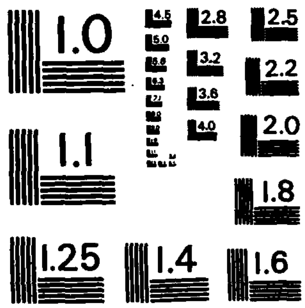
AD-A126 848 ECOLOGICAL CHARACTERIZATION OF THE BENTHIC COMMUNITY OF 1/3
LAKE PONTCHARTRAI..(U) LOUISIANA STATE UNIV BATON ROUGE
COASTAL ECOLOGY LAB W B SIKORA ET AL. APR 82
UNCLASSIFIED LSU-CEL-82-05 DACW29-79-C-0099 F/G 8/8 NL

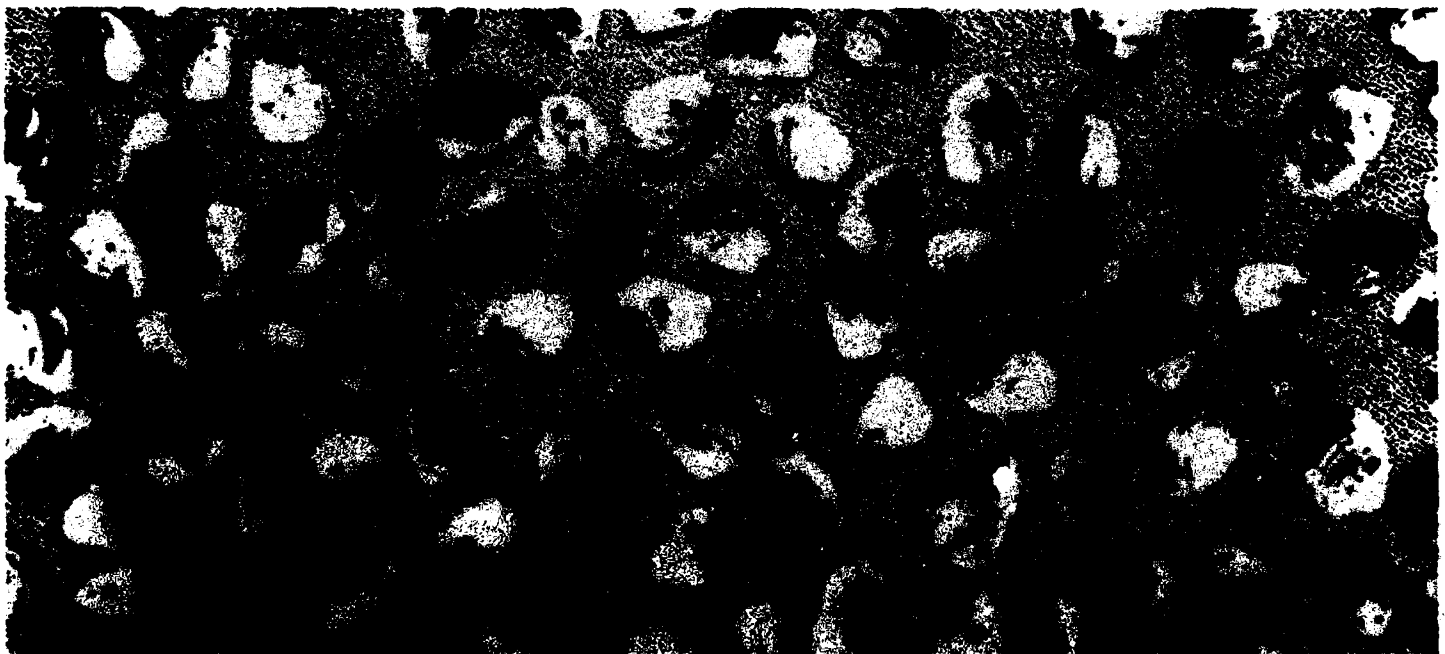

1.0
4.5
5.0
2.8
2.5
3.2
2.2
3.6
4.0
2.0
1.1
1.8
1.25
1.4
1.6

Ecological Characterization of the Benthic Community of Lake Pontchartrain, Louisiana

by

Walter B. Sikora
Jean Pantell Sikora

April 1982



Prepared for
U.S. Army Engineer District, New Orleans
Contract No. DACW29-79-C-0099

Coastal Ecology Laboratory, Center for Wetland Resources,
Louisiana State University, Baton Rouge, Louisiana 70803
Publication No. LSU-CEL-82-06

Ecological Characterization of the Benthic Community of Lake Pontchartrain, Louisiana

by

Walter B. Sikora
Jean Pantell Sikora

April 1982

Prepared for
U.S. Army Engineer District, New Orleans
Contract No. DACW29-79-C-0099

Coastal Ecology Laboratory, Center for Wetland Resources,
Louisiana State University, Baton Rouge, Louisiana 70803
Publication No. LSU-CEL-82-05

PREFACE

This report represents the results of an investigation of the benthic community of Lake Pontchartrain, Louisiana and the subsequent ecological characterization. This study was sponsored by the New Orleans District of the U.S. Army Corps of Engineers (COE) under Contract No. DACW29-79-C-0099 to the Coastal Ecology Laboratory, Center for Wetland Resources, Louisiana State University, Baton Rouge, Louisiana. This report has been designated by the Coastal Ecology Laboratory as contribution No. LSU-CEL-82-05.

Contracting Officer's Representative was Larry Hartzog. Additional assistance in the technical review was provided by Monica Farris, Dr. Eugene Cronin, and Dr. Wiley M. Kitchens. This review was co-ordinated by John C. Weber and Suzanne R. Hawes.

The authors would like to acknowledge significant contributions in the field and in the laboratory by J. Wilkins, laboratory manager, and K. Westphal, N. Walker, E. Parton, M. Lindsay, R. Robertson, and C. Cardiff during the course of the study. We wish also to acknowledge K. Westphal, figures; J. Bagur, editorial suggestions; C. McLean, typing; E. Parton, assistance with data management; R. Wilson, boat captain; and Dr. Richard W. Heard, taxonomic assistance.

Any mention of a commercial product or brand does not mean that the Army Corps of Engineers or Louisiana State University endorses said product or brand.

OVERVIEW AND CONCLUSIONS

The overall objective of this study was the ecological characterization of the benthic community of Lake Pontchartrain. This study also included an investigation of the physical or geological factors and anthropogenic or cultural factors which, while affecting the benthic community measurably, also affected the entire ecosystem. Changes which have been identified in the benthic community will be discussed, particularly when they are strong indicators of ecosystem-wide trends.

Lake Pontchartrain is a modified bar-built estuary formed between 2600 to 2800 years ago. It has the narrow connections with the ocean, the reduced tidal action, shallow depths, and wind-induced mixing typical of estuaries so classified.

Lake Pontchartrain is oligohaline, with mean salinities of about 5 ppt, and a horizontal stratification. Salinities are higher in the east end and lower in the west end. Periodic flooding by waters from the Mississippi River can lower the salinities to essentially freshwater conditions.

The high levels and sources of pollutants in Lake Pontchartrain are described in a recent study (U.S. Army Engineer District, New Orleans 1980). The specific effects of hydraulic clam shell dredging are described in a recent study (Sikora et al. 1981). This report describes the general effects of both of these anthropogenic impacts on the benthic community.

The most striking change which has taken place in the 25 years since the last major study occurred is the loss of the larger size classes of the clam *Rangia cuneata*. Darnell (1979) reports mean densities of *R. cuneata* longer than 20 mm of 135 ± 16/m^2 found during the survey studies in Lake Pontchartrain in 1953 and 1954. During the present study densities of 0.85/m^2 of this clam were found. Dominance in numbers and biomass has shifted from *R. cuneata* to two small hydrobiid gastropods, *Texadina sphinctostoma*, and *Probythinella louisianae*, which now make up 70 to 80% of the numbers of animals found in Lake Pontchartrain.

Although both of these gastropods are found in all samples from Lake Pontchartrain, their proportion varies from station to station. Overall, *T. sphinctostoma* was more numerous the first year (1978-1979) of this study, and *P. louisianae* was dominant, with greater biomass, the second year of the study (1979-1980). Both of these gastropods, however, are much smaller than the clams which they have replaced. They have a length of 2-3 mm and a weight of 0.2-0.3 mg. The usual 15,000-20,000 gastropods per square meter total only 3.75 - 5.0 g/m^2 AFDW. The 135 clams longer than 20 mm per square meter, which the gastropods have replaced, would have had a biomass of 20 to 50 g/m^2 AFDW.

This change in average size, and in total biomass has resulted in a benthic infauna which can be characterized as being much smaller than usual (Table 15). The low biomass would have an effect on the benthic-dependent predators, providing one-tenth of the food, for instance, for blue crabs that was available 25 years ago.

One of the reasons for this decline in benthic biomass, examined in this report, appears to be related to the lower levels of carbon in the sediments. Steinmayer (1939) found 6 to 8% organic matter in the sediments, where we now find about 1%. Primary production in the water column, which would have been a source of carbon for the sediments, is lower than expected for the level of nutrients in the lake. Lowered primary production may be related to the higher levels of toxic substances entering the lake, or to the turbidity caused by the resuspension of sediments which have been destabilized by shell dredging.

In addition to a decline in the benthic community, we have found and presented evidence for a decline in the numbers of zooplankton, and a shift in dominance in the nekton. Diversity in the lake is low. Lowered diversity in the benthic community appears to be related to the low number of species able to live in the lake. The lack of seasonality in species composition is unusual in estuarine benthic communities. Total numbers of species present is lower than average for brackish systems, which are usually characterized by fewer species.

The direct effect of the destabilization of the sediments by shell dredging has been the loss of the larger size classes of the clam, <u>R. cuneata</u>. The replacement of the clam-dominated community by a much lower diversity gastropod-dominated community, instead of the usual polychaete-amphipod community common in estuaries of this region, is probably attributable to the high levels of toxic substances found in the sediments. All measures of benthic community structure, such as diversity and species composition, and community function, such as niche breadth, examined during this study indicate that the benthic community of Lake Pontchartrain is showing unmistakable signs of stress.

TABLE OF CONTENTS

CONTENTS PAGE

CONTENTS PAGE

LIST OF TABLES

LIST OF FIGURES

FIGURE		PAGE

INTRODUCTION

Purpose and Scope

The objectives for this study were the result of recommendations developed during a series of meetings held with participants from the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and the Louisiana Department of Wildlife and Fisheries. These objectives included:

1. The determination of the structure and function of the benthic community of Lake Pontchartrain,

2. An examination of the effects of the Bonnet Carre Spillway opening on the benthic community of Lake Pontchartrain, and

3. An analysis of the altered bulk density due to dredging on the benthic community of Lake Pontchartrain.

In order to fulfill the first objective, a comprehensive sampling program was designed and implemented. After the organisms collected had been enumerated and identified, certain measures of community structure such as species diversity were examined. Factors which affect community structure such as biological interactions (predation and/or competition) or physical disturbances (alteration in sediment stability, or presence of toxic substances) were investigated and assessed. Measures of community function included a study of community respiration, which has been discussed in a previous report (Sikora et al. 1981). In addition, community functions such as resource partitioning by the dominant populations or feeding groups present and niche breadth were examined and quantified.

The second objective, the evaluation of the effects of the Bonnet Carre Spillway opening on the benthic community, was addressed by examining the evidence of changes in the community structure attributable to the opening. The interaction of other impacts on the lake with the opening of the spillway was also examined and will be discussed.

An extensive field and laboratory investigation was necessary to fulfill the third objective. Measurements of bulk densities at all stations were made in the field, and changes of bulk density through time were made in the laboratory. Analyses of these determinations were compared and will be presented.

Our overall objective, the ecological characterization of the benthic community of Lake Pontchartrain, includes an investigation of the physical or geological factors and anthropogenic or cultural factors which affect the entire ecosystem. Any pollutant or natural stress on an estuarine ecosystem will be reflected in an alteration in the benthic community. These changes which have been identified in the benthic community will be discussed, particularly when they are strong indicators of ecosystem-wide trends.

Geomorphic History of Lake Pontchartrain

Worldwide lowering of sea level associated with the build-up of massive continental ice sheets occurred during periods of glaciation in the late Cenozoic (Flint 1971). After the last, or Wisconsin, glacial stage, the worldwide sea level rose in two stages. During the first stage, sea level rose to about -75 m at about 35,000 B.P. (Before Present). The second rise began about 18,500 B.P. and continued until about 3000 B.P., when it reached approximately the present still stand (Morgan 1967). Saucier (1963) gives a detailed account of the formation of Lake Pontchartrain from geological, paleontological, and archeological evidence. From this and from later studies, it appears that the lake has evolved through two distinct types of estuaries (as classified by Pritchard 1967) into its present form. When sea level was about -12 m, a small, drowned river valley estuary was formed when the Gulf waters flooded the Amite trench, a river system that had been formed by the confluence of the Amite, Tangipahoa, and Tchefuncte Rivers and some smaller streams. About 5000 B.P., Pontchartrain Bay, a shallow bay of the Gulf of Mexico, was formed. This large, open bay covered most of present day Lakes Pontchartrain and Maurepas. As sea level rose, two barrier spits were formed. The first, called Milton's Island beach trend, was a typical recurved spit that extended from Goose Point out into the bay and curved back north. A second, larger spit, the Pine Island beach trend, formed later and extended from the Pearl River down into the New Orleans area, over which the city now stands. Saucier places the formation of Lake Pontchartrain at about 3500-4000 B.P. when the prograding Cocodrie Delta of the Mississippi River curved eastward and to the north, burying the Pine Island beach trend. Otvos (1978), however, based on foraminifera assemblages, disputes this early date for the formation of the lake. According to his scenario, the Cocodrie Delta extended only to the western tip of the Pine Island spit, which later broke up into a series of barrier islands. Thus Pontchartrain Bay became a bar-built estuary. This condition allowed open channels to exist between the islands, which would have allowed considerable water exchange between the Gulf and the bay, and probably would have given rise to mesohaline salinity conditions in the estuary.

About 2600 to 2800 B.P. Lake Pontchartrain was formed when the St. Bernard Delta of the Mississippi River buried the Pine Island beach trend completely, covering most of the area and extending out to the Chandeleur Islands. A constricted opening was left approximately where The Rigolets now exists, thus beginning the oligohaline salinity regime that persists to the present. As the St. Bernard Delta was abandoned and began to deteriorate through subsidence and erosion, Lake Borgne and the western part of Mississippi Sound were formed, after which a second opening, Chef Menteur Pass, cut through. Thus, from a geomorphic perspective, Lake Pontchartrain is a modified bar-built estuary. It is modified in the sense that a wide area of subaerial deltaic land covers the original barrier islands and separates them from the sea. It meets Pritchard's definition of an estuary (Pritchard 1967) by having a "free connection with the open sea," which he further defines as allowing "an essentially continuous exchange of water between the estuary and the ocean." He further states of bar-built estuaries that because the inlets connecting this type of estuary with the ocean are usually small compared to the dimensions of the sound within the barrier, tidal action is considerably reduced, and these systems are usually shallow, with the wind providing the important mixing mechanism. Lake Pontchartrain meets all these criteria.

Width-Depth Equilibrium

Tidal basins of the Texas and Louisiana coast were found to be in a dynamic equilibrium with relation to geological processes and physical forces by Price (1947). Price found all 31 tidal basins studied to have a predictable relationship between width and depth regardless of basin origin, although most were bar-built estuaries. Two relationships were derived, one for the "non-humid coast" of south Texas and another for the "humid coast" of eastern Texas and Louisiana. Lake Pontchartrain fits well on a regression line for the 16 basins of the latter group, with 48 km as an average width and 5 m maximum depth. Price discusses several possible reasons for the existence of the relationship. These include fetch of the wind, depth of wave action, character and abundance of incoming sediments, and subsidence. Of these, it would seem that the abundance of incoming sediments is the most important as evidenced by Atchafalaya Bay. In 1947, this bay also fit the regression relationship of width and depth, along with West Côte Blanche Bay and Vermillion Bay. However, since the flood year of 1973 the Atchafalaya River has overcome equilibrium conditions and has built a subaerial delta in the bay. Lake Pontchartrain has not experienced any significant shallowing in historic times despite numerous crevasses and six openings of the Bonnet Carre Spillway, which allowed flood waters of the Mississippi River to enter the lake. The Mississippi River broke through the levees in 1874 in forming the Bonnet Carre Crevasse. Flood waters flowed into the lake for eight years (Steinmeyer 1939, Gunter 1953), yet the lake apparently maintained the equilibrium. Exactly how the mechanism for maintaining this equilibrium works is not precisely known. If wind induced waves do function in this capacity by resuspending sediment, which is then flushed out of the basin, then Lake Pontchartrain must have been a turbid system throughout its history.

General Description of Lake Pontchartrain

Lake Pontchartrain is a shallow (mean depth 3.7 m, maximum 5 m) body of water of about 1630 km^2 lying in the middle of a large, southeastern Louisiana estuarine complex (Figure 1) with a diurnal tidal regime and mean tidal range of 11 cm (Outlaw 1979). To the west is Lake Maurepas, connected to Lake Pontchartrain by Pass Manchac; to the east, Lake Pontchartrain is connected to Lake Borgne by The Rigolets Pass and by the Chef Menteur Pass. In the southeast, the man-made Inner Harbor Navigation Canal (IHNC)-Mississippi River Gulf Outlet (MRGO) complex

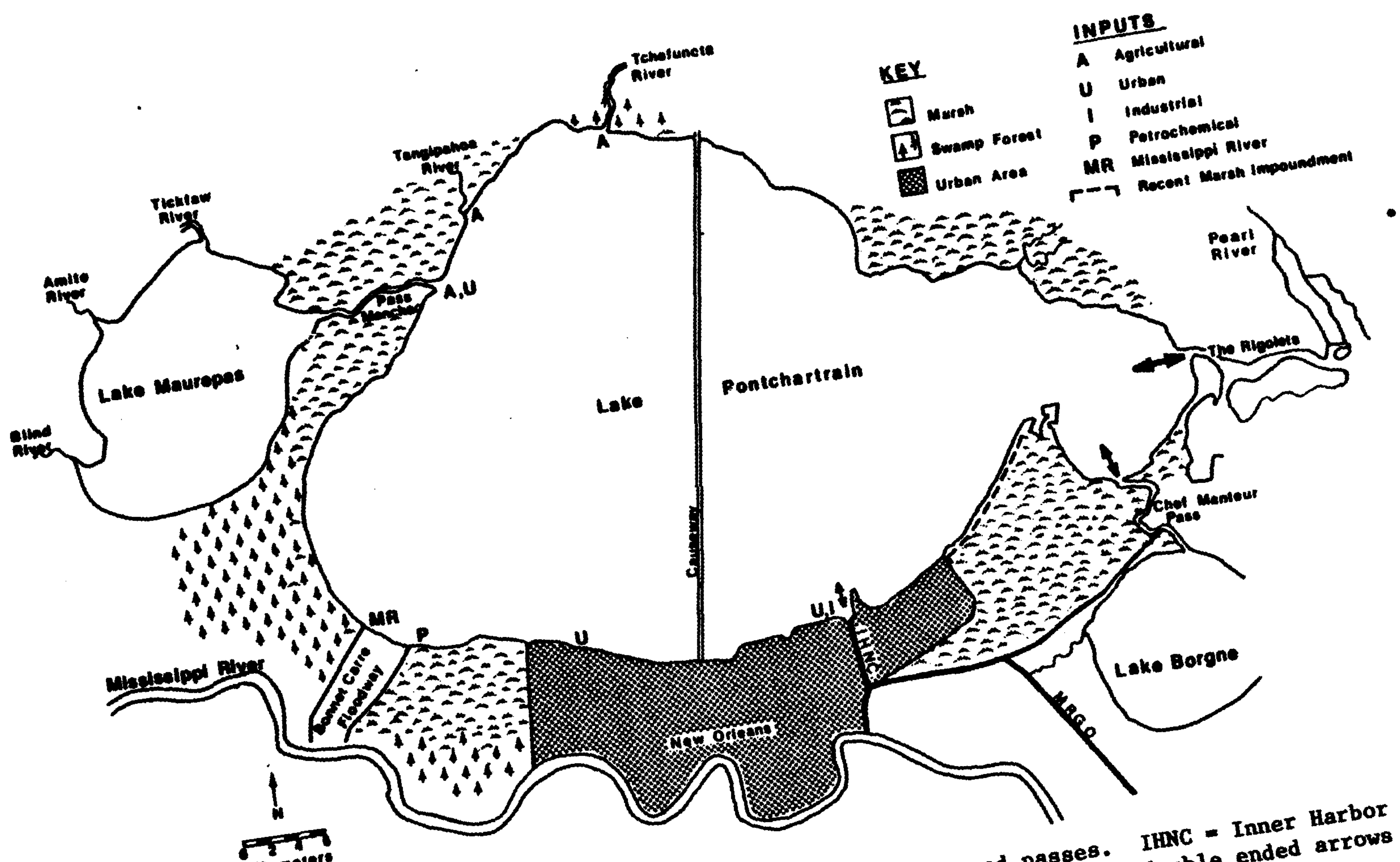


Figure 1. Lake Pontchartrain, Louisiana, showing major rivers and passes. IHNC = Inner Harbor Navigation Canal, MRGO = Mississippi River Gulf Outlet. Size of double ended arrows at passes indicate relative flows. Inputs indicated by letters.

connects the lake to the Gulf of Mexico. The tidal passes located on the east end of the lake have cross sections of 6850 m^2 (Rigolets), 3200 m^2 (Chef Menteur) and 800 m^2 (IHNC). The mean tidal current velocities within these passes during nonflood riverine flows are 70 cm/sec, 100 cm/sec, and 50 cm/sec, respectively (Chuang et al. 1980) with volumes corresponding to 60%, 30%, and 10%, respectively. The total tidal prism of all three passes was calculated to be 1.56 x $10^8 m^3$ with no significant flood or ebb tide dominance (Swenson, personal communication). Higher salinity water enters the lake through these passes. The western end of the lake is characterized by riverine input of freshwater.

Circulation within the lake has been shown to be primarily wind driven (Gulf South Research Institute 1972; Gael 1980) with current speeds reaching velocities of about 15-20 cm/s (U.S. Army Corps of Engineers 1962), with speed and direction dependent on the wind. The mean monthly lake level shows a seasonal pattern with a spring and a fall peak. These peaks correspond to similar peaks in the easterly winds, indicating that the long-term lake level trends appear to be responding to the wind regime. A similar bimodal curve for the level in the Gulf of Mexico also has been documented (Marmer 1954). Chuang and Swenson (1981) have shown that the transport of water in and out of Lake Pontchartrain via the tidal passes at time scales shorter than 15 days is directly related to the east-west wind stress. This pattern indicates a coupled coastal ocean-lake response. Long-term water level variations may be due to the seasonal heating cycle, rainfall, and river runoff into the lake.

Analysis of winter current meter records from the tidal passes (Chuang et al. 1980) has shown that tidal variations account for 50% of the volume transport through the passes (tidal prism is about 1.5 x $10^8 m^3$) and subtidal or nontidal effects (meteorological events) account for the other 50%. During calmer months of the year (summer) the tidal effects are probably more significant.

The salinity of the lake is quite low, with the mean being about 5 ppt. The lake is horizontally stratified (Figure 2), with salinities being highest in the east end (tidal passes) and lowest in the west end (fresh water input) (Swenson 1980a). This gradient rarely may be as much as 12 ppt but is often less than 3 ppt. Analysis of 10 years of salinity data collected by the U.S. Army Corps of Engineers (1962) indicate that the salinity of the lake has a seasonal pattern with a minimum in the summer (June- July) and a maximum in the fall (October--November).

Lake temperatures show a general pattern in which the lake is essentially isothermal, the maximum spatial gradient being about 4° C (Swenson 1980a). In addition, the lake temperature closely follows the air temperature through the year (Thompson and Verret 1980) with a maximum water column mean temperature of about 30° C in August-September and a minimum of about 6° C in January-February.

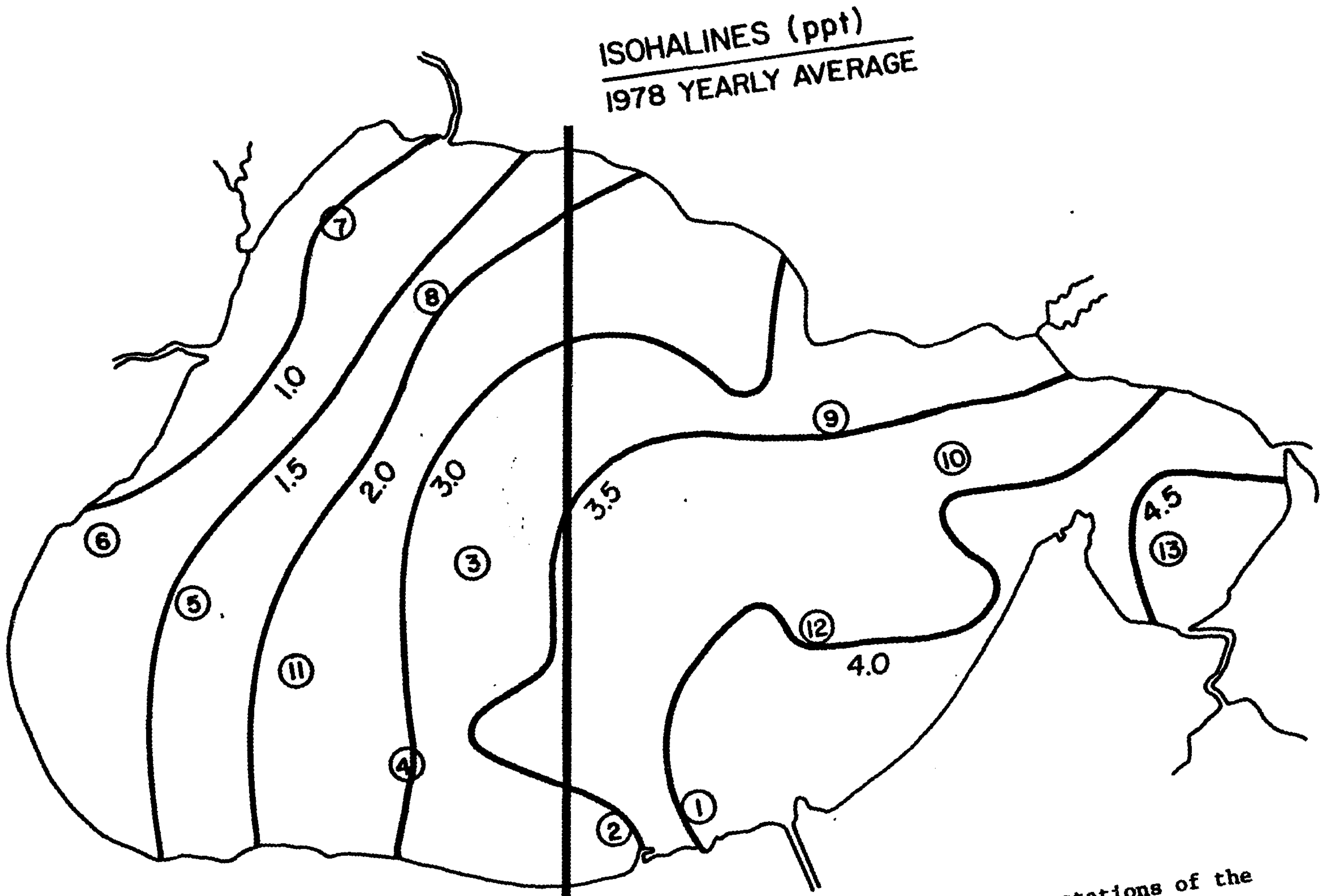


Figure 2. Lake Pontchartrain, Louisiana showing the thirteen sampling stations of the present study and the average isohaline (ppt) for 1978.

Vertical salinity (and temperature) changes are usually small enough to be inconsequential, indicating that the lake is vertically a well-mixed system. Occasionally some salinity stratification does occur. The gradient can be as high as 6 ppt; however, it is usually less. Oxygen stratification may also occur occasionally, with low oxygen conditions resulting at the bottom.

The majority of the fresh water input to the lake is from three river sources: the Tickfaw, the Amite-Comite, and the Tangipahoa. These rivers supply about 85% of the river input to the lake. The Amite-Comite system alone supplies 52%. The remaining input is from numerous small rivers and bayous (8%), marsh drainage (3%) and runoff from the city of New Orleans (4%) (data from Swenson 1980b).

During flood years, Lake Pontchartrain can receive Mississippi River water via the Bonnet Carre Floodway and Pearl River water via The Rigolets. In 1979 the floodway was open for 38 days releasing a volume of water equal to $1.5 \times 10^{10} m^3$, a volume that is more than twice (240%) the volume of the lake (Swenson 1980a).

The flushing time of an estuary is defined as "the time required to replace the existing fresh water in an estuary at a rate equal to the river discharge" (Dyer 1973). Using the mean streamflow of 250 m^3/s, it is estimated that the flushing time for the lake is about 60 days.

Owing to the lake's large area, and hence large fetch, wind induced waves play an important role in the lake system. Wind and wave data collected by the Corps of Engineers in the 1950's and 1960's (unpublished) indicate that there is little lag time between an increase in wind speed and the corresponding increase in wave height. Analysis of this data indicates that resuspension of silt-clay sediments, the major type in Lake Pontchartrain, (Bahr et al. 1980) would occur with wave heights of about 1 m. Waves of this height occur with wind speeds of 9 m/s (20 MPH) or greater. Wind data for the lake (Gael 1980) indicate that winds of this magnitude occur about 15% of the time. Thus, one can conclude that the bottom sediments of the lake are in motion at least 15% of the time due to natural causes. This phenomenon has been recognized as having occurred in Lake Pontchartrain for some time. Steinmayer (1939) states "at times even the sediments in the deepest part of the lake are agitated and moved by waves."

Anthropogenic Impacts on Lake Pontchartrain

In order to understand the dynamics of biological processes occurring in Lake Pontchartrain it is necessary to consider the cultural influences which have modified the physical and chemical environment of the lake. It is not possible to view the faunal parameters in Lake Pontchartrain in the context of a pristine, natural system. Any description of Lake Pontchartrain which neglected these cultural impacts would be woefully incomplete.

Hydrologic Impacts

Lake Pontchartrain has probably been subjected to periodic flooding by waters from the Mississippi River throughout most of its history. This is true in recent times, because of the proximity of the present main channel of the Mississippi to the western shore of the lake. Numerous crevasses or breaks in the natural, and later man-made levees have occurred. The "crevass period" in the Lake Pontchartrain basin is considered as having extended from about 1750 to 1927 (Gunter 1953). Since the floodway was built it has been opened six times: in 1937, 1945, 1950, 1973, 1975, and 1979. The impact of lengthening the interflood periods is not fully known. The impact of the opening of the floodway and thus flooding of Lake Pontchartrain will be addressed later in this report.

The IHNC was built in 1921 (Schweitzer 1979), and the connection to Lake Pontchartrain was made at this time. The MRGO Canal was completed in 1963 to put the Port of New Orleans 65 km closer to the sea by way of a channel 160 m wide and 12 m deep (Schweitzer 1979). The MRGO is connected to the Intracoastal Waterway which connects to the IHNC which in turn is connected to Lake Pontchartrain. High salinity Gulf water enters Lake Pontchartrain via this route causing salinity and oxygen stratification in the southeastern region of the lake (Poirrier 1978). Although stratification does occur, the extent to which overall salinities on a lake-wide basis have been increased has not been fully quantified and will be addressed later in this report.

Many sections of the city of New Orleans are below sea level and leveed, necessitating that storm runoff water be pumped up and out of the city. Much of this water is pumped into Lake Pontchartrain, amounting to 4% of the annual fresh water input budget of the lake (Swenson 1980b). The southern shore of the lake is impacted by this water and its chemical constituents (U.S. Army Engineer District, New Orleans, 1980).

Changing land use patterns in the upper drainage basin of the lake have increased floodwater discharges primarily in the Amite-Comite River system (Turner and Bond 1980a). Urbanization tends to increase storm water runoff as well as adding to the pollution load.

Bonnet Carre Floodway Opening

The Mississippi is considered to have occupied its present channel for the past 700 years. For much of the time, before the building of artificial levees, the river flooded over a wide area. Lake Pontchartrain still received floodwater by overland flow and via Bayou Manchac, which was one of the floodwater distributaries. Thus it is safe to conclude that Lake Pontchartrain has received floodwaters from the Mississippi for the last fourth of its existence, and certainly during its formation by two Mississippi Delta systems. The Mississippi River has played a major role in the evolution of the Lake Pontchartain ecosystem. Levee building along the Mississippi River is considered to have begun about 1727, and extended to Baton Rouge by 1812. The building of levees increased the height of the flood crest on the river, and crevasses became more violent because of the increased gradient (Saucier 1963). From 1849 to 1927 Gunter (1953) states that there were 38 crevasses in the levee system allowing water to flow into Lake Pontchartrain or Lake Borgne, or an average of one crevasse opening every 2.1 years. Saucier (1963), on the other hand, shows the locations of only 11 crevasses, through which water flowed into Lake Pontchartrain, during the same 78 year period, for an average of one every 7.1 years. Gunter's figure of 38 crevasses is, thus, too high, as not all of these crevasses affected Lake Pontchartrain. In order to prevent the flooding of New Orleans and other communities, the Bonnet Carre Floodway was built in 1931 to divert floodwaters from the Mississippi River via Lake Pontchartrain to the Gulf of Mexico thus lowering the river stage downstream. Since 1931, the floodway has been opened six times: in 1937, 1945, 1950, 1973, 1975, and 1979. This is an average of one opening every 8.3 years over the past 50 years.

During the course of this study, the Bonnet Carre Floodway was opened on April 17, 1979. It was considered fully closed by May 26, 1979, with only four of the 350 bays remaining open until May 30, 1979. The opening and closing dates are relative because river water began leaking through the wooden "needles," or slats that close the bays, a considerable period of time before they were opened. Officially, however, the opening is considered to have begun April 19, 1979, with discharge data beginning on that date, and to have remained open for 32 days until May 20, 1979, when discharge data ceased to be taken. The total discharge is given in Figure 3 (Swenson 1980a) and Table 1. The total volume of water was roughly $1.5 \times 10^{10} m^3$, about 240% of the volume of the lake. As seen from Table 2, the whole lake essentially turned fresh in May 1979. Despite this large influx of colder river water, the effect on the temperature of the lake water was not as great as might have been expected (Table 3). Water temperatures in May 1979 remained close to the temperatures recorded in April 1979, about 2-3° below the May temperatures recorded in 1980. In all, the 1979 opening (32 days, mean discharge 4785 m^3/s was most similar to the 1950 opening (38 days, mean discharge 4049 m^3/s Saucier 1963).

Of the effects of the 1950 opening, Gunter (1953) states that the general effects were beneficial to oysters, speckled trout were driven eastward, and "the plant growths were greatly stimulated, and associated animal life, such as scuds and grass shrimp, was found in great concentration. Plankton feeders, such as mullet, anchovies, menhaden, and shad were seen in great abundance everywhere." Gunter does say, however, that the 1945 opening was generally considered to have caused considerable damage to oyster beds in Mississippi Sound. The 1945 opening was of much greater duration and volume (open 57 days, mean discharge 6088 m^3/s Saucier 1963), and was opended later in the year, March to May. The 1950 opening was open from February to March.

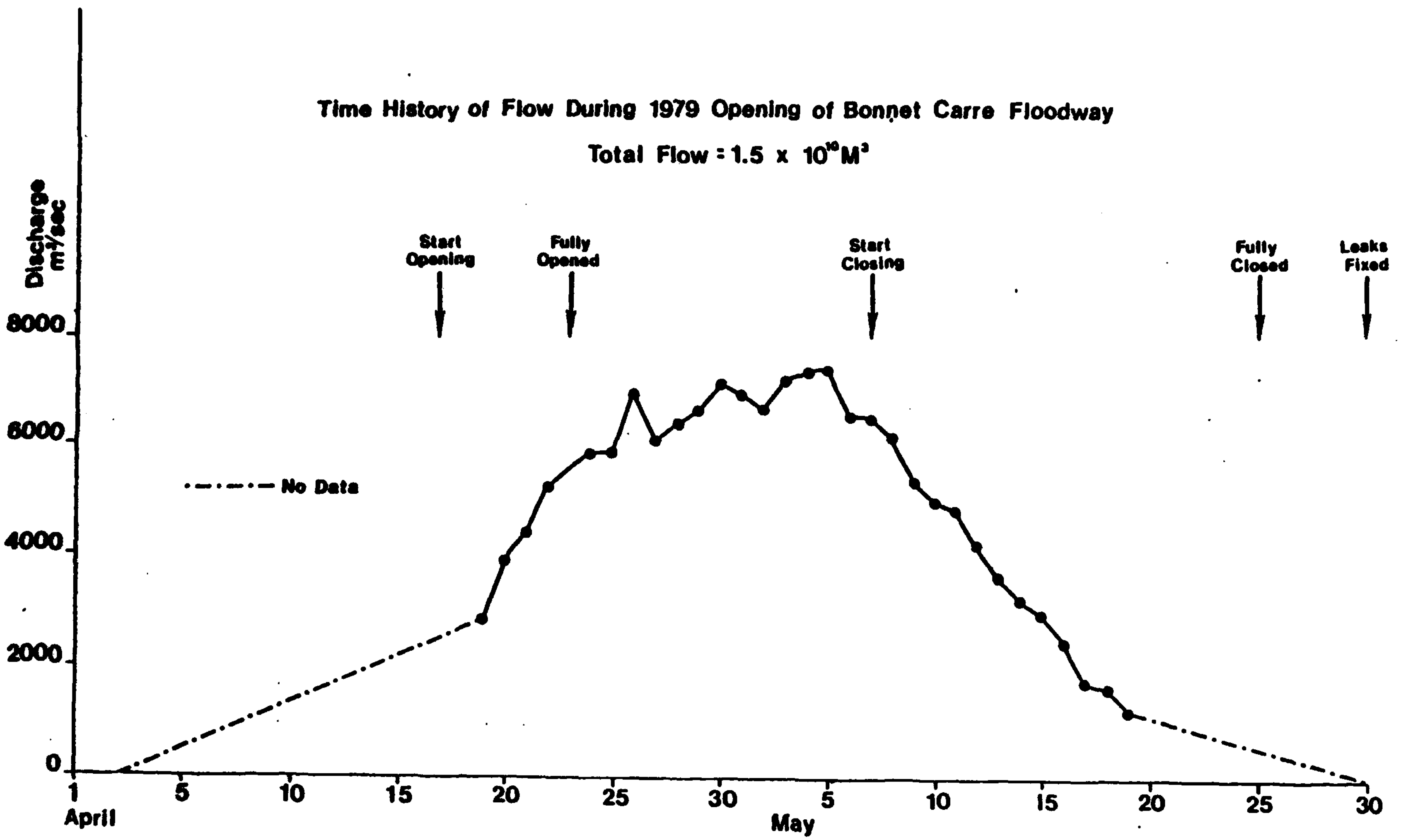


Figure 3. Time history of discharge (m^3/sec) from the April 1979 opening of the Bonnet Carre Floodway (data from Outlaw 1979). The total flow for the time period is indicated above the figure. Notes on floodway operation are also given. (figure from Swenson 1980a)

Table 1. Carbon loading into Lake Pontchartrain from the 1979 opening of the Bonnet Carre Floodway.

Date	volume flux* 10^3 cfs	volume flux* m^3/sec	carbon† mg/l	carbon flow g/sec	chlorophyll† ug/l	chlorophyll carbon g/l	chlorophyll carbon flow g/sec
April							
19	98	2,775.4	6.9	19,150.3	3.94	13.2×10^{-5}	360.8
20	130	3,681.6	12.0	44,179.2	2.98	9.9×10^{-5}	367.4
21	149	4,219.7	7.3	30,803.8	2.45	8.2×10^{-5}	346.4
22	179	5,069.3	-	--	-	--	--
23	-	--	6.9	--	1.85	6.2×10^{-5}	--
24	198	5,607.4	7.5	42,055.5	0.17	0.6×10^{-5}	31.9
25	190	5,380.8	9.0	48,427.2	1.39	4.6×10^{-5}	250.7
26	235	6,655.2	6.6	43,924.3	1.18	3.9×10^{-5}	262.8
27	205	5,805.6	7.4	42,961.4	0.00	0.0	0.0
28	-	--	8.3	--	1.30	--	--
29	216	6,117.2	7.2	44,043.8	0.52	1.7×10^{-5}	106.4
30	226	6,400.3	6.7	42,882.0	-	--	--
May							
1	244	6,910.1	7.3	50,443.8	1.56	5.2×10^{-5}	360.7
2	238	6.740.2	6.5	43,811.3	0.00	0.0	0.0
3	224	6,343.7	-	--	-	--	--
4	243	6,881.8	6.1	41,978.9	.18	0.6×10^{-5}	41.5
5	247	6,995.0	8.0	55,960.0	.89	2.9×10^{-5}	208.4
6	249	7,051.7	-	--	1.49	5.0×10^{-5}	356.8
7	218	6,173.7	6.5	40,129.0	1.47	4.9×10^{-5}	303.7
8	216	6,117.1	5.4	33,032.3	1.95	6.5×10^{-5}	399.4
9	204	5,777.3	6.5	37,552.4	2.94	9.8×10^{-5}	569.1
10	177	5,012.6	-	--	-	--	--
11	166	4,701.1	5.5	28,586.1	3.50	11.7×10^{-5}	550.0
12	161	4,559.5	6.4	29,180.8	2.14	7.2×10^{-5}	326.9
13	141	3,993.1	-	--	-	--	--
14	123	3,483.4	-	--	-	--	--
15	108	3,058.5	9.2	28,138.2	1.76	5.9×10^{-5}	180.1
16	97	2,747.0	6.0	16,482.0	1.47	4.9×10^{-5}	145.1
17	83	2,350.6	6.0	14,103.6	2.73	6.6×10^{-5}	214.8
18	58	1,642.6	5.8	9,527.1	1.97	6.6×10^{-5}	108.2
19	55	1,557.6	5.5	8,566.8	2.07	6.9×10^{-5}	107.9
20	42	1,189.4	4.3	5,114.4	2.27	7.6×10^{-5}	90.4
Mean	169	4,732.0	6.9	33,376.4	1.75	6.2×10^{-5}	258.6

*Data from Outlaw (1979), Table B1.

†Data from U.S. Geological Survey (1980).

Table 2. Lake Pontchartrain salinities in ppt, top and bottom for all stations (listed from west to east) and all sampling dates, recorded during the present study. The data illustrates the relative homogeneity of the salinity regime.

Station	Aug 78	Sep 78	Oct 78	Nov 78	Dec 78	Jan 79	Feb 79	Mar 79	Apr 79	May 79	Jun 79	Jul 79	Aug 79	Feb 80	May 80	Aug 80
7	1.1	1.1	1.7	2.6	3.4	3.3	0.7	1.9	0.0	0.1	0.2	0.5	0.9	1.2	0.0	1.2
	1.2	1.3	1.7	2.6	3.4	3.6	2.4	2.3	0.0	0.1	0.2	2.4	0.9	1.9	0.0	1.2
8	1.7	1.9	2.6	4.3	4.4	4.1	0.6	2.4	0.8	1.4	0.4	0.8	1.5	2.5	0.0	2.9
	1.9	1.9	2.6	4.0	4.4	4.1	3.7	2.4	0.8	1.3	0.4	0.8	1.4	3.0	0.0	2.9
3	3.5	3.5	4.6	5.7	4.1	4.6	2.7	2.4	2.0	1.1	0.5	1.9	2.0	3.1	1.0	4.5
	3.6	3.5	4.6	5.8	4.1	4.6	3.6	2.6	1.9	1.3	0.5	1.9	2.1	3.1	1.0	4.6
6	1.6	1.8	2.4	2.5	2.4	3.1	0.2	1.5	1.0	0.0	0.0	1.3	1.1	2.3	0.0	3.0
	1.7	1.8	2.5	2.7	2.4	3.1	1.2	1.5	1.0	0.0	0.0	1.3	1.1	2.3	0.0	3.0
5	2.3	2.2	2.5	3.3	2.8	3.7	0.6	2.0	1.4	0.1	0.2	1.5	1.5	3.0	0.1	3.2
	2.1	2.5	2.5	3.4	2.8	3.7	1.9	2.3	1.4	0.1	0.2	1.6	1.3	3.0	1.1	3.4
11				3.6			1.6	1.4		0.0			2.1	3.2	0.7	4.3
				3.8			3.4	1.8		0.0			2.1	3.2	1.2	4.3
4	3.1	3.6	4.4	3.4	3.6	3.9	1.7	1.7	1.8	0.0	0.6	1.8	2.8	3.0	0.8	4.4
	3.3	3.6	4.3	4.1	3.7	4.0	3.6	2.2	1.7	0.0	0.6	1.8	2.8	3.0	0.8	4.4
2	4.0	5.0	5.2	3.7	3.3	3.3	2.3	2.3	2.0	0.0	1.4	2.5	3.5	2.7	2.0	4.3
	5.2	5.2	5.2	4.3	4.4	3.7	2.3	2.3	2.0	0.0	1.4	2.6	7.1	2.8	3.0	4.4
1	3.7	5.2	4.9	3.8	3.4	3.3	2.5	2.4	2.5	0.0	1.9	2.7	3.9	2.7	2.1	4.9
	5.9	5.7	4.8	8.3	7.6	5.2	3.3	2.4	2.3	0.0	2.3	2.6	8.3	8.7	2.8	4.9
12				4.7			3.4	2.4		0.0			4.0	3.3	1.2	5.2
				4.7			4.1	1.2		0.0			4.5	3.3	1.4	8.0
9	2.2	2.4	2.9	4.6	4.7	3.5	4.0	2.2	2.2	0.7	0.9	0.9	2.2	3.4	1.0	4.2
	2.9	3.2	2.9	5.1	4.7	3.7	4.0	2.2	2.1	0.6	0.9	4.3	2.2	3.4	1.0	6.7
10	3.3	3.5	4.3	5.8	4.7	4.4	4.3	2.2	2.4	0.0	0.8	1.1	2.5	3.2	1.6	4.7
	3.5	7.7	4.3	5.9	5.1	4.5	4.4	2.2	2.4	0.0	0.8	1.1	3.1	3.2	1.8	9.3
13				5.4			4.2	2.0		0.0			3.4	3.0	1.4	10.7
				5.1			4.6	2.0		0.0			3.7	3.0	1.4	10.6
*East-West Difference																
Top	2.3	2.4	2.6	3.2	1.3	1.1	3.6	0.3	2.4	0.1	0.6	0.6	1.6	2.0	1.6	3.5
bottom	2.4	6.6	2.6	3.3	1.7	0.9	2.0	0.1	2.4	0.1	0.6	1.3	2.2	1.3	1.8	8.1

*Represents the difference in salinity between the eastern most station (Sta 10 for most cruises) and the western most station (Sta 7), in ppt.

Table 3. Lake Pontchartrain water temperatures (^0C) top and bottom for all stations, (listed from west to east) and all sampling dates, recorded during the present study. The data illustrates that the lake is nearly isothermal vertically most of the year. Greatest vertical difference occurred in February 1979. The effect of the Bonnet Carre can be seen at stations 4, 2, 1, and 10 in May 1979 when bottom water temperatures at these stations dropped from April values, while all other stations were higher than April values.

Station	Aug 78	Sep 78	Oct 78	Nov 78	Dec 78	Jan 79	Feb 79	Mar 79	Apr 79	May 79	Jun 79	Jul 79	Aug 79	Feb 80	May 80	Aug 80
7	29.7	28.0	21.0	20.7	11.2	6.7	12.3	20.8	23.6	25.0	26.5	30.7	29.9	15.1	27.2	29.6
	29.6	28.2	19.7	20.7	11.2	6.7	7.6	19.4	23.5	25.0	26.5	29.2	30.0	13.2	27.3	29.2
8	31.3	28.5	20.4	20.9	12.4	7.2	10.9	18.2	23.3	24.8	26.6	28.8	30.2	15.2	27.0	30.1
	28.6	28.3	19.6	20.6	12.3	7.0	8.2	17.3	23.2	24.8	26.7	28.7	29.5	12.6	25.3	30.1
3	29.5	28.5	19.7	21.5	12.2	6.9	10.5	18.8	23.4	27.7	27.2	29.2	29.9	13.1	25.5	30.7
	29.0	28.5	19.8	21.3	12.0	6.8	7.5	17.2	23.0	25.2	26.4	29.3	29.6	12.0	25.0	30.0
6	30.6	28.1	19.6	21.4	12.1	6.7	11.1	19.4	24.4	27.1	27.5	21.8	29.4	13.5	27.4	29.3
	28.5	28.4	19.5	21.0	11.4	6.6	8.3	18.1	23.8	24.8	26.8	29.5	29.5	13.1	27.3	29.4
5	32.6	28.1	19.5	21.5	12.6	6.7	10.3	20.2	24.1	26.3	27.7	31.0	29.9	13.2	27.0	29.5
	25.6	28.2	19.3	21.1	11.4	6.6	7.5	17.6	23.8	24.0	26.0	29.1	29.0	12.2	25.7	29.4
11		28.2		21.1			12.1	19.5		23.6			30.2	13.3	28.1	30.1
		28.4		20.7			7.3	17.1		20.3			29.2	11.8	27.5	29.8
4	30.8	28.5	19.9	20.6	12.4	7.4	11.7	18.9	23.2	22.0	28.4	29.5	30.0	12.7	28.3	29.8
	28.9	28.4	19.7	20.6	11.9	6.8	7.7	17.1	23.0	20.6	26.3	29.2	29.1	12.2	25.6	29.9
2	30.5	25.8	19.8	21.0	13.3	7.7	10.2	18.2	23.5	23.8	26.8	30.2	29.9	12.5	26.9	30.2
	29.1	25.9	19.9	20.2	12.9	7.0	8.1	18.3	23.5	22.2	26.8	30.0	30.4	12.0	24.3	30.1
1	30.5	26.2	20.1	20.7	13.6	8.2	10.5	18.4	24.1	25.3	26.8	30.7	30.0	13.0	26.1	29.4
	29.3	26.2	19.6	20.9	13.8	7.3	7.7	18.3	23.5	22.0	26.6	30.2	30.5	12.0	24.5	29.4
12				21.2			10.9	19.0		24.9			29.9	13.3	25.6	29.8
				20.9			8.0	17.0		21.6			29.6	11.5	24.5	29.6
9	32.5	26.3	18.8	20.6	12.9	7.7	9.2	18.3	24.1	24.2	27.6	29.2	29.9	12.8	24.9	28.8
	29.3	25.5	18.8	20.4	12.5	7.4	7.4	17.4	23.9	24.0	27.5	28.1	29.8	12.1	24.2	29.7
10	31.3	26.5	18.8	21.9	12.9	7.6	10.4	18.8	23.8	23.9	27.3	28.8	29.9	11.8	27.7	29.4
	29.5	25.7	18.7	20.9	12.4	7.3	7.9	17.5	23.6	22.6	27.0	28.9	29.3	11.4	26.2	30.2
13				21.2			9.0	18.5		23.4			31.1	11.8	23.9	29.9
				20.9			8.7	18.2		23.1			30.1	11.6	23.9	29.9

Other floodway studies include Porrier and Mulino (1975) which looked at the effects of the 1973 opening on the epifaunal fouling community, and Porrier and Mulino (1977) which looked at the effects of the 1975 opening on the same community. The former study of the 1973 opening concluded that although five out of 28 species were eliminated from the community, the 21 remaining species appeared to be present in the same relative abundance before and after the spillway opening. In the study of the 1975 opening, a similar conclusion was reached; that there was a lack of a significant change in the epifaunal community after the opening. However, the same five species which were eliminated in the 1973 opening were absent before the 1975 opening. In a study of the effects of the 1973 opening on plankton populations at two stations in eastern Lake Pontchartrain, Hawes and Perry (1978) concluded that the effects on the plankton had been dramatic but short-termed. The endemic assemblages had been replaced temporarily by a freshwater assemblage. However, the original assemblage returned after the closing of the floodway.

In general, it appears that the brackish-oligohaline system of Lake Pontchartrain can tolerate periodic lowering of salinities to 0.0 ppt caused by an opening of the Bonnet Carre Floodway. However, the impacts of the floodway opening can not be evaluated in terms of lowered salinities and freshwater impacts alone. Waterborne constituents need to be considered, particularly in a historic sense. Walsh et al. (1981) point out that, on a global scale, anthropogenic nitrogen loading of the world's rivers is increasing. They state that the nitrate content of the Mississippi has at least doubled to 9.3 mg/ℓ during spring flood over the past 25 years. Gunter (1953) reports a nitrate value of 0.4 mg/ℓ for water coming through the Bonnet Carre in 1950. Samples taken by the U.S. Corps of Engineers and analyzed by the U.S. Geological Survey during the 32 days of the 1979 opening have a mean value of 1.76 mg/ℓ nitrate nitrogen or about 7.66 mg/ℓ nitrate, a twentyfold increase. Gunter's value appears too low. It was probably either an error in analysis, or was taken on a particularly low day. In either event, it appears that certain waterborne constituents are increasing in concentration in Mississippi River water.

Organic carbon is another constituent of concern. Table 1 gives the total organic carbon measured daily by the U.S. Geological Survey during the 1979 opening. To calculate total loading the concentration is multiplied by the flow to give grams C per second (mean 2.76×10^6s) which equals 9.21×10^{10} g C brought into Lake Pontchartrain. If we compare this to the total carbon fixed in the lake by taking a mean of the midlake stations, 157.5 g Cm^2yr (Dow and Turner 1980) times the total area of the lake $1.66 \times 10^9 m^2$ (Swenson 1980b), we find that the total amount of organic carbon brought into the lake by the 1979 opening is 35.3% of the total carbon fixed in the lake in a year. The Bonnet Carre Floodway was only open for 32 days. When we compare the carbon pulse to the amount fixed in the lake during an average 32 day period, we find that more than four times as much carbon entered the lake as was fixed in a 32 day period. This represents a significant pulse, even if some of this carbon passed through without being deposited in the lake. Combined, the allocthonous carbon, and whatever amount of autochthonous production that may have been stimulated by the nutrient influx brought into the lake by the 1979 Bonnet Carre opening, amounts to a significant portion of the lake annual carbon budget.

Pollution

Lake Pontchartrain receives surface water drainage from two large drainage basins; the Lake Pontchartrain watershed, which includes the drainage basin of the Amite-Comite, Tangipahoa, Tchefuncte, and numerous local rivers, as well as the New Orleans area (Turner and Bond 1980b), and the Pearl River Drainage Basin. Both of these drainage basins carry urban, industrial, and agricultural runoff, which finds its way into the lake. Three regions of the lake are primarily impacted by toxic materials (U.S. Army Engineer District, New Orleans 1980). However, because of the shallowness of the lake and the nature of the wind-driven circulation patterns, Lake Pontchartrain is considered a well-mixed system, thus an impact in any region of the lake will impact the whole system.

The following four paragraphs are excerpted from the New Orleans-Baton Rouge Metropolitan Area Water Resources Study (U.S. Army Engineer District, New Orleans 1980).

> North and West Shores of Lake Pontchartrain
>
> Maximum recorded concentrations of mercury exceeded the EPA criterion at stations located at the mouth of the Tangipahoa and Tchefuncte Rivers, Pass Manchac, North Shore, and Greater New Orleans Expressway. The maximum concentration of mercury was 1.3 μg/ℓ, recorded at the month of the Tangipahoa River. The EPA criterion for mercury is 0.1 μg/ℓ.
>
> PCB, chlordane, parathion, dieldrin, and aldrin violated the EPA criteria of 0.001 μg/ℓ, 0.004 μg/ℓ, 0.04 μg/ℓ, 0.003 μg/ℓ and 0.003 μg/ℓ respectively, for these parameters. PCB frequently exceeded the criterion at stations located at the mouth of the Tangipahoa River and Pass Manchac, and it occasionally exceeded the criterion at the mouth of the Tchefuncte River. Maximum recorded concentrations occurred at Pass Manchac and were 0.2 μg/ℓ. Chlordane and parathion frequently exceeded the criteria at the station at Pass Manchac. Maximum recorded concentrations of these two parameters were 0.7 μg/ℓ and 6 μg/ℓ respectively. Dieldrin and aldrin concentrations exceeded the EPA criteria at the mouth of Bayou Lacombe, with maximum recorded concentrations of 0.025 μg/ℓ and 0.025 μg/ℓ. Fecal coliform counts frequently violated the EPA criterion of 200 colonies/100 ml at all of the stations sampled. The maximum recorded value was 2,400 colonies/100 ml.

South Shore of Lake Pontchartrain

All samples analyzed for aldrin and dieldrin exceeded the EPA criteria at all stations. The maximum and minimum concentrations recorded for both parameters were 0.025 μg/ℓ. The EPA criteria for both parameters are 0.003 μg/ℓ.

The Corps of Engineers no-discharge criteria are exceeded by DO, pH, fecal coliform, aldrin, and dieldrin. The maximum and minimum recorded values were given in previous paragraphs. The no-discharge criteria for DO, pH, fecal coliform are 5.0 μg/ℓ 6.0-8.5, and 200 colonies/100 ml, respectively. The no-discharge criteria for aldrin and dieldrin are zero.

It should be noted that several of the pesticides and PCB's exceeded the EPA criteria by several orders of magnitude at maximum recorded concentrations. In addition, high levels of PCB's (mean of 0.32 ± 0.04 μg/ℓ) were found in Lake Pontchartrain sediments at stations in the center of the lake (Sikora et al. 1981). Unfortunately, no sediment criteria exist at this time. However, to put it in perspective on a concentration basis, the EPA water criterion is 0.001 μg/ℓ or 0.001 ppb while the sediment concentrations are 320.0 ppb, five orders of magnitude higher.

Pass Manchac, which is estimated to supply over 60% of the freshwater inflow into Lake Pontchartrain (Swenson 1980b), is the source of significant input of the herbicides 2,4-D and 2,4,5-T. From water resources data (U.S. Geological Survey 1980), Pass Manchac was sampled on 44 days between October 1978 and September 1979 with most of the sample in April, May, and June 1979. Out of 44 sampling days, 2,4-D was present 42 days in concentrations which ranged from 0.01 and 0.12 μg/ℓ and 2,4,5-T was present 37 days in concentrations from 0.01 to 0.03 μg/ℓ. This represents an almost continuous input of these two biocides for which the no-discharge criteria is zero. Unfortunately, no flow data is available for Pass Manchac. A conservative estimate of flows into Lake Maurepas by Swenson (1980b) for 1978 is a mean flow of 203.6 m^3/s. Assuming at least that the same amount of water flows out through Pass Manchac, and multiplying the flow by the mean concentration of 0.05 μg/ℓ 2,4-D an estimated 315 kg or 693 lb enters the lake in a year from this source alone.

The Bonnet Carre Floodway also brings in a load of toxic substances from the Mississippi River. During the 1979 opening significant concentrations of lead (380 μg/ℓ max), zinc (60 μg/ℓ max) and copper (32 μg/ℓ max) were measured (U.S. Geological Survey 1980). Also detected were calcium (1 μg/ℓ), mercury (0.1-0.2 μg/ℓ), selenium and vanadium. The biocides present in detectable amounts were dieldrin, diazinon, DDT, 2,4-D and 2,4,5-T. Although endrin, heptachlor, epoxide, and chlordane are reported to be present in the Mississippi River (Brodtmann 1976), they were below detectable limits during the 1979 flooding. PCB's were also not detected in the 1979 floodwater samples but are reported from the Mississippi River (Giam et al. 1977, Giam et al. 1978). An unfiltered water sample containing a considerable amount of sediment was taken during the present study off the spillway structure and analyzed by the EPA laboratory. It contained 210 ppb arochlor 1260, probably adsorbed to sediment particles, and thus not detectable in filtered water samples.

Hydraulic Shell Dredging in Lake Pontchartrain

Hydraulic dredging for *Rangia* shell in Lake Pontchartrain began around 1933 and has steadily intensified to the present time. This trend can readily be seen from clam shell production estimates by the Louisiana Wild Life and Fisheries Commission, (1968), which range from 230,000 m^3 statewide in the mid-thirties to 3,820,000 m^3, mainly from Lakes Pontchartrain and Maurepas, in 1968. The shells of the brackish water clam *Rangia cuneata* are deposited in shallow layers, 0.5 to 1 m deep, blanketing the entire bottom of an estuary. The strategy for harvesting this resource is for the dredges to move continuously at 5 to 8 km/hr, constantly dredging a shallow trench 1 to 2 m wide. Nearly 0.25 km^2/day will pass through the processing plant of a single dredge, with a larger area being affected by spoil. In this respect clam shell dredging differs from oyster shell dredging, because oyster shells are concentrated in reefs buried 5 to 15 m in depth. Harvesting these shells results in a potholed effect, with severe disturbance in concentrated areas, yet with large areas left undisturbed.

The magnitude of clam shell dredging in Lake Pontchartrain is discussed by Sikora et al. (1981). There are between five and seven dredges operating in the lake continuously. Allowing for breakdowns and repairs, it is estimated that in a year's time between 3.17 to 5.08 x 10^8 m^2 will be dredged.

GSRI (1974) describes a series of zoning restrictions imposed by the Louisiana Wild Life and Fisheries Commission, which include, 1) a one-mile band around the perimeter of the lake, 2) a one-mile strip on each side of the Lake Pontchartrain Causeway, 3) a one-half-mile strip crossing the lake diagonally to protect high pressure gas pipelines, and 4) a four-mile wide area encompassing the eastern end of the lake from Goose Point to New Orleans. Dredging operations are thus prohibited in 56% of the lake. The total area of the lake is estimated by Swenson (1980b) to be 1.66 x $10^9 m^2$ of which 7.17 x $10^8 m^2$ is open to dredging. Dividing this figure by each of the two estimates of the area covered by dredging annually, we find that an area equal to that which is open to dredging will be covered in from 1.4 years (with 7 dredges working 360 days/yr) to 2.3 years (with 5 dredges working 270 days/yr). At this rate, one can see that not only has much of the lake been dredged, but because the entire 44% of lake bottom open to dredging is not covered in any one year, some of the lake bottom is dredged and redredged, possibly several times each year.

Sikora et al. (1981) conclude that shell dredging produces fluid mud and low bulk density sediments which persist for long periods in the lake. Over the two year study period, benthic biomass production was reduced by an average of 32% in a dredged area as compared to a nondredged control area.

Sediments and Mineralogy

There are three major species of clay minerals transported by rivers to the marine environment; kaolinite, illite, and montmorillonite (Parham 1966). The surface charges or cation-exchange capacities of these three minerals are quite different, with montmorillonite having roughly three times the capacity of illite and twelve times that of kaolinite (Strahler and Strahler 1971). The amount of salt in the water necessary to cause flocculation of each clay mineral is therefore different. Kaolinite, with the lowest capacity, will flocculate in the lower salinity waters. Montmorillonite, on the other hand, will remain suspended in the lower salinity waters and be sedimented in areas with water of higher salinity. Generally, in a gradient from fresh to marine water, the sequence of sedimentation is kaolinite, illite, and montmorillonite. The distribution of clay minerals in Lake Pontchartrain was studied by Brooks and Ferrell (1970) based on 1967 field sampling. They found all three species of clay minerals in Lake Pontchartrain, with kaolinite content decreasing from west to east, illite increasing from north to south-southeast and montmorillonite increasing from west to east-southeast. Montmorillonite is the most important in the central lake region, amounting to 60% of the clay; kaolinite, about 30%; and illite, 20% or less. The authors conclude that, on a large scale, salinity gradients and corresponding mineralogical gradients do exist. This study illustrates the fact that Lake Pontchartrain does have considerable periods of time with a stable salinity gradient, or it would not have retained an identifiable gradient of clays in the sediment.

The total organic carbon content of the sediments has been measured in the past (Steinmayer 1939), during the lake-wide initial survey (Bahr et al. 1980), and at the sampling stations during the present study. On comparing the present levels to those measured in 1939, a striking fact emerges: the organic content of the sediments in Lake Pontchartrain has drastically decreased. Steinmayer (1939) states that the organic content of Lake Pontchartrain sediments is of vegetable origin; what he terms as comminuted vegetable matter and humus matter. He gives an average value for organic content of clay sediments as 6.72% by dry weight. He also gives an "isorganic chart" on which are plotted isopleths of organic matter in the lake, and states that "organic content is high in the deeps and gentle slopes and low on the beaches and ridges." Much of the center of the lake is shown to have an organic content of 6% and a considerable area in the very center of the lake 8% organic content. During the lake-wide initial survey in 1978-1979 (Bahr et al. 1980) 86 stations were analyzed for organic carbon. Only 7 stations had organic content above 1.8% (Figure 4a). Only two of these were over 5%; one in a peat

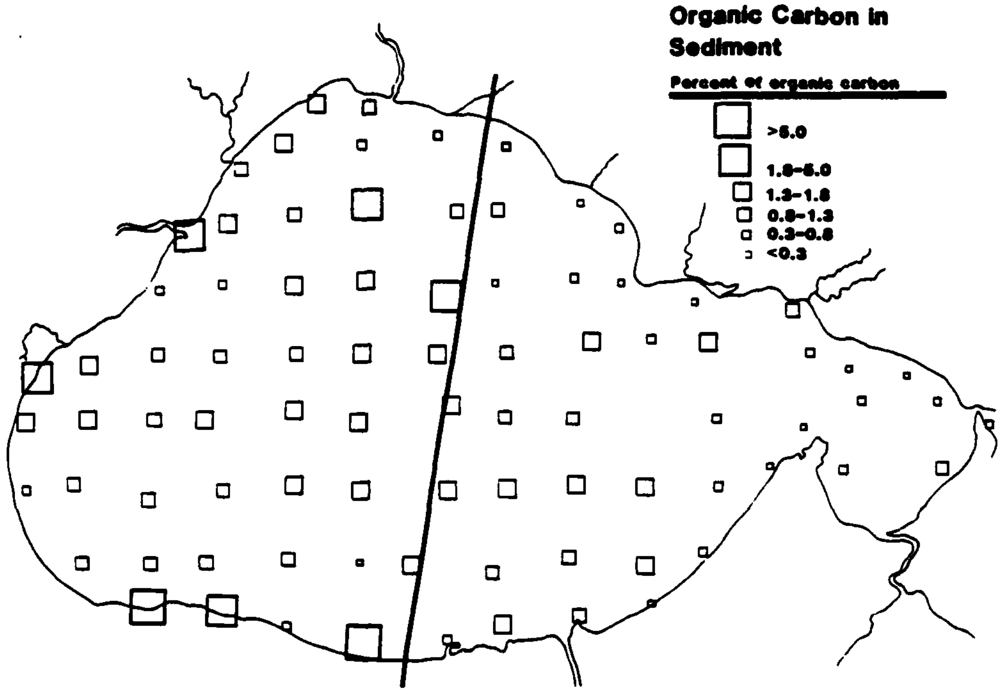


Figure 4a. Distribution of organic carbon in sediments of Lake Pontchartrain La. determined in the initial survey, from Bahr et al. (1980).

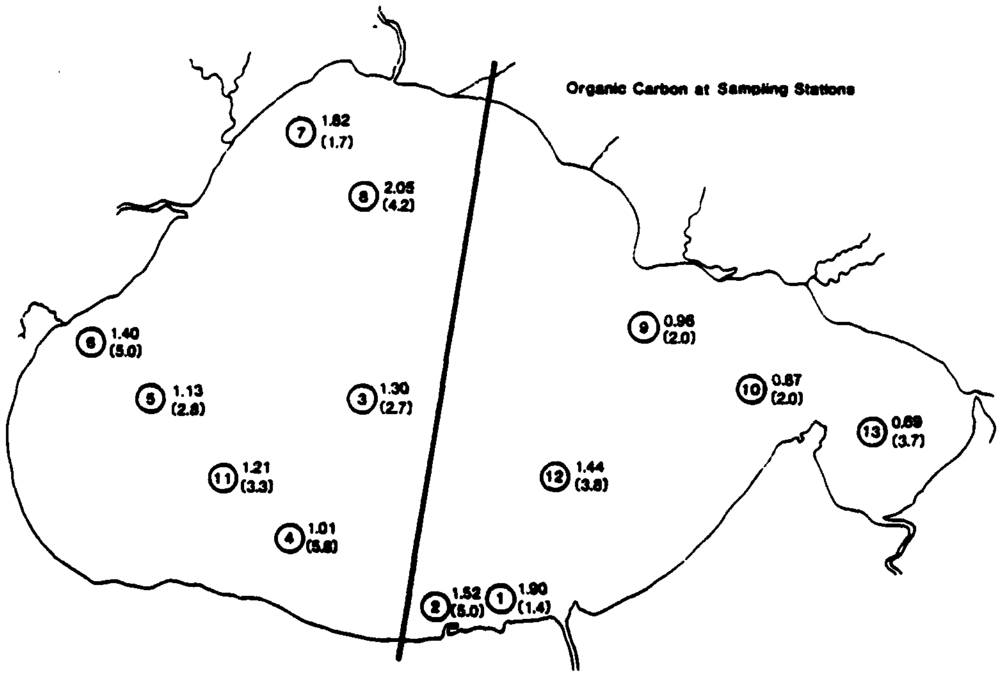


Figure 4b. Sampling stations of present study showing organic carbon in sediments as percent dry weight. Numbers in parentheses indicate depth of sample in centimeters.

bed near the shore, and one near a sewage outfall in Jefferson Parish. The mean value for the 86 stations in the lake was 1.06% ± 0.49%. In the present study the organic carbon content of the sediments was measured by depth at each station. Values for the top layer of sediment (1.7 cm to 5.8 cm except Station 3, in which the top 2 cm were lost) range from a high of 2.05% at Station 8 to 0.69% at Station 13 (Figure 4b, Table 4) with a mean value of 1.33 ± 0.11%. It is evident that a significant drop in the organic content of the sediments has taken place. The methodology used in the two studies is not entirely dissimilar. Steinmayer used loss on ignition of dried sediment (dried at 110° C). In the intial survey, and in the present study, carbon was determined by burning dried sediment in an induction furnace and measuring carbon with a gasiometric carbon analyzer (Appendix E), thus the results should be comparable.

Grain size analysis (methods appear in Appendix E) from Bahr et al. (1980) was used in the present study and is illustrated in Figure 5. The major portion of the open lake region is composed of silty-clay sediments. Ten of the 13 stations had this sediment type, except the following: Station 4, a fine clayey sand; Station 9, a coarse clayey sand; Station 13, a fine sandy silt with some clay. Bahr et al. (1980) show that the distribution of benthic organisms in Lake Pontchartrain was not related to sediment grain size distribution. Therefore, no further effort to refine the grain size analyses at the sampling stations was made in the present study.

Bulk density is the actual weight per unit volume of intact sediment, with differences between sediments of the same grain size distribution, and similar organic content, being the result of sediment consolidation. Consolidation of sediments, corresponding most closely to compaction in geological terminology, is defined as "every process involving a decrease of the water content of a saturated sediment without replacement of the water by air" (Terzaghi 1943) or "the gradual process which involves, simultaneously, a slow escape of water and a gradual compression, and which also involves a gradual pressure adjustment" (Taylor 1948). Bulk density can be used as a measure of the consolidation state provided that the grain size distribution is taken into account. As sediment grain size increases toward larger grain sizes, i.e., toward sand, the bulk density also increases. This increase in bulk desnity of coarser sediments is not due to consolidation. Richards and Parks (1976) report bulk density of 1.42 g/cm^3 for silty clay in North Pacific Continental Shelf and slope sediments.

The methods used to collect samples and determine bulk density are given in Appendix E. Bulk densities were determined in 5 cm depth intervals; however, because of the method employed, the uppermost sample varied in depth. Thus it is difficult to compare the bulk densities of the upper-most samples in an absolute stratigraphic sense. Even on a relative basis, comparison of all the stations is difficult because of differences in sediment type and grain size. Stations 4, 9, 10, 11, and 13 (Table 5) have large components of silt and sand, and which give higher bulk densities. Stations 1, 2, 3, 5, 7, 8, and 12 all have basically silty-clay sediments. Station 8 has anomalously low bulk density in the

Table 4. Organic carbon as percent of sediment dry weight by depth in Lake Pontchartrain. Mean of uppermost samples = 1.33 ± 0.11%.

Depth cm	Stations												
	1	2	3	4	5	6	7	8	9	10	11	12	13
	(1.4)* 1.90	(5.0) 1.52	(2-7)† 1.30	(5.8) 1.01	(2.8) 1.13	(5.0) 1.40	(1.7) 1.82	(4.2) 2.05	(2.0) 0.96	(4.2) 0.87	(3.3) 1.21	(3.8) 1.44	(3.7) 0.69
	2.02	1.77	1.60	0.67	1.14	1.26	2.04	0.93	0.61	1.37	0.88	1.27	0.57
	1.75	1.21	1.53	0.99	1.19	0.66	1.56	1.54	1.46	1.24	1.41	1.21	0.65
	1.74	1.23	1.76	1.04	1.32	0.65	1.87	1.41	1.09	0.94	1.57	1.11	0.77
	1.72	1.10	1.60	0.32	1.45	0.51	1.83	1.67	1.63	1.33	2.02	1.26	0.64
	0.67	1.15	1.99	0.27	1.22		2.05	0.89	1.70	0.66	0.85	1.31	0.54
			1.61		1.17		2.05	0.79	0.24	0.58		1.41	
					0.84							1.29	

*Depth in cm of uppermost segment of sample in parentheses, remaining values are for consecutive 5cm segments.

†Uppermost 2cm lost.

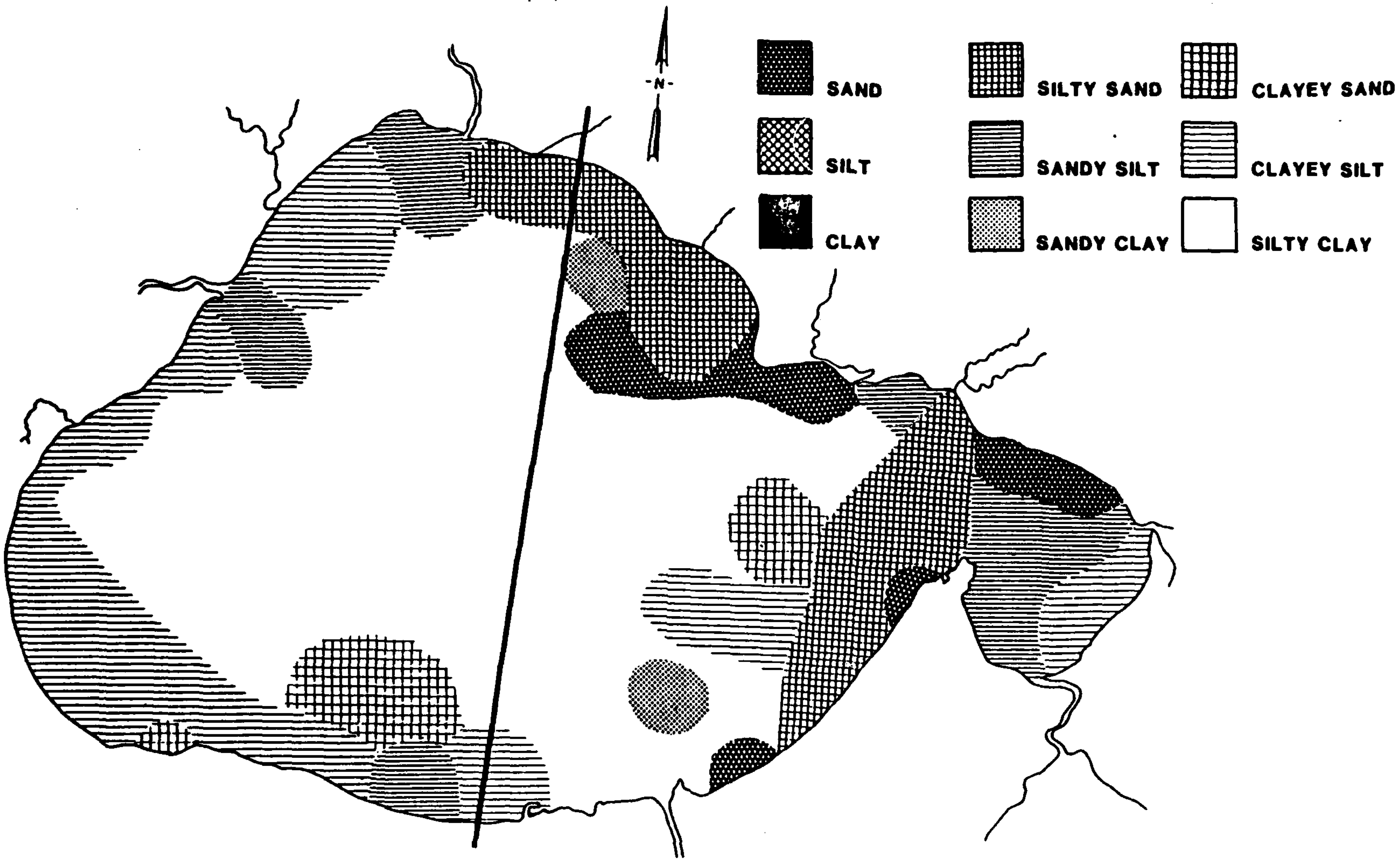


Figure 5. Distribution of sediment types in Lake Pontchartrain, Louisiana, as determined during the initial survey (Bahr et al. 1980).

Table 5. Sediment bulk densities by depth in Lake Pontchartrain, Louisiana.

Depth cm	Stations												
	1	2	3	4	5	6	7	8	9	10	11	12	13
	(1.4)* 1.29	(5.0) 1.26	(2-7)† 1.30	(5.8) 1.46	(2.8) 1.28	(5.0) 1.48	(1.7) 1.33	(4.2) 1.17	(1.95) 1.39	(4.2) 1.48	(3.3) 1.38	(3.8) 1.28	(3.7) 1.55
	1.29	1.41	1.30	1.62	1.40	1.64	1.39	1.36	1.63	1.42	1.43	1.27	1.78
	1.28	1.41	1.31	1.72	1.34	1.73	1.42	1.31	1.57	1.44	1.48	1.25	1.77
	1.28	1.43	1.34	1.45	1.37	1.74	1.42	1.30	1.61	1.59	1.33	1.27	1.74
	1.35	1.43	1.36	2.06	1.39		1.51	1.30	1.30	1.51	1.28	1.30	1.68
	1.50	1.45	1.31	2.10	1.37		1.40	1.32	1.31	1.39	1.46	1.31	1.93
			1.30		1.37		1.44	1.36	2.04	1.40		1.33	
					1.52					1.67		1.35	

*Depth in cm of uppermost segment of sample in parentheses, remaining values are for consecutive 5cm segments.

†Uppermost 2cm lost.

upper-most sample, perhaps because it also has the highest organic carbon content (Table 1). The other stations in this group all have comparable bulk densities ranging from 1.28-1.33. The next tier of samples by depth (5 cm deeper) shows some differences. Stations 1, 3, and 12 show the same bulk density at this depth while Stations 2, 5, 7, and to some degree, 8 show higher bulk densities at this depth. Also Stations 2 and 7 show the same or higher bulk densities at the next deeper depth, while Stations 1, 5, 8, and 12 all decrease in bulk density at the next deeper depth. Perhaps one factor that may have influenced the uniformity of the bulk density in the uppermost samples was the opening of the Bonnet Carre Floodway in April 1979, since samples for the measurement of bulk densities were all taken in July 1979. Another possible factor is the redistribution of sediments altered by shell dredging activity by wind-induced waves and water circulation (Sikora et al. 1981).

Salinity Regime of Lake Pontchartrain

By definition, salinity is an important physical parameter of estuaries. Unless sea water is measurably diluted with fresh water there is no estuary (Pritchard 1967). Of importance to the distribution of the biota is not only the degree of sea water dilution but how the dilution process varies spatially and temporally. Estuaries are generally characterized by changing salinities which are governed by fresh water inputs and mixing processes. In estuaries with large fresh water inputs and large tidal heights, significant changes in salinities can occur in a matter of hours, particularly with a semidiurnal tide. Estuaries with large tidal excursions may have large salinity variations over large areas. Usually estuaries are thought of as stressed environments not only because of the physical variability but because of the temporal variability associated with wide ranges of physical parameters.

The more stressful an environment, the fewer the number of species which can adapt and prosper in it. Slobodkin and Sanders (1969) list three types of low diversity (i.e., species poor) environments: (1) "new" environments, (2) "severe" environments, and (3) "unpredictable" environments. The category, "unpredictable" is defined as those environments in which the variances of environmental properties around their mean values are relatively high and unpredictable both spatially and temporally. The authors go on to predict that given two regions of identical geometric and geologic properties, the less severe and more predictable will probably have greater species diversity.

An examination of the mean monthly salinities taken daily during the 12 year period from 1946 to 1958 at Little Woods, Louisiana on the southeastern shore of Lake Pontchartrain (U.S. Army Corps of Engineers 1962) reveals that Lake Pontchartrain does have a predictable salinity pattern (Figure 6). Salinities are low in late spring and early summer and high in the fall period in October-November. Note that the variability in any one month does not exceed 3 ppt and the range over the 12 year period is about 5.5 ppt.

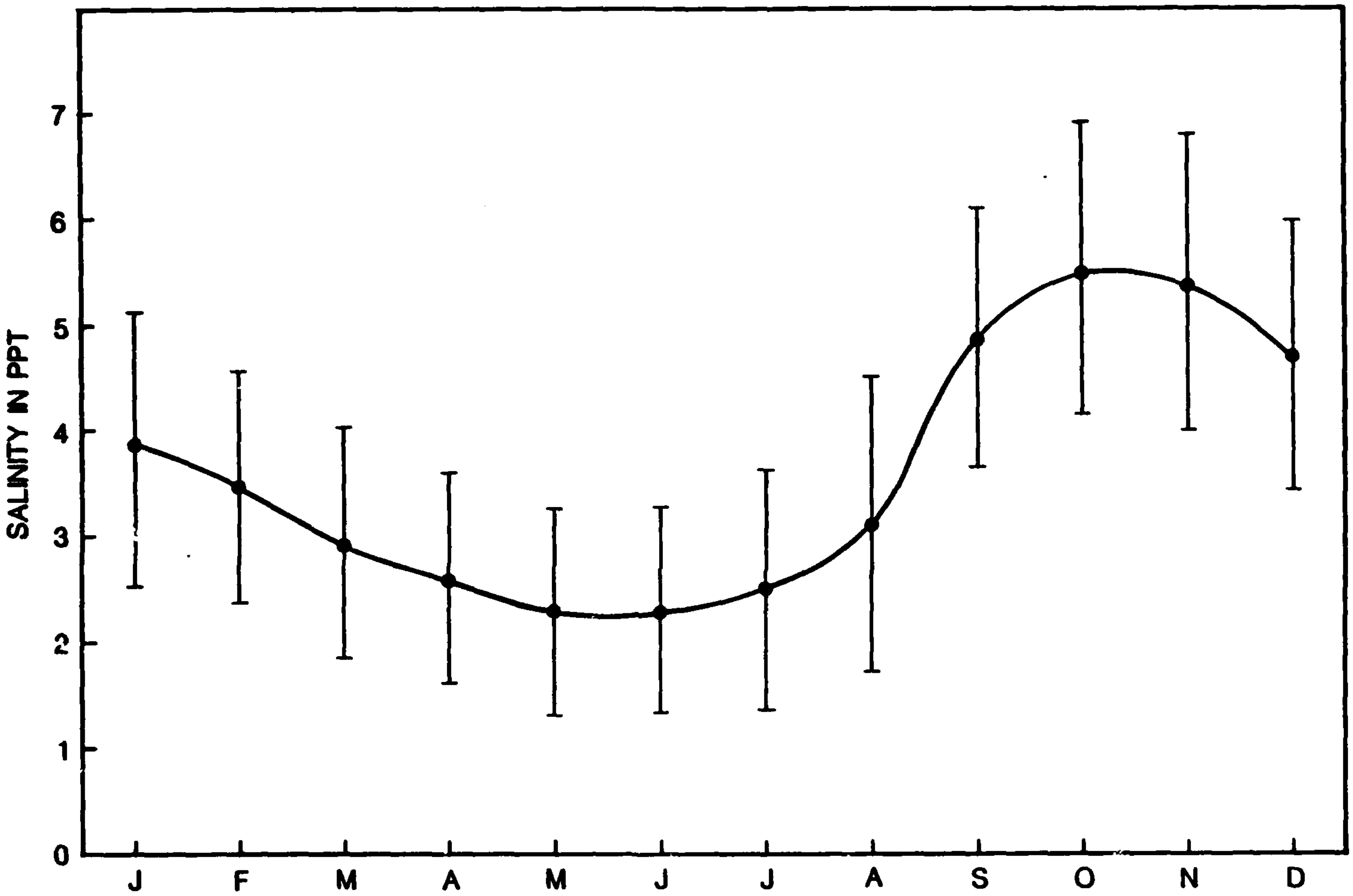


Figure 6. Twelve year monthly mean salinities at Little Woods, Lake Pontchartrain, La., for the years 1946 to 1958. Values in ppt, vertical bars denote 95% confidence intervals. The mean difference between seasonal high and low salinities is only 3 ppt.

The other aspect of predictability in an estuary is the stability of the salinity gradient. Data gathered during a hydrographic study of Lake Pontchartrain by Swenson (1980a) indicate that the lake responds as a unit to salinity fluctuation (Figures 7 and 8). The lake was divided into four regions: A. northwestern riverine region, B. southwestern region, C. eastern region, and D. a far eastern, east bay region. These regions were determined by their salinity response, and they appear to follow each other closely in their salinity fluctuations. It is also evident from Figure 8 that the salinity gradient runs from lower salinities in the west to higher salinities in the east. This was found by previous workers Brooks and Ferrel (1970), Tarver and Savoie (1976), and others. An examination of salinities recorded during the course of the present study reveals that the range in salinities from west to east is usually less than 3 ppt with the largest range recorded in August 1980 of 9.5 ppt. These data also reveal that, although there is little or no salinity stratification most of the time, stratification does occur, particularly at Station 1, and occasionally in the eastern section of Stations 9, 10, and 13. Of interest also is the fact that virtually the whole lake had fresh water conditions in May 1979 after the opening of the Bonnet Carre Floodway. Salinities had not fully recovered two months after the closing of the floodway but had returned to normal conditions by August 1979. Although the opening of the Bonnet Carre Floodway may at first seem drastic, the lowering of salinities in an oligohaline system, even to 0 ppt, is not in reality that great a variation from the mean.

On three occasions the salinity was reversed, albeit slightly, so that lower salinities occurred in the eastern region in March, May, and July 1979. That this should occur at all indicates that the Pearl River may influence salinities in Lake Pontchartrain to a greater extent than previously thought. In order to actually lower salinities in the east, Pearl River water would have to actually enter the lake in abundance. However, the Pearl River could also prevent salinities from becoming high in the eastern region by pushing out and/or diluting Gulf water before it enters Pontchartrain. This appears to have occurred on at least two occasions; in September 1972 (Tarver and Savoie 1976) (high salinities used by Bahr et al. [1980]) and during the present study in August 1980. Both times the Pearl River had flows below normal in combination with low river flows in the Pontchartrain Basin. A closer examination needs to be made of river flow data since it appears that both drainage basins must have low flow times in unison in order to cause high salinities in Pontchartrain.

Thus it appears that Lake Pontchartrain has quite stable and predictable salinity patterns. Other estuaries on the Gulf coast exhibit extreme fluctuations. Parker (1955) reports that several bays in Texas that normally experience fluctuations of 20 ppt experienced salinity fluctuations of 40 ppt in the early 1950's. Apalachicola Bay in northern Florida, another bar-built estuary, experiences yearly salinity fluctuations between 0 and 25 ppt (Livingston et al. 1978). Lake Pontchartrain then would be predicted to have normal to higher than normal diversities for an oligohaline system.

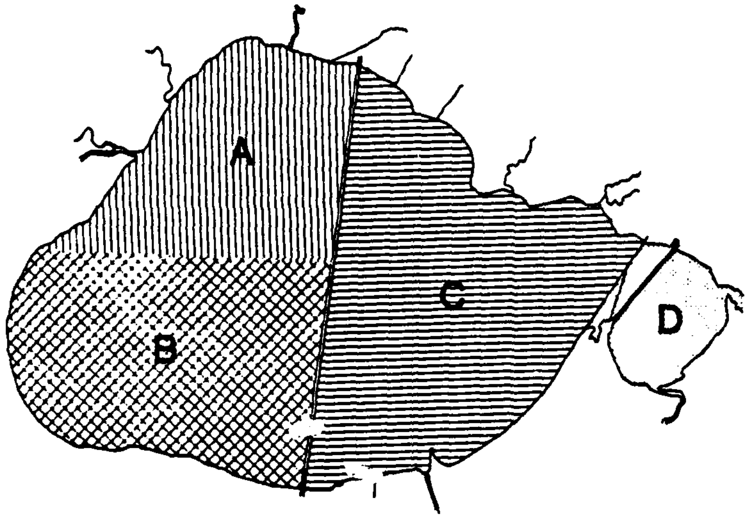


Figure 7. Four regions of Lake Pontchartrain determined by salinity characteristics: A northwestern, riverine region; B southwestern region; C eastern region; D far eastern, east bay region.

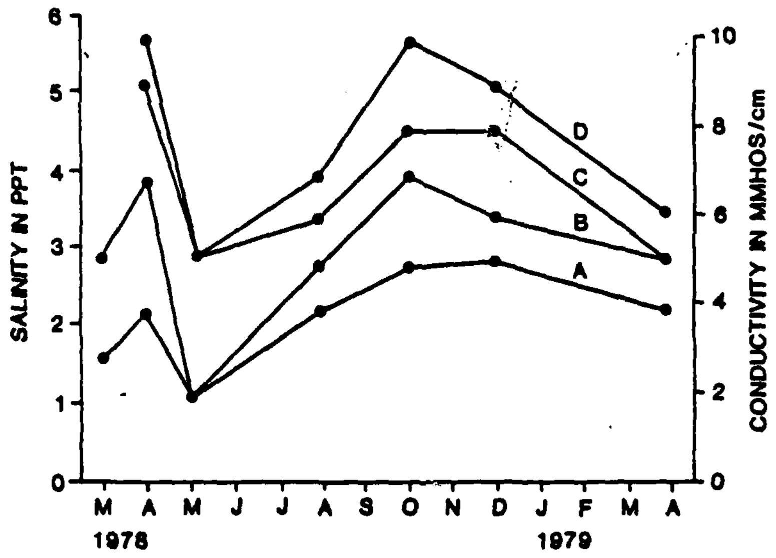


Figure 8. Lake Pontchartrain responds as a whole to seasonal salinity fluctuations despite salinity differences between the four regions. (data from Swenson 1980a)

METHODS

Location of Sampling Stations

In designing a sampling regime to yield the greatest amount of information from a fixed number of samples, the allocation of samples in a stratified random sampling design will produce large gains in precision if stratification is proportional to some variable (Cochran 1977, Green 1979) or to some identifiable deviation in the habitats or biotopes (Elliott 1971). Two environmental variables which were considered as important in the optimal allocation of samples for the characterization of benthic community structure and function were salinity and sediment grain size.

The selection process for the locations of the monthly stations began with an extensive initial survey of the lake from February to May 1978. The lake was divided into a grid of 86 quadrats, each in 23.2 km^2 in area. The results of this initial survey are given in Bahr et al. (1980). The benthic characterization study was conceived as an open lake study rather than a littoral investigation because of relative size of the open lake compared to its shoreline. The lake was further divided into five geographical regions: an eastern, western, northern, southern, and central regions. The intent was to place stations in each of these regions in combination with other factors such as riverine input, salinity regime, sediment grain size, and urban influence. Maximum salinities from Tarver and Savoie (1976) were used to divide the lake into a low salinity portion, 60% of the lake and a higher salinity portion, 40% of the lake. Since salinity was considered one of the most important physical variables governing animal distribution, six stations were allocated to the low salinity portion and four stations to the high salinity portion. A similar type of apportionment was followed for grain size and total organic carbon. Figure 2 shows the locations of the monthly sampling stations (1-10), and the seasonal stations (11-13).

The exact placement of the stations was done with the following rationale: two stations (1 and 2) in the area of urban influence near New Orelans, a transect of stations in a northwesterly direction (4, 5, and 6), a midlake station (3), a riverine station (7), a station further out in the lake which might be impacted by the rivers and Pass Manchac (8), a station in sandy area in the north region (9), and a station which would be in the eastern region subject to water movement from the east (10). Later, after the logistics of sampling these 10 stations and analyzing the samples in the laboratory had been worked out, the 3 seasonal stations were added in areas where additional information would be useful. Dates of benthic sampling cruises are given in Appendix D.

Determination of Precision of Sampling Regime

Before the initiation of the regular sampling cruises a preliminary sampling cruise was made on August 1, 1978 in order to determine the number of replicate samples required to yield statistically valid population estimates. The macroinfauna sampling was accomplished with 10 replicate cores from a modified J&O boxcorer (Jonassen and Olausson 1966). The meiofauna was sampled from three of the boxcores with acrylic core tubes (4.9 cm^2) for a total of 12 replicate cores. Additionally, 8 meiofauna samples were carefully taken by divers to determine the extent to which the sampling gear being used might bias the population estimates. The smaller meiofauna are subject to re-suspension by the bow wave from certain types of sampling gear and make good indicators of bias. Meiofauna samples from the boxcores had a mean of 48,000 ± 8900/m^2. Meiofauna samples from the diver-taken cores had a mean of 47,100 ± 6200/m^2, which was not significantly different ($p > 0.05$) from the mean of the boxcore samples. Analysis of variance established that the variability in the meiofauna was no greater between boxcores than within the boxcores. From these preliminary analyses we concluded that the box corer was sampling infauna without bias, and that the boxcore samples taken at one station were sampling one habitat, since differences between boxcores were no greater than differences within box cores.

After the macrofauna from the 10 boxcore samples had been counted and identified the mean was found to be 6477 ± 844/m^2. To establish the number of samples needed for an adequate sampling regime, this information and a formula from Elliott (1971) was used,

$$n = \frac{s^2}{E^2\ x^2}$$

where n represents the number of samples required; s^2, the variance; E, the error that can be tolerated in the estimate of the population mean; and x, the arithmetic mean of the samples. At least 17.1 samples would be required to achieve a 10% error (or 90% confidence limits to the mean). Another method of establishing an adequate number of replicates was also used (Green 1979), $\sqrt{n} = t_{1-(\frac{1}{2})\alpha}(s/x)$, which gave an estimated replicate number of 27. Finally, numbers were assigned to these 10 preliminary samples, and random numbers were generated to form unbiased groups of samples. The mean and variance of groups of 3 randomly chosen boxcore samples were tested against the mean and variance of the group of 10 boxcores and were found not to be significantly different ($p > 0.05$). In other words, 3 box cores would yield as much information about the density of the population, with as much precision, as 10 boxcores would.

The meiofauna cores were tested in a similar fashion, and it was found that 4 samples would be necessary to yield as much information as 10 cores. The variability of meiofauna is somewhat higher than that usually found in macrofauna, and therefore requires somewhat more sampling effort to attain the same degree of precision of estimates of mean densities.

Sampling Methods

To obtain quantitative information on the density and distribution of the benthic community of Lake Pontchartrain, a series of 3 replicate undisturbed bottom sediment samples were taken at the 13 stations with a modified J&O box corer (Jonassen and Olausson 1966), 0.09 m^2 for macrofauna, and subsampled with acrylic core tubes (4.9 cm^2) for the 4 meiofauna samples. Under the following conditions the contents of the box corer were discarded and another sample was taken.

1) If rough water caused the boat to move sufficiently to cause the corer to enter the sediments at an angle so that the surface was disturbed

2) If the corer was found on retrieval to have entered the sediments too deeply so that organisms could have been lost through the top

3) If, on retrieval, the corer appeared to be leaking because a piece of shell was preventing full closure of the jaws of the device.

The contents of the box corer were sieved first through a 1.27 cm mesh; then through 0.32 cm mesh to remove large shells and organisms; then through a 0.5 mm screen to retain the remainder of the macrofauna (animals > 500 μm). All fractions were preserved onboard ship in a buffered formalin solution with Rose Bengal stain. Meiofauna samples (animals between 500 μm and 44 μm) were preserved unsieved. All samples were returned to the laboratory for further sieving, enumeration, identification, and archiving. Organisms were identified to the lowest practical taxon, with certain forms being sent to specialists for confirmation or for further identification.

Meiofauna samples were sieved in the laboratory through a series of sieves. Animals retained on the 500 mm sieve were returned to the macrofauna sample from the box core from which the meiofauna core was removed. Animals retained on the 63 mm and 44 mm sieves were counted as meiofauna. As animals were identified, they were placed in appropriately labelled vials. The contents of all vials were recounted, and the residue from which the animals had been removed was searched for animals that might have been overlooked: Sample vials have been archived for further use by taxonomic specialists if requested.

All macrofauna were first sorted to major taxa and later identified to species. Some specimens were sent to consulting taxonomic specialists for confirmation of identification. Some undescribed species are listed as such. Since macrofauna are rechecked as species identifications are made, the additional recounting to maintain laboratory efficiency in meiofauna sorting is not necessary for macrofauna sorting.

Stations 1 through 10 were sampled monthly from August 1978 through August 1979, then quarterly through August 1980.

Stations 11, 12, and 13 were sampled quarterly from November 1978 through August 1980.

Statistical Methods

Statistical analyses were performed using computer programs according to Barr et al. (1979). programs. Certain special programs for classification and ordination of benthic data were provided by Dr. Stephen A. Bloom of the University of Florida (Bloom et al. 1977).

With 582 collections of macrofauna, the use of multivariate techniques of analysis became mandatory. Numerical analyses, particularly clustering methods, are a conservative method of treating very large data sets. No subjective elimination or combining of data is necessary, and interpretation is straightforward, eliminating the need for intuitive approaches (Clifford and Stephenson 1975, Green 1979). Clustering analysis is a grouping procedure to separate ecological entities -- in this case, monthly collections at each station. It can show semilarities or differences, depending on the form of coefficient used. An objective decision on the degree to which the opening of the Bonnet Carre caused changes in the benthic community structure of each station was based on cluster analysis of the macrofauna for each station over time.

The Canberra metric coefficient in its dissimilarity form is

$$D_{jk} = \frac{1}{m} \sum_i \frac{|x_{ij} - x_{ik}|}{(x_{kj} + x_{ik})}$$

where X_{ij} is the value of the i-th species in the j-th collection and m is the number of attributes (species). The Canberra metric coefficient is often used in benthic studies (Clifford and Stephenson 1975) because it suppresses the importance of the wide ranges of numbers of individuals of certain species. With particularly "spikey" data sets, the use of a simultaneous double standardization of the data is recommended to alleviate scale problems (Boesch 1973). This yields a standardized element:

$$Y_{ij} = \frac{x_{ij}}{(\sum_j x_{ij} \sum_i x_{ij})^{1/2}}$$

for entry into the matrix. No transformations of the data were performed.

The flexible sorting strategy with $\beta = -0.25$ that was used is considered an intensely clustering, moderately space dilating strategy. It is considered better to use an intensely clustering strategy when the data set is very large (Boesch 1977).

Diversity of all collections was measured using the Shannon-Wiener index, $H' = \Sigma p_i \log_e p_i$, where p_i is the proportion of the population that is of the i-th species. Evenness was measured using $J' = H'/H'_{max}$ where $H'_{max} = \log_e S$, or $J' = H'/\log_e S$, and S is the number of species.

Niche breadth (B_i) for a given species (i) over all environments (h) was measured using a formula derived from a function, $\lambda = \Sigma p_i^2$ proposed by Simpson (1949) as a measure of concentration. Levins (1968) proposed as a measure of niche breadth $B = 1/\lambda$. The formula

$$B_i = \frac{1}{\sum^{h} p_{ih}^{2}}$$

was also used to obtain niche breadth of the total community ($\hat{B}$) by summing all of the species abundances in each environment and then calculating community percentages in the formula given above (Lane et al. 1975). Niche breadth of an individual species B_i was compared with the niche breadth of the total community $\hat{B}$ in order to establish the degree to which that species utilized all resources available (the generalist) or utilized only a part of the total resource (the specialist).

To obtain biomass values for all taxa, intact individuals were placed in preweighed miniature aluminum foil weighing pans and dried at 100° C for 24 hr (Cummins and Wuycheck 1971). All weighings were done on a Cahn Automatic Electrobalance, model 21. Empty pans were also weighed, dried, and muffled, so that corrections for oxidation of the aluminum could be made in the calculations of the ash free dry weights (AFDW).

At least 10 replicates for each taxa were weighed. Some species of macrofauna that had been sorted into size classes, such as Rangia cuneata, had over 40 replicates. The smaller organisms, such as nematodes, required as many as 50 organisms per replicate. Some species that exhibited seasonal changes in biomass required additional replicates for seasonal values. These data were then incorporated into the statistical analysis programs so that estimates of ash-free dry weights could be made for all collections (Appendix A).

RESULTS

The results for various measures of community structure will be described separately for each of the stations. In the section for each station there will be a figure showing macrofauna abundance. The average for the lake is shown as a dashed line with small filled circles. Values for the station being described are represented by larger filled triangles and a solid line.

In each section there will be a similar figure showing nematode abundance. Total meiofauna abundance dynamics are often masked by erratic settlements of temporary meiofauna. The presence or absence of such taxa as benthic ostracods and rotifers, which are sometimes in the sediments, and sometimes just above the sediments, can also contribute to the high variability of meiofauna values. Nematode abundance, on the other hand, varies less and probably represents a more accurate measure of the patterns of true meiofaunal abundance than the more variable total meiofauna.

Tables in Appendix A give average abundance and biomass of meiofauna and macrofauna for each station and each sampling period. These tables also include the diversity, number of species, and evenness of the macrofauna. Table 6 gives the station locations, depths, and sediment types.

<u>Station 1</u>

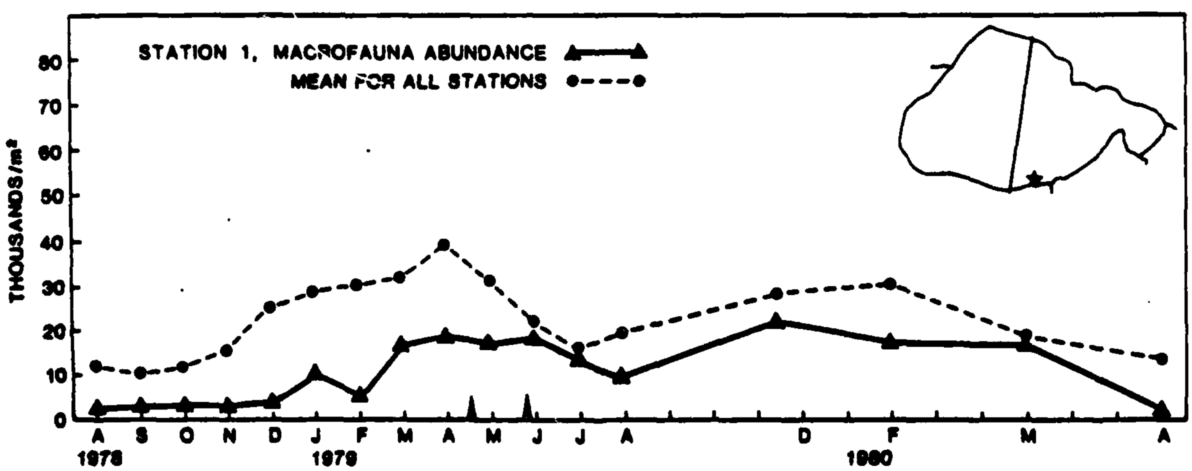


Figure 9. Macrofauna Abundance, Station 1.

Table 6. Location, depth, and sediment type of sampling stations in Lake Pontchartrain, Louisiana

Station number	Location	Depth in meters	Sediments
1	30° 03' 06" N, 90° 04' 55" W	4.6	Soft silty-clay
2	30° 03' 04" N, 90° 07' 25" W	4.6	Firm silty-clay
3	30° 10' 19" N, 90° 10' 28" W	4.6	Soft silty-clay
4	30° 05' 35" N, 90° 12' 57" W	4.5	Hard silty-sand
5	30° 10' 54" N, 90° 19' 42" W	3.5	Soft silty-clay
6	30° 12' 36" N, 90° 21' 17" W	3.0	Soft silty-clay
7	30° 20' 51" N, 90° 13' 16" W	3.0	Soft silty-clay
8	30° 18' 05" N, 90° 10' 20" W	4.3	Soft silty-clay
9	30° 13' 27" N, 89° 59' 12" W	3.8	Mixed; coarse sand, silty-clay
10	30° 10' 34" N, 89° 56' 05" W	4.0	Soft silty-clay
11	30° 07' 45" N, 90° 16' 20" W	4.1	Hard silty-sand
12	30° 07' 44" N, 90° 02' 09" W	5.0	Soft silty-clay
13	30° 09' 19" N, 89° 49' 00" W	2.7	Hard silty-sand

Station 1, located in the southern portion of Lake Pontchartrain (Figure 2, Table 6) was 2.8 km north of the mouth of Bayou St. John, about 2 km northwest of the IHNC, and 6 km east of the Causeway. This station was under urban and industrial influence. Higher salinity water from the IHNC at times caused salinity and oxygen stratification. Porrier (1978) has also recorded this stratification in the same area.

Macrofauna abundance is relatively low, but not significantly different from the overall abundance at Station 12, which had the lowest densities of all stations. Average abundance for the first year was $9,759/m^2$; the second year it was $12,698/m^2$; and for the entire study period, $11,228/m^2$. No seasonal peaks were observed (Figure 9). Densities at Station 1 did not appear to be coupled with the same factors that regulate densities in the lake as a whole. The ususal pattern of low numbers in the warmer months, due to heavier predation pressure (Levine 1980), and higher numbers in the colder months with a peak in February (due to the movement of many predators out into the Gulf) was not followed. No response to the opening of the Bonnet Carre Floodway was seen.

Fewer species were found at Station 1 than the average for the lake (Table 7). A small hydrobiid gastropod, *Texadina sphinctostoma*, was the dominant species found, making up 80% of the numbers. The highest numbers of a capitellid polychaete, *Mediomastus californiensis*, that occur in the lake were found at Station 1. Two clams, *Rangia cuneata* and *Mulinia pontchartrainensis*, occurred in low numbers. These four species plus a few chironomids comprised more than 96% of the numbers of animals found at Station 1.

Species diversity at Station 1 was the lowest of any station in the lake. The diversity of 0.832 ± 0.59 for the first year was significantly lower than the lake mean of 1.117 ± 0.015. Diversity at Station 1 fell even lower the second year, to 0.582 ± 0.085. Average number of species the first year was 9.85 ± 0.44; the second year, 8.00 ± 1.24. Evenness, calculated at 0.365 ± 0.025 the first year, dropped to 0.291 ± 0.021 during the second year. Dominance of *T. sphinctostoma* had increased to 90% with a concomitant drop in percent of other species.

Station 1 also ranked lowest in biomass of any of the stations. The average for the two year study of $2.7677 \pm 0.4823\ g/m^2$ AFDW is significantly lower than the mean of $8.8238\ g/m^2$ AFDW found for the lake.

Cluster analysis of the macrofauna for Station 1 over the 17 sampling periods (Figure C1, Appendix C) showed three major clusters. The first group, characterized by intermediate abundance and diversity, included December 1978 and January, February, and March 1979. The second cluster, with higher abundance and lower diversities than the first cluster, included all sampling periods from April 1979 through May of 1980. The third cluster was the extremely low abundance samples from August through November of 1978 and August of 1980.

Table 7. Macrofauna diversity and niche breadth measures; mean for all months, by station.

Station	Diversity	Number of Species	Evenness	$\hat{B}$
1	0.773 ± 0.051	9.412 ± 0.453	0.347 ± 0.200	24.795
2	0.828 ± 0.039	11.235 ± 0.418	0.346 ± 0.014	29.092
3	1.031 ± 0.035	12.000 ± 0.317	0.418 ± 0.013	25.365
4	1.249 ± 0.033	12.412 ± 0.358	0.500 ± 0.012	46.264
5	1.149 ± 0.024	11.353 ± 0.329	0.477 ± 0.008	44.331
6	1.144 ± 0.029	10.059 ± 0.307	0.506 ± 0.014	35.049
7	1.149 ± 0.050	9.451 ± 0.315	0.523 ± 0.024	18.149
8	1.254 ± 0.024	11.765 ± 0.265	0.513 ± 0.010	49.756
9	1.031 ± 0.055	9.451 ± 0.367	0.467 ± 0.024	28.981
10	1.124 ± 0.036	11.137 ± 0.349	0.472 ± 0.013	37.328
11	1.189 ± 0.047	12.000 ± 0.450	0.483 ± 0.019	38.898
12	0.860 ± 0.073	8.208 ± 0.761	0.477 ± 0.038	21.219
13	1.374 ± 0.059	18.041 ± 0.573	0.478 ± 0.020	46.038
$\bar{x}$	1.089 ± 0.049	11.271 ± 0.667	0.462 ± 0.016	34.251 ± 2.897

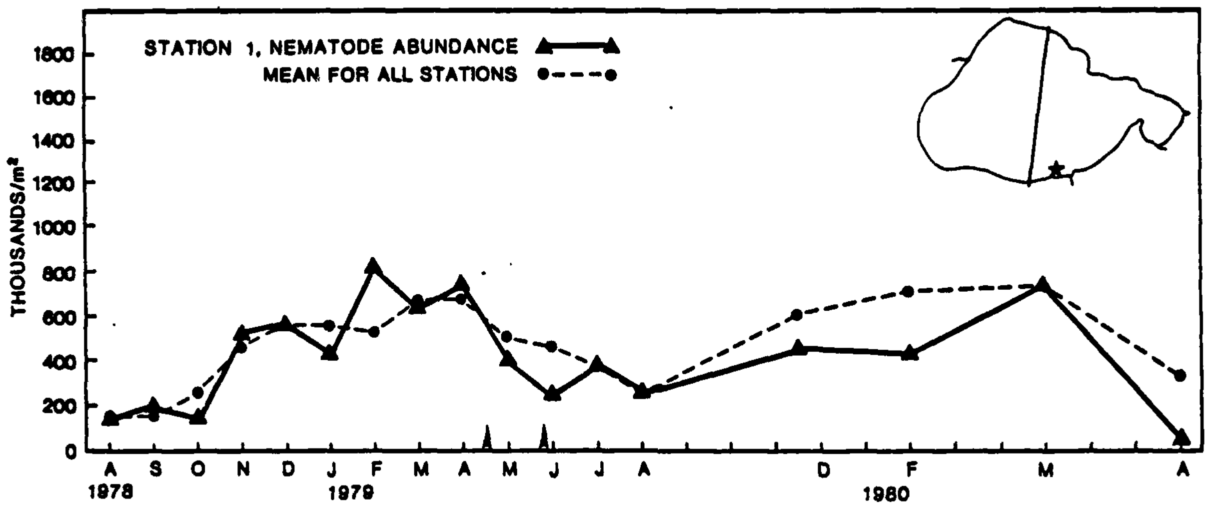


Figure 10. Nematode Abundance, Station 1.

As with the very low abundance, biomass, and diversity of the macrofauna of Station 1, the total meiofauna abundance at Station 1 (Figure 10) was very near the lake mean, but very low numbers of other taxa (Table A2, Appendix A) keep the total abundance down. Biomass was quite low; the mean value of 0.7133 g/m^2 AFDW was significantly ($p < 0.05$) lower than the mean of 0.9424 g/m^2 AFDW found for the lake. Biomass was lower than any other station except Station 12, and was not significantly different ($p < 0.05$) from Station 12.

Copepod densities at Station 1 were below average for the lake, which probably contributes to the low biomass, since copepod ash-free dry weights were approximately three times that of the relatively small nematodes.

In addition to the group of five dominant copepods, Halicyclops coulli, Halicyclops fosteri, Pseudobradya sp., Scottolana canadensis, and Acartia tonsa that were found at all stations, two rarer species with marine affinities occurred at Station 1. These were Enhydrosoma sp. and Pseudostenhelia wellsi, which did not occur at many other stations.

Other meiofauna taxa found to be below the lake average were ostracods and rotifers. Certain taxa found in very low numbers in the lake as a whole, such as kinorhynchs, gastrotrichs, and tardigrades, did not occur at all at Station 1.

Station 2

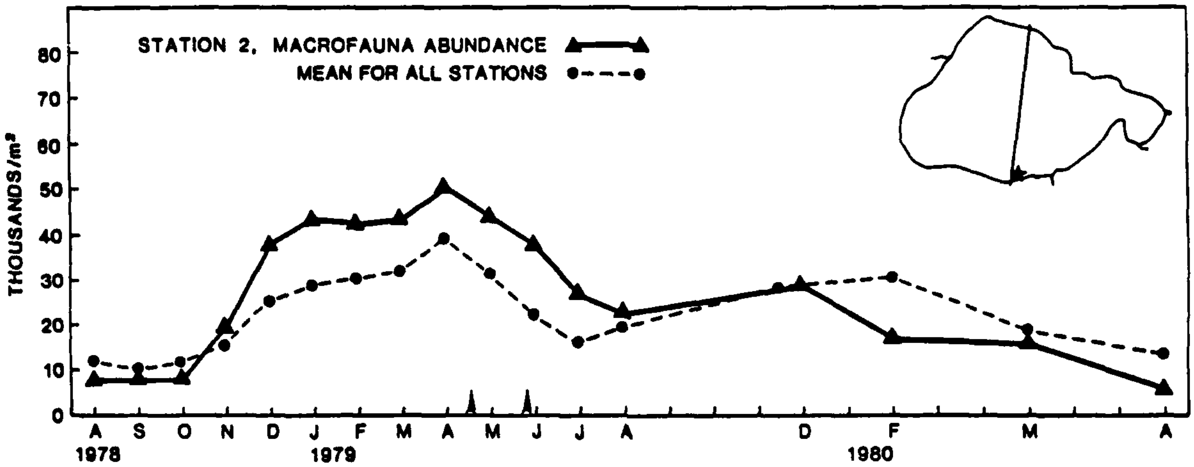


Figure 11. Macrofauna Abundance, Station 2.

Station 2 was west of Station 1, (Figure 2) in the southern portion of Lake Pontchartrain (Table 6). Located 2.7 km north of the Southern Yacht Club and 2.4 km east of the Causeway, this station was under urban influence with occasional salinity and oxygen stratification. Station 2 probably had never been dredged; large amounts of shell were always present in the boxcores.

Macrofauna abundance (Figure 11) was slightly above the average for the lake the first year and below the average for the second year of the study. Average abundance the first year was 29,962/m²; for the second year, 23, 338/m²; for the entire study period, 26,650/m². Seasonal peaks in abundance (Figure 11) followed the general trends for the whole lake, unlike Station 1 that was only 4 km to the east.

A response to the opening of the Bonnet Carre Floodway was seen in the increase in macrofauna abundance in April 1979, possibly attributable to the effect of the colder, fresher flood waters on the usual macrofauna predators.

The number of species found both years of the study was average for the lake. Texadina sphinctostoma, the small gastropod, was the dominant species, accounting for 77% of the abundance. Rangia cuneata, Mulinia pontchartrainensis, Mediomastus californiensis, and chironomids, together with the gastropod, made up 99.5% of the total abundance.

Although macrofauna abundance was average, measures of species diversity for the first year were not significantly different from Station 1, with the lowest measured diversity. During the second year, diversity at Station 2 dropped from 0.832 ± 0.059 to 0.791 ± 0.106, which was not a significant decrease. Three other stations had greater decreases in diversity. Average number of species decreased significantly, from 11.72 ± 0.32 the first year to 9.67 ± 1.39 the second year. Evenness remained quite similar: 0.344 ± 0.016 the first year, and 0.352 ± 0.029 the second year. The significant change in species numbers was not reflected in a significant change in diversity, but rather was a consequence of the lowered densities during the second year.

Biomass of the macrofauna at Station 2 was 7.9712 ± 0.927 g/m^2 AFDW, near the mean for the lake.

Cluster analysis (Figure C2, Appendix C) of Station 2 macrofauna over time yielded three clusters. The first cluster included all sampling periods from January 1979 through August 1979, and was characterized by higher abundances and diversity. The next cluster include November 1978, December 1979, and February and May 1980, with lower diversity, and intermediate abundance. The last cluster included August, September, and October 1978, and August 1980, and was characterized by low abundance.

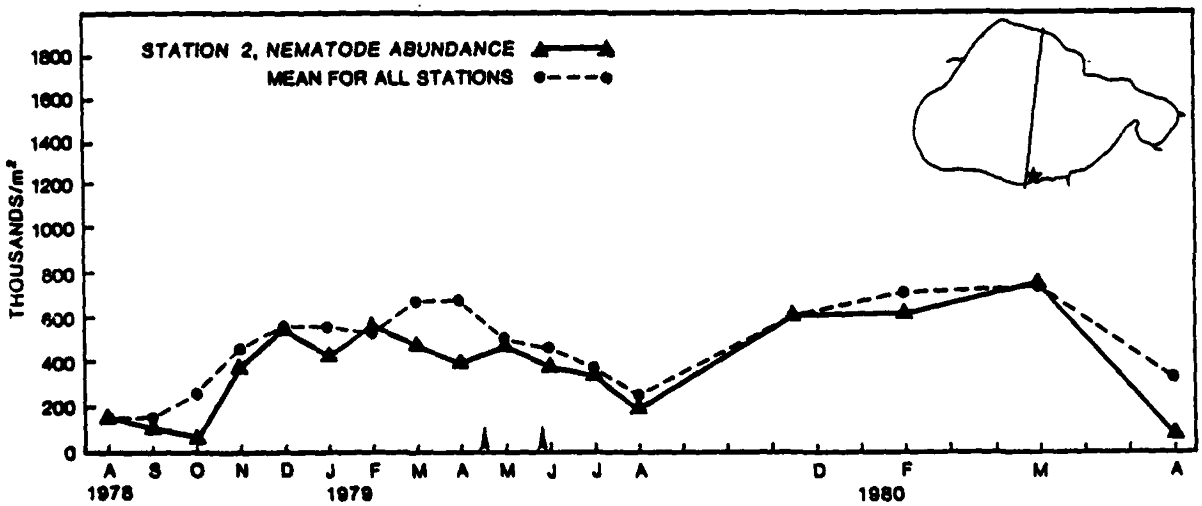


Figure 12. Nematode Abundance, Station 2.

Unlike macrofauna abundance at Station 2, which was higher than at the neighboring Station 1, the abundance of nematodes was lower at Station 2 than at Station 1 the first year of the study (Figure 12). Although numbers of nematodes increased the second year (Table A2, Appendix A) all other meiofauna taxa decreased, with a significant decrease in copepod numbers. Copepod species at Station 2 were the same as at Station 1. Meiofauna biomass was low, 0.7803 ± 0.0596 g/m^2 AFDW, not significantly different ($p < 0.05$) from Station 1, and significantly lower than the mean of 0.9424 ± 0.0901 g/m^2 AFDW for the lake as a whole.

Station 3

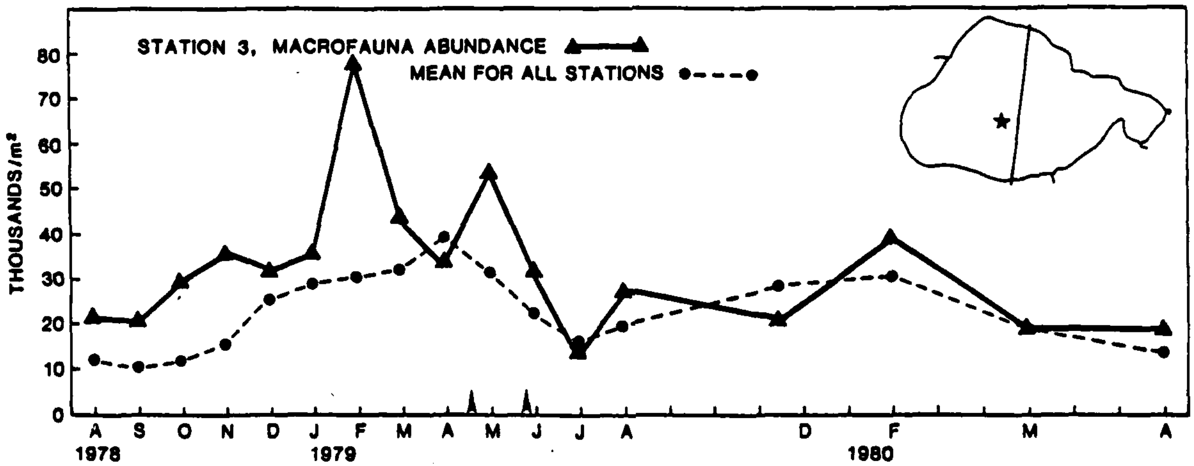


Figure 13. Macrofauna Abundance, Station 3.

Station 3 was 4 km west of the Causeway and about 16 km north of the south shore near the central portion of the lake (Figure 2, Table 6). Macrofauna abundance was relatively high with only two other stations ranking higher. Average abundance of the first year was $35,185/m^2$; the second year, it was $30,303/m^2$; and for the entire study period, it was $32,744/m^2$.

A strong seasonal peak (Figure 13) occurred in February 1979. The high numbers consisted of a settlement of the smaller of the two gastropods, Texadina sphinctostoma. A second peak, which was probably related to the opening of the Bonnet Carre Floodway, occurred in May 1979. Lower abundance in the summer, and higher abundance in the winter and early spring followed the general pattern for macrofauna abundance in Lake Pontchartrain.

The dominant species, Texadina sphinctostoma accounted for almost 70% of the total abundance the first year. This species with three other molluscs, the clams, Rangia cuneata and Mulinia pontchartrainensis, and the other gastropod, Probythinella louisianae, made up 96% of the abundances.

During the second year, a change in dominance occurred with the numbers of P. louisianae increasing, and T. sphinctostoma decreasing.

Species diversity the first year (1.043 ± 0.043) was not significantly different from the lake mean (1.117 ± 0.015), or from the diversity for the second year (0.990 ± 0.052). Average number of species the first year was 12.13 ± 0.34; the second year, 11.58 ± 0.80. Evenness, like diversity and species numbers, remained constant, with 0.42 ± 0.02 the first year and 0.41 ± 0.02 the second year.

Biomass of 11.7858 ± 1.6497 g/m^2 AFDW was slightly higher than the average for the lake and was typical of the four midlake stations.

Cluster analysis for Station 3 (Figure C3, Appendix C) shows a weak seasonality. The first cluster incuded all the months from November 1978 through June 1979 and February 1980, characterized by higher abundance and somewhat lower diversity. The other group, August, September, and October 1978, July, August, and November 1979, and May and August 1980, included all three Augusts and was characterized by lower abundance and somewhat higher diversity.

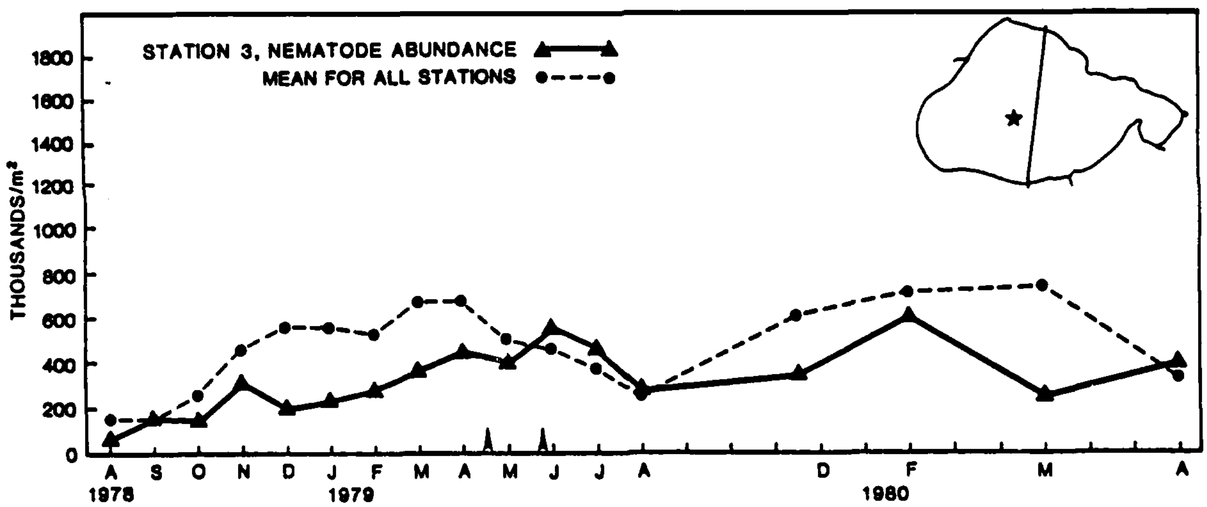


Figure 14. Nematode Abundance, Station 3.

In contrast to the relatively high macrofauna abundance, the total meiofauna abundance at Station 3 was low, although not the lowest in the lake. Nematode abundance (Figure 14) was significantly below the average for the lake from December 1978 through April 1979, during the time of peak macrofauna abundance. Meiofauna biomass (0.7895 ± 0.0866 g/m^2 AFDW) was only slightly lower than the lake mean, reflecting the slightly lower total meiofauna abundance.

Copepod species numbers were lower at Station 3 than at many of the stations. The five common species Halicyclops coulli, Halicyclops fosteri, Pseudobradya sp., Scottolana canadensis, and Acartia tonsa are present, but the two species with marine affinities, Enhydrosoma sp. and Pseudostenhelia wellsi, do not occur. Distribution of the other meiofaunal taxa are not significantly different from the mean for the lake.

Station 4

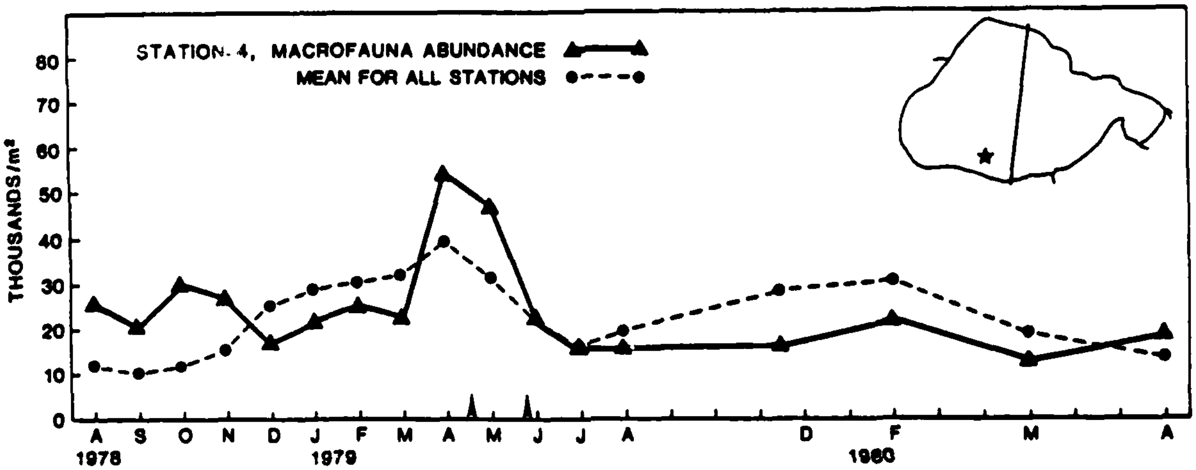


Figure 15. Macrofauna Abundance, Station 4.

Station 4 was 7.2 km west of the Causeway and 6.4 km north of the southern shores of Lake Pontchartrain (Figure 2, Table 6). Macrofauna abundance was slightly above the mean for the lake the first year and below the mean for the lake the second year of the study. Average abundance was 26,195/m^2 the first year; 22,426/m^2 for the second year; and 24,311/m^2 for the entire study period. There was, however, a response to the Bonnet Carre Floodway opening, seen in the increased abundance in April 1979.

The dominant species, Texadina sphinctostoma, made up only 53% of the total macrofauna. The highest numbers in the lake of the mussel, Mytilopsis leucophaeta, were found at Station 4. These two molluscs and Rangia cuneata, Mulinia pontchartrainensis, and Probythinella louisianae together made up 96% of the total macrofauna abundance.

Measures of species diversity showed Station 4 to be among the three highest in diversity in the lake. The diversity of 1.288 ± 0.037 for the first year was significantly higher than the mean for the lake of 1.117 ± 0.015. During the second year, the diversity of 1.124 ± 0.056, although significantly lower than the first year, was still significantly higher than the mean for the lake, 0.987 ± 0.027. The average number of species the first year was 12.56 ± 0.45; the second year, 11.92 ± 0.43, not significantly different. Evenness, calculated at 0.51 ± 0.01 the first year, was both significantly higher than the lake mean and that of the second year, 0.46 ± 0.02.

Station 4 was also significantly high in biomass, with 12.8457 ± 1.7788 g/m^2 AFDW. Despite an average total abundance of macrofauna, the high numbers of Mytilopsis leucophaeta, which have a higher AFDW than most species present, increased the biomass significantly.

Cluster analysis of the macrofauna for Station 4 over the 17 sampling periods (Figure C4) showed three major clusters. The first included the samples from April 1979 and May 1979, which are the two months most affected by the opening of the Bonnet Carre Floodway. The next cluster included the sampling periods before the Floodway was opened, and third cluster those after. Stations 4, 5, and 11 are those closest to the Bonnet Carre Floodway, and all showed a distinct difference in the pattern of clustering from the other stations.

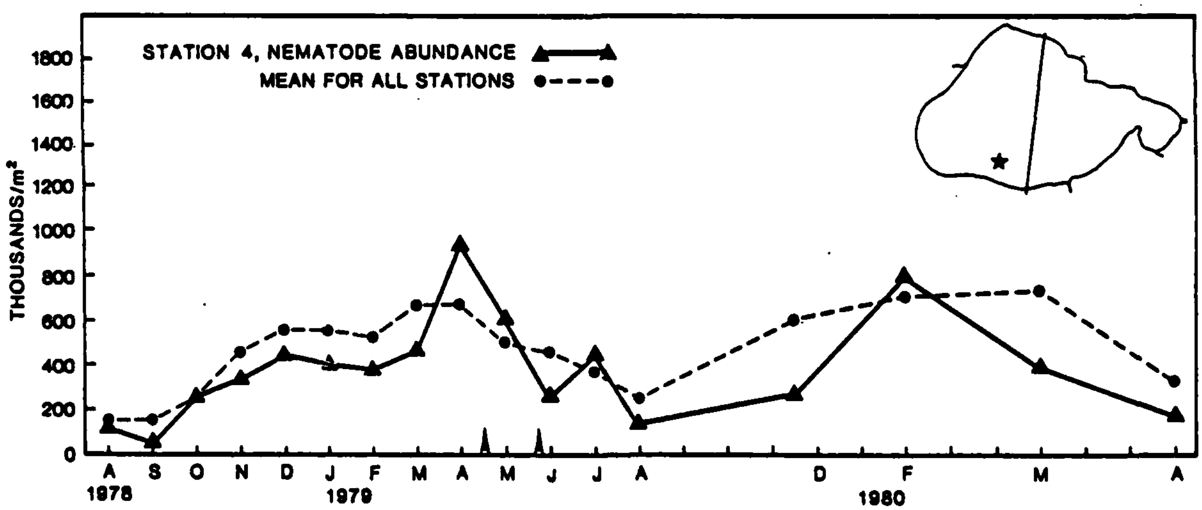


Figure 16. Nematode Abundance, Station 4.

Abundance of total meiofauna at Station 4 was somewhat low. Nematode abundance was low, except for a peak in response to the Bonnet Carre Floodway opening in April 1979. Meiofauna biomass was low, 0.8071 ± 0.750 g/m^2 AFDW, but not significantly different from the mean for the lake, 0.9424 ± 0.0901 gm^2 AFDW. The same copepod species occurred at Station 4 as described for Station 1.

Station 5

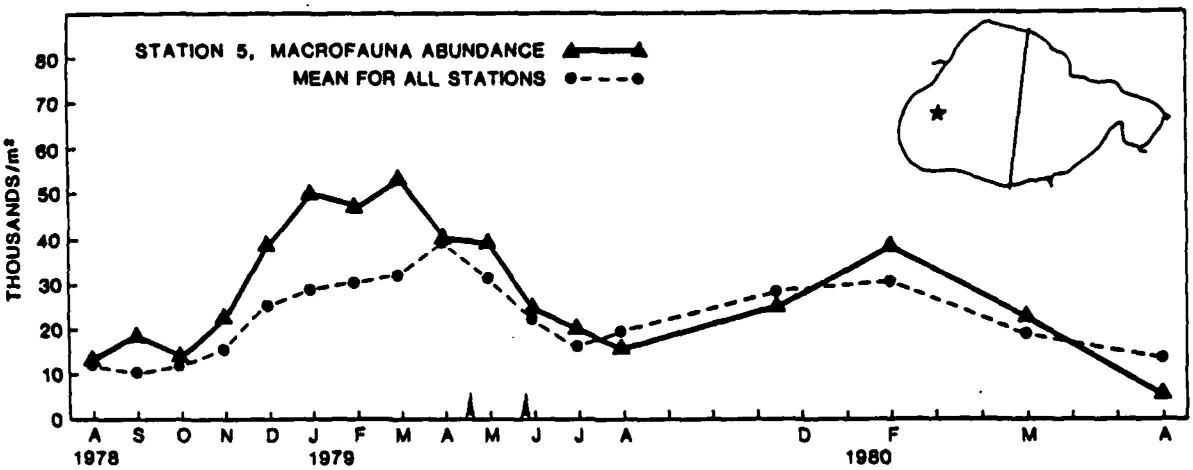


Figure 17. Macrofauna Abundance, Station 5.

Station 5 was in the western part of the lake, 9.7 km east of the west shore, 2.8 km east of the power lines and 12.9 km south of Pass Manchac (Figure 2, Table 6). Macrofauna abundance was higher the first year than the second year, and slightly above the average for the lake. Average abundance the first year was 30,673/m^2 the second year, 27,283/m^2; and for the entire study period, 28,978/m^2. Seasonal peaks in abundance (Figure 17) followed the general trends for the whole lake, with higher population densities in the colder months and lower densities in the warmest months.

A distinct response to the opening of the Bonnet Carre Floodway is evidenced by the increased abundances in March, April, and May 1979.

Station 5 was one of the few stations in the lake characterized by dominance of the small gastropod Probythinella louisianae, rather than the more common Texadina sphinctostoma. The two gastropods, the clam Rangia cuneata, and the polychaete Hypaniola florida make up 94% of the total numbers.

Species diversity for the first year of the study was higher at Station 5 than the mean value for the lake (Table 6). Diversity fell from 1.185 ± 0.025 to 1.033 ± 0.046 the second year, which was not significantly different from the mean for the lake. Average number of species the first year was 11.77 ± 0.38; the second year, 10.000 ± 0.54. Evenness, calculated at 0.484 ± 0.008 the first year, dropped to 0.453 ± 0.020, which was not significant.

Biomass of 11.4344 ± 1.2875 g/m² AFDW was not significantly different from the mean of 8.8238 g/m² AFDW found for the lake.

Cluster analysis of the macrofauna for Station 5 over the 17 sampling periods (Figure C5, Appendix C) showed four major clusters. The first group includes all the months from December 1978 to the opening of the Bonnet Carre Floodway in April 1979. The second group includes August, September, October, and November 1978. The third group includes all sampling dates following the opening of the Floodway from May 1979, except for the last month, August 1980, which stood alone. Station 5 shows the effect of the opening of the Floodway on macrofauna as a division between clusters just as the cluster analysis for Station 4 did. The division, however, comes one month later.

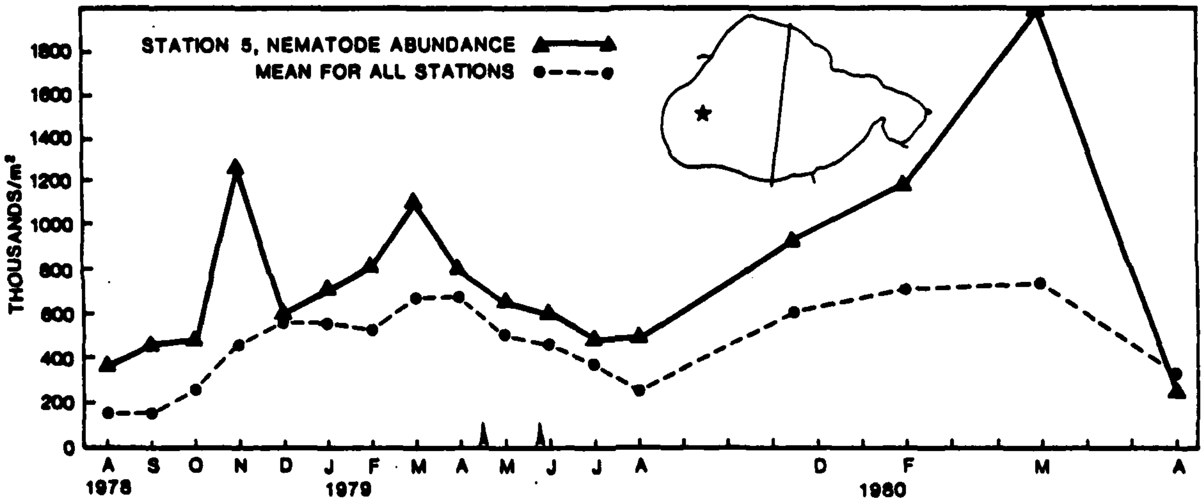


Figure 18. Nematode Abundance, Station 5.

Meiofauna abundance (Table A2, Appendix A) is high at Station 5 on the average. This abundance was the result of high numbers of nematodes (Figure 18) since numbers of other taxa are quite moderate (Table A2, Appendix A). Biomass of 1.1215 ± 0.1031 g/m² AFDW was not significantly different from the mean for the lake of 0.9424 g/m² AFDW. The five common copepods, which occurred at all stations, were present at Station 5. In addition, three rarer copepods, Nitrocra lacustris, Eurytemora affinis, and Mesocyclops edax, were found with some frequency. The two copepods with marine affinities found at Stations 1 and 2 did not occur at Station 5.

Station 6

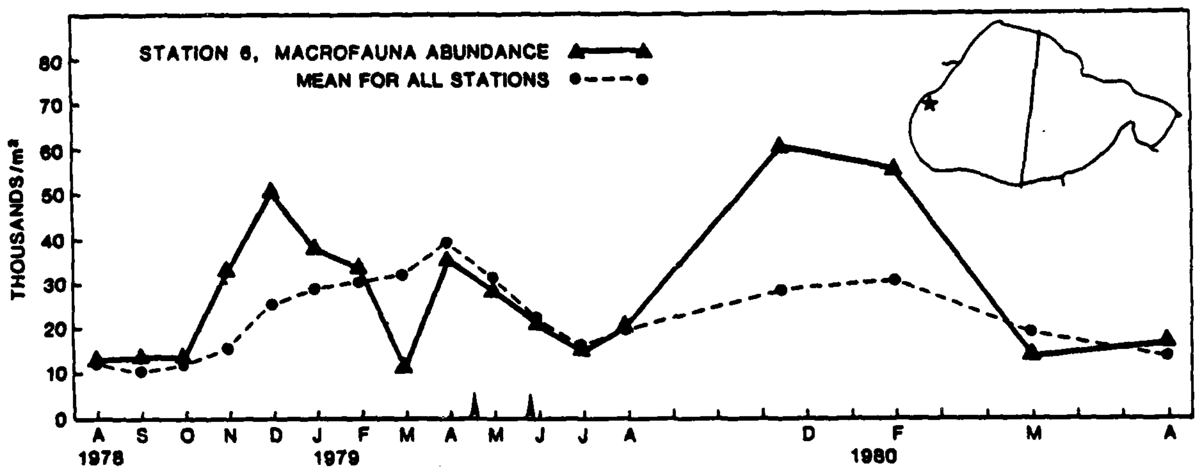


Figure 19. Macrofauna Abundance, Station 6.

Station 6 was 3 km to the north and west of Station 5 (Figure 2, Table 6) and the most westerly of all the stations. Macrofauna abundance was near the mean for the lake the first year and second from highest the second year. Average abundance the first year was 25,488/m^2; the second year, 37,101/m^2; and for the entire study period, 28,230/m^2. Seasonal peaks in abundance (Figure 19) were masked by the effects of an apparent disturbance the first year of the study, but quite distinct during the second year. Response to the opening of the Bonnet Carre Floodway was also masked.

Station 6 was characterized by the dominance of Probythinella louisianae, and above average numbers of the polychaete Hypaniola florida and chironomid larvae. These three plus the other gastropod, Texadina sphinctostoma, made up 87% of the total macrofauna the first year, and 95% of the total the second year. The density of P. louisianae was more than twice as high the second year than it was the first.

Species diversity was significantly higher than the mean for the lake the first year, at 1.200 ± 0.030. A significant decrease, attributable to the increased dominance of P louisianae, to 0.965 ± 0.053 occurred the second year. Average number of species did not change significantly with 10.13 ± 0.33 the first year, and 9.83 ± 0.77 the second year. Evenness dropped from 0.527 ± 0.014 to 0.439 ± 0.031, which was a significant decrease, and a reflection of the change in dominance.

Biomass of the macrofauna of Station 6 was 10.4714 ± 1.2809 g/m^2 AFDW, near the mean for the lake.

Cluster analysis (Figure C6, Appendix C) of Station 6 macrofauna over time yielded two clusters. The first cluster included November and December 1978, January and February 1979, November 1979, and February 1980, the fall and winter months. The second cluster included all the spring and summer months; August, September, and October 1978, May, June, July, and August 1979, and May and August of 1980. Station 6 appeared to be clustering strongly on a seasonal basis, however, this was probably a reflection of the seasonal changes in abundance.

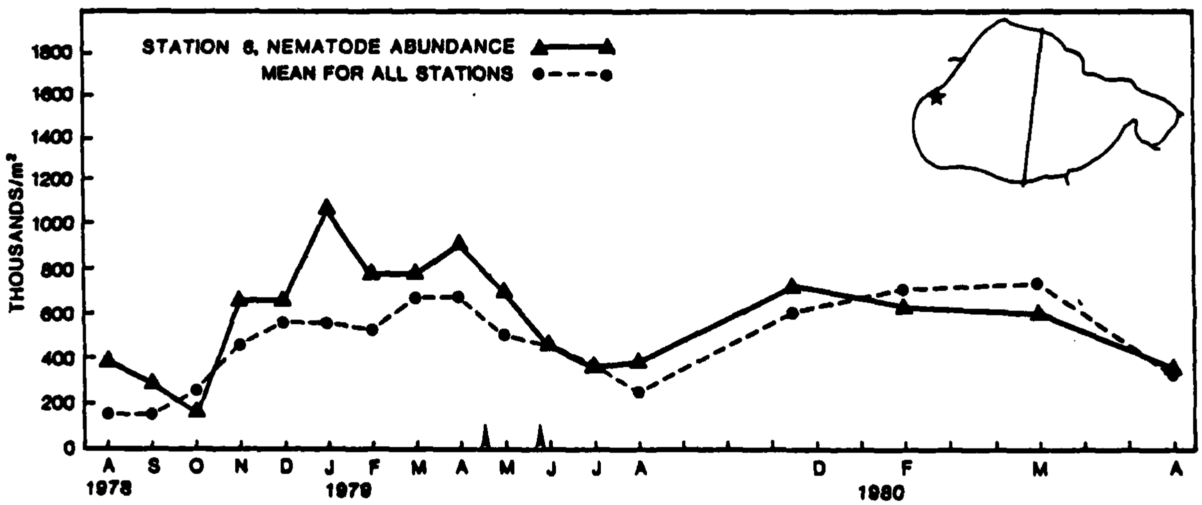


Figure 20. Nematode Abundance, Station 6.

Meiofauna abundance was very near the mean for the lake. Nematode abundance (Figure 20) exhibited a strong seasonal pattern, and was somewhat higher than the mean the first year. Copepods at Station 6 occurred in numbers close to the mean. The species present were the same as those occurring at Station 5. Meiofaunal biomass 0.9129 ± 0.0745 g/m^2 AFDW was not significantly different from the mean for the lake.

Station 7

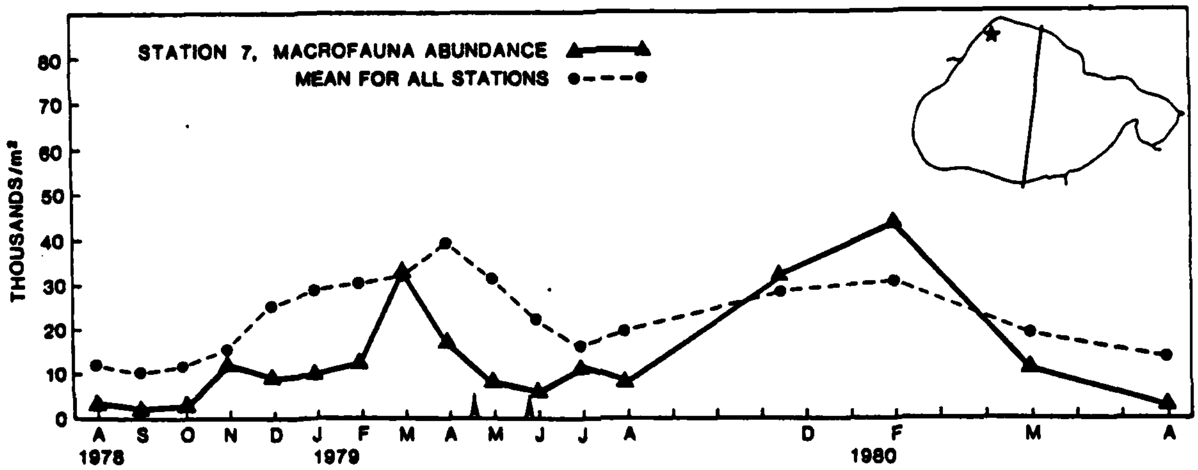


Figure 21. Macrofauna Abundance, Station 7.

Station 7 is the northernmost station, 2.5 km from shore, 6.4 km southwest of the mouth of the Tchefuncte River and 5.2 km northeast of the mouth of the Tangipahoa River (Figure 2, Table 6). Macrofauna abundance at Station 7 was quite low the first year, and near the mean for the lake the second year. Average abundance the first year was $10{,}757/m^2$; the second year, $22{,}089/m^2$; and for the entire study period, $14{,}103/m^2$. Abundance patterns did not follow the seasonal trends for the lake the first year, but appear to follow closely the second year.

The number of species found both years was low. The dominant species both years was the gastropod *Probythinella louisianae*. It accounted for 56% of the total abundance the first year and 85% the second year. Station 7 was unique in having the smallest percentage of *Texadina sphinctostoma* of any of the stations. *T. sphinctostoma* accounted for only 10% of the abundance the first year and 4% the second year. The highest numbers of oligochaetes were found at Station 7. This is the only station at which the two amphipods *Grandidierella bonnieroides* and *Gammarus mucronatus* were found.

Species diversity at Station 7 was significantly higher at 1.287 ± 0.039 than the mean for the lake the first year. The second year, diversity at Station 7 dropped to 0.699 ± 0.094 which was a significant decrease, and significantly lower than the mean. The average number of species (9.718 ± 0.346 the first year and 8.563 ± 0.690 the second year) were not significantly different from each other, but were significantly lower than the mean for the lake. Evenness, which was significantly higher than the mean for the lake at 0.578 ± 0.021 the first year, decreased significantly to 0.345 ± 0.050 the second year, which was significantly lower than the mean for the lake. This significant change in evenness was a reflection of the increase in the dominant species, and concomitant decrease in relative abundance of the others.

Biomass of the macrofauna at Station 7 was 5.8154 ± 0.9101 g/m^2 AFDW, significantly lower than the mean for the lake.

Cluster analysis of the macrofauna of Station 7 over time yielded 3 clusters. One cluster included August, September, and October 1978, and August 1980 and was characterized by low abundance. Another small cluster included March 1979, and February and May 1980, and was characterized by high abundance. A large central cluster included all remaining collections. Seasonality was weak, and reflected control by some factor other than time of year.

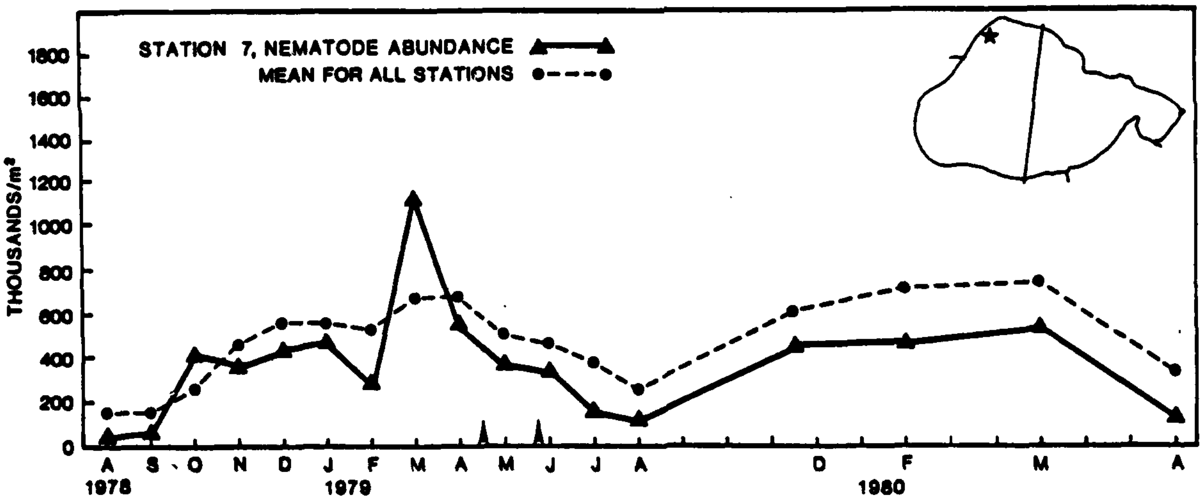


Figure 22. Nematode Abundance, Station 7.

Meiofauna abundance at Station 7 was near the mean for the lake (Table A2, Appendix A), although nematode abundance (Figure 22) was generally low. Components with freshwater affinities, the ostracods and rotifers, were present in significantly higher numbers than at other stations. Copepod species were the same as those found at Stations 4, 5, and 6. Meiofauna biomass of 0.8856 ± 0.0811 g/m^2 AFDW was not significantly different from the mean for the lake.

Station 8

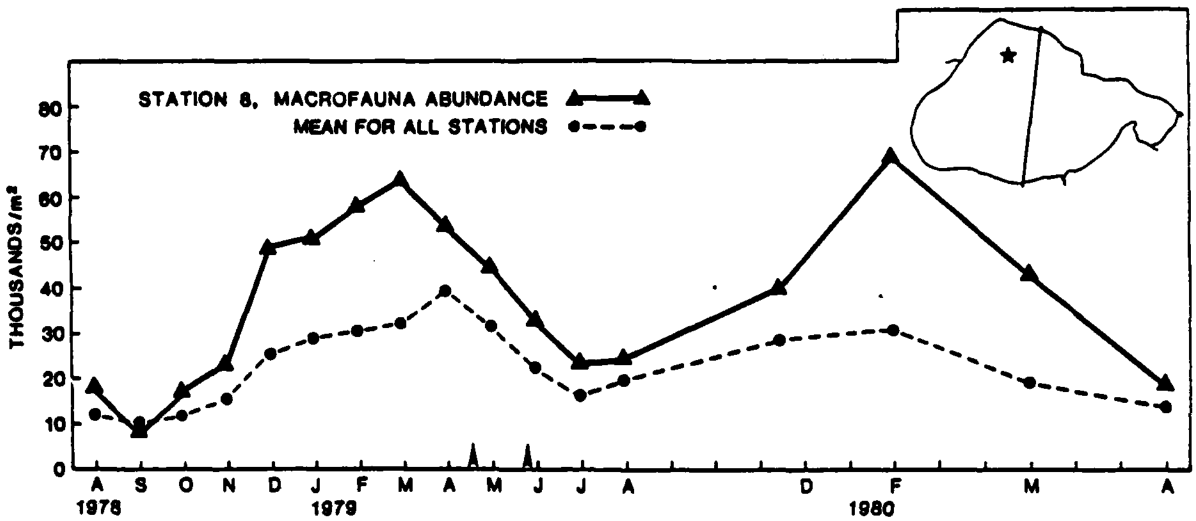


Figure 23. Macrofauna Abundance, Station 8.

Station 8 is 9.3 km south of the mouth of the Tchefuncte River and 12.5 km east of Pass Manchac (Figure 2, Table 6). This station is located over what used to be a fossil oyster reef. It has been dredged at some time in the past, since only small, flat fragments of oyster shell remain, often scattered over the sediment surface. This station had the highest sediment organic carbon values (2.05%) of any station.

Macrofauna abundance was the second highest for the lake, significantly above the mean both years. Average abundance the first year was 35,314/m^2; the second year, 42,234/m^2; and for the entire period, 36,945/m^2. Seasonal peaks in abundance were well defined (Figure 23). No distinct, immediate response to the opening of the Bonnet Carre Floodway was observable in abundance patterns. Station 8 was the only station sampled during this study where a change in the dominant species occurred during the study. The dominant species during the first year of this study at Station 8 was Texadina sphinctostoma. During the second year of the study, numbers of Probythinella louisianae more than doubled, establishing it as the dominant species. One of the two small hydrobiid gastropods was dominant at all stations in the lake. Both occurred at all stations at some time during the year in varying proportions. Distributional maps of the abundance of these two species resulting from quantitative samples collected during a survey in June, July, and August 1954 (Darnell 1979) show quite similar distributions to those present during this study. Darnell (1979) shows roughly equal numbers of the two species in the lake. T. sphinctostoma numbers remain relatively stable, with changing dominance resulting from the variations in the numbers of *P. louisianae*. Station 8 is also characterized by higher than average abundance of the polychaete *Hypaniola florida*.

Species diversity of 1.303 ± 0.025 for the first year was significantly higher than the mean for the lake. Species diversity dropped significantly the second year to 1.096 ± 0.038, a value not significantly different for the mean for the lake. The change in average number of species from 12.05 ± 0.29 the first year to 10.83 ± 0.55 the second year was not significant. The change in evenness from 0.527 ± 0.010 the first year to 0.467 ± 0.023 the second year was significant and is related to the increase in the number of *P. louisianae*.

Biomass at Station 8 was the highest of all stations, 15.2317 ± 1.4906 g/m^2 AFDW.

Cluster analysis of the macrofauna at Station 8 (Figure C8, Appendix C), yielded two clusters with a strong seasonal component. The first, a winter and spring grouping included all collections from December 1978 through May 1979, and December 1979 through May 1980. The second cluster, the summer and fall grouping, included August, September, October, and November 1978; June, July, and August of 1979; and August 1980.

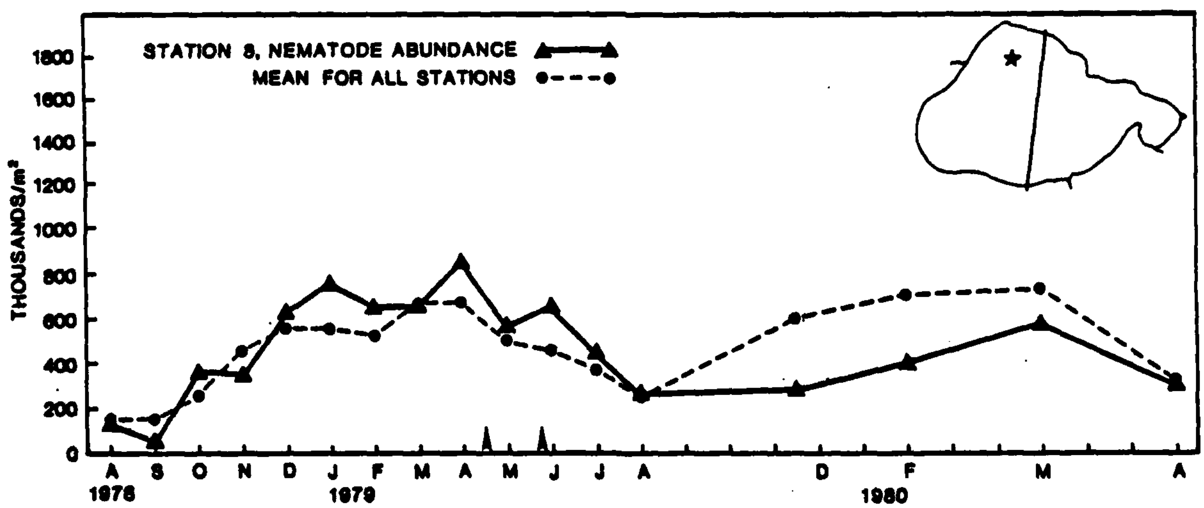


Figure 24. Nematode Abundance, Station 8.

Unlike macrofauna abundance and biomass at Station 8, which was relatively high for the lake, meiofauna abundance and biomass were very close to the mean. Nematode abundance (Figure 24) followed the general trend for the lake, as do other taxa (Table A2, Appendix A). Copepod species were essentially the same as those found at the neighboring Station 7. Meiofauna biomass of 0.8677 ± 0.0644 g/m^2 AFDW was not significantly different from the mean for the lake.

Station 9

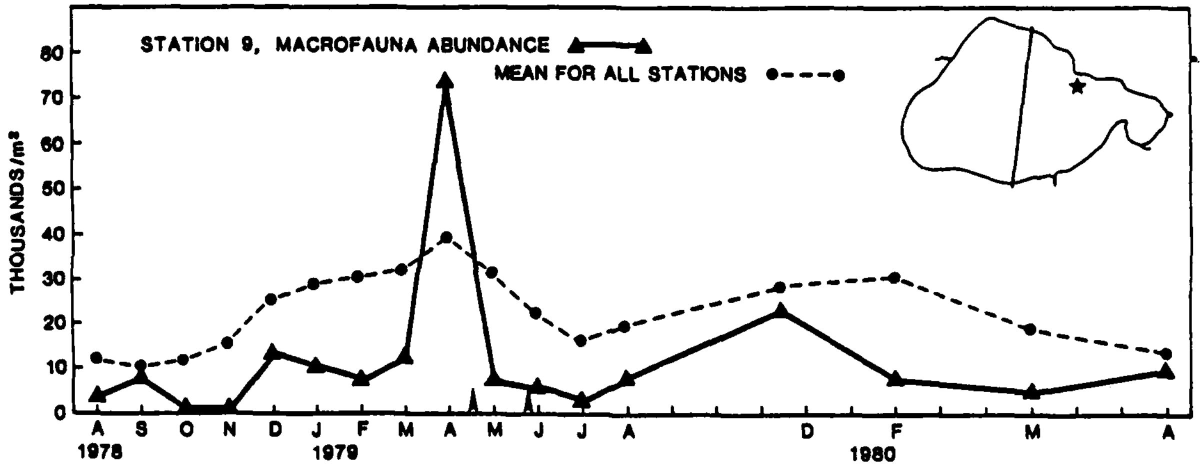


Figure 25. Macrofauna Abundance, Station 9.

Station 9 was in the northeastern portion of Lake Pontchartrain and lies 4.5 km south of Goose Point and 12.5 km east of the Causeway (Figure 2, Table 6). The sand at this station is probably derived from the ancient Milton's Island Beach Trend. This station was dredged during the study sometime between November 1979 and February 1980. Macrofauna abundance was relatively low, with only two other stations averaging lower. Average abundance for the first year was $12,241/m^2$; for the second year it was $12,046/m^2$; and for the entire study period, $12,143/m^2$. The peak in abundance in April 1979 (Figure 25) was neither a seasonal peak, nor a response to the opening of the Bonnet Carre Floodway. A settlement of over $70,000/m^2$ tiny bivalves (so small that it was not possible to identify them as either Rangia cuneata or Mulinia pontchartrainensis) occurred, which did not survive until the next sampling cruise.

Slightly fewer macrofauna species were found at Station 9 than the average for the lake. Texadina sphinctostoma was the dominant species found, and it, with the two clams, made up 96% of the total macrofauna.

Species diversity at Station 9 of 1.056 ± 0.070 for the first year was not significantly different from the mean for the lake. The slight decrease to 0.948 ± 0.067 for the second year was not significant. Average number of species of 9.205 ± 0.427 for the first year, and of 10.250 ± 0.687 for the second year, were not significantly different from each other. Evenness, calculated at 0.484 ± 0.030 the first year, dropped to 0.409 ± 0.023 the second year, which was not a significant change.

Biomass at Station 9 of 5.0359 ± 1.7948 g/m^2 AFDW was relatively low with only two other stations ranking lower.

Cluster analysis of the macrofauna for Station 9 over the 17 sampling periods (Figure C9, Appendix C) yielded 4 clusters separated at high levels of dissimilarity. The first cluster included October and November 1978, and July 1979, and was characterized by extremely low abundance. April 1979 stood alone, separated by the extremely high abundance of tiny clams. The third cluster included December 1978, January 1979, March 1979, and December 1979, all characterized by intermediate abundance. The last cluster included all other sampling times and was also characterized by low abundance, and lower evenness than the first cluster.

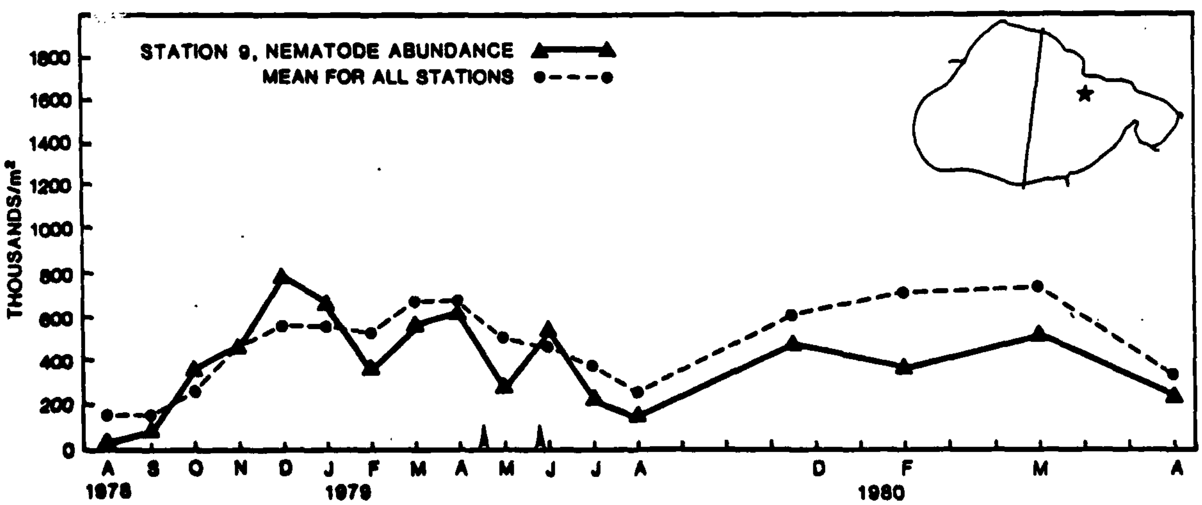


Figure 26. Nematode Abundance, Station 9.

Meiofauna abundance, unlike macrofauna abundance at Station 9, was not significantly lower than the average for the lake the first year. Nematode abundance (Figure 26) was not significantly different at Station 9 for the two years. The mean for nematodes over the whole lake increased substantially the second year, so that the abundance for Station 9 was significantly lower the second year than the mean for the lake. More species of copepods occurred at Station 9 than at any of the stations previously discussed, probably because of the coarser, sandy sediments. Meiofauna biomass of 0.8254 ± 0.0816 g/m² AFDW was not significantly different from the mean for the lake.

Station 10

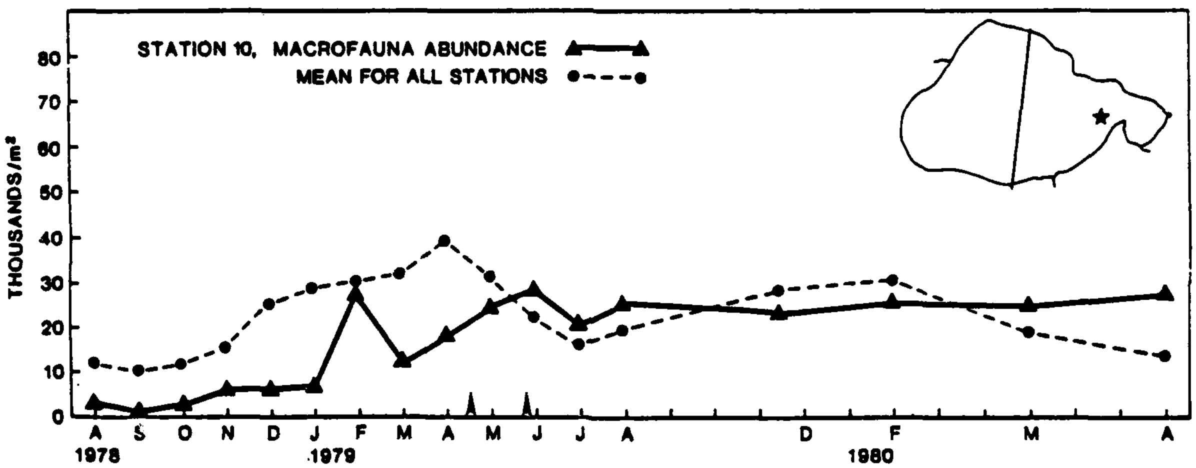


Figure 27. Macrofauna Abundance, Station 10.

Station 10 lies 7 km to the south and east of Station 9, 6.0 km northwest of South Point, in the eastern portion of Lake Pontchartrain (Figure 2, Table 6). Macrofauna abundance was below the mean for the lake the first year and slightly above the mean the second year. Average abundance the first year was 13,711/m²; the second year, 25,296/m²; and for the entire study period, 17,209/m². The peak in February 1979 (Figure 27) was not a seasonal response. Settlement of the small gastropod Texadina sphinctostoma is often quite patchy. One sample at Station 10 at that time contained 6 times as many (≈ 50,000/m²) as the other samples (Table A1, Appendix A) of the newly settled gastropods, which did not survive until the next sampling period.

Station 10 had relatively large numbers of Rangia cuneata and Mulinia pontchartrainensis. Texadina sphinctostoma was dominant, contributing 43% to the total abundance. The three species together made up 94% of the total the first year. The second year of the study, T. sphinctostoma made up 53%, and Probythinella louisianae had increased from 2% to 25% of the total.

Species diversity was 1.089 ± 0.039 the first year, not significantly different from the mean for the lake. The second year diversity increased to 1.236 ± 0.078, significantly higher than the mean for the lake. Average number of species increased from 10.79 ± 0.39 to 12.25 ± 0.71; not significantly different from the mean for the lake or from each other. Evenness increased from 0.464 ± 0.014 to 0.498 ± 0.029; again not significantly different from each other or from the lake mean.

Biomass of the macrofauna at Station 10 was 6.5716 ± 0.9522 g/m^2 AFDW, not significantly different from the mean for the lake.

Cluster analysis (Figure C10, Appendix C), of the macrofauna of Station 10 over the 17 sampling periods yielded three clusters. The first included August, September, and October 1978, and was characterized by extremely low abundance and low species numbers. The second cluster included only November and December of 1978, and January 1979, and was characterized by low abundance and intermediate species numbers. The last very strong, very large cluster included all the remaining sampling dates, with remarkably even abundance and higher species numbers.

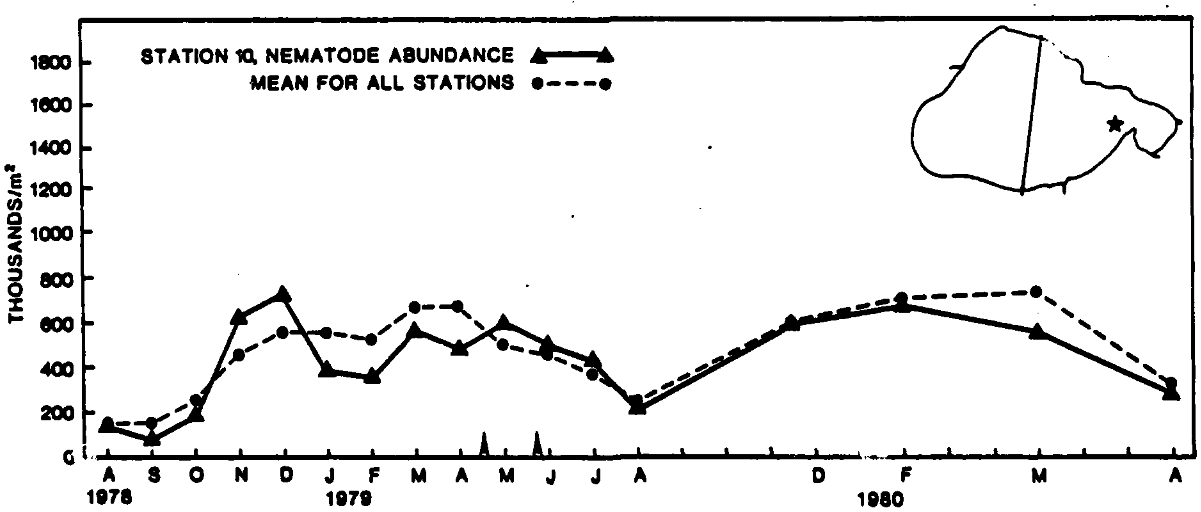


Figure 28. Nematode Abundance, Station 10.

Unlike macrofauna abundance at Station 10, which was lower than the mean for the lake the first year, meiofauna abundance was not significantly different either year. Nematode abundance (Figure 28) follows the general pattern for the lake. Although numbers of nematodes were greater the second year (Table A2, Appendix A), the increase was not significant. Copepod species were high, including not only the common species found at all stations, but the less frequent ones. Biomass of the meiofauna was 0.9340 ± 0.0731 g/m^2 AFDW, not significantly different from the mean of the lake.

Station 11

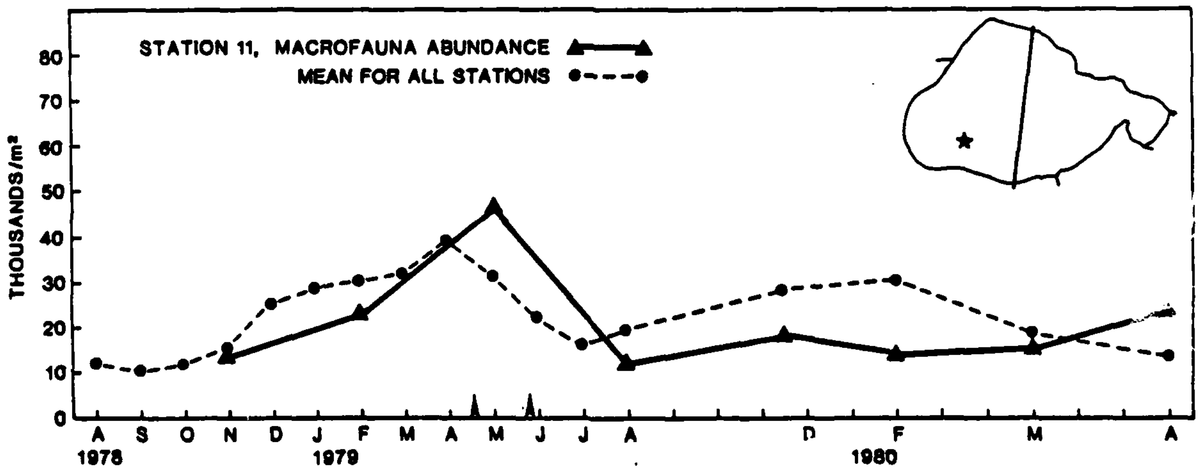


Figure 29. Macrofauna Abundance, Station 11.

Station 11, one of the three seasonal stations sampled on a quarterly basis during both years of the study, lies halfway along a line between Station 4 and Station 5, 12.9 km northeast of the Bonnet Carre Floodway (Figure 2, Table 6), in the western portion of Lake Pontchartrain. Macrofauna abundance was close to the mean for the lake the first year, but below the mean the second year, among the four lowest in the lake. Average abundance for the first year was $24,209/m^2$; the second year it was $18,268/m^2$; and for the entire study period, $21,239/m^2$. No seasonal peaks were observed (Figure 29). A strong response to the opening of the Bonnet Carre Floodway was shown in the increase in abundance in May of 1979. Since Station 11 was the closest station to the floodway, it would be expected to show this response.

The number of species was average for this station. It was dominated by the small gastropod Texadina sphinctostoma which made up 65% of the total abundance the first year, and 61% of the total the second year (Table A1, Appendix A).

Species diversity at Station 11 the first year was 1.105 ± 0.063, not significantly different from the mean for the lake. Species diversity increased the second year to 1.273 ± 0.063, which was significantly higher than the mean for the lake. Average number of species increased from 11.50 ± 0.65 the first year to 12.50 ± 0.62 the second year, which was not a significant increase. Evenness, calculated at 0.458 ± 0.028 for the first year, increased to 0.508 ± 0.025 for the second year, which was not significant.

Biomass of the macrofauna was 8.2022 ± 1.4489 g/m² AFDW, not significantly different from the mean for the lake.

Cluster analysis of the macrofauna yielded two clusters. The first included only the May 1979 collections, when the Bonnet Carre Floodway was opened. The second cluster included all other sampling periods (Figure C11, Appendix C).

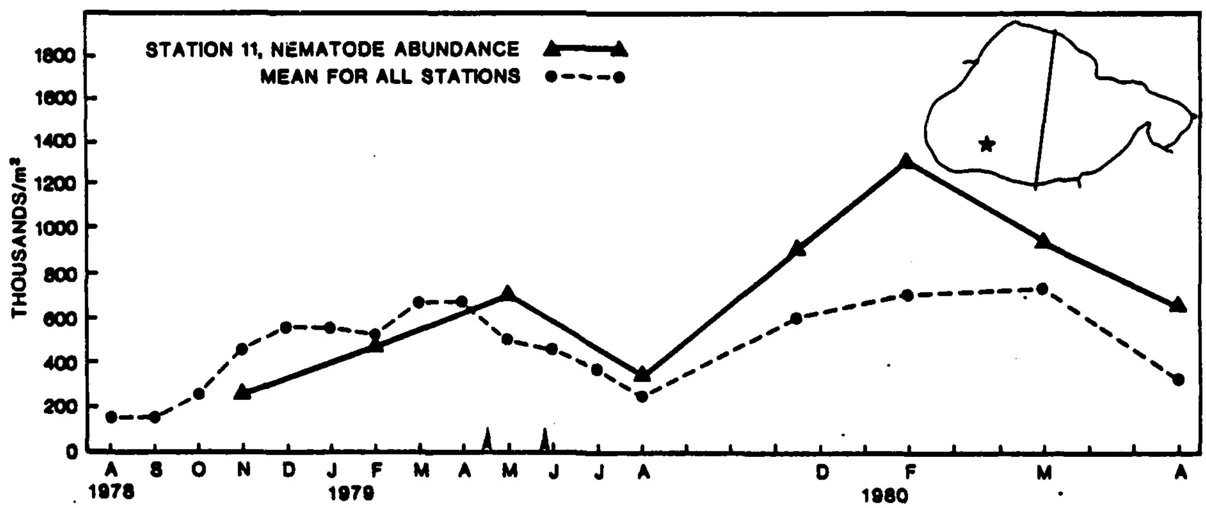


Figure 30. Nematode Abundance, Station 11.

In contrast to the very "average" macrofauna at Station 11, which showed no significant changes, the meiofauna made a dramatic change in the second year. The abundance of nematodes more than doubled (Figure 30). This increase in abundance was significantly different from the previous year, and from the mean for the lake. Other meiofaunal taxa increased in abundance also.

Copepod species at Station 11 included the five common species; Hylicyclops coulli, Halicyclops fosteri, Pseudobradya sp., Scottolana canadensis, and Acartia tonsa. Only two of the rarer species, Nitocra lacustris and Cyclops bicolor occurred there.

Meiofauna biomass was at 1.1599 ± 0.1555 g/m² AFDW, slightly higher than the mean for the lake.

Station 12

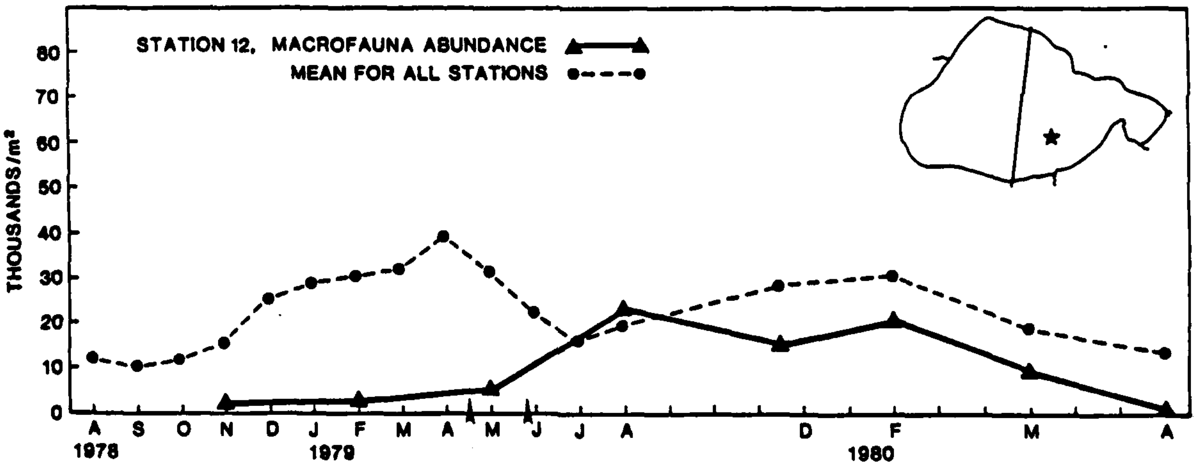


Figure 31. Macrofauna Abundance, Station 12.

Station 12 was in the eastern portion of Lake Pontchartrain, 9 km due north of the Lakefront Airport (Figure 2, Table 6). Macrofauna abundance at this station was the lowest of all stations.

Average abundance for the first year was 8,651/m²; the second year it was 11,748/m²; and for the entire study period, 10,200/m². Densities at Station 12 did not follow the general pattern for macrofauna in the lake as a whole (Figure 31). Neither evidence of the usual seasonal trends nor any response to the opening of the Bonnet Carre Floodway can be seen.

Species numbers were low. Average number of species the first year was 7.75 ± 0.88; the second year, 8.67 ± 1.27. The dominant species, Texadina sphinctostoma, makes up 68% of the total macrofauna. This spcies together with the two clams, Rangia cuneata and Mulinia pontchartrainensis, makes up 93% of the total abundance (Table A1, Appendix A).

Species diversity was low. Diversity dropped from 1.033 ± 0.059 the first year, to 0.687 ± 0.116 the second year. Species diversity for the second year of the study was significantly lower than the first year at Station 12, and significantly lower than the mean for the lake as a whole. Evenness, calculated at 0.538 ± 0.032 for the first year, dropped to 0.411 ± 0.067 during the second year. This change in evenness is related to the change in abundance of the dominant species, and its concomitant change from 68% to 77% of total abundance.

Biomass of the macrofauna at Station 12 was also very low. The average for the two year study of 3.2738 ± 1.0997 was not significantly different from the biomass at Station 1, which was the lowest for any station. It was significantly lower than the mean for the lake.

Cluster analysis of the macrofauna for Station 12 over all sampling periods (Figure C12, Appendix C) yielded three major clusters. The first included the first three quarterly samples; November 1978, February 1979, and May 1979. The second included the next four quarterly samples; August 1979, December 1979, February 1980, and May 1980. The last sampling period, August 1980, was separated from the others at an absolute level of dissimilarity. The collections at this date from Station 12 were almost completely devoid of the usual species.

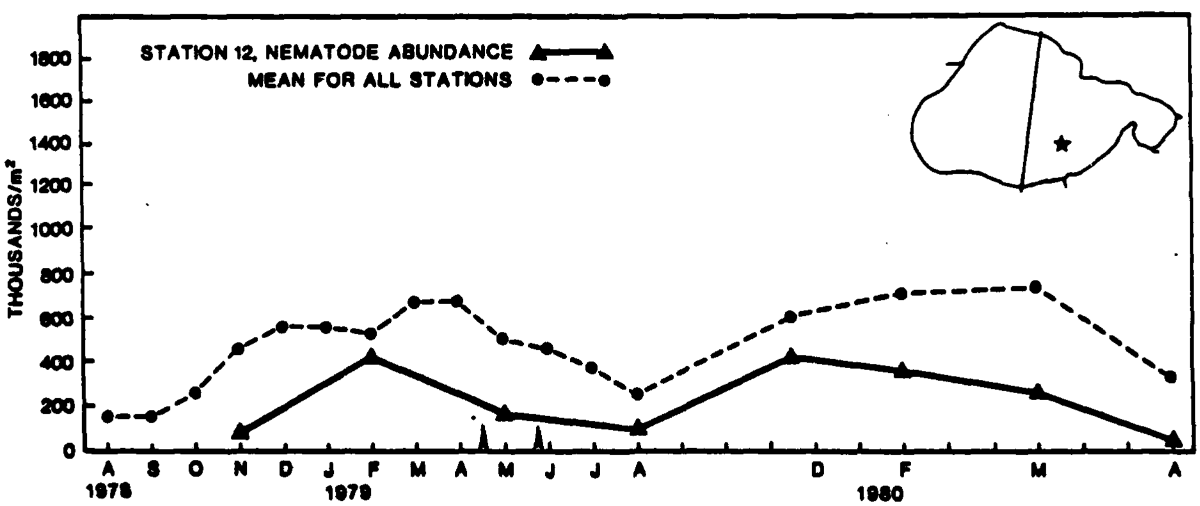


Figure 32. Nematode Abundance, Station 12.

Total meiofauna abundance was consistently below the mean for the lake (Table A2, Appendix A). Nematode abundance (Figure 32) was the lowest of all the stations. Copepod abundances were less severely depressed than nematode abundances. The copepods were dominated by Scottolana canadensis, one of the harpacticoid copepods with pelagic nauplii. Meiofauna biomass at Station 12 was the lowest of all the stations in the lake (Table A2, Appendix A). The mean value for the two year study period was 0.5561 ± 0.0863 g/m^2 AFDW. This was significantly lower than the mean for the lake of 0.9424 g/m^2 AFDW.

Station 13

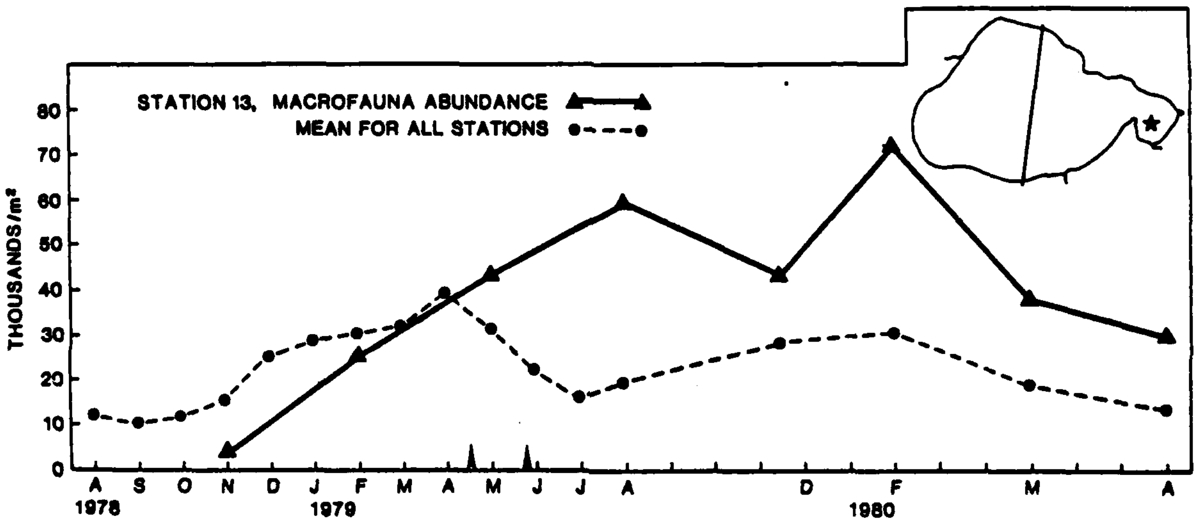


Figure 33. Macrofauna Abundance, Station 13.

Station 13 was in the east bay of Lake Pontchartrain, 6.4 km north of the mouth of Chef Menteur Pass (Figure 2, Table 6). Macrofauna abundance at Station 13 (Figure 33) was often the highest in the lake. Average abundance for the first year was $32,504/m^2$; for the second year, $45,789/m^2$; and for the entire study period, $39,141/m^2$.

The dynamics of the macrofauna populations at Station 13 are clearly being influenced by different environmental factors during different portions of the study. The very low densities at the first sampling period (November 1978) were made up of the highest number of species found at all the stations that month. This pattern would be more typical of an area under heavy predation pressure than one under oxygen or salinity stress, which would have also lowered species numbers. The rise in abundance between May 1979 and August 1979 was also atypical. Late summer, for most of the lake stations, was a time of heavy predation and decreasing benthic populations. Abundance patterns during the second year of the study seem to follow the same general patterns as the rest of the lake stations.

The dominant species Probythinella louisianae made up 33% of total abundance the first year, and 52% of the total the second year. This species, plus the clam Macoma mitchelli, the other common gastropod Texadina sphinctostoma, and the tube-dwelling amphipod Cerapus benthophilus, together made up 77% of the total abundance the first year and 94% of the second year.

Species diversity was the highest of all the stations in the lake at Station 13. Diversities of 1.363 ± 0.085 the first year, and of 1.385 ± 0.085 the second year, were both significantly higher than the mean for the lake. Average number of species increased significantly from 15.75 ± 0.41 the first year to 20.33 ± 0.50 the second year. The total number of species found at Station 13 was 33 (Table A1, Appendix A). Many species were found at this station that occurred at no other station sampled. Others occurred in much higher numbers at Station 13 than at the other stations. The mean of the total numbers of species found at the other stations was 23.2 ± 2.0.

Evenness was measured at 0.495 ± 0.031 the first year, and 0.459 ± 0.026 the second year.

Biomass at Station 13 was 13.3026 ± 2.2242 g/m^2 AFDW, which, was significantly higher than the mean for the lake.

Cluster analysis (Figure C13, Appendix C) of Station 13 macrofauna over time yielded three clusters. The first included only the November 1978 collection, with extremely low abundance and higher diversity, the second included February, May, and August 1979, and February 1980, and was characterized by high dominance of Probythinella louisianae. The third cluster included December 1979, and May and August 1980, and was characterized by more nearly even numbers of Probythinella louisianae and Texadina sphinctostoma.

In addition to having the highest overall abundance of macrofauna, Station 13 also had the highest abundance of meiofauna (Table A2, Appendix A). Average abundance of nematodes (Figure 34) was very high. The collections at Station 13 in February 1979 had the highest numbers of nematodes collected in any month at any station.

Copepod species at Station 13 included both the more common species, Halicyclops fosteri, Pseudobradya sp., Scottolana canadensis, and Acartia tonsa; and the rarer ones, Nitocra lacustris, Eurytemora affinis, Mesocyclops edax, Enhydrosoma sp., Onychocamptus mohammed, and Microarthridion littorale. The last three have strong marine affinities.

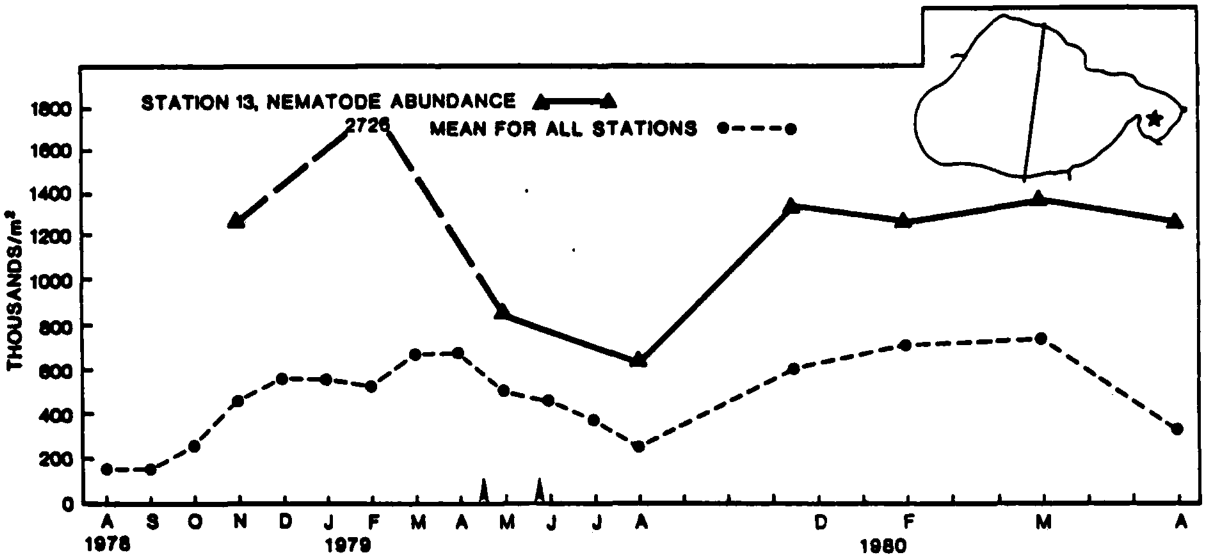


Figure 34. Nematode Abundance, Station 13.

Lake-wide Trends

Changes in the Macrofauna

The results of this study show many differences between the stations, and some similarities. The dominant macrofaunal species at all stations examined was a small hydrobiid gastropod (Figure 35). At nine stations (Station 1, 2, 3, 4, 8, 9, 10, 11, and 12) the first year the dominant species was Texadina sphinctostoma, and at four stations (Stations 5, 6, 7, and 13) the dominant species was Probythinella louisianae. Table 8 shows the ranks by both number and biomass of those species accounting for more than 0.05% of the abundance. Only seven species occur with more than 1.0% abundance. Molluscs make up 95% of all animals found.

The second year of the study the dominance of the gastropods shifted (Table 9). Numbers of Texadina sphinctostoma remained quite similar; the numbers of Probythinella louisianae, however, more than doubled. An examination of the biomass columns on Tables 8 and 9 will show that although numbers of the former gastropod still exceeded thost of the latter the biomass of the latter gastropod was greater. This caused a shift in rank by biomass from fourth to first position.

Other changes included the decrease in numbers in three species of bivalves; Rangia cuneata (Figure 36), Mulinia pontchartrainensis (Figure 37) and Mytilopsis leucophaeta. Rangia cuneata showed the greatest change in numbers of any species other than Probythinella louisianae. The second year of the study Probythinella louisianae was the dominant species at five stations (Stations 5, 6, 7, 8, and 13), Texadina sphinctostoma was dominant at seven stations (Stations 1, 2, 4, 9, 10, 11, and 12), and at Station 3, biomass of the two species was equal (Table 10). Changes in abundance patterns in other taxa are

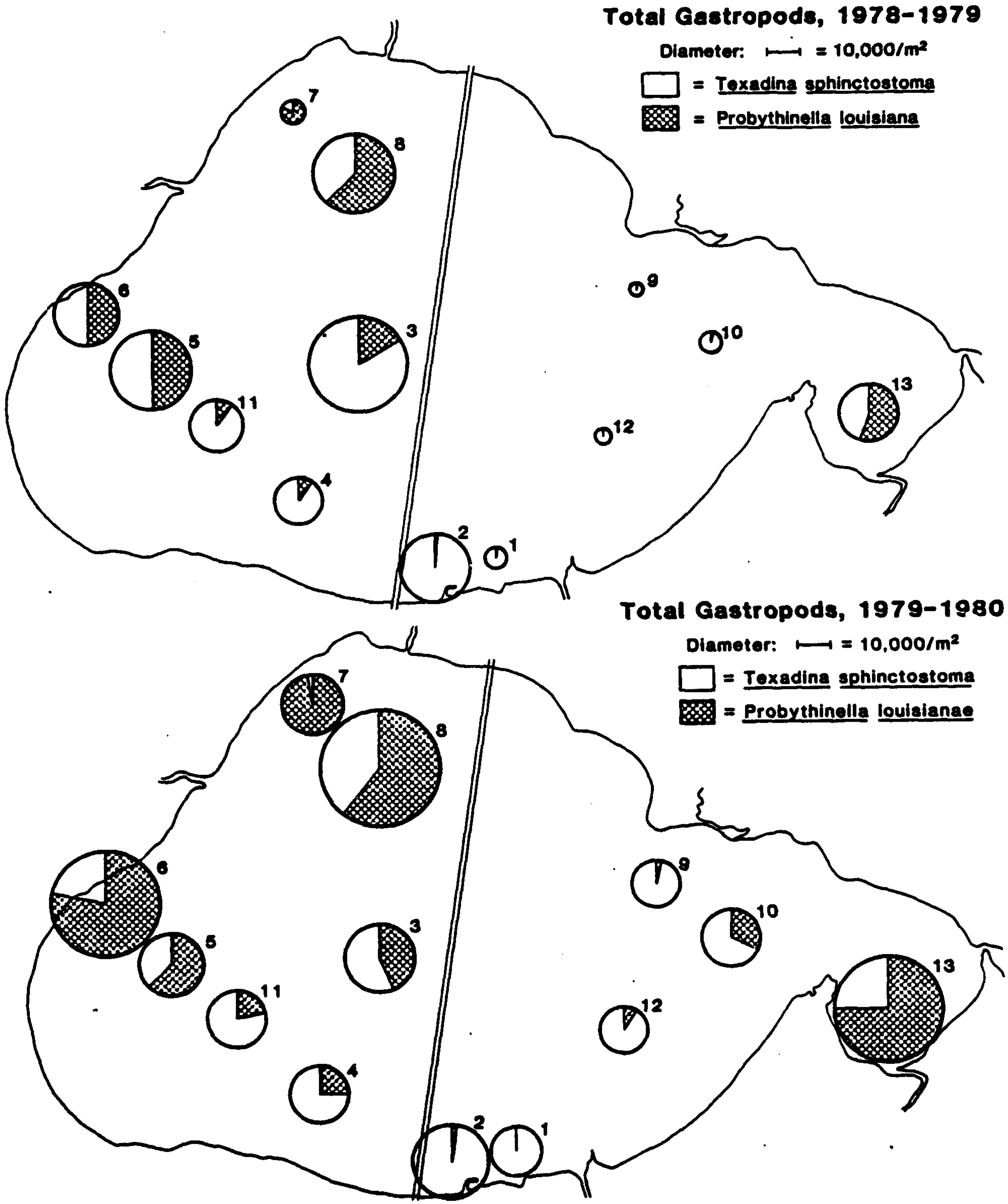


Figure 35. Annual mean gastropod abundance for each sampling station in Lake Pontchartrain. Upper map, 1978-1979; lower map, 1979-1980.

Table 8. Macrofauna ranked by abundance and biomass, 1978-1979

Rank $\bar{N}$	Rank Biomass	Species	$\bar{N}/m^2$	Biomass (AFDW) g/m^2	% N	% Biomass
1	1	*Texadina sphinctostoma*	11,869	2.3453	51.72	25.73
2	4	*Probythinella louisianae*	4,625	1.5179	20.16	16.65
3	3	*Rangia cuneata*	3,794	1.7968	16.53	19.71
4	6	*Mulinia pontchartrainensis*	1,072	0.5076	4.67	5.57
5	9	*Hypaniola florida*	435	0.0154	1.90	0.17
6	2	*Mytilopsis leucophaeta*	399	2.0645	1.74	22.65
7	5	CHIRONOMIDS	365	0.7924	1.59	8.69
8	10	*Mediomastus californiensis*	119	0.0051	0.52	0.06
9	13	*Monoculodes edwardsi*	48	0.0018	0.21	0.02
10	12	*Edotea montosa*	41	0.0029	0.18	0.03
11	11	*Corophium lacustre*	34	0.0038	0.15	0.04
12	7	*Mysidopsis almyra*	27	0.0309	0.11	0.34
13	15	*Streblospio* sp.	18	0.0003	0.08	>0.01
14	8	NEMERTEANS	18	0.0165	0.08	0.18
15	16	OLIGOCHAETES	15	0.0001	0.07	>0.01
16	14	*Cerapus benthophilus*	15	0.0011	0.07	0.01
		ALL OTHERS	53	0.0131	0.22	0.14
		TOTAL	22,947	9.1155		

First 8 species, cumulative percent

98.31 Numbers

99.23 Biomass

Table 9. Macrofauna ranked by abundance and biomass, 1979-1980

Rank $\bar{N}$	Rank Biomass	Species	$\bar{N}/m^2$	Biomass (AFDW) g/m^2	% N	% Biomass
1	2	*Texadina sphinctostoma*	10,070	1.9898	42.01	24.94
2	1	*Probythinella louisianae*	9,753	3.2009	40.69	40.12
3	4	*Rangia cuneata*	1,508	0.7063	6.29	8.85
4	6	*Mulinia pontchartrainensis*	837	0.3964	3.49	4.97
5	8	*Hypaniola florida*	645	0.0228	2.69	0.29
6	3	CHIRONOMIDS	410	0.8910	1.71	11.16
7	7	*Cerapus benthophilus*	322	0.0232	1.34	0.29
8	5	*Mytilopsis leucophaeta*	121	0.6261	0.50	7.85
9	9	*Monoculodes edwardsi*	75	0.0029	0.31	0.04
10	15	OSTRACODS	44	0.0003	0.18	>0.01
11	13	*Streblospio* sp.	29	0.0004	0.12	>0.01
12	10	*Edotea montosa*	27	0.0020	0.11	0.03
13	16	OLIGOCHAETES	24	0.0001	0.10	>0.01
14	14	*Capitella capitata*	19	0.0003	0.08	>0.01
15	12	*Mediomastus californiensis*	15	0.0006	0.06	0.01
16	11	*Corophium lacustre*	12	0.0013	0.05	0.02
		ALL OTHERS	58	0.0143	0.27	0.18
		TOTAL	23,969	7.8778		

First 8 species, cumulative percent

98.41 Numbers

98.24 Biomass

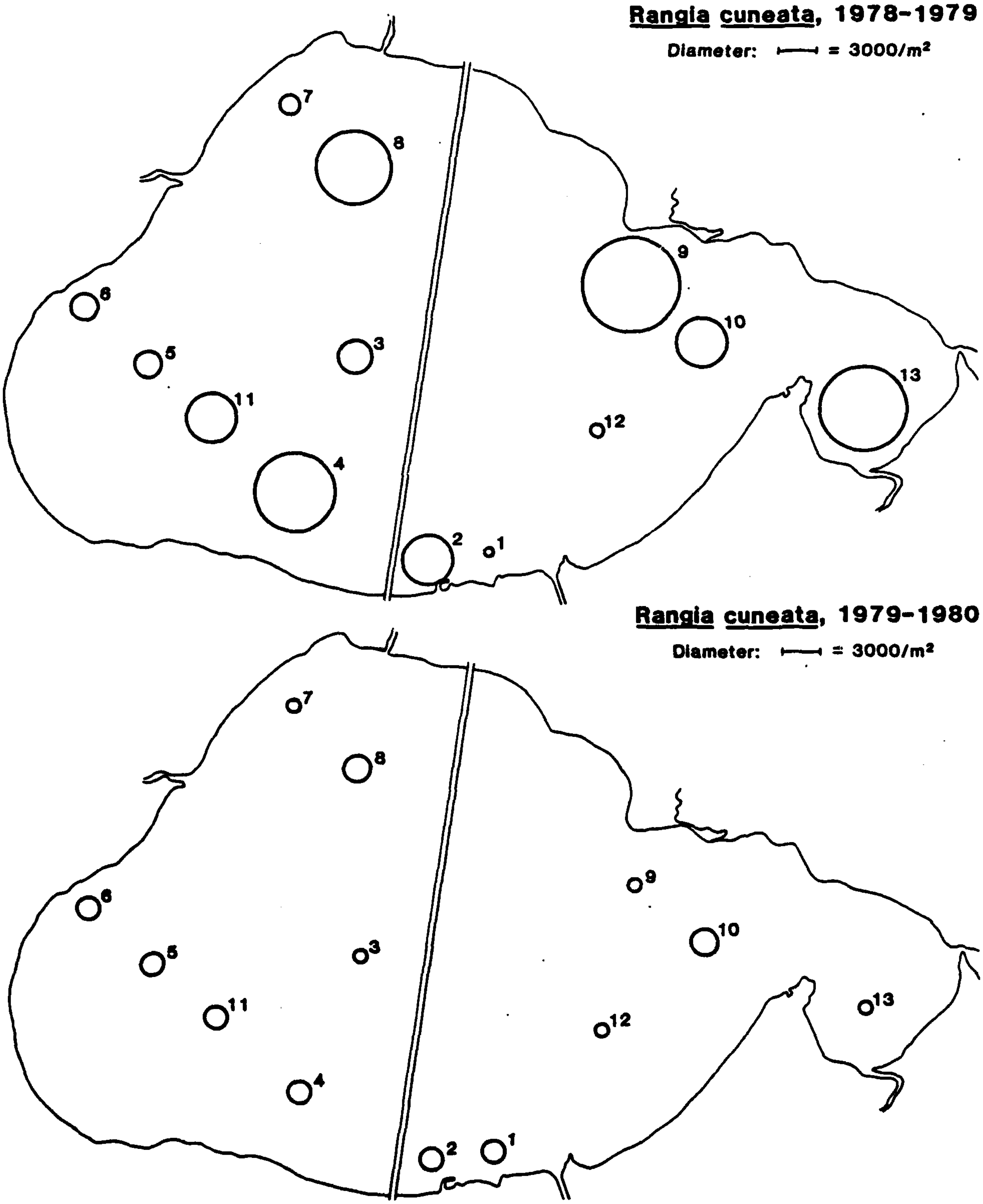


Figure 36. Annual mean *Rangia cuneata* abundance for each sampling station in Lake Poncartrain. Upper map, 1978-1979; lower map, 1979-1980.

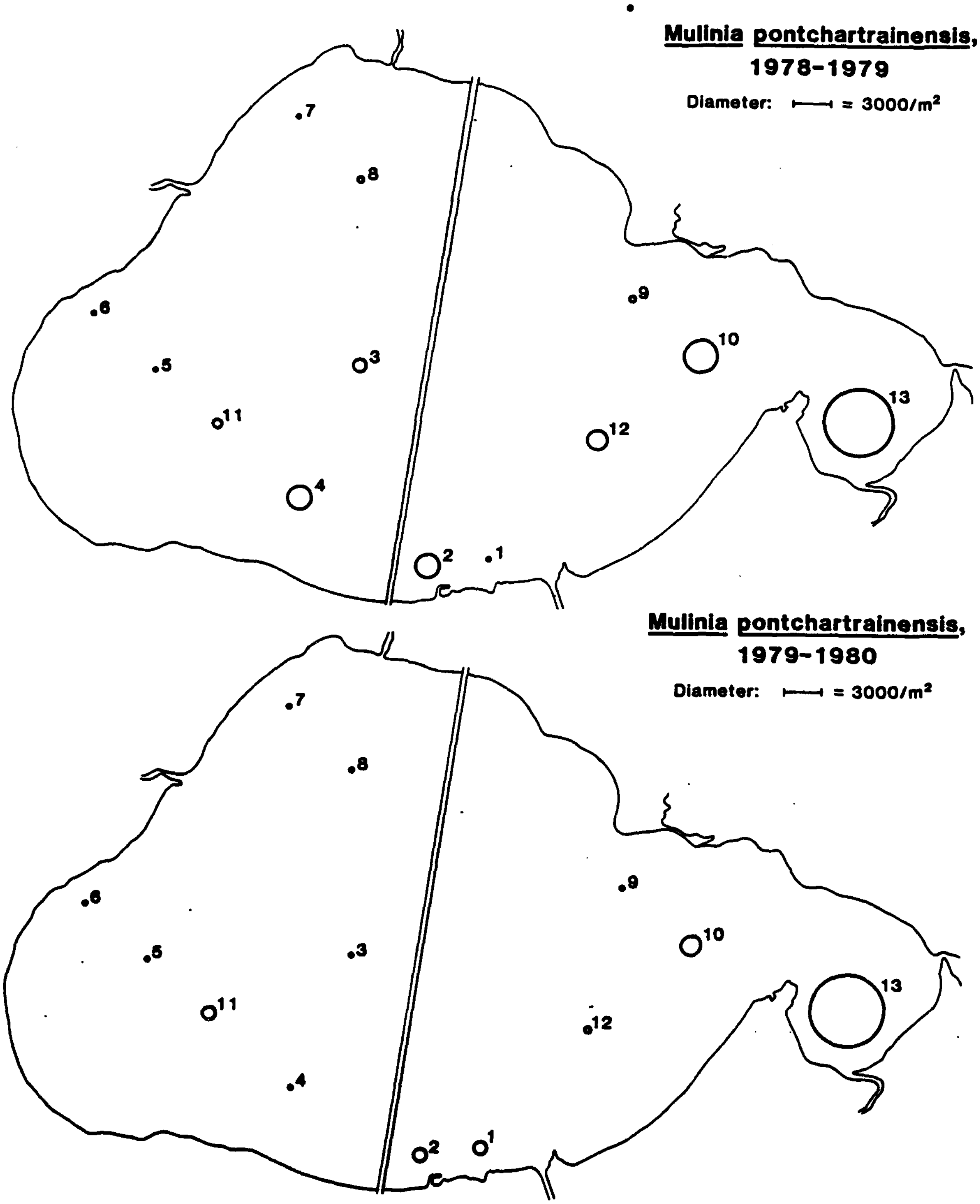


Figure 37. Annual mean *Mulinia pontchartrainensis* abundance for each sampling station in Lake Pontchartrain. Upper map, 1978-1979; lower map, 1979-1980.

Table 10. Ash-free dry weights, g/m^2: Rangia cuneata, Probythinella louisianae, and Texadina sphinctostoma

	Species					
	Rangia cuneata		Probythinella louisianae		Texadina sphinctostoma	
Stations	1st yr	2nd yr	1st yr	2nd yr	1st yr	2nd yr
1	0.31	0.84	0.41	0.04	1.55	2.55
2	1.93	0.83	0.03	0.18	4.57	2.40
3	1.34	0.41	1.69	2.80	4.79	2.82
4	3.03	0.88	0.54	1.22	2.73	2.14
5	1.02	0.69	4.29	4.30	2.51	1.52
6	1.10	0.69	3.59	8.24	1.97	1.44
7	0.82	0.59	1.98	6.18	0.21	0.18
8	2.83	0.99	2.97	7.33	3.40	3.03
9	3.52	0.43	0.02	0.03	0.74	1.73
10	1.81	1.08	0.10	2.04	1.36	2.67
11	1.92	0.89	0.70	0.90	3.11	2.20
12	0.41	0.49	0.04	0.29	1.09	1.79
13	3.22	0.37	3.55	7.86	1.58	1.70
$\bar{X}$	1.78	0.71	1.52	3.20	2.35	1.99
SE	0.15	0.05	0.11	0.35	0.11	0.11

not as well defined. Chironomids (Figure 38), for instance, decreased in abundance the second year of the study at Station 7, and increased at Station 6. Similar trends are seen in the polychaetes (Figure 39) and the Amphipods (Figure 40).

Changes in the Meiofauna

Changes between the first year of the study and the second year in the meiofauna were confined to the nematodes (Figure 41). A significant change from 454.18 ± 15.19/10cm^2 to 594.00 ± 30.01/10cm^2 occurred. Rank by numbers and biomass for the meiofauna is given in Table 11. Changes in the nematode populations have been discussed for each station. A variety of patterns was seen. At some stations an increase in nematodes occurred, while at others there was no increase. Overall, no station exhibited a significant decrease in nematode abundance.

Changes in Community Structure

The change in species diversity of the macrofauna from 1.117 ± 0.015 the first year to 0.985 ± 0.028 the second year was significant. The decrease in eveness from 0.473 ± 0.006 the first year to 0.423 ± 0.010 the second year was significant, and was the component that caused the change in diversity, since there was no significant change in average number of species (Tables 7 and 12).

There is no discernible pattern in the variation of species diversity from month to month over the lake (Table 12). No seasonal increase in species diversity caused by migratory species or seasonal increases in some species through reproduction occurs. Significantly greater variation occurs in species diversity from station to station over all months (Table 7). Briefly, this indicates that spatial differences are more important than temporal; where a station is will affect species diversity more than when it was sampled.

In addition to examining the abundance and biomass of the benthic populations, we have looked at some measures of community structure, such as species dominance, species diversity, evenness and species richness. One additional measure of community structure was made. The percent occurrence through time or constancy of each species was measured. Ranking for constancy was similar to the ranking for abundance; the same 6 species were ranked 1 through 6, although in different order.

Texadina sphinctostoma ranked first with 100% constancy. No collection was made that did not contain at least one of these gastropods. Chironomids are second with 98.9% constancy, yet they make up less than 2% of the total abundance. Third, with 98.45% constancy, is *Rangia cuneata*, which varied from 6 to 16% of total abundance. *Probythinella louisianae*, second in dominance by numbers, ranked fourth with 96.39% constancy. The polychaete *Hypaniola florida*

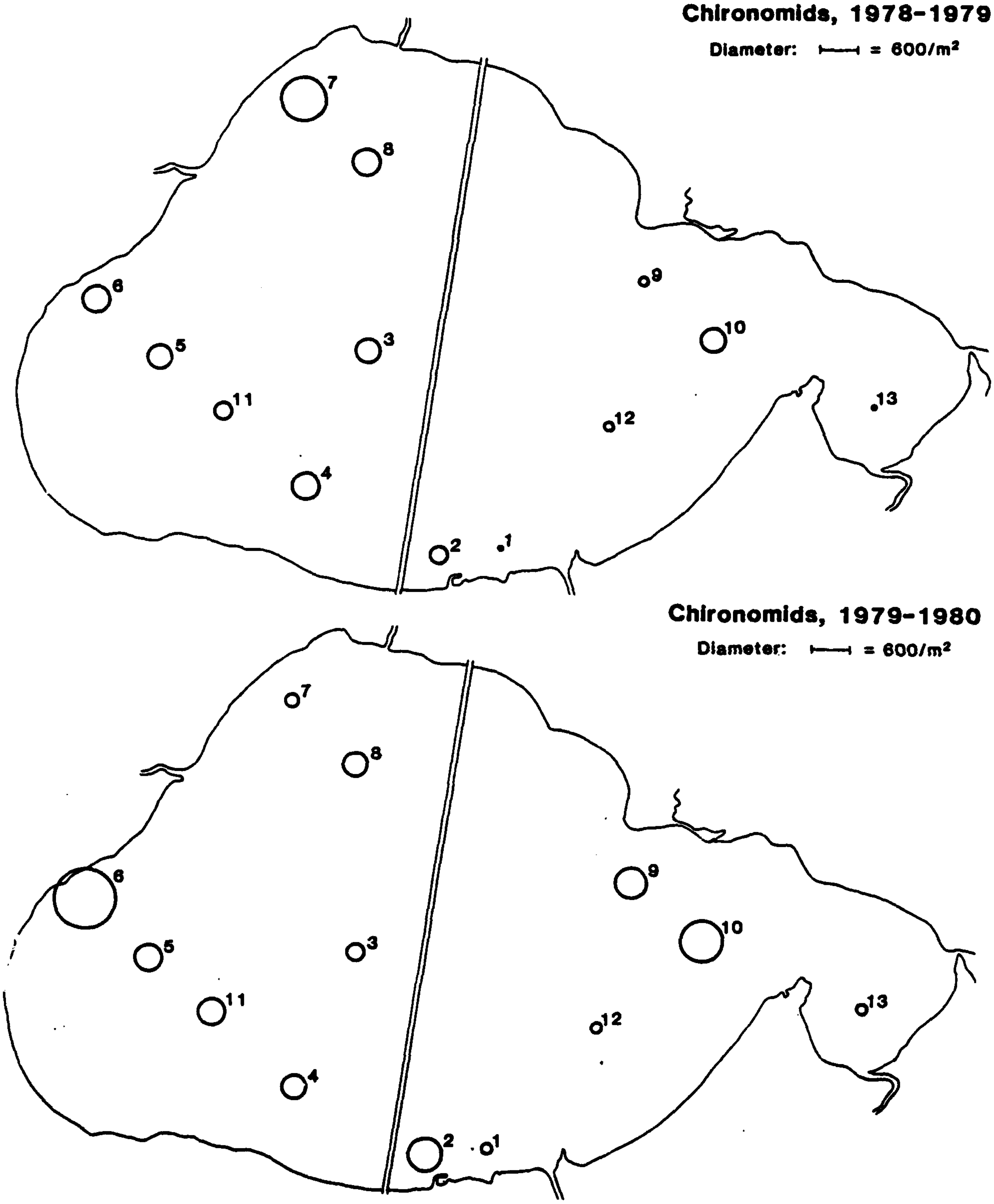


Figure 38. Annual mean chironomid abundance for each sampling station in Lake Pontchartrain. Upper map, 1978-1979; lower map, 1979-1980.

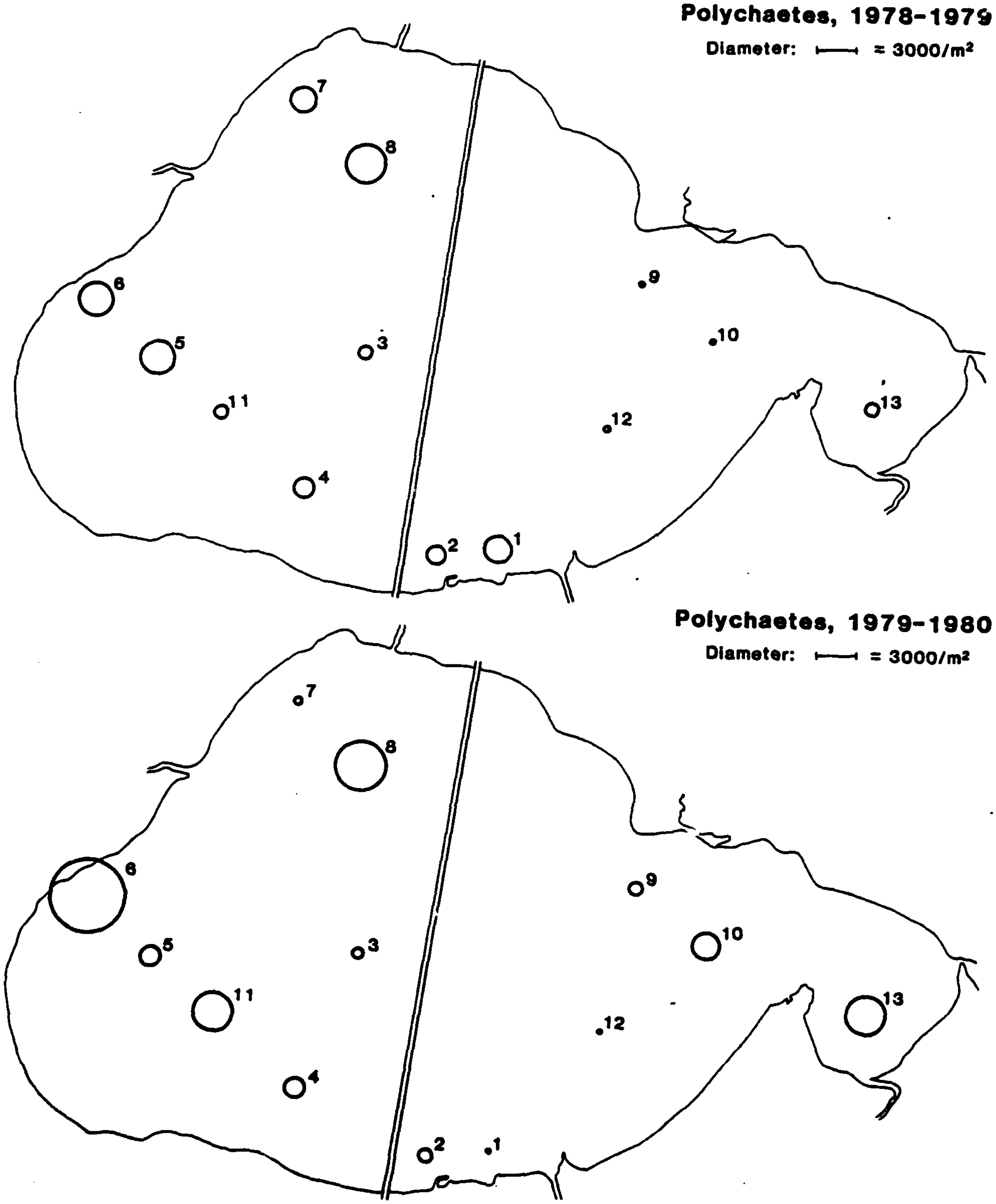


Figure 39. Annual mean polychaete abundance for each sampling station in Lake Pontchartrain. Upper map, 1978-1979; lower map, 1979-1980.

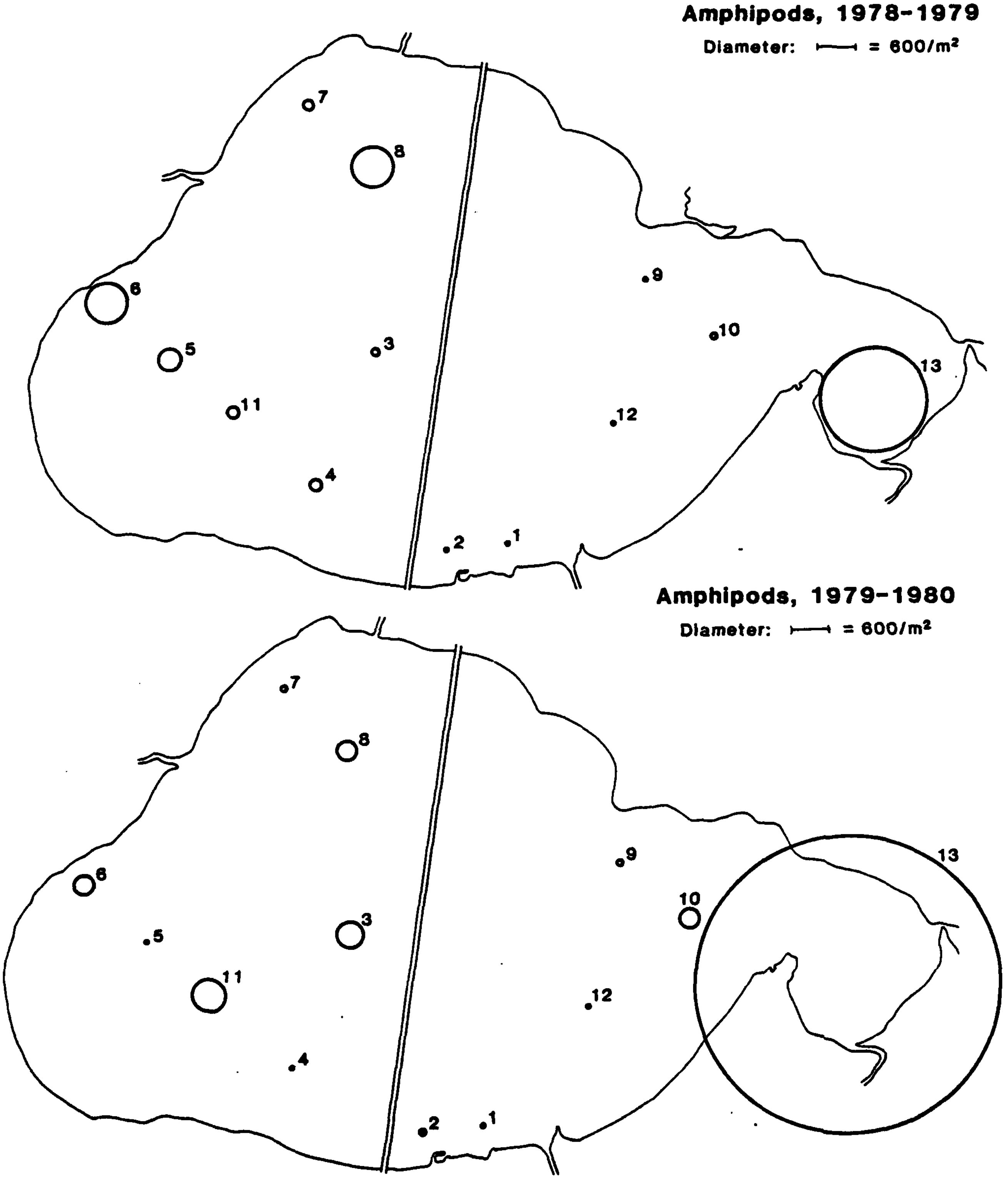


Figure 40. Annual mean amphipod abundance for each sampling station in Lake Pontchartrain. Upper map, 1978-1979; lower map, 1979-1980.

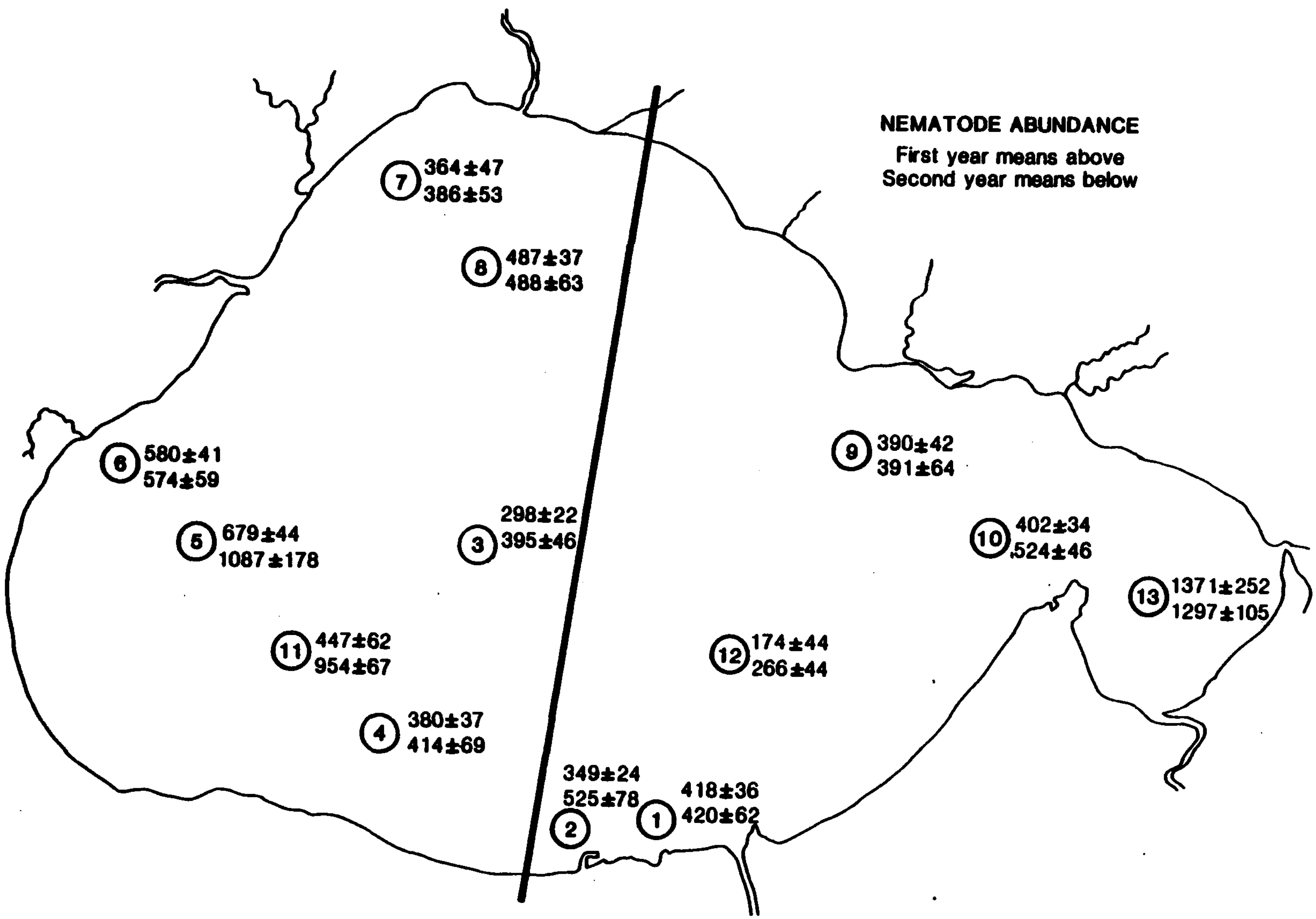


Figure 41. Abundance of nematodes at each sampling station in Lake Pontchartrain. Upper number, $\bar{N}/10cm^2 \pm SE$, 1978-1979, lower number, $\bar{N}/10cm^2 \pm SE$, 1979-1980.

Table 11. Meiofauna, ranked by abundance and biomass, 1978-1980

Rank $\bar{N}$	Rank Biomass	Taxa	Abundance $\bar{N}/10\ cm^2$	Biomass (AFDW) $\mu g/10\ cm^2$	% N	% Biomass
1	1	Nematodes	491.66	419.14	61.57	46.41
2	2	Copepods	69.23	142.96	8.67	15.83
3	6	Copepod nauplii	62.20	39.37	7.79	4.36
4	7	Ostracods	50.95	26.70	6.38	2.96
5	9	Rotifers	37.52	16.28	4.70	1.80
6	4	Turbellarians	26.42	94.97	3.31	9.41
7	3	Gastropods	24.88	95.86	3.12	10.61
8	8	Bivalves	15.30	24.65	1.92	2.73
9	5	Polychaetes	14.20	40.28	1.78	4.46
	·	ALL OTHERS	6.09	13.00	0.76	1.43
		TOTAL	798.56	903.21 $\mu g/10\ cm^2$		

Table 12. Macrofauna diversity and niche breadth measures; mean for all stations, by month.

Month	Diversity	Number of Species	Evenness	$\hat{B}$
August 1978	1.086 ± 0.064	9.667 ± 0.530	0.485 ± 0.024	34.705
September 1978	1.080 ± 0.060	10.233 ± 0.457	0.471 ± 0.027	38.087
October 1978	1.343 ± 0.056	11.833 ± 0.487	0.556 ± 0.028	37.508
November 1978	1.152 ± 0.059	11.282 ± 0.531	0.491 ± 0.024	40.746
December 1978	1.056 ± 0.052	11.500 ± 0.436	0.439 ± 0.021	40.803
January 1979	1.076 ± 0.045	12.500 ± 0.500	0.434 ± 0.020	42.424
February 1979	1.057 ± 0.041	11.744 ± 0.437	0.439 ± 0.018	27.968
March 1979	1.035 ± 0.058	10.733 ± 0.489	0.442 ± 0.022	52.807
April 1979	1.060 ± 0.053	11.767 ± 0.364	0.432 ± 0.020	47.399
May 1979	1.121 ± 0.041	10.821 ± 0.456	0.480 ± 0.017	54.759
June 1979	1.182 ± 0.045	10.933 ± 0.359	0.500 ± 0.019	59.101
July	1.125 ± 0.068	9.867 ± 0.389	0.492 ± 0.030	55.886
August 1979	1.144 ± 0.047	10.667 ± 0.459	0.488 ± 0.019	61.111
December 1979	1.034 ± 0.057	13.000 ± 0.476	0.402 ± 0.010	40.904
February 1980	0.975 ± 0.048	12.179 ± 0.521	0.394 ± 0.019	43.416
May 1980	1.048 ± 0.031	9.949 ± 0.514	0.469 ± 0.015	50.743
August 1980	0.886 ± 0.074	9.308 ± 0.870	0.427 ± 0.024	39.159

which makes up about 2% of the abundance is fifth, with 95.36% constancy. Mulinia pontchartrainensis with 4% of the total abundance is sixth, with 90.21% constancy. This high constancy is another indicator of the lack of seasonality, which will be discussed at greater length in another section.

Changes in Community Function

In addition to community structure, some measures of community function were made. Niche breadth (B) as measured for each station over all months (Table 7) and for each month over all stations (Table 12). Similar to diversity, there was slightly more difference between stations than there was between months. This indicates that although all stations studied are functioning in a similar manner, partitioning resources similarly, resource availability changes less seasonally than it does spatially.

Niche breadth for individual species (B_i) was measured for the dominant macrofauna species.

In order to gain some insight into the possible functional relationships between major groups within the benthic community, a series of stepwise multiple regression analyses were performed using lakewide data. The variables in these exploratory analyses included total molluscs, total bivalves, total gastropods, individual species of molluscs, total nonmolluscs, total polychaetes, individual polychaete species, and many other combinations of macrofauna groups. In addition to the macrofauna, variables were formed from the meiofauna data set similarly (total meiofauna, nematodes, copepods, total non-nematodes, etc.) and merged with the macrofauna variables.

Physical variables such as temperature (using the values from just above the bottom), conductivity, and presence or absence of sediment disruption (indicative of recent dredging) were included.

The results of these exploratory analyses were not highly significant, but did indicate some strong patterns. By performing the analyses on data from single stations, instead of including all stations, a great improvement in significance of the results was possible. Using only those variables which had shown some association in previous trials, and using an option in the program which tests each variable for maximum improvement of r^2, the correlation coefficient, it was finally possible to demonstrate highly significant associations between certain groups, at certain stations.

Table 13 shows the results of these regression analyses for each station with nematodes as the dependent variable. In all but two cases, a significant model with one of the two gastropods as an independent variable emerged after the addition of one, two, or three variables. In one case (Station 4) a one variable model, with temperature as the independent variable, emerged. At Station 9 no combination of variables led to a significant result with nematodes.

Table 13. Stepwise multiple regression analysis; nematodes, dependent variable all stations

Station	Independent Variable	r^2	F	Prob., F
1	Probythinella louisianae, Rangia cuneata	0.98	67.89	0.0032
2	Texadina sphinctostoma	0.88	28.22	0.0060
3	T. sphinctostoma, temperature	0.96	40.14	0.0068
4	Temperature	0.95	84.41	0.0008
5	T. sphinctostoma, conductivity	0.94	23.56	0.0146
6	P. louisianae, temperature	0.99	75.55	0.0131
7	P. louisianae, R. cuneata, temperature	0.90	11.72	0.0189
8	P. louisianae	0.93	40.05	0.0080
9	T. sphinctostoma, conductivity	0.55	1.86	0.2983 (NS)
10	P. louisianae, temperature	0.91	15.28	0.0267
11	T. sphinctostoma, temperature	0.88	10.99	0.0416
12	P. louisianae, conductivity	0.96	32.21	0.0094
13	P. louisianae, temperature	0.51	5.69	0.0201

Using one of the gastropods as the dependent variable at only those stations where that gastropod was the dominant species yielded highly significant results. At the Probythinella louisianae dominated stations, the regression analyses showed a consistent association between that species and nematodes. At all but one of these stations temperature was also associated with P. louisianae (Table 14a). Where temperature appeared it always had a negative slope, showing an inverse association.

At those stations where Texadina sphinctostoma was the dominant species a different pattern emerged. Results were not as consistent as at the other stations, but, generaly, Probythinella louisianae was strongly associated with changes in Texadina sphinctostoma numbers. Other associations were with nematodes, temperature, conductivity, dredging, and chironomids (Table 14b). An occasional weak association with the common polychaete Hypaniola florida was present, but not highly significant.

Table 14a. Stepwise multiple regression analysis *Probythinella louisianae* as dependent variable for stations where *P. louisianae* is dominant species

Station	Independent Variables	r^2	F	Prob., F
6	Nematodes, temperature	0.99	2252.3	0.0004
7	Nematodes, temperature	0.96	36.29	0.0023
8	Nematodes	0.93	40.05	0.0080
13	Nematodes, temperature	0.96	36.84	0.0077

Table 14b. Stepwise multiple regression analysis; *Texadina sphinctostoma* as dependent variable for stations where *T. sphinctostoma* is dominant

Station	Independent Variables	r^2	F	Prob., F
1	Nematodes, temperature	0.99	140.42	0.0011
2	Nematodes, conductivity	0.97	47.09	0.0054
3	Nematodes, chironomids	0.99	350.90	0.0003
4	*P. louisianae*, temperature	0.97	20.89	0.0460
9	*P. louisianae*, dredging	0.97	53.91	0.0045
10	*P. louisianae*, conductivity, dredging	0.99	55.61	0.0177
11	*P. louisianae*, temperature, conductivity	0.94	10.77	0.0862
12	*P. louisianae*, dredging, chironomids	0.99	2752.32	0.0004

DISCUSSION

Loss of Large Rangia cuneata from the Benthic Community

Benthic infauna offer several advantages as ecological indicators. Not the least of these is that both the habitat and the community are stationary. Benthic organisms will occupy the same location in space as long as conditions are conducive to the community through time. The time frame for which this is true can be greatly extended into the past if the organisms in the community leave evidence of their habitation, either as trace fossils, or as actual fossils of the organisms themselves. This is particularly true of the mollusca, especially the bivalves. If we are able to compare fossil information with that gleaned from extant communities, much can be inferred about the ecosystem which supports these communities now and in past times.

One striking pattern that has emerged from the present study is the loss of larger *Rangia cuneata* (over 20 mm long) from the open-lake bottom community. This is one of the most significant faunal changes in Lake Pontchartrain because it represents a complete change in the dominance, biomass, and energy flow patterns of the benthic community. This change is apparently widespread over the entire lake, and reflects a profound change in the lake ecosystem as a whole. That large *R. cuneata* were ever present in the open lake is beyond question, since their fossil shells are there in such abundance that a sizeable industry is supported by harvesting these shells. The shell dredging industry removes almost 5 million cubic yards ($3.8 \times 10^6 m^3$) of shell annually, with 62,200 clams (with 2 valves each) represented in each cubic yard. That large living *R. cuneata* were present in the near past is evidenced from Darnell (1979) who, during a survey study of Lake Pontchartrain between 1953 and 1954, found a mean density of $135 \pm 16/m^2$ of *R. cuneata* longer than 20 mm at 23 open lake stations. At 12 mid-central stations he found a mean of $112.75 \pm 16/m^2$ of *R. cuneata* over 20 mm. A few years later, in 1957 and 1958, working in the nearshore, in waters depths of 2.4 m, and slightly deeper, Fairbanks (1963) found *R. cuneata* larger than 21 mm in densities of $31/m^2$.

Rangia cuneata does not become sexually mature until lengths > 20 mm. Fairbanks (1963) determined that *R. cuneata* developed recognizable gonads at a mean length of 23 mm. Older adult clams are considerably larger, and it is not unusual for these larger clams to be found in high densities in favorable habitats. In Texas, Hopkins and Andrews (1970) report 45 mm clams occurring at a density of $250/m^2$. In Georgia, Godwin (1968) reports 52 mm size clams occurring in densities of $132/m^2$ in the Altamaha River Delta. Pfitzenmeyer and Drobeck (1964) report 35 - 45 mm clams occurring in densities of $225/m^2$ in Maryland.

In the present study of 13 permanent open-lake stations in Lake Pontchartrain, 582 box core samples were taken over a two-year period. In those samples only 10 *R. cuneata* over 30 mm and 33 *R. cuneata* between 20-30 mm were found, for overall mean densities of $0.19/m^2$ and $0.62/m^2$. Expressed another way, there is an average of 1 clam > 30 mm per 5.2 m^2, and 1 clam 20-30 mm per 1.6 m^2. R. cuneata larger than 20 mm equaled less than 0.03% of the overall mean density over the two year period of $3256.5/m^2$ for all sizes of R. cuneata. R. cuneata between 10-20 mm averaged only $21.68/m^2$ for 0.67%, so that all R. cuneata over 10 mm combined are less than one percent (0.692%) of the overall mean population density.

In July 1980 a transect was made from inshore on the north shore to the open lake (Table D2, Appendix D). When the stations with water depths comparable to the depths Fairbanks (1963) sampled (2.1 m to 2.7 m) are examined, we find R. cuneata over 30 mm in size at densities of $4.54/m^2$, or about 24 times as many per m^2 as found in the open lake stations in the present study, but still only 0.12% of overall mean of all the R. cuneata found at these transect stations. R. cuneata between 20-30 mm were found at the same densities, $4.54/m^2$. The density of all R. cuneata > 20 mm was $9.08/m^2$ on this transect during the present study, which is only 29% of the density of $31/m^2$ found by Fairbanks (1963). Only a single individual was found between 10-20 mm in size. The density of all clams over 10 mm found on this transect, from 0.4 km to 1.2 km offshore was 0.26%. The density of large R. cuneata has declined precipitously in the last 23 years both inshore and offshore. In fact, the decline may have taken place before the early 1970's, because Tarver and Dugas (1973) and Dugas et al. (1974) both report R. cuneata larger than 16 mm were conspicuously absent from the open-lake region of Lake Pontchartrain, and that "none was recorded from samples taken in areas that were continually dredged" (Tarver and Dugas 1973). Both these studies covered the entire area of the lake and sampled from 83 quadrats.

Fossil R. cuneata shell larger than 18 mm from two midlake stations (3 and 5) were measured. From Station 3, 131 shells had a mean length of 24.5 ± 0.48 mm (range 14-40 mm) and from Station 5, 154 shells had a mean length of 27.0 ± 0.03 mm (range 18-31 mm) which suggests that R. cuneata commonly grew larger than 20 mm. We do not know how old the clams were that provided the shells, however, it can be said that large Rangia cuneata have survived in the midlake region of Lake Pontchartrain in the distant past and in the recent past.

What change has occurred in the ecosystem that would prevent large R. cuneata from surviving in the open lake, and cause the decline in the peripheral regions? There are a number of possible reasons why large clams do not survive: (1) the sediments have become softer, less stable, and large R. cuneata sink beneath the sediment surface; (2) resuspended sediments silt up and choke the larger clams; (3) primary production has declined so that the rate of carbon input is too low to support the larger biomass of large clams; (4) toxic substances kill large clams because larger clams accumulate a larger body burden over a longer time than do smaller clams; (5) R. cuneata only spawn successfully in certain years so that only in those years do sufficient numbers of larvae reach the open lake to insure survival of the year class to the larger sizes; or (6) predation pressure has increased to the extent that virtually no clams survive to the larger sizes. There is also the possibility, of course, that a combination of the above factors is responsible.

Although Rangia cuneata are important in the diet of many demersal fishes that inhabit Lake Pontchartrain, increased predation pressure to the extent of near complete elimination of clams larger than 10 mm seems highly unlikely. In a year-long study of the nekton of the lake, Thompson and Verrett (1980) found the lowest overall mean biomass of demersal fish at their one midlake station, lower than 11 other stations in the lake. Unfortunately, the authors gave no statistics on the numbers of the principal invertebrate predator, the blue crab, Callinectes sapidus, because trawls are considered inefficient gear for blue crabs.

Rangia cuneata in Lake Pontchartrain have two spawning periods, March though May and late summer through November (Fairbanks 1963). Our data shows that the smallest size clams were always present in the benthos. Even assuming a one percent per year survival rate, there should be greater numbers of large clams in the open lake. In a study of the growth of Rangia cuneata, Wolfe and Petteway (1968) calculate that one year old clams should attain a size of 16 mm. Fairbanks (1963) estimated that one year old clams in Lake Pontchartrain attained a size of 15-20 mm. Thus, it appears that the greatest majority of clams now in the open lake are less than 10 mm, and survive less than one year.

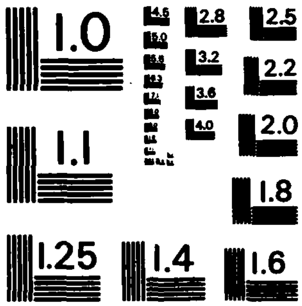
Toxic substances are present in Lake Pontchartrain as previously described in another section of this report. One of the common toxicants entering the lake is the pesticide dieldrin. Petrocelli et al. (1973) have shown in short-term laboratory experiments that Rangia cuneata is capable of concentrating dieldrin from water concentrations of 0.55 μg/ℓ by a factor of 800 times (maximum 2000 times) over ambient. In a later study (Petrocelli et al. 1975a) it was shown that R. cuneata fed algae exposed to dieldrin, exhibited a magnification of dieldrin residues of up to 54 times greater than the concentration resulting from resuspending contaminated algae in clean seawater. It can be seen that R. cuneata can concentrate toxic substances directly from water and through the food chain. Unfortunately we do not yet know what the lethal body burden is, and more research is necessary.

The possibility of an ecosystem-wide decline in primary production will be discussed later in this section.

Resuspension of sediment does take place in Lake Pontchartrain and is primarily caused by wind induced waves as pointed out in a previous section (description of study area). Lake Pontchartrain has probably always been turbid. Darnell (1958) points out "In Lake Pontchartrain the common Rangia is most abundant on the muddiest bottoms in waters of maximum turbidity." In a later paper, Darnell (1961) states that of particular significance is the fact that the waters are highly turbid and "the great turbidity was found to be directly related to wind action which disturbs and raises the bottom sediments." The critical question

AD-A126 648 ECOLOGICAL CHARACTERIZATION OF THE BENTHIC COMMUNITY OF LAKE PONTCHARTRAI..(U) LOUISIANA STATE UNIV BATON ROUGE COASTAL ECOLOGY LAB W B SIKORA ET AL. APR 82 2/3

UNCLASSIFIED LSU-CEL-82-05 DACW29-79-C-0099 F/G 8/8 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

is: has turbidity increased since the 1950's? Good, quantitative data is lacking, although perhaps some increase can be inferred from the literature. Alishahi and Krone (1964) in a series of experiments have shown resuspension of sediments by waves results from the bed shear stress causing scour. They also showed that greater sediment bulk density also has greater resistance to scour. Sikora et al. (1981) have shown that hydraulic dredging for clam shells in Lake Pontchartrain results in lowered sediment bulk density; and as pointed out in a previous section (Cultural Impacts), shell dredging activity covers a significant area of the open lake. To determine whether sediment resuspension has increased or not will take further research; however, even given the same amount of sediment resuspension as occurred in the 1950's, the consequences would be far greater if the sediments were contaminated with toxic materials (Peddicord 1980).

The question of whether the sediments are too soft to support large *R. cuneata* is complex. Rhoads (1974) reviews the problem and states that the density factor may be important for mud-dwelling organisms with mineralized tissue, and that the evolution of some morphological feature of soft-mud bottom benthos is necessary, such as thin shells or some other adaptation. With regard to *R. cuneata*, Stanley (1970) shows that it is adapted for shallow burrowing in stable substrate with thick valves and short siphons, and is a slow burrower. Stanley goes on to point out that another way to deal with the sinking problem is to remain small, thereby keeping the surface/volume ratio as large as possible to maximize support from the substratum per unit animal weight in "soupy mud substrate." It has been shown (Sikora et al. 1981) that shell dredging produces fluid mud of lower bulk density, fitting the category of a "soupy mud substrate". The size distribution data of *Rangia cuneata* in the present study (99.3% smaller than 10 mm) could be interpreted as corroborating the hypothesis that small size is a necessity in soft mud.

Primary Production and the Benthic Community

Primary production in Lake Pontchartrain is considerably lower than might be expected. The mean levels of nutrients in the water column from Lake Okeechobee, Florida were compared with those from Lake Pontchartrain over a 12 month period. Total phosphorus levels of 0.75 μg-at/ℓ, and NO_3-N of 1.08 μg-at/ℓ in Okeechobee, (Davis and Marshall 1975) are probably not significantly different from the levels of 1.60 μg-at/ℓ total phosphorus, and 1.34 μg-at/ℓ NO_3-N reported for Pontchartrain (Stoessel 1980), since the coefficient of variation for field samples for these nutrients is reported as 100%, and laboratory samples as 80% (Stoessel 1980). Both lakes are large, shallow, turbid systems, with no significant differences in secchi disk depths, or nutrient regimes. Both have been classified as mesotrophic (Witzig and Day 1980, Joyner 1974). Primary production in Lake Okeechobee was significantly higher at 1.86 $gm^{-2}day^{-1}$, than in Lake Pontchartrain, 0.5 $gm^{-2}day^{-1}$, averaged over an annual cycle (Dow and Turner 1980, Davis and Marshall 1975).

Organic matter in the sediments is thought to be the carbon substrate which is at the base of the deposit-feeder food chain. Much of the literature on detritus-based systems is in turn based on this premise. It is well known that organic content of sediments varies inversely with sediment grain size so that clay and silty-clay sediments usually have the highest organic matter content. The organic content of Lake Pontchartrain sediments was measured by Steinmayer (1939) and at that time the clay sediments in the central region of the lake had between 6 and 8% organic matter. The mean value for organic carbon in lake sediments from Bahr et al. (1980) was 1.06% and from the 13 stations occupied during the present study a mean of 1.33% organic carbon. There appears to have been a decline in sediment carbon since 1939. However, both sets of samples from which the latter two values were determined were collected in the spring and it is not known whether there is a seasonal component to the organic matter in the lake. Warwick and Price (1975) report the organic content of sediment from a mud flat in the Lynher estuary in England as 12.2 - 13.6% while Rhoads and Young (1970) report values for silty-clays in Buzzard's Bay, Massachusetts of 2.0 - 2.2%. From the present data, it would appear in either case that the organic content of Lake Pontchartrain sediments was low, and lower than it once had been.

Steinmayer (1939), in describing the organic matter, refers to it as being of "vegetable origin", what he terms as comminuted vegetable matter and humus matter. Darnell (1961) refers to the "offshore deposition of much humus from the marsh and swamp area" and says "the vegetable detritus of Lake Pontchartrain seems to be from the decay of certain marsh grasses and phytoplankters". Darnell repeatedly refers to the "allochthonous" origins of the basic organic matter supporting the consumers in the lake community. He defines the primary components of allochthonous material as marginal marsh vegetation, sedges, cord grasses etc., phytoplankton from outside the lake, and Mississippi River overflow material.

The question of organic carbon in detritus-based systems is complex because, although macrodetritus is the most obvious component to the unaided eye, it may represent the most refractory elements in the detritus system. There is evidence that Spartina detritus is not directly available to macroheterotrophs (Wetzel 1975), and the microbial components of the systems are actually what are utilized (Odum and de la Cruz 1967, Pomeroy 1979). It follows then, that the more labile material in detritus will be utilized first, at a faster rate. Present day sediment carbon techniques do not distinguish between labile and refractory components of detritus. Refractory material, though present in seemingly sufficient quantity, may represent a very slow rate of carbon transfer to heterotrophs.

At the other end of the spectrum, dissolved organics are readily available to microorganisms (Pomeroy 1979). Autochthonous dissolved organic production by phytoplankton may be very important in open water systems. Phytoplankton grazing by zooplankton is another pathway by which labile material reaches the bottom in open water systems. Elmgren (1978) has demonstrated in an area of the Baltic Sea that benthos increases roughly in proportion to the primary production in the water column above, and that the benthic system is intimately coupled to the pelagic system and may respond to events in the plankton within weeks. In the open water region of Lake Pontchartrain this phenomenon can be demonstrated at Station 8 and Station 13.

An investigation of primary production by Dow and Turner (1980) in Lake Pontchartrain showed higher production at two of their survey stations. Survey Station 5 is at the point at which the influences of the Tchefuncte and Tangipahoa Rivers and Pass Manchac combine, and is quite close to our benthic Station 8. Survey Station 13 is near the Chef Menteur and our benthic Station 13. Flooding of the Pearl River causes pulses at Station 13 similar to the influence of the rivers on Station 8. These two stations, which had the highest primary production, also had the highest benthic biomass.

Caution should be exercized in comparing Lake Pontchartrain, which is actually an estuary, with Lake Okeechobee, which is not. It is possible that the exchange of water with the gulf through The Rigolets and Chef Menteur Passes removes some portion of the phytoplankton. A comparison should also be made with another estuary. Sellner et al. (1976) report primary production of 234 $gCm^{-2}yr^{-1}$ in North Inlet estuary near Georgetown, South Carolina. Summer peaks in phytoplankton production are correlated with similar peaks in zooplankton production (Lonsdale and Coull 1977). Pontchartrain primary production of 157 $gCm^{-2}yr^{-1}$ (Dow and Turner 1980) is 67% of that of North Inlet.

Zooplankton and the Benthic Community

Annual mean zooplankton biomass in North Inlet was measured at 16.18 mg m^{-3} dry weight (Lonsdale and Coull 1977). Dry weight of zooplankton from midlake stations in Lake Pontchartrain was measured at 8.35 mg m^{-3} (Stone et al. 1980). This value includes both their separately listed macrozooplankton and microzooplankton, in order to decrease differences caused by different net mesh sizes. If we compare only the macrozooplankton with that of a previous study in Lake Pontchartrain (Tarver and Savoie 1976) where the same mesh nets were used we find little difference in the abundances.

Hawes and Perry (1978) reported their findings on zooplankton in Lake Pontchartrain in settled volume for 10 minute tows. Converting this to a volume basis in order to compare with Darnell's earlier studies of the lake (Darnell 1961, 1962) we find that their samples, were, on the average, slightly less than half of what Darnell's settled volume was reported to be.

If we assume that the three recent studies of Lake Pontchartrain zooplankton (Stone et al. 1980, Hawes and Perry 1978, and Tarver and Savoie 1976) were measuring roughly equivalent populations, then we can assume that Darnell's zooplankton biomass would have been more nearly equivalent to that found by Lonsdale and Coull (1977) in the unpolluted, pristine North Inlet Estuary.

Copepods make up less than nine percent of the total meiofauna. Of these, Acartia tonsa makes up 11.6% of the copepods found. This is the equivalent of $8030/m^2$ found on or near the bottom sediments. No exchange with the water column is possible when the closed box corer is retrieved during sampling. When meiofauna samples are taken from the box corer they include the overlying 20 to 30 cm of water. It is significant that almost 300 times more Acartia tonsa are found feeding epibenthically than exist in the water column.

Through alterations over time Lake Pontchartrain is becoming a one resource system. The distinction between the zooplankton and the benthos is disappearing. Not only are so-called planktonic forms found living epibenthically, many benthic forms are found as "tychoplankton." The tube-dwelling amphipod Cerapus benthophilus and tube-dwelling polychaetes were not infrequently found in the plankton tows. Adults of Texadina sphinctostoma, the small gastropod, were frequently found in the plankton. The same rotifer species were found in both series of samples. The resuspension of low bulk-density sediments by wind-induced water movement would account for the appearance of benthic forms in the water column. The high incidence of planktonic forms feeding epibenthically is not so easily accounted for.

Feeding Modes in the Benthic Community

In addition to the disappearance of the distinction between plankton and benthos in our turbid, easily resuspended, one-resource system, the distinction between deposit feeders and suspension feeders is blurred. This situation is not uncommon in fine-sediment systems. Eagle and Hardiman (1977) in discussing the feeding modes of the species present at their study site comment that "at the interface layer the animals probably make no clear distinction between material in suspension and material recently deposited, and further more there is probably a continual flux of food particles between the two states. Thus, for the most part, the polychaetes present use a pair of palps or tentacles to collect food from the sediment surface and from suspension; the molluscs filter out suspended material from just over the sea bed, or suck up the sediment surface layer; while the crustaceans stir up the surface layer and filter the resulting suspension." Boesch (1973) in discussing the same phenomenon states that "generalizations based on broad feeding-type categories suffer because they are imprecise descriptions of feeding behavior and because of the considerable feeding-plasticity of many benthic animals." Holland et al. (1977), in describing the community structure of another low salinity mud-bottom estuary, suggest that in physically stressed communities biotic interactions, such as interactions between feeding types, may be masked by physical controls. They note also that many of the opportunistic species, such as Macoma balthica and Nereis succinea, important in recolonization processes, have the capability of obtaining food by more than one mechanism.

Niche Breadth of the Benthic Community

In commenting on the loss of distinction between planktonic filter feeders, benthic deposit feeders, and benthic suspension feeders we are, in essence, discussing the loss of the specialist with a narrow niche and the increase in the number of species that are functioning as generalists with broad niches.

If we define the environment of an organism as where it lives, then we can define the niche of an organism as how it lives, or how it uses its environment. An organism's niche can be discussed in terms of patterns of resource utilization. A growing body of theory predicts that niche breadth should generally increase as resource availability decreases (Schoener 1971, Charnov 1976, Pianka 1978). Levins (1968) and Hespenheide (1975) relate increased niche breadth to lowered resource productivity. If we calculate $\hat{B}$, the niche breadth for the total community, for each station over all months, we find that they are not significantly different from each other, evaluating the difference by an F test (Petraitis 1979), and have a mean of 34.25. This is not significantly different from the $\hat{B}$ values determined for the perturbed Gull Lake System (Lane et al. 1975). The Gull Lake System experienced an order of magnitude increase in filter-feeding plankton after eutrophication, which lowered the diversity of the system, and lowered the resources available to each organism. Niche breadth expansion is one mechanism by which low diversity in a community may be compensated (Cody 1975).

Species Diversity of the Benthic Community

Species diversity in Lake Pontchartrain is uniformly low throughout the year. Some shallow, low salinity estuaries such as the Calvert Cliffs region of Chesapeake Bay, experience similar low ($H' = 1.00$) diversities during the summer when low oxygen conditions occur during salinity stratification, but return to more normal levels ($H' = 2.25$) during winter months (Holland et al. 1977). Values for species diversity have been shown by various investigators to have a negative correlation with environmental stress, particularly with pollution (Wilhm and Dorris 1968, Woodwell 1970, Copeland and Bechtel 1971, Goodman 1975, and Ruggiero and Merchant 1979).

An empirical categorization, based on the results of extensive environmental sampling has been proposed by Wilhm and Dorris (1968). These widely accepted standards (converted to $\log_e$) for stressed or polluted systems are $H' < 1.443$, severe pollution; $1.443 < H' < 4.328$, moderate pollution; H' > 4.328, clean water. These standards are for freshwater systems. We can not expect a brackish water system to have as high a diversity as either a freshwater system or a full marine system. It is probable, however, that in the past Lake Pontchartrain would have had a species diversity of 2.2 to 2.8 similar to that of other healthy brackish systems (Rosenberg and Moller 1979).

Gray (1978) has pointed out that the use of Caswell's neutral model of diversity (Caswell 1976) can place diversity measures related to pollution on a more theoretical basis. Caswell (1976) enjoins us to consider the factors which may be operating to increase dominance of one or a few species at the expense of all the rest, leading to a very uneven distribution of abundance and a lowered value of H'. In the theory of community structure, the undisturbed operation of biological interactions acts to eliminate extreme dominance, maintaining a larger number of species at reasonable levels of abundance, thus increasing the diversity. Deviations in the directions of increased dominance are attributed to the action of disturbance, upsetting the internal balance attained by the community.

In testing the neutral model predictions of diversity, a series of curvilinear regressions was constructed using Caswell's table in order to extend the range to cover greater abundance. The diversity predicted by the neutral model for Lake Pontchartrain was 1.164. This is significantly higher than the actual H' of 1.086 ± 0.023, the mean for all stations, over all months. A diversity less than or equal to the neutral model is predicted for highly polluted or disturbed systems theoretically, where species equilibrium is altered, and higher dominance and lower species diversity ensues, or wherever the influence of abiotic factors swamp the influence of biological interactions. Other low salinity, polluted estuaries have similarly low diversities; the Baltic, 1.05 (Ankar and Elmgren 1976) and 1.3 (Rosenberg and Moller 1979), Hampton Roads Area "mud" stations, 1.59 ± 0.26 (Boesch 1973).

Huston (1979), using computer simulations of periodic disturbance, showed lowering of diversity as disturbances became more frequent. His model also predicts low diversities under extreme conditions such as low nutrient availability or presence of toxic substances. In short, any factor which could cause density independent mortality will alter diversity.

We have discussed one mechanism of compensation for low diversity; the increase in niche breadth. An alternate mechanism frequently encountered (Cody 1975) is density compensation. If for any reason the species total at a particular site is relatively impoverished, the existing, or remaining, species can use at least a part of the resources which would have gone to the missing species. The densities of such opportunistic species would thereby increase because they have access to additional resources, assuming that density is limited by resources availability. The loss of the large *Rangia cuneata*, found in considerable numbers by Darnell (1979) in Lake Pontchartrain in his studies 25 years ago, have made resources available for the great numbers of tiny gastropods.

Abundance and Biomass of the Benthic Community

Information on mean abundance and mean biomass of several other benthic communities has been summarized in Table 15. The average organism in other benthic communities is 21 times larger than the average for Lake Pontchartrain macrofauna. Not only are the species which occur in the lake smaller representatives of their genera or families, but the size of the individuals are smaller than the average for collections of some of the same species from other areas in Louisiana and from other states. This condition has been noted by taxonomic experts who have confirmed species identifications for us. Whether this is a "stunting," similar to the small bluegills in an overstocked farmpond that have decreased growth rates because of inadequate resource availability (Lagler et al. 1962) or a response to factors other than competition for resources, remains undetermined.

If intense competition for limited resources is one of the factors affecting community structure, then changes in resources availability should be reflected in measures of community structure such as abundance. When the Bonnet Carre Floodway was opened in 1979 such a response was seen. The increased carbon input into the sediments caused quite noticeable responses at several stations, which were described in the earlier section detailing results at each station. Figure 42 shows the mean biomass and abundance for all stations over the two year study period. Values for February 1979 and February 1980 were not significantly different. Values for May 1980 and August 1980 are repeated as open circles on a broken line beneath the values for 1979 to emphasize the difference in the two years.

Changes in Benthic Community Structure and Function in Response to the Opening of the Bonnet Carre Floodway

A response to the opening of the floodway is seen in the increased abundance during March 1979, when it was leaking, through July 1979. Whether this was an immediate response to the carbon input or whether the immediate response was to lowered predation and the sustained response was to the carbon input is a debatable point. Different taxa at different stations appeared to respond. Overall differences in the first and second years of the study, indicative of increased carbon input were these:

1) There was an overall increase in nematodes, which, with their short turnover time, respond quickly to additional organic substrate. The average increase over the lake as a whole was 32%. Not all stations experienced an increase; no station experienced a significant decrease.

2) There was an overall increase in biomass of *Probythinella louisianae* in the lake. The average for all 13 stations more than doubled; no station experienced a significant decrease.

Table 15. Comparison of macrofauna abundance and biomass distribution

Study Site	Sieve Size, mm	$\bar{N}/m^2$	Biomass g/m^2	Biomass mg/animal
Long Island Sound (N.Y) (Sanders 1956)	1.0	16,466	54.627	3.32
Martha's Vineyard (Mass.) (Wigley and McIntyre 1964)	1.0	2,477	10.362	4.18
Goose Greek (N.Y.) (Kaplan et al. 1974)	1.4	1,201	29.460	24.53
Lynher Estuary (V. K.) (Warwick and Price 1975)	0.5	1,436	13.240	9.22
Baltic (Sweden) (Ankar and Elmgren 1976)	1.0	3,547	10.480	2.95
Tampa Bay (Florida) (Conner and Simon 1979)	0.5	18,550	27.505	1.48
Lake Pontchartrain	--	--	--	--
(This study 1978-79)	0.5	22,947	9.1155	0.40
(This study 1979-80)	0.5	23,969	7.8778	0.33

3) Biomass of Rangia cuneata declined overall. Average biomass for all 13 stations the second year was only 40% of the first year. First year biomass was not significantly different from that of Probythinella louisianae, but fell to 22% of second year P. louisianae. Rangia cuneata showed an increase in biomass at two stations where P. louisianae accounted for less than one percent of the gastropod population. There were two stations where nematodes did not increase significantly (1 and 12).

4) Texadina sphinctostoma biomass showed a small but significant decrease of 18% from the first year of the study to the second year, averaged over all 13 stations. An increase was seen only at those stations (1, 9, 10, and 12) where Probythinella louisianae numbers and biomass were low.

5) No station where P. louisianae was dominant and showed an increase, or where Rangia cuneata increased, showed a significant increase in nematodes (Stations 1, 6, 7, 8, 12, and 13).

These changes in community structure from the first to the second year lead toward certain conclusions. The increase in organic carbon brought in during the opening the Bonnet Carre Floodway permitted an increase in microbial production. This would have resulted in an immediate increase in nematode production. At those stations where Probythinella louisianae increased, nematodes did not. We speculate that the increased nematode production was rapidly transferred to P. louisianae production.

The results of the series of stepwise multiple regressions tend to support this hypothesis. Table 13, which shows the results with nematodes as the dependent variable demonstrates the influence of the two gastropods on nematode abundance. This does not indicate, however, whether the gastropods are acting as predators or as competitors.

Hydrobiid gastropods are important components of some estuaries; not only in this country, but along the coasts of Europe and Africa also. They occur in very high numbers. An average of 90,000/m^2, for the period 1969-1975 was reported for the Lower Medway estuary (Walters and Wharfe 1980). This study also reports 663,000/m^2 Hydrobiids in the Danish Waddensee, and 420,000/m^2in the Clyde estuary. The abundance most frequently reported was 50,000/m^2 (Fenchel 1975a, Kofoed 1975a). Many studies on these numerically important organisms have been done. Briefy, they are classified as deposit feeders (Newell 1965) that ingest "particles" with attached micro-organisms; bacteria (Kofoed 1975b), diatoms (Fenchel 1975b, Fenchel et al. 1975), and meiofauna (Lopez and Levinton 1978, Levinton 1980). Hydrobiids very often occur in large numbers, with two to four closely related species competing for limited resources. Various mechanisms for partitioning limited resources are described: different "particle" size selection (Fenchel 1975b), and different feeding strategies (Levinton 1979).

Both mechanisms appear to be acting to limit competition in Lake Pontchartrain. Texadina sphinctostoma feeds on the surface; Probythinella louisianae feeds 2 to 4 mm below the surface (Heard 1979). This strategy, coexistence at different depths by hydrobiid gastropods, is a frequently described phenomenon (Levinton 1977, 1979).

An examination of Table 14 shows P. louisianae abundance changes to be strongly associated with nematode abundance, and temperature. Temperature, as a variable, always had a negative slope; if the temperature is low, P. louisianae numbers are high, and vice-versa. This is an artifact of the analysis; the actual control on P. louisianae numbers is predation pressure, which is much higher in the warm months when many fish, shrimp, and crabs are in the lake feeding on them (Darnell 1958, Levine 1980), and lower during colder months when predators have gone out to the gulf. Nematodes were a positive association; numbers of P. louisianae increased when nematodes increased.

Texadina sphinctostoma, which suffered a decrease in abundance the second year, showed a negative association with nematodes, a negative association with temperature, and a negative association with Probythinella louisianae. In addition a weak negative association with Hypaniola florida, the most common polychaete, appeared in later models.

Niche breadth (B_i) was calculated for major species. Texadina sphinctosoma, with $B_i = 29.91 \pm 2.94$, had a niche breadth that was not significantly different from the overall community niche breadth, $\bar{B} = 34.25 \pm 2.90$. This indicates that T. sphinctostoma is a nonselective deposit feeder. Niche breadth for Probythinella louisianae, $B_i = 18.48 \pm 2.90$ is significantly lower. If two populations occur in the same habitat (have access to the same resource base), then the population whose members as a group tend to use resources in proportion to their availability has a broad niche relative to a population whose members as a group tend to concentrate on some items and bypass others (Levins 1968, Colwell and Futuyma 1971, Cody 1975, Feinsinger et al. 1981). It would appear that P. louisianae with its narrower niche is concentrating on, or actively selecting, nematodes.

Niche breadth for Hypaniola florida, a polychaete, $B_i = 16.33 \pm 2.18$, was not significantly different from that of Probythinella louisianae. It also increased the second year.

The first year of the study, before the opening of the Bonnet Carre Floodway, Texadina sphinctostoma, the nonselective deposit feeder, was dominant. After the opening of the floodway the increase in carbon input to the sediments caused an increase in microbial substrate which permitted enough increase in nematodes that the selective deposit feeder Probythinella louisianae could increase and become the dominant species. We can only speculate that the increased benthic productivity was passed on to the usual predators (fish, shrimp, and crabs) since the nekton portion of the Lake Pontchartrain studies was completed before the opening of the floodway (Thompson and Verret 1980).

Predation by Nekton on the Benthic Community

Abundance of macrofauna and meiofauna is strongly affected by predation by the nekton. Levine (1980), in a recent study of feeding habits of fish in Lake Pontchartrain, described small spot (Leiostomus xanthurus) as feeding on meiofauna until they reached 51 mm, when the incidence of hydrobiid gastropods in the diet increased rapidly with growth. As they grow older, mollusca make up to 94% of the diet of spot, 81% of this hydrobiids. Another important predator is the bay anchovy (Anchoa mitchelli), which is described as being an opportunistic or nonselective feeder, preying on whatever invertebrates are most abundant.

Darnell (1958) describes the blue crab (Callinectes sapid[illegible] as feeding on molluscs. Small bivalves and gastropods constitute[illegible]o-thirds of the food volume of adult crabs. Small shrimp are me[illegible]unal feeders (Sikora 1977); larger shrimp are efficient benthic pre[illegible]s, ingesting, according to Darnell (1958) "many minute clams," ga[illegible]ds, ostracods, and harpacticoid copepods.

The "peaks and valleys" in the macrofauna abundance (Figure 42) are directly related to the migrations of these predatory nekton species into and out of the lake. Most of these species start leaving the lake for the deeper gulf waters in November, and we see macrofauna abundance start to rise. Many species are entering the lake again by February and the abundance starts to drop. The first year of the study the entrance of the major predatory species was delayed by the somewhat colder river waters, and the decline did not begin until April.

Benthic feeders dominate the food web in Lake Pontchartrain, and even fish that are considered planktivores in other systems are feeding near the bottom, or on resuspended bottom animals. Levine (1980) comments that many of the copepods ingested were harpacticoids, probably the dominant Scottolana canadensis.

We can see the trends we have been discussing in the benthic macrofauna, the loss of the specialist, or the broadening of niche breadth, in the fish fauna also. We have described the lake as a one resource system with the distinctions between the plankton and benthos becoming less, and the loss of distinction between filter feeders and deposit feeders. The great increase in dominance of the opportunistic Anchoa mitchelli is an example of the changes in the fish community.

In the first comprehensive study of Lake Pontchartrain, Anchoa mitchelli, the bay anchovy, was second in abundance at 28% to Micropogonius undulatus, the croaker, at 38% (Suttkus et al. 1954). In the recent comprehensive survey the bay anchovy had increased to 35% and the croaker had decreased to 18.2%. The bay anchovy is described as an indicator of toxic stress (Livingston et al. 1978). Its increased dominance is a generally accepted indication of toxic effects (Bechtel and Copeland 1970).

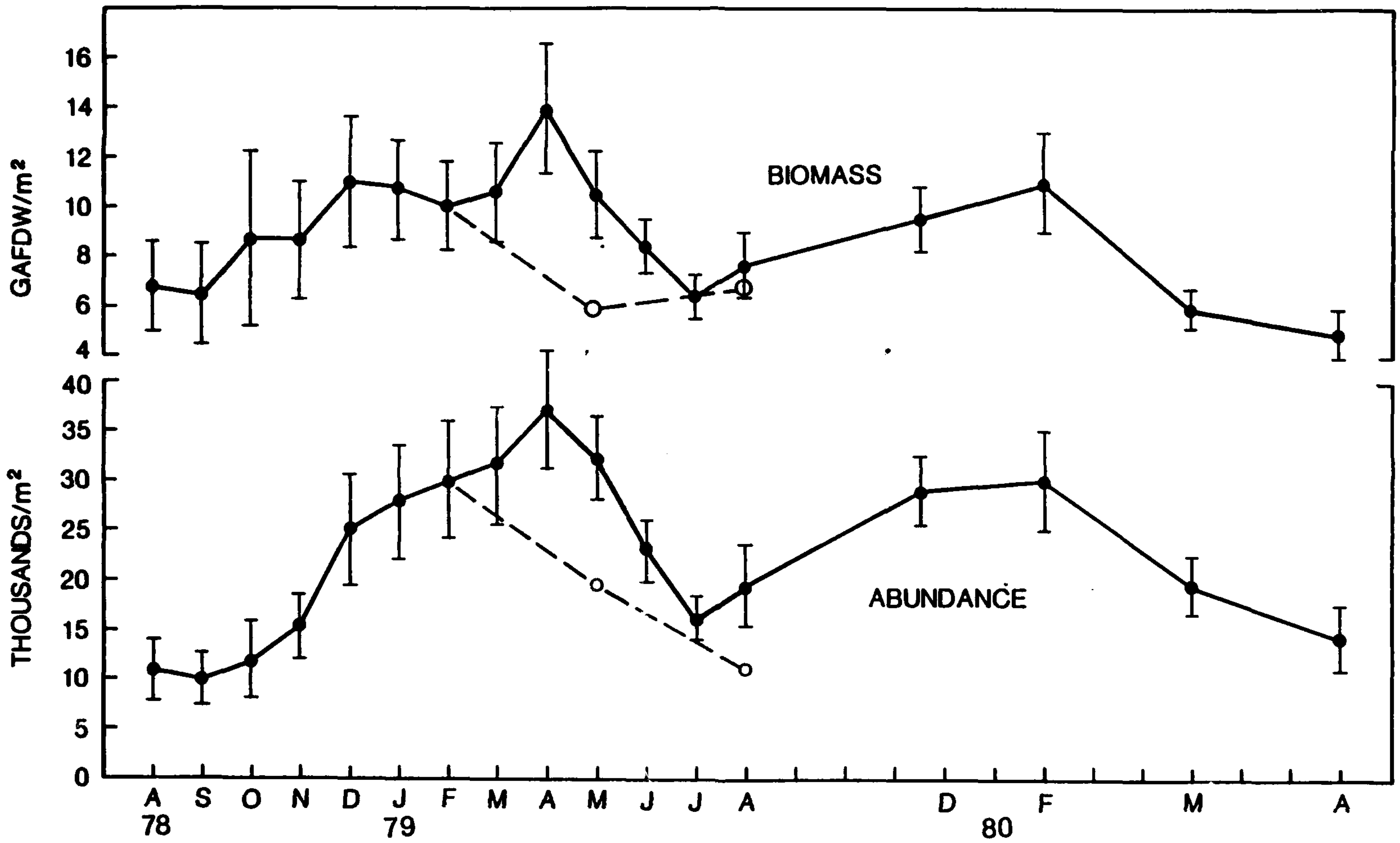


Figure 42. Mean biomass and abundance of macrofauna in Lake Pontchartrain by month. Values for May 1980 and August 1980 are repeated as open circles on a broken line beneath the values for 1979 to emphasize the difference in the two years.

Changes in the Benthic Community Resulting from Shell Dredging

A major and continuous perturbation which affects the benthic community is shell dredging. On a lake-wide basis between 19 and 31% of the total lake bottom is dredged annually. In a study of the effects of shell dredging on the benthic community it was found that a mean loss of 38% of the estimated benthic biomass production occurred (Sikora et al. 1981). The reported loss was calculated from a comparison of a nearby control station which was not dredged during the study. It is difficult, if not impossible, to estimate what the loss would have been compared to an undredged station in the 1950's when large Rangia cuneata were present in abundance in the midlake region. The loss could only have been greater.

Other studies have reported similar observations. Tarver and Dugas (1973) reported that R. cuneata of 2-5 mm were noticeably absent from grid number 58 and 73 in eastern Lake Pontchartrain which was continually dredged by industry. Their grid number 73 corresponds to the location of our Station 12. In a map of overall R. cuneata distribution they show that species to be totally absent from grid 58 which is adjacent to grid 73. Dugas et al. (1978) also state that R. cuneata larger than 16 mm were not recorded from any samples taken in areas that were continually dredged.

During the present study, we have observed direct evidence of dredging at Stations 7, 9, and 10. Although dredging was not observed at Station 12 during the present study, measurements of bulk density of the sediments indicated that it had been intensively dredged. Tarver and Dugas (1973) state that this area was continuously dredged previous to their study. Station 12 has the next to the lowest biomass of all the stations averaged over the entire study period (Station 1 has the lowest). The next three stations, from low to high biomass, are Station 9, Station 7 and Station 10 in that order.

Changes in the Benthic Community Resulting from Toxic Substances

Anthropogenic nitrogen loading of rivers has increased in the past 25 years on a global scale (Walsh et al. 1981). The Lake Pontchartrain watershed has experienced increases in both agricultural land use and urbanization (Turner and Bond 1980a, 1980b). These developments in land use are the underlying cause of increased nutrient loading. It follows then, that Lake Pontchartrain should have higher levels of primary production now than in the past.

There are other factors such as pollution by toxic substances, which also affect primary production, and which must be considered. Polychorinated biphenyls (PCB's) are currently entering the lake (U.S. Army Engineer District, N.O. 1980) and found in high concentrations in midlake sediments (Sikora et al. 1981). The insolubility of PCB's, their rapid removal from the water column by adsorption to fine particles, and subsequent sedimentation was once thought to be a removal process. The opposite is actually true as shown by Harding and Phillips (1978) who demonstrated that particle-bound PCB's are readily transferred to phytoplankton. PCB's have the direct effect of reducing photosynthesis and growth, as well as chlorophyll a concentrations. A secondary effect of PCB's on the phytoplankton community is shown by O'Conners et al. (1978). The larger species are generally more susceptible to this toxicant and are eliminated, while smaller species survive, resulting in an overall size reduction of the phytoplankton community. Smaller sized phytoplankters may not be grazed as efficiently by large zooplankton, which could lead to changes in that community, ultimately altering one of the modes by which fixed carbon reaches the bottom.

The potential effects of PCB's on the deposit-feeder food chain do not stop with phytoplankton and primary production. Bourquin et al. (1975) have shown that PCB's inhibit the growth and metabolism of many estuarine microorganisms. There is, then, the potential for an additive effect, further reducing the available food for deposit-feeding benthic organisms.

PCB's also have direct toxic effects on estuarine organisms such as shrimp (Nimmo et al. 1971), in concentrations of 1 ppm. PCB's can also alter community structure by selectively eliminating certain groups of organisms. Hanson (1974) found that crustaceans, particularly amphipods and crabs, were sensitive and suffered increased mortality; while molluscs such as the oyster experienced significant reduction in growth without mortality. This selective mortality would lead to changes in species composition. Lake Pontchartrain has a particularly poor amphipod fauna, usually less than one percent.

Another biocide found entering Lake Pontchartrain regularly is the herbicide 2,4,-D. Butler (1965) found that concentrations of 1 ppm reduced the uptake of labelled CO_2 by 16% in a natural plankton community composed mainly of dinoflagellates and diatoms. So we must add yet another toxic, photosynthesis-reducing agent to the list.

The organochloride insectides, dieldrin, aldrin, and chlordane, frequently exceeded the EPA criteria. In the south shore region all samples analyzed for aldrin and dieldrin exceeded the EPA criteria at all stations. The full impact of these persistent toxicants on the Lake Pontchartrain ecosystem may never be known. In a recent study (Brown 1980) it was found that a British hydrobiid, Hydrobia jenkinsi possessed an extrordinary resistance to dieldrin. This species failed to show a toxic response to doses in excess of 30 μg/ℓ of dieldrin. To what extent resistance to chlorinated hydrocarbons occurs in other species of hydrobiids is unknown, however it is possible that as a group these small gastropods could be more resistant, just as amphipods as a group are more sensitive to these compounds. If this were true, hydrobiids would possess an advantage over other members of the benthic community which were not as resistant. Such an advantage would enable hydrobiids to utilize the resources left by the elimination of susceptible species. The Lake Pontchartrain benthic community is dominated to an overwhelming extent in numbers and biomass by two species of hydrobiids, Texadina sphinctostoma and Probythinella louisianae (Tables 8 and 9). That this was not always so can be inferred from Darnell (1962) who states "The bottom community throughout the lake is now dominated by enormous populations of the clam

Rangia cuneata. . . . and the small gastropods Littoridina sphinctostoma and Probythinella protera are also widespread and abundant." The exact reverse is true today.

Thus far we have discussed primarily the direct effects of toxicants on estuarine organisms. There is also the aspect of biomagnification through the food chain. The brackish-water clam, Rangia cuneata has been shown to accumulate the insecticide dieldrin directly from water (Petrocelli et. al. 1973), blue crabs (Callinectes sapidus) were shown to have accumulated dieldrin when fed contaminated R. cuneata (Petrocelli et al. 1975b). In another experiment the same authors (Petrocelli et al. 1975a) demonstrated that phytoplankton concentrated sublethal doses of dieldrin 1210 times; that R. cuneata fed these contaminated phytoplankton concentrated dieldrin 54 times, and that blue crabs fed the contaminated Rangia cuneata concentrated dieldrin an average of 5.75 times. In this simple food chain, we have the theoretical potential to concentrate dieldrin over 375,000 times that of ambient concentrations. R. cuneata have the potential of concentrating dieldrin over 65,000 times ambient concentration. Lake Pontchartrain receives dieldrin in concentrations which exceed EPA criteria from the north shore, the south shore, and from Pass Manchac (U.S. Army Engineer District, N.O. 1980) as well as from the Bonnet Carre Floodway (U.S. Geological Survey 1979).

In all the laboratory studies cited above, a single toxicant at a time was tested. Lake Pontchartrain unfortunately receives many toxicants in varying combinations. Many of these, such as PCB's, dieldrin, other organochloride insecticides, and various breakdown products, persist for long periods of time. It is well know to pest-control specialists that certain combinations of insecticides together have synergistic effects, which render the combination many times more lethal than either agent alone. We do not know what the possible synergistic effects are in natural systems. In Lake Pontchartrain there exists a milieu of known toxicants, the individual and combined effects of which have an enormous potential to alter the ecosystem.

SUMMARY

We have examined and documented several changes in the benthic community structure of Lake Pontchartrain. The change from dominance by large Rangia cuneata to dominance by very small hydrobiid gastropods, for instance, has occurred since the last large-scale study was done 25 years ago (Suttkus et al. 1954, Darnell 1958, 1961, 1962, 1979). We have also discussed changes in benthic community function in Lake Pontchartrain. We have characterized the lake as functioning as a one-resource system, with the filter-feeding zooplankton, the deposit-feeding benthos, and suspension-feeding benthos all feeding together at the sediment-water interface. This loss of distinction between feeding types reflects the loss of specialized species and the dominance of the generalist or the broad-niched species. This trend appears to be a response to lower levels of primary production. Several factors appear to be involved in the long-term changes we have documented. Increasing levels of pollution in the lake and the increasing destabilization of the sediments by dredging apparently have acted together to reduce primary production and to diminish the number of species and abundance of the zooplankton and the benthos. Changes in dominance in the nekton appear to be related to the same causes. The only species remaining in the lake in abundance are those known to be tolerant to pollution stress, to the degree that some are considered pollution indicator species.

The response to the Bonnet Carre Floodway opening would indicate that the lake as a whole is carbon limited. A management decision concerning frequent opening *of the floodway for non-flood-related purposes* would indeed be a dilemma, since the much needed organic enrichment provided by the river also brings toxic substances into a system that is already showing unmistakable signs of toxic stress. Changes in community structure such as lowered diversity and fewer species, and changes in community function such as altered food chains and broader niches are some of these foreboding signs.

LITERATURE CITED

Alishahi, M. R., and R., B. Krone. 1964. Suspension of cohesive by sediment wind-generated waves. Inst. Engineering Res., Univ. Calif., Berkely, CA. Tech. Rept. HEL-2-9. 24 pp.

Ankar, S., and R. Elmgren. 1976. The benthic macro- and meiofauna of Asko-Landsort Area (Northern Baltic proper). Contr. Asko. Lab. No. 11. 115 pp.

Bahr, L. M. Jr., J. P. Sikora, and W. B Sikora. 1980. Macrobenthic survey of Lake Pontchartrain, Louisiana, 1978. pp. 659-710. In: J. H. Stone (ed.) Environmental analysis of Lake Pontchartrain, Louisiana, its surrounding wetlands and selected land uses. CEL, CWR, LSU, BR, LA, 70803. Prepared for U.S. Army Engineer District, New Orleans. Contract No. DACW29-77-C-0253.

Barr, J. A., J. H. Goodnight, J. P. Sall, W. H. Blair, and D. M. Chilko. 1979. SAS user's guide, 1979 Edition, SAS Institute, Inc., P. O., Box 10066, Raleigh, N.C. 27605.

Bechtel, T., and B. Copeland. 1970. Fish species diversity indices as indicators of pollution in Galveston Bay, Texas. Contr. Mar. Sci. 15:103-132.

Bloom, S., S. Santos, and J. Field. 1977. A package of computer programs for benthic community analysis. Bull. Mar. Sci. 27:577-580.

Boesch, D. 1973. Classification and community structure of macrobenthos in the Hampton Roads area, Virginia. Mar. Biol. 21:226-244.

Boesch, D. 1977. Application of numerical classification in ecological investigations of water pollution. Ecol. Res. Ser. EPA-600/3-77-033. 113 pp.

Bourquin, A. W., L. A. Kiefer, N. H. Berr , S. Crow, and D. G. Ahern. 1975. Inhibition of estuarine microorganisms by polychlorinated biphenyls. Development in Industrial Microbiology, Vol. 16:255-261.

Brodtmann, N. V. 1976. Continuous analysis of chlorinated hydrocarbon pesticies in the lower Mississippi River. Bull. Environ. Contam. Toxicol. 15:33-39.

Brooks, R. A., and R. E. Ferrell. 1970. The lateral distribution of clay minerals in Lake Pontchartrain and Maurepas, Louisiana. J. Sed. Petrol. 40(3):855-863.

Brown, L. 1980. The use of *Hydrobia jenkensi* to detect intermittent toxic discharges to a river. Water Res. 14:941-947.

Butler, P. A. 1965. Effects of herbicides on estuarine fauna. Proc. South. Conf. 18:576-580.

Caswell, H. 1976. Community structure: A neutral model analysis. Ecol. Monogr. 46:327-354.

Charnov, E. 1976. Optimal foraging: the marginal value theorem. Theoret. Pop. Biol. 9:129-136.

Chuang, W., and E. M. Swenson. 1981. Subtidal water level variations in Lake Pontchartrain, Louisiana. J. Geophys. Res. 86(C5):4198-4204.

Chuang, W., E. M. Swenson, and S. P. Murray. 1980. Chapter II In: Recommended sampling program for an analysis of Physical, Chemical and Biological transport at the Inner Harbor Navigation Canal, Chef Menteur Pass, and The Rigolets tidal pass, Lake Pontchartrain, Louisiana with reports on preliminary studies of these passes. CEL, CWR, LSU, BR, LA 70803. Prepared for U.S. Army Engineer District, New Orleans (unpublished).

Clifford, H. T., and W. Stephenson. 1975. An introduction to numerical classification. Academic Press, New York. 229 pp.

Cochran, W. G. 1977. Sampling techniques. John Wiley and Sons, New York. 428 pp.

Cody, M. 1975. Towards a theory of continental species diversities. pp. 224-257. In: M. Cody and J. Diamond (eds.) Ecology and evolution of communities. Belknap Press, Cambridge.

Colwell, R., and D. Futuyma. 1971. On the measurement of niche breadth and overlap. Ecology 52:567-576.

Conner, W., and J. Simon. 1979. The effects of oyster shell dredging on an estuarine benthic community. Estuar. Coastal Mar. Sci. 9:749-758.

Copeland, B., and T. Bechtel. 1971. Species diversity and water quality in Galveston Bay, Texas. Water, Air, Soil Pollut. 1:89-105.

Cummins, K., and J. Wuycheck. 1971. Caloric equivalents for investigations in ecological energetics. Mitt. Int. Verin. Theor. Angew. Limnol. 18:1-158.

Darnell, R. 1958. Food habits of fishes and larger invertebrates of Lake Pontchartrain, Louisiana, an estuarine community. Publ. Inst. Mar. Sci. Univ. Texas 5:434-416.

__________. 1961. Trophic spectrum of an estuarine community, based on studied of Lake Pontchartrain, Louisiana. Ecology 42(3):553-568.

_________. 1962. Ecological history of Lake Pontchartrain, an estuarine community. Amer. Mid. Natur. 68(2):434-444.

Darnell, R. 1979. (unpublished manuscript). Dept. of Oceanography, Texas A&M University. College Station, TX 77843.

Davis, F. E., and M. L. Marshall. 1975. Chemical and biological investigations of Lake Okeechobee January 1973 - June 1974. Tech. Pub. No. 75-1. Resource Planning Department, Central and Southern Florida Flood Control District. West Palm Beach, Florida. 197 pp.

Dow, D. D., and R. E. Turner. 1980. Structure and function of the phytoplankton community in Lake Pontchartrain, Louisiana. pp. 321-436. In: J. H. Stone (ed.) Environmental analysis of Lake Pontchartrain, Louisiana, its surrounding wetlands and selected land uses. CEL, CWR, LSU, Baton Rouge, LA 70803. Prepared for U.S. Army Engineer District, New Orleans. Contract No. DACW 29-77-C-0253.

Dugas, R. J., J. W. Tarver, and L. S. Nutwell. 1974. The mollusk communities of Lakes Pontchartrain and Maurepas, Louisiana. Louisiana Wild Life and Fisheries Commission, New Olreans, LA. Tech. Bull. 5 pp. 1-13.

Dyer, K. E. 1973. Estuaries: a physical introduction. John Wiley and Sons, New York. 140 pp.

Eagle, R., and P. Hardiman. 1977. Some observations on the relative abundance of species in a benthic community. pp. 197-208. In: B. Keegen, P. Ceidigh, and P. Boaden (eds.). Biology of benthic organisms. Pergamon Press, New York.

Elmgren, R. 1978. Structure and dynamics of Baltic benthos communities, with particular reference to the relationship between macro- and meiofauna. Kieler Meeresforsch. Sonderheft 4:1-22.

Elliott, J. 1971. Some methods for the statistical analysis of samples of benthic invertebrates. Scientific Publication No. 25, Freshwater Biological Association. The Ferry House, Ambleside. 148 pp.

Fairbanks, L. D. 1963. Biodemographic studies of the clam *Rangia cuneata* Gray. Tulane Stud. Zool. 10(1):3-47.

Feinsinger, P., E. Spears, and R. Poole. 1981. A simple measure of niche breadth. Ecology 62:27-32.

Fenchel, T. 1975a. Factors determining the distribution patterns of mud snails (Hydrobiidae). Oecologia (Berl.) 20:1-17.

Fenchel, T. 1975b. Character displacement and coexistence in mud snails (Hydrobiidae). Oecologia (Berl.) 20:19-23.

Fenchel, T., L. Kofoed, and A. Lappalainen. 1975. Particle size-selection of two deposit feeders: the amphipod Corophium volutator and the prosobranch Hydrobia ulvae. Mar. Biol. 30:119-128.

Flint, R. F. 1971. Glacial and quartenary geology. John Wiley and Sons, New York. 892 pp.

Gael, B. T. 1980. Computations of drift patterns in Lake Pontchartrain, Louisiana. pp. 39-56. In: J. H. Stone (ed.). Environmental analysis of Lake Pontchartrain, Louisiana, its surrounding wetlands and selected land uses. CEL, CWR, LSU, BR, LA 70803. Prepared for U.S. Army Engineer District, New Orleans. Contract No. DACW29-77-C-0253.

Giam, C. S., E. Atlas, H. Chan, and G. Neff. 1977. Estimation of fluxes of organic pollutants to the marine environment-phthalate ester plasticizer concentrations and fluxes. Rev. Int. Oceanogr. Med. 47:79-84.

__________, H. S. Chan, and G. S. Neff. 1978. Phthalate ester plasticizers, DDT, DDE and polychlorinated biphenyls in biota from the Gulf of Mexico. Mar. Poll. Bull. 9(9):248-252.

Godwin, W. F. 1968. The distribution and density of the brackish water clam, Rangia cuneata in the Altamaha River, Georgia. Marine Fisheries Division Brunswick, Georgia. Contrib. Ser. No. 5, pp. 1-10 (mimeo).

Goodman, D. 1975. The theory of diversity-stability relationships in ecology. Quart. Rev. Biol. 50:237-266.

Gray, J. S. 1978. The structure of meiofauna communities. Sarsia 64:365-272.

Green, R. H. 1979. Sampling design and statistical methods for environmental biologists. John Wiley and Sons, New York. 257 pp.

Gulf South Research Institute (GSRI). 1972. Surface circulation of Lake Pontchartrain: a wind dominated system. Final Report GSRI Project NS-255. 122 pp.

Gulf South Research Institute (GSRI). 1974. Environmental impact of shell dredging in Lake Pontchartrain. Report GSRI Project No. 414-665-41. 275 pp.

Gunter, G. 1953. The relationship of the Bonnet Carre Spillway to oyster beds in Mississippi Sound and the "Louisiana Marsh," with a report on the 1950 opening. Publ. Inst. Mar. Sci. 3(1):17-71.

Hansen, D. J. 1974. Aroclor[r] 1254: effect of composition of developing estuarine animal communities in the laboratory. Contrib. Mar. Sci. 18:19-33.

Harding, L., and J. Phillips. 1978. Polychlorinated biphenyls: transfer from microparticulates to marine plankton and the effects on photosynthesis. Science 202:1189-1192.

Hawes, S., and H. Perry. 1978. Effects of 1973 floodwaters on plankton populations in Louisiana and Mississippi. Gulf Res. Reps. 6:109-124.

Heard, R. W. 1979. Notes on the genus Probythinella Thiele, 1928 (Gastropoda: Hydrobiidae) in the coastal waters of the northern Gulf of Mexico and the taxonomic status of Vioscalba louisianae Morrison, 1965. Gulf Res. Reps. 6:309-312.

Hespenheide, H. 1975. Prey characteristics and predator niche width. pp. 158-180. In: M. Cody and J. Diamond (eds.). Ecology and evolution of communities. Belknap Press, Cambridge.

Holland, A., N. Mountford, and J. Mihurskey. 1977. Temporal variation in upper bay mesohaline benthic communities: 1. The 9-m habitat. Chesapeake Sci. 18:370-378.

Hopkins, S. H., and J. D. Andrews. 1970. Rangia cuneata on the east coast: thousand mile range extension or resurgence? Science 167:868-869.

Huston, M. 1979. A general hypothesis of species diversity. Amer. Natur. 113:81-101.

Jonasson, A., and E. Olausson. 1966. New device for sediment sampling. Mar. Geol. 4:365-372.

Joyner, B. 1974. Chemical and biological conditions of Lake Okeechobee, Florida, 1969-1972. Rept. 71. United States Geological Survey.

Kaplan, E., J. Welker, and M. Kraus. 1974. Some effects of dredging on populations of macrobenthic organisms. Fish. Bull. 72:445-480.

Kofoed, L. 1975a. The feeding biology of Hydrobia ventrosa (Montagu). I. The assimilation of different components of the food. J. Exp. Mar. Biol. Ecol. 19:233-241.

Kofoed, L. 1975b. The feeding biology of Hydrobia ventrosa (Montagu). II. Allocation of components of the carbon-budget and the significance of the secretion of dissolved organic material. J. Exp. Mar. Biol. Ecol. 19:243-256.

Lagler, K., J. Bardach, and R. Miller. 1962. Ichthyology. John Wiley and Sons, New York. pp. 545.

Lane, P., G. Lauff, and R. Levins. 1975. The feasibility of using a holistic approach in ecosystem analysis. pp. 111-127. In: S. Levin (ed.) Ecosystem analysis and prediction. SIAM. Philadelphia.

Levine, S. 1980. Gut contents of forty-four Lake Pontchartrain fish species, 1977-1978. pp. 899-1029. In: J. H. Stone, (ed.) Environmental analysis of Lake Pontchartrain, Louisiana, its surrounding wetlands and selected land uses. CEL, CWR, LSU, Baton Rouge, LA. 70803. Prepared for U.S. Army Engineer District, New Orleans. Contract No. DACW29-77-C-0253.

Levins, R. 1968. Evolution in changing environments. Princeton University, Press, Princeton. 120 pp.

Levinton, J. 1977. Ecology of shallow water deposit-feeding communities, Quisset Harbor, Massachusetts. pp. 191-227. In: B. Coull (ed.). Ecology of marine benthos. University of South Carolina Press, Columbia.

Levinton, J. 1979. Deposit-feeders, their resources, and the study of resource limitation. pp. 117-141. In: R. Livingston (ed.). Ecological processes in coastal and marine systems. Plenum Press, New York.

Levinton, J. 1980. Particle feeding by deposit feeders: models, data, and a prospectus. pp. 423-439. In: K. Tenore and B. Coull (eds.). Marine benthic dynamics. University of South Carolina Press, Columbia.

Livingston, R., N. Thompson, and D. Meeter. 1978. Long-term variation of orgaonchlorine residues and assemblages of epibenthic organisms in a shallow north Florida (USA) estuary. Mar. Biol. 46:355-372.

Lonsdale, D., and B. Coull. 1977. Composition and seasonality of zooplankton of North Inlet, South Carolina. Chesapeake Sci. 18:272-283.

Lopez, G., and J. Levinton. 1978. The availability of microorganisms attached to sediment particles as food for *Hydrobia ventrosa* Montagu (Gastropoda: Prosbranchia). Oecologia (Berl.) 32:263-275.

Louisiana Wild Life and Fisheries Commission. 1968. The history and regulation of the shell dredging industry in Louisiana. Compiled for the Governor, State of Louisiana. New Orleans. 32 pp.

Marmer, H. A. 1954. Tides and sea level in the Gulf of Mexico. Fish. Bull. 18 pp.

Morgan, J. P. 1967. Ephemeral estuaries of the deltaic environment. pp. 115-120. In: G. H. Lauff (ed.). Estuaries. Amer. Assoc. Adv. Sci. Publ. 83.

Newell, R. 1965. The role of detritus in the nutrition of two marine deposit feeders, the prosobranch Hydrobia ulvae and the bivalve Macoma balthica. Proc. Zool. Soc. Lond. 144: 25-45.

Nimmo, D. R., R. R. Blackman, A. J. Wilson and J. Forester. 1971. Toxicity and distribution of Aroclor[r] 1254 in pink shrimp Penaeus duorarum. Mar. Biol. 11:191-197.

O'Conners, H., B., C. F. Wurster, C. D. Powers, D. C. Biggs and R. G. Rowland. 1978. Polychlorinated biphenyls may alter marine trophic pathways by reducing phytoplankton size and production. Science 201:737-739.

Odum, E. P. and A. de la Cruz. 1967. Particulate organic detritus in a Georgia salt marsh-estuarine ecosystem. pp. 383-388. In: G. H. Lauff (ed.). Estuaries. Amer. Assoc. Adv. Sci. Publ. 83.

Otvos, E. G. 1978. New Orleans - south Hancock holocene barrier trends and origins of Lake Pontchartrain. Trans. Gulf Coast Assoc. Geol. Socs. 28:337-355.

Outlaw, D. C. 1979. Lake Pontchartrain hurricane barrier study: Prototype data acquisition and analysis. Draft, Tech. Rep. HL-79 U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

Parham, W. E. 1966. Lateral variations of clay mineral assemblages in modern and ancient sediments. Proc. Internat. Clay Conf., Jerusalem Vol. 1:135-145.

Parker, R. H. 1955. Changes in the invertebrate fauna, apparently attributable to salinity changes, in the bays of central Texas. J. Paleontol. 29(2):193-211.

Peddicord, R. 1980. Direct effects of suspended sediments on aquatic organisms. Pp. 501-536. In: R. A. Baker (ed.). Contaminants and sediments, Vol. 1, Fate and transport, case studies, modeling, and toxicity. Ann Arbor Science, Ann Arbor.

Petraitis, P. 1979. Likelihood measures of niche breadth and overlap. Ecology 60:703-710.

Petrocelli, S. R., A. R. Hanks, and J. Anderson. 1973. Uptake and accumulation of an organochlorine insecticide (dieldrin) by an estuarine mollusc, Rangia cuneata. Bull. Environ. Contam. Toxicol. 10:315-320.

Petrocelli, S. R., J. W. Anderson, and A. R. Hanks. 1975a. Controlled food-chain transfer of dieldrin residues from phytoplankters to clams. Mar. Biol. 31:215-218.

__________, J. W. Anderson, and A. R. Hanks. 1975b. Biomagnification of dieldrin residues by food-chain transfer from clams to blue crabs under controlled conditions. Bull. Environ. Contam. Toxicol. 13:108-116.

Pfitzenmeyer, H. T. and K. G. Drobeck. 1964. The occurrence of the brackish water clam, Rangia cuneata, in the Potomac River, Maryland. Chesapeake Sci. 5:209-215.

Pianka, E. 1978. Evolutionary ecology. Harper and Row, New York. 397 pp.

Poirrier, M. A. 1978. Studies of salinity stratification in Lake Pontchartrain near the Inner Harbor Navigation Canal. Proc. La. Acad. Sci. 41:26-35.

Poirrier, M. and M. Mulino. 1975. The effects of the 1973 opening of the Bonnet Carre Spillway upon epifaunal invertebrates in southern Lake Pontchartrain. Proc. La. Acad. Sci. 38:36-40.

__________ and M. Mulino. 1977. The impact of the 1975 Bonnet Carre Spillway opening on epifaunal invertebrates in southern Lake Pontchartrain. J. Elisha Mitchell Sci. Soc. 93:11-18.

Pomeroy, L. R. 1979. Secondary production mechanisms of shelf communities. Pp. 163-186. In: R. J. Livingston (ed.). Ecological processes in coastal and marine systems. Plenum Press, New York.

Price, W. A. 1947. Equilibrium of form and forces in tidal basins of coast of Texas and Louisiana. Bull. Amer. Assoc. Petrol. Geol. 31(9):1619-1663.

Pritchard, D. W. 1967. What is an estuary: physical viewpoint. Pp. 3-5. In: G. H. Lauff (ed.). Estuaries. Amer. Assoc. Adv. Sci. Publ. 83.

Rhoads, D. C. 1974. Organism-sediment relations on the muddy sea floor. Oceanogr. Mar. Biol. Ann. Rev. 12:263-300.

Rhoads, D. and D. Young. 1970. The influence of deposit feeding organisms on sediment stability and community strucutre. J. Mar. Res. 28:150-178.

Richards, A. F. and J. M. Parks. 1976. Marine geotechnology: average sediment properties, selected literature and review of consolidation, stability, and bioturbation-geotechnical interactions in the benthic layer. Pp. 157-181. In: I. N. McCave (ed.). The benthic boundary layer. Plenum Press, New York.

Rosenberg, R. and P. Moller. 1979. Salinity stratified benthic macrofaunal communities and long-term monitoring along the west coast of Sweden. J. Exp. Mar. Biol. Ecol. 37:175-203.

Ruggiero, M. and H. Merchant. 1979. Water quality, substrate, and distribution of macroinvertebrates in the Patuxent River, Maryland. Hydrobiologia 64:183-189.

Russell, R. J. 1967. Origins of estuaries. Pp. 93-99. In: G. H. Lauff (ed.). Estuaries. Amer. Assoc. Adv. Sci. Publ. 83.

Sanders, H. L. 1956. Oceanography of Long Island Sound. 1952-1954. X. Biology of marine bottom communities. Bull. Bingham Oceanogr. Coll. 15:345:414.

Saucier, R. R. 1963. Recent geomorphic history of the Pontchartrain basin. Coastal Studies Series No. 9. Louisiana State Univ. Press, Baton Rouge, La. 114 pp.

Schoener, T. 1971. Theory of feeding strategies. Ann. Rev. Ecol. Syst. 2:369-404.

Schweitzer, J. P. 1979. Waterborne! Louisiana's ports and waterways. Center for Wetland Resources, Louisiana State University, Baton Rouge, La. 213 pp.

Sellner, K., R. Zingmark, and T. Miller. 1976. Interpretations of the ^{14}C method of measuring the total annual production of phytoplankton in a South Carolina estuary. Bot. Mar. 19:119-125.

Sikora, W. B. 1977. The ecology of Palaemonetes pugio in a southeastern salt marsh ecosystem with particular emphasis on production and trophic relationships. Ph.D. thesis. University of South Carolina, Columbia, S.C. 122 pp.

Sikora, W. B., J. P. Sikora, and A. McK. Prior. 1981. Environmental effects of hydraulic dredging for clam shells in Lake Pontchartrain, Louisiana. 140 pp. Prepared for U.S. Army Engineer District, New Orleans. Contract No. DACW20-79-C-0099.

Simpson, E. H. 1949. Measurement of diversity. Nature 163:688.

Slobodkin, L. R. and H. L. Sanders. 1969. On the contribution of environmental predictability to species diversity. Brookhaven Symp. Biol. 22:82-95.

Stanley, S. M. 1970. Relation of shell form to life habits of the bivalvia (Mollusca). Geol. Soc. Am. Mem. 125. 296 pp.

Steinmayer, R. A. 1939. Bottom sediments of Lake Pontchartrain, Louisiana. Bull. Amer. Petrol. Geol. 23(1):1-23.

Stoessell, R. K. 1980. Nutrient and carbon geochemistry in Lake Pontchartrain, Louisiana. Pp. 217-296. In: J. H. Stone, (ed.). Environmental analysis of Lake Pontchartrain, Louisiana, its surrounding wetlands and selected land uses. CEL, CWR, LSU, Baton Rouge, LA. 70803. Prepared for U.S. Army Engineer District, New Orleans. Contract No. DACW29-77-C-0253.

Stone, J., N. Drummond, L. Cook, E. Theriot, and D. Lindstedt. 1980. The distribution and abundance of plankton of Lake Pontchartrain, Louisiana, 1978. Pp. 437-590. In: J. H. Stone, (ed.). Environmeltal analysis of Lake Pontchartrain, Louisiana, its surrounding wetlands, and selected land uses. CEL, CWR, LSU, Baton Rouge, LA. 70803. Prepared for U.S. Army Engineer District, New Orleans. Contract No. DACW29-77-C-0253.

Strahler, A. N. and A. H. Strahler. 1971. Environmental geoscience. Hamilton Pub. Co. Santa Barbara. 511 pp.

Suttkus, R., R. Darnell, and J. Darnell. 1954. Biological study of Lake Pontchartrain-Annual Report (1953-1954). Tulane University. 54 pp.

Swenson, E. M. 1980a. General hydrography of Lake Pontchartrain, Louisiana. Pp. 57-155. In: J. H. Stone, (ed.). Environmental analysis of Lake Pontchartrain, Louisiana, its surrounding wetlands, and selected land uses. CEL, CWR, LSU, Baton Rouge, LA. 70803. Prepared for U.S. Army Engineer District, New Orleans. Contract No. DACW29-77-C-0253.

Swenson, E. M. 1980b. General hydrography of the tidal passes of Lake Pontchartrain, Louisiana. Pp. 157-215. In: J. H. Stone, (ed.). Environmental analysis of Lake Pontchartrain, Louisiana, its surrounding wetlands, and selected land uses. CEL, CWR, LSU, Baton Rouge, LA. 70803. Prepared for U.S. Army Engineer District, New Orleans. Contract No. DACW29-77-C-0253.

Tarver, J. W. and R. J. Dugas. 1973. A study of the clam *Rangia cuneata*, in Lake Pontchartrain and Lake Maurepas, Louisiana. Louisiana Wildlife and Fisheries Commission, New Orleans, LA. Tech. Bull. 5. pp. 1-97.

Tarver, J. W. and L. B. Savoie. 1976. An inventory and study of the Lake Pontchartrain-Lake Maurepas estuarine complex. Louisiana Wildlife and Fisheries Commission, New Orleans, LA. Tech. Bull. 19. 159 pp.

Taylor, D. W. 1948. Fundamentals of soil mechanics. John Wiley and Sons, New York. 700 pp.

Terzaghi, K. 1943. Theoretical soil mechanics. John Wiley and Sons, New York. 510 pp.

Turner, R. E. and J. R. Bond. 1980a. Recent land use changes in the Lake Pontchartrain watershed. Pp. 1173-1206. In: J. H. Stone, (ed.). Environmental analysis of Lake Pontchartrain, Louisiana, its surrounding wetlands and selected uses. CEL, CWR, LSU, Baton Rouge, LA. 70803. Prepared for U.S. Army Engineer District, New Orleans. Contract No. DACW29-77-C-0253.

__________. 1980b. Urbanization, peak streamflow, and estuarine hydrology (Louisiana). Pp. 1207-1219. In: J. H. Stone, (ed.). Environmental analysis of Lake Pontchartrain, Louisiana, its surrounding wetlands and selected land uses. CEL, CWR, LSU, Baton Rouge, LA. 70803. Prepared for U.S. Army Engineer District, New Orleans. Contract No. DACW 29-77-C-0253.

Thompson, B. A. and J. S. Verret. 1980. Nekton of Lake Pontchartrain, Louisiana, and its surrounding wetlands. Pp. 711-863. In: J. H. Stone, (ed.). Environmental analysis of Lake Pontchartrain, Louisiana, its surrounding wetlands, and selected land uses. CEL, CWR, LSU, Baton Rouge, LA. 70803. Prepared for U.S. Army Engineer District, New Orleans, Contract No. DACW 29-77-C-0253.

U.S. Army Corps of Engineers. 1962. Prototype data collection program for model study of Lake Pontchartrain, LA and vicinity. U.S. Army Engineer District, New Orleans, LA.

U.S. Army Engineer District, New Orleans. 1980. New Orleans-Baton Rouge metropolitan area water resources study. Draft, background information appendix. Lake Pontchartrain (stream segment 19):234-238.

U.S. Geological Survey. 1980. Water resources data for Louisiana. Vol. 2. Southern Louisiana. Water year 1979. U.S.G.S. Water-data Report, LA-80-2.

Walsh, J. J., G. T. Rowe, R. L. Iverson, and C. P. McRoy. 1981. Biological export of shelf carbon is a sink of the global CO_2 cycle. Nature 291:196-201.

Walters, G. and J. Wharfe. 1980. Distribution and abundance of *Hydrobia ulvae* (Pennant) in the lower Medway estuary. Kent. J. Moll. Stud. 46:171-180.

Warwick, R. and R. Price. 1975. Macrofauna production in an estuarine mud-flat. J. Mar. Biol. Ass. U. K. 55:1-18.

Wetzel, R. L. 1975. An experimental-radiotracer study of detrital carbon utilization in a Georgia salt marsh. Ph.D. thesis. University of Georgia, Athens, GA. 103 pp.

Wigley, R., and A. McIntyre. 1964. Some quantitative comparisons of offshore meiobenthos and macrobenthos south of Marthas's Vineyard. Limnol. Oceanogr. 9:485-493.

Wilhm, J., and T. Dorris. 1968. Biological parameters for water quality criteria. Bioscience 17:477-481.

Witzig, A., and J. Day. 1980. A trophic state analysis of Lake Pontchartrain, Louisiana, and surrounding wetland tributaries. Pp. 21-37. In; J. H. Stone (ed.). Environmental analysis of Lake Pontchartrain, Louisiana, its surrounding wetlands, and selected land uses. CEL, CWR, LSU, BAton Rouge, LA. 70803. Prepared for U.S. Army Engineer District, New Olreans, Contract No. DACW29-77-C-0253.

Wolfe, D. A., and E. N. Petteway. 1968. Growth of Rangia cuneata gray. Chesapeake Sci. 9(2):99-102.

Woodwell, G. M. 1970. Effects of pollution on the structure and physiology of ecosystems. Science 168:429-433.

Table A1. Macrofauna abundance, biomass, and diversity measures for each month for each sampling station in Lake Pontchartrain. ($\bar{N}/m^2$ ±SE,n=3)

	mm	Aug 78 - Sta 1	Aug 78 - Sta 2	Aug 78 - Sta 3	Aug 78 - Sta 4
BIVALVES					
Clams	0.5- 2		206.96 ± 66.23	14.16 ± 20.26	308.26 ± 138.12
Rangia cuneata	2 - 10	14.16 ± 3.59	678.62 ± 85.83	493.44 ± 7.30	1383.37 ± 313.17
	10 - 20	3.27 ± 3.59			3.27 ± 3.59
	20 - 30				
	>30				
Mulinia pontchartrainensis		101.67 ± 23.81	1281.71 ± 114.65	617.25 ± 70.69	1423.23 ± 132.86
Macoma mitchelli			43.57 ± 16.69	25.42 ± 3.63	10.89 ± 6.29
Mytilopsis leucophaeta		18.15 ± 7.26	152.50 ± 21.79	297.73 ± 101.67	1996.99 ± 876.54
Ischadium recurvum					29.05 ± 23.81
GASTROPODS					
Probythinella louisianae			14.52 ± 9.61	1114.69 ± 160.62	1412.42 ± 189.12
Texadina sphinctostoma		1397.90 ± 270.52	4662.10 ± 993.23	18121.80 ± 6049.14	18161.80 ± 555.72
POLYCHAETES					
Hypaniola florida		3.63 ± 3.63	14.52 ± 9.61	14.52 ± 9.61	29.05 ± 13.09
Laeonereis culveri					
Nereis succinea					
Parandalia americana		10.89 ± 6.29	25.42 ± 3.63		14.52 ± 9.61
Mediomastus californiensis		268.69 ± 103.78	123.45 ± 85.85		10.89 ± 6.29
Streblospio benedicti		10.89 ± 10.89	18.15 ± 13.09		
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES					
TURBELLARIANS					
NEMERTEANS		10.89 ± 6.29	50.83 ± 9.61	3.63 ± 3.63	18.15 ± 9.61
CRUSTACEANS					
Edotea montosa			3.63 ± 3.63	14.52 ± 7.26	39.94 ± 3.63
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi					18.15 ± 18.15
Corophium lacustre					21.79 ± 16.64
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra			10.89 ± 10.89	7.26 ± 7.26	3.63 ± 3.63
Ostracods					
Rhithropanopeus harrisii				3.63 ± 3.63	18.15 ± 9.61
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		25.42 ± 7.26	188.81 ± 48.03	315.89 ± 72.53	668.09 ± 164.04
OTHER					
TOTAL, N/m^2		1869.90 ± 381.50	7476.00 ± 1324.0	21404.20 ± 6453.0	25645.00 ± 839.90
BIOMASS, mg/m^2		580.6	3556.5	6952.3	17569.8
DIVERSITY, H´		0.889 ± 0.083	1.208 ± 0.038	0.719 ± 0.097	1.076 ± 0.063
SPECIES NUMBER		8.333 ± 0.882	11.667 ± 1.453	9.333 ± 0.882	13.333 ± 1.202
EVENNESS, J´		0.4243 ± 0.050	0.497 ± 0.023	0.321 ± 0.031	0.417 ± 0.023

Table A1. (Continued)

	mm	Aug 78 - Sta 5			Aug 78 - Sta 6			Aug 78 - Sta 7			Aug 78 - Sta 8		
BIVALVES													
Clams	0.5- 2	190.41	±	13.07	315.89	±	88.78	152.50	±	18.88	51.20	±	35.73
Rangia cuneata	2 - 10	925.88	±	111.76	1710.15	±	208.49				1815.81	±	350.42
	10 - 20				3.27	±	3.59				29.41	±	19.17
	20 - 30										3.27	±	3.59
	>30										3.27	±	3.59
Mulinia pontchartrainensis		254.15	±	26.18	39.94	±	20.22	3.63	±	3.63	620.88	±	148.69
Macoma mitchelli													
Mytilopsis leucophaeta		689.87	±	249.53	809.69	±	272.41	268.69	±	134.49	1953.42	±	744.12
Ischadium recurvum													
GASTROPODS													
Probythinella louisianae		3002.75	±	669.77	3431.20	±	399.93	413.92	±	109.65	1764.62	±	462.52
Texadina sphinctostoma		8347.40	±	2295.62	6840.60	±	2151.38	755.20	±	245.29	10406.20	±	4405.90
POLYCHAETES													
Hypaniola florida		47.20	±	31.02	163.39	±	45.35	1848.13	±	1030.20	1397.90	±	477.47
Laeonereis culveri													
Nereis succinea													
Parandalia americana													
Mediomastus californiensis		10.89	±	6.29									
Streblospio benedicti													
Capitella capitata													
Polydora cf. socialis											3.63	±	3.63
OLIGOCHAETES		10.89	±	6.29	3.63	±	3.63	7.26	±	7.26	3.63	±	3.63
TURBELLARIANS													
NEMERTEANS		10.89	±	6.29	10.89	±	10.89	10.89	±	6.29	7.26	±	3.63
CRUSTACEANS													
Edotea montosa		10.89	±	10.89	116.19	±	59.77	50.83	±	9.61	36.31	±	22.09
Cyathura polita											14.52	±	3.69
Cassidinidea lunifrons													
Monoculodes edwardsi		3.63	±	3.63									
Corophium lacustre					3.63	±	3.63	7.26	±	7.26	83.51	±	40.43
Grandidierella bonnieroides								18.15	±	18.15			
Gammarus tigrinus													
Gammarus mucronatus													
Melita nitida											3.63	±	3.63
Cerapus benthophilus													
Gitanopsis sp.													
Hyalella azteca													
Mysidopsis almyra		3.63	±	3.63				36.31	±	31.02	7.26	±	3.63
Ostracods													
Rhithropanopeus harrisii		18.15	±	7.26	10.89	±	10.89	10.89	±	6.29	72.62	±	32.27
Callianassa jamaicense													
Cumaceans													
HYDROZOANS													
CHIRONOMIDS		432.08	±	73.70	290.47	±	84.92	548.26	±	64.54	613.62	±	94.40
OTHER													
TOTAL, N/m^2		13866.40	±	2822.2	13761.10	±	2331.5	4128.30	±	1219.40	18895.20	±	5960.30
BIOMASS, mg/m^2		7859.00			8377.90			3138.80			15555.90		
DIVERSITY, H′		1.229	±	0.108	1.308	±	0.058	1.531	±	0.110	1.544	±	0.153
SPECIES NUMBER		11.000	±	0.000	9.000	±	0.577	10.000	±	1.000	13.000	±	0.577
EVENNESS, J′		0.513	±	0.045	0.596	±	0.014	0.672	±	0.063	0.605	±	0.070

Table A1. (Continued)

	mm	Aug 78 - Sta 9	Aug 78 - Sta 10	Sep 78 - Sta 1	Sep 79 - Sta 2
BIVALVES					
Clams	0.5- 2	253.80 ± 112.96	133.98 ± 80.17	10.89 ± 10.89	849.63 ± 234.74
Rangia cuneata	2 - 10	149.23 ± 54.90	83.87 ± 34.64	10.89 ± 6.32	236.37 ± 44.22
	10 - 20				
	20 - 30				
	>30				
Mulinia pontchartrainensis		29.05 ± 13.09	61.73 ± 34.64	36.31 ± 15.83	562.79 ± 41.87
Macoma mitchelli					18.15 ± 7.26
Mytilopsis leucophaeta		14.52 ± 3.63	3.63 ± 3.63	3.63 ± 3.63	101.67 ± 22.09
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		3.63 ± 3.63	10.89 ± 10.89	3.63 ± 3.63	29.05 ± 9.61
Texadina sphinctostoma		4110.20 ± 1744.22	2389.10 ± 568.24	1880.80 ± 305.54	5675.10 ± 628.50
POLYCHAETES					
Hypaniola florida				3.63 ± 3.63	29.05 ± 9.61
Laeonereis culveri					
Nereis succinea					
Parandalia americana		3.63 ± 3.63	7.26 ± 7.26	7.26 ± 3.63	3.63 ± 3.63
Mediomastus californiensis				337.67 ± 169.22	522.85 ± 174.74
Streblospio benedicti				61.72 ± 20.22	83.51 ± 26.18
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES					
TURBELLARIANS					
NEMERTEANS				14.52 ± 3.63	36.31 ± 9.61
CRUSTACEANS					
Edotea montosa			3.63 ± 3.63		
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi					3.63 ± 3.63
Corophium lacustre					
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					3.63 ± 3.63
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra				3.63 ± 3.63	3.63 ± 3.63
Ostracods					
Rhithropanopeus harrisii					
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					3.63 ± 3.63
CHIRONOMIDS		185.18 ± 49.12	421.18 ± 44.62	25.42 ± 9.61	257.79 ± 28.36
OTHER					
TOTAL, N/m^2		4749.20 ± 1971.30	3126.20 ± 713.30	2418.20 ± 465.50	8420.10 ± 441.70
BIOMASS, mg/m^2		1498.90	1555.00 ±	597.80	3268.60
DIVERSITY, H'		0.584 ± 0.086	0.773 ± 0.090	0.761 ± 0.067	1.159 ± 0.133
SPECIES NUMBER		5.667 ± 0.333	5.333 ± 0.333	9.000 ± 0.577	12.667 ± 1.667
EVENNESS, J'		0.342 ± 0.064	0.461 ± 0.046	0.347 ± 0.030	0.459 ± 0.047

Table A1. (Continued)

	mm	Sep 78 - Sta 3	Sep 78 - Sta 4	Sep 78 - Sta 5	Sep 78 - Sta 6
BIVALVES					
Clams	0.5- 2	290.84 ± 67.21	359.46 ± 160.45	108.93 ± 49.13	105.66 ± 19.17
Rangia cuneata	2 - 10	337.67 ± 76.47	1325.64 ± 723.93	708.03 ± 127.23	686.24 ± 27.45
	10 - 20		18.52 ± 9.59	29.41 ± 9.59	10.89 ± 6.32
	20 - 30				
	>30				
Mulinia pontchartrainensis		580.94 ± 176.35	1655.69 ± 767.38	297.77 ± 15.83	83.51 ± 18.15
Macoma mitchelli		14.52 ± 3.63	7.26 ± 7.26		
Mytilopsis leucophaeta		827.85 ± 187.51	2875.67 ± 1690.73	1539.50 ± 129.09	308.63 ± 56.37
Ischadium recurvum			7.26 ± 3.63		
GASTROPODS					
Probythinella louisianae		1641.17 ± 330.17	2414.55 ± 798.13	3271.44 ± 817.98	1888.07 ± 352.20
Texadina sphinctostoma		15783.50 ± 2756.28	12225.20 ± 4631.51	11604.40 ± 2407.11	9527.50 ± 1413.85
POLYCHAETES					
Hypaniola florida		130.71 ± 49.12	43.57 ± 28.82	802.43 ± 237.84	766.12 ± 166.90
Laeonereis culveri					
Nereis succinea					
Parandalia americana					
Mediomastus californiensis		10.89 ± 6.29	3.63 ± 3.63	50.83 ± 26.18	
Streblospio benedicti			3.63 ± 3.63		
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		25.42 ± 13.09			
TURBELLARIANS				3.63 ± 3.63	
NEMERTEANS		7.26 ± 3.63	10.89 ± 6.29	7.26 ± 3.63	3.63 ± 3.63
CRUSTACEANS					
Edotea montosa		21.78 ± 16.64	65.36 ± 33.28	87.14 ± 28.82	47.20 ± 9.61
Cyathura polita					
Cassidinidea lunifrons				3.63 ± 3.63	
Monoculodes edwardsi		29.05 ± 9.61	21.78 ± 12.58	65.36 ± 35.02	79.88 ± 3.63
Corophium lacustre					
Grandidierella bonnieroides				25.42 ± 25.42	
Gammarus tigrinus					
Gammarus mucronatus				3.63 ± 3.63	
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		3.63 ± 3.63	3.63 ± 3.63	7.26 ± 3.63	7.26 ± 3.63
Ostracods					
Rhithropanopeus harrisii			18.15 ± 13.09	29.05 ± 13.09	
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		424.82 ± 129.95	609.99 ± 298.38	453.86 ± 69.56	533.74 ± 63.82
OTHER					
TOTAL, N/m^2		20129.70 ± 3711.70	21654.70 ± 8945.70	19098.50 ± 3494.90	14048.00 ± 1562.50
BIOMASS, mg/m^2		9512.60	21129.10	13019.90	5739.40
DIVERSITY, H′		0.873 ± 0.035	1.251 ± 0.191	1.317 ± 0.085	1.154 ± 0.087
SPECIES NUMBER		12.000 ± 0.000	11.667 ± 2.333	13.000 ± 0.577	10.000 ± 0.577
EVENNESS, J′		0.351 ± 0.014	0.513 ± 0.034	0.514 ± 0.033	0.503 ± 0.043

Table A1. (Continued)

	mm	Sep 78 - Sta 7	Sep 78 - Sta 8	Sep 78 - Sta 9	Sep 78 - Sta 10
BIVALVES					
Clams	0.5- 2	7.62 ± 7.30	21.79 ± 10.89	242.91 ± 104.13	18.52 ± 9.59
Rangia cuneata	2 - 10	40.30 ± 3.59	449.87 ± 75.81	144.87 ± 3.59	18.52 ± 9.59
	10 - 20		25.05 ± 20.26	57.73 ± 58.06	
	20 - 30				
	>30				
Mulinia pontchartrainensis			167.02 ± 64.25	196.07 ± 16.24	21.79 ± 6.29
Macoma mitchelli			3.63 ± 3.63	3.63 ± 3.63	3.63 ± 3.63
Mytilopsis leucophaeta		10.89 ± 6.29	809.69 ± 152.28	47.20 ± 7.26	
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		682.61 ± 53.49	762.49 ± 223.85	7.30 ± 7.26	29.00 ± 3.63
Texadina sphinctostoma		403.00 ± 39.27	4938.00 ± 1233.80	7243.60 ± 1465.18	1151.00 ± 275.95
POLYCHAETES					
Hypaniola florida		417.55 ± 109.89	559.16 ± 216.24	14.52 ± 9.61	3.63 ± 3.63
Laeonereis culveri		7.26 ± 7.26			
Nereis succinea					
Parandalia americana					
Mediomastus californiensis					
Streblospio benedicti				14.52 ± 7.26	7.26 ± 3.63
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		50.83 ± 45.50			7.26 ± 7.26
TURBELLARIANS					
NEMERTEANS					7.26 ± 3.63
CRUSTACEANS					
Edotea montosa			18.15 ± 9.61		
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi			10.89 ± 6.29	10.89 ± 6.29	7.26 ± 3.63
Corophium lacustre					
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus			3.63 ± 3.63		
Melita nitida			3.63 ± 3.63		
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra			7.26 ± 3.63		3.63 ± 3.63
Ostracods					
Rhithropanopeus harrisii		21.79 ± 16.64	10.89 ± 6.29		3.63 ± 3.63
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		693.50 ± 56.72	243.27 ± 136.68	265.06 ± 32.27	232.38 ± 44.17
OTHER					
TOTAL, N/m^2		2334.70 ± 143.00	8038.80 ± 1723.5	8191.30 ± 1467.90	1517.70 ± 325.60
BIOMASS, mg/m^2		1971.3 ±	6320.1	2537.00	845.90
DIVERSITY, H'		1.532 ± 0.042	1.344 ± 0.084	0.533 ± 0.070	0.874 ± 0.081
SPECIES NUMBER		7.333 ± 0.667	10.667 ± 0.667	7.667 ± 0.667	8.333 ± 0.333
EVENNESS, J'		0.568 ± 0.027	0.568 ± 0.027	0.266 ± 0.043	0.413 ± 0.043

Table A1. (Continued)

	mm	Oct 78 - Sta 1			Oct 78 - Sta 2			Oct 78 - Sta 3			Oct 78 - Sta 4		
BIVALVES													
Clams	0.5- 2												
Rangia cuneata	2 - 10	283.21	±	22.66	319.16	±	54.25	1652.42	±	654.00	1521.41	±	254.67
	10 - 20	3.27	±	3.59	177.55	±	54.90	900.83	±	132.89	588.21	±	99.89
	20 - 30				14.16	±	14.49	25.05	±	25.38	35.95	±	20.26
	>30												
Mulinia pontchartrainensis		61.73	±	3.63	413.92	±	50.31	2073.24	±	429.78	1677.48	±	214.10
Macoma mitchelli					3.63	±	3.63	7.26	±	3.63	10.89	±	6.29
Mytilopsis leucophaeta		32.68	±	10.89	210.59	±	13.09	5101.41	±	1485.57	3238.76	±	717.22
Ischadium recurvum											7.26	±	3.63
GASTROPODS													
Probythinella louisianae					21.80	±	6.29	1568.50	±	564.85	2458.10	±	637.18
Texadina sphinctostoma		1579.40	±	101.21	5733.20	±	157.26	15329.70	±	6601.51	18971.50	±	2808.62
POLYCHAETES													
Hypaniola florida		29.05	±	9.61	58.09	±	26.18	1510.45	±	192.03	613.62	±	199.90
Laeonereis culveri													
Nereis succinea													
Parandalia americana					7.26	±	3.63	10.89	±	6.29	7.26	±	3.63
Mediomastus californiensis		519.22	±	57.06	214.22	±	122.16	47.20	±	32.27	163.39	±	16.64
Streblospio benedicti		116.19	±	57.06	21.78	±	6.29	152.50	±	41.24	36.31	±	14.52
Capitella capitata													
Polydora cf. socialis		18.15	±	18.15	18.15	±	13.09						
OLIGOCHAETES		7.26	±	3.63				7.26	±	7.26	7.26	±	3.63
TURBELLARIANS													
NEMERTEANS		14.52	±	3.63	25.42	±	9.61	32.68	±	6.29	18.15	±	3.63
CRUSTACEANS													
Edotea montosa								94.40	±	58.43	112.56	±	47.20
Cyathura polita													
Cassidinidea lunifrons													
Monoculodes edwardsi		3.63	±	3.63				32.68	±	16.63	373.98	±	183.28
Corophium lacustre													
Grandidierella bonnieroides													
Gammarus tigrinus													
Gammarus mucronatus													
Melita nitida													
Cerapus benthophilus													
Gitanopsis sp.													
Hyalella azteca													
Mysidopsis almyra		7.26	±	3.63				14.52	±	9.61	3.63	±	3.63
Ostracods													
Rhithropanopeus harrisii								29.05	±	3.63	3.63	±	3.63
Callianassa jamaicense													
Cumaceans													
HYDROZOANS								10.89	±	10.89	7.26	±	7.26
CHIRONOMIDS		36.31	±	19.21	203.55	±	52.37	428.45	±	42.81	551.90	±	42.81
OTHER													
TOTAL, N/m^2		2712.30	±	180.00	7450.60	±	32.70	29039.90	±	9808.90	30365.20	±	4291.80
BIOMASS, mg/m^2		844.40			3288.50			33437.20			24501.30		
DIVERSITY, H′		1.317	±	0.079	0.947	±	0.070	1.576	±	0.161	1.357	±	0.042
SPECIES NUMBER		10.667	±	1.453	11.667	±	0.667	15.000	±	1.000	15.667	±	0.333
EVENNESS, J′		0.561	±	0.006	0.386	±	0.028	0.587	±	0.076	0.493	±	0.016

Table A1. (Continued)

	mm	Oct 78 - Sta 5	Oct 78 - Sta 6	Oct 78 - Sta 7	Oct 78 - Sta 8
BIVALVES					
Clams	0.5- 2	29.41 ± 10.24	127.44 ± 13.07	301.73 ± 166.66	163.39 ± 35.07
Rangia cuneata	2 - 10	504.33 ± 167.53	377.98 ± 62.96	112.19 ± 31.04	596.69 ± 105.44
	10 - 20	57.73 ± 13.07	21.79 ± 12.64	7.62 ± 7.30	43.57 ± 12.64
	20 - 30			3.27 ± 3.59	
	>30			3.27 ± 3.59	
Mulinia pontchartrainensis		145.24 ± 38.43	14.52 ± 14.52		141.61 ± 43.57
Macoma mitchelli					
Mytilopsis leucophaeta		537.37 ± 423.11	228.75 ± 78.55	239.64 ± 202.71	1031.18 ± 396.07
Ischadium recurvum		3.63 ± 3.63			
GASTROPODS					
Probythinella louisianae		2127.70 ± 78.63	1107.40 ± 136.68	305.00 ± 99.83	1161.90 ± 157.89
Texadina sphinctostoma		9080.90 ± 828.90	11121.40 ± 773.41	352.20 ± 18.15	11942.00 ± 2492.22
POLYCHAETES					
Hypaniola florida		1100.16 ± 163.87	969.45 ± 211.59	1332.54 ± 775.38	1288.97 ± 641.23
Laeonereis culveri				3.63 ± 3.63	
Nereis succinea					
Parandalia americana		7.26 ± 3.63	3.63 ± 3.63		
Mediomastus californiensis		10.89 ± 6.28			
Streblospio benedicti		3.63 ± 3.63			3.63 ± 3.63
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		68.99 ± 34.64	25.42 ± 20.22	65.36 ± 49.92	3.63 ± 3.63
TURBELLARIANS					
NEMERTEANS				10.89 ± 10.89	3.63 ± 3.63
CRUSTACEANS					
Edotea montosa		21.79 ± 12.58	90.77 ± 25.42	3.63 ± 3.63	76.25 ± 21.78
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi		116.19 ± 61.73	145.24 ± 75.82		83.51 ± 29.72
Corophium lacustre				18.15 ± 18.15	
Grandidierella bonnieroides				68.99 ± 68.99	
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		21.79 ± 16.64	3.63 ± 3.63	25.42 ± 20.22	36.31 ± 18.15
Ostracods					
Rhithropanopeus harrisii		7.26 ± 7.26	3.63 ± 3.63	7.26 ± 7.26	14.52 ± 3.63
Callianassa jamaicense			3.63 ± 3.63		
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		283.21 ± 45.35	348.57 ± 6.29	573.68 ± 72.34	620.88 ± 88.04
OTHER					
TOTAL, N/m^2		14131.50 ± 1164.90	14592.60 ± 1196.40	3434.80 ± 1282.70	17177.80 ± 3780.00
BIOMASS, mg/m^2		6338.60	4831.00	3028.10	10007.00
DIVERSITY, H'		1.219 ± 0.090	0.944 ± 0.036	1.662 ± 0.049	1.151 ± 0.043
SPECIES NUMBER		12.667 ± 0.882	10.333 ± 1.453	9.000 ± 2.517	11.667 ± 0.667
EVENNESS, J'		0.480 ± 0.027	0.409 ± 0.014	0.802 ± 0.086	0.470 ± 0.018

Table A1. (Continued)

	mm	Oct 78 - Sta 9			Oct 78 - Sta 10			Nov 78 - Sta 1			Nov 78 - Sta 2		
BIVALVES													
Clams	0.5- 2	210.23	±	107.18	123.09	±	17.17	116.55	±	46.40	893.20	±	47.49
Rangia cuneata	2 - 10	43.57	±	18.84	79.52	±	18.19	25.05	±	3.59	130.71	±	21.79
	10 - 20	7.62	±	7.30	87.14	±	81.80				29.41	±	29.08
	20 - 30												
	>30												
Mulinia pontchartrainensis		145.24	±	50.44	275.95	±	48.85	39.94	±	13.09	265.06	±	52.74
Macoma mitchelli					3.63	±	3.63	3.63	±	3.63	25.42	±	9.61
Mytilopsis leucophaeta		21.79	±	6.29	10.89	±		10.89	±	6.29	137.97	±	20.22
Ischadium recurvum													
GASTROPODS													
Probythinella louisianae		83.50	±	13.09	7.30	±	7.26	3.60	±	3.63	32.70	±	10.89
Texadina sphinctostoma		261.40	±	122.75	1394.30	±	274.92	1289.00	±	209.18	16803.80	±	2314.76
POLYCHAETES													
Hypaniola florida		32.68	±	10.89	29.05	±	15.83	58.09	±	25.42	105.30	±	29.72
Laeonereis culveri													
Nereis succinea													
Parandalia americana		10.89	±	0.00	7.26	±	7.26	7.26	±	7.26	3.63	±	3.63
Mediomastus californiensis		7.26	±	3.63	50.83	±	3.63	319.52	±	94.61	145.24	±	36.85
Streblospio benedicti					61.72	±	26.18	43.57	±	22.68	3.63	±	3.63
Capitella capitata													
Polydora cf. socialis					10.89	±	10.89						
OLIGOCHAETES								7.26	±	7.26			
TURBELLARIANS											3.63	±	3.63
NEMERTEANS		10.89	±	0.00	7.26	±	3.63	18.15	±	3.63	18.15	±	9.61
CRUSTACEANS													
Edotea montosa													
Cyathura polita											3.63	±	3.63
Cassidinidea lunifrons													
Monoculodes edwardsi		3.63	±	3.63	68.99	±	9.61				7.26	±	7.26
Corophium lacustre													
Grandidierella bonnieroides													
Gammarus tigrinus													
Gammarus mucronatus													
Melita nitida													
Cerapus benthophilus													
Gitanopsis sp.													
Hyalella azteca													
Mysidopsis almyra		3.63	±	3.63	3.63	±	3.63						
Ostracods													
Rhithropanopeus harrisii		3.63	±	3.63									
Callianassa jamaicense													
Cumaceans													
HYDROZOANS													
CHIRONOMIDS		156.13	±	34.64	232.38	±	102.25	36.31	±	13.09	254.16	±	34.64
OTHER													
TOTAL, N/m^2		1023.90	±	305.40	2371.00	±	295.10	1978.80	±	112.60	18862.50	±	2493.70
BIOMASS, mg/m^2		823.80			1134.70			614.10			5379.90		
DIVERSITY, H′		1.845	±	0.100	1.411	±	0.080	1.163	±	0.242	0.520	±	0.011
SPECIES NUMBER		10.667	±	0.667	11.000	±	1.000	9.667	±	1.667	11.333	±	0.667
EVENNESS, J′		0.784	±	0.060	0.593	±	0.045	0.514	±	0.092	0.215	±	0.010

Table A1. (Continued)

	mm	Nov 78 - Sta 3	Nov 78 - Sta 4	Nov 78 - Sta 5	Nov 78 - Sta 6
BIVALVES					
Clams	0.5- 2	936.77 ± 183.00	1974.85 ± 506.29	166.66 ± 52.72	221.12 ± 51.20
Rangia cuneata	2 - 10	580.58 ± 163.72	900.82 ± 154.35	326.78 ± 10.89	377.98 ± 98.36
	10 - 20	10.89 ± 6.32	119.82 ± 33.33	29.41 ± 14.49	105.66 ± 7.30
	20 - 30				3.27 ± 3.59
	>30				
Mulinia pontchartrainensis		446.60 ± 99.83	2196.69 ± 453.91	116.19 ± 15.83	47.20 ± 22.09
Macoma mitchelli			10.89 ± 6.29		
Mytilopsis leucophaeta		777.01 ± 297.14	4197.32 ± 992.96	1027.54 ± 132.86	835.11 ± 241.64
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		2316.50 ± 25.42	1989.70 ± 428.63	8576.20 ± 768.21	13873.70 ± 3843.29
Texadina sphinctostoma		29708.00 ± 1374.41	13891.80 ± 2348.86	10453.40 ± 1032.63	14196.80 ± 1674.34
POLYCHAETES					
Hypaniola florida		286.84 ± 183.60	464.76 ± 141.37	758.86 ± 286.43	1419.68 ± 498.23
Laeonereis culveri					
Nereis succinea					
Parandalia americana					
Mediomastus californiensis			3.63 ± 3.63	10.89 ± 6.29	7.26 ± 7.26
Streblospio benedicti		3.63 ± 3.63	83.51 ± 34.64	14.52 ± 14.52	
Capitella capitata		29.05 ± 29.05	7.26 ± 7.26		
Polydora cf. socialis					
OLIGOCHAETES			3.63 ± 3.63		
TURBELLARIANS		21.79 ± 12.58		14.52 ± 7.26	
NEMERTEANS			3.63 ± 3.63		
CRUSTACEANS		3.63 ± 3.63	32.68 ± 10.89	10.89 ± 6.29	18.15 ± 3.63
Edotea montosa					
Cyathura polita		43.57 ± 25.16	134.34 ± 13.09	87.14 ± 12.58	196.07 ± 21.79
Cassidinidea lunifrons					
Monoculodes edwardsi					
Corophium lacustre		61.73 ± 23.81	76.25 ± 28.82	58.09 ± 31.65	90.77 ± 57.06
Grandidierella bonnieroides			3.63 ± 3.63		29.05 ± 7.26
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra					
Ostracods			14.52 ± 14.52		25.42 ± 25.42
Rhithropanopeus harrisii					7.26 ± 3.63
Callianassa jamaicense			7.26 ± 3.63	3.63 ± 3.63	
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		3.63 ± 3.63			10.89 ± 10.89
OTHER		450.23 ± 26.18	599.10 ± 22.68	508.33 ± 42.81	544.64 ± 113.72
TOTAL, N/m^2		35717.20 ± 1444.10	26716.20 ± 3321.30	22163.00 ± 1771.70	32017.30 ± 5967.80
BIOMASS, mg/m^2		12622.30	29142.60	11:24.00	13455.80
DIVERSITY, H'		0.723 ± 0.057	1.504 ± 0.047	1.233 ± 0.046	1.168 ± 0.045
SPECIES NUMBER		10.667 ± 1.202	14.333 ± 1.202	11.333 ± 0.667	12.667 ± 0.882
EVENNESS, J'		0.306 ± 0.012	3.569 ± 0.037	0.508 ± 0.012	0.461 ± 0.009

Table A1. (Continued)

	mm	Nov 78 - Sta 7	Nov 78 - Sta 8	Nov 78 - Sta 9	Nov 78 - Sta 10
BIVALVES					
Clams	0.5- 2	301.73 ± 76.03	283.21 ± 108.93	225.48 ± 69.28	417.19 ± 84.96
<u>Rangia cuneata</u>	2 - 10	138.34 ± 44.22	424.82 ± 45.31	116.55 ± 19.17	236.37 ± 74.51
	10 - 20	18.52 ± 7.30	160.12 ± 60.45	3.27 ± 3.59	14.16 ± 3.59
	20 - 30				
	>30				
<u>Mulinia pontchartrainensis</u>			170.65 ± 44.17	18.15 ± 13.09	395.77 ± 122.62
<u>Macoma mitchelli</u>			3.63 ± 3.63		14.52 ± 9.61
<u>Mytilopsis leucophaeta</u>		257.79 ± 101.67	1891.70 ± 383.69	14.52 ± 7.26	72.62 ± 19.21
<u>Ischadium recurvum</u>					
GASTROPODS					
<u>Probythinella louisianae</u>		8111.40 ± 3019.50	5922.00 ± 475.23	50.80 ± 7.26	21.80 ± 6.29
<u>Texadina sphinctostoma</u>		1575.80 ± 347.73	13172.90 ± 1754.78	127.10 ± 51.22	4658.40 ± 820.32
POLYCHAETES					
<u>Hypaniola florida</u>		602.73 ± 34.64	1071.12 ± 470.84	3.63 ± 3.63	3.63 ± 3.63
<u>Laeonereis culveri</u>					
<u>Nereis succinea</u>					
<u>Parandalia americana</u>		14.52 ± 7.26		25.42 ± 20.22	7.26 ± 3.63
<u>Mediomastus californiensis</u>		10.89 ± 6.29			7.26 ± 3.63
<u>Streblospio benedicti</u>			7.26 ± 7.26	3.63 ± 3.63	7.26 ± 7.26
<u>Capitella capitata</u>					
<u>Polydora</u> cf. <u>socialis</u>					
OLIGOCHAETES		32.68 ± 22.68	14.52 ± 14.52		3.63 ± 3.63
TURBELLARIANS					
NEMERTEANS		14.52 ± 7.26		10.89 ± 6.29	7.26 ± 3.63
CRUSTACEANS					
<u>Edotea montosa</u>		25.42 ± 15.83	105.30 ± 13.09		
<u>Cyathura polita</u>		7.26 ± 7.26			
<u>Cassidinidea lunifrons</u>					
<u>Monoculodes edwardsi</u>			43.57 ± 25.16	3.63 ± 3.63	14.52 ± 9.61
<u>Corophium lacustre</u>		72.62 ± 19.21	7.26 ± 7.26		
<u>Grandidierella bonnieroides</u>		14.52 ± 7.26	7.26 ± 7.26		
<u>Gammarus tigrinus</u>					
<u>Gammarus mucronatus</u>		7.26 ± 7.26			
<u>Melita nitida</u>					
<u>Cerapus benthophilus</u>					
<u>Gitanopsis</u> sp.					
<u>Hyalella azteca</u>					
<u>Mysidopsis almyra</u>		14.[illegible]2 ± 14.52	7.26 ± 7.26		3.63 ± 3.63
<u>Ostracods</u>		68.99 ± 68.99			
<u>Rhithropanopeus harrisii</u>		3.63 ± 3.63	3.63 ± 3.63		
<u>Callianassa jamaicense</u>					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		813.32 ± 97.70	493.80 ± 22.09	116.19 ± 13.09	221.48 ± 51.22
OTHER					
TOTAL, N/m^2		12134.50 ± 3615.50	23789.70 ± 1807.30	718.90 ± 132.10	6107.20 ± 994.20
BIOMASS, mg/m^2		6482.80	15966.90	634.10	2362.50
DIVERSITY, H'		1.250 ± 0.119	1.282 ± 0.129	1.476 ± 0.019	0.882 ± 0.030
SPECIES NUMBER		12.667 ± 1.202	11.000 ± 1.528	7.667 ± 1.202	10.667 ± 0.882
EVENNESS, J'		0.494 ± 0.046	0.537 ± 0.035	0.740 ± 0.045	0.375 ± 0.024

Table A1. (Continued)

	mm	Nov 78 - Sta 11	Nov 78 - Sta 12	Nov 78 - Sta 13	Dec 78 - Sta 1
BIVALVES					
Clams	0.5- 2	820.22 ± 435.05	704.76 ± 429.06	667.72 ± 295.19	345.30 ± 178.86
Rangia cuneata	2 - 10	330.05 ± 9.69	14.16 ± 14.49	108.93 ± 33.33	21.79 ± 12.53
	10 - 20	35.95 ± 3.59		3.27 ± 3.59	
	20 - 30				
	>30				
Mulinia pontchartrainensis		577.31 197.68	61.73 ± 56.37	802.43 ± 18.16	61.73 ± 28.36
Macoma mitchelli		32.68 ± 22.68		210.59 + 108.26	3.63 ± 3.63
Mytilopsis leucophaeta		1786.40 ± 1334.27		39.94 ± 7.26	3.63 ± 3.63
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		653.60 ± 280.12	3.60 ± 3.63	1753.70 ± 1139.18	
Texadina sphinctostoma		9182.50 ± 2449.40	1902.60 ± 1793.70	221.50 ± 75.60	2657.80 ± 1238.40
POLYCHAETES					
Hypaniola florida		744.33 ± 613.91		25.42 ± 7.26	112.56 ± 34.64
Laeonereis culveri					
Nereis succinea					
Parandalia americana		18.15 ± 13.09	3.63 ± 3.63	141.61 ± 12.58	14.52 ± 9.61
Mediomastus californiensis		47.20 ± 22.09		7.26 ± 7.26	639.04 ± 281.69
Streblospio benedicti		10.89 ± 6.29	7.26 ± 7.26		54.46 ± 26.82
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		14.52 ± 9.61		7.26 ± 3.63	
TURBELLARIANS				3.63 ± 3.63	
NEMERTEANS		18.15 ± 3.63		39.94 ± 3.63	7.26 ± 3.63
CRUSTACEANS					
Edotea montosa		50.83 ± 26.18		7.26 ± 7.26	3.63 ± 3.63
Cyathura polita				39.94 ± 3.63	
Cassidinidea lunifrons					
Monoculodes edwardsi		79.88 ± 40.92		25.42 ± 9.61	108.93 ± 41.24
Corophium lacustre		3.63 ± 3.63			
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus				76.25 ± 49.12	
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		3.63 ± 3.63		7.26 ± 3.63	
Ostracods					
Rhithropanopeus harrisii				21.79 ± 16.64	
Callianassa jamaicense		3.63 ± 3.63		7.26 ± 3.63	
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		119.82 ± 28.82	18.15 ± 13.09	18.15 ± 13.09	14.52 ± 3.63
OTHER					
TOTAL, N/m^2		14527.20 ± 4694.10	2719.50 ± 2302.00	4237.30 ± 1603.60	4048.50 ± 1390.20
BIOMASS, mg/m^2		12582.50	789.10	2404.00	879.10
DIVERSITY, H′		1.233 ± 0.077	0.774 ± 0.048	1.766 ± 0.149	1.080 ± 0.191
SPECIES NUMBER		14.333 ± 0.333	4.333 ± 0.667	16.000 ± 1.000	9.667 ± 0.882
EVENNESS, J′		0.463 ± 0.027	0.560 ± 0.100	0.639 ± 0.059	0.484 ± 0.100

Table A1. (Continued)

	mm	Dec 78 - Sta 2	Dec 78 - Sta 3	Dec 78 - Sta 4	Dec 78 - Sta 5
BIVALVES					
Clams					
<u>Rangia cuneata</u>	0.5- 2	3347.33 ± 304.02	2127.34 ± 488.86	4142.49 ± 502.81	486.90 ± 239.09
	2 - 10	199.34 ± 48.91	449.87 ± 134.96	236.37 ± 109.91	225.48 ± 94.66
	10 - 20		18.52 ± 9.59	10.89 ± 10.89	116.55 ± 72.65
	20 - 30				7.62 ± 7.30
	>30				
<u>Mulinia pontchartrainensis</u>		232.38 ± 100.29	889.57 ± 9.61	697.13 ± 278.14	127.08 ± 19.21
<u>Macoma mitchelli</u>		61.73 ± 35.76	7.26 ± 7.26	21.79 ± 12.58	
<u>Mytilopsis leucophaeta</u>		50.83 ± 9.61	660.82 ± 243.27	671.72 ± 222.55	1307.12 ± 258.76
<u>Ischadium recurvum</u>			3.63 ± 3.63	3.63 ± 3.63	
GASTROPODS					
<u>Probythinella louisianae</u>		108.90 ± 12.58	1957.10 ± 607.14	1575.80 ± 317.72	18143.60 ± 4942.51
<u>Texadina sphinctostoma</u>		31338.30 ± 2447.70	24679.20 ± 4893.30	7414.30 ± 1266.70	15660.10 ± 1452.60
POLYCHAETES					
<u>Hypaniola florida</u>					
<u>Laeonereis culveri</u>		265.06 ± 103.78	141.61 ± 51.48	1013.02 ± 455.98	1169.15 ± 352.70
<u>Nereis succinea</u>					
<u>Parandalia americana</u>					
<u>Mediomastus californiensis</u>		18.15 ± 7.26		14.52 ± 9.61	
<u>Streblospio benedicti</u>		551.90 ± 164.52	61.73 ± 56.37	254.16 ± 139.12	43.57 ± 25.16
<u>Capitella capitata</u>		29.05 ± 19.21	29.05 ± 19.21	21.79 ± 21.79	
<u>Polydora cf. socialis</u>					
OLIGOCHAETES					
TURBELLARIANS			47.20 ± 18.15		7.26 ± 7.26
NEMERTEANS			3.63 ± 3.63	7.26 ± 7.26	
CRUSTACEANS		54.46 ± 16.64	50.83 ± 31.65	50.83 ± 7.26	14.52 ± 14.52
<u>Edotea montosa</u>					
<u>Cyathura polita</u>		3.63 ± 3.63	105.30 ± 20.22	152.50 ± 90.70	159.76 ± 31.65
<u>Cassidinidea lunifrons</u>					
<u>Monoculodes edwardsi</u>					
<u>Corophium lacustre</u>		50.83 ± 9.61	58.09 ± 7.26	119.82 ± 28.82	116.19 ± 69.27
<u>Grandidierella bonnieroides</u>					
<u>Gammarus tigrinus</u>					
<u>Gammarus mucronatus</u>					
<u>Melita nitida</u>					
<u>Cerapus benthophilus</u>					
<u>Gitanopsis sp.</u>					
<u>Hyalella azteca</u>					
<u>Mysidopsis almyra</u>					
<u>Ostracods</u>		7.26 ± 7.26		29.05 ± 14.52	14.52 ± 14.52
<u>Rhithropanopeus harrisii</u>		3.63 ± 3.63			65.36 ± 33.28
<u>Callianassa jamaicense</u>				7.26 ± 7.26	21.79 ± 21.79
Cumaceans					
HYDROZOANS					
CHIRONOMIDS					7.26 ± 7.26
OTHER		392.14 ± 49.92	381.24 ± 32.68	395.77 ± 122.65	46[illegible].76 ± 26.18
TOTAL, N/m^2		36719.30 ± [illegible]911.80	31672.30 ± 6175.60	16840.10 ± 2291.90	38193.40 ± 5628.60
BIOMASS, mg/m^2		9597.60	11744.30	9167.80	17521.30
DIVERSITY, H′		0.608 ± 0.080	0.895 ± 0.015	1.606 ± 0.077	1.170 ± 0.097
SPECIES NUMBER		13.667 ± 0.333	13.000 ± 0.577	14.000 ± 1.528	11.667 ± 0.667
EVENNESS, J′		0.233 ± 0.031	0.350 ± 0.011	0.611 ± 0.003	0.476 ± 0.029

Table A1. (Continued)

	mm	Dec 78 - Sta 6	Dec 78 - Sta 7	Dec 78 - Sta 8	Dec 78 - Sta 9
BIVALVES					
Clams	0.5- 2	889.93 ± 143.46	330.05 ± 198.46	3107.69 ± 573.83	4574.93 ± 1756.01
Rangia cuneata	2 - 10	163.39 ± 22.66	155.77 ± 64.59	87.14 ± 25.16	185.18 ± 50.32
	10 - 20	51.20 ± 39.98	25.05 ± 7.30	21.79 ± 10.89	3.27 ± 3.59
	20 - 30		3.27 ± 3.59	3.27 ± 3.59	
	>30		3.27 ± 3.59		
Mulinia pontchartrainensis		7.26 ± 3.63		127.08 ± 75.03	174.28 ± 10.89
Macoma mitchelli		14.52 ± 14.52			
Mytilopsis leucophaeta		159.76 ± 95.24	72.62 ± 40.43	3293.62 ± 581.05	508.33 ± 375.14
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		29568.20 ± 7964.25	6310.50 ± 733.47	16012.30 ± 3344.54	101.70 ± 38.43
Texadina sphinctostoma		17577.20 ± 3097.60	817.00 ± 333.30	24083.80 ± 176.10	8343.80 ± 4762.60
POLYCHAETES					
Hypaniola florida		1230.88 ± 183.03	461.12 ± 34.64	889.57 ± 174.55	58.09 ± 9.61
Laeonereis culveri					
Nereis succinea					
Parandalia americana		7.26 ± 7.26			
Mediomastus californiensis					
Streblospio benedicti		7.26 ± 7.26			7.26 ± 3.63
Capitella capitata					
Polydora cf. socialis				7.26 ± 7.26	
OLIGOCHAETES		14.52 ± 14.52	21.79 ± 12.58	14.52 ± 7.26	
TURBELLARIANS				3.63 ± 3.63	
NEMERTEANS		7.26 ± 7.26		29.05 ± 7.26	
CRUSTACEANS					
Edotea montosa		101.67 ± 7.26	36.31 ± 7.26	116.19 ± 26.18	
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi		268.69 ± 127.08	10.89 ± 10.89	54.46 ± 39.27	
Corophium lacustre				196.07 ± 123.88	3.63 ± 3.63
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra			7.26 ± 7.26	14.52 ± 14.52	
Ostracods		177.91 ± 23.81	25.42 ± 20.22		
Rhithropanopeus harrisii				18.15 ± 7.26	
Callianassa jamaicense					
Cumaceans					
HYDROZOANS				3.63 ± 3.63	
CHIRONOMIDS		421.18 ± 90.99	700.76 ± 147.80	413.92 ± 182.38	185.18 ± 83.19
OTHER					
TOTAL, N/m^2		50687.40 ± 10921.80	8982.80 ± 1458.30	48497.90 ± 3254.20	14146.00 ± 5665.90
BIOMASS, mg/m^2		5620.40	4405.30	29821.50	7032.10
DIVERSITY, H'		0.987 ± 0.038	1.042 ± 0.082	1.247 ± 0.035	0.954 ± 0.086
SPECIES NUMBER		11.333 ± 0.882	9.000 ± 0.577	13.667 ± 0.333	8.000 ± 0.000
EVENNESS, J'		0.409 ± 0.027	0.474 ± 0.024	0.477 ± 0.010	0.459 ± 0.042

Table A1. (Continued)

	mm	Dec 78 - Sta 10	Jan 79 - Sta 1	Jan 79 - Sta 2	Jan 79 - Sta 3
BIVALVES					
Clams	0.5 - 2	969.45 ± 237.24	977.08 ± 60.45	1212.21 ± 339.53	1198.20 ± 251.62
Rangia cuneata	2 - 10	62.09 ± 37.91	7.62 ± 7.30	206.96 ± 27.45	269.05 ± 36.27
	10 - 20				
	20 - 30				
	>30				
Mulinia pontchartrainensis		105.30 ± 40.92	54.46 ± 28.82	330.41 ± 22.09	377.61 ± 182.52
Macoma mitchelli			10.89 ± 10.89	123.45 ± 25.42	123.45 ± 107.16
Mytilopsis leucophaeta		3.63 ± 3.63			773.38 ± 479.28
Ischadium recurvum		3.63 ± 3.63			
GASTROPODS					
Probythinella louisianae		210.60 ± 38.43	7.30 ± 7.26	127.10 ± 3.63	3184.30 ± 301.89
Texadina sphinctostoma		4879.90 ± 1024.60	7287.20 ± 183.00	36886.30 ± 3047.90	28255.70 ± 4250.30
POLYCHAETES					
Hypaniola florida		47.20 ± 13.09	199.70 ± 32.27	159.76 ± 73.70	257.79 ± 52.74
Laeonereis culveri			7.26 ± 7.26		
Nereis succinea					
Parandalia americana		18.15 ± 18.15	14.52 ± 7.26	10.89 ± 6.29	
Mediomastus californiensis		47.20 ± 20.22	1753.72 ± 144.64	1274.45 ± 241.69	14.52 ± 7.26
Streblospio benedicti		43.57 ± 21.79	134.34 ± 62.99	58.09 ± 7.26	7.26 ± 7.26
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		14.52 ± 14.52	10.89 ± 10.89		21.78 ± 16.64
TURBELLARIANS			14.52 ± 3.63	7.26 ± 7.26	3.63 ± 3.63
NEMERTEANS		36.31 ± 7.26	36.31 ± 19.21	58.09 ± 14.52	83.51 ± 3.63
CRUSTACEANS					
Edotea montosa		7.62 ± 7.26	3.63 ± 3.63	14.52 ± 7.26	50.83 ± 40.43
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi		3.63 ± 3.63	72.62 ± 32.27	87.14 ± 12.58	50.83 ± 19.21
Corophium lacustre			7.26 ± 7.26		
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra			10.89 ± 6.29	10.89 ± 6.29	
Ostracods				76.25 ± 16.64	
Rhithropanopeus harrisii					
Callianassa jamaicense					
Cumaceans					
HYDROZOANS			3.63 ± 3.63		
CHIRONOMIDS		228.75 ± 38.25	39.94 ± 9.61	312.26 ± 59.44	355.83 ± 63.31
OTHER					
TOTAL, N/m^2		6680.90 ± 821.80	10656.70 ± 363.6	43955.70 ± 3491.70	35027.30 ± 3996.30
BIOMASS, mg/m^2		2328.60	2393.50	10865.10	12952.20
DIVERSITY, H′		0.974 ± 0.115	1.051 ± 0.029	0.655 ± 0.022	0.798 ± 0.100
SPECIES NUMBER		11.000 ± 1.528	13.333 ± 0.667	14.333 ± 0.333	12.667 ± 0.667
EVENNESS, J′		0.416 ± 0.069	0.407 ± 0.017	0.246 ± 0.007	0.313 ± 0.033

Table A1. (Continued)

	mm	Jan 79 - Sta 4	Jan 79 - Sta 5	Jan 79 - Sta 6	Jan 79 - Sta 7
BIVALVES					
Clams	0.5- 2	8096.54 ± 1642.73	1364.86 ± 296.17	1884.44 ± 201.51	537.01 ± 216.11
Rangia cuneata	2 - 10	144.87 ± 31.04	221.12 ± 15.79	123.09 ± 31.04	87.14 ± 28.87
	10 - 20	29.41 ± 19.17	25.05 ± 9.59	35.95 ± 3.59	3.27 ± 3.59
	20 - 30				3.27 ± 3.59
	>30				7.62 ± 7.30
Mulinia pontchartrainensis		639.04 ± 187.65	47.20 ± 20.22	25.42 ± 7.26	10.89 ± 10.89
Macoma mitchelli		14.52 ± 9.61			
Mytilopsis leucophaeta		820.58 ± 186.59	515.59 ± 70.12	867.79 ± 99.90	134.34 ± 74.50
Ischadium recurvum		10.89 ± 6.29			
GASTROPODS					
Probythinella louisianae		1289.00 ± 377.67	28829.30 ± 6577.53	22562.40 ± 6269.24	7653.90 ± 986.38
Texadina sphinctostoma		8579.80 ± 2128.00	16266.40 ± 2654.60	9309.60 ± 2586.30	693.50 ± 42.80
POLYCHAETES					
Hypaniola florida		1172.78 ± 237.35	1121.95 ± 63.83	2356.45 ± 653.45	475.65 ± 54.22
Laeonereis culveri					
Nereis succinea					
Parandalia americana		83.51 ± 20.22			
Mediomastus californiensis		181.54 ± 102.25	87.14 ± 54.83		
Streblospio benedicti		7.26 ± 7.26			
Capitella capitata					
Polydora cf. socialis		7.26 ± 7.26			
OLIGOCHAETES		39.94 ± 23.81	79.88 ± 36.31	14.52 ± 14.52	43.57 ± 33.28
TURBELLARIANS		7.26 ± 7.26	3.63 ± 3.63		
NEMERTEANS		116.19 ± 67.25	14.52 ± 7.26	14.52 ± 14.52	
CRUSTACEANS					
Edotea montosa		79.88 ± 26.18	101.67 ± 52.37	254.16 ± 106.97	7.26 ± 7.26
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi		68.99 ± 25.42	94.40 ± 19.21	58.09 ± 26.18	14.52 ± 14.52
Corophium lacustre		7.26 ± 7.26			7.26 ± 7.26
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida			7.26 ± 7.26		
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra				7.26 ± 7.26	
Ostracods		7.26 ± 3.63	236.01 ± 81.11	123.45 ± 83.75	21.79 ± 12.58
Rhithropanopeus harrisii		3.63 ± 3.63	3.63 ± 3.63	7.26 ± 7.26	
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		344.94 ± 75.55	410.29 ± 59.77	537.37 ± 120.86	704.40 ± 140.11
OTHER					
TOTAL, N/m^2		21752.70 ± 2400.90	49431.10 ± 9650.50	38182.50 ± 9336.70	10406.20 ± 1254.30
BIOMASS, mg/m^2		12176.50	17218.40	16112.50	5200.00
DIVERSITY, H'		1.478 ± 0.104	1.058 ± 0.042	1.224 ± 0.128	0.999 ± 0.004
SPECIES NUMBER		16.667 ± 1.333	13.333 ± 0.882	11.000 ± 1.000	8.667 ± 0.882
EVENNESS, J'		0.527 ± 0.036	0.410 ± 0.018	0.511 ± 0.042	0.467 ± 0.025

Table A1. (Continued)

	mm	Jan 79 - Sta 8			Jan 79 - Sta 9			Jan 79 - Sta 10			Feb 79 - Sta 1		
BIVALVES													
Clams	0.5- 2	5318.91	±	299.22	4756.84	±	2198.80	3256.92	±	877.30	457.49	±	45.31
Rangia cuneata	2 - 10	192.80	±	7.30	138.34	±	72.87	21.79	±	12.64	3.27	±	3.59
	10 - 20	14.16	±	9.59	3.27	±	3.59						
	20 - 30	7.62	±	3.59									
	>30	3.27	±	3.59									
Mulinia pontchartrainensis		170.68	±	22.09	76.25	±	38.25	254.16	±	52.74	137.97	±	29.05
Macoma mitchelli								43.57	±	25.16			
Mytilopsis leucophaeta		867.79	±	171.69	65.36	±	54.82	36.31	±	14.52			
Ischadium recurvum		7.26	±	7.26									
GASTROPODS													
Probythinella louisianae		15881.60	±	1549.88	101.70	±	50.83	29.00	±	29.05	428.40	±	428.45
Texadina sphinctostoma		26077.10	±	1104.20	6256.00	±	3098.30	3460.20	±	645.40	3173.40	±	113.40
POLYCHAETES													
Hypaniola florida		944.03	±	102.25	116.19	±	40.43	39.94	±	25.42	68.99	±	35.76
Laeonereis culveri													
Nereis succinea													
Parandalia americana					25.42	±	15.83	7.26	±	7.26	7.26	±	7.26
Mediomastus californiensis					21.79	±	21.78	39.94	±	18.15	624.51	±	304.30
Streblospio benedicti		7.26	±	7.26	47.20	±	25.42	43.57	±	12.58	3.63	±	3.63
Capitella capitata											14.52	±	7.26
Polydora cf. socialis		7.26	±	7.26									
OLIGOCHAETES					25.42	±	9.61	14.52	±	14.52	7.26	±	7.26
TURBELLARIANS					58.09	±	38.43				7.26	±	7.26
NEMERTEANS		50.83	±	3.63				10.89	±	10.89	21.78	±	0.00
CRUSTACEANS													
Edotea montosa		94.40	±	26.18	7.26	±	7.26				7.26	±	7.26
Cyathura polita													
Cassidinidea lunifrons													
Monoculodes edwardsi		14.52	±	7.26	14.52	±	14.52	10.89	±	6.29	14.52	±	14.52
Corophium lacustre		101.67	±	19.21	7.26	±	7.26						
Grandidierella bonnieroides													
Gammarus tigrinus													
Gammarus mucronatus					14.52	±	7.26						
Melita nitida													
Cerapus benthophilus													
Gitanopsis sp.													
Hyalella azteca													
Mysidopsis almyra					10.89	±	6.29						
Ostracods		3.63	±	3.63							7.26	±	7.26
Rhithropanopeus harrisii		25.42	±	3.63									
Callianassa jamaicense													
Cumaceans													
HYDROZOANS													
CHIRONOMIDS		747.96	±	97.70	152.50	±	88.04	319.52	±	31.65	36.31	±	26.18
OTHER													
TOTAL, N/m^2		50538.50	±	1181.50	11898.50	±	5600.90	7588.60	±	1515.30	5021.50	±	619.00
BIOMASS, mg/m^2		19579.50			4325.20			3366.40			1299.00		
DIVERSITY, H'		1.209	±	0.019	1.121	±	0.134	1.167	±	0.069	1.108	±	0.193
SPECIES NUMBER		13.000	±	0.000	11.667	±	2.906	10.333	±	0.333	9.667	±	2.028
EVENNESS, J'		0.471	±	0.007	0.489	±	0.109	0.501	±	0.036	0.495	±	0.060

Table A1. (Continued)

	mm	Feb 79 - Sta 2			Feb 79 - Sta 3			Feb 79 - Sta 4			Feb 79 - Sta 5		
BIVALVES													
Clams	0.5- 2	3071.74	±	337.67	2671.98	±	837.00	2835.37	±	727.41	1325.64	±	.87
Rangia cuneata	2 - 10	250.53	±	49.13	798.43	±	344.54	228.75	±	38.34	149.23	±	41.83
	10 - 20				3.27	±	3.59	32.68	±	16.67	18.52	±	3.59
	20 - 30												
	>30												
Mulinia pontchartrainensis		668.09	±	194.89	570.05	±	51.22	678.98	±	150.06	98.03	±	27.41
Macoma mitchelli		108.93	±	49.12	36.31	±	20.22	18.15	±	3.63			
Mytilopsis leucophaeta		7.26	±	7.26	279.58	±	177.91	875.0	±	507.82	1096.53	±	237.84
Ischadium recurvum								18.15	±	18.15			
GASTROPODS													
Probythinella louisianae		72.60	±	38.43	12308.80	±	4837.85	929.50	±	309.65	23078.00	±	2329.70
Texadina sphinctostoma		37427.30	±	5412.80	59263.50	±	36129.20	16251.90	±	5968.40	17294.00	±	2831.10
POLYCHAETES													
Hypaniola florida		7.26	±	7.26	275.95	±	58.09	1147.36	±	360.52	1782.77	±	607.34
Laeonereis culveri													
Nereis succinea													
Parandalia americana		108.93	±	108.93				14.52	±	14.52			
Mediomastus californiensis		352.20	±	214.59	21.79	±	12.58	192.44	±	127.70	137.97	±	44.17
Streblospio benedicti					21.79	±	21.78						
Capitella capitata													
Polydora cf. socialis								7.26	±	7.26	7.26	±	7.26
OLIGOCHAETES					7.26	±	7.26				72.62	±	7.26
TURBELLARIANS		7.26	±	7.26									
NEMERTEANS		50.83	±	7.26	43.57	±	25.16	29.05	±	19.21	14.52	±	7.26
CRUSTACEANS													
Edotea montosa		21.78	±	12.58	61.72	±	34.64	108.93	±	37.73	65.36	±	12.58
Cyathura polita													
Cassidinidea lunifrons													
Monoculodes edwardsi		43.57	±	0.00	156.13	±	23.81	36.31	±	19.21	392.14	±	0.00
Corophium lacustre								7.26	±	7.26	21.78	±	12.58
Grandidierella bonnieroides													
Gammarus tigrinus													
Gammarus mucronatus													
Melita nitida													
Cerapus benthophilus													
Gitanopsis sp.													
Hyalella azteca											7.26	±	7.26
Mysidopsis almyra											29.05	±	19.21
Ostracods		79.88	±	7.26							14.52	±	14.52
Rhithropanopeus harrisii					7.26	±	7.26	21.79	±	21.79			
Callianassa jamaicense													
Cumaceans													
HYDROZOANS								7.26	±	7.26			
CHIRONOMIDS		294.10	±	16.64	352.20	±	104.16	566.42	±	99.83	617.25	±	19.21
OTHER													
TOTAL, N/m^2		42572.30	±	5980.30	76880.70	±	41076.70	24007.50	±	5645.50	46221.40	±	4896.50
BIOMASS, mg/m^2		10594.40			20223.30			11395.90			18967.50		
DIVERSITY, H′		0.522	±	0.039	1.246	±	0.183	1.236	±	0.213	1.191	±	0.045
SPECIES NUMBER		11.333	±	0.882	12.333	±	0.882	13.333	±	0.333	14.000	±	1.000
EVENNESS, J′		0.215	±	0.011	0.495	±	0.065	0.476	±	0.078	0.452	±	0.014

Table A1. (Continued)

	mm	Feb 79 - Sta 6	Feb 79 - Sta 7	Feb 79 - Sta 8	Feb 79 - Sta 9
BIVALVES					
Clams	0.5- 2	1260.29 ± 422.09	435.71 ± 71.46	5406.05 ± 1000.60	4582.56 ± 2385.39
Rangia cuneata	2 - 10	177.55 ± 82.13	54.46 ± 25.16	269.05 ± 79.19	83.87 ± 32.24
	10 - 20	21.79 ± 21.79	10.89 ± 10.89	57.73 ± 47.17	
	20 - 30		10.89 ± 0.00	3.27 ± 3.59	
	>30				
Mulinia pontchartrainensis		25.42 ± 9.61		54.46 ± 0.00	101.67 ± 50.83
Macoma mitchelli		72.62 ± 72.62			
Mytilopsis leucophaeta		94.40 ± 29.05	21.79 ± 12.58	515.59 ± 246.18	
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		17279.50 ± 6563.32	9451.20 ± 533.24	22613.20 ± 3260.18	116.20 ± 64.54
Texadina sphinctostoma		12740.80 ± 4024.10	1125.60 ± 227.80	26589.10 ± 1357.00	1793.70 ± 1126.80
POLYCHAETES					
Hypaniola florida		1219.98 ± 622.70	1281.71 ± 375.88	987.60 ± 298.79	36.31 ± 14.52
Laeonereis culveri					
Nereis succinea					
Parandalia americana					14.52 ± 7.26
Mediomastus californiensis			7.26 ± 7.26		36.31 ± 26.18
Streblospio benedicti					
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		7.26 ± 7.26	112.56 ± 23.81		47.20 ± 9.61
TURBELLARIANS			7.26 ± 7.26		14.52 ± 7.26
NEMERTEANS		14.52 ± 14.52	14.52 ± 7.26	3.63 ± 3.63	25.42 ± 9.61
CRUSTACEANS					
Edotea montosa		145.2 ± 44.17	50.83 ± 19.21	61.72 ± 9.61	
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi		217.85 ± 78.55	116.19 ± 52.37	50.83 ± 50.83	65.36 ± 12.58
Corophium lacustre		36.31 ± 14.52	14.52 ± 14.52	108.93 ± 78.55	
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra			21.79 ± 12.58		
Ostracods		188.81 ± 88.34	87.14 ± 21.79		
Rhithropanopeus harrisii				7.26 ± 7.26	
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		428.45 ± 143.04	711.66 ± 63.31	606.36 ± 31.02	297.73 ± 169.84
OTHER					
TOTAL, N/m^2		33930.80 ± 11902.10	13536.00 ± 1190.30	57335.50 ± 6049.20	7214.60 ± 3769.30
BIOMASS, mg/m^2		10597.20	5407.70	19468.00	3445.00
DIVERSITY, H′		1.155 ± 0.045	1.113 ± 0.056	1.133 ± 0.035	1.108 ± 0.082
SPECIES NUMBER		12.000 ± 0.577	12.000 ± 1.527	9.667 ± 0.882	10.333 ± 1.202
EVENNESS, J′		0.466 ± 0.026	0.453 ± 0.029	0.502 ± 0.009	0.484 ± 0.064

Table A1. (Continued)

	mm	Feb 79 - Sta 10	Feb 79 - Sta 11	Feb 79 - Sta 12	Feb 79 - Sta 13
BIVALVES					
Clams					
Rangia cuneata	0.5- 2	4109.82 ± 1698.39	13689.00 ± 431.68	493.44 ± 63.29	2937.76 ± 1539.47
	2 - 10	144.87 ± 124.07	160.12 ± 3.59		1136.11 ± 1114.76
	10 - 20				10.89 ± 10.89
	20 - 30				3.27 ± 3.59
	>30				
Mulinia pontchartrainensis		127.08 ± 46.36	323.15 ± 152.15	112.56 ± 23.81	515.59 ± 29.72
Macoma mitchelli		65.36 ± 33.28	25.42 ± 13.09	14.52 ± 14.52	83.51 ± 46.36
Mytilopsis leucophaeta		163.39 ± 141.61	323.15 ± 29.72	7.26 ± 7.26	39.94 ± 9.61
Ischadium recurvum		21.79 ± 21.79			
GASTROPODS					
Probythinella louisianae		646.30 ± 428.63	1891.70 ± 836.55	50.80 ± 40.43	17333.90 ± 1825.11
Texadina sphinctostoma		21498.60 ± 15128.70	18441.30 ± 4451.00	1318.00 ± 477.60	1655.70 ± 54.80
POLYCHAETES					
Hypaniola florida		65.36 ± 33.28	243.27 ± 97.49	7.26 ± 7.26	65.36 ± 21.79
Laeonereis culveri					
Nereis succinea					
Parandalia americana					
Mediomastus californiensis		18.15 ± 3.63	10.89 ± 6.29	7.26 ± 7.26	286.84 ± 100.29
Streblospio benedicti		29.05 ± 19.21	21.79 ± 12.58	21.79 ± 12.58	29.05 ± 19.21
Capitella capitata				7.26 ± 7.26	3.63 ± 3.63
Polydora cf socialis				21.79 ± 21.79	
OLIGOCHAETES					
TURBELLARIANS		7.26 ± 3.63	7.26 ± 7.26		14.52 ± 9.61
NEMERTEANS		3.63 ± 3.63	7.26 ± 7.26		10.89 ± 6.29
CRUSTACEANS			14.52 ± 7.26	7.26 ± 7.26	79.88 ± 38.43
Edotea montosa					
Cyathura polita			36.31 ± 26.18		
Cassidinidea lunifrons		7.26 ± 7.26	7.26 ± 7.26		43.57 ± 12.58
Monoculodes edwardsi					
Corophium lacustre		29.05 ± 7.26	108.93 ± 108.93	14.52 ± 14.52	14.52 ± 14.52
Grandidierella bonnieroides			29.05 ± 19.21		29.05 ± 14.52
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					885.94 ± 515.74
Hyalella azteca					
Mysidopsis almyra					
Ostracods					
Rhithropanopeus harrisii					
Callianassa jamaicense					7.26 ± 7.26
Cumaceans					10.89 ± 6.29
HYDROZOANS					
CHIRONOMIDS					
OTHER		551.90 ± 283.02	355.83 ± 40.43		108.93 ± 12.58
TOTAL, N/m^2		27489.50 ± 17853.50	23281.30 ± 5605.20	2084.10 ± 588.70	25307.40 ± 2173.10
BIOMASS, mg/m^2		8705.70 ±	7697.20	672.70	9678.90
DIVERSITY, H′		0.886 ± 0.130	0.848 ± 0.105	1.101 ± 0.095	1.100 ± 0.060
SPECIES NUMBER		12.333 ± 0.333	12.333 ± 0.882	7.000 ± 1.528	16.333 ± 0.882
EVENNESS, J′		0.352 ± 0.048	0.337 ± 0.033	0.587 ± 0.057	0.395 ± 0.027

Table A1. (Continued)

	mm	Mar 79 - Sta 1			Mar 79 - Sta 2			Mar 79 - Sta 3			Mar 79 - sta 4		
BIVALVES													
Clams	0.5- 2	889.93	±	31.04	6756.74	±	1177.50	2665.44	±	470.02	5065.11	±	1980.62
Rangia cuneata	2 - 10	10.89	±	10.89	406.30	±	129.30	846.36	±	57.08	239.64	±	65.68
	10 - 20				10.89	±	10.89						
	20 - 30												
	>30												
Mulinia pontchartrainensis		257.79	±	97.50	791.54	±	230.41	628.15	±	35.76	381.24	±	145.05
Macoma mitchelli		43.57	±	21.78	58.09	±	3.63	141.61	±	76.25			
Mytilopsis leucophaeta								14.52	±	14.52	21.79	±	12.58
Ischadium recurvum											3.63	±	3.63
GASTROPODS													
Probythinella louisianae		7.26	±	7.26	50.80	±	7.26	11513.60	±	2392.50	1289.00	±	621.82
Texadina sphinctostoma		13706.60	±	1107.50	34649.70	±	5119.70	26229.60	±	3287.30	14523.60	±	5871.10
POLYCHAETES													
Hypaniola florida		188.81	±	40.43	29.05	±	14.52	428.45	±	23.81	163.39	±	69.18
Laeonereis culveri													
Nereis succinea													
Parandalia americana		3.63	±	3.63	39.94	±	13.09						
Mediomastus californiensis		1172.78	±	248.58	664.45	±	169.58	119.82	±	6.29			
Streblospio benedicti		79.88	±	36.31				21.78	±	12.58	3.63	±	3.63
Capitella capitata		21.78	±	0.00									
Polydora cf. socialis													
OLIGOCHAETES		14.52	±	7.26	3.63	±	3.63	43.57	±	33.28			
TURBELLARIANS		14.52	±	7.26	10.89	±	10.89	7.26	±	3.63			
NEMERTEANS		7.26	±	7.26	36.31	±	7.26	39.94	±	3.63	14.52	±	14.52
CRUSTACEANS													
Edotea montosa					21.78	±	12.58	25.42		15.83	29.05	±	19.21
Cyathura polita													
Cassidinidea lunifrons													
Monoculodes edwardsi		14.52	±	14.52	21.78	±	21.79	94.40	±	7.26			
Corophium lacustre		7.26	±	7.26									
Grandidierella bonnieroides													
Gammarus tigrinus													
Gammarus mucronatus													
Melita nitida													
Cerapus benthophilus													
Gitanopsis sp.													
Hyalella azteca													
Mysidopsis almyra													
Ostracods													
Rhithropanopeus harrisii													
Callianassa jamaicense													
Cumaceans													
HYDROZOANS													
CHIRONOMIDS		83.51	±	25.42	312.26	±	40.43	366.72	±	62.99	570.05	±	77.62
OTHER													
TOTAL, N/m^2		16524.20	±	1092.60	43864.90	±	6786.50	43185.90	±	5468.10	22308.20	±	8569.50
BIOMASS, mg/m^2		3607.00			11659.80			12233.10			7411.50		
DIVERSITY, H'		0.715	±	0.075	0.689	±	0.028	1.078	±	0.041	0.993	±	0.070
SPECIES NUMBER		11.667	±	1.764	11.333	±	1.202	12.667	±	0.882	8.333	±	0.667
EVENNESS, J'		0.293	±	0.022	0.286	±	0.012	0.427	±	0.028	0.469	±	0.023

Table A1. (Continued)

	mm	Mar 79 - Sta 5	Mar 79 - Sta 6	Mar 79 - Sta 7	Mar 79 - Sta 8
BIVALVES					
Clams	0.5- 2	5835.22 ± 298.02	1597.96 ± 309.68	8155.36 ± 324.49	13035.29 ± 1893.04
<u>Rangia cuneata</u>	2 - 10	443.33 ± 88.12	144.87 ± 94.22	236.37 ± 40.41	1042.43 ± 315.78
	10 - 20	7.62 ± 7.30	14.16 ± 9.59	32.68 ± 10.89	
	20 - 30				3.27 ± 3.59
	>30				
<u>Mulinia pontchartrainensis</u>		101.67 ± 20.22	43.57 ± 43.57	3.63 ± 3.63	134.34 ± 44.62
<u>Macoma mitchelli</u>					3.63 ± 3.63
<u>Mytilopsis leucophaeta</u>		580.94 ± 199.10	29.05 ± 15.83	272.32 ± 179.76	809.69 ± 106.42
<u>Tschadium recurvum</u>					
GASTROPODS					
<u>Probythinella louisianae</u>		24755.50 ± 4807.88	4422.40 ± 1323.50	17954.80 ± 2186.91	15151.70 ± 419.95
<u>Texadina sphinctostoma</u>		17490.00 ± 3909.97	4128.30 ± 199.97	2824.80 ± 547.15	27667.50 ± 2956.38
POLYCHAETES					
<u>Hypaniola florida</u>		2781.27 ± 1133.14	1303.49 ± 521.50	1699.26 ± 411.24	4589.46 ± 1178.77
<u>Laeonereis culveri</u>					
<u>Nereis succinea</u>					
<u>Parandalia americana</u>					
<u>Mediomastus californiensis</u>		21.79 ± 12.58			
<u>Streblospio benedicti</u>		3.63 ± 3.63			
<u>Capitella capitata</u>					14.52 ± 14.52
<u>Polydora cf. socialis</u>					7.26 ± 7.26
OLIGOCHAETES		29.05 ± 14.52	7.26 ± 7.26	7.26 ± 7.26	7.26 ± 7.26
TURBELLARIANS					3.63 ± 3.63
NEMERTEANS		25.42 ± 3.63	7.26 ± 7.26		50.83 ± 3.63
CRUSTACEANS					
<u>Edotea montosa</u>		225.11 ± 29.72	14.52 ± 14.52	94.40 ± 14.52	221.48 ± 54.95
<u>Cyathura polita</u>					7.26 ± 7.26
<u>Cassidinidea lunifrons</u>					
<u>Monoculodes edwardsi</u>		116.19 ± 69.27	50.83 ± 26.16	87.14 ± 33.28	266.64 ± 114.30
<u>Corophium lacustre</u>		43.57 ± 25.16	181.54 ± 118.88		161.54 ± 91.64
<u>Grandidierella bonnieroides</u>				29.05 ± 7.26	
<u>Gammarus tigrinus</u>					
<u>Gammarus mucronatus</u>					
<u>Melita nitida</u>		14.52 ± 14.52	14.52 ± 14.52		
<u>Cerapus benthophilus</u>					
<u>Gitanopsis sp.</u>					
<u>Hyalella azteca</u>					
<u>Mysidopsis almyra</u>					
<u>Ostracods</u>		7.26 ± 7.26	7.26 ± 7.26		
<u>Rhithropanopeus harrisii</u>		18.15 ± 9.61	7.26 ± 7.26	14.52 ± 14.52	7.26 ± 7.26
<u>Callianassa jamaicense</u>					
<u>Cumaceans</u>				7.26 ± 7.26	
HYDROZOANS					
CHIRONOMIDS		464.76 ± 110.79	475.65 ± 124.88	682.61 ± 106.42	457.49 ± 75.47
OTHER					
TOTAL, N/m^2		52963.90 ± 7606.50	12450.40 ± 1005.70	32115.30 ± 1034.80	63682.40 ± 1856.90
BIOMASS, mg/m^2		18907.30	4426.60	13396.90	22818.60
DIVERSITY, H′		1.296 ± 0.112	1.445 ± 0.146	1.202 ± 0.110	1.386 ± 0.035
SPECIES NUMBER		13.333 ± 1.453	9.667 ± 1.333	10.333 ± 0.333	13.000 ± 0.577
EVENNESS, J′		0.501 ± 0.022	0.640 ± 0.029	0.515 ± 0.050	0.541 ± 0.017

Table A1. (Continued)

	mm	Mar 79 - Sta 9	Mar 79 - Sta 10	Apr 79 - Sta 1	Apr 79 - Sta 2
BIVALVES					
Clams	0.5- 2	10914.48 ± 4215.69	7254.54 ± 2242.70	1895.33 ± 152.50	10903.59 ± 804.75
Rangia cuneata	2 - 10	196.07 ± 128.42	94.78 ± 31.04	40.30 ± 22.11	410.65 ± 97.49
	10 - 20		7.62 ± 7.30		3.27 ± 3.59
	20 - 30				
	>30				
Mulinia pontchartrainensis		94.40 ± 94.40	239.64 ± 59.99	326.78 ± 70.03	1201.83 ± 224.68
Macoma mitchelli		3.63 ± 3.63	76.25 ± 55.89	18.15 ± 9.61	105.30 ± 23.81
Mytilopsis leucophaeta					
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		87.10 ± 45.35	370.40 ± 21.79		330.4 ± 32.27
Texadina sphinctostoma		1630.30 ± 267.58	9672.70 ± 222.44	14414.7 ± 1310.91	36962.6 ± 4785.21
POLYCHAETES					
Hypaniola florida		36.31 ± 19.21	50.83 ± 31.65	36.31 ± 14.52	
Laeonereis culveri					
Nereis succinea					
Parandalia americana			21.78 ± 12.58	32.68 ± 6.29	7.26 ± 3.63
Mediomastus californiensis			145.24 ± 76.85	1249.03 ± 157.27	468.39 ± 117.82
Streblospio benedicti			29.05 ± 29.05	108.93 ± 12.58	3.63 ± 3.63
Capitella capitata				14.52 ± 7.26	
Polydora cf. socialis					
OLIGOCHAETES		3.63 ± 3.63	14.52 ± 14.52		
TURBELLARIANS		10.89 ± 6.29			
NEMERTEANS		7.26 ± 7.26	18.15 ± 13.09	39.94 ± 3.63	43.57 ± 0
CRUSTACEANS					
Edotea montosa					
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi			47.20 ± 36.85	43.57 ± 33.28	58.09 ± 23.81
Corophium lacustre					
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra			7.26 ± 7.26	14.52 ± 7.26	
Ostracods					
Rhithropanopeus harrisii					
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		79.88 ± 38.43	319.52 ± 7.26	79.88 ± 7.26	236.01 ± 85.38
OTHER					
TOTAL, N/m^2		13067.60 ± 4703.80	18368.70 ± 2368.80	18314.30 ± 1326.50	50734.60 ± 5269.80
BIOMASS, mg/m^2		5827.60	6539.90	4462.40	14234.40
DIVERSITY, H'		0.554 ± 0.060	0.996 ± 0.030	0.805 ± 0.049	0.784 ± 0.038
SPECIES NUMBER		7.000 ± 1.528	10.000 ± 1.732	11.667 ± 0.882	10.000 ± 0.577
EVENNESS, J'		0.304 ± 0.062	0.442 ± 0.022	0.329 ± 0.020	0.342 ± 0.023

Table A1. (Continued)

		Apr 79 - Sta 3	Apr 79 - Sta 4	Apr 79 - Sta 5	Apr 79 - Sta 6
BIVALVES	mm				
Clams	0.5- 2	5046.59 ± 1314.97	18201.70 ± 6644.55	5623.90 ± 477.21	5497.55 ± 2127.02
Rangia cuneata	2 - 10	319.16 ± 7.30	1089.27 ± 261.10	1114.32 ± 69.60	1277.71 ± 477.97
	10 - 20		25.05 ± 9.59	35.95 ± 19.17	35.95 ± 3.59
	20 - 30				3.27 ± 3.59
	>30				
Mulinia pontchartrainensis		366.72 ± 66.65	1782.77 ± 499.97	214.22 ± 57.06	29.05 ± 19.21
Macoma mitchelli		32.68 ± 16.64			
Mytilopsis leucophaeta			156.13 ± 3.63	1318.02 ± 276.93	297.73 ± 178.80
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		7334.40 ± 1873.38	2276.60 ± 113.20	12414.00 ± 1497.62	13354.50 ± 2943.72
Texadina sphinctostoma		20296.70 ± 5198.47	23009.00 ± 6373.80	16037.70 ± 425.44	10816.50 1299.13
POLYCHAETES					
Hypaniola florida		43.57 ± 21.79	196.07 ± 12.58	1760.99 ± 604.66	1982.47 ± 212.62
Laeonereis culveri					
Nereis succinea					
Parandalia americana			7.26 ± 3.63		
Mediomastus californiensis		43.57 ± 33.28	21.78 ± 6.29	21.79 ± 12.58	
Streblospio benedicti		14.52 ± 14.52	7.26 ± 3.63		
Capitella capitata				14.52 ± 7.26	3.63 ± 3.63
Polydora cf. socialis					
OLIGOCHAETES		47.20 ± 31.02		21.79 ± 21.79	29.05 ± 29.05
TURBELLARIANS					
NEMERTEANS		29.05 ± 7.26	43.57 ± 0.00	10.89 ± 6.29	7.26 ± 7.26
CRUSTACEANS					
Edotea montosa		32.68 ± 16.64	156.13 ± 22.09	116.19 ± 14.52	101.67 ± 19.21
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi		185.18 ± 96.82	90.77 ± 22.09	134.34 ± 82.08	83.51 ± 35.76
Corophium lacustre				283.21 ± 145.05	1706.52 ± 649.32
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida				32.68 ± 32.68	
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		72.62 ± 52.57		21.79 ± 12.58	18.15 ± 3.63
Ostracods					
Rhithropanopeus harrisii				10.89 ± 6.29	
Callianassa jamaicense					
Cumaceans					
HYDROZOANS			3.63 ± 3.63		
CHIRONOMIDS		330.41 ± 67.25	250.53 ± 25.16	334.04 ± 29.05	537.37 ± 95.24
OTHER					
TOTAL, N/m^2		34195.80 ± 8650.50	53944.30 ± 5493.40	39526.00 ± 1233.40	35782.50 ± 2347.70
BIOMASS, mg/m^2		10138.80	19929.90	18293.10	12767.10
DIVERSITY, H'		1.108 ± 0.024	1.043 ± 0.032	1.434 ± 0.078	1.438 ± 0.071
SPECIES NUMBER		11.667 ± 1.453	12.667 ± 0.882	14.000 ± 2.082	11.667 ± 0.667
EVENNESS, J'		0.456 ± 0.026	0.411 ± 0.002	0.549 ± 0.005	0.588 ± 0.040

Table A1. (Continued)

	mm	Apr 79 - Sta 7	Apr 79 - Sta 8	Apr 79 - Sta 9	Apr 79 - Sta 10
BIVALVES					
Clams	0.5- 2	5449.62 ± 439.41	12447.09 ± 1781.61	61568.81 ± 4780.04	10198.84 ± 2185.29
Rangia cuneata	2 - 10	185.18 ± 41.28	1219.98 ± 307.39	515.22 ± 94.22	356.19 ± 176.68
	10 - 20	10.89 ± 6.32	3.27 ± 3.59		
	20 - 30		51.20 ± 50.87		
	>30		3.27 ± 3.59		
Mulinia pontchartrainensis			98.03 ± 12.58	1350.69 ± 473.47	671.72 ± 264.76
Macoma mitchelli			7.26 ± 7.26	14.52 ± 9.61	29.05 ± 3.63
Mytilopsis leucophaeta		32.68 ± 32.68	163.39 ± 25.16		
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		8942.90 ± 2147.19	10010.40 ± 1484.82	188.8 ± 83.75	272.3 ± 93.07
Texadina sphinctostoma		1071.10 ± 289.38	26153.40 ± 7560.60	9698.1 ± 1409.62	6259.7 ± 3046.68
POLYCHAETES					
Hypaniola florida		526.48 ± 135.81	1757.36 ± 460.48	14.52 ± 14.52	7.26 ± 7.26
Laeonereis culveri					
Nereis succinea					
Parandalia americana				10.89 ± 6.28	7.26 ± 7.26
Mediomastus californiensis			7.26 ± 7.26	14.52 ± 7.26	43.57 ± 25.16
Streblospio benedicti			21.79 ± 10.89	10.89 ± 10.89	98.03 ± 39.27
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		43.57 ± 21.79	7.26 ± 7.26	18.15 ± 9.61	50.83 ± 40.43
TURBELLARIANS				3.63 ± 3.63	
NEMERTEANS		14.52 ± 14.52	10.89 ± 6.29	10.89 ± 6.29	18.15 ± 3.63
CRUSTACEANS					
Edotea montosa		47.20 ± 9.61	275.95 ± 73.70	14.52 ± 7.26	
Cyathura polita			29.05 ± 29.05		
Cassidinidea lunifrons					
Monoculodes edwardsi		87.42 ± 38.25	123.45 ± 69.27	21.79 ± 12.58	68.99 ± 15.83
Corophium lacustre			421.18 ± 378.45		
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		25.42 ± 15.83	3.63 ± 3.63		47.20 ± 25.42
Ostracods		7.26 ± 7.26			
Rhithropanopeus harrisii					
Callianassa jamaicense					
Cumaceans					7.26 ± 7.26
HYDROZOANS			3.63 ± 3.63		
CHIRONOMIDS		533.74 ± 76.25	395.77 ± 135.52	297.73 ± 26.18	363.09 ± 90.99
OTHER					
TOTAL, N/m^2		16978.10 ± 2310.80	53210.80 ± 8846.30	73761.70 ± 5954.30	18499.4 ± 5206.0
BIOMASS, mg/m^2		7257.60	16863.60	32442.10	7609.10
DIVERSITY, H′		1.165 ± 0.059	1.295 ± 0.060	0.534 ± 0.023	1.034 ± 0.049
SPECIES NUMBER		9.667 ± 0.882	13.000 ± 0.577	11.000 ± 1.000	12.333 ± 0.667
EVENNESS, J′		0.515 ± 0.009	0.491 ± 0.025	0.224 ± 0.011	0.412 ± 0.013

Table A1. (Continued)

	mm	May 79 - Sta 5	May 79 - Sta 6	May 79 - Sta 7	May 79 - Sta 8
BIVALVES					
Clams	0.5- 2	2436.70 ± 236.15	2410.55 ± 498.23	367.80 ± 186.81	5377.73 ± 2022.67
Rangia cuneata	2 - 10	798.43 ± 181.69	2617.52 ± 365.01	1691.64 ± 266.61	6412.53 ± 1418.99
	10 - 20	3.27 ± 3.59	7.62 ± 3.59		3.27 ± 3.59
	20 - 30	7.62 ± 7.30		3.27 ± 3.59	
	>30	3.27 ± 3.59			
Mulinia pontchartrainensis		69.0 ± 41.87		134.30 ± 69.27	1307.10 ± 495.71
Macoma mitchelli		3.63 ± 3.63			10.69 ± 6.29
Mytilopsis leucophaeta		206.96 ± 82.24	174.28 ± 147.89	25.42 ± 25.42	141.61 ± 31.45
Ischadium recurvum					3.63 ± 3.63
GASTROPODS					
Probythinella louisianae		18012.90 ± 2387.34	13379.90 ± 922.59	4382.50 ± 2129.09	9157.10 ± 3666.56
Texadina sphinctostoma		17159.60 ± 2185.01	9705.40 ± 1160.18	646.30 ± 216.52	20104.30 ± 4795.58
POLYCHAETES					
Hypaniola florida		315.89 ± 16.64	134.34 ± 85.85	747.97 ± 308.76	363.09 ± 256.95
Laeonereis culveri					
Nereis succinea					
Parandalia americana					7.26 ± 7.26
Mediomastus californiensis		21.79 ± 12.58			
Streblospio benedicti					58.09 ± 31.65
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		29.05 ± 19.21	7.26 ± 7.26	108.93 ± 57.64	36.31 ± 26.18
TURBELLARIANS		14.52 ± 14.52			
NEMERTEANS		18.15 ± 9.61		7.26 ± 7.26	36.31 ± 7.26
CRUSTACEANS					
Edotea montosa		112.56 ± 13.09	7.26 ± 7.26	43.57 ± 33.28	395.77 ± 96.27
Cyathura polita					7.26 ± 7.26
Cassidinidea lunifrons					
Monoculodes edwardsi		72.62 ± 26.18	21.79 ± 21.79	116.20 ± 19.21	199.70 ± 89.01
Corophium lacustre			7.26 ± 7.26		250.53 ± 115.45
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		7.26 ± 7.26	3.63 ± 3.63	47.20 ± 32.27	58.09 ± 31.65
Ostracods		7.26 ± 7.26			
Rhithropanopeus harrisii					7.26 ± 7.26
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		279.58 ± 14.52	203.33 ± 47.62	363.09 ± 116.87	228.75 ± 16.64
OTHER					
TOTAL, N/m^2		39580.40 ± 4447.60	28680.50 ± 1557.00	8685.10 ± 1668.10	44169.90 ± 7163.80
BIOMASS, mg/m^2		12682.80	16021.40	3645.40	14760.60
DIVERSITY, H′		1.088 ± 0.043	1.118 ± 0.066	1.431 ± 0.254	1.333 ± 0.091
SPECIES NUMBER		12.333 ± 0.667	7.000 ± 1.155	9.667 ± 1.202	15.000 ± 1.155
EVENNESS, J′		0.433 ± 0.009	0.588 ± 0.034	0.633 ± 0.103	0.492 ± 0.019

Table A1. (Continued)

	mm	May 79 - Sta 1	May 79 - Sta 2	May 79 - Sta 3	May 79 - Sta 4
BIVALVES					
Clams	0.5- 2	1459.62 ± 214.91	8024.65 ± 740.81	8085.65 ± 1407.77	16567.80 ± 428.19
Rangia cuneata	2 - 10	308.26 ± 108.49	795.17 ± 92.70	1761.35 ± 444.10	1383.37 ± 422.20
	10 - 20	7.62 ± 7.30	7.62 ± 7.30		35.95 ± 15.79
	20 - 30				
	>30				
Mulinia pontchartrainensis		348.57 ± 10.89	1590.33 ± 134.44	1419.68 ± 205.94	2668.71 ± 844.40
Macoma mitchelli		10.89 ± 6.29	61.73 ± 31.02	47.20 ± 13.09	14.52 ± 9.61
Mytilopsis leucophaeta		7.26 ± 7.26		50.83 ± 29.72	157.02 ± 83.75
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae			207.00 ± 49.12	11982.00 ± 1596.89	3503.80 ± 398.56
Texadina sphinctostoma		15776.30 ± 3701.03	33052.10 ± 321.92	30960.70 ± 6247.34	21694.60 ± 849.50
POLYCHAETES					
Hypaniola florida		21.79 ± 12.58	7.26 ± 7.26	29.05 ± 14.52	108.93 ± 37.73
Laeonereis culveri					
Nereis succinea					
Parandalia americana		18.15 ± 9.61	7.26 ± 7.26		
Mediomastus californiensis		791.54 ± 256.95	363.09 ± 180.67	50.83 ± 14.52	14.52 ± 14.52
Streblospio benedicti		54.46 ± 28.82		7.26 ± 7.26	
Capitella capitata				7.26 ± 7.26	
Polydora cf. socialis					
OLIGOCHAETES				18.15 ± 18.15	
TURBELLARIANS			21.79 ± 21.79		3.63 ± 3.63
NEMERTEANS		32.68 ± 10.89	58.09 ± 26.18	21.79 ± 12.58	10.89 ± 6.29
CRUSTACEANS					
Edotea montosa		14.52 ± 14.52	7.26 ± 7.26	36.31 ± 19.21	14.52 ± 14.52
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi		7.26 ± 7.26		105.30 ± 29.72	
Corophium lacustre					
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus				3.63 ± 3.63	
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra				32.68 ± 16.64	
Ostracods				7.26 ± 7.26	
Rhithropanopeus harrisii		7.26 ± 7.26		14.52 ± 7.26	
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		58.09 ± 14.52	159.76 ± 29.05	145.24 ± 28.36	355.83 ± 28.36
OTHER					
TOTAL, N/m^2		18917.00 ± 3797.70	44362.30 ± 76.10	54786.70 ± 9393.90	46544.50 ± 2642.80
BIOMASS, mg/m^2		4563.40	12295.20	16195.10	16853.90
DIVERSITY, H′		0.680 ± 0.143	0.765 ± 0.027	1.137 ± 0.037	1.153 ± 0.036
SPECIES NUMBER		10.000 ± 1.000	9.000 ± 1.000	14.000 ± 1.155	9.333 ± 0.882
EVENNESS, J′		0.293 ± 0.052	0.350 ± 0.005	0.433 ± 0.019	0.520 ± 0.033

Table A1. (Continued)

	mm	May 79 - Sta 9		May 79 - Sta 10		May 79 - Sta 11		May 79 - Sta 12	
BIVALVES									
Clams	0.5- 2	2933.40	± 631.01	10369.85	± 3564.85	10914.49	± 2412.30	1086.00	± 397.80
Rangia cuneata	2 - 10	1092.54	± 645.39	704.76	± 290.84	1391.00	± 312.84	72.98	± 20.26
	10 - 20					18.52	± 13.07		
	20 - 30								
	>30								
Mulinia pontchartrainensis		1151.00	± 622.77	3997.60	± 877.95	817.00	± 216.31	1735.00	± 474.48
Macoma mitchelli		7.26	± 7.26	21.79	± 6.29	7.26	± 3.63	90.77	± 20.22
Mytilopsis leucophaeta		29.05	± 29.05	50.83	± 40.43	163.39	± 152.50	36.31	± 7.26
Ischadium recurvum						3.63	± 3.63		
GASTROPODS									
Probythinella louisianae		50.80	± 26.18	762.50	± 89.16	5134.10	± 645.78	108.90	± 31.44
Texadina sphinctostoma		1782.80	± 905.78	7610.40	± 983.99	27358.80	± 4649.99	2545.30	± 262.81
POLYCHAETES									
Hypaniola florida		29.05	± 7.26	36.31	± 19.21	65.36	± 33.28		
Laeonereis culveri									
Nereis succinea									
Parandalia americana				7.26	± 7.26			10.89	± 6.29
Mediomastus californiensis		29.05	± 19.21	50.83	± 31.65				
Streblospio benedicti		36.31	± 36.31	10.89	± 10.89				
Capitella capitata								7.26	± 7.26
Polydora cf. socialis									
OLIGOCHAETES		7.26	± 7.26	43.57	± 25.16	7.26	± 7.26	3.63	± 3.63
TURBELLARIANS						7.26	± 7.26		
NEMERTEANS		21.79	± 12.58	14.52	± 7.26	14.52	± 7.26	7.26	± 7.26
CRUSTACEANS									
Edotea montosa									
Cyathura polita									
Cassidinidea lunifrons									
Monoculodes edwardsi		29.05	± 19.21	14.52	± 14.52				
Corophium lacustre				7.26	± 7.26				
Grandidierella bonnieroides									
Gammarus tigrinus									
Gammarus mucronatus									
Melita nitida									
Cerapus benthophilus				14.52	± 14.52			7.26	± 7.26
Gitanopsis sp.									
Hyalella azteca									
Mysidopsis almyra		25.42	± 13.09	29.05	± 14.52				
Ostracods									
Rhithropanopeus harrisii									
Callianassa jamaicense									
Cumaceans									
HYDROZOANS								3.63	± 3.63
CHIRONOMIDS		116.19	± 40.43	167.02	± 40.43	108.93	± 25.16	29.05	± 19.21
OTHER									
TOTAL, N/m^2		*7341.70*	*± 1791.70*	*23913.10*	*± 4056.40*	*46010.80*	*± 7180.50*	*5744.10*	*± 865.30*
BIOMASS, mg/m^2		3373.90		9623.20		14439.60		2333.40	
DIVERSITY, H´		1.062	± 0.166	1.239	± 0.085	1.034	± 0.058	1.246	± 0.017
SPECIES NUMBER		9.667	± 1.667	11.667	± 1.202	9.333	± 0.333	9.000	± 0.577
EVENNESS, J´		0.470	± 0.049	0.506	± 0.025	0.464	± 0.031	0.569	± 0.022

Table A1. (Continued)

	mm	May 79 - Sta 13	Jun 79 - Sta 1	Jun 79 - Sta 2	Jun 79 - Sta 3
BIVALVES					
Clams	0.5- 2	18419.56 ± 8126.28	410.65 ± 128.97	1467.25 ± 776.00	1277.[illegible] ± [illegible].16
Rangia cuneata	2 - 10	1216.71 ± 647.24	1179.68 ± 74.51	4109.82 ± [illegible]	[illegible] ± 503.57
	10 - 20				3[illegible] ± 3.59
	20 - 30				
	>30				
Mulinia pontchartrainensis		3532.90 ± 2480.17	802.40 ± 150.98	5500.80 ± 418.53	2392.80 ± 488.00
Macoma mitchelli		18.15 ± 3.63	21.79 ± 6.29	[illegible]8.15 ± 13.09	29.05 ± 19.21
Mytilopsis leucophaeta		21.78 ± 6.29	65.36 ± 10.89	61.73 ± 22.09	36.31 ± 26.18
Ischadium recurvum		10.89 ± 6.29			
GASTROPODS					
Probythinella louisianae		8307.50 ± 4638.07	43.60 ± 38.25	870.70 ± 67.83	6041.80 ± [illegible]
Texadina sphinctostoma		8652.40 ± 5207.25	15336.90 ± 929.42	25194.80 ± 4252.93	18873.40 ± [illegible]
POLYCHAETES					
Hypaniola florida		50.83 ± 26.18	10.89 ± 6.29	21.78 ± 12.58	72.62 ± 34.64
Laeonereis culveri					
Nereis succinea					
Parandalia americana		130.71 ± 32.68	32.68 ± 12.58	39.94 ± 9.61	
Mediomastus californiensis		68.99 ± 63.62	700.76 ± 242.46	250.53 ± 96.82	14.52 ± 14.52
Streblospio benedicti			10.89 ± 10.89	7.26 ± 7.26	18.15 ± 13.09
Capitella capitata					
Polydora cf. socialis			3.63 ± 3.63		
OLIGOCHAETES		10.89 ± 6.29			29.[illegible]5 ± 19.21
TURBELLARIANS			3.63 ± 3.63		
NEMERTEANS		29.05 ± 3.63	14.52 ± 3.63	43.57 ± 12.58	29.05 ± 19.21
CRUSTACEANS					
Edotea montosa			7.26 ± 7.26		43.57 ± 12.58
Cyathura polita		83.51 ± 15.83			
Cassidinidea lunifrons					
Monoculodes edwardsi		50.83 ± 40.43			58.09 ± 47.62
Corophium lacustre					
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus		1078.38 ± 576.36			
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra			10.89 ± 6.29	7.26 ± 7.26	36.31 ± 14.52
Ostracods					
Rhithropanopeus harrisii					
Callianassa jamaicense		3.63 ± 3.63			
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		87.14 ± 37.73	119.82 ± 38.25	174.28 ± 66.56	265.06 ± 66.65
OTHER					
TOTAL, N/m^2		41773.50 ± 20536.50	18775.40 ± 1408.30	37071.50 ± 4361.60	30957.10 ± 5202.00
BIOMASS, mg/m^2.		16108.80	4971.40	11310.50	9289.20
DIVERSITY, H′		1.292 ± 0.091	0.723 ± 0.066	0.956 ± 0.067	1.160 ± 0.013
SPECIES NUMBER		14.667 ± 0.882	12.333 ± 0.667	11.000 ± 1.155	12.333 ± 0.667
EVENNESS, J′		0.481 ± 0.029	0.287 ± 0.022	0.310 ± 0.011	0.462 ± 0.006

Table A1. (Continued)

	mm	Jun 79 - Sta 4	Jun 79 - Sta 5	Jun 79 - Sta 6	Jun 79 - Sta 7
BIVALVES					
Clams	0.5- 2	4702.38 ± 1560.60	541.37 ± 227.11	1096.89 ± 825.45	127.45 ± 41.63
Rangia cuneata	2 - 10	2382.23 ± 1020.32	1775.51 ± 4134.89	2418.18 ± 1212.03	1928.01 ± 213.61
	10 - 20	14.16 ± 9.59		3.27 ± 3.59	7.62 ± 7.30
	20 - 30				
	>30				
Mulinia pontchartrainensis		3569.20 ± 2123.68	61.70 ± 34.64	10.90 ± 6.29	130.70 ± 49.12
Macoma mitchelli				3.63 ± 3.63	
Mytilopsis leucophaeta		341.30 ± 112.56	32.68 ± 27.41	14.52 ± 14.52	29.05 ± 9.61
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		871.40 ± 243.65	10122.90 ± 1336.54	9204.30 ± 2274.05	3249.70 ± 1575.30
Texadina sphinctostoma		10678.50 ± 3127.25	11201.30 ± 2153.55	9080.90 ± 1686.51	239.60 ± 72.53
POLYCHAETES					
Hypaniola florida		177.91 ± 28.36	123.45 ± 31.65	127.08 ± 84.45	90.77 ± 46.36
Laeonereis culveri					3.63 ± 3.63
Nereis succinea					
Parandalia americana		29.05 ± 7.26			
Mediomastus californiensis		65.36 ± 33.28	101.66 ± 26.18		7.26 ± 7.26
Streblospio benedicti					
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		7.26 ± 7.26	43.57 ± 12.58	7.26 ± 7.26	36.31 ± 19.21
TURBELLARIANS		7.26 ± 7.26			
NEMERTEANS		58.09 ± 36.31	21.79 ± 12.58	14.52 ± 7.26	
CRUSTACEANS					
Edotea montosa					
Cyathura polita					7.26 ± 7.26
Cassidinidea lunifrons					
Monoculodes edwardsi					14.52 ± 14.52
Corophium lacustre		7.26 ± 7.26			3.63 ± 3.63
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra			7.26 ± 7.26		25.42 ± 13.09
Ostracods					
Rhithropanopeus harrisii			14.52 ± 14.52		
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		145.24 ± 25.42	196.07 ± 76.51	236.01 ± 47.20	806.06 ± 119.98
OTHER					
TOTAL, N/m^2		23056.20 ± 4897.70	24243.50 ± 1993.70	22217.50 ± 4149.40	6709.90 ± 1729.30
BIOMASS, mg/m^2		9883.40	7426.40	7151.50	4089.20
DIVERSITY, H′		1.258 ± 0.074	1.067 ± 0.070	1.130 ± 0.067	1.282 ± 0.106
SPECIES NUMBER		11.000 ± 0.577	10.000 ± 0.000	7.333 ± 0.882	9.667 ± 1.202
EVENNESS, J′		0.526 ± 0.037	0.464 ± 0.030	0.572 ± 0.017	0.567 ± 0.019

Table A1. (Continued)

	mm	Jun 79 - Sta 8	Jun 79 - Sta 9	Jun 79 - Sta 10	Jul 79 - Sta 1
BIVALVES					
Clams	0.5- 2	1263.55 ± 607.27	661.19 ± 243.56	413.92 ± 197.70	
Rangia cuneata	2 - 10	5323.26 ± 1430.97	2033.67 ± 451.83	5994.25 ± 1153.54	14.16 ± 9.59
	10 - 20	7.62 ± 7.30			
	20 - 30				
	>30				
Mulinia pontchartrainensis		773.40 ± 288.81	1452.40 ± 460.87	10823.70 ± 2427.23	21.80 ± 10.89
Macoma mitchelli				25.42 ± 15.83	
Mytilopsis leucophaeta		174.28 ± 97.63		134.34 ± 58.43	3.63 ± 3.63
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		8677.90 ± 547.98	127.10 ± 58.43	806.10 ± 78.80	3.60 ± 3.63
Texadina sphinctostoma		15202.60 ± 683.16	1757.40 ± 523.62	8263.90 ± 2884.13	13968.10 ± 724.74
POLYCHAETES					
Hypaniola florida		108.93 ± 33.28	29.05 ± 19.21	36.31 ± 14.52	7.26 ± 3.63
Laeonereis culveri					
Nereis succinea					
Parandalia americana			25.42 ± 9.61		3.63 ± 3.63
Mediomastus californiensis			83.51 ± 23.81	79.88 ± 29.05	210.59 ± 75.55
Streblospio benedicti			7.26 ± 3.63	39.94 ± 23.81	
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		18.15 ± 18.15	7.26 ± 7.26	36.31 ± 7.26	
TURBELLARIANS					
NEMERTEANS		7.26 ± 7.26	10.89 ± 6.29	10.89 ± 10.89	
CRUSTACEANS					
Edotea montosa		134.34 ± 118.05	7.26 ± 7.26	7.26 ± 7.26	
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi		32.68 ± 22.68	32.68 ± 16.64	61.73 ± 15.83	
Corophium lacustre		348.57 ± 348.57			
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		25.42 ± 15.83	152.50 ± 66.56	1147.36 ± 523.24	
Ostracods					
Rhithropanopeus harrisii		7.26 ± 7.26			
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		363.09 ± 128.32	301.36 ± 167.61	1009.39 ± 275.01	167.02 ± 35.76
OTHER					
TOTAL, N/m^2		32467.50 ± 1673.10	6668.10 ± 1675.20	28891.10 ± 7098.40	14400.10 ± 759.70
BIOMASS, mg/m^2		11141.60	3269.00	14358.30	3179.00
DIVERSITY, H′		1.266 ± 0.093	1.490 ± 0.057	1.487 ± 0.016	0.165 ± 0.060
SPECIES NUMBER		10.667 ± 0.333	11.667 ± 0.667	13.333 ± 0.667	6.333 ± 0.882
EVENNESS, J′		0.536 ± 0.047	0.609 ± 0.036	0.575 ± 0.018	0.093 ± 0.016

Table Al. (Continued)

	mm	Jul 79 - Sta 2	Jul 79 - Sta 3	Jul 79 - Sta 4	Jul 79 - Sta 5
BIVALVES					
Clams	0.5- 2	3.27 ± 3.59	628.51 ± 82.13	25.05 ± 13.07	
<u>Rangia cuneata</u>	2 - 10	3035.80 ± 351.51	7.62 ± 7.30	1786.40 ± 869.02	2007.52 ± 161.87
	10 - 20	57.73 ± 58.06		563.15 ± 541.04	
	20 - 30				
	>30				
<u>Mulinia pontchartrainensis</u>		6470.30 ± 1564.70	1721.00 ± 272.61	5319.30 ± 1278.96	101.70 ± 26.18
<u>Macoma mitchelli</u>		7.26 ± 3.63			
<u>Mytilopsis leucophaeta</u>		68.99 ± 19.21		217.85 ± 113.72	
<u>Ischadium recurvum</u>					
GASTROPODS					
<u>Probythinella louisianae</u>		105.30 ± 15.83	1764.60 ± 249.11	748.00 ± 71.52	10221.00 ± 416.08
<u>Texadina sphinctostoma</u>		17225.00 ± 1404.08	9756.20 ± 2290.68	5115.90 ± 843.52	7842.70 ± 461.41
POLYCHAETES					
<u>Hypaniola florida</u>		10.89 ± 0.00	3.63 ± 3.63	519.22 ± 143.46	
<u>Laeonereis culveri</u>					
<u>Nereis succinea</u>					
<u>Parandalia americana</u>		25.42 ± 20.22		32.68 ± 16.64	
<u>Mediomastus californiensis</u>		119.82 ± 16.64	14.52 ± 7.26	76.25 ± 33.28	7.26 ± 3.63
<u>Streblospio benedicti</u>		98.03 ± 22.68			
<u>Capitella capitata</u>					
<u>Polydora cf. socialis</u>					
OLIGOCHAETES			18.15 ± 13.09		61.73 ± 23.81
TURBELLARIANS		3.63 ± 3.63			
NEMERTEANS		14.52 ± 9.61	10.89 ± 6.29	14.52 ± 9.61	10.89 ± 6.28
CRUSTACEANS					
<u>Edotea montosa</u>			36.31 ± 7.26		
<u>Cyathura polita</u>					
<u>Cassidinidea lunifrons</u>					
<u>Monoculodes edwardsi</u>			14.52 ± 3.63		
<u>Corophium lacustre</u>				21.79 ± 16.64	
<u>Grandidierella bonnieroides</u>					
<u>Gammarus tigrinus</u>					
<u>Gammarus mucronatus</u>					
<u>Melita nitida</u>					
<u>Cerapus benthophilus</u>					
<u>Gitanopsis sp.</u>					
<u>Hyalella azteca</u>					
<u>Mysidopsis almyra</u>		3.63 ± 3.63	141.61 ± 16.64	65.36 ± 28.82	29.05 ± 7.26
<u>Ostracods</u>					
<u>Rhithropanopeus harrisii</u>			7.26 ± 3.63	18.15 ± 18.15	
<u>Callianassa jamaicense</u>					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		468.39 ± 107.47	501.06 ± 44.02	232.38 ± 137.26	501.06 ± 72.53
OTHER					
TOTAL, N/m^2		27721.90 ± 3095.60	14625.30 ± 1736.70	14756.00 ± 1740.00	20783.30 ± 762.50
BIOMASS, mg/m^2		9474.00	4959.10	6788.40	7079.40
DIVERSITY, H´		1.038 ± 0.006	1.127 ± 0.149	1.469 ± 0.019	1.089 ± 0.013
SPECIES NUMBER		11.667 ± 0.333	11.000 ± 1.155	11.667 ± 0.667	8.333 ± 0.333
EVENNESS, J´		0.423 ± 0.005	0.475 ± 0.072	0.599 ± 0.010	0.514 ± 0.004

Table A1. (Continued)

	mm	Jul 79 - Sta 6			Jul 79 - Sta 7			Jul 79 - Sta 8			Jul 79 - Sta 9		
BIVALVES													
Clams	0.5- 2	21.79	±	12.64	3.27	±	3.59	46.84	±	7.30	10.89	±	6.32
Rangia cuneata	2 - 10	3180.67	±	380.48	1212.36	±	128.53	7981.08	±	271.45	490.17	±	65.68
	10 - 20				149.23	±	121.67	10.89	±	6.32			
	20 - 30												
	>30												
Mulinia pontchartrainensis		14.50	±	9.61	413.90	±	27.41	1964.30	±	675.94	290.50	±	22.09
Macoma mitchelli								3.63	±	3.63			
Mytilopsis leucophaeta		50.83	±	13.09	7.26	±	3.63	137.97	±	90.34			
Ischadium recurvum													
GASTROPODS													
Probythinella louisianae		4288.10	±	551.93	6099.90	±	615.45	4418.80	±	588.15	21.80	±	10.89
Texadina sphinctostoma		6154.40	±	2710.30	1753.70	±	127.19	7650.30	±	5476.66	1583.10	±	1052.19
POLYCHAETES													
Hypaniola florida		10.89	±	6.29	10.89	±	6.29	246.90	±	36.31	7.26	±	3.63
Laeonereis culveri													
Nereis succinea													
Parandalia americana													
Mediomastus californiensis											3.63	±	3.63
Streblospio benedicti													
Capitella capitata													
Polydora cf. socialis													
OLIGOCHAETES		18.15	±	7.26	54.46	±	18.87	7.26	±	7.26	3.63	±	3.63
TURBELLARIANS													
NEMERTEANS		7.26	±	7.26				7.26	±	7.26	3.63	±	3.63
CRUSTACEANS													
Edotea montosa													
Cyathura polita								36.31	±	3.63			
Cassidinidea lunifrons													
Monoculodes edwardsi								3.63	±	3.63			
Corophium lacustre					3.63	±	3.63	435.71	±	181.40	3.63	±	3.63
Grandidierella bonnieroides													
Gammarus tigrinus													
Gammarus mucronatus													
Melita nitida													
Cerapus benthophilus													
Gitanopsis sp.													
Hyalella azteca													
Mysidopsis almyra		90.77	±	38.43	98.03	±	12.58	141.61	±	89.16	14.52	±	9.61
Ostracods													
Rhithropanopeus harrisii		10.89	±	0.00	7.26	±	7.26	7.26	±	7.26	3.63	±	3.63
Callianassa jamaicense													
Cumaceans													
HYDROZOANS													
CHIRONOMIDS		1129.21	±	96.27	1397.90	±	56.37	294.10	±	70.87	163.39	±	54.83
OTHER													
TOTAL, N/m²		14977.50	±	3477.40	11212.20	±	493.00	23393.90	±	5905.10	2599.70	±	4003.20
BIOMASS, mg/m²		7018.20			6386.00			9315.40			1095.00		
DIVERSITY, H'		1.320	±	0.068	1.341	±	0.047	1.393	±	0.067	1.149	±	0.188
SPECIES NUMBER		9.667	±	0.333	9.000	±	1.000	11.667	±	0.333	8.000	±	1.000
EVENNESS, J'		0.583	±	0.034	0.614	±	0.009	0.567	±	0.026	0.570	±	0.117

Table A1. (Continued)

	mm	Jul 79 - Sta 10	Aug 79 - Sta 1	Aug 79 - Sta 2	Aug 79 - Sta 3
BIVALVES					
Clams	0.5- 2	87.14 ± 70.91		566.42 ± 74.18	486.90 ± 135.83
Rangia cuneata	2 - 10	3147.99 ± 1563.86	7.62 ± 7.30	2077.24 ± 47.60	1249.39 ± 146.83
	10 - 20			3.27 ± 3.59	
	20 - 30				
	>30				
Mulinia pontchartrainensis		8942.90 ± 4957.61		4803.70 ± 282.58	2425.40 ± 436.09
Macoma mitchelli				14.52 ± 3.63	
Mytilopsis leucophaeta		25.42 ± 7.26	7.26 ± 3.63	43.57 ± 16.64	377.61 ± 279.86
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		268.70 ± 170.19	1111.10 ± 1105.61	159.80 ± 3.63	4269.90 ± 682.19
Texadina sphinctostoma		7301.70 ± 2313.82	9440.30 ± 2760.98	15275.20 ± 1718.81	17831.30 ± 2965.32
POLYCHAETES					
Hypaniola florida		10.89 ± 6.29		137.97 ± 42.81	3.63 ± 3.63
Laeonereis culveri					
Nereis succinea					
Parandalia americana		3.63 ± 3.63	3.63 ± 3.63	7.26 ± 3.63	10.89 ± 10.89
Mediomastus californiensis		7.26 ± 3.63	127.08 ± 44.17	119.82 ± 61.94	3.63 ± 3.63
Streblospio benedicti			3.63 ± 3.63	90.77 ± 80.13	
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		3.63 ± 3.63			36.31 ± 31.02
TURBELLARIANS				14.52 ± 14.52	3.63 ± 3.63
NEMERTEANS		14.52 ± 9.61	3.63 ± 3.63	50.83 ± 23.81	3.63 ± 3.63
CRUSTACEANS					
Edotea montosa		3.63 ± 3.63		10.89 ± 10.89	50.83 ± 20.22
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi		36.31 ± 20.22			10.89 ± 6.29
Corophium lacustre					
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		210.59 ± 91.64		14.52 ± 7.26	47.20 ± 32.27
Ostracods					
Rhithropanopeus harrisii		10.89 ± 10.89			3.63 ± 3.63
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		101.67 ± 61.08	105.30 ± 14.52	381.24 ± 18.87	522.65 ± 66.56
OTHER					
TOTAL, N/m^2		20176.90 ± 7277.30	10809.20 ± 1933.20	23775.10 ± 1694.60	27337.00 ± 3583.20
BIOMASS, mg/m^2		7998.50	2534.50	8005.30	10083.50
DIVERSITY, H′		1.158 ± 0.062	0.556 ± 0.233	1.065 ± 0.041	1.127 ± 0.044
SPECIES NUMBER		11.333 ± 0.882	5.667 ± 1.202	12.667 ± 1.453	11.000 ± 2.082
EVENNESS, J′		0.478 ± 0.011	0.217 ± 0.147	0.424 ± 0.031	0.484 ± 0.049

Table A1. (Continued)

	mm	Aug 79 - Sta 4	Aug 79 - Sta 5	Aug 79 - Sta 6	Aug 79 - Sta 7
BIVALVES					
Clams	0.5- 2	90.41 ± 58.38	32.68 ± 18.84		457.49 ± 35.07
Rangia cuneata	2 - 10	1027.18 ± 94.22	718.92 ± 141.61	1503.19 ± 390.50	3.27 ± 3.59
	10 - 20	7.62 ± 3.59			
	20 - 30				
	>30				
Mulinia pontchartrainensis		3242.40 ± 573.44	58.10 ± 13.09	90.80 ± 85.38	254.20 ± 15.83
Macoma mitchelli					
Mytilopsis leucophaeta		188.81 ± 114.65	101.67 ± 47.62	141.61 ± 38.25	7.26 ± 3.63
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		798.80 ± 113.26	7352.60 ± 561.93	7799.20 ± 1016.61	4792.80 ± 845.17
Texadina sphinctostoma		9182.50 ± 1027.15	6564.70 ± 507.82	8667.00 ± 1163.74	1481.40 ± 451.27
POLYCHAETES					
Hypaniola florida		795.17 ± 161.20		90.77 ± 3.63	10.89 ± 6.29
Laeonereis culveri					
Nereis succinea					
Parandalia americana		21.79 ± 12.58			
Mediomastus californiensis		10.89 ± 10.89	3.63 ± 3.63		
Streblospio benedicti		14.52 ± 3.63	3.63 ± 3.63		
Capitella capitata					
Polydora cf. *socialis*					
OLIGOCHAETES			7.26 ± 3.63	21.79 ± 12.58	32.68 ± 27.41
TURBELLARIANS		3.63 ± 3.63			
NEMERTEANS		25.42 ± 9.61			
CRUSTACEANS					
Edotea montosa					
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi				14.52 ± 9.61	3.63 ± 3.63
Corophium lacustre					
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		250.53 ± 129.95	32.68 ± 27.41	47.20 ± 9.61	25.42 ± 7.26
Ostracods					3.63 ± 3.63
Rhithropanopeus harrisii				29.05 ± 7.26	10.89 ± 6.29
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		250.53 ± 81.76	341.30 ± 29.72	1092.90 ± 71.52	856.89 ± 138.40
OTHER					
TOTAL, N/m^2		15910.60 ± 454.30	15217.10 ± 1290.20	19497.90 ± 1808.90	7940.80 ± 1089.60
BIOMASS, mg/m^2		6156.50	5395.40	8252.00	4155.70
DIVERSITY, H′		1.316 ± 0.067	1.015 ± 0.032	1.204 ± 0.079	1.182 ± 0.056
SPECIES NUMBER		11.333 ± 0.882	8.000 ± 0.577	10.000 ± 0.000	9.333 ± 0.882
EVENNESS, J′		0.546 ± 0.040	0.490 ± 0.014	0.523 ± 0.034	0.535 ± 0.047

Table A1. (Continued)

	mm	Aug 79 - Sta 8	Aug 79 - Sta 9	Aug 79 - Sta 10	Aug 79 - Sta 11
BIVALVES					
Clams	0.5- 2	14.16 ± 14.49	519.58 ± 52.39	392.14 ± 312.40	116.55 ± 3.59
Rangia cuneata	2 - 10	5645.69 ± 609.99	980.34 ± 142.91	1481.41 ± 196.07	1358.32 ± 217.20
	10 - 20	3.27 ± 3.59			3.27 ± 3.59
	20 - 30				
	>30				
Mulinia pontchartrainensis		2113.20 ± 188.98	1434.20 ± 432.72	9749.00 ± 668.13	1663.00 ± 96.68
Macoma mitchelli				3.63 ± 3.63	
Mytilopsis leucophaeta		203.33 ± 104.73	90.77 ± 18.15	108.93 ± 44.02	127.08 ± 31.65
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		5914.70 ± 961.54	21.80 ± 12.58	555.50 ± 161.20	853.30 ± 52.74
Texadina sphinctostoma		9781.60 ± 1848.94	4135.60 ± 975.37	11183.20 ± 1621.20	7919.00 ± 1678.05
POLYCHAETES					
Hypaniola florida		130.71 ± 51.48	79.88 ± 20.22	206.96 ± 101.21	266.84 ± 44.17
Laeonereis culveri			3.63 ± 3.63		
Nereis succinea					
Parandalia americana				10.89 ± 10.89	
Mediomastus californiensis			14.52 ± 9.61	3.63 ± 3.63	
Streblospio benedicti			54.46 ± 35.02	61.73 ± 3.63	
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		29.05 ± 13.09	3.63 ± 3.63	10.89 ± 10.89	10.89 ± 6.29
TURBELLARIANS					
NEMERTEANS		10.89 ± 6.29			7.26 ± 7.26
CRUSTACEANS					
Edotea montosa		3.63 ± 3.63		32.68 ± 10.89	
Cyathura polita		10.89 ± 6.29			
Cassidinidea lunifrons					
Monoculodes edwardsi			47.20 ± 25.42	177.91 ± 20.22	21.79 ± 6.29
Corophium lacustre		65.36 ± 65.36			
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus				3.63 ± 3.63	
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		87.14 ± 28.82	79.88 ± 23.81	108.93 ± 28.82	50.83 ± 23.81
Ostracods					
Rhithropanopeus harrisii			3.63 ± 3.63		
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		196.07 ± 28.82	188.81 ± 52.37	1078.38 ± 152.63	548.27 ± 56.37
OTHER					
TOTAL, N/m^2		24210.80 ± 1712.30	7657.60 ± 1495.30	25169.40 ± 2534.60	12965.90 ± 2045.20
BIOMASS, mg/m^2		9189.90	3202.10	10959.40	5287.60
DIVERSITY, H'		1.390 ± 0.052	1.319 ± 0.147	1.280 ± 0.065	1.306 ± 0.070
SPECIES NUMBER		10.667 ± 0.667	10.667 ± 1.453	12.667 ± 0.667	10.000 ± 0.577
EVENNESS, J'		0.589 ± 0.024	0.559 ± 0.032	0.504 ± 0.021	0.568 ± 0.030

Table A1. (Continued)

	mm	Aug 79 - Sta 12	Aug 79 - Sta 13	Dec 79 - Sta 1	Dec 79 - Sta 2
BIVALVES					
Clams					
Rangia cuneata	0.5- 2	879.04 ± 463.92	849.63 ± 226.68	2421.45 ± 372.86	1499.92 ± 119.71
	2 - 10	210.23 ± 141.50	2120.81 ± 162.85	1005.40 ± 88.12	1963.95 ± 26.14
	10 - 20			3.27 ± 3.59	261.42 ± 92.70
	20 - 30				
	>30				
Mulinia pontchartrainensis		4640.30 ± 1095.30	17493.70 ± 404.79	1808.20 ± 279.91	2367.30 ± 283.02
Macoma mitchelli		3.63 ± 3.63	7.26 ± 3.63		
Mytilopsis leucophaeta		344.94 ± 105.48	39.94 ± 3.63	39.94 ± 9.61	261.43 ± 87.37
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		377.60 ± 171.12	15863.40 ± 1454.69	25.40 ± 25.42	167.00 ± 41.87
Texadina sphinctostoma		16342.70 ± 5675.54	21520.30 ± 8473.69	16890.90 ± 1020.59	18339.70 ± 1317.71
POLYCHAETES					
Hypaniola florida		217.85 ± 93.91	410.29 ± 7.26	123.45 ± 19.21	1212.72 ± 131.07
Laeonereis culveri					
Nereis succinea					
Parandalia americana		7.26 ± 7.26	47.20 ± 13.09	10.89 ± 6.29	
Mediomastus californiensis		7.26 ± 3.63		43.57 ± 16.64	32.68 ± 6.29
Streblospio benedicti		337.67 ± 158.23	43.57 ± 18.87	3.63 ± 3.63	
Capitella capitata				3.63 ± 3.63	
Polydora cf. socialis				7.26 ± 3.63	7.26 ± 3.63
OLIGOCHAETES		3.63 ± 3.63			
TURBELLARIANS					
NEMERTEANS		7.26 ± 7.26	7.26 ± 7.26	21.79 ± 10.89	21.79 ± 6.29
CRUSTACEANS					
Edotea montosa		7.26 ± 3.63	50.83 ± 25.42		123.45 ± 7.26
Cyathura polita			32.68 ± 21.79		
Cassidinidea lunifrons					
Monoculodes edwardsi			50.83 ± 13.09	65.36 ± 27.41	101.67 ± 26.18
Corophium lacustre				3.63 ± 3.63	7.26 ± 3.63
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus			18.15 ± 9.61	3.63 ± 3.63	3.63 ± 3.63
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra			18.15 ± 9.61	3.63 ± 3.63	3.63 ± 3.63
Ostracods					127.08 ± 41.87
Rhithropanopeus harrisii			21.79 ± 6.29		
Callianassa jamaicense			14.52 ± 9.61		36.31 ± 36.31
Cumaceans					
HYDROZOANS				3.63 ± 3.63	18.15 ± 9.61
CHIRONOMIDS		631.78 ± 305.45	79.86 ± 32.27	243.27 ± 22.09	784.27 ± 61.94
OTHER					
TOTAL, N/m^2		24018.40 ± 7960.70	56689.90 ± 7758.20	22733.10 ± 469.40	27340.70 ± 1804.20
BIOMASS, mg/m^2		9295.50	19784.50	6706.90	9925.50
DIVERSITY, H′		1.013 ± 0.078	1.295 ± 0.053	0.845 ± 0.051	1.168 ± 0.021
SPECIES NUMBER		10.667 ± 1.667	16.000 ± 0.577	12.333 ± 1.202	15.000 ± 1.732
EVENNESS, J′		0.434 ± 0.036	0.468 ± 0.021	0.340 ± 0.032	0.435 ± 0.012

Table A1. (Continued)

		Dec 79 - Sta 3			Dec 79 - Sta 4			Dec 79 - Sta 5			Dec 79 - Sta 6		
BIVALVES	mm												
Clams	0.5- 2	471.65	±	20.26	345.30	±	97.93	138.34	±	15.79	729.81	±	103.92
Rangia cuneata	2 - 10	620.88	±	113.72	272.32	±	37.69	152.50	±	27.45	210.23	±	36.27
	10 - 20				7.62	±	7.30	3.27	±	3.59	46.84	±	19.17
	20 - 30												
	>30												
Mulinia pontchartrainensis		337.70	±	175.30	439.30	±	32.27	14.50	±	7.26			
Macoma mitchelli		3.63	±	3.63									
Mytilopsis leucophaeta		217.85	±	16.64	225.12	±	9.61	145.24	±	42.81	210.59	±	14.52
Ischadium recurvum													
GASTROPODS													
Probythinella louisianae		5239.40	±	420.18	984.00	±	494.24	16604.10	±	3604.88	49035.30	±	2930.64
Texadina sphinctostoma		12432.20	±	581.08	12475.80	±	1632.52	7733.80	±	1396.31	6023.70	±	960.62
POLYCHAETES													
Hypaniola florida		236.01	±	34.64	475.65	±	45.50	635.41	±	59.77	2890.20	±	113.43
Laeonereis culveri													
Nereis succinea													
Parandalia americana													
Mediomastus californiensis		18.15	±	7.26	65.36	±	10.89	29.05	±	29.05			
Streblospio benedicti		90.77	±	23.81	68.99	±	48.85				10.89	±	10.89
Capitella capitata													
Polydora cf. socialis													
OLIGOCHAETES		58.09	±	31.02	3.63	±	3.63	90.77	±	3.63	39.94	±	3.63
TURBELLARIANS		10.89	±	10.89				18.15	±	9.61			
NEMERTEANS					7.26	±	3.63						
CRUSTACEANS													
Edotea montosa		75.62	±	23.81	25.42	±	15.83						
Cyathura polita													
Cassidinidea lunifrons													
Monoculodes edwardsi		555.53	±	32.68	112.56	±	101.86	14.52	±	3.63	330.41	±	26.18
Corophium lacustre											50.83	±	9.61
Grandidierella bonnieroides													
Gammarus tigrinus													
Gammarus mucronatus													
Melita nitida													
Cerapus benthophilus								3.63	±	3.63			
Gitanopsis sp.													
Hyalella azteca													
Mysidopsis almyra		14.52	±	14.52	10.89	±	6.29	3.63	±	3.63	21.79	±	10.89
Ostracods					87.14	±	45.35	68.99	±	23.81	32.68	±	6.29
Rhithropanopeus harrisii													
Callianassa jamaicense													
Cumaceans													
HYDROZOANS					3.63	±	3.63	10.89	±	10.89			
CHIRONOMIDS		461.12	±	31.65	432.08	±	162.34	446.60	±	57.64	1198.20	±	83.19
OTHER													
TOTAL, N/m^2		20841.40	±	1265.00	16041.30	±	2116.50	26113.40	±	3710.70	60832.10	±	2042.80
BIOMASS, mg/m^2		7038.80			5500.10			8891.80			21582.00		
DIVERSITY, H'		1.220	±	0.047	0.957	±	0.047	0.938	±	0.073	0.757	±	0.047
SPECIES NUMBER		13.000	±	0.577	13.000	±	0.577	11.667	±	0.882	11.333	±	0.333
EVENNESS, J'		0.476	±	0.010	0.373	±	0.013	0.383	±	0.028	0.312	±	0.021

Table A1. (Continued)

	mm	Dec 79 - Sta 7			Dec 79 - Sta 8			Dec 79 - Sta 9			Dec 79 - Sta 10		
BIVALVES													
Clams	0.5- 2	337.67	±	125.81	443.33	±	117.75	776.65	±	67.86	1314.75	±	188.86
Rangia cuneata	2 - 10	123.10	±	18.19	526.12	±	81.80	969.45	±	137.90	617.61	±	108.27
	10 - 20				7.62	±	7.30	3.27	±	3.59			
	20 - 30												
	>30												
Mulinia pontchartrainensis		61.70	±	13.09	156.10	±	54.22	1136.50	±	328.07	755.20	±	193.87
Macoma mitchelli											3.63	±	3.63
Mytilopsis leucophaeta		43.57	±	10.89	377.61	±	50.83	188.81	±	48.03	210.59	±	107.16
Ischadium recurvum													
GASTROPODS													
Probythinella louisianae		28342.80	±	9752.11	19040.40	±	2189.41	188.80	±	77.62	4752.80	±	869.42
Texadina sphinctostoma		337.70	±	127.65	16629.50	±	4816.54	16625.90	±	199.10	11531.70	±	7687.98
POLYCHAETES													
Hypaniola florida		983.97	±	166.67	1092.90	±	142.90	744.33	±	255.02	1800.93	±	160.62
Laeonereis culveri													
Nereis succinea													
Parandalia americana					3.63	±	3.63				7.26	±	7.26
Mediomastus californiensis					3.63	±	3.63				32.68	±	12.58
Streblospio benedicti					21.79	±	16.64	3.63	±	3.63	7.26	±	7.26
Capitella capitata													
Polydora cf. socialis													
OLIGOCHAETES		25.42	±	25.41	25.42	±	13.09	3.63	±	3.63	7.26	±	7.26
TURBELLARIANS					7.26	±	3.63				3.63	±	3.63
NEMERTEANS					3.63	±	3.63	3.63	±	3.63	3.63	±	3.63
CRUSTACEANS													
Edotea montosa					14.52	±	9.61	21.79	±	12.58	18.15	±	9.61
Cyathura polita													
Cassidinidea lunifrons													
Monoculodes edwardsi		25.42	±	7.26	275.95	±	138.40	50.83	±	28.36	305.00	±	120.48
Corophium lacustre					18.15	±	9.61				10.89	±	10.89
Grandidierella bonnieroides													
Gammarus tigrinus													
Gammarus mucronatus													
Melita nitida													
Cerapus benthophilus					3.63	±	3.63				14.52	±	14.52
Gitanopsis sp.													
Hyalella azteca													
Mysidopsis almyra		18.15	±	3.63	25.42	±	25.41				7.26	±	3.63
Ostracods		392.14	±	158.23							3.63	±	3.63
Rhithropanopeus harrisii											3.63	±	3.63
Callianassa jamaicense													
Cumaceans													
HYDROZOANS													
CHIRONOMIDS		352.20	±	47.62	559.16	±	193.36	1463.25	±	156.89	896.83	±	104.54
OTHER													
TOTAL, N/m^2		31044.20	±	10016.70	39235.50	±	7299.50	22181.20	±	705.20	22308.20	±	8891.80
BIOMASS, mg/m^2		10748.90			13344.60			8916.30			8273.30		
DIVERSITY, H′		0.489	±	0.083	1.071	±	0.035	0.949	±	0.091	1.546	±	0.201
SPECIES NUMBER		10.333	±	0.333	13.000	±	1.000	9.333	±	0.882	13.667	±	1.202
EVENNESS, J′		0.209	±	0.035	0.420	±	0.021	0.425	±	0.027	0.591	±	0.068

Table A1. (Continued)

		Dec 79 - Sta 11	Dec 79 - Sta 12	Dec 79 - Sta 13	Feb 80 - Sta 1
BIVALVES	mm				
Clams	0.5- 2	471.65 ± 82.13	1238.50 ± 399.44	83.87 ± 26.14	1020.65 ± 556.94
Rangia cuneata	2 - 10	403.03 ± 56.64	7.26 ± 6.32	1086.00 ± 78.65	624.15 ± 187.03
	10 - 20	18.52 ± 13.07		7.62 ± 3.59	
	20 - 30				
	>30				
Mulinia pontchartrainensis		167.00 ± 31.65	388.50 ± 140.25	12414.00 ± 1196.88	820.60 ± 338.45
Macoma mitchelli				68.99 ± 36.85	3.63 ± 3.63
Mytilopsis leucophaeta		50.83 ± 15.83	14.52 ± 9.61	87.14 ± 22.68	7.26 ± 7.26
Ischadium recurvum				3.63 ± 3.63	
GASTROPODS					
Probythinella louisianae		2341.90 ± 236.73	47.20 ± 20.22	11963.80 ± 4354.38	
Texadina sphinctostoma		10762.00 ± 179.76	13637.70 ± 1084.03	7439.70 ± 2738.87	13227.40 ± 2161.27
POLYCHAETES					
Hypaniola florida		1452.36 ± 13.09	29.05 ± 7.26	907.72 ± 327.04	3.63 ± 3.63
Laeonereis culveri					
Nereis succinea				7.26 ± 7.26	
Parandalia americana			10.89 ± 6.29	127.08 ± 38.43	3.63 ± 3.63
Mediomastus californiensis		54.46 ± 38.25	3.63 ± 3.63	29.05 ± 14.52	61.73 ± 61.73
Streblospio benedicti		217.85 ± 27.41	14.52 ± 14.52	10.89 ± 6.29	
Capitella capitata					
Polydora cf. socialis				10.89 ± 6.29	
OLIGOCHAETES		145.24 ± 20.22		7.26 ± 7.26	
TURBELLARIANS		7.26 ± 7.26			
NEMERTEANS			21.79 ± 6.29	25.42 ± 9.61	21.78 ± 6.29
CRUSTACEANS					
Edotea montosa		58.09 ± 26.18	3.63 ± 3.63	14.52 ± 9.61	3.63 ± 3.63
Cyathura polita				141.61 ± 54.83	
Cassidinidea lunifrons					
Monoculodes edwardsi		671.72 ± 195.80	14.52 ± 3.63	188.81 ± 97.70	18.15 ± 9.61
Corophium lacustre				76.25 ± 27.41	
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida				7.26 ± 7.26	
Cerapus benthophilus			3.63 ± 3.63	8427.32 ± 5106.61	
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		21.79 ± 16.64		3.63 ± 3.63	3.63 ± 3.63
Ostracods		148.87 ± 23.81			
Rhithropanopeus harrisii				21.79 ± 12.58	
Callianassa jamaicense				21.79 ± 6.29	
Cumaceans					
HYDROZOANS		47.20 ± 23.81	7.26 ± 3.63	14.52 ± 14.52	
CHIRONOMIDS		718.92 ± 43.57	108.93 ± 22.68	217.85 ± 61.94	283.21 ± 55.90
OTHER					
TOTAL, N/m^2		17758.70 ± 122.60	15620.10 ± 686.00	43421.90 ± 12066.30	16103.00 ± 3099.30
BIOMASS, mg/m^2		5379.40	3972.60	14042.10	4576.00
DIVERSITY, H´		1.427 ± 0.024	0.513 ± 0.109	1.565 ± 0.048	0.612 ± 0.105
SPECIES NUMBER		14.667 ± 0.667	11.333 ± 0.333	20.333 ± 1.202	8.000 ± 1.155
EVENNESS, J´		0.532 ± 0.001	0.212 ± 0.047	0.520 ± 0.009	0.293 ± 0.032

Table A1. (Continued)

	mm	Feb 80 - Sta 2	Feb 80 - Sta 3	Feb 80 - Sta 4	Feb 80 - Sta 5
BIVALVES					
Clams	0.5- 2	842.01 ± 160.67	922.61 ± 146.51	1484.68 ± 210.56	2414.91 ± 412.40
Rangia cuneata	2 - 10	708.02 ± 114.37	462.55 ± 85.40	294.10 ± 66.55	141.61 ± 6.32
	10 - 20	101.30 ± 15.79	3.27 ± 3.59	14.16 ± 7.30	7.62 ± 3.59
	20 - 30				
	>30				
Mulinia pontchartrainensis		410.30 ± 59.77	108.90 ± 35.02	105.30 ± 18.15	
Macoma mitchelli			3.63 ± 3.63		
Mytilopsis leucophaeta		32.68 ± 18.87	90.77 ± 7.26	145.24 ± 71.52	108.93 ± 38.25
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		515.60 ± 106.97	12272.40 ± 4044.65	9008.30 ± 295.18	24370.60 ± 284.07
Texadina sphinctostoma		12780.80 ± 982.77	12996.60 ± 2964.52	9890.60 ± 397.60	9549.30 ± 1114.85
POLYCHAETES					
Hypaniola florida		177.91 ± 31.65	635.41 ± 149.66	838.74 ± 85.08	1085.64 ± 102.25
Laeonereis culveri					
Nereis succinea					
Parandalia americana		7.26 ± 7.26	7.26 ± 3.63		
Mediomastus californiensis		72.62 ± 36.85	7.26 ± 3.63	18.15 ± 3.63	
Streblospio benedicti			130.71 ± 57.64	76.25 ± 37.73	7.[illegible] ± 7.26
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES			76.25 ± 10.89		79.86 ± 32.27
TURBELLARIANS			14.52 ± 9.61	3.63 ± 3.63	7.26 ± 3.63
NEMERTEANS		14.52 ± 7.26	3.63 ± 3.63	14.52 ± 7.26	7.26 ± 3.63
CRUSTACEANS					
Edotea montosa		39.94 ± 29.72	79.88 ± 36.31	148.87 ± 19.21	
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi		47.20 ± 19.21	7.26 ± 3.63		7.26 ± 7.26
Corophium lacustre			7.26 ± 3.63		
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra			3.63 ± 3.63	3.63 ± 3.63	7.26 ± 3.63
Ostracods		3.63 ± 3.63		646.30 ± 127.08	406.66 ± 104.73
Rhithropanopeus harrisii					
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		809.69 ± 7.26	501.06 ± 49.92	729.81 ± 130.71	708.03 ± 12.58
OTHER					
TOTAL, N/m^2		16567.80 ± 1113.70	39359.00 ± 1117.90	23426.60 ± 291.10	38908.70 ± 1071.60
BIOMASS, mg/m^2		5705.30	11118.10	8434.20	13372.70
DIVERSITY, H´		0.899 ± 0.068	0.937 ± 0.077	1.368 ± 0.003	1.067 ± 0.020
SPECIES NUMBER		10.333 ± 0.882	14.333 ± 1.764	12.667 ± 0.333	10.667 ± 0.667
EVENNESS, J´		0.386 ± 0.023	0.358 ± 0.042	0.539 ± 0.007	0.452 ± 0.011

Table A1. (Continued)

	mm	Feb 80 - Sta 6	Feb 80 - Sta 7	Feb 80 - Sta 8	Feb 80 - Sta 9
BIVALVES					
Clams	0.5- 2	3101.15 ± 832.09	936.77 ± 136.16	2472.64 ± 167.74	574.05 ± 254.67
Rangia cuneata	2 - 10	206.96 ± 51.52	62.09 ± 13.07	413.92 ± 25.16	258.16 ± 80.17
	10 - 20	46.84 ± 26.14	7.62 ± 3.59		3.27 ± 3.59
	20 - 30	3.27 ± 3.59			
	>30	3.27 ± 3.59		3.27 ± 3.59	
Mulinia pontchartrainensis			18.15 ± 3.63	50.83 ± 19.21	29.05 ± 9.61
Macoma mitchelli		7.26 ± 7.26			10.89 ± 0.00
Mytilopsis leucophaeta		243.27 ± 132.86	18.15 ± 3.63	406.66 ± 254.47	21.79 ± 16.64
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		39083.00 ± 6064.65	38694.20 ± 1795.77	38912.40 ± 3478.75	479.30 ± 132.52
Texadina sphinctostoma		9353.20 ± 1517.05	1151.00 ± 220.86	23459.20 ± 4453.33	7000.40 ± 1276.58
POLYCHAETES					
Hypaniola florida		2189.43 ± 440.63	1056.59 ± 169.57	2251.16 ± 366.94	355.83 ± 135.81
Laeonereis culveri					
Nereis succinea					
Parandalia americana					3.63 ± 3.63
Mediomastus californiensis			7.26 ± 7.26		10.89 ± 10.89
Streblospio benedicti		10.89 ± 10.89		3.63 ± 3.63	14.52 ± 9.61
Capitella capitata					
Polydora cf. *socialis*					
OLIGOCHAETES		21.79 ± 16.64	32.68 ± 16.64	7.26 ± 7.26	29.05 ± 14.52
TURBELLARIANS		3.63 ± 3.63		3.63 ± 3.63	
NEMERTEANS		10.89 ± 6.29			14.52 ± 9.61
CRUSTACEANS					
Edotea montosa				18.15 ± 3.63	7.26 ± 3.63
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi		68.99 ± 25.42	148.87 ± 20.22	83.51 ± 23.81	43.57 ± 6.29
Corophium lacustre		29.05 ± 19.21		29.05 ± 13.09	
Grandidierella bonnieroides					
Gammarus tigrinus				3.63 ± 3.63	
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus		3.63 ± 3.63			
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		7.26 ± 7.26	3.63 ± 3.63	3.63 ± 3.63	
Ostracods		29.05 ± 15.83	145.24 ± 23.81		
Rhithropanopeus harrisii		7.26 ± 3.63			
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		994.87 ± 52.37	294.10 ± 37.73	751.60 ± 88.72	261.42 ± 59.99
OTHER					
TOTAL, N/m^2		[illegible] ± 8966.10	42775.60 ± 2116.30	68870.90 ± 6192.50	9117.20 ± 1538.40
BIOMASS, mg/m^2		19849.40	14279.10	22610.60	2748.30
DIVERSITY, H′		0.955 ± 0.041	0.447 ± 0.038	1.022 ± 0.007	0.902 ± 0.111
SPECIES NUMBER		11.667 ± 1.453	10.667 ± 0.333	11.667 ± 0.667	12.000 ± 1.528
EVENNESS, J′		0.393 ± 0.018	0.189 ± 0.014	0.417 ± 0.008	0.364 ± 0.034

Table A1. (Continued)

	mm	Feb 80 - Sta 10			Feb 80 - Sta 11			Feb 80 - Sta 12			Feb 80 - Sta 13		
BIVALVES													
Clams	0.5- 2	1234.14	±	571.65	1699.26	±	698.00	1481.41	±	491.70	443.33	±	48.91
Rangia cuneata	2 - 10	228.75	±	81.80	301.73	±	36.82	108.93	±	41.28	166.66	±	32.24
	10 - 20	7.62	±	7.30	35.95	±	7.30	7.62	±	3.59	14.16	±	9.59
	20 - 30												
	>30												
Mulinia pontchartrainensis		152.50	±	49.12	87.14	±	25.16	944.03	±	292.71	4854.51	±	172.50
Macoma mitchelli		3.63	±	3.63							21.79	±	6.29
Mytilopsis leucophaeta		47.20	±	26.18	130.71	±	98.24	25.42	±	13.09	87.14	±	25.16
Ischadium recurvum													
GASTROPODS													
Probythinella louisianae		8804.90	±	4396.67	2846.60	±	1162.55	341.30	±	47.20	49525.50	±	4496.47
Texadina sphinctostoma		12820.70	±	5285.12	6266.90	±	1212.67	17442.80	±	842.84	9719.90	±	448.34
POLYCHAETES													
Hypaniola florida		704.39	±	178.36	1557.66	±	216.31	65.36	±	22.68	762.49	±	154.43
Laeonereis culveri													
Nereis succinea													
Parandalia americana					3.63	±	3.63				61.73	±	7.26
Mediomastus californiensis		7.26	±	3.63				18.15	±	9.61	36.31	±	31.02
Streblospio benedicti					7.26	±	7.26	7.26	±	3.63	7.26	±	7.26
Capitella capitata													
Polydora cf. *socialis*													
OLIGOCHAETES		3.63	±	3.63	21.79	±	16.64				18.15	±	9.61
TURBELLARIANS		3.63	±	3.63	3.63	±	3.63	7.26	±	7.26	7.26	±	3.63
NEMERTEANS		7.26	±	7.26	3.63	±	3.63	32.68	±	6.29	10.89	±	0.00
CRUSTACEANS													
Edotea montosa		18.15	±	3.63	72.62	±	31.65	29.05	±	13.09	14.52	±	3.63
Cyathura polita											90.77	±	31.02
Cassidinidea lunifrons													
Monoculodes edwardsi		61.73	±	15.83				25.42	±	7.26	68.99	±	40.92
Corophium lacustre											36.31	±	9.61
Grandidierella bonnieroides													
Gammarus tigrinus											43.57	±	33.28
Gammarus mucronatus													
Melita nitida													
Cerapus benthophilus		7.26	±	3.63							5711.41	±	764.88
Gitanopsis sp.											10.89	±	10.89
Hyalella azteca													
Mysidopsis almyra					3.63	±	3.63	3.63	±	3.63			
Ostracods					188.81	±	62.04						
Rhithropanopeus harrisii		3.63	±	3.63	3.63	±	3.63				32.68	±	21.79
Callianassa jamaicense											29.05	±	7.26
Cumaceans													
HYDROZOANS								3.63	±	3.63	3.63	±	3.63
CHIRONOMIDS		1154.63	±	196.17	522.85	±	31.45	355.83	±	48.03	163.39	±	33.28
OTHER											3.63	±	3.63
TOTAL, N/m^2		25263.80	±	10651.70	13757.50	±	3126.70	20903.10	±	1017.40	71946.30	±	3763.00
BIOMASS, mg/m^2		9020.10			5124.30			5871.20			22396.80		
DIVERSITY, H′		1.216	±	[illegible]	1.502	±	0.039	0.670	±	0.105	1.072	±	0.068
SPECIES NUMBER		12.000	±	[illegible]	11.667	±	1.333	12.000	±	1.000	20.667	±	0.882
EVENNESS, J′		0.491	±	[illegible]	0.618	±	0.033	0.272	±	0.045	0.354	±	0.019

Table A1. (Continued)

	mm	May 80 - Sta 1	May 80 - Sta 2*	May 80 - Sta 3	May 80 - Sta 4
BIVALVES					
Clams	0.5- 2	1201.46 ± 56.38	1001.75 ± 195.52	624.15 ± 278.53	2737.34 ± 1147.65
Rangia cuneata	2 - 10	882.31 ± 93.02	583.21 ± 269.70	264.69 ± 20.26	606.72 ± 257.07
	10 - 20	3.27 ± 3.59	93.03 ± 51.52		29.41 ± 14.16
	20 - 30		14.16 ± 14.49		
	>30				
Mulinia pontchartrainensis		1376.11 ± 79.63	341.30 ± 109.89	167.02 ± 74.50	181.54 ± 54.95
Macoma mitchelli		3.63 ± 3.63			
Mytilopsis leucophaeta		7.26 ± 3.63	72.62 ± 14.52	10.89 ± 10.89	119.82 ± 49.92
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		25.40 ± 3.63	1477.80 ± 183.28	9454.90 ± 2081.88	3144.40 ± 1419.47
Texadina sphinctostoma		13543.30 ± 265.50	12196.20 ± 870.06	8906.60 ± 2406.53	6437.60 ± 2227.29
POLYCHAETES					
Hypaniola florida		3.63 ± 3.63	7.26 ± 3.63	14.52 ± 7.26	25.42 ± 9.61
Laeonereis culveri					
Nereis succinea					
Parandalia americana		10.89 ± 6.29	3.63 ± 3.63	3.63 ± 3.63	14.52 ± 14.52
Mediomastus californiensis		83.51 ± 9.61	18.15 ± 9.61		
Streblospio benedicti		3.63 ± 3.63		3.63 ± 3.63	
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES					10.89 ± 10.89
TURBELLARIANS					
NEMERTEANS		25.42 ± 7.26	7.26 ± 3.63	7.26 ± 3.63	3.63 ± 3.63
CRUSTACEANS					
Edotea montosa		3.63 ± 3.63	36.30 ± 20.22	7.26 ± 3.63	94.40 ± 29.72
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi			7.26 ± 3.63	3.63 ± 3.63	
Corophium lacustre					
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra					36.31 ± 19.21
Ostracods					
Rhithropanopeus harrisii			3.63 ± 3.63	3.63 ± 3.63	
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		90.77 ± 7.26	275.95 ± 32.27	156.13 ± 35.76	65.36 ± 33.29
OTHER					
TOTAL, N/m^2		17264.90 ± 408.49	16161.10 ± 787.15	19628.60 ± 4172.33	13506.90 ± 3358.24
BIOMASS, mg/m^2		4726.00	4897.80	5812.50	4820.30
DIVERSITY, H′		0.733 ± 0.014	0.871 ± 0.060	0.965 ± 0.093	1.174 ± 0.104
SPECIES NUMBER		9.667 ± 1.453	10.333 ± 1.453	8.667 ± 0.667	9.667 ± 0.333
EVENNESS, J′		0.329 ± 0.018	0.382 ± 0.049	0.446 ± 0.027	0.519 ± 0.053

Table A1. (Continued)

	mm	May 80 - Sta 5	May 80 - Sta 6	May 80 - Sta 7	May 80 - Sta 8
BIVALVES					
Clams	0.5- 2	2385.50 ± 82.46	879.04 ± 405.21	3325.54 ± 627.09	3354.95 ± 940.15
Rangia cuneata	2 - 10	72.98 ± 34.64	116.55 ± 44.22	177.55 ± 47.60	435.71 ± 248.46
	10 - 20	3.27 ± 3.59		25.05 ± 25.38	7.62 ± 7.30
	20 - 30				
	>30				
Mulinia pontchartrainensis			3.63 ± 3.63	14.52 ± 9.61	43.57 ± 0.00
Macoma mitchelli					
Mytilopsis leucophaeta			3.63 ± 3.63		32.68 ± 10.89
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		8009.80 ± 2007.59	9941.40 ± 2431.80	5747.70 ± 469.54	23437.50 ± 1005.84
Texadina sphinctostoma		12501.20 ± 6405.96	3184.30 ± 474.48	1924.40 ± 344.94	14222.20 ± 354.21
POLYCHAETES					
Hypaniola florida		76.25 ± 18.87	116.19 ± 62.05	326.78 ± 12.58	468.39 ± 133.11
Laeonereis culveri					
Nereis succinea					
Parandalia americana					
Mediomastus californiensis					
Streblospio benedicti				3.63 ± 3.63	
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		21.79 ± 6.29	3.63 ± 3.63	18.15 ± 9.61	
TURBELLARIANS					
NEMERTEANS		3.63 ± 3.63	3.36 ± 3.63	3.63 ± 3.63	7.26 ± 3.63
CRUSTACEANS					
Edotea montosa					
Cyathura polita					39.94 ± 13.09
Cassidinidea lunifrons					
Monoculodes edwardsi		3.63 ± 3.63			3.63 ± 3.63
Corophium lacustre					3.63 ± 3.63
Grandidierella bonnieroides					
Gammarus tigrinus		3.63 ± 3.63			
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					3.63 ± 3.63
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra				18.15 ± 3.63	
Ostracods		3.63 ± 3.63			
Rhithropanopeus harrisii					
Callianassa jamaicense		3.63 ± 3.63			
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		323.15 ± 98.70	450.23 ± 109.35	181.54 ± 85.85	137.97 ± 9.61
OTHER					
TOTAL, N/m^2		23412.00 ± 4295.21	14705.10 ± 3369.88	11767.70 ± 1465.60	42198.30 ± 1232.48
BIOMASS, mg/m^2		6991.50	5382.10	4372.90	12853.40
DIVERSITY, H'		0.956 ± 0.139	0.921 ± 0.033	1.191 ± 0.022	0.995 ± 0.045
SPECIES NUMBER		7.667 ± 0.667	6.333 ± 0.882	8.000 ± 1.000	9.667 ± 0.333
EVENNESS, J'		0.470 ± 0.065	0.512 ± 0.055	0.582 ± 0.030	0.440 ± 0.027

Table A1. (Continued)

	mm	May 80 - Sta 9	May 80 - Sta 10	May 80 - Sta 11	May 80 - Sta 12
BIVALVES					
Clams	0.5- 2	221.12 ± 63.29	3954.05 ± 806.82	1742.83 ± 501.06	1107.79 ± 100.65
<u>Rangia cuneata</u>	2 - 10	290.84 ± 26.14	312.62 ± 72.33	312.62 ± 104.57	54.46 ± 6.32
	10 - 20	3.27 ± 3.59		3.27 ± 3.59	
	20 - 30	3.27 ± 3.59			
	>30				
<u>Mulinia pontchartrainensis</u>		58.09 ± 7.26	617.25 ± 300.71	43.57 ± 18.87	689.87 ± 165.24
<u>Macoma mitchelli</u>		10.89 ± 0.00	3.63 ± 3.63		7.26 ± 7.26
<u>Mytilopsis leucophaeta</u>				39.94 ± 34.64	
<u>Ischadium recurvum</u>					
GASTROPODS					
<u>Probythinella louisianae</u>		675.30 ± 344.51	10235.50 ± 1271.24	3616.40 ± 389.15	3151.60 ± 702.71
<u>Texadina sphinctostoma</u>		3304.10 ± 849.20	9611.00 ± 1435.87	9952.30 ± 1604.97	5083.30 ± 2964.43
POLYCHAETES					
<u>Hypaniola florida</u>		290.47 ± 222.38	7.26 ± 3.63	43.57 ± 6.29	14.52 ± 7.26
<u>Laeonereis culveri</u>					
<u>Nereis succinea</u>					
<u>Parandalia americana</u>			3.63 ± 3.63		
<u>Mediocastus californiensis</u>		7.26 ± 7.26		3.63 ± 3.63	10.89 ± 6.29
<u>Streblospio benedicti</u>		14.52 ± 14.52			3.63 ± 3.63
<u>Capitella capitata</u>					
<u>Polydora cf. socialis</u>					
OLIGOCHAETES		18.15 ± 13.09	3.63 ± 3.63	36.31 ± 13.09	3.63 ± 3.63
TURBELLARIANS					
NEMERTEANS		7.26 ± 7.26			7.26 ± 3.63
CRUSTACEANS					
<u>Edotea montosa</u>		18.15 ± 7.26	43.57 ± 10.89	54.46 ± 28.82	3.63 ± 3.63
<u>Cyathura polita</u>					
<u>Cassidinidea lunifrons</u>					
<u>Monoculodes edwardsi</u>		39.94 ± 39.94	43.57 ± 12.58	14.52 ± 9.61	14.52 ± 3.63
<u>Corophium lacustre</u>					
<u>Grandidierella bonnieroides</u>					
<u>Gammarus tigrinus</u>					
<u>Gammarus mucronatus</u>					
<u>Melita nitida</u>					
<u>Cerapus benthophilus</u>			10.89 ± 10.89		
<u>Gitanopsis sp.</u>					
<u>Hyalella azteca</u>					
<u>Mysidopsis almyra</u>		3.63 ± 3.63	7.26 ± 3.63	21.79 ± 16.64	3.63 ± 3.63
<u>Ostracods</u>					
<u>Rhithropanopeus harrisii</u>				10.89 ± 10.89	
<u>Callianassa jamaicense</u>					
Cumaceans			3.63 ± 3.63		
HYDROZOANS					
CHIRONOMIDS		192.44 ± 120.37	504.70 ± 52.74	177.91 ± 38.43	108.93 ± 6.29
OTHER		3.63 ± 3.63			
TOTAL, N/m^2		5163.10 ± 1373.53	25358.20 ± 3726.30	16074.00 ± 2511.68	10264.60 ± 3601.02
BIOMASS, mg/m^2		1640.10	8667.50	4790.50	3206.10
DIVERSITY, H′		1.146 ± 0.149	1.222 ± 0.030	1.033 ± 0.064	1.235 ± 0.131
SPECIES NUMBER		10.333 ± 1.856	10.000 ± 1.528	10.667 ± 1.202	9.667 ± 0.333
EVENNESS, J′		0.494 ± 0.036	0.539 ± 0.021	0.439 ± 0.018	0.546 ± 0.063

Table A1. (Continued)

	mm	May 80 - Sta 13	Aug 80 - Sta 1	Aug 80 - Sta 2	Aug 80 - Sta 3
BIVALVES					
Clams	0.5- 2	584.94 ± 69.28			7.62 ± 3.59
Rangia cuneata	2 - 10	232.01 ± 18.19			123.09 ± 34.64
	10 - 20	14.16 ± 14.49			10.89 ± 0.00
	20 - 30				
	>30				
Mulinia pontchartrainensis		2160.39 ± 593.34			105.30 ± 18.15
Macoma mitchelli		3.63 ± 3.63			
Mytilopsis leucophaeta					192.44 ± 74.50
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		23782.40 ± 2403.12		79.90 ± 20.22	7181.90 ± 946.98
Texadina sphinctostoma		8688.70 ± 1436.66	1928.00 ± 425.23	5170.40 ± 546.82	11753.20 ± 707.38
POLYCHAETES					
Hypaniola florida		137.97 ± 40.43			7.26 ± 7.26
Laeonereis culveri					
Nereis succinea					
Parandalia americana		43.57 ± 6.29			
Mediomastus californiensis		18.15 ± 18.15			3.63 ± 3.63
Streblospio benedicti		7.26 ± 7.26			25.42 ± 13.09
Capitella capitata					
Polydora cf. socialis		7.26 ± 7.26			
OLIGOCHAETES		36.31 ± 18.15			50.83 ± 29.72
TURBELLARIANS					
NEMERTEANS		21.79 ± 10.89			3.63 ± 3.63
CRUSTACEANS					
Edotea montosa		32.68 ± 10.89			32.68 ± 6.29
Cyathura polita		246.90 ± 15.83			
Cassidinidea lunifrons					
Monoculodes edwardsi		210.59 ± 50.44			
Corophium lacustre		352.20 ± 151.76			
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida		14.52 ± 14.52			
Cerapus benthophilus		1601.23 ± 440.36			
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		68.99 ± 3.63			3.63 ± 3.63
Ostracods					
Rhithropanopeus harrisii		47.20 ± 9.61			
Callianassa jamaicense		18.15 ± 3.63			
Cumaceans		3.63 ± 3.63			
HYDROZOANS					
CHIRONOMIDS		148.87 ± 36.85	61.73 ± 14.52	185.18 ± 22.68	98.03 ± 38.25
OTHER					
TOTAL, N/m^2		38157.10 ± 4664.84	1989.70 ± 433.22	5435.50 ± 551.81	19603.20 ± 414.03
BIOMASS, mg/m^2		11842.50	515.80	1452.00	6045.40
DIVERSITY, H'		1.176 ± 0.032	0.139 ± 0.026	0.226 ± 0.029	0.838 ± 0.058
SPECIES NUMBER		18.667 ± 0.667	2.000 ± 0.000	3.000 ± 0.000	10.333 ± 0.667
EVENNESS, J'		0.402 ± 0.008	0.201 ± 0.038	0.205 ± 0.026	0.360 ± 0.027

Table A1. (Continued)

	mm	Aug 80 - Sta 4	Aug 80 - Sta 5	Aug 80 - Sta 6	Aug 80 - Sta 7
BIVALVES					
Clams	0.5- 2	1143.73 ± 789.72	351.63 ± 164.15	226.75 ± 35.07	7.62 ± 7.30
Rangia cuneata	2 - 10	558.80 ± 330.92	247.26 ± 74.51	330.05 ± 51.20	68.62 ± 31.70
	10 - 20	7.27 ± 3.59	3.27 ± 3.59	7.62 ± 7.30	
	20 - 30				
	>30		3.27 ± 3.59		
Mulinia pontchartrainensis		192.44 ± 187.02			
Macoma mitchelli					
Mytilopsis leucophaeta		472.02 ± 392.46	21.79 ± 16.64	156.13 ± 77.62	
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		1724.70 ± 534.27	3445.70 ± 365.10	2396.40 ± 387.27	2320.10 ± 1132.21
Texadina sphinctostoma		14443.70 ± 6277.80	1074.70 ± 708.57	10496.90 ± 1044.36	265.10 ± 106.04
POLYCHAETES					
Hypaniola florida		508.33 ± 310.42	87.14 ± 35.02	2458.12 ± 126.46	
Laeonereis culveri					
Nereis succinea					
Parandalia americana		10.89 ± 0.00			
Mediomastus californiensis		21.79 ± 16.64		3.63 ± 3.63	
Streblospio benedicti		163.39 ± 66.56	25.42 ± 20.22		
Capitella capitata					
Polydora cf. *socialis*					
OLIGOCHAETES		21.79 ± 12.58	54.46 ± 31.44	43.57 ± 10.89	68.99 ± 38.42
TURBELLARIANS			3.63 ± 3.63		
NEMERTEANS		10.89 ± 0.00	3.63 ± 3.63		
CRUSTACEANS					
Edotea montosa		29.05 ± 29.05			
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi			10.89 ± 0.00	3.63 ± 3.63	
Corophium lacustre					
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		130.71 ± 125.31	123.45 ± 68.99	21.79 ± 6.29	10.89 ± 10.89
Ostracods				10.89 ± 6.29	10.89 ± 10.89
Rhithropanopeus harrisii		7.26 ± 7.26	3.63 ± 3.63		
Callianassa jamaicense					
Cumaceans					
HYDROZOANS				7.26 ± 7.26	
CHIRONOMIDS		225.12 ± 79.63	359.46 ± 172.92	1278.08 ± 58.09	14.52 ± 9.61
OTHER				3.63 ± 3.63	
TOTAL, N/m^2		19672.20 ± 7938.05	5820.30 ± 1096.98	17446.50 ± 1155.59	2766.70 ± 1249.50
BIOMASS, mg/m^2		7515.70	2695.60	6828.80	896.20
DIVERSITY, H′		0.997 ± 0.063	1.172 ± 0.069	1.227 ± 0.017	0.671 ± 0.090
SPECIES NUMBER		12.333 ± 0.333	10.000 ± 0.577	10.000 ± 1.000	5.333 ± 0.333
EVENNESS, J′		0.397 ± 0.027	0.509 ± 0.017	0.538 ± 0.034	0.401 ± 0.050

Table A1. (Continued)

	mm	Aug 80 - Sta 8	Aug 80 - Sta 9	Aug 80 - Sta 10	Aug 80 - Sta 11
BIVALVES					
Clams	0.5- 2	377.98 ± 31.04	457.49 ± 235.94	1125.22 ± 233.43	1963.95 ± 188.77
Rangia cuneata	2 - 10	410.65 ± 29.74	160.12 ± 40.96	476.01 ± 62.96	620.88 ± 104.68
	10 - 20				10.89 ± 0.00
	20 - 30				
	>30				
Mulinia pontchartrainensis			76.25 ± 60.65	4633.03 ± 298.73	87.14 ± 0.00
Macoma mitchelli			3.63 ± 3.63	14.52 ± 9.61	
Mytilopsis leucophaeta		838.74 ± 101.21	29.05 ± 3.63	90.77 ± 22.09	733.44 ± 182.52
Ischadium recurvum					
GASTROPODS					
Probythinella louisianae		7977.10 ± 210.97	1739.20 ± 568.11	1078.40 ± 152.63	2189.40 ± 362.14
Texadina sphinctostoma		7105.70 ± 379.44	8006.10 ± 1108.19	20155.10 ± 2073.95	17530.00 ± 3896.92
POLYCHAETES					
Hypaniola florida		1601.23 ± 347.26	94.40 ± 42.81	337.67 ± 245.59	1089.27 ± 38.25
Laeonereis culveri					
Nereis succinea				3.63 ± 3.63	
Parandalia americana			3.63 ± 3.63	21.79 ± 16.64	14.52 ± 14.52
Mediomastus californiensis		7.26 ± 3.63			32.68 ± 32.68
Streblospio benedicti			90.77 ± 15.83	21.79 ± 12.58	68.99 ± 63.62
Capitella capitata					
Polydora cf. socialis					
OLIGOCHAETES		10.89 ± 10.89			119.82 ± 28.82
TURBELLARIANS		21.79 ± 21.79			
NEMERTEANS		3.63 ± 3.63	10.89 ± 6.29	21.79 ± 10.89	43.57 ± 0.00
CRUSTACEANS					
Edotea montosa				29.05 ± 9.61	83.51 ± 34.64
Cyathura polita					
Cassidinidea lunifrons					
Monoculodes edwardsi				3.63 ± 3.63	3.63 ± 3.63
Corophium lacustre					
Grandidierella bonnieroides					
Gammarus tigrinus					
Gammarus mucronatus					
Melita nitida					
Cerapus benthophilus					
Gitanopsis sp.					
Hyalella azteca					
Mysidopsis almyra		87.14 ± 16.64	3.63 ± 3.63	79.88 ± 38.43	72.62 ± 13.09
Ostracods					3.63 ± 3.63
Rhithropanopeus harrisii		7.26 ± 7.26		3.63 ± 3.63	
Callianassa jamaicense					
Cumaceans					
HYDROZOANS					
CHIRONOMIDS		181.54 ± 44.17	39.94 ± 18.15	152.50 ± 66.56	308.63 ± 25.42
OTHER				7.26 ± 7.26	
TOTAL, N/m^2		18630.10 ± 219.87	10714.80 ± 1876.50	28255.70 ± 2238.63	24977.00 ± 4760.11
BIOMASS, mg/m^2		9321.40	2800.20	8389.50	10316.50
DIVERSITY, H′		1.296 ± 0.021	0.796 ± 0.151	0.961 ± 0.019	1.131 ± 0.066
SPECIES NUMBER		9.000 ± 0.000	9.333 ± 1.202	13.333 ± 1.453	13.000 ± 0.577
EVENNESS, J′		0.590 ± 0.010	0.353 ± 0.049	0.373 ± 0.008	0.442 ± 0.033

Table A1. (Continued)

		Aug 80 - Sta 12			Aug 80 - Sta 13		
BIVALVES	mm						
Clams	0.5- 2				377.98	±	107.18
Rangia cuneata	2 - 10				98.03	±	0.00
	10 - 20				14.16	±	9.59
	20 - 30				14.16	±	14.49
	>30						
Mulinia pontchartrainensis					5097.78	±	1067.10
Macoma mitchelli					148.87	±	32.27
Mytilopsis leucophaeta					47.20	±	3.63
Ischadium recurvum					3.63	±	3.63
GASTROPODS							
Probythinella louisianae		50.80	±	40.43	10496.90	±	1068.82
Texadina sphinctostoma		167.02	±	102.25	8481.78	±	973.81
POLYCHAETES							
Hypaniola florida					1532.24	±	275.73
Laeonereis culveri							
Nereis succinea					68.99	±	3.63
Parandalia americana					94.40	±	15.83
Mediomastus californiensis					18.15	±	3.63
Streblospio benedicti					373.98	±	47.20
Capitella capitata					10.89	±	10.89
Polydora cf. socialis					3.63	±	3.63
OLIGOCHAETES					7.26	±	7.26
TURBELLARIANS							
NEMERTEANS					72.62	±	23.81
CRUSTACEANS							
Edotea montosa					141.61	±	16.64
Cyathura polita					283.21	±	27.41
Cassidinidea lunifrons							
Monoculodes edwardsi					221.49	±	23.81
Corophium lacustre					18.15	±	9.61
Grandidierella bonnieroides							
Gammarus tigrinus							
Gammarus mucronatus							
Melita nitida							
Carapus benthophilus					965.82	±	100.88
Gitanopsis sp.							
Hyalella azteca							
Mysidopsis almyra					134.34	±	45.50
Ostracods							
Rhithropanopeus harrisii					68.99	±	13.09
Callianassa jamaicense					21.79	±	10.89
Cumaceans							
HYDROZOANS							
CHIRONOMIDS					181.55	±	9.61
OTHER							
TOTAL, N/m^2		217.90	±	142.16	29326.80	±	2294.20
BIOMASS, mg/m^2		49.70			10163.00		
DIVERSITY, H′		0.330	±	0.172	1.729	±	0.055
SPECIES NUMBER		1.667	±	0.333	21.667	±	0.667
EVENNESS, J′		0.714	±	0.122	0.563	±	0.023

Table A2. Meiofauna abundance, biomass, and diversity measures for each month for each sampling station in Lake Pontchartrain. ($\bar{N}/10cm^2 \pm SE, n=4$)

	Aug 78 - Sta 1	Aug 78 - Sta 3	Aug 78 - Sta 5	Aug 78 - Sta 7
NEMATODES	139.55 ± 67.77	64.68 ± 9.35	375.86 ± 60.73	31.58 ± 10.86
COPEPODS	45.33 ± 9.20	67.74 ± 7.77	114.08 ± 16.23	241.92 ± 79.87
COPEPOD NAUPLII	23.94 ± 8.58	47.36 ± 1.28	150.75 ± 32.61	19.35 ± 6.98
OSTRACODS	13.24 ± 13.24	40.24 ± 1.53	158.39 ± 23.98	23.94 ± 7.91
ROTIFERS	11.20 ± 2.56	20.37 ± 4.63	25.97 ± 10.30	155.85 ± 46.11
TURBELLARIANS	3.06 ± 2.42	4.07 ± 2.20	4.07 ± 0.83	1.02 ± 1.02
POLYCHAETES	3.56 ± 2.26	1.02 ± 0.59	2.55 ± 1.93	2.55 ± 1.28
OLIGOCHAETES		0.51 ± 0.51	0.51 ± 0.51	1.02 ± 0.59
BIVALVES		6.11 ± 0.83	6.11 ± 2.20	
GASTROPODS	26.99 ± 4.80	32.60 ± 6.39	48.89 ± 17.39	1.02 ± 0.59
OTHERS	1.53 ± 1.53	4.07 ± 2.05	8.15 ± 4.50	1.02 ± 1.02
TOTAL N/10cm^2	268.40 ± 108.80	288.77 ± 21.39	895.35 ± 93.71	479.25 ± 127.12
BIOMASS μg/10cm^2	366.22	417.73	982.45	637.89

	Aug 78 - Sta 2	Aug 78 - Sta 4	Aug 78 - Sta 6	Aug 78 - Sta 8
NEMATODES	140.06 ± 15.41	116.63 ± 13.85	382.48 ± 74.95	130.38 ± 23.90
COPEPODS	84.54 ± 24.82	129.87 ± 11.57	51.44 ± 12.71	75.36 ± 10.81
COPEPOD NAUPLII	34.63 ± 7.39	59.59 ± 19.93	49.40 ± 10.27	39.22 ± 9.16
OSTRACODS	3.06 ± 0.59	62.14 ± 19.21	88.11 ± 6.83	43.80 ± 4.88
ROTIFERS	30.05 ± 8.78	14.26 ± 5.06	30.05 ± 9.89	9.17 ± 3.06
TURBELLARIANS	30.56 ± 3.63	4.58 ± 1.93	2.04 ± 2.04	13.24 ± 4.28
POLYCHAETES	16.81 ± 3.85	3.06 ± 0.59	6.11 ± 3.00	9.17 ± 2.94
OLIGOCHAETES				1.02 ± 0.59
BIVALVES	18.33 ± 5.19	21.39 ± 6.73	12.73 ± 3.37	2.04 ± 1.44
GASTROPODS	80.47 ± 5.36	74.36 ± 18.55	13.75 ± 1.53	23.43 ± 3.48
OTHERS	6.62 ± 5.97		5.09 ± 2.94	3.06 ± 2.19
TOTAL N/10cm^2	445.13 ± 50.55	485.87 ± 84.80	641.21 ± 100.71	349.89 ± 43.58
BIOMASS μg/10cm^2	832.15	787.27	633.70	489.68

Table A2. (Continued)

	Aug 78 - Sta 9	Sep 78 - Sta 1	Sep 78 - Sta 3	Sep 78 - Sta 5
NEMATODES	6.11 ± 2.04	198.12 ± 54.79	154.83 ± 41.16	459.39 ± 145.35
COPEPODS	38.71 ± 7.53	67.23 ± 20.29	31.07 ± 2.26	106.95 ± 27.34
COPEPOD NAUPLII	88.62 ± 9.43	70.79 ± 23.34	58.57 ± 12.95	66.72 ± 12.84
OSTRACODS	6.11 ± 3.00	2.04 ± 0.83	63.15 ± 14.76	93.20 ± 35.23
ROTIFERS	31.58 ± 6.88	22.92 ± 6.88	16.81 ± 0.51	40.24 ± 15.81
TURBELLARIANS		3.57 ± 1.53	10.70 ± 3.66	6.62 ± 3.04
POLYCHAETES	1.53 ± 1.53	3.57 ± 2.10	9.68 ± 2.10	5.60 ± 3.47
OLIGOCHAETES			7.13 ± 3.58	
BIVALVES	1.02 ± 1.02	25.97 ± 8.33	45.33 ± 9.28	14.26 ± 1.86
GASTROPODS	2.55 ± 1.93	55.51 ± 23.56	34.12 ± 7.27	24.45 ± 2.88
OTHERS		1.02 ± 1.02	4.07 ± 2.26	17.83 ± 4.10
TOTAL N/10cm^2	176.22 ± 6.47	450.73 ± 120.74	435.45 ± 72.06	835.25 ± 216.33
BIOMASS μg/10cm^2	173.30	642.08	570.30	911.54

	Aug 78 - Sta 10	Sep 78 - Sta 2	Sep 78 - Sta 4	Sep 78 - Sta 6
NEMATODES	124.78 ± 17.39	108.48 ± 17.29	59.59 ± 35.94	270.95 ± 43.94
COPEPODS	121.72 ± 11.57	68.76 ± 17.31	28.01 ± 12.76	64.68 ± 7.17
COPEPOD NAUPLII	36.67 ± 6.28	54.50 ± 14.65	40.24 ± 13.78	85.56 ± 11.10
OSTRACODS	37.18 ± 23.23	5.09 ± 2.12	19.86 ± 8.78	75.38 ± 9.37
ROTIFERS	40.74 ± 5.19	18.34 ± 4.40	25.47 ± 2.94	63.15 ± 25.30
TURBELLARIANS	17.83 ± 9.24	16.81 ± 3.47	3.06 ± 1.76	3.57 ± 1.74
POLYCHAETES	3.06 ± 0.59	13.75 ± 3.04	3.06 ± 1.95	2.55 ± 0.51
OLIGOCHAETES				
BIVALVES	4.07 ± 1.44	40.23 ± 2.93	17.32 ± 7.74	13.75 ± 2.55
GASTROPODS	23.43 ± 9.86	58.06 ± 3.17	20.88 ± 13.98	8.66 ± 2.68
OTHERS	5.09 ± 2.61	2.55 ± 1.34	2.55 ± 1.53	5.09 ± 2.63
TOTAL N/10cm^2	414.57 ± 73.71	386.56 ± 24.61	220.02 ± 84.83	593.33 ± 60.24
BIOMASS μg/10cm^2	611.80	669.47	294.02	569.19

Table A2. (Continued)

	Sep 78 - Sta 7	Sep 78 - Sta 9	Oct 78 - Sta 1	Oct 78 - Sta 3
NEMATODES	43.80 ± 6.58	84.03 ± 17.13	139.04 ± 22.35	121.72 ± 42.52
COPEPODS	141.59 ± 13.65	32.09 ± 6.72	61.63 ± 13.32	62.14 ± 12.24
COPEPOD NAUPLII	7.64 ± 3.93	26.99 ± 5.22	34.63 ± 9.22	63.66 ± 23.28
OSTRACODS	75.38 ± 12.25	28.52 ± 10.62		59.08 ± 12.80
ROTIFERS	65.19 ± 27.93	2.55 ± 1.28	17.83 ± 2.68	39.73 ± 15.44
TURBELLARIANS	2.55 ± 0.98	3.57 ± 2.26	8.66 ± 6.02	25.47 ± 9.61
POLYCHAETES	5.60 ± 2.41	5.60 ± 3.15	12.73 ± 2.09	22.41 ± 5.45
OLIGOCHAETES	4.07 ± 1.66	0.51 ± 0.51	0.51 ± 0.51	1.02 ± 0.59
BIVALVES	6.62 ± 0.98	91.67 ± 16.49	11.20 ± 3.17	38.71 ± 11.25
GASTROPODS	1.02 ± 0.59	37.69 ± 3.18	33.61 ± 5.16	43.29 ± 10.49
OTHERS	6.62 ± 3.95	1.53 ± 0.98	2.04 ± 1.48	0.51 ± 0.51
TOTAL N/10cm^2	360.08 ± 62.39	314.75 ± 59.05	321.88 ± 38.84	477.72 ± 124.44
BIOMASS μg/10cm^2	462.66	495.24	494.57	701.97

	Sep 78 - Sta 8	Sep 78 - Sta 10	Oct 78 - Sta 2	Oct 78 - Sta 4
NEMATODES	52.97 ± 30.02	62.13 ± 6.58	72.32 ± 10.69	264.84 ± 19.54
COPEPODS	18.34 ± 7.53	118.16 ± 15.80	26.48 ± 6.17	54.49 ± 5.08
COPEPOD NAUPLII	46.86 ± 6.91	50.42 ± 9.68	40.74 ± 5.82	50.93 ± 3.22
OSTRACODS	5.09 ± 1.76	20.88 ± 3.85	6.62 ± 2.09	114.59 ± 31.00
ROTIFERS	10.19 ± 3.99	66.72 ± 7.64	98.80 ± 25.51	52.46 ± 2.68
TURBELLARIANS	1.53 ± 0.51		10.19 ± 2.63	4.58 ± 9.51
POLYCHAETES	3.06 ± 1.95	1.02 ± 1.02	10.69 ± 3.04	14.26 ± 4.32
OLIGOCHAETES		1.02 ± 1.02	0.51 ± 0.51	0.51 ± 0.51
BIVALVES	38.19 ± 12.92	9.68 ± 3.85	16.29 ± 4.07	53.99 ± 10.54
GASTROPODS	5.60 ± 1.28	26.48 ± 6.05	34.63 ± 8.56	58.57 ± 16.56
OTHERS	1.02 ± 1.02	1.02 ± 1.02	4.58 ± 2.76	2.04 ± 1.48
TOTAL N/10cm^2	182.84 ± 16.39	357.53 ± 39.17	321.88 ± 25.58	671.26 ± 70.06
BIOMASS μg/10cm^2	218.33	494.48	437.46	831.68

Table A2. (Continued)

	Oct 78 - Sta 5	Oct 78 - Sta 7	Oct 78 - Sta 9	Nov 78 - Sat 1
NEMATODES	470.59 ± 91.47	406.42 ± 48.62	367.21 ± 49.30	457.66 ± 89.84
COPEPODS	105.43 ± 12.00	203.21 ± 29.27	73.85 ± 2.93	66.21 ± 5.91
COPEPOD NAUPLII	117.14 ± 16.44	250.07 ± 32.63	76.39 ± 13.42	72.32 ± 18.08
OSTRACODS	59.08 ± 10.35	110.01 ± 37.13	94.22 ± 24.51	1.53 ± 0.97
ROTIFERS	17.32 ± 6.58	189.46 ± 60.27	47.87 ± 10.67	38.20 ± 11.29
TURBELLARIANS	7.13 ± 2.42	36.67 ± 8.84	33.61 ± 3.95	14.77 ± 2.68
POLYCHAETES	4.07 ± 2.76	16.81 ± 4.11	5.60 ± 1.74	29.54 ± 4.28
OLIGOCHAETES	0.51 ± 0.51	2.55 ± 1.53		1.02 ± 0.59
BIVALVES	24.96 ± 4.02	43.60 ± 7.74	53.48 ± 14.32	12.22 ± 4.85
GASTROPODS	22.41 ± 0.83	34.12 ± 5.66	49.91 ± 10.27	45.33 ± 14.17
OTHERS	3.57 ± 1.09	11.21 ± 8.08	3.06 ± 2.19	0.51 ± 0.51
TOTAL N/10cm²	832.20 ± 123.15	1304.32 ± 69.75	805.20 ± 105.04	739.50 ± 118.43
BIOMASS μg/10cm²	901.70	1500.09	996.41	920.90

	Oct 78 - Sta 6	Oct 78 - Sta 8	Oct 78 - Sta 10	Nov 78 - Sta 2
NEMATODES	140.06 ± 43.47	350.91 ± 92.54	191.50 ± 24.71	376.88 ± 33.98
COPEPODS	62.64 ± 13.03	104.92 ± 11.30	72.83 ± 8.25	88.62 ± 8.82
COPEPOD NAUPLII	99.82 ± 27.69	113.07 ± 9.93	39.73 ± 8.58	58.57 ± 8.42
OSTRACODS	38.71 ± 12.99	88.12 ± 7.82	31.58 ± 11.69	26.99 ± 8.16
ROTIFERS	45.84 ± 10.14	50.42 ± 15.52	30.05 ± 9.46	22.41 ± 7.20
TURBELLARIANS	1.02 ± 0.59	6.62 ± 2.68	5.09 ± 2.42	30.05 ± 7.68
POLYCHAETES	2.04 ± 2.04	35.14 ± 7.50	12.22 ± 2.49	41.76 ± 2.69
OLIGOCHAETES			0.51 ± 0.51	
BIVALVES	36.16 ± 7.41	36.16 ± 4.73	11.20 ± 4.20	26.99 ± 3.37
GASTROPODS	10.69 ± 2.81	39.73 ± 5.67	17.32 ± 3.17	52.46 ± 24.27
OTHERS	1.53 ± 1.53	9.17 ± 5.10	1.53 ± 1.53	3.57 ± 2.27
TOTAL N/10cm²	438.51 ± 92.59	834.23 ± 144.73	413.55 ± 22.36	728.30 ± 47.05
BIOMASS μg/10cm²	462.64	1012.12	510.01	1043.56

Table A2. (Continued)

	Nov 78 - Sta 3	Nov 78 - Sta 5	Nov 78 - Sta 7	Nov 78 - Sta 9
NEMATODES	312.71 ± 71.11	1277.83 ± 22.57	371.28 ± 97.21	435.96 ± 98.78
COPEPODS	49.40 ± 7.73	100.84 ± 5.42	100.84 ± 29.69	63.15 ± 11.37
COPEPOD NAUPLII	28.01 ± 5.60	144.13 ± 28.89	171.13 ± 66.21	96.26 ± 26.46
OSTRACODS	36.16 ± 8.54	91.67 ± 11.37	78.94 ± 35.62	118.67 ± 52.44
ROTIFERS	21.39 ± 5.16	29.03 ± 2.10	216.45 ± 104.09	85.56 ± 24.63
TURBELLARIANS	21.90 ± 4.19	23.43 ± 3.58	59.59 ± 21.49	58.06 ± 18.86
POLYCHAETES	24.96 ± 3.26	13.75 ± 0.97	6.11 ± 1.86	35.65 ± 9.93
OLIGOCHAETES	1.53 ± 0.98	1.02 ± 0.59	1.53 ± 0.98	1.02 ± 1.02
BIVALVES	26.99 ± 3.66	26.48 ± 5.06	23.43 ± 8.50	92.18 ± 37.41
GASTROPODS	30.56 ± 6.81	56.02 ± 19.85	30.05 ± 11.92	23.43 ± 10.67
OTHERS	2.55 ± 1.34	13.75 ± 6.56	10.19 ± 5.58	2.04 ± 1.48
TOTAL N/10cm^2	556.16 ± 86.99	1777.97 ± 71.29	1069.53 ± 349.82	1011.98 ± 274.31
BIOMASS μg/10cm^2	735.24	1864.52	1163.15	1201.11

	Nov 78 - Sta 4	Nov 78 - Sta 6	Nov 78 - Sta 8	Nov 78 - Sta 10
NEMATODES	339.19 ± 50.00	644.77 ± 83.29	343.78 ± 40.24	622.36 ± 72.45
COPEPODS	25.97 ± 4.43	132.42 ± 11.31	68.25 ± 6.14	80.98 ± 11.92
COPEPOD NAUPLII	75.38 ± 1.44	96.26 ± 7.95	73.85 ± 13.83	88.62 ± 18.77
OSTRACODS	83.53 ± 15.16	112.56 ± 15.74	61.62 ± 14.53	228.68 ± 48.35
ROTIFERS	49.40 ± 26.93	28.52 ± 2.49	78.43 ± 19.90	101.35 ± 6.98
TURBELLARIANS	17.32 ± 4.59	21.39 ± 4.44	18.34 ± 3.33	29.03 ± 8.58
POLYCHAETES	19.86 ± 3.66	33.61 ± 6.14	29.03 ± 6.24	69.77 ± 14.72
OLIGOCHAETES		1.02 ± 1.02		1.02 ± 1.02
BIVALVES	48.89 ± 11.00	49.40 ± 13.16	21.90 ± 7.77	82.00 ± 17.81
GASTROPODS	40.74 ± 4.85	74.67 ± 15.25	58.57 ± 15.68	26.99 ± 7.55
OTHERS	4.58 ± 2.17	24.96 ± 6.82	7.13 ± 3.94	9.17 ± 4.47
TOTAL N/10cm^2	704.87 ± 97.07	1219.77 ± 116.10	760.89 ± 105.78	1339.97 ± 170.34
BIOMASS μg/10cm^2	830.63	1554.90	964.35	1475.02

Table A2. (Continued)

	Nov 78 - Sta 11	Nov 78 - Sta 13	Dec 78 - Sta 2	Dec 78 - Sta 4
NEMATODES	257.71 ± 69.83	1277.32 ± 178.01	572.96 ± 18.75	443.09 ± 102.89
COPEPODS	48.89 ± 12.17	49.40 ± 4.19	105.42 ± 6.57	27.50 ± 8.38
COPEPOD NAUPLII	55.51 ± 20.31	40.2[illegible] ± 6.67	72.83 ± 9.12	30.56 ± 9.26
OSTRACODS	30.56 ± 8.32	84.03 ± 24.28	14.77 ± 5.08	56.02 ± 20.52
ROTIFERS	21.90 ± 7.22	81.49 ± 17.31	7.13 ± 3.38	
TURBELLARIANS	30.56 ± 8.19	24.96 ± 9.[illegible]6	39.22 ± 3.04	10.19 ± 3.63
POLYCHAETES	11.20 ± 5.67	36.16 ± 9.92	43.29 ± 7.95	8.66 ± 2.68
OLIGOCHAETES	1.02 ± 0.59	0.51 ± 0.51		
BIVALVES	19.86 ± 8.54	50.93 ± 18.05	11.20 ± 3.77	19.86 ± 7.82
GASTROPODS	23.43 ± 9.43	133.9[illegible] ± 7.27	27.50 ± 1.95	13.75 ± 4.19
OTHERS	1.53 ± 0.51	67.23 ± 10.49	3.06 ± 1.32	1.53 ± 1.10
TOTAL N/10cm^2	502.17 ± 121.87	1846.21 ± 237.51	897.39 ± 38.20	611.16 ± 135.78
BIOMASS μg/10cm^2	640.92	2227.80	1157.45	632.60

	Nov 78 - Sta 12	Dec 78 - Sta 1	Dec 78 - Sta 3	Dec 78 - Sta 5
NEMATODES	66.21 ± 9.05	564.81 ± 126.07	199.14 ± 38.1[illegible]	591.30 ± 50.61
COPEPODS	104.92 ± 12.46	83.52 ± 17.11	25.46 ± 3.38	34.12 ± 4.73
COPEPOD NAUPLII	35.65 ± 6.25	101.86 ± 22.13	13.24 ± 3.38	28.52 ± 7.53
OSTRACODS		20.88 ± 3.04	12.73 ± 3.66	26.48 ± 11.82
ROTIFERS	25.46 ± 6.58	13.75 ± 2.80	6.62 ± 2.10	4.58 ± 1.74
TURBELLARIANS	1.53 ± 0.98	43.80 ± 3.77	20.37 ± 6.11	29.03 ± 8.70
POLYCHAETES	20.88 ± 3.15	32.60 ± 9.03	7.13 ± 2.94	7.64 ± 2.26
OLIGOCHAETES			0.51 ± 0.51	0.51 ± 0.51
BIVALVES	31.58 ± 15.90	6.11 ± 2.63	26.99 ± 4.27	11.71 ± 2.68
GASTROPODS	4.58 ± 1.74	30.56 ± 6.50	16.30 ± 1.66	32.60 ± 2.63
OTHERS	1.02 ± 1.02	5.[illegible] ± 2.42	0.51 ± 0.51	5.09 ± 2.07
TOTAL N/10cm^2	291.83 ± 30.26	903.50 ± 165.81	329.01 ± 47.32	771.59 ± 78.41
BIOMASS μg/10cm^2	440.84	1127.90	435.79	860.97

Table A2. (Continued)

	Dec 78 - Sta 6	Dec 78 - Sta 8	Dec 78 - Sta 10	Jan 79 - Sta 2
NEMATODES	645.28 ± 64.21	629.49 ± 2.63	722.70 ± 54.64	433.41 ± 24.44
COPEPODS	55.00 ± 7.49	37.69 ± 5.55	114.08 ± 9.84	66.72 ± 8.33
COPEPOD NAUPLII	55.51 ± 15.88	61.12 ± 5.70	58.06 ± 5.67	13.24 ± 5.02
OSTRACODS	35.65 ± 8.58	69.27 ± 12.72	108.99 ± 12.38	13.24 ± 6.03
ROTIFERS	2.55 ± 1.53	35.65 ± 10.60	43.29 ± 8.70	7.64 ± 6.30
TURBELLARIANS	16.30 ± 4.32	60.61 ± 5.84	52.46 ± 22.35	98.30 ± 31.27
POLYCHAETES	11.71 ± 2.10	19.86 ± 3.04	133.44 ± 16.01	32.09 ± 4.43
OLIGOCHAETES	0.51 ± 0.51	1.02 ± 0.59	1.53 ± 0.98	
BIVALVES	15.79 ± 3.04	24.45 ± 7.15	62.64 ± 7.41	17.83 ± 3.47
GASTROPODS	34.63 ± 8.02	26.48 ± 6.91	5.09 ± 1.02	25.47 ± 5.29
OTHERS	10.19 ± 5.25	8.66 ± 5.14	2.04 ± 1.18	3.57 ± 2.70
TOTAL N/10cm^2	833.13 ± 68.78	974.29 ± 34.43	1304.32 ± 71.43	711.49 ± 71.80
BIOMASS μg/10cm^2	1002.71	1130.81	1642.35	1080.50

	Dec 78 - Sta 7	Dec 78 - Sta 9	Jan 79 - Sta 1	Jan 79 - Sta 3
NEMATODES	423.74 ± 57.95	794.00 ± 202.66	432.90 ± 83.88	234.79 ± 21.81
COPEPODS	58.57 ± 8.97	28.01 ± 8.08	44.31 ± 9.99	45.33 ± 9.35
COPEPOD NAUPLII	79.45 ± 12.75	25.97 ± 2.81	29.54 ± 10.20	8.15 ± 1.66
OSTRACODS	73.85 ± 10.03	27.50 ± 22.91	3.57 ± 1.28	22.41 ± 12.05
ROTIFERS	10.19 ± 4.32	42.78 ± 5.88	27.50 ± 11.78	20.88 ± 13.62
TURBELLARIANS	62.14 ± 11.48	47.37 ± 25.64	49.91 ± 12.12	48.38 ± 14.03
POLYCHAETES	15.28 ± 4.12	28.01 ± 10.43	25.97 ± 5.41	18.34 ± 1.18
OLIGOCHAETES	0.51 ± 0.51	2.55 ± 1.28		1.53 ± 0.98
BIVALVES	23.94 ± 6.52	41.25 ± 17.88	8.66 ± 2.10	10.70 ± 2.81
GASTROPODS	26.48 ± 7.93	17.83 ± 7.46	19.86 ± 0.98	19.35 ± 7.27
OTHERS	6.62 ± 3.60	1.02 ± 1.02	2.04 ± 1.61	1.53 ± 1.53
TOTAL N/10cm^2	780.76 ± 60.90	1056.29 ± 290.59	644.26 ± 125.59	431.38 ± 41.88
BIOMASS μg/10cm^2	989.91	1165.46	830.11	631.83

Table A2. (Continued)

	Jan 79 - Sta 4	Jan 79 - Sta 6	Jan 79 - Sta 8	Jan 79 - Sta 10
NEMATODES	407.44 ± 133.81	1059.85 ± 176.61	753.76 ± 123.70	380.45 ± 72.48
COPEPODS	24.45 ± 2.04	37.69 ± 6.98	47.87 ± 4.59	47.87 ± 2.56
COPEPOD NAUPLII	22.92 ± 5.60	46.35 ± 13.52	64.17 ± 12.95	40.74 ± 12.19
OSTRACODS	37.69 ± 15.12	39.72 ± 6.93	46.86 ± 12.25	41.25 ± 10.47
ROTIFERS	27.50 ± 14.13	8.15 ± 3.22	48.89 ± 19.59	67.74 ± 18.90
TURBELLARIANS	18.34 ± 6.81	28.01 ± 5.41	32.09 ± 8.25	42.27 ± 17.11
POLYCHAETES	12.22 ± 3.81	3.06 ± 1.02	9.68 ± 4.66	61.12 ± 2.88
OLIGOCHAETES	0.51 ± 0.51		2.04 ± 1.44	2.04 ± 0.83
BIVALVES	42.27 ± 13.70	24.96 ± 6.72	14.26 ± 1.86	40.74 ± 4.92
GASTROPODS	38.20 ± 9.71	25.97 ± 5.46	11.20 ± 5.29	4.07 ± 0.83
OTHERS	2.55 ± 2.55	14.26 ± 7.34	3.56 ± 3.01	
TOTAL N/10cm^2	634.08 ± 173.57	1288.02 ± 167.56	1034.39 ± 167.60	728.30 ± 80.76
BIOMASS μg/10cm^2	759.76	1304.10	1039.35	897.78

	Jan 79 - Sta 5	Jan 79 - Sta 7	Jan 79 - Sta 9	Feb 79 - Sta 1
NEMATODES	709.96 ± 84.94	487.91 ± 80.64	647.32 ± 212.19	823.03 ± 147.48
COPEPODS	25.46 ± 3.86	64.17 ± 15.46	47.36 ± 13.11	56.02 ± 10.30
COPEPOD NAUPLII	50.93 ± 11.31	83.02 ± 21.77	26.99 ± 9.42	25.97 ± 5.48
OSTRACODS	52.46 ± 8.93	50.42 ± 12.76	39.22 ± 10.40	1.53 ± 0.51
ROTIFERS	60.61 ± 24.59	84.54 ± 52.27	12.73 ± 8.78	32.09 ± 20.33
TURBELLARIANS	16.30 ± 2.50	46.35 ± 7.32	132.93 ± 44.67	37.69 ± 17.14
POLYCHAETES	3.06 ± 0.59	8.66 ± 2.93	84.03 ± 27.43	16.81 ± 2.93
OLIGOCHAETES	1.02 ± 0.59	2.04 ± 0.83		2.04 ± 1.18
BIVALVES	6.62 ± 4.80	10.19 ± 2.63	58.06 ± 19.42	6.11 ± 0.83
GASTROPODS	21.90 ± 9.09	14.77 ± 6.24	35.14 ± 17.55	20.37 ± 6.05
OTHERS	11.20 ± 6.78	9.68 ± 5.43	1.53 ± 0.98	2.55 ± 2.55
TOTAL N/10cm^2	959.52 ± 86.44	861.74 ± 139.91	1085.32 ± 333.86	1024.20 ± 144.74
BIOMASS μg/10cm^2	927.32	947.16	1602.67	1119.00

Table A2. (Continued)

	Feb 79 - Sta 2	Feb 79 - Sta 4	Feb 79 - Sta 6	Feb 79 - Sta 8
NEMATODES	571.94 ± 45.13	392.67 ± 89.50	783.30 ± 47.50	643.25 ± 98.03
COPEPODS	76.90 ± 9.75	23.43 ± 5.61	64.17 ± 6.98	36.67 ± 7.15
COPEPOD NAUPLII	31.58 ± 5.36	32.09 ± 13.73	64.17 ± 9.79	29.54 ± 8.21
OSTRACODS	7.64 ± 3.85	24.45 ± 9.66	27.50 ± 1.95	34.63 ± 9.22
ROTIFERS	43.80 ± 30.40	11.71 ± 3.47	13.75 ± 9.39	41.25 ± 22.01
TURBELLARIANS	55.00 ± 4.32	30.05 ± 4.19	19.35 ± 6.68	44.31 ± 16.27
POLYCHAETES	16.81 ± 1.74	3.57 ± 2.26	0.51 ± 0.51	23.43 ± 10.70
OLIGOCHAETES	0.51 ± 0.51			
BIVALVES	12.73 ± 2.81	30.05 ± 9.75	14.26 ± 2.50	15.26 ± 3.58
GASTROPODS	24.96 ± 5.84	17.83 ± 9.16	18.34 ± 2.63	9.17 ± 2.42
OTHERS	1.02 ± 0.59	0.51 ± 0.51	11.21 ± 1.76	2.55 ± 1.99
TOTAL N/10cm^2	842.89 ± 88.99	566.34 ± 110.56	1016.56 ± 76.66	880.07 ± 78.43
BIOMASS μg/10cm^2	1037.45	647.97	1041.76	957.79

	Feb 79 - Sta 3	Feb 79 - Sta 5	Feb 79 - Sta 7	Feb 79 - Sta 9
NEMATODES	286.23 ± 25.83	803.17 ± 20.46	282.15 ± 22.59	358.04 ± 66.72
COPEPODS	34.12 ± 3.47	52.97 ± 5.70	78.94 ± 3.47	9.17 ± 2.70
COPEPOD NAUPLII	31.07 ± 9.42	61.63 ± 6.35	68.76 ± 9.85	15.79 ± 4.43
OSTRACODS	25.47 ± 5.42	23.94 ± 7.08	29.54 ± 8.00	3.57 ± 1.28
ROTIFERS	94.73 ± 87.31	16.30 ± 6.60	5.60 ± 3.04	12.22 ± 5.45
TURBELLARIANS	45.33 ± 18.86	16.81 ± 0.98	46.35 ± 13.34	30.05 ± 15.37
POLYCHAETES	5.09 ± 1.32		9.68 ± 0.98	14.26 ± 6.33
OLIGOCHAETES			0.51 ± 0.51	
BIVALVES	17.83 ± 2.93	3.57 ± 1.28	13.24 ± 3.17	33.61 ± 23.07
GASTROPODS	20.37 ± 6.50	10.19 ± 0.83	18.84 ± 6.98	1.53 ± 0.98
OTHERS		7.64 ± 3.15	2.04 ± 2.04	2.55 ± 2.55
TOTAL N/10cm^2	560.23 ± 68.12	996.19 ± 25.20	555.65 ± 22.26	480.78 ± 76.42
BIOMASS μg/10cm^2	659.22	967.11	744.18	545.96

Table A2. (Continued)

	Feb 79 - Sta 10	Feb 79 - Sta 12	Mar 79 - Sta 1	Mar 79 - Sta 3
NEMATODES	353.45 ± 41.71	414.06 ± 102.15	631.53 ± 45.86	365.17 ± 64.53
COPEPODS	31.07 ± 7.50	80.47 ± 14.13	76.40 ± 3.17	96.80 ± 10.44
COPEPOD NAUPLII	18.84 ± 1.74	34.63 ± 9.63	132.42 ± 32.37	98.30 ± 6.78
OSTRACODS	3.06 ± 1.76	6.62 ± 4.35	6.11 ± 1.44	20.86 ± 2.26
ROTIFERS	15.79 ± 4.43	43.29 ± 10.43	13.24 ± 5.55	1.02 ± 1.02
TURBELLARIANS	112.56 ± 37.17	77.41 ± 32.29	23.43 ± 6.58	24.96 ± 11.29
POLYCHAETES	13.24 ± 5.16	20.37 ± 10.91	30.56 ± 10.12	8.15 ± 2.88
OLIGOCHAETES		0.51 ± 0.51		0.51 ± 0.51
BIVALVES	62.13 ± 27.08	4.58 ± 1.28	5.60 ± 1.93	8.15 ± 1.86
GASTROPODS	26.48 ± 9.95	3.57 ± 2.41	11.71 ± 3.85	12.22 ± 2.63
OTHERS		0.51 ± 0.51	2.04 ± 2.04	0.51 ± 0.51
TOTAL N/10cm^2	636.62 ± 51.44	686.03 ± 160.63	933.04 ± 65.52	638.66 ± 81.43
BIOMASS μg/10cm^2	997.97	899.74	1009.49	755.50

	Feb 79 - Sta 11	Feb 79 - Sta 13	Mar 79 - Sta 2	Mar 79 - Sta 4
NEMATODES	472.12 ± 90.74	2725.77 ± 524.21	483.33 ± 41.30	473.65 ± 87.48
COPEPODS	30.05 ± 14.15	99.82 ± 14.09	87.09 ± 13.32	87.60 ± 16.23
COPEPOD NAUPLII	99.31 ± 54.32	82.00 ± 14.65	107.97 ± 29.93	71.30 ± 28.07
OSTRACODS	23.43 ± 6.31	80.98 ± 15.43	22.41 ± 7.06	29.03 ± 18.79
ROTIFERS	10.70 ± 1.28	7.13 ± 1.32	2.55 ± 1.53	3.06 ± 1.32
TURBELLARIANS	45.33 ± 22.89	35.65 ± 8.00	37.69 ± 13.03	51.44 ± 20.77
POLYCHAETES	2.55 ± 0.98	34.12 ± 7.82	7.13 ± 4.59	2.04 ± 0.83
OLIGOCHAETES	1.02 ± 0.59	2.04 ± 1.44	0.51 ± 0.51	1.02 ± 1.02
BIVALVES	7.13 ± 3.48	86.58 ± 7.08	4.07 ± 1.66	6.62 ± 1.74
GASTROPODS	41.76 ± 16.91	163.49 ± 6.72	6.62 ± 1.74	8.66 ± 2.81
OTHERS	0.51 ± 0.51	112.56 ± 26.34	0.51 ± 0.51	
TOTAL N/10cm^2	733.90 ± 167.61	3430.14 ± 578.01	759.88 ± 79.93	734.41 ± 131.65
BIOMASS μg/10cm^2	875.79	3847.54	850.60	867.11

Table A2. (Continued)

	Mar 79 - Sta 5	Mar 79 - Sta 7	May 79 - Sta 9	Apr 79 - Sta 1
NEMATODES	1116.89 ± 213.25	1119.95 ± 330.36	582.13 ± 214.46	750.20 ± 83.44
COPEPODS	84.03 ± 14.00	87.09 ± 31.89	93.20 ± 17.61	89.64 ± 8.52
COPEPOD NAUPLII	221.04 ± 86.00	99.82 ± 27.12	35.65 ± 8.70	116.63 ± 22.71
OSTRACODS	32.09 ± 12.84	64.17 ± 24.54	1.53 ± 0.97	2.04 ± 1.18
ROTIFERS	4.58 ± 1.53	2.04 ± 0.83	1.53 ± 0.97	0.51 ± 0.51
TURBELLARIANS	18.84 ± 8.08	52.97 ± 20.42	28.52 ± 19.94	12.22 ± 3.43
POLYCHAETES	2.04 ± 0.00	8.66 ± 4.80	6.11 ± 2.50	7.13 ± 3.17
OLIGOCHAETES	1.02 ± 0.59	0.51 ± 0.51	1.02 ± 0.59	
BIVALVES	5.60 ± 2.55	8.15 ± 3.22	15.79 ± 9.92	2.55 ± 1.28
GASTROPODS	10.19 ± 1.44	7.64 ± 2.25	0.51 ± 0.51	3.57 ± 2.41
OTHERS	9.68 ± 6.45	0.51 ± 0.51		0.51 ± 0.51
TOTAL N/10cm^2	1506.00 ± 293.64	1451.50 ± 343.76	765.99 ± 180.23	984.99 ± 60.78
BIOMASS μg/10cm^2	1419.75	1473.64	852.31	976.82
	Mar 79 - Sta 6	**Mar 79 - Sta 8**	**Mar 79 - Sta 10**	**Apr 79 - Sta 2**
NEMATODES	789.41 ± 61.96	658.02 ± 45.22	546.99 ± 136.68	392.16 ± 51.72
COPEPODS	59.08 ± 10.29	114.08 ± 21.86	112.56 ± 9.96	32.09 ± 7.41
COPEPOD NAUPLII	52.97 ± 18.43	129.36 ± 41.02	141.06 ± 59.72	32.60 ± 12.02
OSTRACODS	8.66 ± 1.53	35.65 ± 9.50	9.17 ± 3.06	2.55 ± 1.28
ROTIFERS	3.06 ± 1.95	3.06 ± 1.02	5.60 ± 2.10	4.07 ± 3.43
TURBELLARIANS	12.22 ± 3.53	73.85 ± 25.73	19.86 ± 6.93	12.22 ± 3.43
POLYCHAETES		6.11 ± 1.44	21.90 ± 8.21	5.09 ± 1.95
OLIGOCHAETES	0.51 ± 0.51	0.51 ± 0.51	1.53 ± 0.98	
BIVALVES	3.57 ± 2.26	7.13 ± 4.59	19.86 ± 7.82	2.04 ± 0.83
GASTROPODS	7.64 ± 2.93	15.28 ± 6.14	2.55 ± 1.93	0.51 ± 0.51
OTHERS	0.51 ± 0.51	4.58 ± 1.95	1.02 ± 1.02	0.51 ± 0.51
TOTAL N/10cm^2	937.62 ± 95.01	1047.63 ± 92.46	882.11 ± 182.96	483.83 ± 50.43
BIOMASS μg/10cm^2	909.79	1239.36	968.20	484.42

Table A2. (Continued)

	Apr 79 - Sta 3	Apr 79 - Sta 5	Apr 79 - Sta 7	Apr 79 - Sta 9
NEMATODES	447.67 ± 64.78	802.15 ± 74.25	565.32 ± 147.90	603.52 ± 73.46
COPEPODS	82.51 ± 10.27	47.87 ± 9.17	53.99 ± 8.25	74.67 ± 13.75
COPEPOD NAUPLII	160.43 ± 76.19	56.53 ± 7.59	36.67 ± 14.57	42.78 ± 10.22
OSTRACODS	57.55 ± 14.49	39.22 ± 8.21	80.98 ± 38.90	19.35 ± 3.48
ROTIFERS		3.06 ± 1.32	2.55 ± 0.98	17.32 ± 10.13
TURBELLARIANS	41.76 ± 18.27	48.89 ± 10.22	90.15 ± 14.27	98.80 ± 22.95
POLYCHAETES	2.55 ± 0.51	15.28 ± 4.52	11.71 ± 2.93	25.46 ± 1.02
OLIGOCHAETES	3.06 ± 3.06	2.55 ± 1.53	0.51 ± 0.51	0.51 ± 0.51
BIVALVES	6.11 ± 2.04	4.07 ± 0.83		8.66 ± 3.85
GASTROPODS	18.33 ± 6.33	17.83 ± 8.04	4.07 ± 2.04	6.11 ± 1.44
OTHERS	2.04 ± 1.48	4.07 ± 3.64	1.53 ± 0.51	
TOTAL N/10cm^2	822.01 ± 175.00	1041.52 ± 83.22	847.48 ± 202.89	897.39 ± 99.36
BIOMASS μg/10cm^2	918.64	1132.77	1010.62	1150.59

	Apr 79 - Sta 4	Apr 79 - Sta 6	Apr 79 - Sta 8	Apr 79 - Sta 10
NEMATODES	960.03 ± 126.66	919.80 ± 29.41	847.48 ± 75.16	471.61 ± 70.38
COPEPODS	93.20 ± 11.95	34.63 ± 4.16	52.97 ± 6.28	135.98 ± 13.78
COPEPOD NAUPLII	52.46 ± 9.46	77.92 ± 8.04	46.35 ± 11.01	53.48 ± 13.21
OSTRACODS	92.69 ± 17.50	49.91 ± 5.29	45.33 ± 5.08	25.46 ± 7.08
ROTIFERS	2.04 ± 0.83	3.56 ± 1.74	1.53 ± 0.98	
TURBELLARIANS	47.36 ± 8.08	32.60 ± 4.48	39.22 ± 10.60	44.82 ± 7.01
POLYCHAETES	7.64 ± 3.85	19.86 ± 6.46	11.20 ± 3.48	13.24 ± 1.32
OLIGOCHAETES				0.51 ± 0.51
BIVALVES	4.58 ± 3.26	0.51 ± 0.51	6.11 ± 2.88	3.57 ± 1.28
GASTROPODS	19.35 ± 10.40	9.17 ± 4.88	6.11 ± 2.50	3.06 ± 1.76
OTHERS	1.53 ± 0.98	6.11 ± 2.04	7.64 ± 6.32	1.53 ± 1.10
TOTAL N/10cm^2	1280.89 ± 165.24	1154.07 ± 25.26	1063.93 ± 75.18	753.25 ± 86.11
BIOMASS μg/10cm^2	1354.24	1143.51	1096.73	936.17

Table A2. (Continued)

	May 79 - Sta 1	May 79 - Sta 3	May 79 - Sta 5	May 79 - Sta 7
NEMATODES	399.80 ± 48.76	393.69 ± 62.50	648.34 ± 97.57	381.97 ± 96.91
COPEPODS	72.32 ± 4.28	47.37 ± 6.19	101.35 ± 22.43	119.69 ± 32.83
COPEPOD NAUPLII	20.88 ± 9.78	66.72 ± 26.92	25.47 ± 2.70	58.57 ± 2.26
OSTRACODS	6.11 ± 4.16	82.00 ± 25.87	86.07 ± 24.75	64.17 ± 24.47
ROTIFERS	31.07 ± 12.21	182.33 ± 61.37	48.89 ± 19.16	76.90 ± 21.73
TURBELLARIANS	5.60 ± 0.98	32.09 ± 12.26	18.84 ± 9.57	23.43 ± 7.18
POLYCHAETES	1.53 ± 0.98	2.55 ± 1.93	1.02 ± 0.59	22.92 ± 7.27
OLIGOCHAETES		0.51 ± 0.51	1.02 ± 0.59	0.51 ± 0.51
BIVALVES		0.51 ± 0.51	0.51 ± 0.51	1.53 ± 0.51
GASTROPODS	1.02 ± 0.59	5.09 ± 2.12	2.55 ± 1.53	4.58 ± 1.28
OTHERS	0.51 ± 0.51	1.02 ± 1.02	13.24 ± 7.59	4.58 ± 1.56
TOTAL N/10cm^2	538.84 ± 55.88	815.86 ± 144.94	947.30 ± 136.75	758.86 ± 165.30
BIOMASS μg/10cm^2	546.45	732.72	948.15	848.39

	May 79 - Sta 2	May 79 - Sta 4	May 79 - Sta 6	May 79 - Sta 8
NEMATODES	474.16 ± 40.98	625.42 ± 44.32	698.25 ± 64.80	564.30 ± 82.71
COPEPODS	35.14 ± 7.55	48.89 ± 11.40	50.42 ± 17.55	69.77 ± 15.92
COPEPOD NAUPLII	20.37 ± 6.00	67.23 ± 9.22	13.75 ± 3.04	35.14 ± 8.54
OSTRACODS	12.73 ± 4.43	153.81 ± 38.76	90.15 ± 51.49	109.50 ± 48.18
ROTIFERS	92.69 ± 49.49	37.69 ± 12.52	37.18 ± 9.71	8.15 ± 1.44
TURBELLARIANS	17.32 ± 1.76	59.08 ± 16.98	10.70 ± 4.51	34.63 ± 5.06
POLYCHAETES	2.04 ± 1.18	4.07 ± 2.20	2.04 ± 1.44	6.62 ± 1.28
OLIGOCHAETES		0.51 ± 0.51	0.51 ± 0.51	2.04 ± 2.04
BIVALVES	2.55 ± 0.51	2.04 ± 0.83		10.19 ± 3.00
GASTROPODS	2.55 ± 1.53	7.13 ± 2.94	2.04 ± 0.83	8.15 ± 3.63
OTHERS	2.04 ± 0.83	2.55 ± 1.10	11.20 ± 4.23	7.13 ± 5.33
TOTAL N/10cm^2	661.58 ± 82.46	1008.41 ± 85.29	916.23 ± 138.81	855.62 ± 144.67
BIOMASS μg/10cm^2	616.26	1015.82	842.99	907.06

Table A2. (Continued)

	May 79 - Sta 9	May 79 - Sta 11	May 79 - Sta 13	Jun 79 - sta 2
NEMATODES	272.48 ± 52.43	700.29 ± 154.24	855.11 ± 261.16	373.32 ± 19.76
COPEPODS	77.92 ± 19.06	42.78 ± 3.81	35.65 ± 8.34	153.81 ± 32.18
COPEPOD NAUPLII	28.01 ± 7.77	24.45 ± 7.76	18.34 ± 3.81	50.42 ± 16.33
OSTRACODS	13.24 ± 8.00	50.42 ± 23.02	59.59 ± 31.33	12.22 ± 4.16
ROTIFERS	8.15 ± 0.83	19.86 ± 9.46	105.93 ± 48.28	33.61 ± 17.30
TURBELLARIANS	11.71 ± 5.35	18.84 ± 3.93	16.30 ± 6.71	11.20 ± 3.17
POLYCHAETES	7.13 ± 2.42	3.06 ± 1.32	2.55 ± 0.98	7.13 ± 1.76
OLIGOCHAETES	1.02 ± 0.59	1.02 ± 1.02	0.51 ± 0.51	1.02 ± 0.59
BIVALVES	2.55 ± 0.98	1.53 ± 0.51	0.51 ± 0.51	0.51 ± 0.51
GASTROPODS	1.02 ± 0.59	3.06 ± 1.32	8.15 ± 1.44	3.06 ± 3.06
OTHERS	1.53 ± 1.53		52.97 ± 19.90	2.04 ± 1.61
TOTAL N/10cm^2	424.76 ± 55.71	865.30 ± 196.50	1155.60 ± 313.58	648.34 ± 21.96
BIOMASS μg/10cm^2	492.75	821.17	1095.81	763.28

	May 79 - Sta 10	May 79 - Sta 12	Jun 79 - Sta 1	Jun 79 - Sta 3
NEMATODES	600.46 ± 55.73	142.09 ± 13.57	249.05 ± 62.06	544.95 ± 19.58
COPEPODS	77.41 ± 10.15	91.67 ± 12.96	62.14 ± 19.64	39.22 ± 6.57
COPEPOD NAUPLII	29.54 ± 2.42	26.48 ± 13.54	67.23 ± 21.75	66.21 ± 22.54
OSTRACODS	51.44 ± 12.79	0.51 ± 0.51	2.04 ± 1.44	74.87 ± 18.90
ROTIFERS	153.30 ± 9.78	95.24 ± 31.11	7.64 ± 3.04	21.90 ± 7.12
TURBELLARIANS	40.74 ± 9.66	3.06 ± 0.59	7.64 ± 3.37	35.65 ± 11.20
POLYCHAETES	6.11 ± 1.44	1.02 ± 0.59	5.09 ± 1.76	0.51 ± 0.51
OLIGOCHAETES	0.51 ± 0.51	0.51 ± 0.51		2.04 ± 0.83
BIVALVES	2.04 ± 0.83			1.02 ± 0.59
GASTROPODS	1.02 ± 0.59	2.04 ± 1.44	1.02 ± 0.59	4.07 ± 3.43
OTHERS	4.58 ± 3.12	2.04 ± 2.04	0.51 ± 0.51	3.57 ± 2.55
TOTAL N/10cm^2	967.16 ± 50.92	364.66 ± 42.60	402.35 ± 84.34	794.00 ± 52.53
BIOMASS μg/10cm^2	951.82	396.01	431.22	783.12

Table A2. (Continued)

	Jun 79 - Sta 4	Jun 79 - Sta 6	Jun 79 - Sta 8	Jun 79 - Sta 10
NEMATODES	259.23 ± 57.35	453.28 ± 59.97	651.90 ± 82.41	501.66 ± 57.62
COPEPODS	40.74 ± 9.77	16.81 ± 5.22	55.51 ± 11.71	82.00 ± 15.66
COPEPOD NAUPLII	55.00 ± 17.90	14.77 ± 1.28	61.12 ± 21.29	16.30 ± 3.72
OSTRACODS	31.58 ± 11.84	64.17 ± 27.59	159.92 ± 63.23	132.42 ± 58.73
ROTIFERS	92.69 ± 51.55	11.71 ± 9.78	19.35 ± 7.74	13.75 ± 5.54
TURBELLARIANS	21.39 ± 8.98	5.09 ± 1.32	14.77 ± 4.19	15.79 ± 3.47
POLYCHAETES	1.02 ± 0.59			1.02 ± 0.59
OLIGOCHAETES	0.51 ± 0.51		1.02 ± 0.59	0.51 ± 0.51
BIVALVES			0.51 ± 0.51	
GASTROPODS	2.55 ± 0.51		0.51 ± 0.51	7.13 ± 1.76
OTHERS	18.64 ± 4.86	16.81 ± 5.68	18.84 ± 11.62	6.11 ± 2.77
TOTAL N/10cm^2	523.56 ± 63.16	582.64 ± 94.06	983.46 ± 173.63	776.68 ± 134.89
BIOMASS μg/10cm^2	520.15	524.68	892.58	777.23

	Jun 79 - Sta 5	Jun 79 - Sta 7	Jun 79 - Sta 9	Jul 79 - Sta 1
NEMATODES	600.46 ± 70.75	344.29 ± 56.03	535.27 ± 88.56	383.50 ± 13.24
COPEPODS	22.41 ± 6.81	130.89 ± 26.05	127.32 ± 15.12	5.09 ± 2.42
COPEPOD NAUPLII	87.60 ± 57.76	88.62 ± 32.24	57.04 ± 19.70	6.62 ± 2.55
OSTRACODS	46.86 ± 25.36	30.05 ± 6.78	29.54 ± 19.12	4.58 ± 0.98
ROTIFERS	33.10 ± 14.00	20.88 ± 5.02	58.06 ± 29.35	31.58 ± 5.67
TURBELLARIANS	10.19 ± 3.63	15.28 ± 3.38	8.66 ± 3.37	10.70 ± 3.85
POLYCHAETES	0.51 ± 0.51	1.53 ± 0.51	11.20 ± 7.13	10.70 ± 0.98
OLIGOCHAETES	0.51 ± 0.51	0.51 ± 0.51	2.04 ± 1.18	
BIVALVES		0.51 ± 0.51		1.02 ± 0.59
GASTROPODS	0.51 ± 0.51	1.53 ± 1.53	23.94 ± 10.50	9.68 ± 2.26
OTHERS	22.41 ± 11.44	7.64 ± 3.13	2.04 ± 1.61	1.53 ± 1.53
TOTAL N/10cm^2	824.56 ± 96.21	641.72 ± 117.43	855.11 ± 186.72	464.99 ± 20.14
BIOMASS μg/10cm^2	736.39	721.84	954.94	464.63

Table A2. (Continued)

	Jul 79 - Sta 2	Jul 79 - Sta 4	Jul 79 - Sta 6	Jul 79 - Sta 8
NEMATODES	349.89 ± 38.71	465.50 ± 66.66	370.26 ± 63.73	437.49 ± 58.51
COPEPODS	89.64 ± 11.34	226.13 ± 71.08	94.22 ± 15.81	114.59 ± 18.11
COPEPOD NAUPLII	17.83 ± 5.41	39.22 ± 9.28	82.51 ± 23.85	67.74 ± 11.83
OSTRACODS	40.74 ± 13.28	103.39 ± 47.95	41.25 ± 10.47	103.90 ± 32.53
ROTIFERS	87.60 ± 27.50	53.48 ± 12.15	16.81 ± 2.93	47.87 ± 10.54
TURBELLARIANS	62.64 ± 16.60	69.77 ± 30.51	5.60 ± 1.74	1.53 ± 0.98
POLYCHAETES	27.50 ± 7.4[illegible]	3.06 ± 1.02	1.02 ± 1.02	3.06 ± 1.32
OLIGOCHAETES				0.51 ± 0.51
BIVALVES	12.22 ± 1.86	8.15 ± 5.45		1.53 ± 0.98
GASTROPODS	35.14 ± 4.80	28.52 ± 13.84	3.57 ± 2.41	1.02 ± 0.59
OTHERS	3.06 ± 2.50	3.57 ± 2.55	6.11 ± 2.54	5.60 ± 2.92
TOTAL N/10cm^2	726.26 ± 88.02	1000.77 ± 245.52	621.35 ± 83.59	784.83 ± 124.04
BIOMASS μg/10cm^2	1006.23	1344.68	637.71	758.36

	Jul 79 - Sta 3	Jul 79 - Sta 5	Jul 79 - Sta 7	Jul 79 - Sta 9
NEMATODES	468.56 ± 18.80	479.25 ± 40.50	154.32 ± 21.63	212.38 ± 42.38
COPEPODS	51.44 ± 2.10	14.26 ± 1.86	43.80 ± 7.08	134.46 ± 9.66
COPEPOD NAUPLII	41.25 ± 10.98	33.61 ± 12.35	12.73 ± 2.68	168.07 ± 33.41
OSTRACODS	293.87 ± 79.89	38.71 ± 12.34	12.73 ± 5.22	4.07 ± 1.44
ROTIFERS	19.86 ± 4.88	7.13 ± 2.56	17.32 ± 8.00	56.02 ± 27.21
TURBELLARIANS	39.22 ± 12.54	4.58 ± 2.68	0.51 ± 0.51	2.55 ± 0.98
POLYCHAETES	1.53 ± 0.51		1.02 ± 0.59	
OLIGOCHAETES		1.53 ± 0.51		1.02 ± 1.02
BIVALVES	8.66 ± 3.93	6.11 ± 6.11		1.53 ± 0.98
GASTROPODS	42.27 ± 7.55	23.43 ± 6.98	1.02 ± 0.59	4.58 ± 3.93
OTHERS	10.19 ± 4.78	1.53 ± 0.98	1.53 ± 1.53	
TOTAL N/10cm^2	976.84 ± 95.05	610.14 ± 77.77	244.97 ± 12.89	584.68 ± 27.92
BIOMASS μg/10cm^2	1024.50	602.87	255.25	620.32

Table A2. (Continued)

	Jul 79 - Sta 10	Aug 79 - Sta 2	Aug 79 - Sta 4	Aug 79 - Sta 6
NEMATODES	435.45 ± 173.89	187.93 ± 13.16	132.93 ± 31.69	379.94 ± 67.57
COPEPODS	99.31 ± 27.46	23.43 ± 3.77	40.74 ± 17.47	117.14 ± 27.59
COPEPOD NAUPLII	56.02 ± 10.27	33.61 ± 3.42	32.09 ± 13.16	53.48 ± 14.51
OSTRACODS	128.34 ± 54.15	3.57 ± 1.28	19.35 ± 8.50	65.70 ± 18.42
ROTIFERS	33.10 ± 15.25	37.18 ± 12.12	20.37 ± 10.32	100.84 ± 25.26
TURBELLARIANS	11.71 ± 5.60	87.09 ± 25.56	29.03 ± 12.65	7.13 ± 1.76
POLYCHAETES	0.51 ± 0.51	24.96 ± 6.02	6.62 ± 3.37	0.51 ± 0.51
OLIGOCHAETES				
BIVALVES		10.19 ± 2.76	4.07 ± 2.35	
GASTROPODS	4.58 ± 1.28	12.22 ± 2.76	33.10 ± 12.09	17.32 ± 1.76
OTHERS	1.02 ± 0.59	6.11 ± 4.78	2.55 ± 2.12	7.13 ± 4.63
TOTAL N/10cm^2	770.06 ± 272.23	426.28 ± 59.88	320.86 ± 99.07	749.18 ± 121.11
BIOMASS μg/10cm^2	751.14	683.51	490.58	782.44

	Aug 79 - Sta 1	Aug 79 - Sta 3	Aug 79 - Sta 5	Aug 79 - Sta 7
NEMATODES	267.38 ± 91.18	283.17 ± 39.89	492.49 ± 153.79	118.16 ± 29.25
COPEPODS	14.77 ± 4.43	55.00 ± 13.54	35.14 ± 9.12	284.19 ± 28.94
COPEPOD NAUPLII	22.92 ± 3.47	50.42 ± 13.70	28.01 ± 9.78	128.34 ± 33.71
OSTRACODS	1.02 ± 0.59	101.86 ± 39.04	5.60 ± 1.74	151.77 ± 37.09
ROTIFERS	14.26 ± 5.19	75.38 ± 31.19	75.89 ± 21.52	280.62 ± 147.84
TURBELLARIANS	2.55 ± 1.28	19.86 ± 5.02	5.60 ± 2.68	5.09 ± 2.42
POLYCHAETES	17.32 ± 5.61	5.60 ± 2.09	1.53 ± 1.53	0.51 ± 0.51
OLIGOCHAETES		1.02 ± 1.02		0.51 ± 0.51
BIVALVES	0.51 ± 0.51	34.63 ± 6.60	2.04 ± 1.44	0.51 ± 0.51
GASTROPODS	10.69 ± 2.81	59.59 ± 13.32	25.47 ± 13.53	7.13 ± 1.02
OTHERS		65.19 ± 18.40	0.51 ± 0.51	2.04 ± 1.48
TOTAL N/10cm^2	351.42 ± 93.77	751.73 ± 121.54	672.28 ± 198.65	978.87 ± 261.32
BIOMASS μg/10cm^2	378.43	979.20	669.55	1018.36

Table A2. (Continued)

	Aug 79 - Sta 8	Aug 79 - Sta 10	Aug 79 - Sta 12	Dec 79 - Sta 1
NEMATODES	268.91 ± 40.96	216.96 ± 93.05	74.87 ± 22.80	459.90 ± 25.63
COPEPODS	115.10 ± 24.25	80.47 ± 6.73	54.50 ± 9.75	38.20 ± 2.68
COPEPOD NAUPLII	78.43 ± 18.04	44.31 ± 12.51	27.50 ± 5.67	48.89 ± 4.40
OSTRACODS	59.08 ± 21.37	65.70 ± 29.49	1.02 ± 1.02	14.77 ± 5.22
ROTIFERS	157.37 ± 38.87	30.56 ± 9.19	20.37 ± 8.11	21.90 ± 9.75
TURBELLARIANS	2.55 ± 0.98	17.32 ± 6.58	6.62 ± 2.93	19.35 ± 2.42
POLYCHAETES	1.02 ± 0.59	[illegible] ± 1.32	36.67 ± 7.89	43.80 ± 8.21
OLIGOCHAETES			0.51 ± 0.51	
BIVALVES	2.04 ± 0.00	25.47 ± 8.08	9.68 ± 3.66	60.61 ± 11.20
GASTROPODS	25.46 ± 9.57	121.72 ± 25.85	74.36 ± 13.78	10.19 ± 1.44
OTHERS	3.57 ± 3.57	3.57 ± 2.97		2.55 ± 1.28
TOTAL N/10cm^2	713.53 ± 101.83	609.12 ± 175.10	306.09 ± 38.38	720.15 ± 43.95
BIOMASS μg/10cm^2	733.75	1008.80	631.58	859.23

	Aug 79 - Sta 9	Aug 79 - Sta 11	Aug 79 - Sta 13	Dec 79 - Sta 2
NEMATODES	175.20 ± 15.15	358.04 ± 57.27	625.93 ± 90.44	613.20 ± 119.35
COPEPODS	[illegible] ± 14.68	65.19 ± 10.05	85.05 ± 13.78	32.60 ± 8.02
COPEPOD NAUPLII	37.18 ± 7.64	29.03 ± 5.41	47.37 ± 13.37	23.94 ± 9.78
OSTRACODS	102.37 ± 14.70	14.77 ± 4.11	108.99 ± 28.48	23.94 ± 8.33
ROTIFERS	56.02 ± 5.91	16.30 ± 3.81	15.79 ± 5.41	23.94 ± 7.41
TURBELLARIANS	8.15 ± 3.22	36.67 ± 9.30	19.86 ± 3.15	29.03 ± 6.46
POLYCHAETES	4.58 ± 0.98	25.47 ± 6.68	6.62 ± 0.51	42.27 ± 5.96
OLIGOCHAETES	2.04 ± 0.83	1.02 ± 0.59		
BIVALVES	42.27 ± 13.65	17.32 ± 1.95	29.54 ± 5.85	36.67 ± 12.05
GASTROPODS	69.26 ± 18.28	59.59 ± 13.55	99.82 ± 32.44	2.55 ± 1.53
OTHERS	2.55 ± 1.95	4.07 ± 2.93	15.28 ± 5.47	1.02 ± 0.59
TOTAL N/10cm^2	587.73 ± 60.79	627.46 ± 76.39	1054.25 ± 122.12	829.14 ± 157.56
BIOMASS μg/10cm^2	815.73	933.81	[illegible]	917.98

Table A2. (Continued)

	Dec 79 - Sta 3	Dec 79 - Sta 5	Dec 79 - Sta 7	Dec 79 - Sta 9
NEMATODES	331.55 ± 26.19	922.85 ± 53.17	436.47 ± 88.92	473.65 ± 157.44
COPEPODS	66.21 ± 4.81	91.17 ± 12.73	57.55 ± 5.41	29.54 ± 7.74
COPEPOD NAUPLII	39.22 ± 10.73	61.12 ± 14.43	99.82 ± 26.18	38.71 ± 9.07
OSTRACODS	17.32 ± 7.37	30.05 ± 9.89	113.57 ± 23.65	23.94 ± 11.80
ROTIFERS	15.28 ± 7.91	9.17 ± 3.[illegible]	16.81 ± 7.77	10.19 ± 2.50
TURBELLARIANS	10.70 ± 5.22	41.25 ± 17.37	23.94 ± 3.37	39.22 ± 14.20
POLYCHAETES	17.83 ± [illegible].41	8.15 ± 3.72	15.79 ± 2.26	9.68 ± 3.47
OLIGOCHAETES	1.02 ± 0.59	2.04 ± 1.44	0.51 ± 0.51	
BIVALVES	1.02 ± 0.59	57.04 ± 2.20	21.39 ± 4.74	4.07 ± 2.35
GASTROPODS	26.99 ± 9.71	94.22 ± 25.67	106.44 ± 32.87	10.19 ± 4.16
OTHERS	1.02 ± 0.59	0.51 ± 0.51	1.02 ± 0.59	1.02 ± 1.02
TOTAL N/10cm²	528.14 ± 39.46	1317.56 ± 70.93	893.31 ± 151.11	640.19 ± 194.87
BIOMASS μg/10cm²	658.88	1650.41	1190.54	712.46

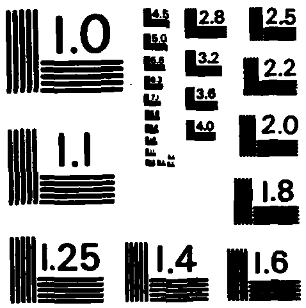
	Dec 79 - Sta 4	Dec 79 - Sta 6	Dec 79 - Sta 8	Dec 79 - Sta 10
NEMATODES	27[illegible].95 ± 44.59	720.66 ± 70.87	283.17 ± 118.59	582.64 ± 69.66
COPEPODS	39.22 ± 6.67	80.47 ± 10.34	33.10 ± 14.41	15.28 ± 2.70
COPEPOD NAUPLII	21.39 ± 11.89	107.97 ± 21.38	38.71 ± 9.45	42.27 ± 5.28
OSTRACODS	3.57 ± 1.74	55.00 ± 7.76	17.83 ± 7.27	182.84 ± 25.00
ROTIFERS	3.57 ± 1.53	40.24 ± 16.52	5.60 ± 1.93	5.60 ± 4.35
TURBELLARIANS	15.28 ± 4.89	18.84 ± 7.59	5.60 ± 3.85	58.06 ± 20.72
POLYCHAETES	15.79 ± 7.17	6.11 ± [illegible].20	4.58 ± 2.68	33.61 ± 10.13
OLIGOCHAETES				
BIVALVES	7.13 ± 0.59	11.71 ± 6.35	5.09 ± 2.42	11.71 ± 3.15
GASTROPODS	14.26 ± 7.11	66.72 ± 17.94	35.65 ± 12.01	31.07 ± 17.13
OTHERS		0.51 ± 0.51	0.51 ± 0.51	1.53 ± 0.98
TOTAL N/10cm²	391.14 ± 59.96	1108.24 ± 129.02	429.85 ± 162.52	964.61 ± 113.51
BIOMASS μg/10cm²	489.90	1248.98	523.11	1087.30

AD-A126 848 ECOLOGICAL CHARACTERIZATION OF THE BENTHIC COMMUNITY OF LAKE PONTCHARTRAI..(U) LOUISIANA STATE UNIV BATON ROUGE COASTAL ECOLOGY LAB W B SIKORA ET AL. APR 82

UNCLASSIFIED LSU-CEL-82-05 DACW29-79-C-0099 F/G 8/8 NL

3A

END
DATE
FILMED
5 83
DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Table A2. (Continued)

	Dec 79 - Sta 11	Dec 79 - Sta 13	Feb 80 - Sta 2	Feb 80 - Sta 4
NEMATODES	895.86 ± 82.07	1325.20 ± 137.68	630.00 ± 73.69	803.68 ± 124.59
COPEPODS	59.08 ± 11.49	45.33 ± 3.04	48.89 ± 6.76	123.25 ± 11.36
COPEPOD NAUPLII	78.43 ± 14.75	42.27 ± 7.64	59.08 ± 16.45	152.28 ± 36.51
OSTRACODS	42.78 ± 16.17	101.35 ± 45.75	17.83 ± 12.54	41.76 ± 15.35
ROTIFERS	18.84 ± 8.97	6.11 ± 2.99	5.09 ± 1.32	3.57 ± 1.74
TURBELLARIANS	14.77 ± 4.35	17.32 ± 10.86	20.88 ± 6.62	42.27 ± 8.08
POLYCHAETES	8.66 ± 1.53	3.06 ± 1.76	4.58 ± 1.74	7.64 ± 1.93
OLIGOCHAETES	1.02 ± 0.59	0.51 ± 0.51	0.51 ± 0.51	1.02 ± 0.59
BIVALVES	6.11 ± 1.44	1.02 ± 0.59	2.55 ± 0.98	1.02 ± 1.02
GASTROPODS	18.84 ± 7.36	64.17 ± 34.54	5.09 ± 1.02	10.69 ± 3.04
OTHERS	2.04 ± 2.04	16.29 ± 8.85		
TOTAL N/10cm^2	1146.43 ± 123.28	1622.63 ± 228.88	794.51 ± 99.88	1187.18 ± 188.78
BIOMASS µg/10cm^2	1129.83	1656.77	792.04	1263.23

	Dec 79 - Sta 10	Feb 80 - Sta 1	Feb 80 - Sta 3	Feb 80 - Sta 5
NEMATODES	424.25 ± 60.78	424.76 ± 53.89	604.54 ± 122.41	1176.99 ± 146.79
COPEPODS	55.51 ± 12.89	110.52 ± 13.08	82.51 ± 7.13	60.09 ± 10.03
COPEPOD NAUPLII	39.73 ± 1.95	132.93 ± 18.83	153.29 ± 44.76	114.08 ± 11.73
OSTRACODS	7.13 ± 2.12	4.07 ± 1.44	21.39 ± 7.55	86.58 ± 26.02
ROTIFERS	47.87 ± 6.68	14.77 ± 3.66	2.04 ± 1.44	0.51 ± 0.51
TURBELLARIANS	43.79 ± 1.76	47.87 ± 12.18	45.33 ± 10.66	88.11 ± 24.18
POLYCHAETES	28.52 ± 8.92	10.19 ± 2.99	15.79 ± 4.27	2.55 ± 1.53
OLIGOCHAETES		0.51 ± 0.51	2.04 ± 0.00	1.53 ± 0.98
BIVALVES	8.66 ± 4.51	8.66 ± 5.28	1.53 ± 0.51	11.71 ± 3.47
GASTROPODS	13.24 ± 4.59	3.57 ± 0.98	11.71 ± 3.04	13.24 ± [illegible]
OTHERS	0.51 ± 0.51	0.51 ± 0.51	1.02 ± 1.02	2.04 ± [illegible]
TOTAL N/10cm^2	669.22 ± 74.89	758.35 ± 55.93	941.19 ± 171.62	1557.44 ± 169.70
BIOMASS µg/10cm^2	816.71	900.80	1041.79	1618.55

Table A2. (Continued)

	Feb 80 - Sta 6			Feb 80 - Sta 8			Feb 80 - Sta 10			Feb 80 - Sta 12		
N[illegible]TODES	626.95	±	161.16	792.47	±	39.53	681.95	±	64.33	361.60	±	44.65
COPEPODS	57.04	±	11.25	125.80	±	12.26	42.27	±	6.19	45.64	±	3.06
COPEPOD NAUPLII	42.78	±	10.78	95.24	±	16.07	74.87	±	19.42	84.54	±	5.55
OSTRACODS	41.25	±	21.00	22.41	±	2.20	44.31	±	14.84	5.60	±	1.74
ROTIFERS	1.53	±	0.51	5.09	±	1.32				22.92	±	10.92
TURBELLARIANS	38.20	±	14.29	17.32	±	4.59	40.23	±	16.24	42.27	±	14.70
POLYCHAETES				2.04	±	2.04	11.71	±	1.74	5.60	±	1.74
OLIGOCHAETES				0.51	±	0.51						
BIVALVES	2.55	±	1.28	3.06	±	1.02	1.02	±	0.59	4.07	±	1.86
GASTROPODS	12.73	±	3.57	15.28	±	4.88	11.20	±	3.77	6.62	±	2.68
OTHERS	1.53	±	1.53	0.51	±	0.51						
TOTAL N/10cm^2	824.56	±	181.85	1079.72	±	39.56	907.57	±	82.96	579.07	±	66.83
BIOMASS μg/10cm^2	882.66			1135.77			948.57			656.12		

	Feb 80 - Sta 7			Feb 80 - Sta 9			Feb 80 - Sta 11			Feb 80 - Sta 13		
NEMATODES	470.59	±	47.14	365.68	±	144.36	1308.90	±	58.49	1258.99	±	281.41
COPEPODS	69.26	±	24.69	35.14	±	9.46	134.96	±	13.83	99.62	±	6.91
COPEPOD NAUPLII	61.62	±	6.02	139.55	±	38.45	264.84	±	17.95	173.67	±	13.85
OSTRACODS	70.79	±	7.22	3.06	±	1.32	91.67	±	22.61	153.81	±	31.59
ROTIFERS	21.90	±	14.05	2.55	±	0.51	3.06	±	1.95	1.53	±	1.53
TURBELLARIANS	39.22	±	10.98	51.44	±	9.24	48.38	±	2.80	8.66	±	4.43
POLYCHAETES	2.55	±	1.28	10.19	±	5.45	5.09	±	1.02	3.06	±	2.42
OLIGOCHAETES	0.51	±	0.51	1.02	±	1.02	0.51	±	0.51			
BIVALVES	2.04	±	0.83	4.58	±	2.68	3.06	±	1.32	1.02	±	1.02
GASTROPODS	22.41	±	5.45	1.02	±	1.02	15.28	±	2.70	52.97	±	8.02
OTHERS										26.48	±	11.03
TOTAL N/10cm^2	760.89	±	44.55	614.22	±	196.16	1875.75	±	34.05	1780.00	±	330.92
BIOMASS μg/10cm^2	855.81			686.99			1846.35			1765.22		

Table A2. (Continued)

	May 80 - Sta 1	May 80 - Sta 3	May 80 - Sta 5	May 80 - Sta 7
NEMATODES	698.76 ± 109.26	253.12 ± 43.53	2010.72 ± 267.94	535.27 ± 91.19
COPEPODS	17.32 ± 4.52	42.78 ± 14.95	41.25 ± 3.75	35.14 ± 6.62
COPEPOD NAUPLII	49.40 ± 17.88	19.35 ± 4.12	76.90 ± 17.94	29.03 ± 8.69
OSTRACODS		90.66 ± 32.22	189.46 ± 97.95	74.87 ± 15.16
ROTIFERS	34.63 ± 16.40	14.26 ± 7.20	18.34 ± 9.19	216.96 ± 80.19
TURBELLARIANS	14.77 ± 3.93	12.73 ± 5.66	9.68 ± 3.75	4.58 ± 1.93
POLYCHAETES	5.60 ± 1.53	2.04 ± 0.83	0.51 ± 0.51	0.51 ± 0.51
OLIGOCHAETES	0.51 ± 0.51	1.02 ± 0.59		
BIVALVES			0.51 ± 0.51	
GASTROPODS	6.62 ± 2.55	0.51 ± 0.51	1.02 ± 1.02	
OTHERS	2.04 ± 2.04	1.02 ± 1.02	6.11 ± 4.35	6.11 ± 1.48
TOTAL N/10cm^2	829.65 ± 125.45	437.49 ± 63.05	2354.49 ± 366.25	902.48 ± 187.69
BIOMASS μg/10cm^2	773.67	423.11	2000.28	707.57

	May 80 - Sta 2	May 80 - Sta 4	May 80 - Sta 6	May 80 - Sta 8
NEMATODES	765.48 ± 136.18	394.71 ± 40.12	597.41 ± 105.71	575.51 ± 56.30
COPEPODS	21.90 ± 4.80	53.99 ± 3.48	37.69 ± 3.17	55.51 ± 5.60
COPEPOD NAUPLII	38.71 ± 4.92	16.81 ± 5.96	29.54 ± 12.52	45.33 ± 8.12
OSTRACODS	29.54 ± 10.86	90.15 ± 52.29	212.69 ± 53.19	148.72 ± 56.78
ROTIFERS	8.66 ± 2.26	27.50 ± 15.99	15.28 ± 8.98	22.92 ± 6.29
TURBELLARIANS	8.15 ± 2.20	13.75 ± 2.26	4.07 ± 2.88	5.09 ± 3.17
POLYCHAETES	5.09 ± 1.32	5.09 ± 1.95		0.51 ± 0.51
OLIGOCHAETES		1.53 ± 0.51	0.51 ± 0.51	
BIVALVES	1.02 ± 0.59		0.51 ± 0.51	
GASTROPODS	0.51 ± 0.51	0.51 ± 0.51	1.02 ± 0.59	
OTHERS		4.07 ± 2.44	14.26 ± 5.76	7.64 ± 3.33
TOTAL N/10cm^2	879.05 ± 137.57	608.10 ± 108.66	913.17 ± 143.48	861.23 ± 71.69
BIOMASS μg/10cm^2	784.36	594.36	771.04	753.91

Table A2. (Continued)

	May 80 - Sta 9	May 80 - Sta 11	May 80 - Sta 13	Aug 80 - Sta 2
NEMATODES	501.66 ± 140.89	923.87 ± 43.04	1341.50 ± 137.94	89.64 ± 13.59
COPEPODS	49.40 ± 10.98	73.34 ± 16.94	93.20 ± 19.98	8.15 ± 3.63
COPEPOD NAUPLII	23.43 ± 1.95	79.96 ± 5.66	31.07 ± 8.68	99.31 ± 43.61
OSTRACODS	11.20 ± 5.16	308.13 ± 52.94	258.22 ± 48.19	
ROTIFERS	31.58 ± 18.85	62.64 ± 20.12	4.58 ± 2.10	60.10 ± 9.86
TURBELLARIANS	24.96 ± 8.82	21.90 ± 7.50	11.20 ± 2.12	0.51 ± 0.51
POLYCHAETES	34.63 ± 29.27	2.04 ± 1.18	3.57 ± 0.98	5.09 ± 2.12
OLIGOCHAETES	2.04 ± 0.83		1.02 ± 0.59	
BIVALVES	0.51 ± 0.51	3.06 ± 1.32	0.51 ± 0.51	3.57 ± 2.93
GASTROPODS	2.55 ± 0.98	3.56 ± 0.51	3.06 ± 1.32	14.77 ± 5.78
OTHERS	2.55 ± 1.53	3.06 ± 2.04	28.01 ± 10.08	0.51 ± 0.51
TOTAL N/10cm^2	684.50 ± 144.55	1481.55 ± 110.11	1775.93 ± 109.03	281.64 ± 57.78
BIOMASS μg/10cm^2	763.94	1277.55	1609.83	261.23

	May 80 - Sta 10	May 80 - Sta 12	Aug 80 - Sta 1	Aug 80 - Sta 3
NEMATODES	552.59 ± 33.61	243.45 ± 53.52	96.77 ± 10.47	390.63 ± 33.79
COPEPODS	44.31 ± 13.75	38.20 ± 3.15	33.61 ± 5.29	70.79 ± 5.96
COPEPOD NAUPLII	11.71 ± 2.26	23.94 ± 7.08	24.45 ± 3.00	52.97 ± 6.65
OSTRACODS	43.29 ± 7.95	28.01 ± 12.84	0.51 ± 0.51	3.06 ± 1.32
ROTIFERS	5.01 ± 2.70	40.74 ± 23.06	122.74 ± 33.49	137.51 ± 33.95
TURBELLARIANS	14.77 ± 10.73	11.71 ± 0.98		68.25 ± 15.28
POLYCHAETES	5.09 ± 2.12	20.88 ± 3.15		172.14 ± 37.70
OLIGOCHAETES	1.02 ± 0.59			2.04 ± 1.44
BIVALVES	0.51 ± 0.51	0.51 ± 0.51	35.65 ± 12.60	47.36 ± 13.95
GASTROPODS	9.17 ± 1.95	3.06 ± 1.76	2.04 ± 0.83	150.75 ± 29.78
OTHERS	2.04 ± 1.02	3.06 ± 1.02		1.53 ± 0.98
TOTAL N/10cm^2	689.59 ± 45.22	413.55 ± 92.44	315.77 ± 42.95	1097.03 ± 159.34
BIOMASS μg/10cm^2	6[illegible]9.18	460.94	285.18	1951.67

Table A2. (Continued)

	Aug 80 - Sta 4	Aug 80 - Sta 6	Aug 80 - Sta 8	Aug 80 - Sta 10
NEMATODES	185.39 ± 35.67	352.94 ± 54.55	302.01 ± 32.74	280.62 ± 55.52
COPEPODS	40.74 ± 9.52	102.88 ± 14.25	116.63 ± 16.39	95.24 ± 3.85
COPEPOD NAUPLII	79.45 ± 13.44	83.02 ± 5.15	83.53 ± 13.79	72.83 ± 11.01
OSTRACODS	13.75 ± 3.15	91.67 ± 25.69	1.02 ± 0.59	8.15 ± 4.63
ROTIFERS	39.22 ± 4.58	165.52 ± 34.77	22.92 ± 2.81	18.34 ± 4.48
TURBELLARIANS	26.99 ± 6.35	32.09 ± 18.95	7.13 ± 5.29	30.56 ± 5.45
POLYCHAETES	86.07 ± 13.00	8.15 ± 2.76	16.81 ± 4.11	68.25 ± 12.49
OLIGOCHAETES	5.60 ± 4.[illegible]	1.53 ± 0.98		0.51 ± 0.51
BIVALVES	37.18 ± 10.13	19.86 ± 5.08	24.96 ± 4.43	45.33 ± 7.68
GASTROPODS	66.21 ± 16.22	79.45 ± 16.11	57.55 ± 9.82	66.21 ± 10.54
OTHERS	4.07 ± 2.50	12.73 ± 6.50	2.04 ± 0.83	0.51 ± 0.51
TOTAL N/10cm^2	584.68 ± 66.17	949.84 ± 144.48	634.59 ± 48.07	686.54 ± 89.59
BIOMASS μg/10cm^2	995.89	1207.06	897.47	1120.23

	Aug 80 - Sta 5	Aug 80 - Sta 7	Aug 80 - Sta 9	Aug 80 - Sta 11
NEMATODES	236.32 ± 38.56	102.37 ± 32.83	224.09 ± 22.55	686.03 ± 100.60
COPEPODS	92.18 ± 10.53	100.33 ± 22.04	88.11 ± 9.96	31.58 ± 6.36
COPEPOD NAUPLII	88.11 ± 26.74	160.43 ± 12.46	72.32 ± 9.35	50.42 ± 7.55
OSTRACODS	6.62 ± 4.02		1.02 ± 0.59	18.33 ± 7.11
ROTIFERS	28.01 ± 8.21	106.95 ± 21.82	19.35 ± 2.56	28.01 ± 12.40
TURBELLARIANS	2.04 ± 0.83	0.51 ± 0.51	15.79 ± 2.93	90.66 ± 12.46
POLYCHAETES	15.28 ± 3.17		51.44 ± 6.72	65.70 ± 11.83
OLIGOCHAETES			0.51 ± 0.51	9.17 ± 1.02
BIVALVES	10.19 ± 0.83	30.56 ± 7.20	25.47 ± 6.14	19.35 ± 5.29
GASTROPODS	83.02 ± 19.40	9.17 ± 2.94	34.12 ± 11.68	129.87 ± 14.93
OTHERS	1.53 ± 1.53	0.51 ± 0.51	0.51 ± 0.51	5.60 ± 4.28
TOTAL N/10cm^2	563.29 ± 52.96	510.83 ± 61.72	532.73 ± 26.12	1134.72 ± 141.49
BIOMASS μg/10cm^2	851.18	528.03	801.62	1753.88

Table A2. (Continued)

	Aug 80 - Sta 12		
NEMATODES	35.14	±	1.53
COPEPODS	11.71	±	1.53
COPEPOD NAUPLII	23.94	±	2.10
OSTRACODS	0.51	±	0.51
ROTIFERS	162.47	±	5.84
TURBELLARIANS			
POLYCHAETES	[illegible].53	±	0.98
OLIGOCHAETES			
BIVALVES	1.02	±	1.02
GASTROPODS	0.51	±	0.51
OTHERS			
TOTAL N/10cm^2	236.82	±	5.41
BIOMASS µg/10cm^2	147.15		

	Aug 80 - Sta 13		
NEMATODES	1264.59	±	320.29
COPEPODS	75.38	±	18.65
COPEPOD NAUPLII	77.92	±	9.71
OSTRACODS	28.52	±	4.78
ROTIFERS	26.99	±	7.50
TURBELLARIANS	8.66	±	2.41
POLYCHAETES	36.67	±	6.17
OLIGOCHAETES			
BIVALVES	15.28	±	6.93
GASTROPODS	21.90	±	3.93
OTHERS	3.57	±	3.57
TOTAL N/10cm^2	1559.48	±	297.51
BIOMASS µg/10cm^2	1557.28		

APPENDIX B

Systematic List of Benthic Invertebrates in Lake Pontchartrain

The following list comprises a taxonomic inventory of the soft bottom benthic invertebrates, exlcuding the epifaunal (fouling) community, found during the present study, the initial survey (Bahr et al., 1980) and a preliminary qualitative survey of 17 littoral areas of the lake. The list is not exhaustive but rather comprises the commonly encountered organisms. Numbers in brackets after each organism indicate the habitat in which the organism was found:

[1] open lake only
[2] open lake and littoral
[3] littoral only, intertidal or in marshes
[4] passes only or in close proximity to passes.

MACROFAUNA

Phylum Rhynococoela

Unidentified species [2]

Phylum Annelida

Class Polychaeta
Order Spionida
Fam. Spionidae
Boccardia sp. [1]
Polydora cf. *socialis* (Schmarda, 1861) [1]
Streblospio benedicti (Webster, 1879) [1]
Order Capitellida
Fam. Capitellidae
Capitella cf. *capitata* (Fabricius, 1780) [1]
Mediomastus californiensis (Hartman, 1947) [1]
Order Nereidiforma
Fam. Pilargiidae
Parandalia americana (Hartman, 1947) [1]
Fam. Nereidae
Laeonereis culveri (Webster, 1880) [2]
Nereis succinea (Frey and Leuckart, 1847) [2]

Order Terebellidae

Fam. Ampharetidae

Hypaniola florida (Hartman, 1951) now *Hobsonia florida*

Class Oligochaeta

Fam. Naididae

Paranais litoralis (Muller, 1784) [1[and [2?]

Fam. Tubificidae

Aulodrilus pigueti Kowalewski, 1914 [1] and [2?]

Limnodrilus cervix Brinkhurst, 1963 [1] and [2?]

Limnodrilus claparedeianus Ratzel, 1868 [1] and [2?]

Limnodrilus hoffmeisteri Claparede, 1862 [1] and [2?]

Monopylephorus sp. [1] and [2?]

Tubificoides heterochaetus (Michaelsen, 1926) (= *Peloscolex*) [1] and [2?]

Phylum Mollusca

Class Gastropoda

Fam. Neritidae

Neritina reclivata (Say, 1822) [3]

Fam. Littorinidae

Littorina irrorata (Say, 1822) [3]

Fam. Hydrobiidae

Littoridinops palustris Thompson, 1968 [3]

Probythinella louisianae (Morrison, 1965) (= *Vioscalba*) [1]

Texadina sphinctostoma (Abbott and Ladd, 1951) (= *Littoridina*) [1]

Fam. Ellobiidae

Detracia floridana Pfeiffer, 1856 [3]

Melampus bidentatus Say, 1822 [3]

Fam. Physidae

Physa spp. [3]

Class Bivalvia

Order Mytiloida

Fam. Mytilidae

Ischadium recurvum (Rafinesque, 1820) (= *Brachidontes*) [2]

Amygdalum papyria (Conrad, 1846) [3] and [4]

Geukensia demissa (Dillwyn, 1817) (= *Modiolus*) [3]

Fam. Dreissenidae

Mytilopsis leucophaeta (Conrad, 1831) (= *Congeria*) [2]

Order Pterioda

Fam. Ostreidae

Crassostrea virginica (Gmelin, 1791) [2] and [4]

Order Veneroida

Fam. Corbiculidae

Polymesoda caroliniana (Bosc, 1802) [3]

Fam. Mactridae

Mulinia ponchartrainensis Morrison, 1965 [2]
Rangia cuneata (Gray, 1831) [2]

Fam. Tellinidae

Macoma mitchelli Dall, 1895 [1]

Fam. Solecurtidae

Tagelus plebeius (Lightfoot, 1786) [2?]

Phylum Arthropoda

Class Crustacea

Order Mysidacea

Fam. Mysidae

Mysidopsis almyra Bowman, 1964 [2]
Mysidopsis bahia Molenock, 1969 [3]
Taphromysis cf. bowmani Bacescu, 1961 [3]
Taphromysis louisianae Banner, 1953 [3]

Order Cumacea

Fam. Nannastacidae

Almyracuma sp. (undescribed species) [2]

Order Tanaidacea

Fam. Paratanaidae

Hargaria rapax (Hargar, 1879) (= Leptochelia) [3] and [4]

Order Isopoda

Fam. Idoteidae

Edotea montosa (Stimpson, 1853) [2]

Fam. Anthuridae

Cyathura polita (Stimpson, 1855) [2]

Fam. Sphaeromatidae

Cassidinidea lunifrons (Richardson, 1900) [2]
Sphaeroma terebrans Bate, 1866 (= S. destructor Richardson, 1897) [3]

Fam. Asellidae

Asellus sp. [3]
Lirceus sp. [3]

Fam. Munnidae

Munna cf. reynoldsi Frankenberg and Menzies, 1966 [3]

Fam. Ligiidae

Ligia exotica Roux, 1828 [3]

Order Amphipoda

Fam. Gammaridae

Gammarus mucronatus Say, 1818 [2]
Gammarus tigrinus Sexton, 1939 [2]
Gammarus sp. ("mucronate form") [3]

Fam. Melitidae
Melita nitida Smith, 1873 (may be a complex of species) [2]

Fam. Amphilochidae
Gitanopsis sp. (underscribed species) [2]

Fam. Oedicerotidae
Monoculodes edwardsi Holmes, 1905 [2]

Fam. Haustoriidae
Lepidactylus sp. [3]

Fam. Hyalellidae
Hyalella azteca Saussure, 1857 [2]

Fam. Talitridae
Orchestia grillus (Bosc, 1802) [3]
Orchestia platensis Krøyer, 1845 [3]
Orchestia uhleri Shoemaker, 1936 [3]

Fam. Aoridae
Grandidierella bonnieroides Stephenson, 1948

Fam. Corophiidae
Cerapus benthophilus Thomas and Heard, 1979 [4]
Corophium lacustre Vanhoffen, 1911 [2]
Corophium louisianum Shoemaker, 1934 [3]

Order Decapoda
Suborder Natantia

Fam. Penaeidae
Penaeus aztecus Ives, 1891 [2]
Penaeus setiferus Linnaeus, 1767 [2]

Fam. Palaemonidae
Macrobrachium ohione (Smith, 1874) [3]
Palaemonetes kadiokensis Rathbun, 1902 [3]
Palaemonetes intermedius Holthius, 1949 [3]
Palaemonetes paludosus (Gibbes, 1850) [3]
Palaemonetes pugio Holthius, 1949 [3]
Palaemonetes vulgaris (Say, 1818) [3]

Suborder Reptantia
Section Macrura

Fam. Callianassidae
Callianassa jamaicense Schmitt, 1935 [4]

Section Brachyura

Fam. Portunidae
Callinectes sapidus Rathburn, 1896 [2]

Fam. Xanthidae
Panopeus herbstii Milne Edwards, 1834 [4]
Rhithropanopeus harrisii (Gould, 1841) [2]

Fam. Grapsidae
Sesarma cinereum (Bosc, 1801-02) [3]
Sesarma reticulatum (Say, 1817) [3]

Fam. Ocypodidae
Uca longisignalis Salmon and Atsides, 1968 [3]
Uca minax (LeConte, 1855) [3]
Uca panacea Novak and Salmon, 1974 [3]
Uca spinicarpa Rathbun, 1900 [3]

Class Insecta
Order Diptera
Fam. Chironomidae (larvae)
Ablabesmyia sp. [2]

Coelotanypus sp. [2]

Cryptotanypus sp. [2]

MEIOFAUNA

Phylum Platyhelminthes

Class Turbellaria
Undentified spp.

Phylum Rotifera

Class Monogononta
Brachionus sp.
Chromogaster sp.
Cordylosoma sp.
Eosphora sp.
Keratella sp.
Polyarthra vulgaris Carlin, 1943
Proales sp.
Sinantherina sp.
Synchaeta sp.

Phylum Kinorhyncha

Unidentified sp.

Phylum Nematoda

Class Adenophorea (= Aphasmida)

Fam. Comesomatidae
- *Sabatiera* sp.

Fam. Sphaerolaimidae
- *Sphaerolaimus* sp. 1
- *Sphaerolaimus* sp. 2

Fam. Monhysteridae
- *Theristus* sp. 1
- *Theristus* sp. 2

Phylum Arthropoda

Class Crustacea
Subclass Ostracoda
Order Podocopida
- Unidentified spp.

Subclass Copepoda
Order Calanoida

Fam. Temoridae
- *Eurytemora affinis* (Pappe, 1880)

Fam. Acartiidae
- *Acartia tonsa* Dana, 1849

Order Harpacticoida

Fam. Canuellidae
- *Scottolana canadensis* (Willey, 1923)

Fam. Ectinosomidae
- *Pseudobradya* sp.

Fam. Tachidiidae
- *Microarthridion littorale* (Pappe, 1881)

Fam. Diosaccidae
- *Schizopera knabeni* (Lang, 1965)

Fam. Ameiridae
- *Nitocra lacustris* (Schmankevitsch, 1875)

Fam. Cletodidae
- *Enhydrosoma* sp.

Fam. Laophontidae
- *Onychocamptus mohammed* (Blanchard and Richard, 1891)
- *Pseudostenhelia wellsi* (Coull and Fleeger, 1977)

DISCUSSION

The above systematic list is composed primarily of organisms found in and on soft bottom substrates in Lake Pontchartrain during the present study. For coverage of the hard substrate, epifaunal fouling community in Lake Pontchartrain the reader is referred to Porrier and Mulino (1975, 1977). Some species, however, such as Mytilopsis leucophaeta are never found singly in soft mud but rather colonize dead Rangia shells lying on the surface of soft mud. Other species which deserve mention but which were omitted from the list are parasites which parasitize benthic invertebrates. The leech Myzobdella lugubris Leidy, 1851 is found on blue crabs and catfish. The isopods Probopyrus floridensis Richardson, 1904 and P. pandalicola (Packard 1879) parasitize Palaemonetes paludosus and Palaemonetes pugio, repectively and Probopyrus bithynes Richardson, 1904 parasitizes Macrobrachium ohione.

Several species are notable because of their absence. Rangia flexuosa (Conrad 1839) was absent. No dead shells of this species were ever found either, although several "flexuosa" shaped shells were found that were actually Rangia cuneata as diagnosed by the hinge teeth. Another species which was not found during the present study but which has been reported by Tarver and Savoie (1976) was Tellina texana.

A curious situation presents itself in the case of Polymesoda caroliniana, the carolina marsh clam. Both Dugas et al. (1974) and Tarver and Savoie (1976) report numerous individuals from Peterson grab stations in open water. This clam was never encountered at any of the open lake, box core stations in the present study nor were any dead shells found at these stations. This clam is usually restricted to the intertidal or shallow subtidal littoral zone. Its reported occurrence in open water areas of the lake is unexplained unless there was some error in identification or sample labelling in previous studies.

Tagelus plebeius was reported as occurring in low densities in eastern Lake Pontchartrain by Dugas et al. (1974). Two specimens were encountered in the present study, a juvenile at Station 10 and an adult at Station 13, both in February 1977. This species may occur in the littoral area but because of its deep burrowing habits, it may have been missed.

Thomas and Heard (1979) mentioned in the ecological notes accompanying the description of Cerapus benthophilus that Ampelisca abdita usually occurs abundantly in close proximity to C. benthophilus in salinities of 1-15°/₀₀. No Ampelisca abdita were found in the present study even though the lake bottom, where there was little or no current influence, should be a suitable habitat.

The insect family Chironomidae is represented by three genera. However, the fauna is overwhelmingly dominated (99%) by a single undetermined species of Ablabesmyia. Members of this genus are reported to be predacious.

The meiofauna is composed of the true meiofauna and the temporary meiofauna which are the smallest larval and post larval stages of macrofaunal polychaetes, gastropods and bivalves. Only the true meiofauna are included in the list. Determinations were made to the lowest practical taxon.

LITERATURE CITED

Dugas, R. J., J. W. Tarver, and L. S. Nutwell. 1974. The mollusk communities of Lakes Pontchartrain and Maurepas, Louisiana. Louisiana Wild Life and Fisheries Commission, New Orleans, LA. Tech. Bull. 10. pp. 1-13.

Porrier, M. A., and M. M. Mulino. 1975. The effects of the 1973 opening of the Bonnet Carre Spillway upon epifaunal invertebrates in southern Lake Pontchartrain. Proc. Louisiana Acad. Sci. 38:36-40.

__________, and __________. 1977. The impact of the 1975 Bonnet Carre Spillway opening on epifaunal invertebrates in southern Lake Pontchartrain. J. Elish Mitchell Sci. Soc. 93:11-18.

Tarver, J. W., and L. B. Savoie. 1976. An inventory and study of the Lake Pontchartrain-Lake Maurepas estuarine complex, Phase II-Biology, Section III Mollusks collected in Peterson samples. Louisiana Wildlife and Fisheries Commission, New Orleans, LA. Tech. Bull. 19. pp. 87-99.

Thomas, J. D., and R. W. Heard. 1979. A new species of Cerapus Say, 1817 (Crustacea: Amphipoda) from the northern Gulf of Mexico, with notes on its ecology. Proc. Biol. Soc. Wash. 92:98-105.

APPENDIX C

Dendrograms resulting from numerical classification of the macrofauna data from each sampling period for each station. Description of the analysis used is in the Methods section (pp. 31-32) Evaluation of each cluster is found in the Results section for each station (pp. 33-62).

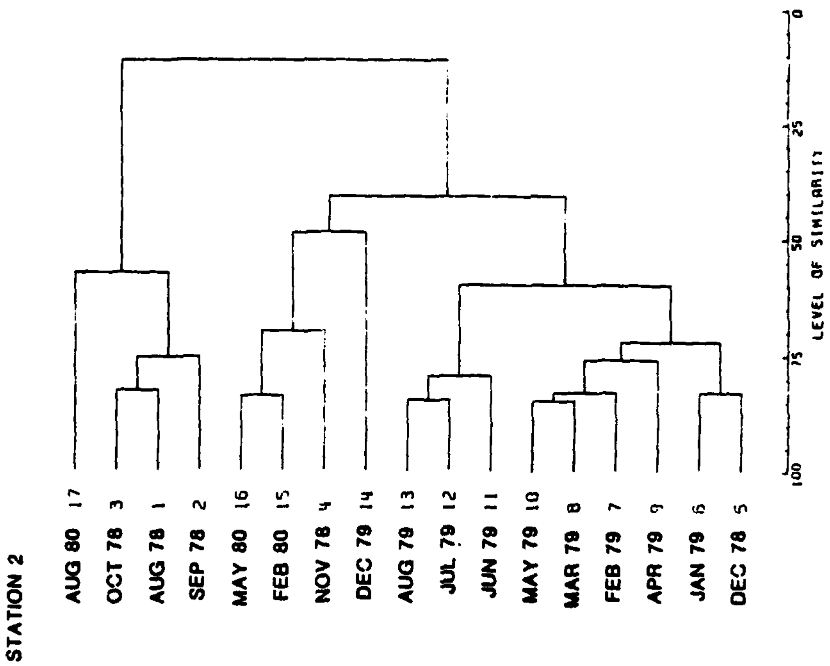


Figure C2.

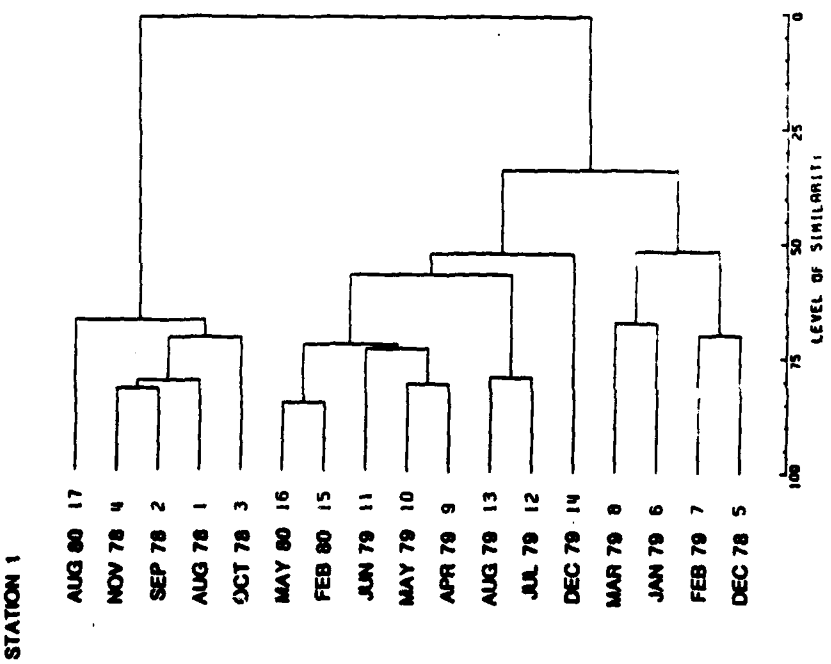


Figure C1.

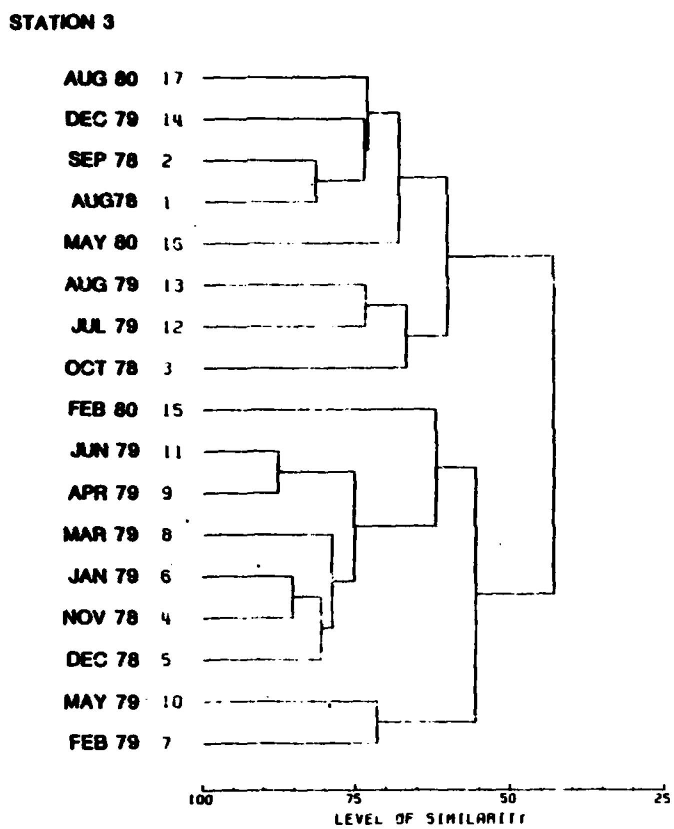


Figure C3.

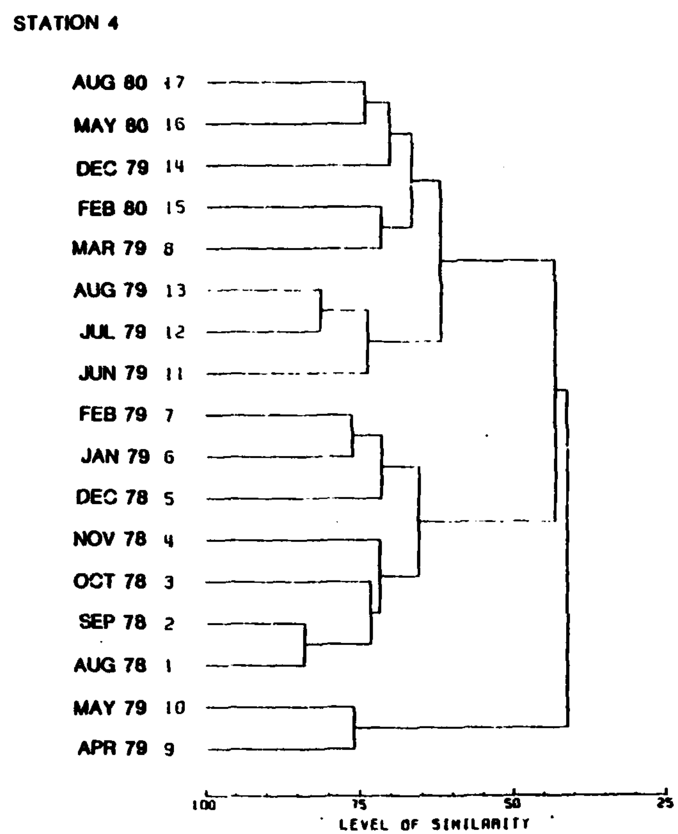


Figure C4.

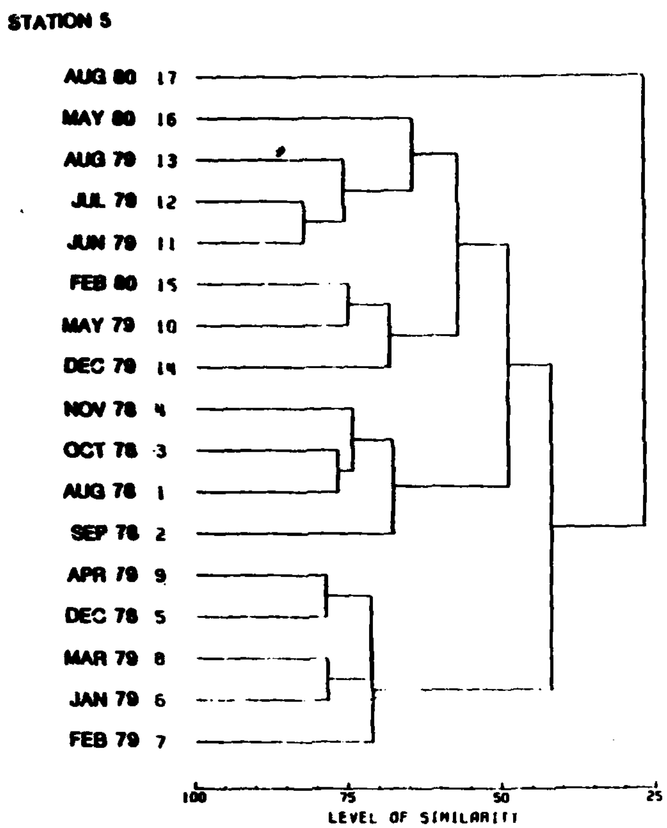


Figure C5.

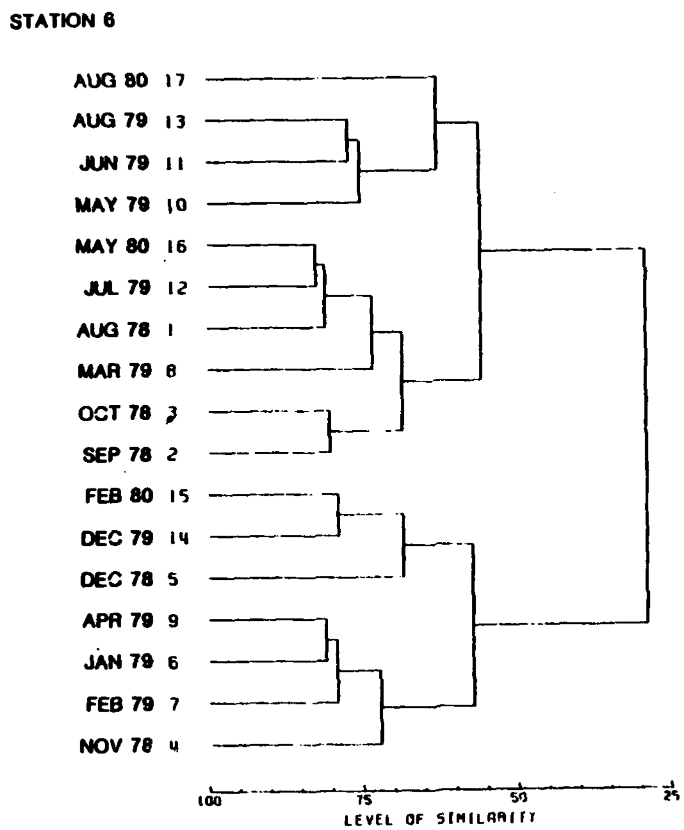


Figure C6.

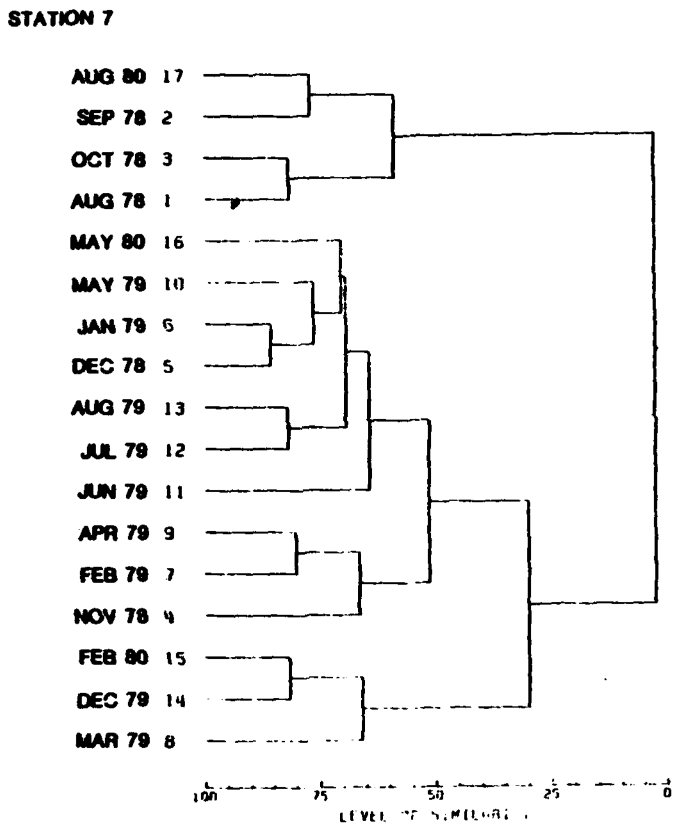


Figure C7.

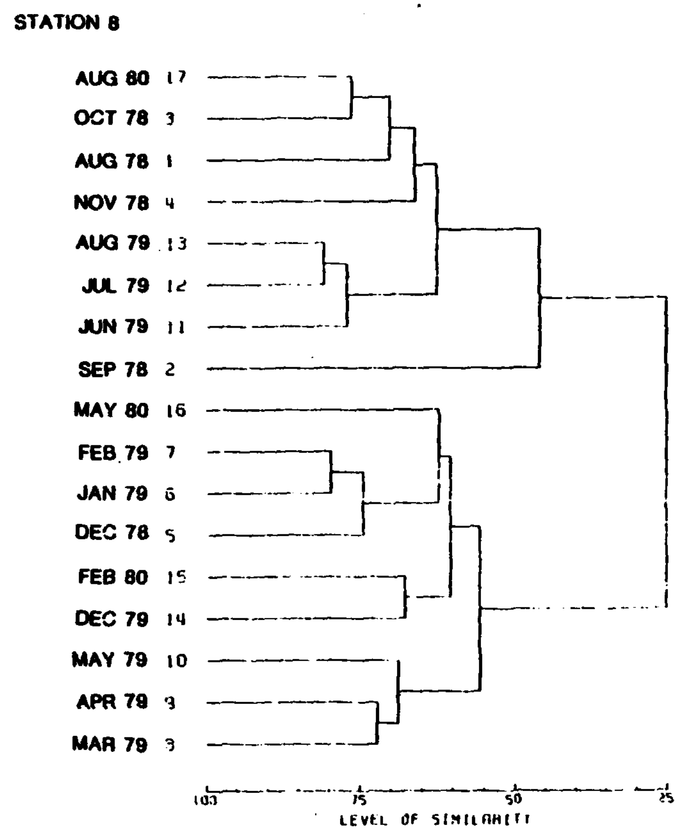


Figure C8.

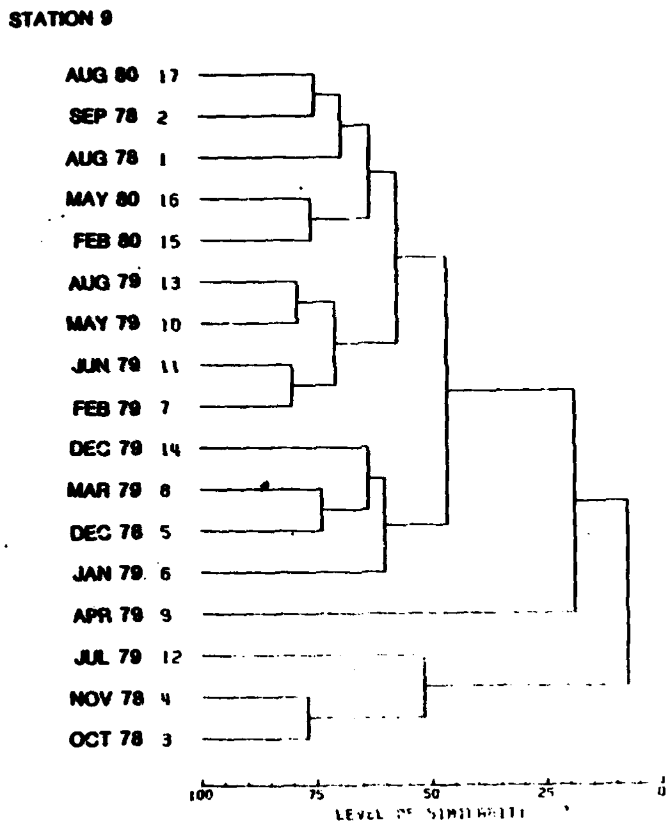


Figure C9.

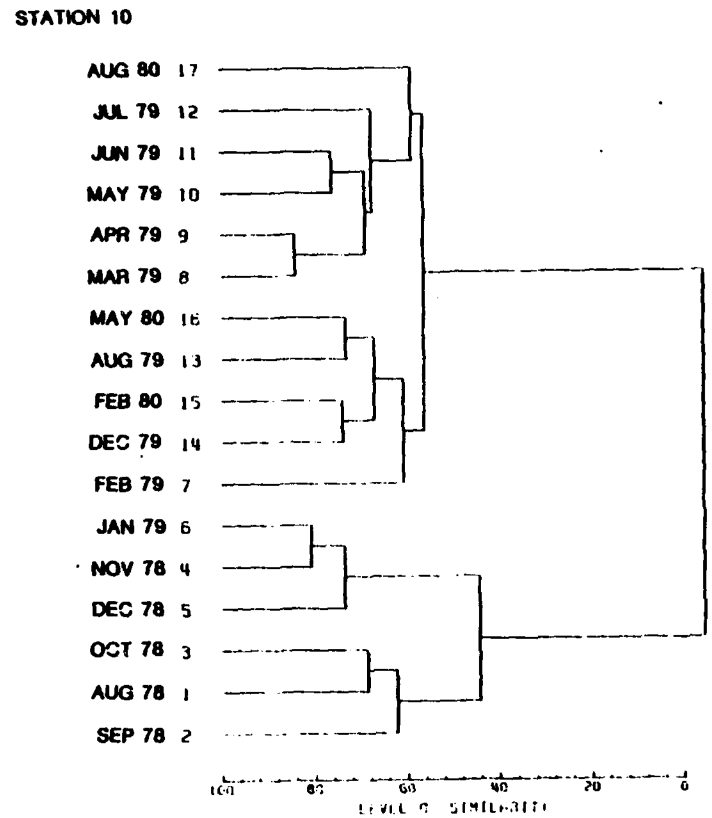


Figure C10.

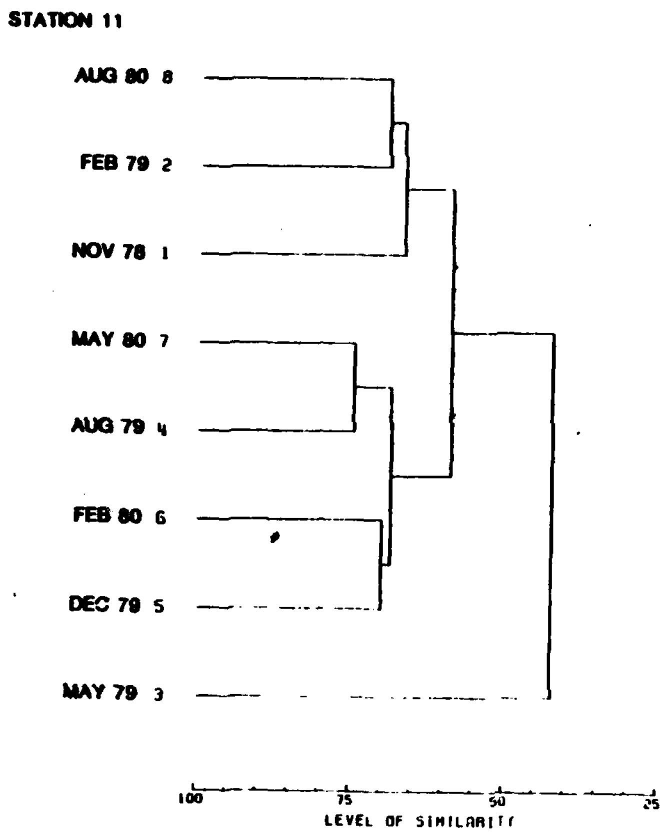


Figure C11.

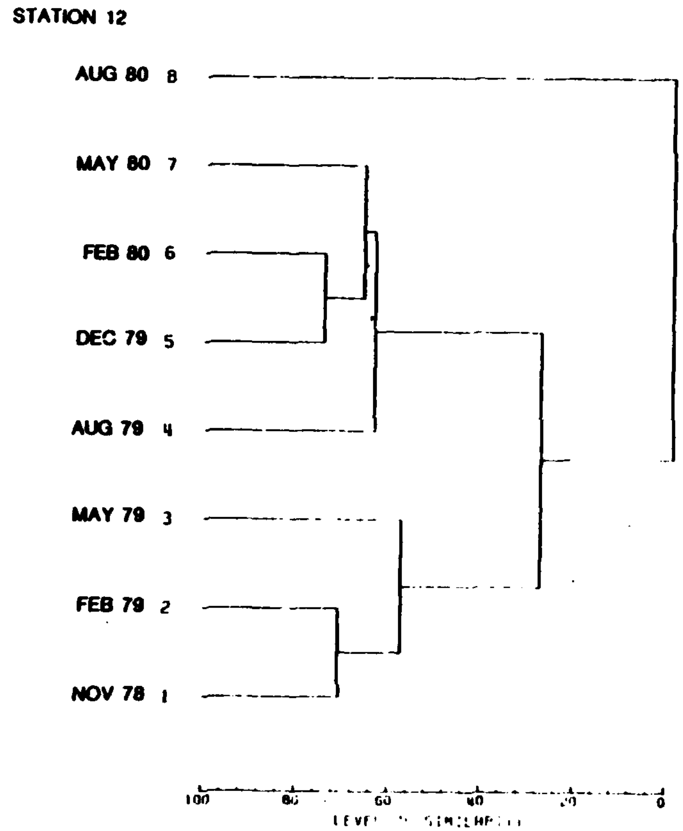


Figure C12.

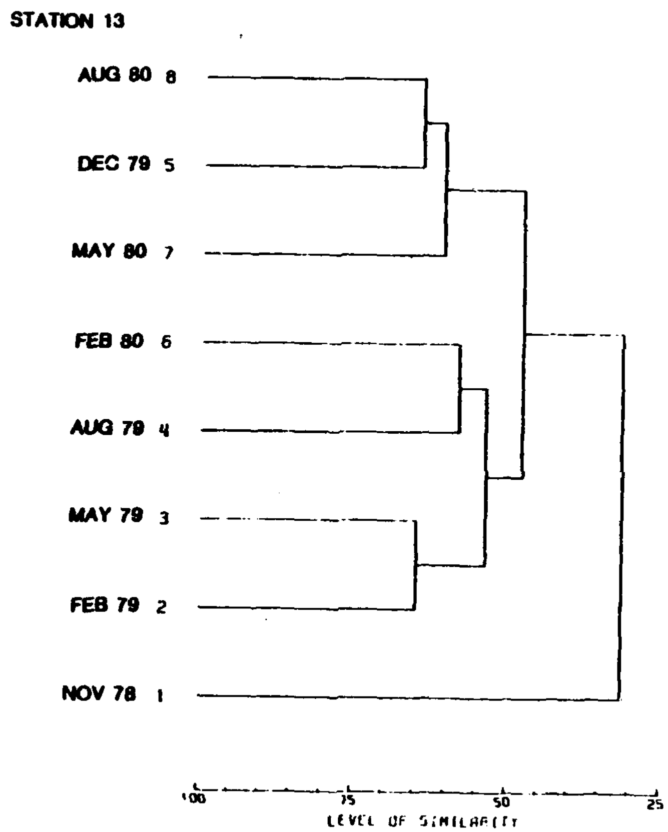

STATION 13
AUG 80 8
DEC 79 5
MAY 80 7
FEB 80 6
AUG 79 4
MAY 79 3
FEB 79 2
NOV 78 1
100
75
50
25
LEVEL OF SIMILARITY

Figure C13.

APPENDIX D

Table D1. Benthic sampling cruise dates.

Cruise	Date	Stations Sampled
Preliminary Cruise	1 Aug 78	Near STA 8
August	16 Aug 78	3, 4, 5, 6, 8
	17 Aug 78	1, 2, 7, 9, 10
September	14 Sep 78	3, 4, 5, 6, 8
	15 Sep 78	7
	30 Sep 78	1, 2, 9, 10
October	18 Oct 78	1, 2, 4, 9, 10
	19 Oct 78	3, 4, 5, 7, 8
November	13 Nov 78	1, 2, 9, 10, 12, 13
	14 Nov 78	4, 5, 6, 7, 8, 11
	15 Nov 78	3
December	18 Dec 78	3, 4, 5, 6, 7
	19 Dec 78	1, 2, 8, 9, 10
January	15 Jan 79	4
	16 Jan 79	3, 5, 6, 7
	17 Jan 79	1, 2, 8, 9, 10
February	13 Feb 79	1, 2, 9, 10, 12, 13
	14 Feb 79	3, 5, 6, 7
	15 Feb 79	4, 11
March	20 Mar 79	5, 6, 8
	21 Mar 79	9, 10
	22 Mar 79	1, 2, 3, 4, 7
April	17 Apr 79	3, 4, 7
	18 Apr 79	1, 2, 8, 9, 10
	19 Apr 79	5, 6
May	15 May 79	4, 5, 6, 8, 11
	16 May 79	3, 9, 10, 12, 13
	17 May 79	1, 2, 7
June	12 Jun 79	4, 5, 6, 7
	13 Jun 79	1, 2, 3, 8, 9, 10
July	17 Jul 79	9
	19 Jul 79	1, 2, 3, 4, 10
	20 Jul 79	8
	3 Jul 79	5, 6, 7

Table D1. (Continued)

Cruise	Date	Stations Sampled
August	21 Aug 79	9
	22 Aug 79	1, 2, 10, 13
	23 Aug 79	3, 7, 12
	24 Aug 79	4, 5, 6, 8, 11
November	30 Nov 79	7
	1 Dec 79	3, 8
	3 Dec 79	9, 10, 12, 13
	4 Dec 79	1, 2, 4
	5 Dec 79	5, 6, 11
February	27 Feb 80	1, 9, 10, 12, 13
	28 Feb 80	2, 4, 5, 6, 11
	29 Feb 80	3, 7, 8
May	20 May 80	9, 10, 12, 13
	21 May 80	1, 2
	27 May 80	3, 4, 5, 6, 8, 11
	28 May 80	7
August	25 Aug 80	3, 7, 8
	26 Aug 80	2, 4, 5, 6, 11
	27 Aug 80	9, 10
	3 Sep 80	1, 12, 13

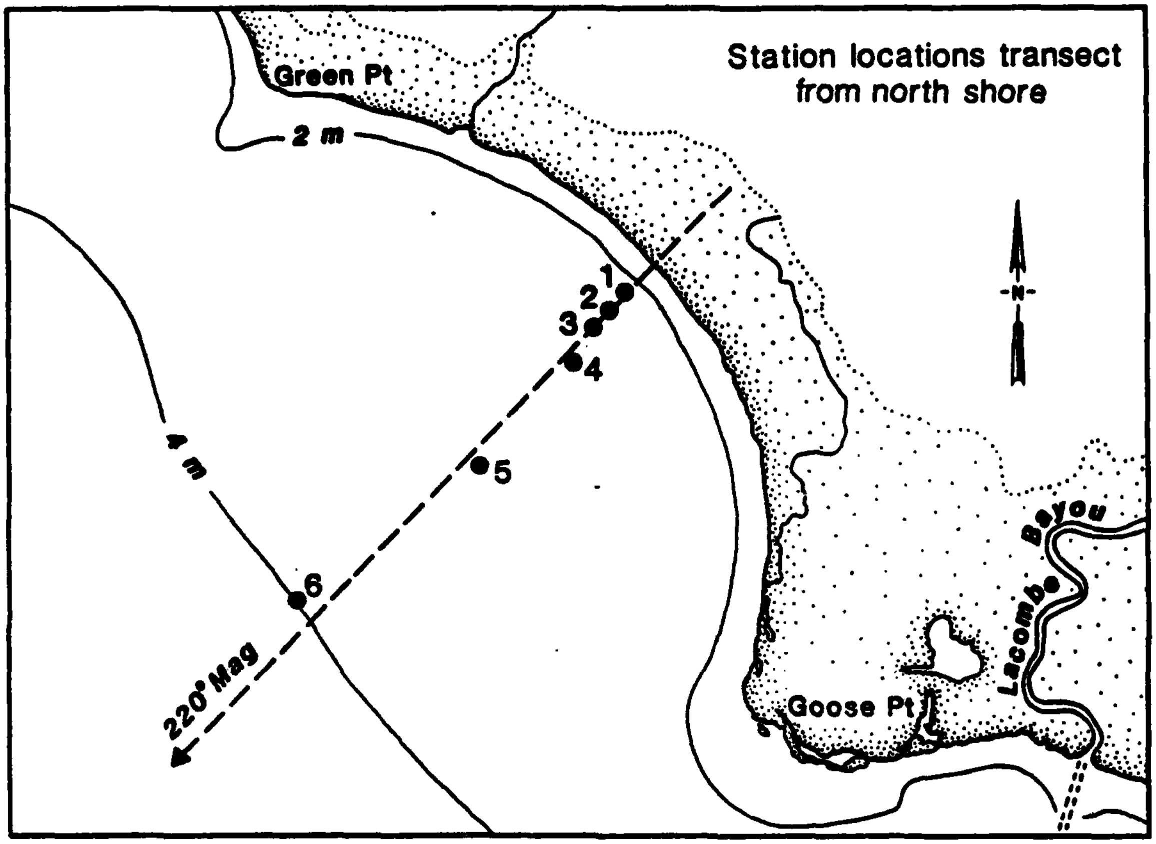


Figure D1. Station locations on transect from north shore, Lake Pontchartrain, Louisiana, 9 July 1980.

Table D2. *Rangia cuneata* data from north shore transect, 9 July 1980

Station, Distance from shore in km, depth in m	Box Core	0.5-2	2-10	10-20	20-30	<30
		size classes, *Rangia cuneata*, in mm				
T1*	A	8	219	0	0	0
0.4 km	B	3	270	0	0	1
2.1 m	C	0	209	0	1	0
T2*	A	16	234	0	2	1
0.8 km	B	0	273	0	0	0
2.1 m	C	0	251	0	0	1
T3*	A	0	507	0	0	0
1.2 km	B	20	309	0	1	1
2.7 m	C	27	348	0	1	0
T4*	A	0	550	0	0	0
1.6 km	B	0	255	0	0	0
2.7 m	C	0	680	1	0	1
	$\bar{X}$	6.17	342.08	0.08	0.42	0.42
	$\bar{X}/m^2$	67.17	3726.21	0.91	4.54	4.54
	Total $/m^2$ 3803.37					
	%	1.77	97.97	0.02	0.12	0.12
T5	A	0	491	0	0	0
2.4 km	B	0	656	0	0	0
3.0 m	C	0	553	0	0	0
T6	A	0	337	0	0	0
7.2 km	B	107	417	0	0	0
4.2 m	C	0	380	0	0	0

*These stations correspond to Fairbanks' (1963) stations in depth and distance from shore.

APPENDIX E

Sediment Methodology

Sediment Organic Carbon Analysis

Sediment samples for organic carbon determination were prepared in the following way: the sample was throughly mixed and 5-10 gm of sediment was removed and pretreated with 0.4 HCl for 24 hours to remove carbonates. The sample was then washed to remove the excess HCl, and centrifuged. The supernatant was discarded, and the pellet was resuspended in distilled water and recentrifuged 5 times, each time discarding the supernatant. A pH check was made during the last washing to be certain that pH = 7. The sample was then oven-dried at 60° C for 24 hrs and ground with mortar and pestle. A subsample of 250 mg was then combusted in a LECO model 521 induction furnace coupled to a LECO semiautomatic gasiometric carbon determinator. Two determinations were made for each sample.

Grain Size Analysis

The hydrometer method of particle size analysis as described by Day (1956) and modified by Patrick (1958) was used to determine sediment grain size. Briefly, the method consists of floating an A.S.T.M. 152H hydrometer in a sample of sediment suspended in a cylinder and taking readings at predetermined intervals at known temperatures. Statistical treatment of data followed McBride (1971). Hydrometer methods have been determined to be sufficiently accurate by the Committee on Physical Analysis of the Soil Science Society of America to separate soil samples into the three size fractions of clay, silt, and sand (assuming no gravel is present).

Sediment Bulk Density Determinations

Bulk density samples were obtained using core tubes, which were made of 5 cm long core segments taped together with waterproof tape to form one core tube. The in situ samples were taken with core tubes constructed of core segments cut from standard 50 cc plastic syringes, 2.55 cm in diameter, with the leading segment beveled to form a cutting edge. Each core segment was numbered and premeasured for volume. The core tube was inserted slowly into the box core sample with a gentle rotation. After removing the core tube containing the sample, the outside was washed and the tape holding each segment was cut, and a piece of preweighed aluminum foil was inserted as the segment was removed and placed in a preweighed plastic vial with a tight-fitting cap. The samples were refrigerated, brought back to the laboratory, and weighed. Total sediment weights for each 5 cm sediment interval were calculated by subtracting plastic vial weight, core segment weight, and aluminum foil weight for each sample. Sediment bulk densities in g/cm^3 were calculated by dividing total sediment weight by the core segment volume.

LITERATURE CITED

Day, P. R. 1956. Report of the committee on physical analysis, 1954-55, Soil Science Society of America: the hydrometer method of particle size anlaysis. Soil Sci. Soc. Amer. Proc. 20:167-169.

McBride, E. F. 1971. Mathematical treatment of size distribution data. PP. 109-127. In: R. E. Carver (ed.). Procedures in sedimentary petrology. Wiley-Interscience, New York.

Patrick, W. H. 1958. Modification of method of particle size analysis. Soil Sci. Soc. Amer. Proc. 22:366-367.

APPENDIX F

LAKE PONTCHARTRAIN "DEAD ZONE" INCIDENT

During the last scheduled cruise, August 1980, of the present study (Ecolcgical Characterization of the Benthic Community of Lake Pontchartrain, Louisiana), a large area of bottom in southeastern Lake Pontchartain was found to be defaunated. This occurrence was labelled the "Lake Pontchartrain dead zone" by local news media in Baton Rouge and New Orleans. The following account and discussion of the "dead zone" incident is included here because of the large size of the affected area and possible ecological consequences to the lake as a whole.

The cruise began on 25 August 1980 with stations 7, 3, 8, dredging experimental, and dredging control being sampled. The following day, 26 August 1980 stations 6, 5, 11, 4, and 2 were sampled; seas increased to over 2 feet and winds of 30 knots were reported during a storm between 0900 and 1030. On the third day 27 August 1981 stations 9 and 10 were sampled. After station 9 was sampled the port engine stopped and couldn't be restarted. Station 10 was sampled after which we returned to port, with winds increasing to 20 knots. After the engine was repaired the sampling cruise was resumed on 3 September 1980 . The remainder of the stations (1, 12, and 13) were sampled that day. Seas were rough and at 0920 hrs and later at 1600 hrs white caps were visible.

The "dead zone" was first discovered on 3 September 1980 at stations 1 and 12 (Figure F1). The sediment surface at both stations was totally black in color instead of the usual brown color and there was a slight odor of hydrogen sulfide present. Both these conditions indicate a depletion of oxygen in the surface sediments at the time of sampling. What made the discovery alarming was the distance between the two stations. Station 1 is located approximately 1 mile off Bayou St. John while station 12 is 6.5 miles out into the open lake from station 1. Analysis of the biological data confirmed our initial appraisal that the area had been subjected to an acute environmental perturbation.

Results

Biological data (Table F1) as well as physical parameters (Table F2) measured are given for stations 1, 2, and 12 for August-September 1980, as well as, August 1979 and August 1978.

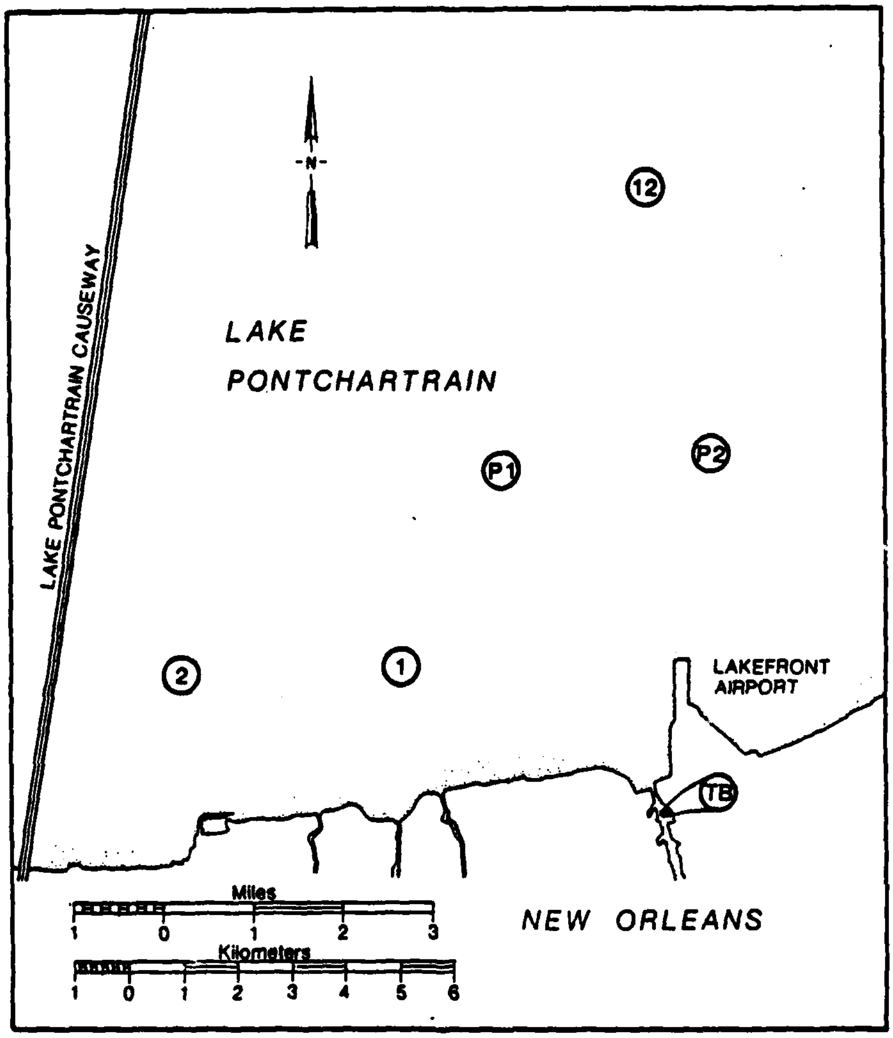


Figure F1. Map showing station locations in the "dead zone" area. Map coordinates of the stations are as follows: Station 1, 30°03'06"N, 90°04'55"W; Station 2, 30°13'04"N, 90°07'25"W; Station 12, 30°07'44"N, 90°02'09"W; Station P1, 30°05'00"N, 90°03'48"W; Station P2, 30°03'04"N, 90°07'25"W. Station TB is the turning basin at Seabrook in the Inner Harbor Navigation Canal.

Table F1. **Oxygen, temperature, conductivity and salinity by depth at "dead zone" stations in August 1978, August 1979, and August-September 1980.**

		Aug. - Sept. 1980				Aug. 1979				Aug. 1978			
		O_2 †	°C Temp	Cond	°/°° Sal *	PPM O_2	°C Temp	Cond	°/°° Sal *	PPM O_2	°C Temp	Cond	°/°° Sal *
	Station 1												
	Surface		29.4	8.48	4.87	7.2	30.0	6.87	3.90	9.2	30.5	6.53	3.70
	1M		29.4	8.50	4.88	7.0	30.0	7.02	3.99	9.0	30.4	6.52	3.69
Depth	2M		29.4	8.41	4.89	6.4	30.0	7.49	4.28	6.7	29.5	6.99	3.97
	3M		29.4	8.50	4.88	4.4	30.3	11.50	6.69	5.8	29.4	7.56	4.32
	4M		29.4	8.53	4.90	1.1	30.5	14.20	8.32	2.1	29.3	10.24	5.93
	Station 2												
	Surface		30.2	7.68	4.39	7.2	29.9	6.15	3.47	9.0	30.5	7.12	4.05
	1M		30.2	7.69	4.40	7.1	29.9	6.16	3.47	9.0	30.5	7.12	4.05
Depth	2M		30.2	7.70	4.40	7.1	30.0	6.27	3.54	8.8	30.0	7.12	4.05
	3M		30.1	7.70	4.40	7.0	30.0	6.38	3.61	6.6	29.6	8.49	4.94
	4M		30.1	7.70	4.40	2.8	30.4	12.10	7.06	2.4	29.1	9.05	5.20
	Station 12												
	Surface		29.8	9.09	5.24	8.1	29.9	6.98	3.97	Not Sampled in Aug. 1978			
	1M		29.8	9.14	5.24	7.5	29.6	6.88	3.85				
Depth	2M		29.7	9.14	5.24	7.2	29.4	6.86	3.83				
	3M		29.7	9.13	5.26	7.1	29.4	6.87	3.84				
	4M		29.6	9.15	5.27	4.6	29.6	7.87	4.75				

†Oxygens not taken in 1980 - oxygen meter broken.

*Salinity values converted from conductivity $\left(\text{salinity} = \frac{\text{conductivity} - 0.4}{1.658}\right)$

Table F2. Macrofauna densities ($\bar{N}/m^2 \pm SE$) for stations in the "dead zone" area in August 1978, August 1979, and August-September 1980.

	mm	Aug 78 - Sta 1	Aug 79 - Sta 1	Aug 80 - Sta 1
BIVALVES				
Clams	0.5- 2			
Rangia cuneata	2 - 10	14.16 ± 3.59	7.62 ± 7.30	
	10 - 20	3.27 ± 3.59		
	20 - 30			
	>30			
Mulinia pontchartrainensis		101.67 ± 23.81		
Macoma mitchelli				
Mytilopsis leucophaeta		18.15 ± 7.26	7.26 ± 3.63	
Ischadium recurvum				
GASTROPODS				
Probythinella louisianae			1111.10 ± 1105.61	
Texadina sphinctostoma		1397.90 ± 270.52	9440.30 ± 2760.96	1926.00 ± 425.23
POLYCHAETES				
Hypaniola florida		3.63 ± 3.63		
Laeonereis culveri				
Nereis succinea				
Parandalia americana		10.89 ± 6.29	3.63 ± 3.63	
Mediomastus californiensis		268.69 ± 103.78	127.08 ± 44.17	
Streblospio benedicti		10.89 ± 10.89	3.63 ± 3.63	
Capitella capitata				
Polydora cf. socialis				
OLIGOCHAETES				
TURBELLARIANS				
NEMERTEANS		10.89 ± 6.29	3.63 ± 3.63	
CRUSTACEANS				
Edotea montosa				
Cyathura polita				
Cassidinidea lunifrons				
Monoculodes edwardsi				
Corophium lacustre				
Grandidierella bonnieroides				
Gammarus tigrinus				
Gammarus mucronatus				
Melita nitida				
Cerapus benthophilus				
Gitanopsis sp.				
Hyalella azteca				
Mysidopsis almyra				
Ostracods				
Rhithropanopeus harrisii				
Callianassa jamaicense				
Cumaceans				
HYDROZOANS				
CHIRONOMIDS		25.42 ± 7.26	105.30 ± 14.52	61.73 ± 14.52
OTHER				
TOTAL, N/m^2		1869.90 ± 381.50	10809.20 ± 1933.20	1989.70 ± 433.22
BIOMASS, mg/m^2		580.6	2534.50	515.80
DIVERSITY, H´		0.889 ± 0.083	0.356 ± 0.233	0.139 ± 0.026
SPECIES NUMBER		8.333 ± 0.882	5.667 ± 1.202	2.000 ± 0.000
EVENNESS, J´		0.4243 ± 0.050	0.217 ± 0.147	0.201 ± 0.036

Table F2. (Continued)

	mm	Aug 78 - Sta 2	Aug 79 - Sta 2	Aug 80 - Sta 2
BIVALVES				
Clams	0.5- 2	206.96 ± 66.23	566.42 ± 74.16	
Rangia cuneata	2 - 10	678.62 ± 85.83	2077.24 ± 47.60	
	10 - 20		3.27 ± 3.59	
	20 - 30			
	>30			
Mulinia pontchartrainensis		1281.71 ± 114.65	4803.70 ± 262.58	
Macoma mitchelli		43.57 ± 16.69	14.52 ± 3.63	
Mytilopsis leucophaeta		152.50 ± 21.79	43.57 ± 16.64	
Ischadium recurvum				
GASTROPODS				
Probythinella louisianae		14.52 ± 9.61	159.60 ± 3.63	79.90 ± 20.22
Texadina sphinctostoma		4662.10 ± 993.23	15275.20 ± 1718.81	5170.40 ± 546.82
POLYCHAETES				
Hypaniola florida		14.52 ± 9.61	137.97 ± 42.81	
Laeonereis culveri				
Nereis succinea				
Parandalia americana		25.42 ± 3.63	7.26 ± 3.63	
Mediomastus californiensis		123.45 ± 85.85	119.82 ± 61.94	
Streblospio benedicti		18.15 ± 13.09	90.77 ± 80.13	
Capitella capitata				
Polydora cf. *socialis*				
OLIGOCHAETES				
TURBELLARIANS			14.52 ± 14.52	
NEMERTEANS		50.83 ± 9.61	50.83 ± 23.81	
CRUSTACEANS				
Edotea montosa		3.63 ± 3.63	10.89 ± 10.89	
Cyathura polita				
Cassidinidea lunifrons				
Monoculodes edwardsi				
Corophium lacustre				
Grandidierella bonnieroides				
Gammarus tigrinus				
Gammarus mucronatus				
Melita nitida				
Cerapus benthophilus				
Gitanopsis sp.				
Hyalella azteca				
Mysidopsis almyra		10.89 ± 10.89	14.52 ± 7.26	
Ostracods				
Rhithropanopeus harrisii				
Callianassa jamaicense				
Cumaceans				
HYDROZOANS				
CHIRONOMIDS		188.81 ± 48.03	381.24 ± 18.87	185.18 ± 22.68
OTHER				
TOTAL, N/m^2		7476.00 ± 1324.0	23775.10 ± 1694.60	5435.50 ± 551.81
BIOMASS, mg/m^2		3556.5	8005.30	1452.00
DIVERSITY, H´		1.208 ± 0.038	1.065 ± 0.041	0.226 ± 0.029
SPECIES NUMBER		11.667 ± 1.453	12.667 ± 1.453	3.000 ± 0.000
EVENNESS, J´		0.497 ± 0.023	0.424 ± 0.031	0.205 ± 0.026

Table F2. (Continued)

	mm	Aug 79 - Sta 12			Aug 80 - Sta 12		
BIVALVES							
Clams	0.5- 2	879.04	±	463.92			
Rangia cuneata	2 - 10	210.23	±	141.50			
	10 - 20						
	20 - 30						
	>30						
Mulinia pontchartrainensis		4640.30	±	1095.30			
Macoma mitchelli		3.63	±	3.63			
Mytilopsis leucophaeta		344.94	±	105.48			
Ischadium recurvum							
GASTROPODS							
Probythinella louisianae		5[illegible].60	±	171.12	50.80	±	40.43
Texadina sphinctostoma		16342.70	±	5675.54	167.02	±	102.25
POLYCHAETES							
Hypaniola florida		217.85	±	93.91			
Laeonereis culveri							
Nereis succinea							
Parandalia americana		7.26	±	7.26			
Mediomastus californiensis		7.26	±	3.63			
Streblospio benedicti		337.67	±	158.23			
Capitella capitata							
Polydora cf. socialis							
OLIGOCHAETES		3.63	±	3.63			
TURBELLARIANS							
NEMERTEANS		7.26	±	7.26			
CRUSTACEANS							
Edotea montosa		7.26	±	3.63			
Cyathura polita							
Cassidinidea lunifrons							
Monoculodes edwardsi							
Corophium lacustre							
Grandidierella bonnieroides							
Gammarus tigrinus							
Gammarus mucronatus							
Melita nitida							
Cerapus benthophilus							
Gitanopsis sp.							
Hyalella azteca							
Mysidopsis almyra							
Ostracods							
Rhithropanopeus harrisii							
Callianassa jamaicense							
Cumaceans							
HYDROZOANS							
CHIRONOMIDS		631.78	±	305.45			
OTHER							
TOTAL, N/m^2		24018.40	±	7960.70	217.90	±	142.16
BIOMASS, mg/m^2		9295.50			49.70		
DIVERSITY, H´		1.013	±	0.078	0.330	±	0.172
SPECIES NUMBER		10.667	±	1.667	1.667	±	0.333
EVENNESS, J´		0.434	±	0.036	0.714	±	0.122

Discussion

It became immediately apparent from the analysis of the biological data that station 2 was affected also, despite the fact that station 2 sediments appeared normal on the day they were sampled. All three stations (1, 2, and 12) exhibited the same pattern of macrobenthic defaunation in the 1980 samples: all bivalves, all polychaetes and all crustaceans were killed. In fact, all groups were killed at all three stations except the two species of hydrobiid snails and chironomid larvae. The chironomids were also completely missing from station 12 which was apparently the most seriously affected station. Total numbers of organisms per square meter at Station 12 were reduced to less than 1% of what they were in August 1979, or a 99% reduction. Station 1 suffered an 82% reduction and station 2 suffered a 79% reduction.

This great a reduction in numbers per square meter from previous years during the same season is reason enough for alarm. Even more significant, however, is the pattern of reduction. As shown in Table F2, these stations have been subjected to low oxygen concentrations in August 1979 and 1978. Yet in these years an intact community, characteristic of those stations, was present. In fact, not only are many benthic organisms capable of surviving low oxygen concentrations, but continue anaerobic metabolism even when exposed to fully oxygenated conditions (Pamatmat, 1980). Members of many groups including bivalves, gastropods, polychaetes, and crustacea have been shown to be facultative anaerobes which normally undergo anaerobic metabolism as an energy saving strategy (Pamatmat, 1980). Chen and Awapara (1969) kept *Rangia cuneata* in deoxygenated water for three weeks without apparent harm to the animals during a study of glycolysis in *R. cuneata*. These authors go as far as to consider *R. cuneata*, from biochemical standpoint, as essentially an anaerobic organism. It appears unlikely that low oxygen concentrations in the bottom water of the lake would kill the benthic infaunal community. It is uncertain whether low oxygen conditions in the bottom waters developed during the period of sampling in 1980. Even though we were unable to directly measure oxygen concentrations during the August-September 1980 sampling, we were able to measure conductivity and convert to salinity. As Poirrier (1978) points out, low oxygen conditions in the bottom waters of this area of the lake are caused by a non-mixing bottom water layer of higher salinity, as he states which "if weather conditions were such that mixing did not occur for extended periods, dissolved-oxygen values would be lowered."

Weather conditions during the time of sampling were such that storms caused 30 and 20 knot winds on August 25 and 26, 1980, respectively, and white caps developed on September 3, 1980. Waves caused by winds of 15-20 mph affect bottom sediments in Lake Pontchartrain (Swenson 1980). From the salinities measured by depth at station 2 on August 26, 1980 and stations 1 and 12 on September 3, 1980 the water column appears to be well mixed with no salinity stratification. A slight salinity stratification at all stations in August 1979 and August

1978 was present as were low oxygen concentrations. It appears unlikely that low oxygen concentrations were present in 1980 when these stations were sampled because prevailing weather conditions precluded water column stratification for an extended period of time.

The fact that some hydrobiid gastropods survived at all three stations may be highly significant. Brown (1980) working with another species of hydrobiid, Hydrobia jenkinsi reports that this species is extremely resistant to the toxic effect of the chlorinated hydrocarbon pesticide dieldrin. H. jenkinsi did not show any toxic effects to dieldrin in concentrations in excess of 30,000 ppb. It is possible that resistance to chlorinated hydrocarbons is a characteristic shared by other hydrobiids, and may explain why some of the hydrobiids remained alive in the "dead zone" if chlorinated hydrocarbon compounds caused the defaunation. Hydrobia jenkinsi was, on the other hand quite sensitive to the toxic effects of heavy metals particularly cooper and chromium. It should also be pointed out that both species of hydrobiids in Lake Pontchartrain have been collected in the plankton and could be moved in the water column. Some individuals could have been transported into the dead zone areas after the initial defaunation occurred.

At first it was thought that pentachoropenol (PCP) might have caused the "dead zone" because of a ship collision in the Mississippi River-Gulf Outlet near Shell Beach which resulted in a large PCP spill in late July 1980. One of the ships involved in the collision (the Sea Daniel) was brought back to the Inner Harbon Navigation Canal and docked at the Seabrook turning basin. Several hundred pounds of PCP reportedly washed off the deck of this ship and into the canal during a heavy rain storm.

One week later, on September 11, 1980 another cruise was made to the area of the "dead zone" in order to collect sediment samples and biological samples. Sediment samples were collected in specially prepared glass containers supplied by the Center for Bio-Organic Studies of the University of New Orleans. Surface sediments were scooped with the glass containers from box cores taken at stations 1, 2, and 12, and at stations P1 and P2 half way between station 12 and the southern shore of the lake (Figure D1), and at the IHNC turning basin. The samples were immediately frozen with dry ice onboard and deposited in a freezer the next day at UNO.

The Center for Bio-Organic Studies was at the time, routinely analyzing large numbers of sediment samples from the area near the site of the ship collision and kindly offered to do a preliminary analysis of the samples for PCP. The results of the preliminary analysis showed that no PCP was present in the "dead zone" samples, however, the samples did contain relatively high concentrations of three unknown halogenated hydrocarbons.

In light of the forgoing considerations there is sufficient reason to suspect that an event of acute chemical toxicity occurred in southeastern Lake Pontchartrain in the late summer of 1980.

LITERATURE CITED

Brown, L. 1980. The use of *Hydrobia jenkensi* to detect intermittent toxic discharges to a river. Water Res. 14:941-947.

Chen, C., and J. Awapara. 1969. Effect of oxygen on the end-products of glycolysis in *Rangia cuneata* Comp. Biochem. Physiol. 31:395-401.

Pamatmat, M. 1980. Facultative anaerobiosis of benthos pp. 69-90. *In* K. Tenore and B. Coull (eds.) Marine Benthic Dynamics. The Belle W. Baruch Library in Marine Science No. 11. University of South Carolina Press, Columbia, S.C.

Poirrier, M. 1978. Studies of salinity stratification in southern Lake Pontchartrain near the Inner Harbor Navigation Canal. Proc. Louisiana Acad. Sci. 41:26-35.

Swenson, E. 1980. General hydrography of Lake Pontchartrain, Louisiana. PP. 157-215 *In*: J. H. Stone (ed.) Environmental analysis of Lake Pontchrartrain, Louisiana its surrounding wetlands and selected land uses. CEL, CWR, LSU, Baton Rouge, LA. 70803. Prepared for U.S. Army Engineer District, New Orleans,. Contract No. DACW 29-77-C-0253.