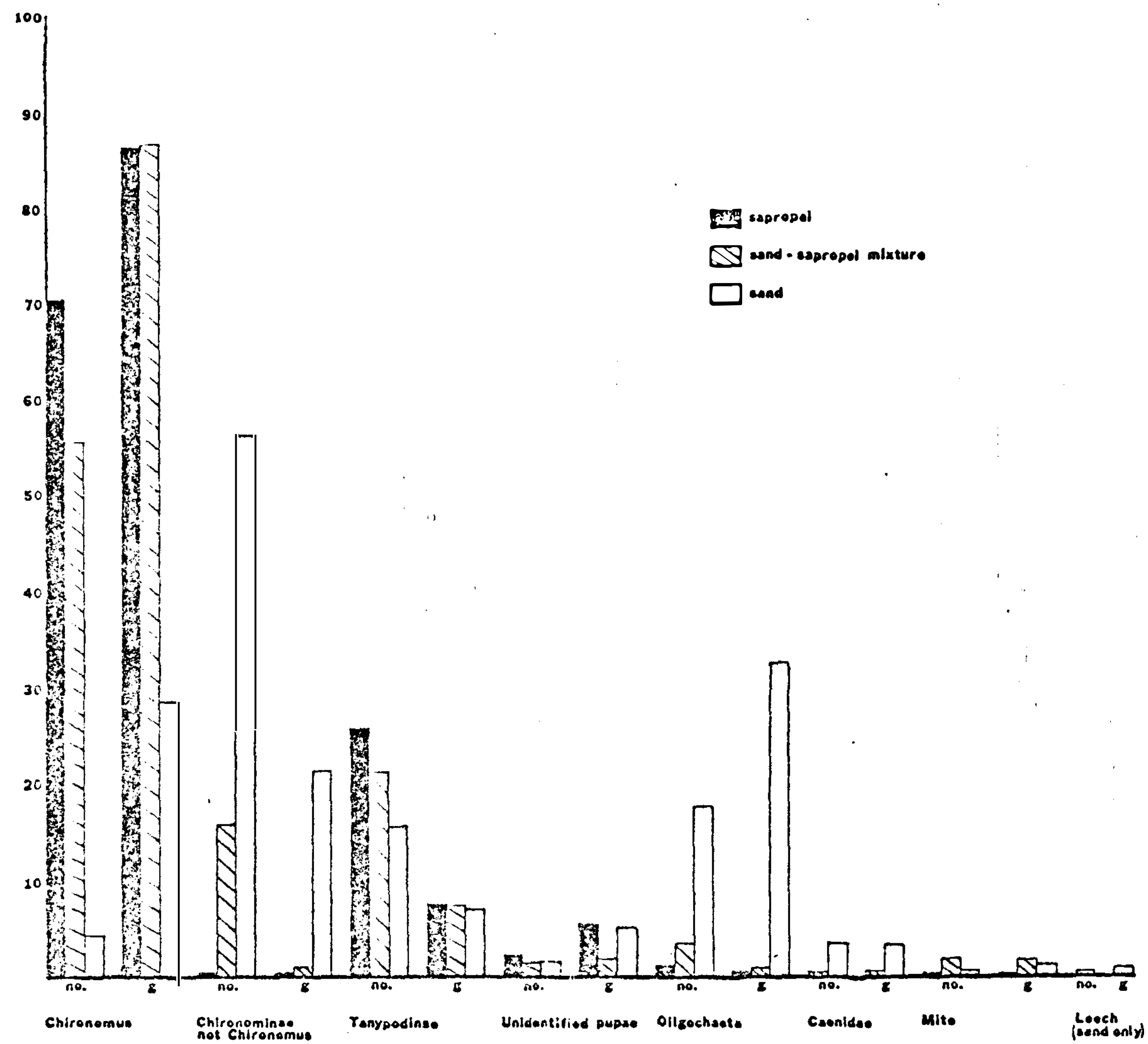

Figure 26 Mean percent composition of macroscopic benthic organisms from March 1970 - February 1971 in three substrate types in Lake Poinsett, South Dakota

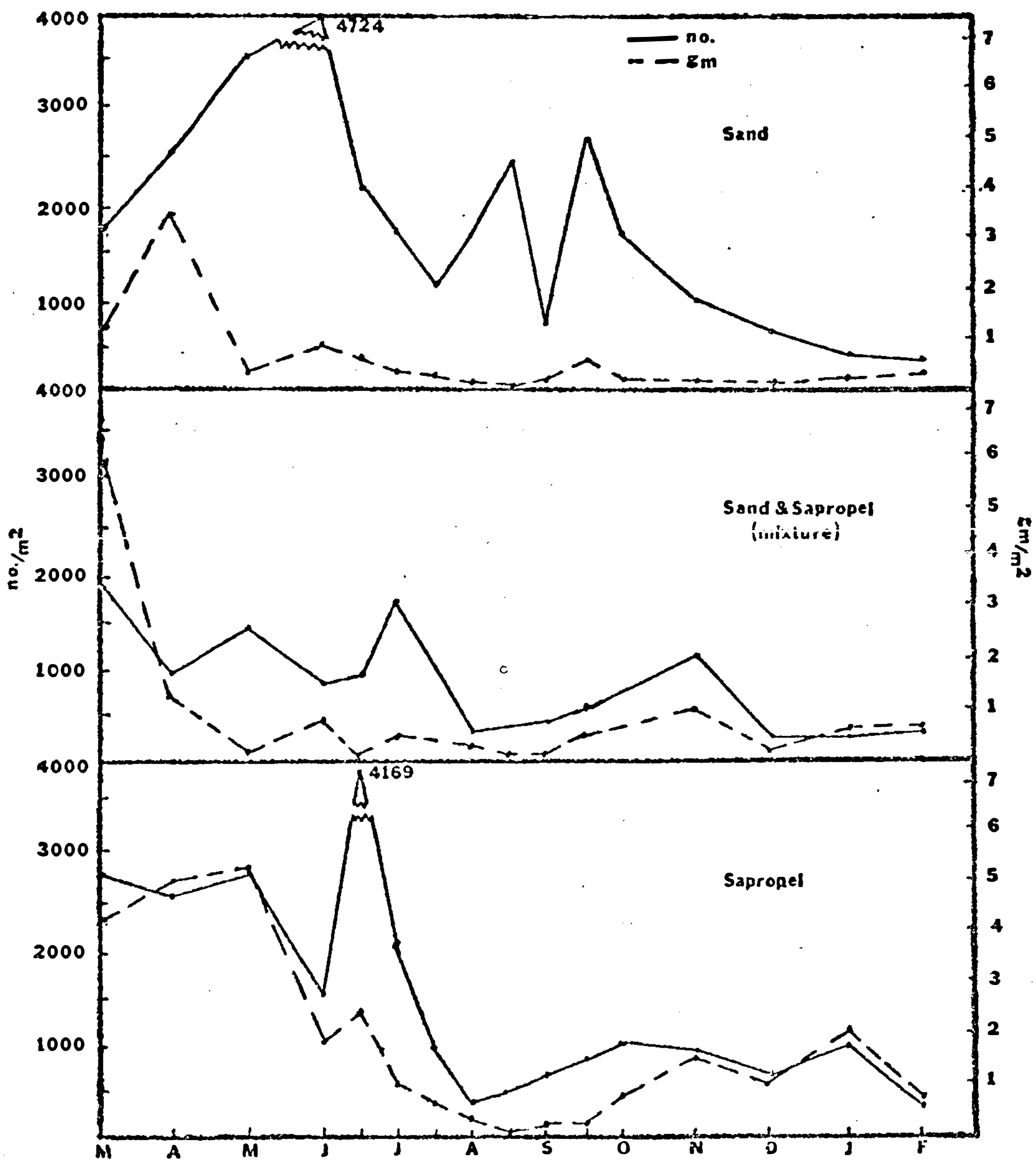

Figure 27 Mean monthly numbers and weights of macroscopic benthic organisms in three substrate types from March 1970 through February 1971 in Lake Poinsett, South Dakota

Mud from the south stations in February was peculiar. During washing, the mud formed into small balls that would not pass through the screen of the bucket. Samples taken in sapropel from the north end of the lake during February were similar to previous samples, in that everything washed through the screen except detritus and organisms. The peculiar mud from the south stations is possibly due to the low dissolved oxygen concentrations found under the ice during February (Appendix A, Table 2). Low concentrations of dissolved oxygen may have allowed a chemical reaction with the mud to occur, causing the small balls to form. South stations were sampled again in March 1971 to determine if these peculiar conditions persisted. The small balls were again present and the numbers of organisms were even lower than February samples. Numbers of benthic organisms usually present in the sapropel seemed to be lower when the peculiar mud was present.

Six genera of benthic organisms were found in the sapropel substrate and none was restricted to this type of substrate. While diversity was not high, the means represented 54% (2.1246 gm/m^2) of the mean annual weight and 38% (1498.7/m^2) of the mean annual number for all substrates. The sapropel substrate (1518 hectares) had a mean number of approximately 2.5×10^6 organisms (3600 gm).

All Substrates

The mean annual standing crop of macroscopic benthic organisms in Lake Poinsett was 1.2803 gm/m (1302.9 gm/m^2). There were an estimated 43×10^6 (4,100 gm) organisms throughout the entire lake bottom (3184.6 hectares). *Chironomus* spp. (*Chironomus plomosus*, *Chironomus attenuatus*, *Chironomus* species "A-F") were the organisms with the highest mean numbers (514.2/m^2) and mean weights (0.9961 gm/m^2) for the three combined substrates. These *Chironomus* spp. accounted for 40% of the mean number and 77% of the mean weight (Figure 28). Numerically, the next two important groups were Chironominae other than *Chironomus* (*Cryptochironomus* sp., *Polypedilum* sp., unidentified species and *Cladotanytarsus* sp.) with 354.8/m^2 and Tanypodinae (*Procladius* sp.) with 269/m^2. By weight, Tanypodinae (0.0934 gm/m^2) and Oligochaeta (0.0725 gm/m^2) were the next in importance.

Townes (1938) considers a lake with a mean annual standing crop of 300 kgm/ha wet weight of bottom fauna to be at least normally rich. Assuming dry weight to be 15% of wet weight, Townes' figure would be 4.5 gm/m^2. From this standard, the standing crop of benthos in Lake Poinsett would be considered rather poor. The lake is shallow with the bottom water rarely becoming void of oxygen, except possibly under the ice. The lake is also wind swept, keeping the temperature equal throughout the depths of the lake. Lindeman (1942) stated that temperature is the most important factor in determining the seasonal distribution and number of chironomid generations per year. Lake Poinsett has consistent, relatively high temperature and adequate oxygen which could contribute to a high rate of turnover of chironomid generations throughout the summer.

Seasonal variation of standing crop of benthic organisms in Lake Poinsett was similar to the variation described as being characteristic of many natural bodies of water (Sublette, 1957). A maximum occurs in

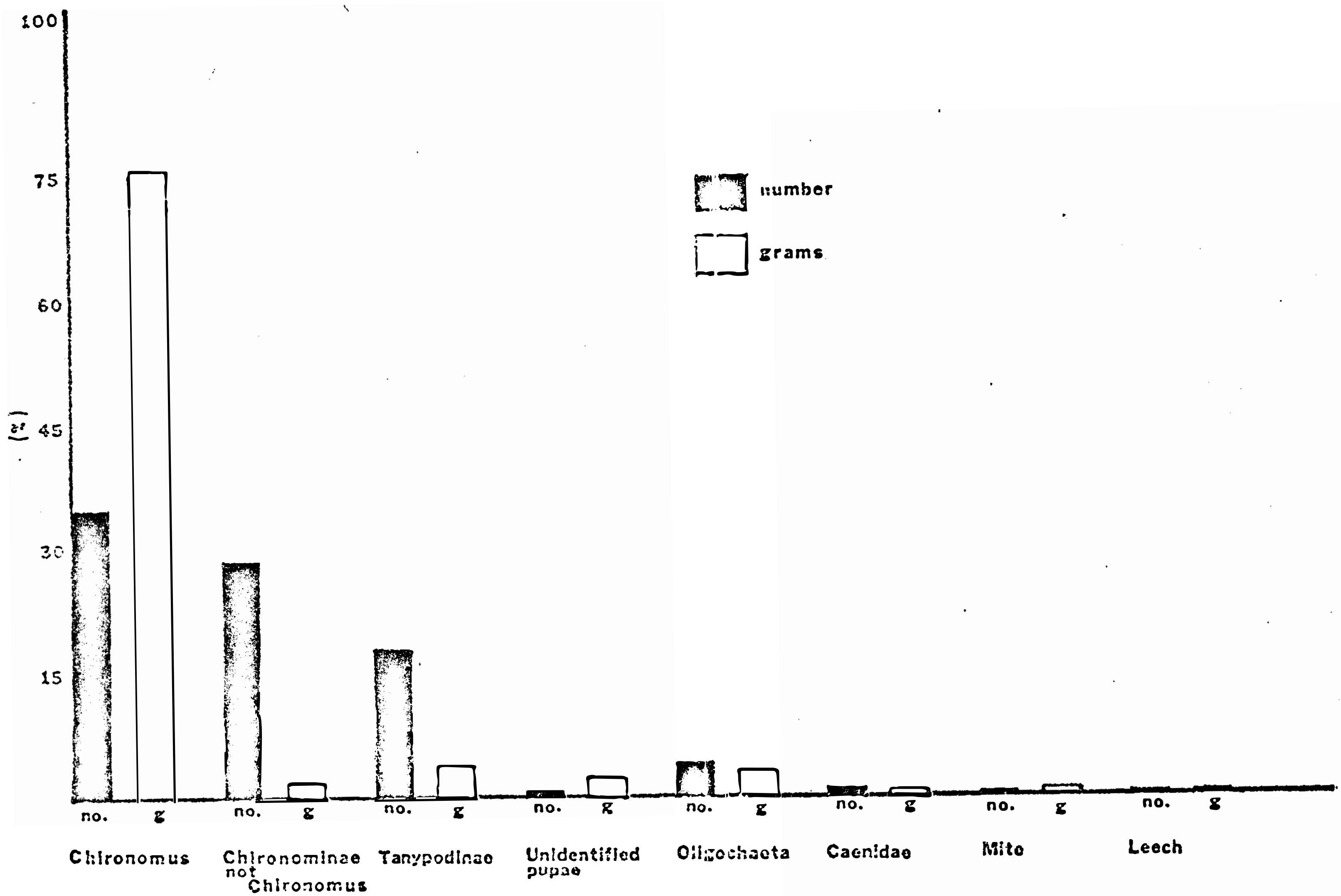

Figure 28 Mean percent composition of macroscopic benthic organisms from March 1970 through February 1971 over entire lake bottom in Lake Poinsett, South Dakota

late winter and early spring and a minimum occurs in late summer. The maximum occurred in Lake Poinsett in March 1970 (3.8 gm/m^2) and the minimum occurred in August 1970 (0.1041 gm/m^2) (Figure 29).

Many authors have expressed standing crops of benthic organisms in wet weight. The values were changed to dry weight by the method described by Cole and Underhill (1965), assuming dry weight to be 15% of wet weight (Table 7). Based on these values, few lakes would be "at least normally rich" according to Townes (1938). Lake Poinsett benthos standing crops are comparable to values found by Deevey (1941) and Wohschlog (1950) for 38 United States lakes. The benthos standing crop in Lake Poinsett greatly exceeds the benthos standing crop reported for Lake Kampeska, the only other natural lake studied in South Dakota (Hartung, 1968).

Lake Poinsett also has a small benthos population with a large portion of the biomass being grayed by the large number of forage fish in the lake.

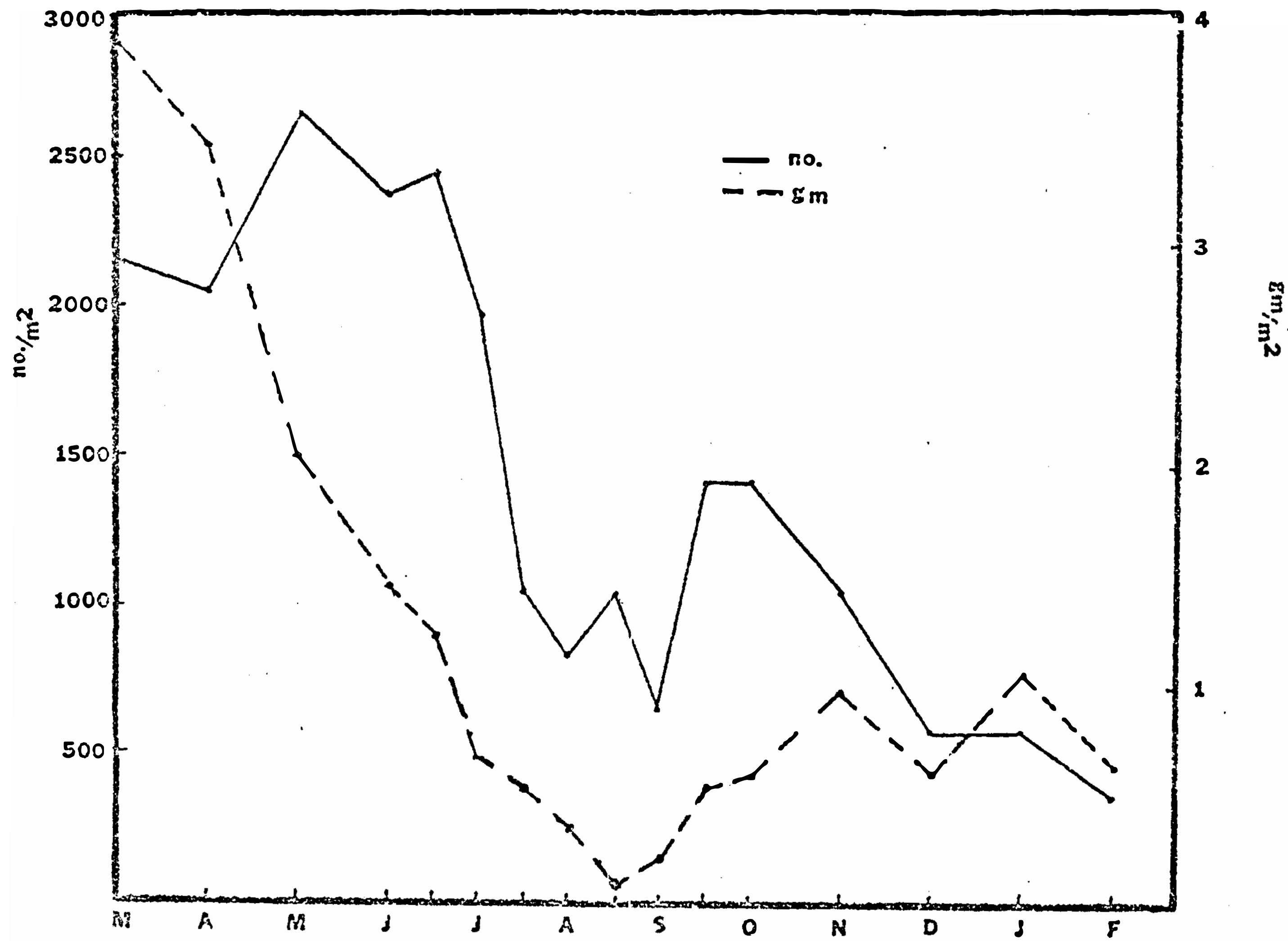

Figure 29 Mean monthly numbers and weights of macroscopic benthos in Lake Poinsett, South Dakota substrate from March 1970 through February 1971

Table 7. Dry weight of benthos in selected lakes throughout the world

Lake	gm/m^2	kgm/ha	Source
Last Mountain, Sask.	8.6	86	Rawson and Moore (1944)
Mendota, Wisc.	7.7	77	Juday (1921)
Ersom, Denmark	6.9	69	Berg (1938)
Echo, Sask.	5.8	58	Rawson and Moore (1944)
Moutain, Sask.	5.6	56	Rawson (1960)
Linsley, Conn.	5.2	52	Deevey (1941)
Itasca, Minn.	4.5	45	Cole and Underhill (1965)
Soap, Wash.	4.4	44	Lauer (1959)
Lenore, Wash.	4.3	43	Lauer (1959)
West Okoboji, Iowa (deep)	4.0	40	Bardach *et al.* (1951)
Otter, Sask.	2.3	23	Rawson (1960)
Waskesiu, Sask.	2.46	24.6	Rawson (1959)
Lizzard, Iowa	1.83	18.3	Tebo (1955)
North Germany (64)*	1.71	17.1	Lundbeck (1936b)
U.S.A. largely Conn. and N.Y.(38)	1.3	13	Deevey (1941) Wohschlog (1950)
Poinsett, South Dakota	1.28	12.8	Present study
Clear, Iowa	1.17	11.7	Mrachek (1967)
Alpine Lake (43)	1.13	11.3	Lundbeck (1936a, 1936b)
Texoma, Okla. & Texas Reservoir	.93	9.3	Sublette (1957)
LaRonge, Sask.	.89	8.9	Rawson (1959)
West Okoboji, Iowa (shallow)	.77	7.7	Clampitt *et al.* (1960)
Russia (10)	.61	6.1	Hayes (1957)
Wollaston, Sask.	.47	4.7	Rawson (1959)
Sweden (5)	.46	4.6	Hayes (1957)
Finland (75)	.35	3.5	Hayes (1957)
Kampeska, South Dakota	.24	2.4	Hartung (1968)
Creeand Reindeer, Sask.	.16	1.6	Rawson (1959)

* Number of lakes studied.

SUMMARY AND CONCLUSIONS

Benthos samples were collected from ten stations in Lake Poinsett, South Dakota from March 1970 through February 1971, a total of 160 dredge samples (320 dredge hauls). The ten stations varied in depth and substrate type but were representative of habitats in Lake Poinsett.

Species of 19 genera were sampled. Representatives from all 19 genera were collected in the sand substrate with only six genera found in each of the other substrates (sand-sapropel mixture and sapropel). The most important group with respect to mean annual numbers and mean annual weights was *Chironomus* spp. (514.2/m^2 and 0.9961 gm/m^2). The species included in this group are *Chironomus* (*Chironomus*) *plomosus*, *Chironomus* (*Chironomus*) *attenuatus* and *Chironomus* (*Chironomus*) species "A-F".

Even though the highest mean annual numbers (1669.7/m^2) were recorded from the sand, this substrate had the lowest mean annual weight (0.6276 gm/m^2) of all the substrates. The highest mean annual weight and the second highest mean annual number of benthos occurred in the sapropel substrate. The differences in numbers and weights indicate many small organisms were present in the sand and larger but fewer organisms were present in the sapropel.

The standing crop of macroscopic benthic organisms in Lake Poinsett was 1.2803 gm/m^2 (1402/m^2). The peak in abundance occurred in late winter and early spring (March 1970) (3.8813 gm/m^2) with the minimum occurring in August 1970 (0.1041 gm/m^2). The benthos standing crops in Lake Poinsett appear to be average when compared to other lakes.

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APPENDIX A

Table 1. Type of sediment found at Lake Poinsett shown as either sapropel (1), sand and sapropel (2) or sand (3)

Sampling period	Collection stations and depth in meters									
	1 5.7	2 5.6	3 3.5	4 5.8	5 4.9	6 5.7	7 2.5	8 5.1	9 5.0	10 2.2
1970										
March	1	1	3	1	2	1	3	-	1	3
April	1	1	2	1	2	1	3	2	1	3
May	1	1	2	1	1	2	3	1	1	3
June 5	1	1	3	1	2	1	3	1	1	3
June 18	1	1	3	1	1	1	3	1	1	3
July 9	1	1	3	1	2	2	3	1	2	3
July 27	1	1	3	1	1	1	3	1	1	3
August 10	1	1	3	1	1	2	3	1	3	3
August 27	1	1	3	1	2	1	3	1	1	3
September 10	1	1	3	1	2	1	3	2	2	3
September 28	1	1	3	1	2	1	3	1	3	3
October	1	1	3	1	1	1	3	1	2	3
November	1	1	3	1	1	2	3	1	1	3
December	1	1	3	1	1	2	3	2	1	3
1971										
January	1	1	3	1	2	2	3	2	1	3
February	1	1	3	1	2	2	3 + gravel (1.8 m)	2	3 + gravel (2.0 m)	3

Table 2. Dissolved oxygen (ppm) of water from Lake Poinsett, South Dakota (March 1970 - February 1971)

Sampling period	Collection stations									
	1	2	3	4	5	6	7	8	9	10
1970										
March	4.2* 1.3	.8	3.8* 1.6	1.2	3.0	2.0	4.8	--	1.6	5.6
April	12.4	13.2		12.6	13.0	13.6	10.8	11.8	13.8	14.4
May	9.1	8.9	8.9	9.1	9.3	9.0	8.7	8.8	8.9	8.8
June 5	8.9	8.8	8.3	7.4	7.0	4.3	8.5	9.4	7.8	10.2
June 18	7.2	7.5	6.8	6.6	6.6	6.8	7.6	8.4	8.3	9.2
July 9	11.8*	11.6* 6.8	11.0*	6.8	12.2*	11.4*	10.2	5.4	7.2	11.0
July 27	7.6	9.6	12.5*	9.8*	12.2*	12.8*	12.2*	11.2*	7.9*	9.7*
August 10	3.0	6.0	5.6	5.6	--	5.0	7.6	6.2	7.4	9.8
August 24	5.8	7.2	7.6	7.4	8.6	7.3	8.7	7.6	6.6	7.0
September 10	9.0	9.0	8.2	7.8	8.4	9.0	9.4	10.0	8.8	8.8
September 28	9.0	8.0	11.0	8.6	8.8	9.8	9.6	8.0	8.2	8.0
October	6.6	9.2	9.4	8.9	7.6	9.4	11.2	9.2	9.4	10.4
November	10.6	9.4	10.2	9.0	9.6	10.4	7.6	11.2	10.4	5.0
December	1.8	7.6	11.0	5.4	5.0	8.8	12.6	10.8	7.8	6.0
1971										
January	3.0	4.0	5.2	4.4	4.2	7.8	8.0	8.6	9.0	11.4
February	1.0	1.0	1.4	2.6	2.4	3.4	4.0	4.0	5.2	5.0

* Sample taken from surface.

Table 3. Temperature (°C) of water from Lake Poinsett, South Dakota (March 1970 - February 1971)

Sampling period	Collection stations									
	1	2	3	4	5	6	7	8	9	10
1970										
March	4	1* 2	1* 4	-	-	-	5	-	2 3	-
April	5	5	6	6	6	6	5	5	6	11
May	13	13	13	13	13	13	13	13	13	13
June 5	21	21	21	21	19	19	21	22	20	21
June 18	21	22	21	22	21	21	22	22	22	22
July 9	24*	25*	24*	25*	25*	25*	25	25	25	27
July 27	29	27* 26	28*	27*	28*	29*	26*	26*	25*	25*
August 10	26	26	26	26	27	27	29	26	26	26
August 27	23	22	23	23	23	24	23	23	23	23
September 10	13	13	18	13	13	14	13	13	18	17
September 28	14	14	15	15	15	15	15	15	16	17
October	9	8	8	9	10	10	10	10	10	11
November	2	2	2	2	2	2	2	2	3	1
December	1* 4	1* 2	1* 2	2	-	-	1	2	2	1
1971										
January	1	1	1	2	1	2	2	3	2	1
February	3	4	3	4	3	3	2	2	2	3

* Sample taken from surface.

Table 4. pH of water from Lake Poinsett, South Dakota (March 1970 - February 1971)

Sampling period	Collection stations									
	1	2	3	4	5	6	7	8	9	10
1970										
March	-	8.2	8.0	8.4	8.4	8.4	8.4	-	7.9	8.2
April							8.9	8.7		
May	8.8	8.7	8.7	8.7	8.6	8.8	8.7	8.6	8.7	8.8
June 5	8.6	8.6	8.5	8.4	8.5	8.3	8.4	8.4	8.5	8.5
June 18	8.7	8.7	8.6	8.6	8.6	8.6	8.6	8.8	8.6	8.7
July 10	9.0*	9.0*	9.0*	8.8	9.2*	9.1*	9.0	8.8	9.1	9.1
July 27	9.0	9.2	9.5*	9.2*	9.6*	9.3*	9.4*	9.3*	9.3*	9.6*
August 10	-	-	-	8.9	9.0	-	9.4	9.1	9.2	9.0
August 24	9.1	9.2	9.1	9.1	9.1	9.2	9.1	9.1	9.1	9.1
September 10	-	-	9.1	-	-	-	-	-	9.0	8.8
September 28	8.8	8.8	8.9	8.8	8.9	8.9	8.9	8.8	9.0	8.9
October	8.8	8.9	8.9	8.9	9.0	8.8	8.9	8.9	8.9	8.9
November	8.8	8.7	8.8	8.8	8.8	8.7	8.8	8.8	8.8	8.8
December	8.4	8.6	-	8.6	8.6	8.7	8.7	8.7	8.8	8.7
1971										
January	8.6	8.6	8.6	8.4	8.5	8.6	8.6	8.6	8.5	8.8
February	8.4	8.4	8.3	8.4	8.5	8.6	8.5	8.4	8.5	8.5

* Sample taken from surface.

Table 5. Specific conductance (mmhos/cm at 25°C) of water from Lake Poinsett, South Dakota (March 1970 - February 1971)*

Sampling period	Collection stations									
	1	2	3	4	5	6	7	8	9	10
1970										
March	--	1000	1000	1000	1000	1000	980	--	1000	950
April	860	860	860	850	860	800	860	880	860	900
May	--	--	910	960	910	910	--	920	890	--
June 5	960	960	960	975	1010	990	960	950	1000	950
June 18	940	925	940	920	950	850	910	910	890	910
July 10	910	900	910	910	900	910	--	910	920	910
July 27	825	875	850	860	860	870	910	900	875	900
August 10	890	860	900	900	900	850	850	900	900	900
August 24	925	910	910	920	930	900	915	925	920	920
September 10	910	960	910	950	--	980	930	930	910	900
September 28	910	910	925	925	925	925	925	940	960	950
October	930	910	910	910	950	970	990	1010	1000	905
November	850	900	825	910	910	910	910	910	940	900
December	1080	1030	1020	1050	1060	1040	1150	1190	1070	1130
1971										
January	1075	1050	860	1050	1100	1120	1120	1275	1250	1125
February	1160	1175	1210	1150	1100	1150	1110	1110	1020	1160

* All surface samples.

Table 6. Calcium, magnesium and total hardness (ppm) of water from Lake Poinsett, S. D. (March 1970 - February 1971)

Sampling period	Collection stations									
	1	2	3	4	5	6	7	8	9	10
1970										
March										
Calcium	240	125	120	120	130	135	145	--	150	165
Magnesium	190	305	290	300	300	290	260	--	290	245
Total	430	430	410	420	430	425	405	--	440	410
April										
Calcium	105	115	115	115	115	110	110	115	115	125
Magnesium	205	310	260	255	255	250	255	250	245	240
Total	310	425	375	370	370	360	365	365	360	365
May										
Calcium	130	125	130	125	125	120	135	125	120	120
Magnesium	270	255	260	265	275	260	265	280	275	270
Total	400	380	390	390	400	380	400	405	395	390
June 5										
Calcium	100	120	130	120	120	110	120	120	115	120
Magnesium	280	310	320	250	230	190	290	230	255	240
Total	380	430	450	370	350	300	410	350	370	360
June 18										
Calcium	120	120	120	120	130	120	130	120	110	120
Magnesium	270	270	270	270	260	270	250	260	265	270
Total	390	390	390	390	390	390	380	380	375	390
July 9										
Calcium	115*	130*	110*	130	140*	125*	165	205	215	120
Magnesium	295	225	255	200	245	260	210	195	165	250
Total	410	355	365	330	385	385	375	400	380	370
July 27										
Calcium	120	115	105*	105*	120*	110*	130*	110*	100*	120*
Magnesium	250	245	260	260	235	250	240	260	260	255
Total	370	360	365	365	355	360	370	370	370	375
August 10										
Calcium	105	120	90	115	120	110	110	120	125	100
Magnesium	245	230	275	225	240	250	260	240	235	250
Total	350	350	365	340	360	360	370	360	360	350

Table 6. Continued

Sampling period	Collection stations 1	2	3	4	5	6	7	8	9	10
1970										
August 24										
Calcium	160	170	200	180	170	185	155	150	170	175
Magnesium	220	185	170	190	210	235	220	230	205	190
Total	380	355	370	370	380	420	375	380	375	365
September 10										
Calcium	180	160	150	160	200	170	210	120	200	200
Magnesium	195	210	225	205	160	200	160	230	165	170
Total	375	370	375	365	360	370	370	350	365	370
September 28										
Calcium	160	180	250	230	260	250	250	220	270	250
Magnesium	215	180	120	145	125	145	130	155	130	160
Total	375	360	370	375	385	395	380	375	400	410
October										
Calcium	160	210	200	200	200	250	230	250	240	225
Magnesium	230	155	215	180	200	150	140	145	170	145
Total	390	365	415	380	400	400	370	395	410	370
November										
Calcium	155	200	240	260	175	230	230	230	260	195
Magnesium	255	190	140	120	215	150	160	140	130	185
Total	410	390	380	380	390	380	390	370	390	380
December										
Calcium	150	170	190	170	190	210	160	240	190	240
Magnesium	260	270	240	245	210	210	280	180	240	200
Total	410	440	430	415	400	420	440	420	430	440
1971										
January										
Calcium	160	290	220	270	270	310	220	310	290	320
Magnesium	260	160	220	170	140	150	230	140	170	140
Total	420	450	440	440	410	460	450	450	460	460
February										
Calcium	205	230	235	130	245	250	270	250	265	215
Magnesium	235	210	215	320	205	190	185	215	215	255
Total	440	440	450	450	450	440	455	465	480	470

* Sample taken from surface.

Table 7. Chloride (ppm) of water from Lake Poinsett, South Dakota (March 1970 - February 1971)

Sampling period	Collection stations									
	1	2	3	4	5	6	7	8	9	10
1970										
August 10	32	35	35	35	35	40	35	38	35	35
August 24	38	38	38	38	38	38	38	38	38	38
September 10	38	38	42	38	35	38	38	42	38	38
September 28	35	35	28	38	35	38	35	35	32	35
October	--	--	--	--	--	--	--	--	--	--
November	--	--	--	--	--	--	--	--	--	--
December	35	38	38	40	35	38	42	38	40	45
1971										
January	42	42	48	42	45	50	42	45	48	52
February	58	45	42	45	45	50	45	50	45	55

Table 8. Copper (ppm) of water from Lake Poinsett, South Dakota (March 1970 - February 1971)

Sampling period	Collection stations									
	1	2	3	4	5	6	7	8	9	10
1970										
August 10	.38	.38	.39	.12	.35	.36	.41	.40	.35	.42
August 24	.38	.45	.50	.34	.46	.31	.41	.23	.43	.29
September 10	.48	.55	.50	.70	.37	.52	.37	.50	.61	.40
September 28	.37	.28	.46	.41	.32	.33	.29	.50	.46	.39
October	.20	.15	.41	.35	.33	.36	.32	.23	.13	.17
November	.10	.15	.12	.32	.15	.38	.20	.06	.25	.31
December	.20	.32	.31	.17	.36	.33	.20	.15	.14	.11
1971										
January	.23	.22	.32	.23	.21	.22	.32	.25	.20	.22
February	.12	--	--	--	--	--	--	--	.25	--

Table 9. Transparency of water from Lake Poinsett, South Dakota (March 1970 - February 1971)

Sampling period	Collection stations									
	1	2	3	4	5	6	7	8	9	10
1970					Turbidity (JTU)					
March	--	30	18	2	11	5	15	--	49	20
April	31	31	40	34	20	25	30	25	9	35
May	21	11	8	12	16	9	10	15	18	8
June 5	18	16	21	18	8	22	10	11	19	12
June 18	3		2	13	20	8	8	28	10	5
					Secchi (m)					
July 10	--	.7	.7	.3	.3	.3	.3	.5	.4	.5
July 27	.5	.7	.5	.5	.3	.5	.3	.2	.3	.3
August 10	.5	.8	.5	.8	.5	.5	.5	.5	.3	.5
August 24	.7	.5	.7	.8	.5	--	--	--	--	--
September 10	.8	.8	--	.8	.8	.9	.9	1.0	.7	.8
September 28	.8	.8	1.0	1.0	1.1	.9	.9	1.0	1.0	1.0
October	.8	.9	1.0	1.0	.9	.9	.8	.8	.9	.9
November	1.5	1.5	--	--	--	--	.8	.7	.7	.7

Table 10. Alkalinity (ppm) of water from Lake Poinsett, South Dakota (March 1970 - February 1971)

Sampling period	Collection stations									
	1	2	3	4	5	6	7	8	9	10
1970										
March										
Carbonate	-	-	-	-	-	-	-	-	-	-
Bicarbonate	250	190	200	240	230	235	215	-	220	220
April										
Carbonate	-	-	-	40	40	20	80	90	40	80
Bicarbonate	220	195	200	170	170	150	105	100	150	135
May										
Carbonate	10	20	40	-	10	30	10	30	20	20
Bicarbonate	205	150	190	215	210	165	175	180	170	180
June 5										
Carbonate	-	-	-	-	-	-	-	-	-	-
Bicarbonate	230	225	220	210	215	220	220	215	235	215
June 18										
Carbonate	30	50	20	-	60	40	20	40	40	60
Bicarbonate	195	160	200	220	160	190	220	200	180	190
July 10										
Carbonate	50	60	80	40	60	60	50	60	50	50
Bicarbonate	175	140	150	160	150	150	145	175	165	155
July 27										
Carbonate	20	40	50	60	50	60	60	40	50	50
Bicarbonate	185	175	165	140	160	155	145	160	155	145
August 10										
Carbonate	10	40	60	40	40	30	40	30	50	60
Bicarbonate	180	160	140	170	160	175	160	155	145	140
August 24										
Carbonate	30	40	40	40	30	60	70	60	80	40
Bicarbonate	165	160	145	170	175	145	125	130	125	155

Table 10. Continued

Sampling period	Collection stations									
	1	2	3	4	5	6	7	8	9	10
1970										
September 10										
Carbonate	40	30	60	40	40	40	40	40	60	90
Bicarbonate	160	165	160	160	160	150	160	150	150	115
September 28										
Carbonate	30	40	50	40	40	40	30	40	50	50
Bicarbonate	165	160	145	160	150	155	170	160	170	140
October										
Carbonate	40	50	40	10	40	30	50	40	30	40
Bicarbonate	145	140	145	185	160	160	150	155	170	165
November										
Carbonate	20	20	30	20	30	30	-	10	20	10
Bicarbonate	170	165	165	170	160	165	180	185	170	175
December										
Carbonate	-	-	-	-	-	-	10	-	-	-
Bicarbonate	240	220	230	220	220	230	210	210	220	220
1971										
January										
Carbonate	-	10	-	-	-	10	10	-	-	10
Bicarbonate	210	195	245	230	230	215	245	245	245	220
February										
Carbonate	-	-	-	-	-	-	-	-	-	30
Bicarbonate	240	230	250	245	245	245	250	240	250	230

APPENDIX B

Table 1. Number (no.) and weight (gm) of organisms (per square meter) at Station 1, Lake Poinsett, South Dakota (March 1970 - February 1971) (Sapropel)

Sampling period	Chironomus		Tanypodinae		Unidentified Pupae		Oligochaetae		Total	
	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm
1970										
March 6	2666.6	4.3250							2666.6	4.3250
April 24	2493.8	6.2345	888.8	.5506					3382.6	6.7851
May 15	1421.0	4.1184	543.2	.2503	197.5	.1382	49.4	.0069	2211.1	4.5138
June 5	1551.4	2.3391	988.0	.4223	148.2	.4594			2687.6	3.2208
June 19	888.8	.8592	370.4	.2518	74.1	.2074			1333.3	1.3184
July 9	1605.5	1.3684	395.5	.1383	49.4	.1531			2050.1	1.6598
July 27	962.9	.7704	74.1	.0247					1037.0	.7951
August 10	197.5	.2370	172.8	.0814	49.3	.1432			419.6	.4616
September 16	271.6	.1037	24.7	.0111					295.3	.1148
September 28	395.1	.1901							395.1	.1901
October 19	1061.7	1.7284							1061.7	1.7284
November 16	419.7	.9802							419.7	.9802
December 28	246.9	.4888							246.9	.4888
1971										
January 28	1432.7	3.2982	29.2	.0132					1461.9	3.3114
February (March 3)	146.2	.3245	29.2	.0117					175.4	.3362

Table 2. Number (no.) and weight (gm) of organisms (per square meter) at Station 2, Lake Poinsett, South Dakota (March 1970 - February 1971) (Sapropel)

Sampling period	Chironomus		Tanypodinae		Unidentified Pupae		Oligochaetae		Total	
	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm
1970										
March 13	1987.6	3.1623	745.3	1.0484					2732.9	4.1207
April 24	2864.2	6.9135	592.6	.3654					3456.8	7.2789
May 15	1975.3	3.8330	271.6	.0876	395.1	.5345			2740.7	4.4551
June 5	1382.7	2.1665	543.2	.2839	123.5	.3580			2049.4	3.0084
June 18	2197.5	1.1136	98.7	.0444					2296.2	1.1580
July 9	987.6	.8024	296.3	.1062	98.8	.1309			1382.7	1.0395
July 27	518.5	.4148	98.8	.0296					617.3	.4444
August 10	370.4	.2592							370.4	.2592
August 24	49.3	.0017							49.3	.0017
September 16	345.7	.1679							345.7	.1679
September 28	493.7	.3284							493.7	.3284
October 20	765.3	.8824							765.3	.8824
November 16	666.6	1.5678	74.1	.0346			24.7	.0019	765.4	1.6043
December 28	49.3	.7999							49.3	.7999
1971										
January 28	1052.6	2.6198	58.5	.0263			29.2	.0023	1140.3	2.6484
February (March 3)	146.2	.4824							146.2	.4824

Table 3. Number (no.) and weight (gm) of organisms (per square meter) at Station 3, Lake Poinsett, South Dakota (March 1970 - February 1971) (Sand)

Sampling period	Chironomus		Chironominae (not Chironomus)		Tanypodinae		Unidentified Pupae		Oligochaetae		Caenidae		Hydroacarinae		Total	
	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm
1970																
March 13	645.9	.4669			670.8	.0108			422.4	.7031					1739.1	1.1808
April 24*	444.4	1.1111			617.3	.3827					49.4	.0094			1111.1	1.5032
May 15*	24.7	.0706			123.5	.0706									148.2	.1412
June 5	148.1	.2370			962.9	.1506			98.7	.0197					1209.7	.4073
June 19*	641.9	.1876			246.9	.1950			98.7	.1161					987.5	.4987
July 9			370.4	.0419	444.4	.0741			172.8	.0346					987.6	.1586
July 27	49.3	.0395	395.1	.0419	148.1	.0247	74.1	.0029	123.5	.0247					790.1	.1337
August 10			765.4	.0494	49.3	.0222	24.7	.0099							839.4	.0815
August 24	74.1	.0251			24.7	.0111									98.8	.0362
September 10	24.7	.0197	345.7	.0469					98.8	.0197	24.7	.0259			493.9	.1122
September 28	246.9	.4938	395.1	.1582					1185.1	.2370					1827.1	.8890
October 20	98.8	.1308							419.7	.0666					518.5	.1974
November 16	172.8	.1457	123.5	.0246	1234.6	.0444			172.8	.0345			24.7	.0222	1728.4	.2714
December 28	148.1	.1333	246.9	.0518	49.3	.0024			49.3	.0098			24.7	.0222	518.1	.2197
1971																
January 28	204.7	.6491							29.2	.0058					233.9	.6549
February (March 3)	818.7	.6462			87.7	.0035			58.5	.0117					964.9	.6614

* Mixture of sapropel and sand.

Table 4. Number (no.) and weight (gm) of organisms (per square meter) at Station 4, Lake Poinsett, South Dakota (March 1970 - February 1971) (Sapropel)

Sampling period	Chironomus		Chironominae (not Chironomus)		Tanypodinae		Unidentified Pupae		Oligochaetae		Hydroacarinae		Total	
	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm
1970														
March 20	1950.6	3.1259			197.5	.2395							2148.1	3.3654
April 24	1876.5	4.6913			1185.2	.7348							3061.7	5.4261
May 16	2079.2	7.2550			965.3	.2549	247.5	3.8341	371.3	.0693			3663.3	11.4133
June 5	444.4	1.4592			419.7	.1382	197.5	.6123	74.1	.0059			1135.7	2.2156
June 19	3629.6	1.4444			148.1	.1308							3777.7	1.5752
July 10	2469.1	.4987			888.8	.1333							3357.9	.6320
July 27	419.7	.1259	74.1	.0052	24.7	.0111	24.7	.0017					543.2	.1439
August 10	98.8	.2493			246.9	.0716	24.7	.0044					370.4	.3253
August 24	74.1	.0251			24.7	.0111							98.8	.0362
September 16	1012.3	.1926			222.2	.0914							1234.5	.2840
September 28	123.5	.1654	49.3	.0198	246.9	.0338	24.7	.0716	24.7	.0019	24.7	.0222	493.8	.3147
October 19	641.9	.8444			543.2	.0888							1185.1	.9332
November 16	666.6	1.8246			246.9	.0370	24.7	.0716					938.2	1.9322
December 29	345.7	.5999			172.8	.0765							518.5	.6764
1971														
January (February 3)	146.2	.5555											146.2	.5555
February 25	58.5	.1929			58.5	.0263							117.0	.2192

Table 5. Number (no.) and weight (gm) of organisms (per square meter) at Station 5, Lake Poinsett, South Dakota (March 1970 - February 1971) (Sapropel)

Sampling period	Chironomus		Chironominae (not Chironomus)		Tanypodinae		Unidentified Pupae		Oligochaetae		Hydroacarinae		Total	
	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm
1970														
March 20*	1876.5	6.0518			74.1	.0518							1950.6	6.1036
April 24*					246.9	.1530							246.9	.1530
May 16	1555.6	4.5765			592.6	.2593	617.3	1.7914	345.7	.0281			3110.7	6.6553
June 5*	172.8	.6148			543.2	.1531	148.1	.2148					864.1	.9827
June 18	5629.6	3.4987			691.4	.1456							6321.0	3.6443
July 9*	98.8	.0444			148.1	.0207	49.4	.1433					296.3	.1884
July 27	1259.1	1.2173			197.5	.0593	49.3	.1432					1505.9	1.4198
August 10	444.4	.4024			24.7	.0111	24.7	.0716					493.8	.4851
August 24*	197.5	.0553											197.5	.0553
September 16*	172.8	.1086	74.1	.0444	74.1	.0296							321.0	.1826
September 28*	395.1	.1975	24.7	.0148	123.5	.0864	24.7	.0716			74.1	.1851	642.1	.5554
October 22	395.1	.0741			345.7	.0765							740.8	.1506
November 16	469.1	.7259			296.3	.0888					24.7	.0222	790.1	.8369
December 29	1111.1	1.7012			320.9	.1728							1432.0	1.8740
1971														
January (February 3)*	204.7	.7075											204.7	.7075
February 25*	87.7	.2894											87.7	.2894

* Mixture of sapropel and sand.

Table 6. Number (no.) and weight (gm) of organisms (per square meter) at Station 6, Lake Poinsett, South Dakota (March 1970 - February 1971) (Sapropel)

Sampling period	Chironomus		Chironominae (not Chironomus)		Tanypodinae		Unidentified Pupae		Oligochaetae		Hydroacarinae		Total	
	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm
1970														
March 20	1357.9	4.0493			493.8	.2888							1851.7	4.3381
April 24	2172.8	5.4320			962.9	.5975							3135.7	6.0295
May 15*			2592.6	.1938					395.1	.0641			2987.7	.2579
June 5	271.6	.8493			814.8	.0698	271.6	.0698	24.7	.0019			1382.7	1.1209
June 22	2148.1	2.3827	395.1	.4370	172.8	.2839			24.7	.0197			2740.6	3.1036
July 9*	2271.6	.7753			987.6	.2197	49.3	.1432					3308.5	1.1382
July 27	444.4	.3777			666.6	.1999							1111.0	.5776
August 10*	222.2	.2864			98.8	.0074	49.3	.0827					370.3	.3765
August 27	592.6	.3531			222.2	.0543							814.8	.4074
September 16	469.0	.2468			320.9	.1284	24.7	.0716					814.6	.4468
September 28	666.6	.1753			790.1	.1925							1456.7	.3678
October 22	543.2	.5086			296.3	.0197							839.5	.5283
November 16*	641.9	.8888			444.4	.0567					123.5	.1136	1209.8	1.0591
December 29*	296.3	.4741			246.9	.0593							543.2	.5334
1971														
January (February 3)*	58.5	.1988											58.5	.1988
February 25*	555.5	1.1257			204.6	.0906							760.1	1.2163

* Mixture of sapropel and sand.

Table 7. Number (no.) and weight (gm) of organisms (per square meter) at Station 7, Lake Poinsett, South Dakota (March 1970 - February 1971) (Sand)

Sampling period	Chironomus		Chironominae (not Chironomus)		Tanypodinae		Unidentified Pupae		Oligochaetae		Caenidae		Hydroacarinae		Total	
	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm
1970																
March 16			1703.7	1.7333											1703.7	1.7333
April 23	1160.5	2.9012			814.8	.5061			296.3	.0414					2271.6	3.4487
May 15	24.7	.0706	3000.0	.1196	407.4	.0100			419.8	.2346					3851.9	.4548
June 5			2592.6	.2938	716.0	.2049	444.4	.0642	469.1	.0963					4222.1	.6592
June 19	148.1	.5432			444.4	.1632			543.2	.1481					1135.7	.1481
July 10	24.7	.0706	1308.6	.1062	98.8	.0039	49.3	.1432			74.1	.0765	24.7	.0222	1580.2	.4226
July 27			814.8	.0888	148.1	.0247	222.2	.2913	320.9	.0642					1506.0	.4690
August 10			2493.8	.0864	24.7	.0010	24.7	.0098	24.7	.0049					2567.9	.1021
August 27			2098.7	.0202			222.2	.0261			24.7	.0259			2345.6	.0722
September 16	24.7	.0706	938.3	.1308					172.8	.0395			24.7	.0706	1160.5	.2631
September 28			1925.9	.1012					197.5	.1333			24.7	.0222	2148.1	.2567
October 22			1259.3	.1209					98.8	.0197					1358.1	.1406
November 14			49.3	.0098	395.1	.0148			24.7	.0049	24.7	.0259			493.8	.0554
December 30			765.4	.0321											765.4	.0321
1971																
January (February 2)			526.3	.0702					87.7	.0175	29.2	.0307			643.2	.1284
February 23			58.5	.0023											58.5	.0023

Table 8. Number (no.) and weight (gm) of organisms (per square meter) at Station 8, Lake Poinsett, South Dakota (March 1970 - February 197[illegible]ropel)

Sampling period	Chironomus		Chironominae (not Chironomus)		Tanypodinae		Unidentified Pupae		Oligochaetae		Caenidae		Hydroacarinae		Total	
	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm		gm
1970																
April 24*	716.1	1.7901			987.6	.6123									.6	2.4024
May 15	864.2	1.8271			1407.4	.4532	172.8	.4222	24.7	.0019					.1	2.7044
June 6	123.4	.6173			716.0	.1802	24.7	.0716							.1	.8691
June 22	6049.3	3.2814			641.9	.1876									.2	3.4690
July 10	1999.9	.9802			469.1	.0704									.0	1.0506
July 27	666.6	.5654			24.7	.0111	24.7	.0716							.0	.6481
August 10	172.8	.4469			148.1	.0444	24.7	.0716							.6	.5630
August 27	271.6	.0308			518.5	.0765									.1	.1073
September 16*			395.1	.0419					197.5	.0543	98.8	.1037			1.4	.1999
September 28	1259.3	.0568			172.8	.0864							148.1	.1358	.2	.2790
October 22	1160.5	.8222			419.7	.1481							24.7	.0222	4.9	.9925
November 14	1283.9	2.9481	24.7	.0027	320.9	.0666			24.7	.0019					4.2	3.0193
December 30*	98.7	.1580													8.7	.1580
1971																
January (Feb. 2)	643.3	1.4268			29.2	.0117									2.5	1.4385
February 23	555.5	1.6871			204.7	.0409									0.2	1.7280

* Mixture of sapropel and sand.

Table 9. Number (no.) and weight (gm) of organisms (per square meter) at Station 9, Lake Poinsett, South Dakota (March 1970 - February 1971) (Sapropel)

Sampling period	Chironomus		Chironominae (not Chironomus)		Tanypodinae		Unidentified Pupae		Oligochaetae		Caenidae		Hydroacarinae		Total	
	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm
1970																
March 13	1925.8	4.6863			2962.9	1.2098			24.7	.0197					4913.4	5.9158
May 15	987.6	2.4444			1777.7	.4567	24.7	.0716	98.7	.0864					2888.7	3.0591
June 6	197.5	.8469			1160.5	.3531	49.4	.2864							1407.4	1.4864
June 22	4913.6	3.2790			1037.0	.1209			74.1	.0593					6024.7	3.3999
July 10*			123.5	.0197	1876.5	.1777	24.7	.0098							2024.7	.2072
July 27	493.8	.4197			296.3	.0888	24.7	.0716							814.8	.5801
August 10**	24.7	.0706	469.1	.0543	98.8	.0197	74.1	.2148	74.1	.0059					740.8	.3653
August 27	839.5	.2419			419.7	.1508	24.7	.0716							1283.9	.4643
September 10*			98.8	.0296	197.5	.0741			74.1	.0148	24.7	.0259			395.1	.1444
September 28**			2222.2	.1827			98.7	.1284	246.9	.1580	1481.5	.4345	148.1	.1926	4198.4	1.0962
October 22**			2765.4	.1037					469.1	.0642	123.5	.1264	49.3	.0444	3407.3	.3407
November 14	814.8	1.3999			197.5	.0444									1012.3	1.4443
December 30	913.6	2.0246			641.9	.0790							24.7	.0222	1580.2	2.1258
1971																
January (Feb. 2)	1052.6	2.2338			175.4	.1169									1228.0	2.3507
February 25**			175.4	.0702					58.5	.0046	58.5	.0614			292.4	.8362

* Mixture of sapropel and sand.

** Sand.

Table 10. Number (no.) and weight (gm) of organisms (per square meter) at Station 10 in Lake Poinsett, South Dakota (March 1970 - February 1971) (Sand)

Sampling period	Chironomus		Chironominae (not Chironomus)		Tanypodinae		Unidentified Pupae		Oligochaetae		Caenidae		Hirunidae		Hydroacarinae		Total	
	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm	no.	gm
1970																		
March 16			271.6	.2716							1333.3	.1345	123.5	.0617			1728.4	.4678
April 30			271.6	.2271					2395.1	3.4567	123.5	.0370					2790.2	3.7208
May 15			1012.3	.1012	1259.3	.0914			888.8	.0914							3160.4	.2840
June 5			6617.3	.4469	1234.6	.2197	172.8	.5012	271.6	.1062	419.7	.4395	24.7	.0165			8740.7	1.7300
June 22	123.4	.3531	2864.1	.3037	49.2	.0019	98.7	.5012	49.2	.0098							3184.6	1.1697
July 10			2049.4	.1506	222.2	.0666			222.2	.0691	49.3	.0518	172.8	.1160			2715.9	.4541
July 27			592.6	.0642			123.5	.1629	493.8	.0987	24.7	.0247					1234.6	.3505
August 10			1975.3	.1185			345.7	.0296	296.3	.0029							2617.3	.1510
August 27			4691.3	.0938	74.1	.0029	24.7	.0320			49.3	.0259					4839.4	.1546
September 10			370.4	.0469	123.5	.0049	24.7	.0321	74.1	.0148							592.7	.0987
September 28			2469.1	.1235	24.7	.0009	24.7	.0321	98.8	.0197							2617.3	.1752
October 22			1358.0	.1308					493.8	.0839							1851.8	.2147
November 14			123.5	.0197	641.9	.0024			98.8	.0197					24.7	.0222	888.9	.0640
December 30	24.7	.0395	469.1	.1259	123.5	.0419			49.3	.0098					24.7	.0222	691.3	.2393
1971																		
January 28			380.1	.0233					58.5	.0116							438.6	.0349
February 23			146.2	.0161					58.5	.0117							204.7	.0278