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**SOME SEASONAL FISHERIES
TRENDS AND EFFECTS
OF A 1000 CFS FRESH WATER
DISCHARGE ON THE FISHES
AND MACROINVERTEBRATES IN
THE ST. LUCIE ESTUARY, FLORIDA**

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Technical Publication 80-3

SOME SEASONAL FISHERIES TRENDS AND
EFFECTS OF A 1000 CFS FRESH WATER DISCHARGE
ON THE FISHES AND MACROINVERTEBRATES IN
THE ST. LUCIE ESTUARY, FLORIDA

by

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and
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"This public document was promulgated at an annual cost
of \$211.53 or \$.42 per copy to inform the public, govern-
mental agencies and officials, of the District's seasonal fish-
eries trends and effects of 1000 CFS freshwater discharge
on the fishes and macroinvertebrates in the St. Lucie Est-
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Resource Planning Department
South Florida Water Management District
West Palm Beach, Florida

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INTRODUCTION

An estuary is a semi-closed body of water that is connected freely with the open sea, within which a measurable dilution of seawater by fresh water occurs (1). The importance and utilization of estuarine waters, and their associated habitats, by a wide variety of organisms have been well documented (2). This importance stems from the fact that an estuary provides unique combinations of chemical, physical, and biological conditions that are advantageous to the inhabitants and are found only in the transitional zones between fresh water and seawater.

In Martin and St. Lucie Counties, the St. Lucie Estuary (Fig. 1) with its two distinct geographical areas, is one of the largest estuarine systems on Florida's east coast. The inner estuary, composed of the North and South Forks of the St. Lucie River, has a total surface area of about 1134 hectares (2800 acres) and is approximately 9.6 km (6 miles) long and 0.8 to 1.2 km (0.50 to 0.75 miles) wide. Both the North and South Forks have dendritic drainage systems with shorelines that are lined with red, white, and black mangroves. At their confluence is the Roosevelt Bridge (U.S. 1), and any direct water exchange between the inner and outer estuary must flow through a narrow 300 m wide channel under the bridge. The outer estuary is approximately 1.6 km (1 mile) wide for 4.8 km (3 miles) and then, after bending to the south, is about 0.8 km (0.5 mile) wide and 4.8 km (3 miles) long. It has a total surface area of nearly 1106 hectares (2730 acres). The outer estuary flows into the Indian River Lagoon and eventually into the Atlantic Ocean through the St. Lucie Inlet.

Fresh water entering the St. Lucie Estuary comes from several sources. Rain on the surface of the estuary adds water directly into

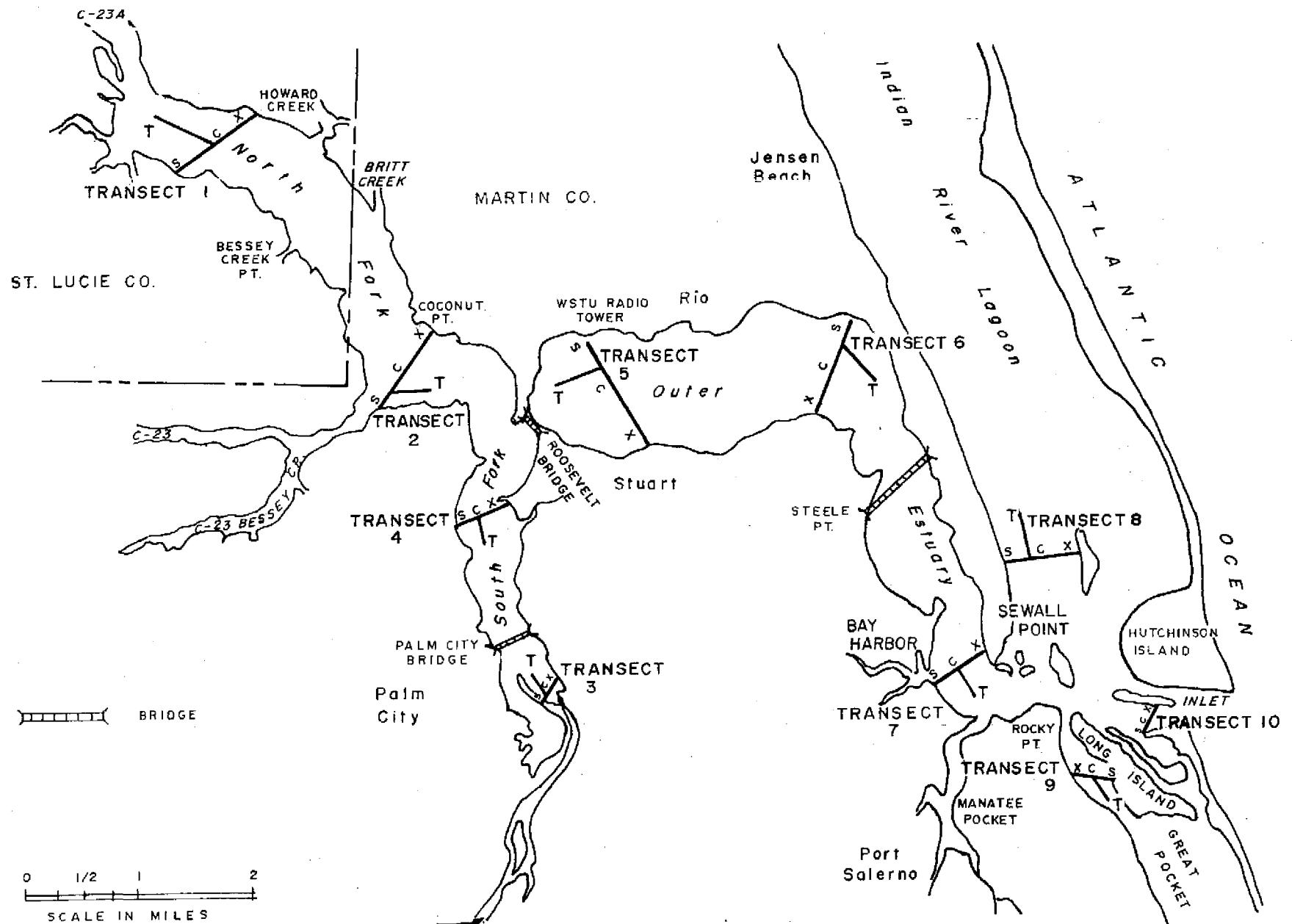


Figure 1. ST. LUCIE TRANSECT SAMPLE SITES

the system while other fresh water inputs are surface runoff and ground-water seepage. The North and South Forks of the St. Lucie River drain a land area of approximately 1295 km^2 (500 square miles). Other occasional sources of fresh water are from Bessey Creek (C-23), near the head of the North Fork from Canal 24 (C-24, C-23A) and from Lake Okeechobee via the St. Lucie Canal (C-44) into the South Fork. All three canals have salinity structures but only the St. Lucie Lock and Dam (S-80) can be operated for controlled releases of water from Lake Okeechobee.

There has been considerable concern expressed in the past from both the private and public sectors regarding the overall effects on the estuary of the volume and duration of fresh water discharges from Lake Okeechobee. Unfortunately, only a limited amount of research has been completed documenting the effects of fresh water discharges upon the estuary's fish and benthic algae populations (3,4,5,6,7). The investigators of the aforementioned studies did not have the opportunity of having a fixed rate of fresh water discharge for a predetermined amount of time, in a certain season, for a controlled study. In response to the recent public and private concern, a baseline study of the St. Lucie Estuary fishes was initiated by the District. During the baseline study there were no controlled fresh water discharges into the estuary and therefore the information obtained from this period of the study reflected the "natural" dynamics of the fish species composition.

During the periods from June 13, 1977 to July 15, 1977 and from June 12, 1978 to July 14, 1978 the District monitored the effects of controlled discharges, of three week duration. These discharges were $1000 \text{ ft}^3/\text{sec}$ (cfs) and 2500 cfs respectively. Effects on the fishes, benthic fauna, salinity and turbidity throughout the estuary were

monitored. It is the purpose of this paper to present an evaluation of field and laboratory data from the baseline study and the 1000 cfs controlled discharge study.

MATERIALS AND METHODS

Before the St. Lucie Estuary controlled discharge began, a baseline, monthly fish sampling program was initiated in January 1975, and was continued through September 1976. The ten sampling transects (Figure 1) and the methods and materials that were established for the baseline study were also used for the controlled discharge study (June 13, 1977 - July 15, 1977) so that comparative evaluations could be made. These sample stations and methods were also comparable to those used in an earlier investigation (4).

Seine samples at each S site (Figure 1) were taken with a 3.2 mm mesh, 7.6 m seine towed for 15.0 m parallel to the shoreline in an effort to collect both neustonic and benthic organisms. In order to have consistent sample areas, permanent, galvanized pipes were driven into the substrate to delineate each 15 m sample section.

Trawl samples were taken with a 4.9 m flat otter trawl with 12.7 mm bar mesh wings and a 6.4 mm bar mesh tail. The trawl was towed at approximately three knots behind an outboard motor boat in a straight line for 10 minutes. During the discharge study one trawl and two seine samples were taken each week at each sample transect. All organisms collected with each seine sample were put into glass jars, and fixed and preserved with a 10% formalin solution. Large specimens captured in the trawl were identified, measured and returned to the water. Small specimens taken in the trawl samples were fixed and preserved using the same procedure as for the seine samples. Surface temperatures and salinities were recorded at each seine and trawl station. Temperatures were taken with a hand held thermometer and read to the nearest 0.1°C.

Surface salinities were measured with a temperature compensated refractometer to the nearest 0.5 ppt.

Each species of fish was given a taxon number according to a phylogenetic sequence. This allowed computer manipulation of each species number with the field and laboratory data. Field data for each species included: station number, date, surface water temperature, and salinity. Other information obtained for each sample consisted of the total number of each species and the number of different species. Ranges in total lengths of each species were assessed by grouping the fish into three arbitrary size classes with the number of individuals in each class listed in Appendix I.¹

Macroinvertebrate benthic grab samples were taken at all S, C and X sites (Figure 1) with a 15.24 x 15.24 cm short Ekman dredge. One set of samples was taken one week before and four weeks after the discharge. At each of the three station sites on a transect, a composite sample was made from two benthic grabs (0.046 m^2). The type of substrate was noted and the sample was rinsed with water through a #20 (841 micron) A.S.T.M. Standard Sieve. The sample remaining in the sieve was rinsed into a glass container and preserved with 10% formalin solution and .025% rose bengal.

At each Ekman dredge site, physical and chemical parameters near the water-substrate interface were measured with a Hydrolab Surveyor Model 6D prior to the collection of benthic invertebrate samples. These physical and chemical parameters included pH, specific conductance, dissolved oxygen, and temperature. Salinities were determined by conversion of specific conductivities (8).

¹Data of this type for the baseline study is on file at the South Florida Water Management District headquarters, West Palm Beach, Florida.

The effects of the 1000 cfs fresh water discharge on the pH, specific conductance, dissolved oxygen, and temperature were measured each week for high and low tides at each C sample site location. Profiles of these parameters were taken at 0.5 m depth intervals. Occasionally, the Hydrolab was not available, and at these times water samples were taken with a Niskin bottle and salinity measurements were made with a refractometer. The high tide study began with high ebb tide at the St. Lucie Inlet, at the C site located nearest the inlet, and proceeded to the sites in the inner estuary. The sampling order was stations 10 through 1C in reverse numerical order. The low tide study began with low ebb tide at the inlet and samples were taken in the same sequence as in the high tide study. Approximately three hours were required to complete one high or low tide study.

Total suspended solid samples were taken upstream of the St. Lucie Lock and Dam (S-80) twice a week. These samples were analyzed using the methods outlined in APHA Standard Methods 14th Edition (9).

Surface turbidity samples were taken twice a week during the latter part of the outgoing tide at all C sites. Measurements of turbidity in Jackson Turbidity Units (JTU) were determined with a Hach Laboratory Turbidimeter Model 1860A.

RESULTS

Baseline Study

The dates that seine and trawl samples were taken are presented in Table 1. Fish that were collected are listed in order of abundance, and as percentage of the total catch in Table 2. There were a total of 101 species caught throughout the study. The bay anchovy, Anchoa mitchilli, the tidewater silverside, Menidia beryllina, the mojarras, Eucinostomus spp. and the pinfish, Lagodon rhomboides, were among the most abundant species found in the estuary. Scientific and common names of the fishes caught are shown in Table 3 (10).

Physical, chemical, and biological data collected during the baseline study were used to determine seasonal trends. Monthly rainfall totals from the St. Lucie Lock and Dam (S-80) were plotted with surface salinity values for each of the ten stations (Figs. 2,3,4). The stations are grouped to represent the inner estuary (Stations 1 through 4), the middle portion of the estuary (Stations 5 through 6), and the outer portion of the estuary that has direct water exchange with the Indian River Lagoon and the ocean (Stations 7 through 10). These data indicate an inverse relationship between salinity and rainfall. This relationship is most pronounced at the inner estuary stations.

The mean surface water temperatures for all stations for each monthly sampling date were graphed (Fig. 5) and they depict a seasonal variation in water temperatures from 21°C to 31°C for the given sampling period.

Seasonal relationships among salinities, water temperatures, total number of individuals, number of species, and species diversities for

TABLE 1. CHRONOLOGICAL LISTING OF SEINE (S) AND TRAWL (T) SAMPLES AT EACH STATION FROM 1-28-75 TO 8-22-76

DATE	1S	1T	2S	2T	3S	3T	4S	4T	5S	5T	6S	6T	7S	7T	8S	8T	9S	9T	10S
1-28-75	X	X	X		X		X		X		X		X		X		X		X
2-6-75		X		X		X		X		X		X		X		X		X	
3-31-75			X		X		X		X		X		X		X		X		X
5-27-75	X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	
6-24-75	X			X		X		X		X		X		X		X		X	
7-23-75	X		X		X		X		X		X		X		X		X		X
8-21-75	X	X	X		X		X	X	X		X		X		X	X	X		X
9-16-75	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
10-21-75	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
11-18-75	X	X	X		X	X	X	X		X	X	X	X	X		X		X	
12-16-75	X		X		X		X	X			X		X		X		X		X
1-15-76	X				X		X	X	X		X				X		X		X
2-17-76	X		X		X		X		X		X		X		X		X		X
3-16-76	X	X		X	X	X	X	X	X		X	X	X		X	X	X		X
4-21-76	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
5-25-76	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
6-23-76	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
7-20-76	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
8-24-76	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
9-22-76	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
*	18	12	17	11	19	12	19	15	18	10	19	12	18	11	19	10	19	11	18

* Total Number of Samples

TABLE 2. FISH SPECIES AND THE NUMBER OF INDIVIDUALS CAUGHT DURING THE BASELINE STUDY

<u>Species</u>	<u>NC*</u>	<u>Species</u>	<u>NC*</u>	<u>Species</u>	<u>NC*</u>
<i>Pseudupeneus maculatus</i>	1	<i>Lagocephalus laevigatus</i>	3	<i>Cynoscion nebulosus</i>	21
<i>Microgobius gulosus</i>	1	<i>Microgobius</i> sp.	4	<i>Cynoscion regalis</i>	21
<i>Haemulon flavolineatum</i>	1	<i>Cyprinodon variegatus</i>	4	<i>Caranx latus</i>	21
<i>Evorthodus lyricus</i>	1	<i>Gobionellus hastatus</i>	4	<i>Sphoeroides nephelus</i>	24
<i>Eretelis smaragdus</i>	1	<i>Halichoeres bivittatus</i>	5	<i>Sparisoma</i> sp.	31
<i>Dactyloscopus cossotus</i>	1	<i>Lucania parva</i>	5	<i>Elops saurus</i>	36
<i>Menticirrhus saxatalis</i>	1	<i>Selene vomer</i>	5	<i>Strongylura marina</i>	37
<i>Lactophrys triqueter</i>	1	Balistidae, juveniles**	5	<i>Trinectes maculatus</i>	48
<i>Diplectrum formosum</i>	1	<i>Prionotus</i> sp.	7	<i>Centropomus undecimalis</i>	48
<i>Fustularia tabacaria</i>	1	<i>Pogonias cromis</i>	7	<i>Chloroscombrus chrysurus</i>	50
<i>Lobotes surinamensis</i>	1	<i>Sphoeroides maculatus</i>	7	<i>Oligoplites saurus</i>	67
<i>Muraenidae, leptocephalus</i>	1	<i>Scorpaena plumieri</i>	8	<i>Fundulus grandis</i>	67
<i>Pomatomus saltatrix</i>	1	<i>Gobiosoma boscii</i>	8	<i>Synodus foetens</i>	68
<i>Tylosurus</i> sp.	1	<i>Albula vulpes</i>	8	<i>Brevoortia smithi</i>	72
<i>Hemiramphus brasiliensis</i>	1	<i>Menticirrhus americanus</i>	9	<i>Achirus lineatus</i>	75
<i>Opsanus tau</i>	1	<i>Caranx hippos</i>	10	<i>Archosargus probatocephalus</i>	78
<i>Histrio histrio</i>	1	<i>Opisthonema oglinum</i>	11	<i>Lutjanus griseus</i>	82
<i>Gerres cinereus</i>	2	<i>Bagre marinus</i>	12	<i>Diapterus plumieri</i>	86
<i>Chaetodipterus faber</i>	2	<i>Lutjanus mahogoni</i>	12	<i>Dorosoma pentenne</i>	88
<i>Trichiurus lepturus</i>	2	<i>Poecilia latipinna</i>	14	<i>Syngnathus louisianae</i>	89
<i>Labrisomus nuchipinnis</i>	2	<i>Gobionellus</i> sp.	15	<i>Sphoeroides testudineus</i>	92
<i>Micropterus salmoides</i>	2	<i>Syphurus palgiusa</i>	16	<i>Sardinella anchovia</i>	97
<i>Anchoa cubana</i>	2	<i>Dasysatis sabina</i>	18	<i>Sphyraena barracuda</i>	103
<i>Serranidae, juveniles**</i>	2	<i>Chilomycterus schoepfi</i>	18	<i>Haemulon sciurus</i>	108
<i>Haemulon plumieri</i>	3	<i>Bathygobius saporator</i>	10	<i>Gobionellus boleosoma</i>	113
<i>Centropristes philadelphica</i>	3	<i>Monacanthus</i> sp.	20	<i>Citharichthys spilopterus</i>	158
<i>Epinephelus</i> sp.	3	<i>Gambusia affinis</i>	20	<i>Orthopristis chrysoptera</i>	183

*NC = Number Caught

** = Less Than 30 mm

Table 2 (Cont.)

<u>Species</u>	<u>NC*</u>	<u>% of Catch</u>
<i>Syngnathus scovelli</i>	187	
<i>Lutjanus synagris</i>	198	
<i>Haemulon parrai</i>	230	
<i>Arius felis</i>	238	
<i>Trachinotus falcatus</i>	262	
<i>Sciaenops ocellata</i>	281	
<i>Cynoscion nothus</i>	387	
<i>Diplodus holbrooki</i>	426	
<i>Bairdiella chrysura</i>	521	
<i>Mugil curema</i>	552	
<i>Mugil cephalus</i>	1074	.7
<i>Micropogon undulatus</i>	1075	.8
<i>Anchoa lyolepis</i>	1763	1.4
<i>Engraulidae, juveniles**</i>	2324	1.8
<i>Eucinostomus argenteus</i>	2627	2.1
<i>Harengula pensacolae</i>	2932	2.3
<i>Anchoa hepsetus</i>	3104	2.4
<i>Eucinostomus gula</i>	3356	2.6
<i>Diapterus olithostomus</i>	5514	4.3
<i>Lagodon rhomboides</i>	9721	7.6
<i>Menidia beryllina</i>	11421	8.9
<i>Clupeidae, juveniles **</i>	23743	18.6
<i>Eucinostomus, juveniles **</i>	24862	19.4
<i>Anchoa mitchilli</i>	28834	22.5

*NC = Number Caught

** = Less than 30 mm



TABLE 3. SCIENTIFIC AND COMMON NAMES OF THE FISHES

<u>Scientific Name</u>	<u>Common Name</u>
<i>Achirus lineatus</i>	Lined sole
<i>Albula vulpes</i>	Bonefish
<i>Anchoa cubana</i>	Cuban anchovy
<i>Anchoa hepsetus</i>	Striped anchovy
<i>Anchoa lyolepis</i>	Dusky anchovy
<i>Anchoa mitchilli</i>	Bay anchovy
<i>Archosargus probatocephalus</i>	Sheepshead
<i>Arius felis</i>	Sea catfish
<i>Bagre marinus</i>	Gafftopsail catfish
<i>Bairdiella chrysura</i>	Silver perch
<i>Balistidae, juveniles</i>	Triggerfish
<i>Bathygobius saporator</i>	Frillfin goby
<i>Brevoortia smithi</i>	Yellowfin menhaden
<i>Caranx hippos</i>	Crevalle jack
<i>Caranx latus</i>	Horse-eye jack
<i>Centropomus undecimalis</i>	Snook
<i>Centropristes philadelphica</i>	Rock sea bass
<i>Chaetodipterus faber</i>	Spadefish
<i>Chilomycterus schoepfi</i>	Stripped burrfish
<i>Citharichthys spilopterus</i>	Bay whiff
<i>Chloroscombrus chrysurus</i>	Atlantic bumper
<i>Clupeidae, juveniles</i>	Herring, juvenile
<i>Cynoscion nebulosus</i>	Spotted seatrout
<i>Cynoscion nothus</i>	Silver seatrout
<i>Cynoscion regalis</i>	Weakfish
<i>Cyprinodon variegatus</i>	Sheepshead minnow
<i>Dactyloscopus crossotus</i>	Bigeye stargazer
<i>Dasyatis sabina</i>	Atlantic stingray
<i>Diapterus olisthostomus</i>	Irish pompano
<i>Diapterus plumieri</i>	Striped mojarra
<i>Diplectrum formosum</i>	Sand perch
<i>Diplodus holbrooki</i>	Spotted pinfish
<i>Dorosoma cepedianum</i>	Gizzard shad
<i>Dorosoma pentenne</i>	Threadfin shad
<i>Elops saurus</i>	Lady fish

COLLECTED IN THE ST. LUCIE ESTUARY

<u>Scientific Name</u>	<u>Common Name</u>
<i>Engraulidae</i> , juveniles	Anchovy juveniles
<i>Epinephelus</i> sp.	Sea bass
<i>Erotelis smaragdus</i>	Emerald sleeper
<i>Eucinostomus argenteus</i>	Spotfin mojarra
<i>Eucinostomus gula</i>	Silver jenny
<i>Eucinostomus</i> , juveniles	Mojarra juveniles
<i>Evorthodus lyricus</i>	Lyre goby
<i>Fistularia tabacaria</i>	Bluespotted cornetfish
<i>Fundulus grandis</i>	Gulf killifish
<i>Gambusia affinis</i>	Mosquito fish
<i>Gerres cinereus</i>	Yellowfin mojarra
<i>Gobionellus boleosoma</i>	Darter goby
<i>Gobionellus hastatus</i>	Sharptail goby
<i>Gobiosoma boscii</i>	Naked goby
<i>Haemulon flavolineatum</i>	French grunt
<i>Haemulon parrae</i>	Sailors choice
<i>Haemulon plumieri</i>	White grunt
<i>Haemulon sciurus</i>	Bluestriped grunt
<i>Halichoeres bivittatus</i>	Slippery dick
<i>Harengula pensacolae</i>	Scaled sardine
<i>Hemiramphus brasiliensis</i>	Ballyhoo
<i>Hippocampus</i> sp.	Seahorse
<i>Histrio histrio</i>	Sargassumfish
<i>Labrisomus nuchipinnis</i>	Hairy blenny
<i>Lactophrys triqueter</i>	Smooth trunkfish
<i>Lagocephalus laevigatus</i>	Smooth puffer
<i>Lagodon rhomboides</i>	Pinfish
<i>Leiostromus xanthurus</i>	Spot
<i>Lobotes surinamensis</i>	Tripletail
<i>Lucania parva</i>	Rainwater killifish
<i>Lutjanus griseus</i>	Gray snapper
<i>Lutjanus mahogoni</i>	Mahogany snapper
<i>Lutjanus synagris</i>	Lane snapper
<i>Menidia beryllina</i>	Tidewater silverside
<i>Menticirrhus americanus</i>	Southern kingfish

TABLE 3 (Cont.)

<u>Scientific Name</u>	<u>Common Name</u>
<i>Menticirrhus saxatalis</i>	Northern kingfish
<i>Microgobius gulosus</i>	Clown goby
<i>Microgobius thalassinus</i>	Green goby
<i>Micropogon undulatus</i>	Atlantic croaker
<i>Micropterus salmoides</i>	Largemouth bass
<i>Monacanthus hispidus</i>	Planehead filefish
<i>Mugil cephalus</i>	Striped mullet
<i>Mugil curema</i>	White mullet
<i>Muraenidae, leptcephalus</i>	Moray eels, larval stage
<i>Oligoplites saurus</i>	Leatherjacket
<i>Opisthonema oglinum</i>	Atlantic thread herring
<i>Opsanus tau</i>	Oyster toadfish
<i>Orthopristis chrysoptera</i>	Pigfish
<i>Poecilia latipinna</i>	Sailfin molly
<i>Pogonias cromis</i>	Black drum
<i>Pomatomus saltatrix</i>	Bluefish
<i>Pomoxis nigromaculatus</i>	Black crappie
<i>Prionatus sp.</i>	Searobin
<i>Pseudupeneus maculatus</i>	Spotted goatfish
<i>Sardinella anchovia</i>	Spanish sardine
<i>Scarus sp.</i>	Parrotfish

<u>Scientific Name</u>	<u>Common Name</u>
<i>Sciaenops ocellata</i>	Red drum
<i>Scomberomorus maculatus</i>	Spanish mackerel
<i>Scorpaena grandicornis</i>	Plumed scorpionfish
<i>Scorpaena plumieri</i>	Spotted scorpionfish
<i>Selen vomer</i>	Lookdown
<i>Serranidae</i> , juveniles	Sea bass juveniles
<i>Sparasoma</i> sp.	Parrotfish
<i>Sphoeroides maculatus</i>	Northern puffer
<i>Sphoeroides nephelus</i>	Southern puffer
<i>Sphoeroides testudineus</i>	Checkered puffer
<i>Sphyraena borealis</i>	Northern sennet
<i>Sphyraena barracuda</i>	Great barracuda
<i>Strongylura marina</i>	Atlantic needlefish
<i>Sympodus plagiura</i>	Blackcheek tonguefish
<i>Syngnathus louisianae</i>	Chain pipefish
<i>Syngnathus scovelli</i>	Gulf pipefish
<i>Synodus foetens</i>	Inshore lizardfish
<i>Trinectes maculatus</i>	Hogchoker
<i>Trachinotus falcatus</i>	Permit
<i>Trichiurus lepturus</i>	Atlantic cutlassfish
<i>Tylosurus</i> sp.	Mudloafish

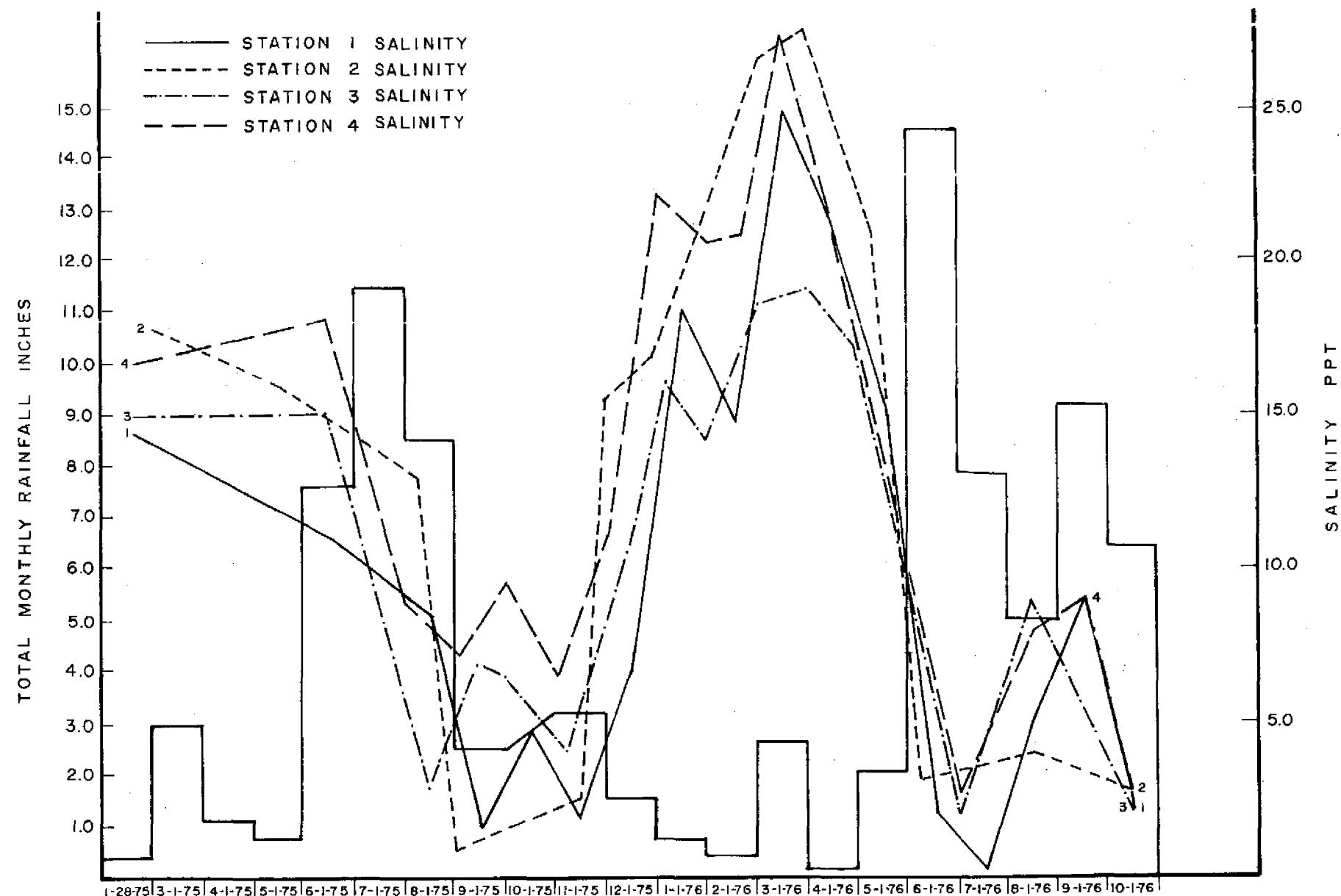
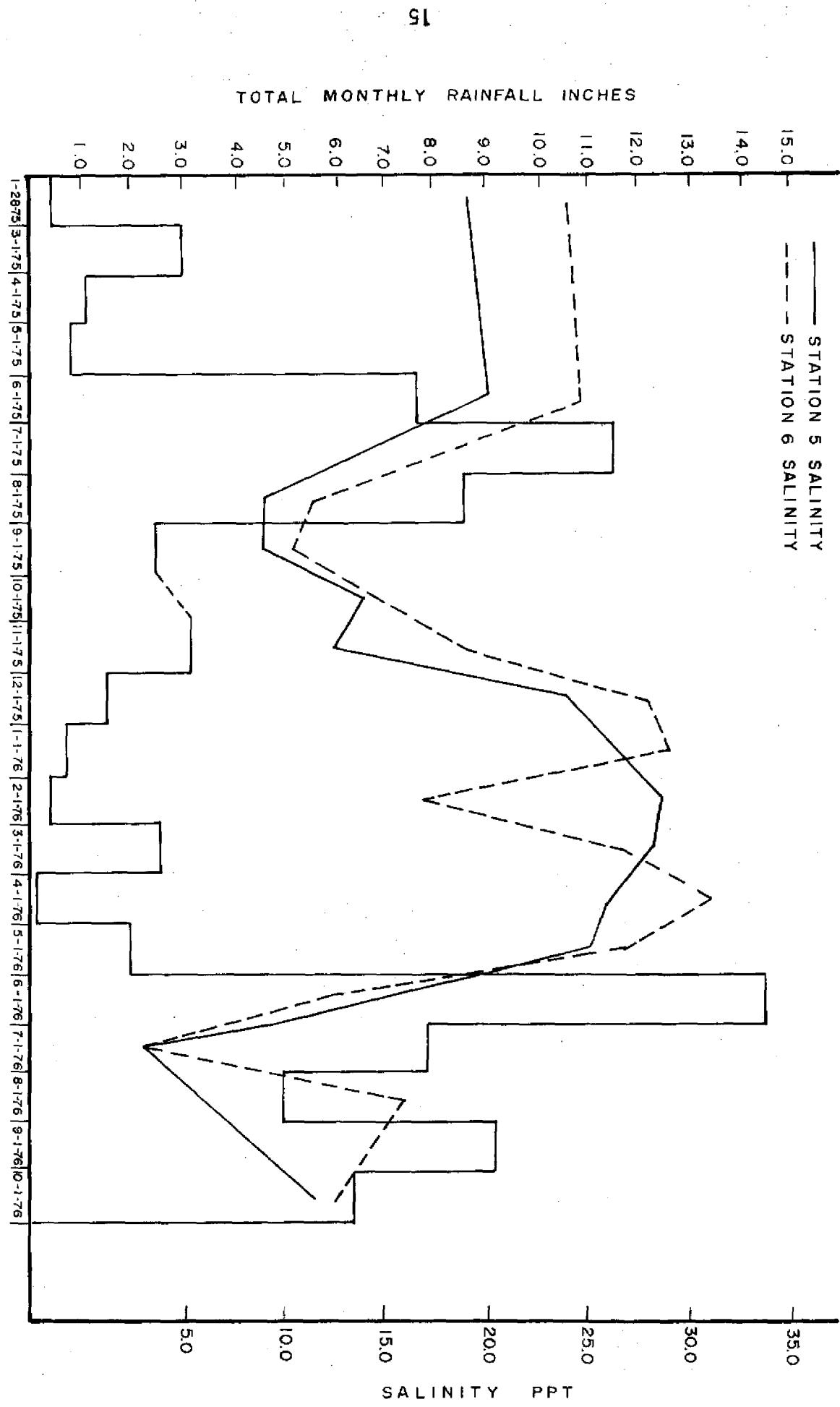


Figure 2. SURFACE SALINITIES AND TOTAL MONTHLY RAINFALL 1/28/75 - 10/1/76
AT S-80

Figure 3. SURFACE SALINITIES AND TOTAL MONTHLY RAINFALL AT S-80



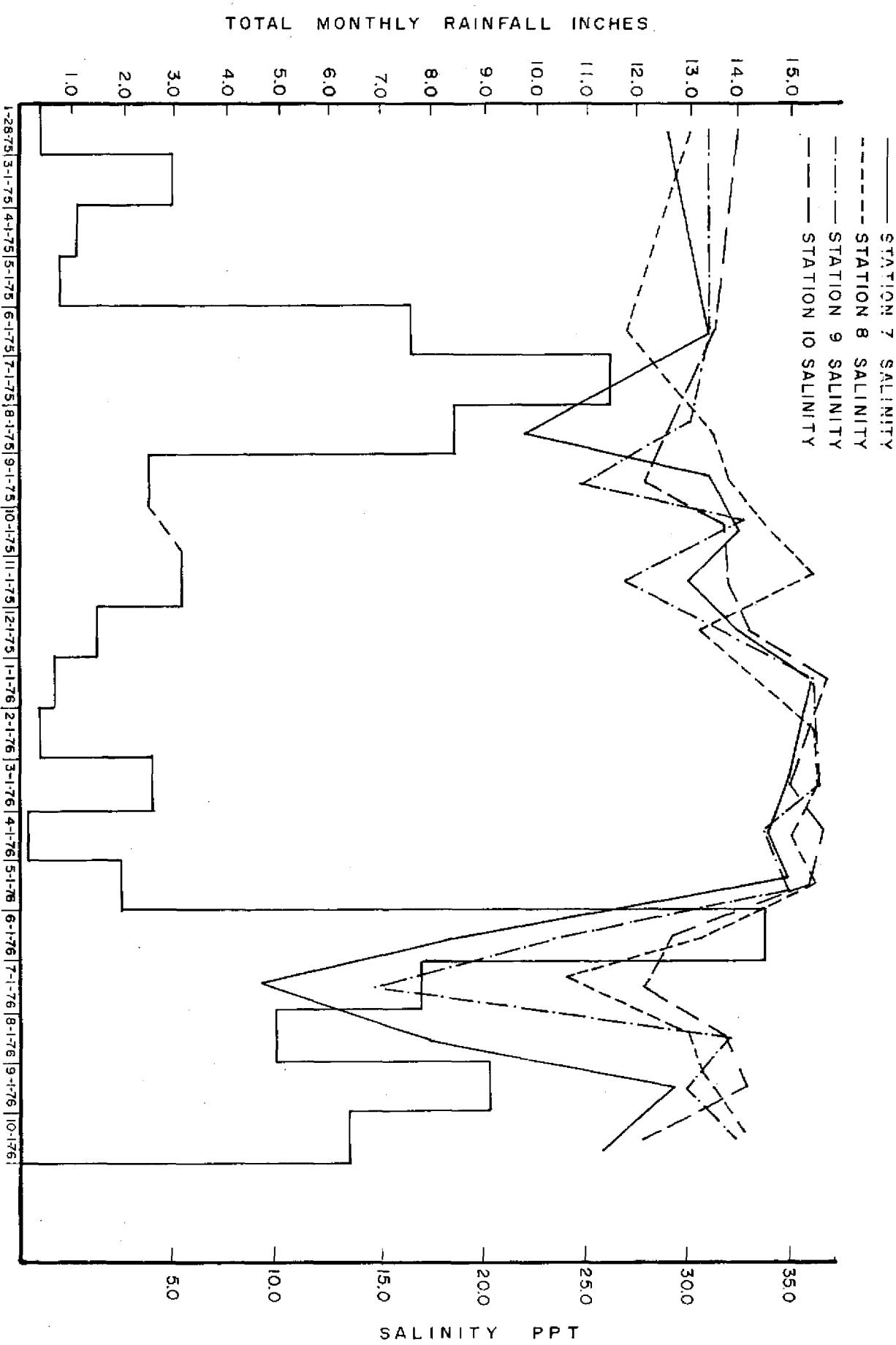


Figure 4. SURFACE SALINITIES AND TOTAL MONTHLY RAINFALL
AT S-80
1/28/75 - 10/1/76

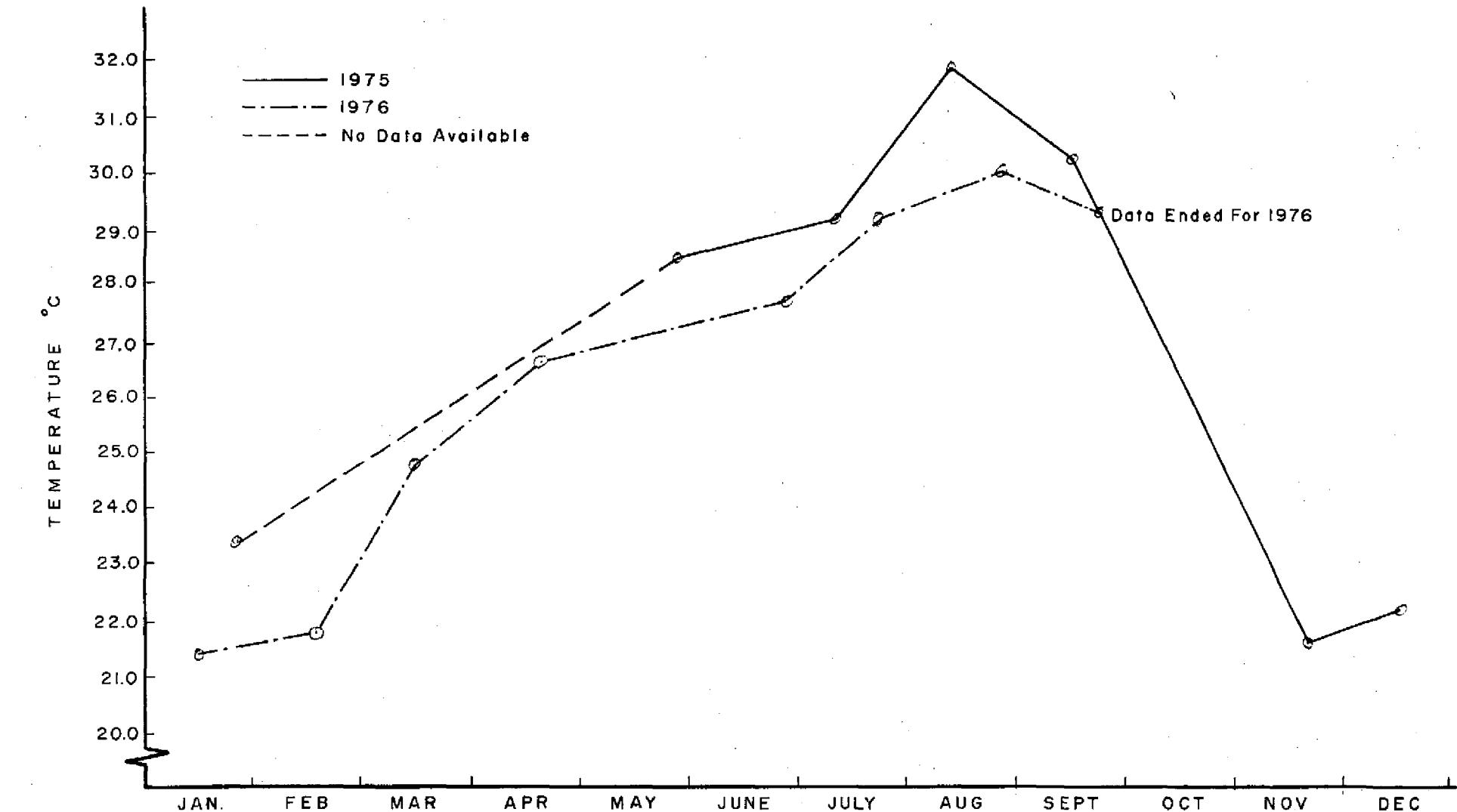


Figure 5. WATER TEMPERATURE MEANS FOR EACH SAMPLE MONTH 1/28/75-9/22/76
AT THE ST. LUCIE ESTUARY

each station and for the entire estuary were examined by using linear regressions. With one exception, no definitive seasonal linear relationships were noted among the parameters tested. The only significant relationship found was a negative correlation between salinity and temperature for the entire estuary.

Histograms were constructed for 40 of the common fish, which compare the frequency of occurrence of each fish at different salinities throughout the species' overall salinity range (Appendix II). The mean (\bar{x}) and variance (σ^2) of the salinities, along with the number of data points (N) or the number of times the fish was caught, are given for each distribution. These histograms indicated that most species tested were tolerant to wide ranges of salinity and had a high variability of frequency of catch within these ranges. Several species of mojarra, such as Eucinostomus gula and E. argenteus were found at all salinities with a nearly even distribution throughout the study area. A few other species showed a propensity for either low or high salinity ranges but were also found throughout the entire salinity range. The silverside, Menidia beryllina, and the lined sole, Achirus lineatus, were present most often at lower salinities but also occurred at values of 31.5 ppt and 32.6 ppt, respectively. The striped anchovy, Anchoa hepsetus, and the frillfin goby, Bathygobius saporator, were present most often at high salinities, but could be found at salinities as low as 0.2 ppt and 2.0 ppt, respectively. Two species were found only in the outer estuary and the Indian River Lagoon. The darter goby, Gobionellus boleosoma, was found in a salinity range from 24.0 ppt to 36.0 ppt, and the dusky anchovy, Anchoa lyolepus, was collected in a salinity range from 17.0 ppt to 36.0 ppt. In contrast, the striped mojarra, Diapterus plumieri,

was found only in the inner estuary with a salinity range from 2.0 ppt to 12.0 ppt.

Species presence tables of the 27 most abundant species and two other selected species (red drum, Scieanops ocellata and snook, Centropomis undecimalis) were made for each seine and trawl station, for every sample date of the baseline study (Appendix III). These two selected species were chosen because they are of great interest to sports fishermen. Surface salinities measured when these samples were taken are listed so that the salinity ranges and the time of year can be readily correlated with each other. These tables indicate the relationships among species presence, salinity ranges, and locations in the estuary as well as seasonal presence of juveniles of some fishes due to yearly spawning cycles.

DISCUSSION

Baseline Study

During the baseline study, 101 species of fish were collected. Seine and trawl samples provided a good indication of species that were present and their distribution in the estuary. However, there were some species of fish that were observed in the waterways or caught by local sport and commercial fishermen that were not found in our samples. Two of these species were the tarpon, Megalops atlantica and the pompano, Trachinotus carolinus. For a more complete list of fish species found in the St. Lucie Estuary area refer to "Fishes of the Indian River Lagoon and Adjacent Waters, Florida" (11).

The list of the species that were caught during this study was compared with the list of species that were captured by Gunter (4) and Springer (6) who used similar sampling techniques and locations in the St. Lucie Estuary. There were many freshwater fish (those fish which spawn in fresh water) found during the previous sampling programs that were not caught during this study. Prolonged, high flow discharges from the St. Lucie Lock and Dam, which were in progress during certain periods of their studies, resulted in the presence of fresh water throughout the estuary and parts of the Indian River Lagoon. The large reductions in salinities, resulting from high flow discharges, accounted for the differences found in the species composition.

During the baseline study there were no controlled discharges from Lake Okeechobee into the St. Lucie Estuary, excluding the small amount of water released as a result of boat lockage. Therefore, any seasonal decreases in salinity values resulted primarily from other sources of

fresh water, such as rainfall and groundwater seepage. Figures 2, 3, and 4 show the relationships between the monthly rainfall and surface salinities for each of the sampling stations. The greatest retention of fresh water occurs in the inner estuary, which receives the most surface runoff and groundwater seepage, and has a limited tidal communication with the ocean.

The summer and early fall months usually correspond with the wet season in South Florida. Seasonal increases in water temperatures occur simultaneously with a decrease in salinities in the estuary. These seasonal changes in salinity and temperature produce a highly variable environment for the organisms inhabiting the entire estuary, especially the inner estuary. The resident fish were able to adapt to the ranges and fluctuations of seasonal changes in temperature, salinity, and other variables.

The histogram for each species (Appendix II) represents the number of times a species was present at a certain salinity and provides an empirical method for determining a species preference for different salinities. Although this approach yields important information, it should be noted that there are many factors which influence the distribution of fishes throughout the estuary. Such factors include: egg distribution by currents, age, and habitat preference.

Most clupeids produce pelagic eggs that are distributed by currents. The herring, Clupea harengus, has eggs that are capable of developing and hatching at salinities between 6.0 ppt and 52.0 ppt, with the newly hatched larvae tolerating salinities as low as 1.4 ppt or as high as 60.0 ppt (12). The histogram for the Clupeidae juveniles showed that they were present most often at high salinities with their presence

decreasing at lower salinities. This decrease in presence coincided with the decrease in tidal communication with the ocean. Therefore, it is possible that the current, and not the salinity, is the limiting factor in their distribution.

The age of a fish also influences its salinity tolerance. Many juvenile marine fish (fish that spawn in brackish or saltwater) utilize the estuary during their early development. During this stage some marine species of fish can tolerate extremely low salinities. These fish possess an organ that aids them in osmoregulation at low salinities, but degenerates as the juvenile matures (12). The age and size of juveniles having this osmoregulatory ability varies intraspecifically as well as interspecifically. In the histogram analysis (Appendix II) the salinity data were used for all sizes of the same species. Therefore, one must be cautious when evaluating these salinity distributions if looking for the salinity range of the adult fish.

Habitat preference of a fish is influenced by the location of suitable amounts and types of food. This may have also tended to distort the empirical analysis of the fisheries salinity distribution. For example, grass bed communities are usually biologically productive areas that have a high density of food organisms. Seine stations 7S, 8S, and 9S are dominated by the seagrass, Halodule wrightii, which can tolerate salinities from about 5 ppt to 40 ppt for extended periods of time (13). Sailors choice, Haemulon parrai, was found at these three stations; however, station 7S differed greatly in salinity range from the other two stations, indicating that habitat preference may have influenced this species presence more than salinity.

Species presence tables for the baseline study (Appendix III), showed seasonal salinity changes, the locations, and the time of year at which each fish was caught. Due to sampling techniques, only the juveniles of certain fish were collected (e.g. Mugil cephalus and Sciaenops ocellata). Some other species, because of their size and habitat requirements, were consistently caught either in the seine or in the trawl. On some of the early sampling dates, either the seine or the trawl were not used, thus these sets of samples were not as representative of the species composition as were the samples taken on other sample dates (Table 1).

Each species of fish in the species presence tables could be classified into one of three major categories. The first category of fishes were the residents which spend the majority of the year in the estuary. These year round residents could be subdivided into those species which utilized the entire estuary or just the inner or outer estuary. The other two categories were those fishes which, as adults and/or juveniles, appear in the estuary during the winter or appear in the spring months, (i.e. November through February and April through July, respectively). These latter two categories of fish utilized either the whole, or just the inner estuary.

Some resident fishes such as the bay anchovy, Anchoa mitchilli, and the spotfin mojarra, Eucinostomus argenteus, were found in the estuary from the juvenile to the adult stage, year round, and therefore probably provide a major food source for predatory fish. During the winter months, the estuary was inhabited by many resident species and transient juveniles. Transient juveniles, such as the red drum,

Sciaenops ocellata, and the striped mullet, Mugil cephalus, appeared to occupy the lower salinity range of the estuary during the juvenile stages. In the spring, juvenile snook, Centropomis undecimalis, were found in the inner estuary along with the resident fish. The snook remained there for approximately four months and then migrated to areas of higher salinity.

Many juvenile marine fishes were found in low salinity waters. One reason for this behavioral and physiological adaptation can be related to the small number of adult predator species which are able to adapt to the salinities between 5.0 ppt and 12.0 ppt. The majority of fresh-water fish can inhabit slightly brackish waters with salinity values up to about 5.0 ppt, and any regular occurrence of freshwater species above 8.0 ppt is rare (14). Marine species that spend the majority of their adult lives in high salinity waters can inhabit the outer regions of the estuary without any major osmotic problems until the salinity values fall to about one-third that of seawater, or 12.0 ppt (12). These osmo-regulatory barriers to both the fresh water and marine predatory species enable the vast majority of the resident and migrating juvenile species to flourish in nutrient rich estuarine waters. The period of time that these species spend in the estuary, where they may escape from less euryhaline predators, is advantageous to them (15).

RESULTS

Controlled 1000 cfs Discharge Study: Fishes

Data obtained from the S-80 rain gauge, turbidity and suspended solids analyses, high and low tide studies, seine and trawl samples and benthic invertebrate samples were used to evaluate the effects of the three week 1000 cfs discharge on the estuary.

Rainfall data from S-80 showed that heavy precipitation occurred during the sampling period from June 29 through July 6 (Fig. 6). Turbidities were examined by three different approaches. Means and standard deviations were calculated for each station throughout the study and secondly, for each set of data from one sample date (Table 4). Results indicated that the inner estuary was affected by increased turbidity during the study period. The third approach, an ANOVA, was used to compare the entire data set for a single date with the other nine sets of turbidity data (Table 5) so that temporal changes for the whole estuary could be noted. With the exception of the values obtained on July 11, 1977 the entire estuary showed no significant differences of variation in turbidity values. Although turbidity levels were higher on July 11 than all other sample dates, the mean value was only 11.2 JTU.

To evaluate the suspended solids data, a linear regression was performed using all values except those from the first and last samples that were taken (Fig. 7). These data were omitted as they did not adequately represent the change in suspended solids for the duration of the discharge. The results of the regression ($P=0.01$) showed a steady increase in suspended solids as a function of time, increasing

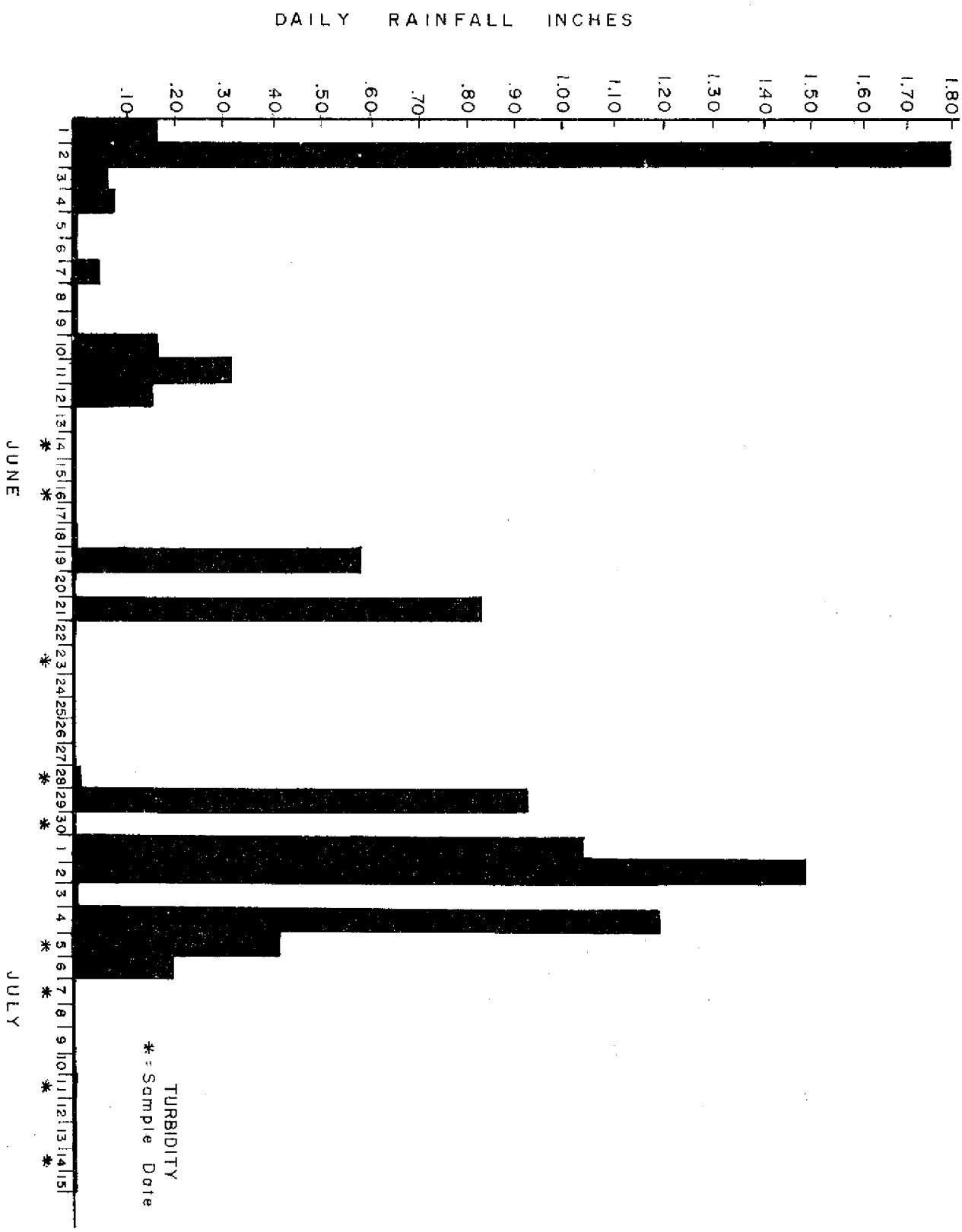


Figure 6. DAILY RAINFALL FOR JUNE AND JULY 1977 AT S-80

TABLE 4. TURBIDITY RESULTS IN JACKSON TURBIDITY UNITS (JTU) 1977

<u>Station</u>	<u>6/14</u>	<u>6/16</u>	<u>6/23</u>	<u>6/28</u>	<u>6/30</u>	<u>7/5</u>	<u>7/7</u>	<u>7/11</u>	<u>7/14</u>	For Each Station Mean	Std. Dev.
1	4.4	6.2	4.9	4.7	7.3	6.1	7.4	12.5	5.5	6.6	2.3
2	4.0	4.3	3.8	5.2	4.1	7.8	4.7	12.1	4.5	5.6	2.6
3	6.9	4.0	5.5	7.8	9.5	12.0	9.6	26.0	7.4	10.0	6.1
4	9.8	5.2	6.0	7.6	6.9	8.9	9.5	17.5	5.3	8.5	3.6
5	6.2	6.8	6.2	5.8	5.8	8.6	7.2	9.8	5.6	6.9	1.4
6	5.0	4.6	4.7	3.9	4.3	5.7	5.0	8.1	3.4	5.0	1.3
7	6.0	6.4	5.8	3.5	2.7	4.8	5.3	6.9	3.4	5.0	1.4
8	5.4	6.3	6.8	4.6	3.6	6.2	5.5	7.6	4.9	5.7	1.2
9	5.7	6.7	3.8	3.6	4.5	5.9	3.5	5.9	6.1	5.1	1.2
10	5.6	5.4	4.1	3.5	3.5	4.2	5.0	5.9	3.9	4.6	0.9
<u>Mean</u>	5.9	5.6	5.2	5.0	5.2	7.0	6.3	11.2	5.0	For All	
<u>Std. Dev.</u>	1.5	1.0	1.0	1.5	2.0	2.2	2.0	6.0	1.2	Stations	

TABLE 5. ANOVA EVALUATION FOR TURBIDITY RESULTS, COMPARING EACH SAMPLE DATE WITH ALL OTHER SAMPLE DATES

	Discharge Begins						Discharge Stopped		
	6-20-77						7-10-77		
	6-14	6-16	6-23	6-28	6-30	7-5	7-7	7-11	7-14
6-14								X	
6-16						X			
6-23					X		X		
6-28				X			X		
6-30							X		
7-5									X
7-7							X		
7-11									X
7-14									

X = Significant Difference in Variance at 95% Confidence Level

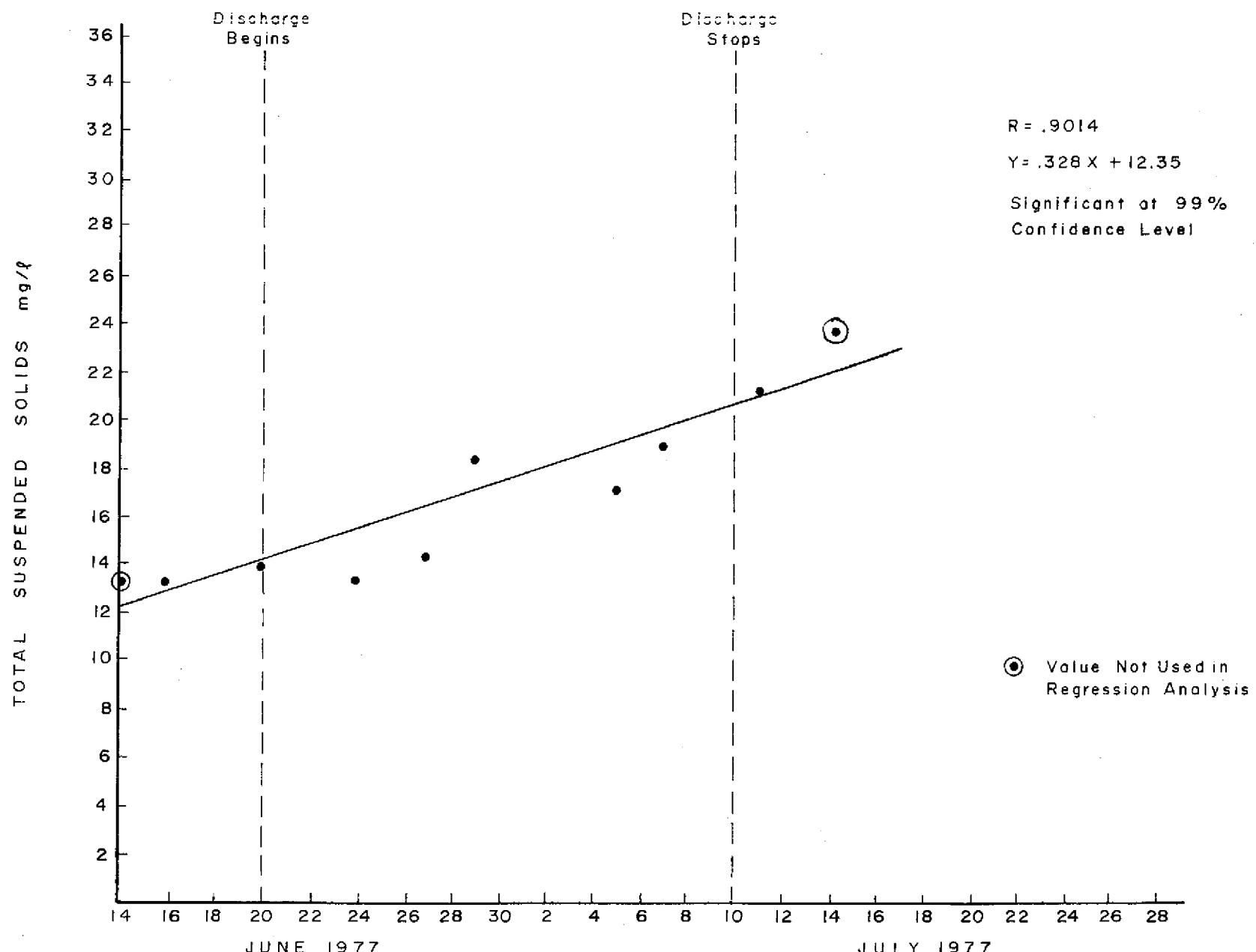


Figure 7. LINEAR REGRESSION OF TOTAL SUSPENDED SOLIDS VS. TIME FOR THE DISCHARGE STUDY JUNE-JULY 1977

from 14.2 to 20.8 mg/l throughout the discharge study. Calculations using these results showed that approximately 3.86 tons/day of suspended solids were initially added to the estuary and steadily increased to about 5.66 tons/day by the end of the discharge.

A list of fish species caught in order of abundance, and field and laboratory data for each species, are presented in Table 6 and Appendix I, respectively. Appendix I lists sets of data for each species in phylogenetic order (10) and within these sets data is in chronological order. Linear regressions were used to analyze these data in an effort to find relationships among salinities, water temperature, total number of individuals, number of species and species diversities. A comparison of these data was made for each station throughout the study period and secondly, for all the stations on every sample date. The null hypothesis was that no significant linear relationships between the variables tested would occur. This null hypothesis was not rejected. Analyses of these data did not show any consistent significant correlations among the variables even though there were substantial decreases in the salinities at each station.

In order to determine if individual species remained at the same sample locations throughout the discharge period, species presence tables were compiled for 31 of the most abundant species and two other selected species which were the snook, Centropomis undecimalis and the pigfish, Orthopristis chrysoptera (Table 7). Over 98% of the fish caught were represented by this method. By inspection, Table 7 indicates that individual species did not relocate during the 1000 cfs study period. Moreover, chi-square tests indicated that there was not a significant change ($P=.05$) in the number of species that were caught

TABLE 6. FISH SPECIES AND THE NUMBER OF INDIVIDUALS CAUGHT

<u>Species</u>	<u>NC*</u>	<u>Species</u>
<i>Elops saurus</i>	1	<i>Hemiramphus brasiliensis</i>
<i>Opisthonema oglinum</i>	1	<i>Chloroscombrus chrysurus</i>
<i>Opsanus tau</i>	1	<i>Trinectes maculatus</i>
<i>Fistularia tabacaria</i>	1	<i>Caranx hippos</i>
<i>Hippocampus</i> sp.	1	<i>Pogonias cromis</i>
<i>Epinephelus</i> sp.	1	<i>Achirus lineatus</i>
<i>Pomoxis nigromaculatus</i>	1	<i>Lactophrys triqueter</i>
<i>Selene vomer</i>	1	<i>Dasyatis sabina</i>
<i>Lobotes surinamensis</i>	1	<i>Chaetodipterus faber</i>
<i>Diplodus holbrooki</i>	1	<i>Bathygobius soporator</i>
<i>Leiostomus xanthurus</i>	1	<i>Syphurus plagiura</i>
<i>Sciaenops ocellata</i>	1	<i>Microgobius gulosus</i>
<i>Sphyraena borealis</i>	1	<i>Brevoortia smithi</i>
<i>Dactyloscopus crossotus</i>	1	<i>Scarus</i> sp.
<i>Microgobius thalassinus</i>	1	<i>Halichoeres brivittatus</i>
<i>Scomberomorus maculatus</i>	1	<i>Chilomycterus schoepfii</i>
<i>Scorpaena plumieri</i>	1	<i>Haemulon plumieri</i>
<i>Dorosoma cepedianum</i>	1	<i>Sparasoma</i> sp.
<i>Lucania parva</i>	1	<i>Cyprinodon variegatus</i>
<i>Menticirrhus saxatilis</i>	1	<i>Haemulon sciurus</i>
<i>Mugil cephalus</i>	2	<i>Bagre marinus</i>
<i>Labrisomus nuchipinnis</i>	2	<i>Mugil curema</i>
<i>Scorpaena grandicornis</i>	2	<i>Synodus foetens</i>
<i>Monocanthus hispidus</i>	2	<i>Cynoscion nebulosus</i>
<i>Lutjanus mohogani</i>	2	<i>Orthopristis chrysoptera</i>
<i>Menticirrhus americanus</i>	3	<i>Albula vulpes</i>
<i>Prionatus</i> sp.	3	<i>Gobiosoma boscii</i>
<i>Sphoeroides nephelus</i>	3	<i>Centropomis undecimalis</i>
<i>Sardinella anchovia</i>	4	<i>Caranx latus</i>
<i>Anchoa lyolepis</i>	4	<i>Cynoscion regalis</i>

*NC = Number Caught

GHT IN ORDER OF ABUNDANCE DURING THE FIVE WEEK STUDY

<u>NC*</u>	<u>Species</u>	<u>NC*</u>	<u>% of Catch</u>
4	<i>Lutjanus synagris</i>	26	
4	<i>Archosargus probatocephalus</i>	27	
4	<i>Fundulus grandis</i>	31	
5	<i>Syngnathus louisianae</i>	33	
5	<i>Strongylura marina</i>	34	
5	<i>Gobionellus boleosoma</i>	37	
5	<i>Oligoplites saurus</i>	44	
6	<i>Cynoscion nothus</i>	45	
6	<i>Citharichthys spilopterus</i>	50	
6	<i>Diapterus plumieri</i>	57	
6	<i>Lutjanus griseus</i>	60	
7	<i>Trachinotus falcatus</i>	67	
7	<i>Haemulon parrai</i>	86	
7	<i>Syngnathus scovelli</i>	89	
8	<i>Sphoeroides testudineus</i>	89	
8	Cludeidae, juvenile	117	
8	<i>Sphyraena barracuda</i>	139	
9	<i>Dorosoma pentenense</i>	155	0.5
9	<i>Bairdiella chrysura</i>	249	0.9
10	<i>Lagodon rhomboides</i>	447	1.6
11	<i>Arius felis</i>	564	2.0
13	<i>Micropogon undulatus</i>	637	2.2
14	<i>Diapterus olisthostomus</i>	827	2.9
14	<i>Harengula pensacolae</i>	993	3.5
15	<i>Anchoa hepsetus</i>	1311	4.6
18	<i>Menidia beryllina</i>	1704	6.0
19	<i>Eucinostomus gula</i>	2071	7.3
20	<i>Eucinostomus argenteus</i>	2340	8.3
20	<i>Eucinostomus</i> , juvenile	6154	21.7
26	<i>Anchoa mitchilli</i>	9494	33.5
	Total	28326	95.0%

TABLE 7 . SURFACE SALINITIES FOR EACH STATION AND SPECIES PRESENCE FOR THE 1000 C.F.S DISCHARGE STUDY

		Station																		
	Date	1S	1T	2S	2T	3S	3T	4S	4T	5S	5T	6S	6T	7S	7T	8S	8T	9S	9T	10S
<u>Surface Salinities PPT</u>	6/15/77	17.0	20.0	24.0	25.0	18.0	21.0	22.0	24.0	27.0	26.0	31.0	28.0	34.0	35.0	35.0	27.0	36.0	35.0	
	6/23/77	14.5	14.0	18.2	19.5	2.0	3.8	7.8	16.0	15.2	20.5	15.5	24.0	9.0	34.2	35.2	33.0	NSD	32.0	30.5
	6/28/77	16.0	13.8	13.8	14.8	1.8	2.0	5.5	3.8	14.0	10.5	15.6	20.5	29.2	30.5	32.4	NSD	31.3	25.0	32.0
	7/06/77	7.5	7.8	9.5	9.5	1.5	1.5	2.0	2.2	8.0	8.5	17.5	14.0	23.0	29.5	29.6	33.5	23.5	27.0	33.5
	7/12/77	8.0	7.0	8.0	8.5	3.0	3.0	4.5	4.0	10.0	10.5	16.0	14.5	21.5	24.2	30.5	NSD	30.0	29.5	30.5
<u>Anchoa mitchilli</u>	6/15/77	X	X		X	X	X			X	X	X	X	X				X		X
	6/23/77			X	X	X	X		X	X	X		X							X
	6/28/77	X		X		X		X	X	X	X	X	X	X	X	X	X	X		X
	7/06/77	X		X		X		X	X	X	X	X	X	X	X	X	X	X	X	X
	7/12/77	X		X		X		X	X	X	X	X	X	X	X	X	X	X		X
<u>Eucinostomus Juveniles</u>	6/15/77			X	X					X			X			X	X	X	X	X
	6/23/77					X	X				X		X		X	X	X	X	X	X
	6/28/77	X	X	X	X			X			X	X	X	X	X	X	X	X	X	X
	7/06/77					X				X	X	X	X	X	X	X	X	X	X	X
	7/12/77										X	X	X	X	X	X	X	X	X	X
<u>Eucinostomus argenteus</u>	6/15/77	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X
	6/23/77	X		X	X			X		X	X	X	X	X	X	X	X	X	X	X
	6/28/77	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X
	7/06/77					X		X	X	X	X	X	X	X	X	X	X	X	X	X
	7/12/77	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X
<u>Eucinostomus guttatus</u>	6/15/77	X	X			X		X		X	X	X	X	X	X	X	X	X	X	X
	6/23/77	X				X		X		X	X	X	X	X	X	X	X	X	X	X
	6/28/77	X		X	X			X		X	X	X	X	X	X	X	X	X	X	X
	7/06/77	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X
	7/12/77	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X
<u>Menidia beryllina</u>	6/15/77	X						X												
	6/23/77	X						X												
	6/28/77	X						X												
	7/06/77	X						X												
	7/12/77	X						X												
<u>Anchoa hepsetus</u>	6/15/77							X			X			X						X
	6/23/77							X			X			X						X
	6/28/77	X						X			X			X						X
	7/06/77							X			X			X						X
	7/12/77							X			X			X						X
<u>Harengula pensacolae</u>	6/15/77	X																		X
	6/23/77																			X
	6/28/77																			X
	7/06/77																			X
	7/12/77																			X
<u>Dipturus olistostomus</u>	6/15/77							X			X			X						X
	6/23/77							X			X			X						X
	6/28/77	X	X		X			X			X			X						X
	7/06/77							X			X			X						X
	7/12/77	X						X			X			X						X
<u>Micropogon undulatus</u>	6/15/77	X								X			X							X
	6/23/77									X			X							X
	6/28/77	X								X			X							X
	7/06/77									X			X							X
	7/12/77									X			X							X
<u>Arius fellsii</u>	6/15/77	X								X			X						X	X
	6/23/77	X								X			X						X	X
	6/28/77									X			X						X	X
	7/06/77	X								X			X						X	X
	7/12/77									X			X						X	X
<u>Lagodon rhomboides</u>	6/15/77			X	X													X	X	X
	6/23/77																	X	X	X
	6/28/77																	X	X	X
	7/06/77																	X	X	X
	7/12/77																	X	X	X
<u>Bairdiella chrysura</u>	6/15/77							X										X	X	X
	6/23/77							X										X	X	X
	6/28/77							X										X	X	X
	7/06/77							X										X	X	X
	7/12/77							X										X	X	X
<u>Dorosoma petenense</u>	6/15/77	X								X			X							X
	6/23/77									X			X							X
	6/28/77									X			X							X
	7/06/77									X			X							X
	7/12/77									X			X							X
<u>Sphyraena barracuda</u>	6/15/77	X								X			X							X
	6/23/77									X			X							X
	6/28/77									X			X							X
	7/06/77									X			X							X
	7/12/77									X			X							X
<u>Clinidae Juveniles</u>	6/15/77																	X		X
	6/23/77																	X		X
	6/28/77																	X		X
	7/06/77																	X		X
	7/12/77																	X		X
<u>Sphoeroides testudineus</u>	6/15/77							X					X		X			X	X	X
	6/23/77							X					X		X			X	X	X
	6/28/77							X					X		X			X	X	X
	7/06/77	X						X					X		X			X	X	X
	7/12/77	X						X					X		X			X	X	X

TABLE 7 (con't.)

	IS	1T	2S	2T	2S	3T	4S	4T	5S	5T	6S	6T	7S	7T	8S	8T	9S	9T	10S
<u>Syngnathus</u> <u>scovelli</u>	6/15/77								X				X		X		X		
	6/23/77								X				X		X		X		
	6/28/77								X				X		X		X		
	7/06/77	X							X				X		X		X		
	7/12/77												X		X		X		
<u>Haemulon</u> <u>parrat</u>	6/15/77			X										X		X		X	
	6/23/77												X		X		X		
	6/28/77												X		X		X		
	7/06/77												X		X		X		
	7/12/77												X		X		X		
<u>Trachinotus</u> <u>falcatus</u>	6/15/77					X			X			X		X		X			
	6/23/77	X		X								X		X		X			
	6/28/77								X			X		X		X			
	7/06/77								X			X		X		X			
	7/12/77											X		X		X			
<u>Lutjanus</u> <u>griseus</u>	6/15/77				X										X				
	6/23/77				X										X				
	6/28/77					X									X				
	7/06/77					X		X	X				X		X				
	7/12/77					X			X				X		X				
<u>Dipterus</u> <u>plumieri</u>	6/15/77					X		X	X										
	6/23/77					X		X	X										
	6/28/77						X	X	X										
	7/06/77						X		X										
	7/12/77							X											
<u>Citharichthys</u> <u>spilopterus</u>	6/15/77						X											X	
	6/23/77						X		X									X	
	6/28/77							X		X								X	
	7/06/77								X									X	
	7/12/77									X								X	
<u>Cynoscion</u> <u>northus</u>	6/15/77		X						X										
	6/23/77		X							X									
	6/28/77		X								X								
	7/06/77										X								
	7/12/77											X							
<u>Oligoplites</u> <u>saurus</u>	6/15/77	X											X		X			X	
	6/23/77	X												X				X	
	6/28/77						X												
	7/06/77																		
	7/12/77		X																
<u>Gobionellus</u> <u>boleosoma</u>	6/15/77							X									X		
	6/23/77								X								X		
	6/28/77									X							X		
	7/06/77										X						X		
	7/12/77											X					X		
<u>Strongylura</u> <u>marina</u>	6/15/77										X			X		X		X	
	6/23/77											X		X		X		X	
	6/28/77											X		X		X		X	
	7/06/77											X		X		X		X	
	7/12/77												X		X		X		
<u>Syngnathus</u> <u>louisianae</u>	6/15/77									X			X		X		X		
	6/23/77										X		X		X		X		
	6/28/77											X		X		X		X	
	7/06/77											X		X		X		X	
	7/12/77												X		X		X		
<u>Fundulus</u> <u>grandis</u>	6/15/77																		
	6/23/77																		
	6/28/77																		
	7/06/77																		
	7/12/77																		
<u>Archosargus</u> <u>probatocephalus</u>	6/15/77										X			X		X			
	6/23/77											X		X		X			
	6/28/77												X		X		X		
	7/06/77													X		X			
	7/12/77														X				
<u>Lutjanus</u> <u>synagris</u>	6/15/77												X						
	6/23/77													X					
	6/28/77														X				
	7/06/77															X			
	7/12/77																X		
<u>Cynoscion</u> <u>regalis</u>	6/15/77						X			X									
	6/23/77							X		X									
	6/28/77								X										
	7/06/77									X									
	7/12/77										X								
<u>Centropomus</u> <u>undecimalis</u>	6/15/77		X																
	6/23/77		X																
	6/28/77		X																
	7/06/77		X																
	7/12/77		X																
<u>Orthopristis</u> <u>chrysoptera</u>	6/15/77																		
	6/23/77																		
	6/28/77																		
	7/06/77																		
	7/12/77																		

at each station; or the number of times the most abundant species were caught throughout the estuary for the discharge study.

Data from the high and low tide studies were evaluated by using linear regressions (Appendix IV). These analyses used the conductivity (salinity) data generated from each station to show the relationship and rate of decreasing conductivities as a function of time. All ten stations analyzed, except for stations 3 and 5, showed significant correlations ($P \leq 0.05$) between salinity and elapsed time.

Benthic Macroinvertebrates

The benthic fauna were sampled one week prior to the beginning of the discharge, and one month after its completion. Statistical evaluations consisted of comparisons between data from these two sampling dates.

Substrate types, water depths, and \log_e Shannon-Weiner Species Diversity Index (16) were determined for all transect sample sites and are listed in Table 8. Substrates at the inner estuary sample sites were primarily composed of mud. Substrate types exhibited a transition from mud to sand and shell towards the outermost sample sites. Water depths ranged from two to twelve feet with the C sample sites being the deepest. Community structure, measured by the diversity index ranged from 0.10 through 2.25 in June and from 0.0 through 2.30 in August. Species diversities increased from the inner to the outer estuary transects, even though considerable variability of these values occurred among sites on the same transect. Results of a t-test indicated that means of species diversities for each transect were not significantly different before and after the discharge (See Table 11).

TABLE 8. DEPTHS, SUBSTRATE TYPES, AND LOG_e SHANNON-WEINER SPECIES DIVERSITY INDEX AT 30 EKMAN STATIONS FROM ST. LUCIE ESTUARY ON 6-13-77 and 8-15-77.

STATION	DEPTH (FT)	SUBSTRATE TYPE	LOG _e SHANNON-WEINER SPECIES DIVERSITY	
			6/13/77	8/15/77
1S	5	mud, sand, shell, detritus	.90	NSD
1C	3	mud, detritus, shell	.49	NSD
1X	3	mud, sapropel, detritus, shell	.45	NSD
2S	5	mud, sapropel, shell	.76	1.67
2C	6	mud, shell, sapropel	.30	NSD
2X	6	mud, shell, sapropel	1.09	NSD
3S	2	mud, sand, detritus, shell	1.23	.83
3C	8	mud, sapropel, shell	.89	0.00
3X	2	mud, sapropel, detritus	.76	1.21
4S	3	mud, sapropel, detritus, shell	1.17	1.43
4C	5	mud, sapropel, detritus, shell	.51	.24
4X	3	mud, sapropel, shell	.71	.56
5S	2	mud, sand, shell	1.23	1.23
5C	10	mud, shell, sapropel	1.51	1.24
5X	5	mud, shell, sapropel	.10	.36
6S	6	mud, sapropel, shell	.61	.83
6C	9	mud, sapropel, shell	.54	.22
6X	3	mud, sand, shell	1.03	1.14
7S	3	sand, shell, mud	1.07	2.02
7C	7	sand, shell, mud,	1.82	1.57
7X	6	sand, mud, shell	1.89	1.39
8S	3	sand, shell, mud	2.01	2.30
8C	12	sand, shell	1.42	.95
8X	2	sand, shell	1.52	1.80
9S	5	sand, small shell, mud	1.04	1.70
9C	10	sand, shell, mud, detritus	1.51	1.03
9X	3	sand, mud, sapropel, detritus	2.25	2.17
10S	6	sand	1.33	1.48
10C	10	shell, sand	.69	.69
10X	3	shell, sand	.95	NSD

NSD = Non-sufficient data

Sapropel = Bottom deposits rich in decomposing organic matter

H₀: No statistical difference in the variance of species diversity before and after discharge, F.05(1,52)d.f. = .493

Phylogenetic and quantitative listings of benthic data (Tables 9 and 10, respectively) are shown for both sampling dates. By inspection, Table 10 shows that there were distinct inner and outer estuary benthic communities which corresponded with the types of substrates that were listed in Table 8. Transects 1 through 4 comprised the inner estuary community which had mud substrates, and transects 7 through 10 (with the exception of transect 9) composed the outer estuary community having mainly sand substrates. Transects 5 and 6 show a transition between these two community types.

Homogeneity of variance was shown for the total number of individuals and the number of species collected for each sample site before and after the discharge. Six phyla were represented in two sets of samples by 41 species that were collected in June and 42 species collected in August. Thirty species were common to both sample sets so there was a change in species composition. This change can be attributed to species which comprised less than 1.31% of the total relative abundance.

The change in species composition by number of species was approximately 28% and was determined by:

41 species collected in June	42 species collected in August
-30 species common to both sets	-30 species common to both sets
11 species not present in	12 species not present in
August	June

$$(11+12) \div (41+42) \times 100\% = 28\% \text{ change}$$

For both sampling dates and at each sample site, the number of species and number of organisms per square foot ranged from 0 through 13, and from 1 through 1,146, respectively.

TABLE 9. PHYLOGENETIC LISTING OF FAUNA COLLECTED FROM THE BENTHIC COMMUNITIES OF THE ST. LUCIE ESTUARY AT 30 SITES ON 6-13-77 AND 8-15-77

PHYLUM CNIDARIA		
Class Anthozoa	Family Lyonsidea	<u>Leptochelia</u> sp.
<u>unknown sp.</u>	<u>Lyonsia hyalina</u>	Order Decapoda
Order Actiniaria	Family Mactridae	Family Alpheidae
Family Sagartidae	<u>Mulinia lateralis</u>	<u>Alpheus</u> sp.
<u>Sagartia</u> sp.	Family Mytilidae	Family Penaeidae
PHYLUM ANNELIDA	<u>Amygdalum papyria</u>	<u>Penaeus</u> sp.
Class Polychaeta	<u>Ischadium recurvum</u>	Family Portunidae
Family Goniadidae	<u>Mytilopsis leucophaeta</u>	<u>Portunus</u> sp.
<u>Glycinde solitaria</u>	Family Nuculanidae	PHYLUM ECHINODERMATA
Family Nereidae	<u>Nuculana acuta</u>	Class Stelleroidea
<u>Nereis</u> sp.	Family Nuculidae	Order Ophiuroidea
Family Onuphidae	<u>Nucula verrilli</u>	Family Amphiidae
<u>Diopatra cuprea</u>	Family Solecurtidae	<u>Amphipolis</u> sp.
Family Ophelidae	<u>Tagelus plebeius</u>	PHYLUM CHORDATA
<u>Armandia</u> sp.	Family Tellinidae	Class Osteichthyes
Family Orbiniidae	<u>Macoma mitchelli</u>	Order Perciformes
<u>Haploscoloplos foliosus</u>	<u>Tellina candeana</u>	Family Gerreidae
<u>Haploscoloplos</u> sp.	<u>T. tampaensis</u>	<u>Eucinostomus</u> sp.
Family Pectinariidae	Family Veneridae	Family Gobiidae
<u>Pectinaria gouldii</u>	<u>Chione cancellata</u>	<u>Gobionellus</u> sp.
Family Spionidae	<u>C. intepurpurea</u>	
<u>Paraprionospio pinnata</u>	<u>Transella conradina</u>	
Family Terebellidae	<u>T. cubaniana</u>	
<u>Terebellides</u> sp.	PHYLUM ARTHROPODA	
PHYLUM MOLLUSCA		Class Crustacea
Class Gastropoda		Order Mysidacea
Family Retusidae		Family Mysidae
<u>Acteocina canaliculata</u>		<u>Mysis stenolepis</u>
Family Atyidae		Order Cumacea
<u>Haminoea succinea</u>		Family Diastylidae
Family Cerithiidae		<u>Diastylis</u> sp.
<u>Alabina cerithidioides</u>		Order Isopoda
Family Marginellidae		Family Munnidae
<u>Marginella succinea</u>		<u>Munna reynoldsi</u>
Family Nassariidae		Family Anthuridae
<u>Nassarius vibex</u>		<u>Cyathura polita</u>
Family Olividae		Order Amphipoda
<u>Olivella pusilla</u>		Family Ampeliscidae
Family Scaphandriidae		<u>Ampelisca abdita</u>
<u>Cylinchna bidentata</u>		Family Corophiidae
Class Pelecypoda		<u>Cerapus</u> sp.
Family Corbiculidae		<u>Corophium acherusicum</u>
<u>Corcula swiftiana</u>		Family Haustoriidae
Family Diplodontidae		<u>Bathyporeia</u> sp.
<u>Diplodonta punctata</u>		<u>Haustorius</u> sp.
Family Gouldidae		<u>Parahaustorius</u> sp.
<u>Crasinella lunulata</u>		Family Phoxocephalidae
Family Lucinidae		<u>Paraphoxus</u> sp.
<u>Parilucina multilineata</u>		Order Tanaidacea
		Family Tanaidae

TABLE 10 . QUANTITATIVE LISTING OF BENTHIC MACROINVERTEBRATE FAUNA OF ST. LUCIE ESTUARY AT 30 SAMPLE SITES ON 6-13-77 AND 8-15-77 (6 SITES NOT USED IN ENUMERATION).

Transect Location	1			2			3			4			5			6			7			8			9			10				
	S	C	X	S	C	X	S	C	X	S	C	X	S	C	X	S	C	X	S	C	X	S	C	X	S	C	X	S	C	X		
Class Anthozoa																																
Anthozoa																																
Sagartia sp.																																
Class Polychaeta																																
Glycinde solitaria																																
Nereis sp.	2	1	0				1	2	0	4	0	0	7			2	1	0	4	7	2	1	1	0	0	6	2	0	2	0		
Dipatrea cuprea	NS	NS					1	2	0	0	0	0	1			0	2	6	0	1	1	0	0	2	4	0	1	1	1	NS		
Armandia sp.										0			1																			
Haploscoloplus foliosus																10	0															
Haploscoloplus sp.																8	4															
Pectinaria gouldii	4	1	6				1	5	0	5			0			1	0	5	13											0		
Paraprionospio pinnata	NS	1	NS				3	2	1	0	4	0	0	3		4	0	2	0	2	0	1	0	0	0	3	1	0	0			
Terebellides sp.																0	1	0	9										5	0		
Class Gastropoda																																
Acteocina canaliculata																0	4	2	2	1	0	4			0	1	1	0	0	0		
Haminoea succinea																3	0	0	0	0	1	0	0	2	10	0	0	0	0	1		
Alabina cerithidoidea																0	2															
Marginella succinea																			10													
Nassarius vibex																			1													
Olivella pussila																																
Cylinchna bidentata																0	14															
Class Pelecypoda																																
Corbicula swiftiana																			0	3										0	1	
Diplodonta punctata																					2	0	1		0	1	0	2				
Crassinella lunulata																																
Parvilucina multilineata																																
Lyonsia hyalina																0	1															

TABLE 10 . (Con't)

Transect Location	1	2	3	4	5	6	7	B	9	10	
	S C X	S C X	S C X	S C X	S C X	S C X	S C X	S C X	S C X	S C X	
<i>Mulinia lateralis</i>	84 NS	5 NS	110 9	139 NS	89 47	38 0	56 44	123 72	132 134	140 15	
<i>Amygdalum papyria</i>	3 NS	823 0	0 6	2 0	0 1	0 29	5 1	1 0	101 129	65 158	
<i>Ischadium recurvum</i>	3 NS	2 NS	2 NS	7 1	7 2	2 0	0 2	1 9	23 1	2 7	
<i>Mytilopsis leucophaeta</i>	2 NS	3 NS	1 2	1 0	1 0	1 0	1 0	11 3	0 8	0 0	
<i>Nuculana acuta</i>									1 0	1 1	
<i>Nucula verrilli</i>									0 0	0 0	
<i>Tagelus plebeius</i>			0 10						1 5	1 1	
<i>Macoma mitchelli</i>	6 NS	1 NS	1 16	3 NS	0 31	1 0	1 12	0 15	0 3	0 1	0 2
<i>Tellina candaena</i>										3 1	
<i>Tellina tampaensis</i>									4 2	0 3	
<i>Chione cancellata</i>									2 0	0 1	
<i>Chione intepurpurea</i>									2 0	0 1	
<i>Transennella conradina</i>									1 0	0 11	
<i>Transennella cubaniana</i>									1 0	0 1	
Class Crustacea											
<i>Mysis stenolepis</i>	1 NS		9 0	1 0	1 0	1 0	1 2	4 0	1 0	1 0	5 0
<i>Diastylis sp.</i>							2 0		2 0	1 1	0 1
<i>Munna reynoldsi</i>	1 NS	3 NS					0 1		1 1	1 1	1 1
<i>Cyathura polita</i>											
<i>Ampelisca abdita</i>	298 NS	209 0	1 NS	247 NS	14 2	2 0	340 0	131 0	1 5	1 0	1 1
<i>Cerapous sp.</i>	4 NS	45 NS	1 0	2 0	1 0	1 0	58 106	6 4	0 1	0 1	3 0
<i>Corophium acherusicum</i>	2 0						4 2		1 1		5 0
<i>Bathyporeia sp.</i>									6 0	20 0	5 5
<i>Haustorius sp.</i>									1 0	16 1	0 1
<i>Parahaustorius sp.</i>									0 1	0 1	1 1
<i>Paraphoxus sp.</i>									2 0	0 0	0 0
<i>Leptocheilia sp.</i>			75 NS		40 76	0 2	0 0	3 0		2 0	0 1

TABLE 10 . (Con't)

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Transect Location	1			2			3			4			5			6			7			8			9			10				
	S	C	X	S	C	X	S	C	X	S	C	X	S	C	X	S	C	X	S	C	X	S	C	X	S	C	X	S	C	X		
Alpheus sp.																			0													
Penaeus sp.																			0											3	0	
Portunus sp.																			1													
Class Stelleroidea																			0													
Amphipholus sp.																															0	1
Class Osteichthyes																																
Eucinostomus sp.																															0	1
Gobionellus sp.																																
No. of Species/Station	1	NS																														
Total No. of Ind/Station	13	6	2	6	5	8	6	8	10	11	7	5	5	11	3	6	5	7	6	7	9	13	6	8	4	7	12	4	2	3		
	NS	NS	NS	7	NS	NS	4	1	5	8	4	2	4	6	6	9	4	8	9	7	4	12	3	11	10	5	12	5	0	NS		
	412	376	6	326	146	423	67	71	573	294	157	48	21	80	174	100	116	92	33	13	26	58	31	24	18	17	37	5	2	5		
	NS	NS	NS	47	NS	NS	81	1	239	111	141	20	16	31	139	194	354	103	12	14	4	20	5	52	46	22	47	7	0	5		

6-13-77

X B-15-77 NS = Non-sufficient data (Not sampled on 8-15-77)

H₀ : No statistical difference in the variance of the number of species at all sites before and after discharge,
 $F_{.05}$ (1,46) d.f. = 1.07.

H₀ : No statistical difference in the variance of the total number of individuals of all species, at all sites
before and after discharge, $F_{.05}$ (1,46) d.f. = .759.

The arithmetic means of the measured values from bottom water samples (Table 11) collected with the June biota for temperature ($^{\circ}$ C), dissolved oxygen (ppm D.O.), salinity (ppt S), and pH varied from 27.8 $^{\circ}$ C to 31.2 $^{\circ}$ C, from 6.9 ppm to 8.6 ppm, D.O.; from 21.5 ppt to 37.0 ppt, S; and from 6.4 to 7.1 pH; respectively. The mean values for the August biota sample data for these same parameters varied from 26.4 $^{\circ}$ C to 28.5 $^{\circ}$ C, from 4.1 ppm to 9.2 ppm, D.O.; from 4.4 ppt to 33.0 ppt, S; and from 7.4 to 8.2, pH; respectively. The means of the number of individuals ranged from 4 to 298 individuals per transect in June and from 4 to 217 individuals per transect in August.

There were no statistical differences found for dissolved oxygen, species diversities, number of species, and the number of individuals at each transect between the two sampling dates. Significantly different means ($P=0.05$) were found for temperature and salinity (Table 11).

Benthic community analyses were determined using a modification of the methods of Walker and Bambach (17) for determining the percent presence, rank presence (Table 12), total relative abundance, and rank abundance (Table 13) of all species collected. Percent presence was ascertained for each species from the ratio of the number of sites at which a species occurred over the total number of sites in the estuary. A numerical rank presence was determined for all species from these percent presence values. Total relative abundance, expressed in percent, was determined from the ratio of the total number of individuals of one species over the total number of individuals of all species. A numerical rank abundance was determined for all species from these total relative abundance values.

A chi square analysis ($P=0.05$) indicated no significant difference

TABLE 11. BENTHIC COMMUNITY COMPARISON OF TRANSECT MEANS BEFORE AND AFTER FRESHWATER DISCHARGE FOR 10 TRANSECTS IN THE ST. LUCIE ESTUARY ON 6/13/77 AND 8/15/77. (N=3).

VARIABLE		MEAN FOR TRANSECT*									
		1SCX	2SCX	3SCX	4SCX	5SCX	6SCX	7SCX	8SCX	9SCX	10SCX
Temperature ***	6/13/77	31.0	29.8	31.2	30.8	30.3	29.3	28.5	28.2	29.0	27.8
	8/15/77	28.5	27.0	27.3	26.9	27.9	27.1	26.4	26.9	28.4	27.8
Dissolved Oxygen	6/13/77	6.87	7.43	7.00	8.63	7.13	6.43	7.53	7.57	7.36	7.80
	8/15/77	7.47	4.07	5.88	5.35	7.48	5.90	9.15	7.02	4.87	4.98
Salinity ***	6/13/77	22.0	24.5	21.5	25.2	29.0	33.3	35.0	37.0	35.7	37.0
	8/15/77	4.4	11.8	10.1	12.4	14.8	25.0	31.6	33.0	32.5	32.7
pH ***	6/13/77	6.57	6.43	6.97	7.07	6.65	6.72	7.08	NSD	NSD	NSD
	8/15/77	7.41	7.47	8.18	7.83	7.95	7.8	8.01	8.10	7.88	8.08
No. of Species	6/13/77	7	7	8	8	6	6	7	9	8	3
	8/15/77	NSD	NSD	3	5	5	7	6	9	9	3**
Species Diversity	6/13/77	.613	.72	.96	.79	.94	.72	1.59	1.65	1.60	.99
	8/15/77	NSD	NSD	.68	.74	.94	.73	1.66	1.68	1.63	1.08**
Total No. of Individuals	6/13/77	264	298	237	166	91	103	24	37	24	4
	8/15/77	NSD	NSD	107	100	63	217	10	26	38	4**

*N=3

**N=2

NSD=Non-sufficient data

*** = Statistical difference of mean values before and after discharge,
(t-test, P = 0.05)

TABLE 12. PERCENT PRESENCE AND RANK PRESENCE OF ST. LUCIE ESTUARY BENTHIC SPECIES BEFORE AND AFTER 3 WEEK 1,000 C.F.S. DISCHARGE
ON 6/13/77 AND 8/15/77 AT 24 SITES

TAXA	% PRESENCE BEFORE		RANK PRESENCE BEFORE		TAXA	% PRESENCE BEFORE		RANK PRESENCE BEFORE	
	AFTER		BEFORE	AFTER		AFTER		BEFORE	AFTER
<i>Mulinia lateralis</i>	79.2	79.2	1	1	<i>ischadium recurvum</i>	4.2	0.0	14	0
<i>Mysis stenolepis</i>	66.7	12.5	2	8	<i>Lyonsia floridana</i>	4.2	20.8	14	6
<i>Ampelisca abdita</i>	62.5	29.2	3	4	<i>Marginella succinea</i>	4.2	0.0	14	0
<i>Glycinde solitaria</i>	50.0	33.3	4	3	<i>Mytilopsis leucophaeta</i>	4.2	4.2	14	10
<i>Nereis</i> sp.	45.8	33.3	5	3	<i>Nucula verrillii</i>	4.2	0.0	14	0
<i>Acteocina canaliculata</i>	37.5	16.7	6	7	<i>Parahaustorius</i> sp.	4.2	0.0	14	0
<i>Haploscoloplos foliosus</i>	33.3	8.3	7	9	<i>Paraphoxus</i> sp.	4.2	0.0	14	0
<i>Cerapus</i> sp.	29.2	29.2	8	4	<i>Parvilucina multilineata</i>	4.2	0.0	14	0
<i>Bathyporeia</i> sp.	25.0	12.5	9	8	<i>Penaeus</i> sp.	4.2	4.2	14	10
<i>Macoma mitchelli</i>	25.0	41.7	9	2	<i>Portunus</i> sp.	4.2	4.2	14	10
<i>Pectinaria gouldii</i>	25.0	16.7	9	7	<i>Tellina tampaensis</i>	4.2	8.3	14	9
<i>Armandia</i> sp.	20.8	4.2	10	10	<i>Terebellides</i> sp.	4.2	0.0	14	0
<i>Paraprionospio pinnata</i>	20.8	16.7	10	7	<i>Transella conradina</i>	4.2	4.2	14	10
<i>Diopatra cuprea</i>	16.7	20.8	11	6	<i>T. cubaniana</i>	4.2	0.0	14	0
<i>Haustorius</i> sp.	16.7	16.7	11	7	<i>Alabina cerithidioides</i>	0.0	4.2	0	10
<i>Amygdalum papryia</i>	12.5	25.0	12	5	<i>Alpheus</i> sp.	0.0	4.2	0	10
<i>Chione cancellata</i>	12.5	12.5	12	8	<i>Amphipolis</i> sp.	0.0	4.2	0	10
<i>Diastylis</i> sp.	12.5	16.7	12	7	<i>Corbula swiftiana</i>	0.0	8.3	0	9
<i>Leptochelia</i> sp.	12.5	12.5	11	8	<i>Crassinella lunulata</i>	0.0	4.2	0	10
<i>Corophium acherusicum</i>	8.3	4.2	13	10	<i>Cylichna bidentata</i>	0.0	8.3	0	9
<i>Cyathura polita</i>	8.3	0.0	13	0	<i>Gobionellus</i> sp.	0.0	4.2	0	10
<i>Nuculana acuta</i>	8.3	12.5	13	8	<i>Haminoea succinea</i>	0.0	16.7	0	7
<i>Sagartia</i> sp.	8.3	0.0	13	0	<i>Munna reynoldsi</i>	0.0	4.2	0	10
<i>Anthozoan</i>	4.2	0.0	14	0	<i>Nassarius vibex</i>	0.0	4.2	0	10
<i>Chione intepurpurea</i>	4.2	8.3	14	9	<i>Olivella pusilla</i>	0.0	4.2	0	10
<i>Diplodonta punctata</i>	4.2	12.5	14	8	<i>Tagelus plebeius</i>	0.0	16.7	0	7
<i>Haploscoloplos</i> sp.	4.2	8.3	14	9					

TABLE 13. TOTAL RELATIVE ABUNDANCE AND RANK ABUNDANCE OF ST. LUCIE ESTUARY BENTHIC SPECIES BEFORE AND AFTER 3 WEEK 1,000 C.F.S. DISCHARGE
ON 6/13/77 AND 8/15/77 AT 24 SITES

TAXA	T R A (%)*		RANK ABUNDANCE		TAXA	T R A (%)*		RANK ABUNDANCE	
	BEFORE	AFTER	BEFORE	AFTER		BEFORE	AFTER	BEFORE	AFTER
<i>Mulinia lateralis</i>	49.37	60.66	1	1	<i>Penaeus</i> sp.	.13	.05	22	23
<i>Ampelisca abdita</i>	29.68	1.31	2	6	<i>Chione intepurpurea</i>	.08	.16	23	21
<i>Cerapus</i> sp.	3.15	6.56	3	2	<i>Diplodonta punctata</i>	.08	.22	23	20
<i>Leptocheilia</i> sp.	1.89	4.32	4	4	<i>Ischadium recurvum</i>	.08	0.00	23	24
<i>Bathyporeia</i> sp.	1.85	.82	5	10	<i>Parahaustorius</i> sp.	.08	0.00	23	24
<i>Glycinde solitaria</i>	1.68	.98	6	8	<i>Anthozoan</i>	.04	0.00	24	24
<i>Mysis stenolepis</i>	1.39	.33	7	18	<i>Haploscoloplus</i> sp.	.04	.16	24	21
<i>Nereis</i> sp.	1.26	1.20	8	7	<i>Lyonsia floridana</i>	.04	.66	24	13
<i>Haploscoloplus foliosus</i>	1.18	.66	9	13	<i>Marginella succinea</i>	.04	0.00	24	24
<i>Pectinaria gouldii</i>	1.09	.38	10	17	<i>Paraphoxus</i> sp.	.04	0.00	24	24
<i>Haustorius</i> sp.	.92	.22	11	20	<i>Parvilucina multilineata</i>	.04	0.00	24	24
<i>Acteocina canaliculata</i>	.84	.55	12	15	<i>Portunus</i> sp.	.04	.05	24	23
<i>Armandia</i> sp.	.67	.05	13	23	<i>Transella conradina</i>	.04	.60	24	14
<i>Parapriionospio pinnata</i>	.63	.77	14	11	<i>T. cubaniana</i>	.04	0.00	24	24
<i>Nuculana acuta</i>	.55	.44	15	16	<i>Alabina cerithidioides</i>	0.00	.11	0	22
<i>Macoma mitchelli</i>	.42	4.59	16	3	<i>Alpheus</i> sp.	0.00	.11	0	22
<i>Amygdalum papyria</i>	.34	2.62	17	5	<i>Amphipholis</i> sp.	0.00	.05	0	23
<i>Nucula verrilli</i>	.34	0.00	17	24	<i>Corbula swiftiana</i>	0.00	.22	0	20
<i>Diopatra cuprea</i>	.29	.77	18	11	<i>Crassinella lunulata</i>	0.00	.11	0	22
<i>Mytilopsis leucophyta</i>	.29	.05	18	23	<i>Cyllichna bidentata</i>	0.00	1.31	0	6
<i>Corophium acherusicum</i>	.25	.71	19	12	<i>Gobionellus</i> sp.	0.00	.05	0	23
<i>Chione cancellata</i>	.21	.33	20	18	<i>Haminoea succinea</i>	0.00	.71	0	12
<i>Diastylis</i> sp.	.21	.22	20	20	<i>Munna reynoldsi</i>	0.00	.05	0	23
<i>Sagartia</i> sp.	.21	0.00	20	24	<i>Nassarius vibex</i>	0.00	.05	0	23
<i>Terebellides</i> sp.	.21	0.00	20	24	<i>Olivella pusilla</i>	0.00	.05	0	23
<i>Tellina tampaensis</i>	.17	.27	21	19	<i>Tagelus plebeius</i>	0.00	.93	0	9
<i>Cyathura polita</i>	.13	0.00	22	24					

* T R A (%) = Total Relative Abundance (%)

for the relative abundance, but did show a significant difference in the percent presence of all species collected for both sampling periods. These evaluations indicate that there was little change in the relative abundance of all benthic species collected from one sample date to the next. There was, however, a difference in the number of sites at which each species was collected for the two sampling periods.

A comparison of the percent presence values for all species that were collected before and after the discharge revealed that the greatest decrease in these values occurred with the polychaetes, amphipods, and mysids. In contrast, the pelecypods showed the greatest increase. The Cumacea, Decapoda, Isopoda, and Tanaidacea species remained approximately the same in percent presence. No species was ubiquitous throughout the estuary.

As a group, the pelecypods represented 52% of the relative abundance of the benthic species collected in June. In August pelecypods represented 76% of the relative abundance. The second largest assemblage, the crustaceans, represented 40% of the relative abundance in June and yet only 16% in August. The polychaetes represented 7% to 5% of the relative abundance of benthic species in June and August, respectively. The gastropods had a relatively small change from 1% to 3% for the same set of samples.

The total relative abundance list (Table 13) indicates that the pelecypod, Mulinia lateralis, and two amphipods, Ampelisca abdita and Cerapus sp.¹, were the most abundant consecutively, in the June samples. In August, M. lateralis was again most abundant. The amphipod,

¹This species is distinct from C. tubularis and is identified in Bousfield (1973) as Cerapus sp. (Florida). (Reference 19).

Cerapus sp. was second and the pelecypod, Macoma mitchelli, was the third most abundant species. Crustaceans, especially the amphipods, showed the most reduction in relative abundance between June and August, while the most recruitment of new species was noted for the pelecypods and gastropods.

Significant values ($P=0.05$) for the linear regression coefficients (R^2) and the correlation coefficients (R) for three levels of analysis were determined by using benthic, physical, chemical and biological data.¹ These three approaches were used to define relationships among these data for each sample date. The estuary level of analysis (Table 14) had the largest sample size ($N=30$) which utilized the entire data set. The transect analysis correlations were determined by using the data from the three sample site locations found on each of the transects ($N=3$). These two approaches reinforced observations of the quantitative listings (Table 10) that two separate groups of benthic communities existed in the estuary. Also, the zonation of physical and chemical parameters and substrates in these two groups was expressed.

The site location analysis correlations for all the transects were determined for all S, C, and X sample sites ($N=10$). This approach was used for the comparison of correlations at the sublittoral zone sites (S and X) with the correlations of the channel sites (C). This analysis revealed that the greatest number of significant correlations were found for the channel sample site locations. The S and X sample site locations had approximately the same overall trends as each other before and after the discharge. The C sample site correlations changed

¹These data are on file at the South Florida Water Management District headquarters, West Palm Beach, Florida.

TABLE T4. SIGNIFICANT VALUES FOR R AND R^2 AT THE 99% AND 95% CONFIDENCE LEVELS FOR BENTHIC COMMUNITY SAMPLES FROM ST. LUCIE ESTUARY ON 6/13/77 AND 8/15/77. CORRELATIONS ARE AT THE ESTUARY LEVEL WITH N=30.

	6/13/77		8/15/77	
	R	R^2	R	R^2
Temperature-Distance**	-.787*	.620		
Salinity-Distance**	.930*	.864	.940*	.884
Species Diversity-Distance**	.514	.264	.547*	.299
No. Individuals-Distance**	-.658*	.433	NS	
Temperature-Depth	-.487	.237	NSD	
D.O.-Depth	-.473	.223	NSD	
Salinity-Temperature	-.887*	.786	NS	
No. Individuals-Temperature	.531*	.282	NS	
pH-Temperature	.520	.270	NS	
No. Individuals-Salinity	-.664*	.441	NS	
pH-Species Diversity	NS		.515	.266
pH-Distance**	NS		.506	.256
Species Diversity-No. Species	.537*	.288	.768*	.590
Species Diversity-Salinity	.488	.238	.533*	.284

* 99% Confidence Level

** = Distance out the estuary (Stations 3, 4, 5, 6, 7 and 10)

NS = Non-significant

NSD = Non-sufficient data for possible correlation.

the most in the number and type of correlations found between the two sampling periods indicating that these sample locations had less stability in biota assemblages than either the S or X sites.

DISCUSSION

Controlled 1000 cfs Discharge Study: Fishes

Any physical or chemical change in the aquatic environment may cause physiological stresses on organisms that are present. When fishes are introduced to sub-lethal stresses from changes in salinities, they may be expected to initially have higher metabolic rates than normal. Many species cannot tolerate this increased metabolism for indefinite periods of time. Consequently, if they do not ultimately become acclimated to the stressed environment, they will leave the area or they will eventually die. If they do adapt to a continually stressed environment, growth depression and suppressed reproduction could result.

Estuarine fishes are euryhaline, and they can adjust to a broad range of salinities as was previously indicated in the salinity histograms presented in Appendix II. This evolutionary, physiological adaptation allows these fish to inhabit the estuarine areas that are known for their seasonal fluctuations in salinities. When salinity or any other physical or chemical change occurs rapidly, estuarine fishes are severely stressed and may leave the area. However for the most part, if the rate of salinity change is slow, most estuarine fishes can adapt. Odum (18) has shown that adult fishes such as Lutjanus griseus, Archosargus probatocephalus, Centropomus undecimalis, Sciaenops ocellatus, Strongylura marina, Eucinostomus gula and E. argenteus were frequently found in extremely low salinities (0.5 ppt) as well as in marine habitats (35 ppt), at the North River region in Southwest Florida. In addition, Gunters' fish survey of the St. Lucie Estuary (4) revealed that many other fish species exhibited the same versatility, but they required a period of time for acclimation before residing in low salinity waters.

The St. Lucie Estuary was exposed to a change in salinity as a result of the fresh water discharge, groundwater seepage and rain. This change at several stations in the South Fork occurred as an immediate stratification of water masses after the discharge began (See Appendix IV, Stations 3 and 4). The stratified "layer" of surface fresh water, included freshwater plants such as water hyacinth, water lettuce and intermittent small blooms of blue-green algae, Anabaena and Schizothrix. This water mass eventually moved to the outer estuary and then to the ocean during outgoing tides. In contrast, the stations in the North Fork showed a uniform decrease in salinity from the surface to the bottom which may have resulted from groundwater seepage, rainfall and a slow mixing of the waters in this area with the surface waters coming from the South. In fact, during the outgoing tides, at the confluence of the North and South Forks, a difference in color of the water could be observed. A row of debris and foam demarcated the two water masses, one of which was the low salinity water coming from the South Fork that flowed under the Roosevelt Bridge to the outer estuary.

There was an initial, rapid decrease in the surface salinities at the South Fork and mid-estuary stations; however, bottom salinity measurements revealed a slow, uniform decrease. This relatively slow change in salinity most likely did not present a significant stress for most resident fishes as there was no significant change in the number of species that were captured at each station or the number of times each of the 31 most abundant species were captured throughout the estuary during the five week study. Furthermore, there was no significant change in the number of times the most abundant fishes were caught, indicating that their relative abundance may not have

changed considerably during the study period. If a significant stress had resulted from the decrease in salinity, fishes that were present before the discharge would have relocated during the study period in order to avoid an unfavorable environment. There were no observations or reports of dead fish except for some sea catfish whose deaths were attributed to the activities of commercial fishermen.

The only area that was subject to rapid,daily salinity changes throughout the entire water column was the area from transect 7 (Sewall Point across the Bay Harbor) to the St. Lucie Inlet. The decrease in salinities occurred during the transition from high to low tide when estuarine waters were discharging from the inlet. This is a relatively small area that is exposed to rapid daily salinity changes even when there is no discharge at S-80.

Surface salinities for each station during and after the discharge study (Table 9) were compared with the surface salinities obtained from the earlier baseline study (Figs. 2,3,4). This showed that salinities found in June 1976 were appreciably lower, due to 14.5 inches of rainfall which fell that month, than the values resulting from the 1000 cfs discharge and accompanying 5.5 inches of rainfall. These events may indicate that the impact of the June, 1976 rainfall on salinity for the entire estuary was greater than the impact of a three week, 1000 cfs discharge and rainfall on the estuary.

The rate and magnitude of salinity change resulting from any given rate and duration of discharges are dependent on the prior existing conditions in the estuary including the amount of rainfall that has recently occurred. For example, if the estuary contains low

salinity waters and a 1000 cfs, three week discharge occurs, the fresh water added to the system may not significantly alter the salinities present but could increase the duration of low salinities in the estuary. Whereas, if the existing salinities were relatively high, such as was the case in this study, there would be a significant stratification and a decrease in salinities resulting from the same discharge; but the duration of low salinity water after the discharge may be short lived. Therefore, one must consider these aforementioned circumstances before projecting the effects of a given discharge on the biota in the estuary.

A high concentration of suspended organic and/or inorganic material in the water can cause a physical stress or even death to fish by retarding the absorption of dissolved oxygen across the gill filaments. It has been demonstrated that some species of adult estuarine fish are more tolerant than others; however, the juvenile stages of most species may be highly sensitive to abnormal increases in concentrations of suspended particles (20). These increases in concentrations might result from natural occurrences such as floods, storms, high winds, and tidal scour. Man-induced increases in suspended solids may result from dredging, dumping, filling, sewage and high volume river discharges.

Turbidity is an indicator of the relative content of suspended material in water. The highest values during the study were found in the inner estuary on July 11, 1977. This area had an average value of 17 JTU and had a maximum value of 26 JTU. In comparison, various tidal rivers and bays in Everglades National Park, studied by Kolipinski and Higer (21), had turbidity values throughout the year that ranged from 0 to 30 JTU. Further, Yokel (22), during his monthly water

quality surveys at the Rookery Bay Sanctuary, recorded measurements that fluctuated with season from 0 to 70 JTU and reported that "turbidity did not appear to be a source of serious stress to the Sanctuary." The authors believe that the highest turbidity value found during our study (26 JTU) was not stressful to the environment.

Benthic Macroinvertebrates

The St. Lucie Estuary has distinct inner and outer estuary benthic communities. Biological parameters and water quality measurements also showed distinct trends throughout the estuary. Turbidity and temperature decreased as a function of distance out the estuary. The density of individual benthos showed the same trend. Increasing trends between the two communities included salinity, water depth, and species diversity.

Most estuarine benthic communities in temperate areas can be classified as a Pelecypod-Annelid biome. This type of biome is typically found where sand, shell and mud substrates exist (23), such as those substrates which are present in the St. Lucie Estuary (Table 10). Sample transects 1 through 4 and site 9X are marsh mangrove communities and transects 7, 8 and 10 are bay communities. Transects 5 and 6 are located in a transitional zone between these two community types. Mud substrates are characteristic of the marsh-mangrove community and sand-shell substrates are characteristic of the bay communities (23).

Differences in substrate composition lead to a segregation of animals with different feeding habits (23). Coarse sediment, composed mainly of sand, or sand with gravel or shell fragments (e.g., transects

7, 8 and 10) are inhabited mostly by filter feeders that sort plankton and other organic materials from the water. At these transects, tidal currents are sufficiently strong to carry away fine particles or reduce their deposition so that only small amounts of these particles are present in the substrate. These particles settle out of the water at transects 1 through 6 and site 9X producing a mud substrate. Organic debris often attaches to these fine particles and becomes a principle food source for suspension and deposit feeders, thus influencing their distribution. The locations at each transect with substrates composed of mud, sand, and shell had the highest species diversities (e.g., sites 7S, 7X, 8S, 8X, 9X).

Estuarine benthic surveys of the Lake Worth and Boca Raton Intra-coastal areas showed highest species diversity values at stations that were associated with sand substrates composed of silty-sand and sandy-silt (24, 25, 26). These and other studies (27, 28, 29) also reported the highest densities of organisms were found in sand substrates rather than mud. In contrast, samples of the St. Lucie Estuary benthic community from mud substrates supported highest faunal densities. This contradiction of results may have been a product of the dominance of euryhaline species such as Mulinia lateralis, Macoma mitchelli, Ampelisca abdita, and Cerapus sp. that were found in great abundance in mud substrates.

The species diversity index is regarded as a means for evaluating changes in the environment (30, 31, 32). The range of the St. Lucie Estuary benthic diversity values was relatively low, and resembled the range found in Galveston Bay (33) and in the Los Angeles - Long Beach Harbor (34). Both of these areas were considered to be polluted.

Estuarine studies in Lake Worth and Boca Raton revealed a greater range of species diversity values than those of the St. Lucie. It should be emphasized that reduced density and diversity may also result from certain physical stresses other than those related to toxic chemical pollution. Salinity and temperature extremes and substrate disturbances are a few forms of stress that may result in low species density and diversity (26).

Some of the dominant benthic species found in the St. Lucie Estuary have been reported as pollution indicators. Of the species listed as tolerant to pollution (35), the following species were found in the St. Lucie Estuary: Mulinia lateralis, Paraprionospio pinnata, Diopatra cuprea, and Corophium acherusicum. These species and Cerapus sp. were reported as pollution indicators in Lake Worth (25). Furthermore, it has been cited that tubicolous (tube-dwelling) amphipods, such as C. acherusicum and Cerapus sp., are more abundant in polluted conditions than in unpolluted conditions (36, 37). These same five species were collected from 17% to 79% of the sample sites, and composed 54% and 74% of the total relative abundance of the benthos in June and August, respectively. This dominance of pollution tolerant species reinforced the low species diversity values that were calculated for the St. Lucie benthic communities.

The use of species diversity indices for estuaries as a quantitative standard of water quality without subjective ecological interpretation is cautioned (38), due to the dramatic seasonality of species presence and the broad ranges of physical and chemical gradients found in estuaries (25). The interpretation of our benthic data warrants this caution. For example, there was no significant difference in the species

diversity for June and August; however, there was a 28% species composition change and a significant difference in the percent of the stations at which each species was present. Thus, the dynamics of species movement and the ecological significance of any individual or group of species is not reflected in the species diversity index. Ecological interpretation of the relatively low diversity values for the St. Lucie Estuary did indicate a stressed, polluted environment due to the presence of a large percentage of pollution tolerant species.

Before the discharge, the species diversity indices for the channel site locations were predominantly lower than those of the adjacent, sublittoral sample sites. This same type of relationship was present after the discharge but there was an overall decrease in species diversity values at the channel sites and a common increase in these values at the sublittoral sample locations. The channel, due to maintenance dredging, is the deepest and therefore has the least amount of bottom friction. This, in turn, allows the majority of surface water movement and mixing (tidal exchange and discharge) at these locations. As a result, the channel surface waters may be exposed to greater variations in water chemistry than the shallower areas. Recent studies of nearby estuaries (25, 39) showed that many benthic invertebrates do not colonize deep channel substrates because of sediment types (high organic content), low dissolved oxygen, and lack of benthic algae or marine grass on which they feed. Therefore, the type of substrate and the ranges of certain physical or chemical parameters along with the tidal velocity and amount of water exchange at any specific location may preclude or enhance different types of benthic community structures.

The relatively deep areas which have poor bottom circulation, such as the channel sites, constituted zones of major deposition of organic-rich sediments, and were dominated by pollution tolerant species. Even though these locations were dominated by these species, which include the tubicolous amphipods, they showed the most significant change in the number of species and individuals between the two sets of samples. This may have been the result of an increase in sedimentation. The large standing stock of benthic invertebrates collected from the channel sites were influenced by the abundance of turbidity sensitive amphipods that were present prior to discharge. The migratory "Ampelisca communities" (25) have been noted to be physically stressed by minute increases in turbidity. Corophium acherusicum and Cerapus sp. are also affected by relatively high turbidity levels and are therefore most often found in stagnant water environments where turbidity is often low (25). If these amphipods are not taken into consideration there would be approximately the same number of benthos collected at these locations in June as in August. Excluding these tubicolous amphipods, the total number of benthos collected before and after the discharge is 1594 and 1673, respectively; whereas, if they are included the total is 2382 and 1830, respectively. This indicates that there was a change in benthos density due to the migration of the sensitive amphipod species.

SUMMARY

Data from the baseline program shows the seasonal changes in temperature, rainfall, and salinity that cause the typical, variable environmental conditions for the St. Lucie Estuary fishes. Species presence data reveals three major categories of fishes: 1) the resident species, fishes which spend the majority of their lives in the estuary, 2) the winter and 3) the spring migratory juvenile marine species which are present in the estuary on a seasonal basis. The vast majority of fishes in all three categories were found throughout broad salinity ranges in the St. Lucie Estuary. Juvenile marine fishes illustrated a tendency to inhabit lower salinity waters of the inner estuary.

Even though there were significant reductions in salinity throughout the estuary, fisheries data for the discharge study showed no significant change in the number of species that were captured at each sample station; or the number of times each of the 31 most abundant species were captured throughout the estuary during the five week period. Reduced salinities during the discharge study were the result of the 1000 cfs discharge and local rainfall within the basin. These values were not as low as those recorded in the estuary in June 1976 which resulted from a seasonal rainfall event. Suspended solids and turbidity data collected for the study revealed low values that probably had little impact on the fishes or the benthic macroinvertebrates.

Benthic macroinvertebrate data before and after the discharge indicated that transects 3 and 4 showed the most change among physical or chemical parameters, and the number of species and individuals collected. Community structures, as measured by species diversity

index, were lower at the channel locations when compared with adjacent littoral zone sample sites both before and after the discharge. Species composition change and recruitment were not expressed by the species diversity index; however, low diversity values coupled with the abundance of five pollution tolerant benthic species indicated a stressed estuarine environment.

The pelecypods, gastropods, and decapods appeared to adapt to the physical and chemical changes that occurred in the estuary. Even though some changes were noted between the two sets of sample data, the estuary as a whole did not significantly change in benthic invertebrate relative abundance or species diversity.

Overall, analyses of most parameters indicated that this 1000 cfs discharge had no short-term, detrimental effect on the fishes or benthos.

APPENDIX I

**PHYLOGENETIC SORT OF THE
ST. LUCIE FISH FAUNA BY DATE
FOR THE 5 WEEK DISCHARGE STUDY
6/15/77-8/16/77**

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PAGE	PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77													08/15/78 NO. OF GENUS INITIAL AND SPECIES NAME	
	GENUS-SPECIE TOTAL	SIZE	NO.	IND	STZ#	SIZE	NO.	IND	STATION	DATE	TEMP	SAL	SAL		
TAXON NUMBER	TNO	CLASS	CLASST	CLASST	CLASST	CLASST	CLASST	CLASST	NUMBER	NO.	DAY	YR	TOP C	TOP	BOTTOM
	0	0	0	0	0	0	0	0	BT	06/15/77	30.8	35.0	36.0	0	TEMP AND SAL.
	0	0	0	0	0	0	0	0	BT	06/15/77	28.0	36.0	36.0	0	TEMP AND SAL.
	0	0	0	0	0	0	0	0	BT	06/23/77	29.7	34.2	36.0	0	TEMP AND SAL.
	0	0	0	0	0	0	0	0	BT	06/28/77	29.8	25.0	25.0	0	TEMP AND SAL.
	0	0	0	0	0	0	0	0	BT	07/06/77	30.2	27.5	27.5	0	TEMP AND SAL.
	0	0	0	0	0	0	0	0	BT	07/06/77	29.8	31.5	31.5	0	TEMP AND SAL.
	0	0	0	0	0	0	0	0	BT	07/12/77	29.6	29.5	29.5	0	TEMP AND SAL.
504005050104	1	150	0	1	0	0	0	0	BT	02/08/77	21.0	16.0	00.0	3	O.SABINA
504005050104	1	240	0	1	0	0	0	0	BT	06/15/77	31.8	21.0	00.0	15	O.SABINA
504005050104	1	330	0	1	0	0	0	0	BT	06/30/77	31.0	02.0	00.0	22	O.SABINA
504005050104	2	152756	2	0	0	0	0	0	BT	07/06/77	30.9	02.2	00.0	16	O.SABINA
504005050104	1	154	0	1	0	0	0	0	BT	07/12/77	31.0	04.0	00.0	15	O.SABINA
504100000000	0	0	0	0	0	0	0	0	BT	07/01/77	29.4	30.5	30.5	6	UNKNOWN SPECIES
504100000000	0	0	0	0	0	0	0	0	BT	07/01/77	29.4	30.5	30.5	6	UNKNOWN SPECIES
504100000000	0	0	0	0	0	0	0	0	BT	07/11/77	32.2	30.0	30.0	16	UNKNOWN SPECIES
509104010101	1	22	0	1	0	0	0	0	IS	08/16/77	29.4	03.5	00.0	4	FLOPS LEPTOCEPHALUS
509104020101	2	40	0	1	70	0	1	0	IS	06/15/77	30.8	17.0	17.0	8	A.VULPES
509104020101	3	53	54	2	0	0	0	0	IS	06/23/77	33.6	14.5	14.5	8	A.VULPES
509104020101	1	62	0	1	0	0	0	0	IS	06/28/77	33.1	16.0	16.0	5	A.VULPES
509104020101	2	52	52	2	0	0	0	0	IS	07/01/77	29.6	20.5	28.0	10	A.VULPES LEPTOCEPHALUS
509104020101	1	77	4	1	0	0	0	0	IS	07/06/77	29.5	09.5	00.0	6	A.VULPES
509104020101	7	62	67	2	72	82	5	0	IS	07/06/77	30.1	17.5	17.5	10	A.VULPES
509104020101	2	62	65	2	0	0	0	0	IS	07/12/77	30.2	08.5	00.0	6	A.VULPES
509107010000	1	22	0	1	0	0	0	0	IS	06/23/77	27.0	09.0	00.0	20	CLUPETDAE JUVS
509107010000	52	19	25	52	0	0	0	0	IS	06/28/77	29.8	29.2	29.2	20	CLUPETDAE JUVS
509107010000	7	17	25	7	0	0	0	0	IS	06/28/77	29.8	31.3	31.3	16	CLUPETDAE JUV.
509107010000	5	20	22	5	0	0	0	0	IS	07/06/77	32.1	08.0	00.0	11	CLUPETDAE JUV.
509107010000	38	14	25	38	0	0	0	0	IS	07/13/77	33.4	30.5	30.5	7	CLUPETDAE JUV.
509107010000	3	18	0	1	14	0	1	24	IS	08/16/77	31.8	34.5	00.0	16	CLUPETO JUVS.
509107010000	11	16	17	11	0	0	0	0	IS	08/16/77	32.2	33.0	31.0	10	CLUPETDAE JUV.
509107010203	2	130	35	2	0	0	0	0	IS	06/28/77	29.7	32.0	32.0	8	P.SMITHI
509107010203	2	35	0	1	37	0	1	0	IS	06/30/77	31.0	02.0	00.0	22	P.SMITHI
509107010203	1	33	0	1	41	0	0	0	IS	07/06/77	28.7	01.5	00.0	14	P.SMITHI
509107010203	1	22	0	1	40	0	0	0	IS	07/06/77	32.8	23.5	23.5	14	P.SMITHI
509107010203	1	76	0	1	40	0	0	0	IS	08/16/77	29.4	03.5	00.0	13	P.SMITHI
509107010401	2	80	0	1	82	0	1	0	IS	08/16/77	29.4	03.5	00.0	13	O.CEPEDIANUM
509107010402	1	57	0	1	40	0	0	0	IS	06/23/77	33.0	14.5	14.5	8	O.PENTENENSE
509107010402	2	38	0	1	52	0	1	0	IS	06/28/77	30.2	13.8	00.0	11	O.PENTENENSE
509107010402	3	37	38	2	53	0	1	0	IS	06/30/77	30.8	14.8	00.0	16	O.PENTENENSE
509107010402	1	35	0	1	45	0	1	48	IS	06/30/77	31.0	02.0	00.0	22	O.PENTENENSE
509107010402	1	47	0	1	40	0	0	4	IS	06/30/77	30.2	03.8	00.0	13	O.PENTENENSE
509107010402	2	41	45	2	0	0	0	5	IS	07/01/77	29.6	20.5	28.0	10	O.PENTENENSE
509107010402	1	67	0	1	0	0	0	0	IS	07/06/77	30.9	02.2	00.0	16	O.PENTENENSE
509107010402	2	45	0	1	60	0	1	0	IS	07/12/77	30.8	03.0	00.0	12	O.PENTENENSE
509107010402	1	74	31	14	0	0	0	0	IS	08/16/77	29.4	03.5	00.0	13	O.PENTENENSE
509107010402	1	74	0	1	0	0	0	0	IS	08/16/77	30.0	12.0	00.0	9	O.PENTENENSE
509107010603	156	36	52	156	0	0	0	0	IS	06/15/77	30.8	17.0	17.0	8	H.PENSACOLAE
509107010603	1	48	0	1	2	0	0	0	IS	06/15/77	31.0	31.0	31.0	9	H.PENSACOLAE
509107010603	72	23	27	72	0	0	0	0	IS	06/15/77	33.0	35.0	35.0	10	H.PENSACOLAF
509107010603	1	37	0	1	0	0	0	0	IS	06/23/77	28.9	30.5	30.5	3	H.PENSACOLAF
509107010603	85	25	47	85	0	0	0	0	IS	06/28/77	26.8	35.2	35.2	8	H.PENSACOLAF
509107010603	446	28	49	446	0	0	0	0	IS	06/28/77	29.7	32.0	32.0	8	H.PENSACOLAF
509107010603	31	49	48	31	0	0	0	0	IS	07/06/77	32.3	08.0	00.0	11	H.PENSACOLAF
509107010603	54	33	57	54	0	0	0	0	IS	07/06/77	30.1	17.5	17.5	10	H.PENSACOLAF

PAGE 2 GENUS-SPECIE TOTAL TAXON NUMBER	PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77											NO. OF GENUS INITIAL AND SPECIES SPECIE NAME	08/15/78	
	TOTAL CLASS#	SIZE# CLASS#	NO.IND. CLASS#	SIZE# CLASS#	NO.IND. CLASS#	SIZE# CLASS#	NO.IND. CLASS#	STATION CLASS#	DATE NO.DAY YR	TEMP C TOP	SAL TOP	SAL BOTTOM		
508107010603	178	28 43	138	0 0	0	0 0	0	65	07/12/77	32.2	16.0	16.0	6	H.PENSACOLAE
508107010603	4	26 41	4	0 0	0	6 0	0	105	07/13/77	33.4	30.5	30.5	7	H.PENSACOLAE
508107010603	1	31 0	1	0 0	0	0 0	0	75	08/16/77	32.2	31.0	00.0	11	H.PENSACOLAE
508107010603	2	53 56	2	0 0	0	0 0	0	105	08/16/77	32.2	33.0	33.0	10	H.PENSACOLAE
508107010802	1	52 0	1	0 0	0	4 0	0	55	07/06/77	32.3	08.0	08.0	11	G.OGI TNIM
508107010901	3	24 27	3	0 0	0	0 0	0	105	06/15/77	33.0	35.0	35.0	10	S.ANCHOVIA
508107010901	1	37 0	1	0 0	0	0 0	0	105	06/28/77	29.7	32.0	32.0	8	S.ANCHOVIA
508107020106	1212	29 45	1212	0 0	0	0 0	0	105	06/15/77	33.0	15.0	35.0	10	A.HERSETUS
508107020106	1	43 0	1	0 0	0	0 0	0	45	06/16/77	32.2	24.0	00.0	3	A.HERSETUS
508107020106	4	39 43	4	0 0	0	0 0	0	55	06/16/77	32.0	26.0	00.0	10	A.HERSETUS
508107020106	2	42 47	2	0 0	0	0 0	0	25	06/21/77	30.1	19.5	00.0	12	A.HERSETUS
508107020106	1	54 0	1	0 0	0	0 0	0	35	06/21/77	30.1	03.0	06.0	8	A.HERSETUS
508107020106	2	45 0	2	49 0	1	0 0	0	55	06/22/77	30.4	20.5	00.0	9	A.HERSETUS
508107020106	3	44 46	2	47 0	1	0 0	0	65	06/22/77	31.0	15.5	15.5	5	A.HERSETUS
508107020106	17	46 46	17	0 0	0	0 0	0	45	06/23/77	32.5	07.0	07.0	5	A.HERSETUS
508107020106	1	48 0	1	0 0	0	0 0	0	105	06/28/77	29.7	32.0	32.0	8	A.HERSETUS
508107020106	6	42 52	6	0 0	0	0 0	0	15	06/30/77	30.2	13.0	00.0	11	A.HERSETUS
508107020106	1	40 0	1	52 53	2	0 0	0	25	06/30/77	30.8	14.0	00.0	16	A.HERSETUS
508107020106	1	58 0	1	0 0	0	0 0	0	45	06/30/77	30.2	03.0	00.0	13	A.HERSETUS
508107020106	5	34 0	1	41 49	3	64 1	0	65	07/01/77	29.6	20.5	28.0	10	A.HERSETUS
508107020106	1	46 0	1	0 0	0	0 0	0	45	07/06/77	31.5	02.0	02.0	9	A.HERSETUS
508107020106	2	51 52	2	0 0	0	0 0	0	45	07/06/77	30.9	02.0	00.0	16	A.HERSETUS
508107020106	1	46 0	1	0 0	0	0 0	0	55	07/06/77	32.3	08.0	08.0	11	A.HERSETUS
508107020106	1	42 0	1	0 0	0	0 0	0	65	07/06/77	30.1	17.5	17.5	10	A.HERSETUS
508107020106	1	48 0	1	0 0	0	0 0	0	25	07/12/77	30.2	08.5	00.0	6	A.HERSETUS
508107020106	2	48 0	1	70 0	1	0 0	0	45	07/12/77	31.0	04.0	00.0	15	A.HERSETUS
508107020106	2	45 0	1	58 0	1	0 0	0	55	07/12/77	32.0	10.5	00.0	11	A.HERSETUS
508107020106	7	39 57	7	0 0	0	0 0	0	65	07/12/77	31.2	14.5	26.0	9	A.HERSETUS
508107020106	6	38 41	6	0 0	0	0 0	0	105	07/13/77	33.4	30.5	30.5	7	A.HERSETUS
508107020106	7	52 57	3	61 63	3	68 1	1	65	08/16/77	30.8	21.0	00.0	7	A.HERSETUS
508107020106	23	22 28	23	29 0	3	0 0	0	45	08/16/77	31.0	34.5	00.0	16	A.HERSETUS
508107020108	2	47 0	1	53 0	1	0 0	0	105	06/28/77	29.7	32.0	32.0	8	ALLYOLEPTIS
508107020108	2	56 57	2	0 0	0	0 0	0	45	06/28/77	30.2	03.0	00.0	13	ALLYOLEPTIS
508107020109	19	36 48	18	0 0	0	0 0	0	15	06/15/77	30.8	17.0	17.0	8	A.MITCHILLI
508107020109	60	24 40	67	0 0	0	0 0	0	35	06/15/77	30.8	18.0	18.0	9	A.MITCHILLI
508107020109	334	40 52	334	0 0	0	0 0	0	65	06/15/77	31.0	31.0	31.0	9	A.MITCHILLI
508107020109	1	35 0	1	0 0	0	0 0	0	75	06/15/77	31.4	34.0	34.0	13	A.MITCHILLI
508107020109	1	29 0	1	0 0	0	0 0	0	95	06/15/77	32.0	27.0	27.0	17	A.MITCHILLI
508107020109	19	37 47	19	0 0	0	0 0	0	105	06/15/77	33.0	35.0	35.0	10	A.MITCHILLI
508107020109	15	27 57	17	0 0	0	0 0	0	15	06/16/77	32.0	20.0	00.0	6	A.MITCHILLI
508107020109	1	42 0	1	0 0	0	0 0	0	25	06/16/77	32.6	25.0	00.0	5	A.MITCHILLI
508107020109	560	16 53	562	0 0	0	0 0	0	35	06/16/77	31.8	21.0	00.0	15	A.MITCHILLI
508107020109	2	36 0	1	43 0	1	0 0	0	55	06/16/77	32.0	26.0	00.0	10	A.MITCHILLI
508107020109	37	35 52	37	0 0	0	0 0	0	65	06/16/77	29.4	28.0	34.0	5	A.MITCHILLI
508107020109	71	33 45	71	0 0	0	0 0	0	25	06/21/77	30.1	19.5	00.0	12	A.MITCHILLI
508107020109	1774	25 48	1774	0 0	0	0 0	0	35	06/21/77	30.1	03.0	00.0	8	A.MITCHILLI
508107020109	42	32 57	42	0 0	0	0 0	0	45	06/21/77	29.6	16.0	00.0	6	A.MITCHILLI
508107020109	1	48 0	1	0 0	0	0 0	0	55	06/22/77	30.4	20.5	00.0	9	A.MITCHILLI
508107020109	1	48 0	1	0 0	0	0 0	0	35	06/23/77	32.0	02.0	00.0	5	A.MITCHILLI
508107020109	12	32 0	1	20 39	5	41 43	6	75	06/23/77	27.0	09.0	09.0	20	A.MITCHILLI
508107020109	1	18 0	1	0 0	0	0 0	0	55	06/28/77	32.4	14.0	14.0	10	A.MITCHILLI
508107020109	13	22 23	3	26 0	1	40 44	9	75	06/28/77	29.8	29.2	29.2	20	A.MITCHILLI
508107020109	1	38 0	1	0 0	0	0 0	0	105	06/28/77	29.7	32.0	32.0	8	A.MITCHILLI
508107020109	412	17 54	412	0 0	0	0 0	0	15	06/10/77	30.2	19.0	00.0	11	A.MITCHILLI

GENUS-SPECIES TAXON NUMBER	TOTAL CLASSTI	SIZE CLASSTI	NO.IND CLASSTI	SIZE CLASSTI	NO.IND CLASSTI	SIZE CLASSTI	NO.IND CLASSTI	STATION CLASSTI	DATE CLASSTI	TEMP CLASSTI	SAL CLASSTI	SAL CLASSTI	NO. CLASSTI	OF GENUS INITIAL AND SPECIES NAME	08/15/78	
508107020109	1098	24	50	109*	0	0	0	0	0	27	06/30/7	30.8	14.8	00.0	16 A.MITCHILLI	
508107020109	647	23	45	497	0	0	0	0	0	37	06/30/7	31.0	02.0	00.0	22 A.MITCHILLI	
508107020109	355	26	66	355	0	0	0	0	0	47	06/30/7	30.2	03.8	00.0	13 A.MITCHILLI	
508107020109	13	24	44	13	0	0	0	0	0	57	07/01/7	29.6	10.5	00.0	6 A.MITCHILLI	
508107020109	179	33	53	179	0	0	0	0	0	67	07/01/7	29.6	20.5	28.0	10 A.MITCHILLI	
508107020109	1	35	0	1	0	0	0	0	0	77	07/01/7	29.4	30.5	30.5	6 A.MITCHILLI	
508107020109	480	25	42	479	52	0	1	0	0	17	07/06/7	29.8	07.8	00.0	5 A.MITCHILLI	
508107020109	3	26	38	2	31	0	1	0	0	27	07/06/7	29.5	09.5	00.0	6 A.MITCHILLI	
508107020109	178	27	58	178	0	0	0	0	0	37	07/06/7	28.7	01.5	00.0	14 A.MITCHILLI	
508107020109	3	34	40	2	42	0	1	0	0	45	07/06/7	31.5	02.0	02.0	9 A.MITCHILLI	
508107020109	117	28	64	117	0	0	0	0	0	47	07/06/7	30.9	02.2	00.0	16 A.MITCHILLI	
508107020109	2	35	39	2	0	0	0	0	0	57	07/06/7	31.4	08.5	00.0	6 A.MITCHILLI	
508107020109	56	46	51	56	0	0	0	0	0	65	07/06/7	30.1	17.5	17.5	10 A.MITCHILLI	
508107020109	1203	32	51	1203	0	0	0	0	0	67	07/06/7	31.3	14.0	26.3	10 A.MITCHILLI	
508107020109	4	39	8	1	40	0	2	41	0	75	07/06/7	32.8	23.5	23.5	14 A.MITCHILLI	
508107020109	1	43	0	1	0	0	0	0	0	77	07/06/7	29.8	29.5	29.5	1 A.MITCHILLI	
508107020109	104	27	45	104	0	0	0	0	0	17	07/12/7	30.2	07.0	00.0	8 A.MITCHILLI	
508107020109	4	25	38	4	0	0	0	0	0	27	07/12/7	30.2	08.5	00.0	6 A.MITCHILLI	
508107020109	498	28	45	498	0	0	0	0	0	37	07/12/7	30.8	03.0	00.0	12 A.MITCHILLI	
508107020109	58	33	41	58	0	0	0	0	0	45	07/12/7	31.9	04.5	04.5	9 A.MITCHILLI	
508107020109	535	27	68	535	0	0	0	0	0	47	07/12/7	31.0	04.0	00.0	15 A.MITCHILLI	
508107020109	1	41	0	1	0	0	0	0	0	55	07/12/7	33.2	10.0	10.0	3 A.MITCHILLI	
508107020109	16	32	45	16	0	0	0	0	0	57	07/12/7	32.0	10.5	00.0	11 A.MITCHILLI	
508107020109	171	35	51	171	0	0	0	0	0	67	07/12/7	31.2	14.5	26.0	9 A.MITCHILLI	
508107020109	2	38	42	2	0	0	0	0	0	77	07/12/7	29.0	24.2	33.5	5 A.MITCHILLI	
508107020109	324	18	24	54	38	45	270	0	0	105	07/13/7	33.4	30.5	30.5	7 A.MITCHILLI	
508107020109	388	35	54	388	0	0	0	0	0	17	08/16/7	29.4	03.5	00.0	13 A.MITCHILLI	
508107020109	7	38	43	7	0	0	0	0	0	35	08/16/7	30.8	12.0	00.0	4 A.MITCHILLI	
508107020109	2	41	0	1	48	0	1	0	0	37	08/16/7	30.8	12.0	00.0	8 A.MITCHILLI	
508107020109	19	32	36	2	37	45	7	46	57	5	47	08/16/7	30.0	12.0	00.0	9 A.MITCHILLI
508107020109	6	43	44	2	45	46	3	50	6	1	67	08/16/7	30.8	21.0	00.0	7 A.MITCHILLI
508107020109	6	16	17	6	0	0	0	0	0	105	08/16/7	32.2	33.0	33.0	10 A.MITCHILLI	
508110020201	1	66	0	1	0	0	0	0	0	55	08/15/7	31.0	27.0	27.0	11 S.FOFTENS	
508110020201	3	46	0	1	0	0	0	0	0	65	08/15/7	31.0	31.0	31.0	9 S.FOFTENS	
508110020201	1	66	0	1	0	0	0	0	0	75	08/15/7	31.4	34.0	34.0	13 S.FOFTENS	
508110020201	1	68	0	1	0	0	0	0	0	85	08/15/7	31.4	35.0	35.0	10 S.FOFTENS	
508110020201	1	92	0	1	0	0	0	0	0	57	08/22/7	30.4	20.5	00.0	9 S.FOFTENS	
508110020201	2	70	0	1	70	0	3	0	0	75	08/23/7	27.0	09.0	09.0	20 S.FOFTENS	
508110020201	1	78	0	1	0	0	0	0	0	75	08/28/7	29.8	29.2	29.2	20 S.FOFTENS	
508110020201	1	85	0	1	0	0	0	0	0	27	08/30/7	30.8	14.8	00.0	16 S.FOFTENS	
508110020201	1	87	0	1	0	0	0	0	0	27	07/06/7	29.5	09.5	00.0	6 S.FOFTENS	
508110020201	2	96	0	1	142	0	1	0	0	67	07/06/7	31.3	14.0	26.3	10 S.FOFTENS	
508110020201	1	96	0	1	0	0	0	0	0	85	07/07/7	29.6	30.5	30.5	10 S.FOFTENS	
508110020201	1	137	0	1	0	0	0	0	0	95	07/13/7	32.2	30.0	30.0	16 S.FOFTENS	
508112030101	8	158	90	7	304	0	1	0	0	17	06/16/7	32.0	20.0	00.0	6 A.FEFLIS	
508112030101	1	134	0	1	0	0	0	0	0	27	06/16/7	32.6	26.0	00.0	5 A.FEFLIS	
508112030101	10	133	71	10	0	0	0	0	0	37	06/16/7	31.8	21.0	00.0	15 A.FEFLIS	
508112030101	3	159	0	1	178	0	1	204	0	57	06/16/7	32.0	26.0	00.0	10 A.FEFLIS	
508112030101	3	165	0	1	171	0	1	241	0	1	67	06/16/7	29.4	28.0	34.0	5 A.FEFLIS
508112030101	7	184	90	2	222	0	1	0	0	77	06/16/7	28.0	35.0	35.0	4 A.FEFLIS	
508112030101	1	266	0	1	0	0	0	0	0	17	06/22/7	30.8	14.0	00.0	1 A.FEFLIS	
508112030101	2	190	54	2	0	0	0	0	0	87	06/23/7	28.8	34.0	34.0	1 A.FEFLIS	
508112030101	29	12	14	6	152228	71	234254	2	0	17	06/30/7	30.2	13.8	00.0	11 A.FEFLIS	
508112030101	6	152758	2	165	0	2	174185	2	0	27	06/30/7	30.8	14.8	00.0	16 A.FEFLIS	

PAGE 4 PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77
 GENUS-SPECIE TOTAL SIZE NO.IND SIZE NO.IND SIZE NO.IND STATION DATE TEMP SAL SAL NO. OF GENUS INITIAL AND
 TAXON NUMBER IND CLASSI CLASSI CLASSII CLASSIII CLASSIII CLASSIII NUMBER NO.DAY YR TOP C TOP BOTTOM SPECIES SPECIE NAME
 508112030101 5 54 4 1 111152 3 177 0 1 3T 06/30/7 31.0 02.0 00.0 22 A.FFLTS
 508112030101 30 130250 30 0 0 0 0 0 0 5T 07/01/7 29.6 10.5 00.0 6 A.FFLTS
 508112030101 3 228254 3 0 0 0 0 0 0 6T 07/01/7 29.6 20.5 28.0 10 A.FFLTS+S+EGGS
 508112030101 9 165190 7 209 0 2 0 0 0 1T 07/06/7 29.8 07.8 00.0 5 A.FFLTS
 508112030101 15 139 0 1 146196 13 222 0 1 3T 07/06/7 28.7 01.5 00.0 14 A.FFLTS
 508112030101 4 136139 2 146 0 1 155 0 1 5T 07/06/7 31.4 08.5 00.0 6 A.FFLTS
 508112030101 51 13 15 19 19 30 16 165282 16 6T 07/06/7 31.3 14.0 26.3 10 A.FFLTS
 508112030101 2 177 0 1 190 0 1 0 0 0 1T 07/12/7 30.2 07.0 00.0 8 A.FFLTS
 508112030101 75 133222 75 0 0 0 0 0 0 3T 07/12/7 30.2 03.0 00.0 12 A.FFLTS
 508112030101 30 13 0 1 27 32 16 47 56 13 4T 07/12/7 31.0 04.0 00.0 15 A.FFLTS
 508112030101 2 152 0 1 196 0 1 0 0 0 5T 07/12/7 32.0 10.5 00.0 11 A.FFLTS
 508112030101 81 14 25 67 184254 14 0 0 0 6T 07/12/7 31.2 14.5 26.0 9 A.FFLTS+S+EGGS
 508112030101 8 40 47 4 244247 3 260 0 1 7T 07/12/7 29.0 24.2 33.5 5 A.FFLTS
 508112030101 26 35 38 23 190 0 1 210248 2 1T 08/16/7 29.4 03.5 00.0 13 A.FFLTS
 508112030101 3 51 0 1 193 0 1 220 0 1 3T 08/16/7 30.8 12.0 00.0 8 A.FFLTS
 508112030101 137 43 62 136 220 0 1 290 0 1 4T 08/16/7 30.0 12.0 00.0 9 A.FFLTS
 508112030101 11 42 48 9 184 0 1 260 0 1 5T 08/16/7 30.6 14.5 00.0 6 A.FFLTS
 508112030101 1 200 0 1 0 0 0 0 0 6T 08/16/7 30.8 21.0 00.0 7 A.FFLTS
 508112030101 4 47 48 3 180 0 1 0 0 0 7T 08/16/7 30.2 32.0 00.0 6 A.FFLTS
 508112030201 1 279 0 1 0 0 0 0 0 1T 08/21/7 30.1 03.8 00.0 8 R.MARTNUS
 508112030201 2 75 0 1 177 0 1 0 0 0 3T 08/30/7 31.0 20.0 00.0 22 R.MARTNUS
 508112030201 1 73 0 1 0 0 0 0 0 4T 07/06/7 30.9 02.2 00.0 16 R.MARTNUS
 508112030201 2 75 0 1 170 0 1 0 0 0 3T 07/12/7 30.8 03.0 00.0 12 R.MARTNUS
 508112030201 5 62 0 1 68 73 4 0 0 0 4T 07/12/7 31.0 04.0 00.0 15 R.MARTNUS
 508114010103 1 193 0 1 0 0 0 0 0 5T 06/22/7 30.4 20.5 00.0 9 O.TAU
 508118010602 4 40 41 2 47 44 2 0 0 0 6S 06/28/7 31.0 15.8 15.8 4 H.BRASILIENSIS
 508118020302 2 41 56 2 0 0 0 0 0 0 6S 06/15/7 31.0 31.0 31.0 9 S.MARTNA
 508118020302 2 71 0 1 72 0 1 0 0 0 7S 06/15/7 31.4 34.0 34.0 13 S.MARTNA
 508118020302 4 28 0 1 65 79 2 107 0 1 9S 06/15/7 32.0 27.0 27.0 17 S.MARTNA
 508118020302 1 58 0 1 0 0 0 0 0 6S 06/22/7 31.0 15.5 15.5 8 S.MARTNA
 508118020302 3 100 0 1 121125 2 0 0 0 10S 06/23/7 28.9 30.5 30.5 3 S.MARTNA
 508118020302 1 82 0 1 0 0 0 0 0 5S 06/28/7 32.4 14.0 14.0 10 S.MARTNA
 508118020302 1 70 0 1 0 0 0 0 0 4S 06/28/7 29.8 32.4 32.4 8 S.MARTNA
 508118020302 6 70 81 3 100147 3 0 0 0 9S 06/28/7 29.8 31.3 31.3 16 S.MARTNA
 508118020302 2 32 0 1 37 0 1 0 0 0 3S 07/06/7 28.7 01.5 00.0 7 S.MARTNA
 508118020302 1 35 0 1 0 0 0 0 0 8S 07/07/7 29.6 30.5 30.5 10 S.MARTNA
 508118020302 4 93 97 2 115 0 1 132 0 1 10S 07/07/7 30.2 33.5 33.5 4 S.MARTNA
 508118020302 1 70 0 1 0 0 0 0 0 9S 07/13/7 32.2 30.0 30.0 16 S.MARTNA
 508118020302 6 74 0 1 110117 5 0 0 0 10S 07/13/7 33.4 30.5 30.5 7 S.MARTNA
 508118040311 1 29 0 1 0 0 0 0 0 3S 07/06/7 28.7 01.5 00.0 7 C.VARTEGATUS
 508118040311 5 16 24 5 0 0 0 0 0 0 4S 07/07/7 29.6 30.5 30.5 10 C.VARTEGATUS
 508118040311 1 19 0 1 0 0 0 0 0 0 4S 07/07/7 29.8 23.5 23.5 11 C.VARTEGATUS
 508118040311 1 33 0 1 0 0 0 0 0 0 4S 07/13/7 31.8 30.5 30.5 12 C.VARTEGATUS
 508118040311 1 24 0 1 0 0 0 0 0 0 4S 07/13/7 32.2 30.0 30.0 16 C.VARTEGATUS
 508118040607 15 78 49 13 95 62 2 0 0 0 9S 06/15/7 32.0 27.0 27.0 17 F.GRANDIS
 508118040607 9 38 51 7 62 0 1 73 0 1 9S 07/07/7 29.8 23.5 23.5 11 F.GRANDIS
 508118040607 2 46 48 2 0 0 0 0 0 0 9S 07/13/7 32.2 30.0 30.0 16 F.GRANDIS
 508118040607 5 36 45 3 50 58 2 0 0 0 9S 08/16/7 31.8 34.5 00.0 16 F.GRANDIS
 508118040902 1 20 0 1 0 0 0 0 0 0 9S 06/28/7 29.8 31.3 31.3 16 I.PAPVA
 508118040902 1 11 0 1 0 0 0 0 0 0 8S 07/13/7 31.8 30.5 30.5 12 I.PAPVA
 508118060802 27 23 59 27 0 0 0 0 0 0 1S 06/15/7 30.8 17.0 17.0 8 M.AFRYLINA
 508118060802 2 29 0 1 34 0 1 0 0 0 3S 06/15/7 30.8 18.0 18.0 9 M.AFRYLINA
 508118060802 55 28 47 55 0 0 0 0 0 0 1S 06/23/7 33.0 14.5 14.5 8 M.AFRYLINA
 508118060802 48 21 53 48 1 0 0 0 0 0 0 3S 06/23/7 32.0 02.0 00.0 5 M.AFRYLINA

PAGE 5 PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77 08/15/78
 GENUS-SPECIE TOTAL SITE NO.IND SIZE NO.IND SIZE NO.IND STATION DATE TEMP SAL SAL NO. OF GENUS INITIAL AND
 TAXON NUMBER TWO CLASSI CLASSI CLASSI CLASSI CLASSI CLASSI CLASSI CLASSI NUMBER MO-DAY YR TOP C TOP BOTTOM SPECIES SPECIE NAME

508118060802 1 32 0 1 0 0 0 0 0 4S 06/23/7 32.5 07.8 07.8 5 M.BERYLLINA
 508118060802 426 29 47 426 0 0 0 0 0 1S 06/28/7 33.1 16.0 14.0 5 M.BERYLLINA
 508118060802 11 28 40 11 0 0 0 0 0 3S 06/28/7 32.2 01.8 00.0 6 M.BERYLLINA
 508118060802 155 12 76 155 0 0 0 0 0 1S 07/06/7 29.5 07.5 07.5 5 M.BERYLLINA
 508118060802 472 12 47 472 0 0 0 0 0 3S 07/06/7 28.7 01.5 00.0 7 M.BERYLLINA
 508118060802 1 18 0 1 0 0 0 0 0 3T 07/06/7 28.7 01.5 00.0 14 M.BERYLLINA
 508118060802 3 17 0 1 36 0 1 50 0 1 4S 07/06/7 31.5 02.0 02.0 9 M.BERYLLINA
 508118060802 1 18 0 1 0 0 0 0 0 4T 07/06/7 30.9 02.2 00.0 16 M.BERYLLINA
 508118060802 333 20 58 333 0 0 0 0 0 1S 07/12/7 30.2 08.0 08.0 5 M.BERYLLINA
 508118060802 24 16 17 5 31 46 19 0 0 0 3S 07/12/7 30.8 03.0 00.0 6 M.BERYLLINA
 508118060802 7 24 28 2 35 43 5 0 0 0 4S 07/12/7 31.9 04.5 04.5 9 M.BERYLLINA
 508118060802 75 38 52 75 0 0 0 0 0 1S 08/16/7 29.4 03.5 00.0 4 M.BERYLLINA
 508118060802 36 14 37 24 38 55 12 0 0 0 3S 08/16/7 30.8 12.0 00.0 4 M.BERYLLINA
 508118060802 27 46 58 27 0 0 0 0 0 8S 08/16/7 31.4 35.0 00.0 17 M.BERYLLINA
 508122050300 1 51 0 1 0 0 0 0 0 3T 06/16/7 31.8 21.0 00.0 15 HIPPOCAMPUS JUV.
 508122050600 1 77 0 1 0 0 0 0 0 5S 07/06/7 32.1 08.0 08.0 11 SYNGNATHUS SP.
 508122050610 1 67 0 1 0 0 0 0 0 5S 06/15/7 31.0 27.0 27.0 11 S.LOUISIANAE
 508122050610 1 68 0 1 0 0 0 0 0 6S 06/15/7 31.0 31.0 31.0 9 S.LOUISIANAE
 508122050610 6 73 90 5 115 0 1 0 0 0 9S 06/15/7 32.0 27.0 27.0 17 S.LOUISIANAE
 508122050610 1 74 0 1 0 0 0 0 0 7S 06/23/7 27.0 09.0 09.0 20 S.LOUISIANAE
 508122050610 2 121 23 2 0 0 0 0 0 9S 06/28/7 32.4 14.0 14.0 10 S.LOUISIANAE
 508122050610 6 60 84 2 114 15 2 140 0 1 7S 06/28/7 29.8 29.2 29.2 20 S.LOUISIANAE
 508122050610 7 45 60 5 72 0 1 100 0 1 9S 06/28/7 29.8 31.3 31.3 16 S.LOUISIANAE
 508122050610 1 92 0 1 0 0 0 0 0 5S 07/06/7 32.3 08.0 08.0 11 S.LOUISIANAE
 508122050610 1 86 0 1 0 0 0 0 0 8S 07/07/7 29.6 30.5 30.5 10 S.LOUISIANAE
 508122050610 1 35 0 1 0 0 0 0 0 9S 07/07/7 29.8 23.5 23.5 13 S.LOUISIANAE
 508122050610 1 102 0 1 0 0 0 0 0 6S 07/12/7 32.2 16.0 16.0 6 S.LOUISIANAE
 508122050610 1 104 0 1 0 0 0 0 0 7S 07/12/7 32.4 21.5 21.5 10 S.LOUISIANAE
 508122050610 1 142 0 1 0 0 0 0 0 8S 07/13/7 31.8 30.5 30.5 12 S.LOUISIANAE
 508122050610 1 76 0 1 0 0 0 0 0 9S 07/13/7 32.2 30.0 30.0 16 S.LOUISIANAE
 508122050610 1 97 0 1 0 0 0 0 0 8S 08/16/7 31.4 35.0 00.0 17 S.LOUISIANAE
 508122050610 2 87 1 1 112 0 1 0 0 0 9S 08/16/7 31.8 34.5 00.0 16 S.LOUISIANAE
 508122050612 1 66 0 1 0 0 0 0 0 1S 06/15/7 30.8 17.0 17.0 9 S.SCOVELLI
 508122050612 1 62 0 1 0 0 0 0 0 5S 06/15/7 31.0 27.0 27.0 11 S.SCOVELLI
 508122050612 3 37 0 1 48 0 1 58 0 1 7S 06/15/7 31.4 34.0 34.0 13 S.SCOVELLI
 508122050612 4 34 38 2 64 65 2 0 0 0 8S 06/15/7 31.8 35.0 35.0 10 S.SCOVELLI
 508122050612 5 57 84 5 8 0 0 0 0 0 9S 06/15/7 32.0 27.0 27.0 17 S.SCOVELLI
 508122050612 17 28 68 17 0 0 0 0 0 7S 06/23/7 27.0 09.0 09.0 20 S.SCOVELLI
 508122050612 1 53 0 1 0 0 0 0 0 5S 06/28/7 32.4 14.0 14.0 10 S.SCOVELLI
 508122050612 14 26 37 5 38 49 5 52 66 4 7S 06/28/7 29.8 29.2 29.2 20 S.SCOVELLI
 508122050612 5 59 79 5 0 0 0 0 0 8S 06/28/7 29.8 32.4 32.4 8 S.SCOVELLI
 508122050612 3 53 0 1 68 64 2 0 0 0 9S 06/28/7 29.8 31.3 31.3 16 S.SCOVELLI
 508122050612 1 57 0 1 0 0 0 0 0 1S 07/06/7 29.5 07.5 07.5 5 S.SCOVELLI
 508122050612 1 52 0 1 0 0 0 0 0 5S 07/12/7 33.2 10.0 10.0 3 S.SCOVELLI
 508122050612 8 33 1 1 50 54 3 60 65 4 7S 07/12/7 32.4 21.5 21.5 10 S.SCOVELLI
 508122050612 9 57 76 9 6 0 0 0 0 0 4S 07/13/7 31.8 30.5 30.5 12 S.SCOVELLI
 508122050612 3 48 0 1 64 0 1 83 0 1 9S 07/13/7 32.2 30.0 30.0 14 S.SCOVELLI
 508122050612 4 58 54 2 65 77 2 0 0 0 7S 08/16/7 32.2 31.0 00.0 11 S.SCOVELLI
 508122050612 3 58 0 1 85 0 1 92 0 1 8S 08/16/7 31.4 35.0 00.0 17 S.SCOVELLI
 508122050612 6 52 58 2 60 65 2 66 70 2 9S 08/16/7 31.8 34.5 00.0 16 S.SCOVELLI
 5081220506104 2 81 0 1 93 0 1 0 0 0 3S 06/15/7 30.8 18.0 18.0 9 C.UNDECIMALIS
 5081220506104 1 342 0 1 0 0 0 0 0 3T 06/16/7 32.0 20.0 00.0 6 C.UNDECIMALIS
 5081220506104 4 114392 2 406584 2 0 0 0 0 3T 06/30/7 30.2 13.8 00.0 11 C.UNDECIMALIS
 5081220506104 3 228 0 1 349 0 1 584 0 1 3T 06/30/7 31.0 02.0 00.0 22 C.UNDECIMALIS

PAGE GENUS-SPECIE TOTAL TAXON NUMBER	PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77											NO. OF GENUS INT'L AND SPECIES SPECIE NAME	08/15/78				
	SIZE	NO.IND	SIZE	NO.IND	SIZE	NO.IND	STATION	DATE	TEMP	SAL	SAL	BOTTOM					
	TND	CLASSI	CLASSII	CLASSIII	CLASSIV	CLASSV	CLASSVI	NUMBER	MO.DAY	TOP C	TOP	BOTTOM					
508123018104	5	304381	2	450508	2	558	0	1	3T	07/06/77	28.7	01.5	00.0	14	CUNDICIMALIS		
508123018104	1	349	0	1	0	0	0	0	0	1T	07/12/77	30.2	07.0	00.0	8	CUNDICIMALIS	
508123018104	2	222	0	1	247	0	1	0	0	0	1T	07/12/77	30.8	03.0	00.0	12	CUNDICIMALIS
508123018104	1	254	0	1	0	0	0	0	0	4T	07/12/77	31.0	04.0	00.0	15	CUNDICIMALIS	
508123018104	1	673	0	1	0	0	0	0	0	3T	08/16/77	30.8	12.0	00.0	8	CUNDICIMALIS	
508123036720	1	38	0	1	0	0	0	0	0	7S	06/23/77	27.0	09.0	09.0	20	EPINEPHELUS SP.	
508123057402	1	42	0	1	0	0	0	0	0	3T	07/06/77	28.7	01.5	00.0	14	PINTIGRUMACULATUS	
508123136204	1	53	0	1	0	0	0	0	0	5S	06/15/77	31.0	27.0	27.0	11	C.HIPPOS	
508123136204	1	57	0	1	0	0	0	0	0	4S	07/06/77	31.5	02.0	02.0	9	C.HIPPOS	
508123136204	1	63	0	1	0	0	0	0	0	5S	07/06/77	32.3	08.0	08.0	11	C.HIPPOS	
508123136204	1	53	0	1	0	0	0	0	0	4T	07/12/77	31.0	04.0	00.0	15	C.HIPPOS	
508123136204	1	24	0	1	0	0	0	0	0	7S	08/16/77	32.2	31.0	00.0	11	C.HIPPOS	
508123136205	1	50	0	1	0	0	0	0	0	5S	06/28/77	32.4	14.0	14.0	10	C.LATUS	
508123136205	1	39	0	1	0	0	0	0	0	7S	06/28/77	29.8	29.2	29.2	20	C.LATUS	
508123136205	18	27	42	18	0	0	0	0	0	10S	08/16/77	32.2	33.0	33.0	10	C.LATUS	
508123136301	1	22	0	1	0	0	0	0	0	5T	07/01/77	29.6	10.5	00.0	6	C.CHRYSURUS	
508123136301	3	52	0	1	66	0	1	68	0	1	6T	08/16/77	30.8	21.0	00.0	7	C.CHRYSURUS
508123136401	8	39	46	5	0	0	0	0	0	1S	06/15/77	30.8	17.0	17.0	8	O.SAURUS	
508123111401	2	18	14	2	0	0	0	0	0	5S	06/15/77	31.0	27.0	27.0	11	O.SAURUS	
508123136901	2	14	16	2	0	0	0	0	0	6S	06/15/77	31.0	31.0	31.0	9	O.SAURUS	
508123136901	1	19	0	1	0	0	0	0	0	9S	06/15/77	32.0	27.0	27.0	17	O.SAURUS	
508123136901	1	22	25	2	26	0	1	0	0	6S	06/22/77	31.0	15.5	15.5	5	O.SAURUS	
508123136901	9	54	68	6	80	90	3	0	0	1S	06/23/77	33.0	14.5	14.5	8	O.SAURUS	
508123136901	14	25	0	1	21	26	12	75	0	1	6S	06/23/77	31.0	15.8	15.8	4	O.SAURUS
508123136901	1	92	0	1	0	0	0	0	0	2T	06/30/77	30.8	14.8	00.0	16	O.SAURUS	
508123136901	2	34	84	2	0	0	0	0	0	6S	07/06/77	30.1	17.5	17.5	10	O.SAURUS	
508123136901	1	88	9	1	0	0	0	0	0	1T	07/12/77	30.2	07.0	00.0	8	O.SAURUS	
508123136901	1	102	0	1	0	0	0	0	0	2T	08/16/77	29.4	08.5	00.0	3	O.SAURUS	
508123136901	2	72	0	1	74	0	1	0	0	6S	08/16/77	30.8	21.0	00.0	5	O.SAURUS	
508123131101	1	152	0	2	0	0	0	0	0	2T	06/30/77	30.8	14.8	00.0	16	SUDOMER	
508123131302	6	37	46	5	62	0	1	0	0	5S	06/15/77	31.0	27.0	27.0	11	T.FALCATUS	
508123131302	38	14	28	28	0	0	0	0	0	6S	06/15/77	31.0	31.0	31.0	9	T.FALCATUS	
508123131302	1	18	0	1	0	0	0	0	0	6S	06/22/77	31.0	15.5	15.5	5	T.FALCATUS	
508123131302	6	24	31	6	0	0	0	0	0	1S	06/23/77	33.0	14.5	14.5	8	T.FALCATUS	
508123131302	1	39	0	1	0	0	0	0	0	2S	06/23/77	32.0	18.2	18.2	4	T.FALCATUS	
508123131302	1	13	0	1	0	0	0	0	0	7S	06/23/77	27.0	09.0	09.0	20	T.FALCATUS	
508123131302	1	16	0	1	0	0	0	0	0	5S	06/28/77	32.4	14.0	14.0	10	T.FALCATUS	
508123131302	1	67	0	1	0	0	0	0	0	5S	07/04/77	32.3	08.0	04.0	11	T.FALCATUS	
508123131302	1	27	0	1	0	0	0	0	0	6S	07/04/77	30.1	17.5	17.5	10	T.FALCATUS	
508123131302	1	43	48	2	52	0	1	0	0	6S	07/12/77	32.2	16.0	16.0	6	T.FALCATUS	
508123131302	2	16	0	1	22	0	1	0	0	1S	08/16/77	29.4	03.5	00.0	4	T.FALCATUS	
508123131302	1	18	0	1	0	0	0	0	0	4S	08/16/77	30.8	11.8	00.0	5	T.FALCATUS	
508123131302	13	27	30	6	31	37	4	38	57	3	6S	08/16/77	30.8	21.0	00.0	5	T.FALCATUS
508123174300	5	13	15	2	27	31	3	6	0	9S	07/07/77	29.8	23.5	23.5	11	LUTJANUS SP.	
508123174300	3	11	0	1	12	0	1	13	0	2	7S	07/12/77	32.4	21.5	21.5	10	LUTJANUS JUV.
508123174300	1	20	0	1	0	0	0	0	0	9S	08/16/77	31.8	34.5	00.0	16	LUTJANUS SP.	
508123174306	2	11	0	2	0	0	0	0	0	7S	06/15/77	31.4	34.0	34.0	13	L.GRISFUS	
508123174306	3	165784	2	0	0	0	0	0	0	2T	06/14/77	32.6	25.0	00.0	5	L.GRISFUS	
508123174306	2	201203	2	0	0	0	0	0	0	4T	06/21/77	29.6	16.0	00.0	6	L.GRISFUS	
508123174306	1	37	0	1	0	0	0	0	0	7S	06/23/77	27.0	09.0	09.0	20	L.GRISFUS	
508123174306	2	12	0	1	19	0	1	0	0	5	7S	06/28/77	29.8	29.2	29.2	20	L.GRISFUS
508123174306	2	177	0	1	198	0	1	0	0	2T	06/30/77	30.8	14.8	00.0	16	L.GRISFUS	
508123174306	1	171	0	1	0	0	0	0	0	3T	07/06/77	28.7	01.5	00.0	14	L.GRISFUS	
508123174306	1	85	0	1	0	0	0	0	0	4S	07/06/77	31.5	02.0	02.0	9	L.GRISFUS	

PAGE #	PHOENOTYPIC SORT OF ST.						WOLF FISH FAUNA BY DATE 6/15/77 - 7/16/77						08/15/78					
	GENUS-SPECIES	TOTAL	SIZE	NO. IND.	SIZE	NO. IND.	SIZE	NO. IND.	SIZE	NO. IND.	DATE	TEMP	SAL	SAL	NO. OF GENUS INITIAL AND SPECIES	SPECIES NAME		
TAXON NUMBER	IND.	CLASS#	CLASS#	CLASS#	CLASS#	CLASS#	CLASS#	CLASS#	CLASS#	CLASS#	MO./DAY	TOP C	TOP F	BOTTOM C	BOTTOM F			
508123170306	1	16	0	1	0	0	0	0	0	0	07/16/77	30.1	17.1	17.5	10	L.GRISSEUS		
508123170306	4	22	0	1	28	0	1	31	0	0	07/16/77	32.8	23.5	23.5	14	L.GRISSEUS		
508123170306	2	178	0	1	197	0	1	0	0	0	07/16/77	30.2	04.5	00.0	6	L.GRISSEUS		
508123170306	1	237	0	1	0	0	0	0	0	0	07/16/77	31.0	04.0	00.0	15	L.GRISSEUS		
508123170306	3	33	37	3	0	0	0	0	0	0	07/16/77	32.2	30.0	30.0	16	L.GRISSEUS		
508123170306	20	11	20	4	21	35	11	36	45	5	08/16/78	32.2	31.0	00.0	11	L.GRISSEUS		
508123170306	1	27	0	1	0	0	0	0	0	0	08/16/78	31.4	35.0	00.0	17	L.GRISSEUS		
508123170306	5	15	17	5	0	0	0	0	0	0	08/16/78	31.8	34.5	00.0	16	L.GRISSEUS		
508123170308	1	32	0	1	0	0	0	0	0	0	08/23/77	27.0	09.0	09.0	20	L.MAHOGONI		
508123170308	1	24	0	1	0	0	0	0	0	0	07/12/77	32.4	21.5	21.5	10	L.MAHOGONI		
508123170309	2	15	19	2	0	0	0	0	0	0	06/15/77	32.0	27.0	27.0	17	L.SYNAGRIS		
508123170309	1	31	0	1	0	0	10	0	0	0	08/28/77	29.8	29.2	29.2	20	L.SYNAGRIS		
508123170309	1	30	0	1	0	0	0	0	0	0	08/28/77	29.8	31.3	31.3	16	L.SYNAGRIS		
508123170309	1	88	0	1	0	0	0	0	0	0	07/30/77	30.2	03.8	00.0	13	L.SYNAGRIS		
508123170309	2	15	0	1	27	0	1	0	0	0	07/11/77	32.2	30.0	30.0	16	L.SYNAGRIS		
508123170309	15	14	30	9	31	44	5	0	0	0	08/16/77	32.2	31.0	00.0	11	L.SYNAGRIS		
508123170309	1	82	0	1	0	0	0	0	0	0	07/16/77	30.2	32.0	00.0	6	L.SYNAGRIS		
508123170309	2	15	26	2	0	0	0	0	0	0	08/16/77	31.4	35.0	00.0	17	L.SYNAGRIS		
508123170309	1	25	0	1	0	0	0	0	0	0	10/5	32.2	33.0	33.0	10	L.SYNAGRIS		
508123170309	1	68	0	1	0	0	0	0	0	0	08/16/77	30.8	11.8	00.0	5	L.SURINAMENSIS		
508123190101	2	73	0	1	78	0	1	0	0	0	08/15/77	26.8	22.0	22.0	4	P.DISTHOSTOMUS		
508123190101	1	78	0	1	0	0	0	0	0	0	08/15/77	31.4	34.0	34.0	13	P.DISTHOSTOMUS		
508123190101	1	26	0	1	0	0	0	0	0	0	10/5	32.0	35.0	35.0	10	P.DISTHOSTOMUS		
508123190101	5	38	0	1	82	82	1	100	0	1	07/16/77	31.8	21.0	00.0	15	P.DISTHOSTOMUS		
508123190101	2	38	0	1	80	9	1	0	0	0	07/21/77	30.1	19.5	00.0	12	P.DISTHOSTOMUS		
508123190101	1	105	0	1	0	0	0	0	0	0	07/21/77	30.1	38.0	00.0	8	P.DISTHOSTOMUS		
508123190101	2	25	26	2	0	0	0	0	0	0	08/23/77	32.0	02.0	00.0	5	P.DISTHOSTOMUS		
508123190101	5	21	22	3	93	0	2	0	0	0	11/1	30.2	13.8	00.0	11	P.DISTHOSTOMUS		
508123190101	16	14	15	7	22	34	11	40	41	2	07/30/77	30.8	14.8	00.0	16	P.DISTHOSTOMUS		
508123190101	3	46	0	1	74	0	1	96	0	1	07/30/77	31.0	02.0	00.0	22	P.DISTHOSTOMUS		
508123190101	16	12	15	7	18	27	4	0	0	0	07/30/77	30.2	03.8	00.0	13	P.DISTHOSTOMUS		
508123190101	2	29	34	2	0	0	0	0	0	0	07/06/77	29.5	07.5	07.5	5	P.DISTHOSTOMUS		
508123190101	7	16	18	7	0	0	0	0	0	0	07/06/77	29.5	09.5	00.0	6	P.DISTHOSTOMUS		
508123190101	2	47	0	1	51	0	1	0	0	0	07/06/77	28.7	01.5	00.0	7	P.DISTHOSTOMUS		
508123190101	43	27	94	43	0	0	0	0	0	0	07/06/77	28.7	01.5	00.0	14	P.DISTHOSTOMUS		
508123190101	17	17	29	9	40	0	1	88	96	2	07/06/77	30.9	02.2	00.0	16	P.DISTHOSTOMUS		
508123190101	18	25	78	12	0	0	0	0	0	0	07/12/77	30.2	07.0	00.0	8	P.DISTHOSTOMUS		
508123190101	1	21	0	1	0	0	0	0	0	0	07/12/77	30.8	03.0	00.0	12	P.DISTHOSTOMUS		
508123190101	1	17	0	1	0	0	0	0	0	0	07/12/77	32.0	10.5	00.0	11	P.DISTHOSTOMUS		
508123190101	2	22	24	2	0	0	0	0	0	0	07/12/77	31.2	14.5	26.0	9	P.DISTHOSTOMUS		
508123190101	2	23	25	2	0	0	0	0	0	0	08/11/77	31.8	30.5	30.5	12	P.DISTHOSTOMUS		
508123190101	3	28	6	1	47	0	1	44	0	1	08/14/77	30.8	12.0	00.0	4	P.DISTHOSTOMUS		
508123190101	161	31	35	77	37	42	42	47	52	42	08/16/77	30.8	12.0	00.0	8	P.DISTHOSTOMUS		
508123190101	133	33	51	131	0	0	0	0	0	0	07/16/77	30.0	12.0	00.0	9	P.DISTHOSTOMUS		
508123190101	2	35	0	1	40	0	1	0	0	0	07/16/77	30.6	14.5	00.0	6	P.DISTHOSTOMUS		
508123190101	1	37	0	1	0	0	0	0	0	0	07/16/77	30.8	21.0	00.0	7	P.DISTHOSTOMUS		
508123190101	1	40	0	1	0	0	0	0	0	0	07/16/77	30.2	32.0	00.0	6	P.DISTHOSTOMUS		
508123190101	1	28	0	1	0	0	0	0	0	0	08/16/77	31.4	35.0	00.0	17	P.DISTHOSTOMUS		
508123190101	1	34	0	1	0	0	0	0	0	0	08/16/77	32.2	33.0	33.0	10	P.DISTHOSTOMUS		
508123190102	1	37	0	1	0	0	0	0	0	0	08/16/77	30.8	18.0	18.0	9	P.PLUMIFERI		
508123190102	1	113	0	1	0	0	0	0	0	0	07/16/77	31.8	21.0	00.0	15	P.PLUMIFERI		
508123190102	2	122	23	2	0	0	0	0	0	0	07/16/77	30.1	19.5	00.0	12	P.PLUMIFERI		
508123190102	1	262	0	1	0	0	0	0	0	0	07/16/77	30.1	03.8	00.0	8	P.PLUMIFERI		

PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77												08/15/78
GENUS-SPECIES TOTAL TAXON NUMBER	IND	SIZE	NO.IND	GENUS-SPECIES TOTAL IND	SIZE	NO.IND	STATION	DATE	TEMP	SAL	SAL	NO. OF GENUS INITIAL AND SPECIES SPECIE NAME
									MOL/DAY	TOP C	TOP	BOTTOM
508123196102	4	34	3	1	41	46	3	0	0	0	35	D. PLUMIERI
508123146102	7	32	19	5	120	0	1	128	0	1	27	D. PLUMIERI
508123196102	1	164	0	1	0	0	0	0	0	0	37	D. PLUMIERI
508123196102	1	34	0	1	0	0	0	0	0	0	47	D. PLUMIERI
508123196102	26	38	47	4	134	209	20	2853	04	2	37	D. PLUMIERI
508123196102	2	41	0	1	45	1	1	6	6	0	35	D. PLUMIERI
508123196102	2	172	0	1	140	0	1	0	0	0	37	D. PLUMIERI
508123196102	6	54	58	2	222	0	1	2412	54	3	17	D. PLUMIERI
508123196102	1	216	0	1	0	0	0	6	0	0	27	D. PLUMIERI
508123196102	2	153	0	1	162	0	1	0	0	0	37	D. PLUMIERI
508123196200	35	14	24	76	0	0	0	0	0	0	35	F. JUV.
508123196200	9	9	0	9	4	0	0	0	0	0	65	F. JUV.
508123196200	8	9	10	8	0	0	0	0	0	0	45	F. JUV.
508123196200	9	9	10	9	0	0	0	0	0	0	45	F. JUV.
508123196200	48	10	14	48	0	0	0	0	0	0	105	F. JUV.
508123196200	90	14	21	43	24	31	53	33	43	3	27	F. JUV.
508123196200	43	23	31	43	0	0	0	0	0	0	47	F. SP.
508123196200	25	13	36	25	0	1	0	0	0	0	71	F. JUV.
508123196200	27	16	31	22	0	0	0	0	0	0	27	F. JUV.
508123196200	31	14	28	31	0	0	0	0	0	0	57	F. JUV.
508123196200	146	13	22	72	25	34	123	0	0	0	35	F. JUV.
508123196200	21	9	26	21	0	0	0	0	0	0	75	FUCINOSTOMUS SP.
508123196200	27	9	26	27	0	0	0	0	0	0	105	F. JUV.
508123196200	39	12	17	38	0	0	0	0	0	0	25	F. JUVENTILES
508123196200	82	9	22	82	0	0	0	0	0	0	75	FUCINOSTOMUS SP.
508123196200	25	4	15	25	0	0	0	0	0	0	45	F. JUV.
508123196200	1225	9	26	1225	0	0	0	0	0	0	95	F. JUV.
508123196200	4	4	13	4	0	0	0	0	0	0	105	F. JUV.
508123196200	85	22	31	45	0	0	0	0	0	0	17	F. JUV.
508123196200	445	14	39	445	0	0	0	0	0	0	27	F. JUV.
508123196200	287	14	37	287	0	0	0	0	0	0	47	F. SP.
508123196200	8	24	71	8	0	0	0	0	0	0	57	F. JUV.
508123196200	22	20	29	22	0	0	0	0	0	0	67	F. JUV.
508123196200	7	24	36	7	0	0	0	0	0	0	15	F. JUVENTILES
508123196200	57	24	32	57	0	0	0	0	0	0	17	F. JUV.
508123196200	47	19	31	47	0	0	0	0	0	0	35	F. JUVENTILES
508123196200	38	18	36	38	0	0	0	0	0	0	47	F. SP.
508123196200	1	10	0	1	0	0	0	0	0	0	45	F. JUV.
508123196200	327	17	34	327	0	0	0	0	0	0	57	F. JUV.
508123196200	66	4	0	35	12	24	27	26	30	4	75	FUCINOSTOMUS SP.
508123196200	57	4	39	53	0	0	0	0	0	0	95	F. JUV.
508123196200	584	4	14	565	22	33	19	6	0	0	95	F. JUV.
508123196200	43	20	28	43	1	0	0	0	0	0	105	F. JUV.
508123196200	443	20	65	443	0	0	0	0	0	0	27	F. JUV.
508123196200	21	15	35	21	0	0	0	0	0	0	47	F. SP.
508123196200	8	12	21	8	0	0	0	0	0	0	55	F. JUV.
508123196200	88	28	33	98	0	0	0	0	0	0	57	F. JUV.
508123196200	46	13	28	46	0	0	0	0	0	0	75	FUCINOSTOMUS SP.
508123196200	496	8	42	496	0	0	0	0	0	0	71	F. JUV.
508123196200	161	16	40	161	0	0	0	0	0	0	85	F. JUV.
508123196200	399	9	10	297	18	19	2	0	0	0	95	F. JUV.
508123196200	4	25	28	4	0	0	0	0	0	0	105	F. JUV.
508123196200	24	13	5	24	0	0	0	0	0	0	65	F. JUV.
508123196200	5	10	12	5	0	0	0	0	0	0	85	F. JUVENTILES

PAGE 9 GENUS-SPECIE TAXON NUMBER	PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77											08/15/78 NO. OF GENUS INITIAL AND SPECIES SPECIE NAME	
	TOTAL IND	SIZE NO.	IND	SIZE NO.	IND	SIZE NO.	IND	STATION NAME	DATE YR	TEMP TOP C	SAL TOP		
508123190200	37	9.15	2	15.28	35	0.0	0	95	08/16/77	31.8	34.5	00.0	16 F. JUVENTILES
508123190200	453	10.12	453	0.0	0	0.0	0	105	08/16/77	32.2	33.0	33.0	10 F. JUV.
508123190201	250	19.81	250	0.0	0	0.0	0	15	06/15/77	30.8	17.0	17.0	8 F. ARGENTEUS
508123190201	12	27.42	11	79.0	1	0.0	0	35	06/15/77	30.8	18.0	18.0	9 F. ARGENTEUS
508123190201	16	62.81	16	0.0	0	0.0	0	45	06/15/77	26.8	22.0	22.0	4 F. ARGENTEUS
508123190201	8	20.21	2	74.0	1	53.65	5	55	06/15/77	31.0	27.0	27.0	11 F. ARGENTEUS
508123190201	3	34.35	2	45.0	1	0.0	0	65	06/15/77	31.0	31.0	31.0	9 F. ARGENTEUS
508123190201	18	9.11	11	53.58	4	60.61	3	75	06/15/77	31.4	34.0	34.0	13 F. ARGENTEUS
508123190201	39	29.71	39	0.0	6	0.0	0	85	06/15/77	31.8	35.0	35.0	10 F. ARGENTEUS
508123190201	18	28.43	9	79.0	1	0.0	0	95	06/15/77	32.0	27.0	27.0	17 F. ARGENTEUS
508123190201	23	14.47	23	0.0	0	0.0	0	105	06/15/77	33.0	35.0	35.0	10 F. ARGENTEUS
508123190201	1	32.0	1	0.0	0	0.0	0	15	06/16/77	31.8	21.0	00.0	15 F. ARGENTEUS
508123190201	2	35.17	2	0.0	0	0.0	0	45	06/16/77	32.2	24.0	00.0	3 F. ARGENTEUS
508123190201	3	16.19	2	38.0	1	0.0	0	55	06/16/77	32.0	26.0	00.0	10 F. ARGENTEUS
508123190201	6	65.69	2	78.82	2	101.04	2	65	06/16/77	29.4	24.0	34.0	5 F. ARGENTEUS
508123190201	5	65.0	1	80.84	4	0.0	0	75	06/16/77	28.0	35.0	35.0	4 F. ARGENTEUS
508123190201	42	28.43	41	50.0	1	0.0	0	55	06/22/77	30.4	20.5	00.0	9 F. ARGENTEUS
508123190201	2	51.0	1	61.0	1	0.0	0	65	06/22/77	29.8	24.0	29.0	3 F. ARGENTEUS
508123190201	5	36.46	5	0.0	0	0.0	0	15	06/23/77	33.0	14.5	14.5	8 F. ARGENTEUS
508123190201	5	34.44	5	0.0	0	0.0	0	25	06/23/77	32.0	18.2	18.2	4 F. ARGENTEUS
508123190201	40	33.52	40	0.0	0	0.0	0	35	06/23/77	32.0	02.0	00.0	5 F. ARGENTEUS
508123190201	2	64.0	1	92.0	1	0.0	0	45	06/23/77	32.5	07.8	07.8	5 F. ARGENTEUS
508123190201	2	36.0	1	63.0	1	0.0	0	55	06/23/77	33.8	15.2	15.2	4 F. ARGENTEUS
508123190201	5	28.0	1	30.40	2	53.54	2	75	06/23/77	27.0	09.0	09.0	20 F. ARGENTEUS
508123190201	50	24.41	50	0.0	0	0.0	0	105	06/23/77	28.9	30.5	30.5	3 F. ARGENTEUS
508123190201	30	28.35	6	38.44	12	50.57	12	15	06/28/77	33.1	16.0	16.0	5 F. ARGENTEUS
508123190201	14	30.39	11	73.84	3	0.0	0	25	06/28/77	32.8	13.9	13.9	2 F. ARGENTEUS
508123190201	4	36.40	3	50.0	1	0.0	0	45	06/28/77	31.6	05.5	05.5	2 F. ARGENTEUS
508123190201	4	29.0	1	40.42	3	0.0	0	55	06/28/77	32.4	14.0	14.0	10 F. ARGENTEUS
508123190201	1	61.0	1	0.0	0	0.0	0	75	06/28/77	29.8	29.2	29.2	20 F. ARGENTEUS
508123190201	20	9.66	20	0.0	0	0.0	0	85	06/28/77	29.8	32.4	32.4	8 F. ARGENTEUS
508123190201	4	37.42	2	48.51	2	0.0	0	95	06/28/77	29.8	31.3	31.3	16 F. ARGENTEUS
508123190201	14	26.44	11	60.63	2	92.0	1	105	06/28/77	29.7	32.0	32.0	8 F. ARGENTEUS
508123190201	182	23.71	153	33.47	29	0.0	0	1T	06/30/77	31.2	13.8	00.0	11 F. ARGENTEUS
508123190201	116	28.50	116	0.0	0	0.0	0	2T	06/30/77	30.8	14.8	00.0	16 F. ARGENTEUS
508123190201	1	41.0	1	0.0	0	0.0	0	3T	06/30/77	31.0	02.0	00.0	22 F. ARGENTEUS
508123190201	277	26.47	277	0.0	0	0.0	0	4T	06/30/77	30.2	03.8	00.0	13 F. ARGENTEUS
508123190201	103	16.72	18	77.57	25	0.0	0	6T	07/01/77	29.6	20.5	28.0	10 F. ARGENTEUS
508123190201	6	36.38	3	45.46	2	55.0	1	1T	07/06/77	29.8	07.8	00.0	5 F. ARGENTEUS
508123190201	18	21.47	18	0.0	0	0.0	0	25	07/06/77	29.7	09.5	09.5	4 F. ARGENTEUS
508123190201	129	15.0	1	22.46	127	57.0	1	2T	07/06/77	29.5	09.5	00.0	6 F. ARGENTEUS
508123190201	5	37.44	5	0.0	0	0.0	0	35	07/06/77	28.7	01.5	00.0	7 F. ARGENTEUS
508123190201	54	22.44	54	0.0	0	0.0	0	3T	07/06/77	28.7	01.5	00.0	14 F. ARGENTEUS
508123190201	1	66.0	1	0.0	0	0.0	0	45	07/06/77	31.5	02.0	02.0	9 F. ARGENTEUS
508123190201	45	17.43	44	53.0	1	0.0	0	4T	07/06/77	30.9	02.2	00.0	16 F. ARGENTEUS
508123190201	43	26.28	2	24.55	37	77.88	4	55	07/06/77	32.3	08.0	08.0	11 F. ARGENTEUS
508123190201	27	31.52	27	0.0	0	0.0	0	5T	07/06/77	31.4	08.5	00.0	6 F. ARGENTEUS
508123190201	12	38.87	12	0.0	0	0.0	0	6S	07/04/77	30.1	17.5	17.5	10 F. ARGENTEUS
508123190201	13	28.31	2	45.59	10	72.0	1	6T	07/06/77	31.3	14.0	26.3	10 F. ARGENTEUS
508123190201	13	33.38	5	42.55	6	68.76	2	75	07/06/77	32.8	23.5	23.5	14 F. ARGENTEUS
508123190201	5	32.42	5	0.0	0	0.0	0	85	07/07/77	29.6	30.5	30.5	10 F. ARGENTEUS
508123190201	39	31.41	39	0.0	0	0.0	0	105	07/07/77	30.2	31.5	31.5	4 F. ARGENTEUS
508123190201	28	27.53	24	0.0	0	0.0	0	15	07/12/77	30.2	08.0	08.0	5 F. ARGENTEUS
508123190201	24	34.51	24	0.0	0	0.0	0	1T	07/12/77	30.2	07.0	00.0	8 F. ARGENTEUS

PAGE 10 GENUS-SPECIES TOTAL TAXON NUMBER	PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77												NO. OF GENUS INITIAL AND SPECIES SPECIE NAME	08/15/78			
	IND	SIZE	NO.IND	SIZE	NO.IND	SIZE	NO.IND	STATION	DATE	TEMP	SAL	SAL					
	IND	CLASSI	CLASSI	MO, DAY	YR	C TOP	BOTTOM										
508123198201	1	45	0	1	0	0	0	0	0	25	07/12/77	30.4	08.0	08.0	2	F. ARGENTEUS	
508123198201	32	29	50	32	0	0	0	0	0	35	07/12/77	30.8	03.0	00.0	4	F. ARGENTEUS	
508123198201	3	41	45	3	0	0	0	0	0	45	07/12/77	31.9	04.5	04.5	9	F. ARGENTEUS	
508123198201	25	22	54	25	0	0	0	0	0	47	07/12/77	31.0	04.0	00.0	15	F. ARGENTEUS	
508123198201	1	42	0	1	0	0	0	0	0	55	07/12/77	32.2	16.0	16.0	6	F. ARGENTEUS	
508123198201	49	30	74	44	0	0	0	0	0	AT	07/12/77	31.2	14.5	26.0	9	F. ARGENTEUS	
508123198201	4	38	0	3	44	0	1	0	0	75	07/12/77	32.4	21.5	21.5	10	F. ARGENTEUS	
508123198201	62	39	64	62	0	0	0	0	0	77	07/12/77	29.0	24.2	33.5	5	F. ARGENTEUS	
508123198201	36	12	14	5	19	31	23	37	42	?	95	07/13/77	32.2	30.0	30.0	16	F. ARGENTEUS
508123198201	6	52	55	4	74	0	1	105	0	1	105	07/13/77	33.4	30.5	30.5	7	F. ARGENTEUS
508123198201	6	26	34	3	34	42	2	52	0	1	1T	08/16/77	29.4	03.5	00.0	13	F. ARGENTEUS
508123198201	24	41	57	24	0	0	0	4	0	0	45	08/16/77	30.8	11.8	00.0	5	F. ARGENTEUS
508123198201	1	46	0	1	0	0	-0	4	0	0	4T	08/16/77	30.0	12.0	00.0	9	F. ARGENTEUS
508123198201	32	45	61	32	0	0	0	0	0	55	08/16/77	32.0	14.6	00.0	3	F. ARGENTEUS	
508123198201	2	43	0	1	51	0	1	0	0	0	65	08/16/77	30.8	21.0	00.0	5	F. ARGENTEUS
508123198201	12	47	58	12	0	0	0	0	0	6T	08/16/77	30.8	21.0	00.0	7	F. ARGENTEUS	
508123198201	62	24	51	62	0	0	0	0	0	75	08/16/77	32.2	31.0	00.0	11	F. ARGENTEUS	
508123198201	88	38	72	88	0	0	0	0	0	7T	08/16/77	30.2	32.0	00.0	6	F. ARGENTEUS	
508123198201	68	32	55	68	0	0	0	0	0	85	08/16/77	31.4	35.0	00.0	17	F. ARGENTEUS	
508123198201	74	16	37	18	78	47	16	0	0	95	08/16/77	31.8	34.5	00.0	16	F. ARGENTEUS	
508123198201	18	28	0	1	40	63	8	105	0	1	105	08/16/77	32.2	33.0	33.0	10	F. ARGENTEUS
508123198203	18	26	44	18	0	0	0	4	0	0	15	06/15/77	30.8	17.0	17.0	8	F. GULIA
508123198203	65	29	69	65	0	0	0	0	0	35	06/15/77	30.8	18.0	18.0	9	F. GULIA	
508123198203	2	42	47	2	0	0	0	0	0	45	06/15/77	26.8	22.0	22.0	4	F. GULIA	
508123198203	4	40	0	2	51	72	2	0	0	55	06/15/77	31.0	27.0	27.0	11	F. GULIA	
508123198203	6	30	34	4	43	52	2	0	0	65	06/15/77	31.0	31.0	31.0	9	F. GULIA	
508123198203	11	13	0	2	48	52	3	58	44	6	75	06/15/77	31.4	34.0	34.0	13	F. GULIA
508123198203	24	21	54	24	0	0	0	0	0	85	06/15/77	31.8	35.0	35.0	10	F. GULIA	
508123198203	18	28	46	17	62	0	1	0	0	95	06/15/77	32.0	27.0	27.0	17	F. GULIA	
508123198203	9	31	56	4	0	0	0	0	0	105	06/15/77	33.0	35.0	35.0	10	F. GULIA	
508123198203	141	31	53	141	0	0	0	0	0	1T	06/16/77	32.0	20.0	00.0	6	F. GULIA	
508123198203	28	34	51	28	0	0	0	0	0	4T	06/16/77	32.2	24.0	00.0	3	F. GULIA	
508123198203	12	16	0	1	30	50	11	0	0	5T	06/16/77	32.0	26.0	00.0	10	F. GULIA	
508123198203	7	34	49	2	51	55	4	68	0	1	7T	06/16/77	28.0	35.0	35.0	4	F. GULIA
508123198203	5	32	36	2	38	0	2	41	0	1	PT	06/21/77	30.1	19.5	00.0	12	F. GULIA
508123198203	29	24	57	29	0	0	0	0	0	4T	06/21/77	29.6	16.0	00.0	6	F. GULIA	
508123198203	45	31	58	45	0	0	0	4	0	5T	06/22/77	30.4	20.5	00.0	9	F. GULIA	
508123198203	8	41	0	1	0	0	-0	0	0	65	06/22/77	31.0	15.5	15.5	5	F. GULIA	
508123198203	51	30	51	51	0	0	0	6	0	6T	06/22/77	29.8	24.0	29.0	3	F. GULIA	
508123198203	57	32	51	57	0	0	0	6	0	15	06/23/77	33.0	14.5	14.5	8	F. GULIA	
508123198203	8	33	55	8	0	0	0	6	0	35	06/23/77	32.0	02.0	00.0	5	F. GULIA	
508123198203	4	34	76	2	37	38	2	0	0	45	06/23/77	32.5	07.8	07.8	5	F. GULIA	
508123198203	2	28	0	1	31	0	1	0	0	45	06/23/77	33.8	15.2	15.2	4	F. GULIA	
508123198203	41	30	37	14	79	57	22	0	0	45	06/23/77	33.1	16.0	16.0	5	F. GULIA	
508123198203	3	45	48	3	0	0	0	0	0	25	06/28/77	32.8	13.9	17.9	2	F. GULIA	
508123198203	41	15	45	41	0	0	0	0	0	75	06/28/77	32.2	01.8	00.0	6	F. GULIA	
508123198203	17	33	43	2	45	52	7	65	0	1	45	06/28/77	31.6	05.5	05.5	2	F. GULIA
508123198203	6	32	42	6	0	0	0	6	0	55	06/28/77	32.4	14.0	14.0	10	F. GULIA	
508123198203	17	35	57	19	0	0	0	0	0	65	06/28/77	31.0	15.0	15.0	4	F. GULIA	
508123198203	17	11	21	8	27	45	7	61	66	2	75	06/28/77	29.8	29.2	29.2	20	F. GULIA
508123198203	4	41	45	3	54	0	1	0	0	45	06/28/77	26.8	35.2	35.2	8	F. GULIA	
508123198203	13	13	62	13	0	0	0	0	0	45	06/28/77	29.8	31.3	31.3	16	F. GULIA	
508123198203	9	25	43	4	0	0	0	0	0	105	06/28/77	29.7	32.0	32.0	8	F. GULIA	
508123198203	51	23	45	51	0	0	0	0	0	2T	06/30/77	30.8	14.8	00.0	16	F. GULIA	

PAGE II GENUS-SPCIE TOTAL TAXON NUMBER	PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77												08/15/78 NO. OF GENUS INITIAL AND SPECIES SPECIE NAME
	TND	SIZE CLASSI	NO.IND CLASSI	SIZE CLASSII	NO.IND CLASSII	SIZE CLASSIII	NO.IND CLASSIII	STATION NUMBER	DATE MO.DAY YR	TEMP TDP C	SAL TOP	SAL BOTTOM	
508123194203	56	26 47	56	0 0	0	0 0	0	4T	06/30/77	30.2	03.8	00.0	13 F.GULI
508123194203	144	27 64	144	0 0	0	0 0	0	6T	07/01/77	29.5	20.5	28.0	10 F.GULI
508123194203	32	31 42	32	0 0	0	0 0	0	1S	07/06/77	29.5	07.5	07.5	5 F.GULI
508123194203	13	39 53	13	0 0	0	0 0	0	1T	07/06/77	29.8	07.8	00.0	6 F.GULI
508123194203	3	35 42	3	0 0	0	0 0	0	2S	07/06/77	29.7	09.5	09.5	4 F.GULI
508123194203	10	37 43	10	0 0	0	0 0	0	3S	07/06/77	28.7	01.5	00.0	7 F.GULI
508123194203	4	36 52	12	60 70	2	0 0	0	4S	07/06/77	31.5	02.0	02.0	9 F.GULI
508123194203	27	39 42	27	0 0	0	0 0	0	4T	07/06/77	30.9	02.2	00.0	16 F.GULI
508123194203	13	38 55	13	0 0	0	0 0	0	5S	07/06/77	32.3	08.0	08.0	11 F.GULI
508123194203	36	40 69	39	0 0	0	0 0	0	5T	07/06/77	31.4	08.5	00.0	6 F.GULI
508123194203	16	40 75	16	0 0	0	0 0	0	6S	07/06/77	30.1	17.5	17.5	10 F.GULI
508123194203	5	37 39	2	43 0	1	51 53	2	6T	07/06/77	31.3	14.0	26.3	18 F.GULI
508123194203	9	38 45	4	55 56	2	65 76	3	7S	07/06/77	32.8	23.5	23.5	14 F.GULI
508123194203	2	38 44	2	0 0	0	0 0	0	8S	07/07/77	29.6	30.5	30.5	10 F.GULI
508123194203	10	41 46	8	73 75	2	0 0	0	9S	07/07/77	29.8	23.5	23.5	11 F.GULI
508123194203	16	32 49	15	0 0	0	0 0	0	10S	07/07/77	30.2	33.5	33.5	4 F.GULI
508123194203	3	39 44	3	0 0	0	0 0	0	1S	07/12/77	30.2	08.0	08.0	5 F.GULI
508123194203	184	32 64	184	0 0	0	0 0	0	1T	07/12/77	30.2	07.0	00.0	8 F.GULI
508123194203	1	71 0	1	0 0	0	0 0	0	2S	07/12/77	30.4	08.0	08.0	2 F.GULI
508123194203	27	28 58	27	0 0	0	0 0	0	3S	07/12/77	30.8	03.0	00.0	6 F.GULI
508123194203	4	31 34	2	45 0	1	53 0	1	4T	07/12/77	31.0	04.0	00.0	15 F.GULI
508123194203	9	34 38	9	0 0	0	0 0	0	5S	07/12/77	33.2	10.0	10.0	3 F.GULI
508123194203	41	18 34	39	55 0	2	0 0	0	5T	07/12/77	32.0	10.5	00.0	11 F.GULI
508123194203	12	46 74	12	0 0	0	0 0	0	6S	07/12/77	32.2	16.0	16.0	6 F.GULI
508123194203	43	35 55	43	0 0	0	0 0	0	6T	07/12/77	31.2	14.5	26.0	9 F.GULI
508123194203	130	35 58	130	0 0	0	0 0	0	7T	07/12/77	29.0	24.2	33.5	5 F.GULI
508123194203	6	24 0	1	22 44	5	0 0	0	9S	07/13/77	32.2	30.0	30.0	16 F.GULI
508123194203	32	29 66	32	0 0	0	0 0	0	10S	07/13/77	30.4	30.5	30.5	7 F.GULI
508123194203	7	43 48	7	0 0	0	0 0	0	1S	08/16/77	29.4	03.5	00.0	4 F.GULI
508123194203	5	36 0	1	41 0	2	48 58	2	1T	08/16/77	29.4	03.5	00.0	13 F.GULI
508123194203	6	50 51	3	52 0	2	53 0	1	2T	08/16/77	29.4	08.5	00.0	3 F.GULI
508123194203	84	32 64	84	0 0	0	0 0	0	3S	08/16/77	30.8	12.0	00.0	4 F.GULI
508123194203	3	33 0	1	36 0	1	45 0	1	3T	08/16/77	30.8	12.0	00.0	8 F.GULI
508123194203	22	36 64	22	0 0	0	0 0	0	4S	08/16/77	30.8	11.8	00.0	5 F.GULI
508123194203	12	25 39	2	41 49	5	50 58	5	4T	08/16/77	30.0	12.0	00.0	9 F.GULI
508123194203	37	41 72	37	0 0	0	0 0	0	5S	08/16/77	32.0	14.6	00.0	3 F.GULI
508123194203	29	39 45	10	47 51	12	52 47	7	6S	08/16/77	30.8	21.0	00.0	5 F.GULI
508123194203	36	49 70	36	0 0	0	0 0	0	6T	08/16/77	30.8	21.0	00.0	7 F.GULI
508123194203	38	29 56	38	0 0	0	0 0	0	7S	08/16/77	32.2	31.0	00.0	11 F.GULI
508123194203	95	39 63	95	0 0	0	0 0	0	7T	08/16/77	30.2	32.0	00.0	6 F.GULI
508123194203	13	35 53	13	0 0	0	0 0	0	8S	08/16/77	31.4	35.0	00.0	17 F.GULI
508123194203	38	28 56	38	0 0	0	0 0	0	9S	08/16/77	31.8	34.5	00.0	16 F.GULI
508123194203	18	26 1	1	41 63	17	0 0	0	10S	08/16/77	32.2	33.0	33.0	10 F.GULI
508123200210	2	17 3	1	26 0	1	27 0	0	8S	08/15/77	31.8	26.0	35.0	10 H.PARRAI
508123200210	5	17 19	2	21 22	2	42 0	1	7S	08/28/77	29.8	29.2	29.2	20 H.PARRAI
508123200210	1	14 0	1	0 0	0	0 0	0	8S	08/28/77	29.8	32.4	32.4	8 H.PARRAI
508123200210	18	29 77	17	0 0	0	0 0	0	8S	07/13/77	31.8	30.5	30.5	12 H.PARRAI
508123200210	1	33 0	1	0 0	0	0 0	0	9S	07/13/77	32.2	30.0	30.0	16 H.PARRAI
508123200210	53	29 79	8	36 45	34	46 57	11	7S	08/16/77	32.2	31.0	00.0	11 H.PARRAI
508123200210	13	21 51	13	0 0	0	0 0	0	8S	08/16/77	31.4	35.0	00.0	17 H.PARRAI
508123200210	1	41 0	1	0 0	0	0 0	0	9S	08/16/77	31.8	34.5	00.0	16 H.PARRAI
508123200211	1	41 0	1	0 0	0	0 0	0	8S	06/15/77	31.8	35.0	35.0	16 H.PLUMIFERI
508123200211	2	23 25	2	0 0	0	0 0	0	8S	07/07/77	29.6	30.5	30.5	10 H.PLUMIFERI
508123200211	1	25 0	1	0 0	0	0 0	0	8S	07/13/77	33.8	30.5	31.5	12 H.PLUMIFERI

PAGE #	PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77												NO. OF GENUS INITIAL AND SPECIES NAME	08/15/78				
	GENUS-SPECIES	TOTAL	SIZE	NO.IND	SIZE	NO.IND	SIZE	NO.IND	STATION	DATE	TEMP	SAL	SAL	NO. DAY	YR	TOP C	TOP	BOTTOM
508123200211	H.PLUMIFERT	4	38.45	4	2	0	0	0	BS	08/16/77	31.4	35.0	00.0	17				
508123200212	H.SCTURUS	3	14.0	1	34.0	1	42.0	1	TS	07/04/77	32.8	23.5	23.5	14				
508123200212	H.SCTURUS	7	28.42	7	2	0	0	0	BS	07/07/77	29.6	30.5	30.5	16				
508123200301	O.CHRYSOPTERA	2	65.1	1	68.0	1	60.0	0	TS	06/15/77	31.4	34.0	34.0	13				
508123200301	O.CHRYSOPTERA	1	53.0	1	60.0	0	60.0	0	BS	06/15/77	32.0	27.0	27.0	17				
508123200301	O.CHRYSOPTERA	10	31.45	2	60.68	4	71.78	4	TS	06/23/77	27.0	09.0	09.0	20				
508123200301	O.CHRYSOPTERA	1	69.0	1	60.0	0	60.0	0	TS	06/28/77	29.8	29.2	29.2	20				
508123200301	O.CHRYSOPTERA	1	102.0	1	60.0	0	60.0	0	BS	08/16/77	31.4	35.0	00.0	17				
508123210101	A.PRORATOCEPHALUS	1	200.0	1	60.0	0	60.0	0	ST	06/16/77	32.0	26.0	00.0	10				
508123210101	A.PRORATOCEPHALUS	1	279.0	1	60.0	0	60.0	0	AT	06/21/77	29.6	16.0	00.0	6				
508123210101	A.PRORATOCEPHALUS	1	203.0	1	60.0	0	60.0	0	TS	06/23/77	27.0	09.0	09.0	20				
508123210101	A.PRORATOCEPHALUS	1	228.0	1	60.0	0	60.0	0	PT	06/30/77	30.8	14.8	00.0	16				
508123210101	A.PRORATOCEPHALUS	2	228.0	1	260.0	1	60.0	0	ST	06/20/77	31.0	02.0	00.0	22				
508123210101	A.PRORATOCEPHALUS	1	228.0	1	60.0	0	60.0	0	ST	07/01/77	29.6	20.0	20.0	10				
508123210101	A.PRORATOCEPHALUS	1	254.0	1	60.0	0	60.0	0	PT	07/06/77	29.5	09.5	00.0	6				
508123210101	A.PRORATOCEPHALUS	3	209.0	1	285.0	1	342.0	1	ST	07/06/77	28.7	01.5	00.0	14				
508123210101	A.PRORATOCEPHALUS	1	196.0	1	60.0	0	60.0	0	AT	07/06/77	30.9	02.2	00.0	16				
508123210101	A.PRORATOCEPHALUS	1	266.0	1	60.0	0	60.0	0	PT	07/12/77	30.2	08.5	00.0	6				
508123210101	A.PRORATOCEPHALUS	5	199.28	2	311.342	2	402.0	1	ST	07/12/77	30.8	03.0	00.0	12				
508123210101	A.PRORATOCEPHALUS	2	215.0	1	298.0	1	60.0	0	ST	07/12/77	31.2	14.5	26.0	9				
508123210101	A.PRORATOCEPHALUS	2	229.0	1	267.0	1	60.0	0	ST	08/16/77	30.8	12.0	00.0	8				
508123210101	A.PRORATOCEPHALUS	1	240.0	1	60.0	0	60.0	0	AT	08/16/77	30.0	12.0	00.0	9				
508123210101	A.PRORATOCEPHALUS	3	240.0	1	240.0	0	60.0	0	ST	08/16/77	30.6	14.5	00.0	6				
508123210101	A.PRORATOCEPHALUS	1	43.0	1	60.0	0	60.0	0	BS	06/28/77	29.8	32.4	32.4	8				
508123210401	L.PHOMBOIDES	7	39.0	1	61.0	1	66.0	1	TS	06/15/77	30.8	18.0	18.0	9				
508123210401	L.PHOMBOIDES	19	36.45	5	46.57	9	57.65	5	TS	06/15/77	31.4	34.0	34.0	13				
508123210401	L.PHOMBOIDES	21	30.56	21	7.0	0	0	0	BS	06/15/77	31.8	35.0	35.0	10				
508123210401	L.RHOMBOIDES	38	31.65	39	0.0	0	0	0	BS	06/15/77	32.0	27.0	27.0	17				
508123210401	L.RHOMBOIDES	1	120.0	1	7.0	0	0	0	PT	06/16/77	32.6	25.0	00.0	5				
508123210401	L.RHOMBOIDES	1	44.0	1	0.0	0	0	0	BS	06/23/77	33.8	15.2	15.2	4				
508123210401	L.RHOMBOIDES	32	21.49	11	50.60	14	62.72	7	TS	06/23/77	27.0	09.0	09.0	20				
508123210401	L.RHOMBOIDES	71	28.40	2	45.49	8	50.63	21	TS	06/28/77	29.8	29.2	29.2	20				
508123210401	L.RHOMBOIDES	46	30.53	46	0.0	0	0	0	BS	06/28/77	29.8	32.4	32.4	8				
508123210401	L.RHOMBOIDES	14	33.70	14	0.0	0	0	0	BS	06/28/77	29.8	31.3	31.3	16				
508123210401	L.RHOMBOIDES	2	70.0	1	87.0	1	60.0	0	AS	07/04/77	31.5	02.0	02.0	9				
508123210401	L.RHOMBOIDES	13	19.0	1	48.56	7	57.67	5	TS	07/06/77	32.8	23.5	23.5	14				
508123210401	L.RHOMBOIDES	56	32.17	2	35.55	54	0.0	0	BS	07/07/77	29.6	30.5	30.5	10				
508123210401	L.RHOMBOIDES	15	37.54	13	63.0	1	77.0	1	BS	07/07/77	29.8	23.5	23.5	11				
508123210401	L.RHOMBOIDES	10	40.54	4	73.5	1	60.0	0	TS	07/12/77	32.4	21.5	21.5	10				
508123210401	L.RHOMBOIDES	73	34.53	73	0.0	0	0	0	AS	07/11/77	31.8	30.5	30.5	12				
508123210401	L.RHOMBOIDES	29	31.60	28	78.0	1	60.0	0	BS	07/11/77	32.2	30.0	30.0	16				
508123210401	L.RHOMBOIDES	3	60.0	1	84.0	2	0.0	0	TS	08/16/77	32.2	31.0	00.0	11				
508123210401	L.RHOMBOIDES	38	38.74	38	0.0	0	0	0	AS	08/16/77	31.4	35.0	00.0	17				
508123210401	L.RHOMBOIDES	2	71.0	1	80.0	1	60.0	0	BS	08/16/77	31.8	34.5	00.0	16				
508123220202	R.CHRYSUPRA	3	38.0	1	40.0	1	49.0	1	ST	06/16/77	31.8	21.0	00.0	15				
508123220202	R.CHRYSUPRA	8	15.0	1	22.28	7	0.0	0	ST	06/16/77	32.0	26.0	00.0	10				
508123220202	R.CHRYSUPRA	1	203.0	1	0.0	0	0	0	ST	06/21/77	30.1	03.8	00.0	8				
508123220202	R.CHRYSUPRA	4	15.0	1	20.0	1	23.0	0	TS	06/23/77	27.0	09.0	09.0	20				
508123220202	R.CHRYSUPRA	2	27.0	2	0.0	0	0	0	TS	06/28/77	29.8	29.2	29.2	20				
508123220202	R.CHRYSUPRA	187	24.45	186	177.0	1	0.0	0	ST	06/30/77	31.0	02.0	00.0	22				
508123220202	R.CHRYSUPRA	28	26.91	29	0.0	0	0	0	ST	07/06/77	28.7	01.5	00.0	14				
508123220202	R.CHRYSUPRA	1	45.0	1	0.0	0	0	0	AT	07/06/77	30.9	02.2	00.0	16				
508123220202	R.CHRYSUPRA	1	71.0	1	0.0	0	0	0	ST	07/06/77	31.3	14.0	26.3	10				
508123220202	R.CHRYSUPRA	7	45.0	1	51.60	6	0.0	0	AT	07/12/77	31.0	04.0	00.0	15				

PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77												DA/15/78				
GENUS-SPECIE TOTAL	SIZE	NO.IND	SIZE	NO.IND	SIZE	NO.IND	STATION	DATE	TEMP	SAL	SAL	NO. OF GENUS INITIAL AND SPECIES SPECIE NAME				
TAXON NUMBER	IND	CLASS1	CLASS2	CLASS1	CLASS2	CLASS1	CLASS2	CLASS1	MO, DAY	C	TOP	BOTTOM				
508123221202	1	28	2	1	6	2	0	75	07/17/77	32.4	21.5	21.5	10 RICHRYSURA			
508123221202	2	85	0	1	93	0	1	75	08/16/77	29.4	03.5	00.0	13 RICHRYSURA			
508123221202	1	72	0	1	74	0	1	88	0	1	4T	08/16/77	30.0	12.0	00.0	9 RICHRYSURA
508123221202	1	73	2	1	6	6	0	65	0	0	5T	08/16/77	30.6	14.5	00.0	6 RICHRYSURA
508123221402	1	41	0	1	6	0	0	85	0	0	75	06/15/77	31.4	34.0	34.0	13 C.NERULOSUS
508123221402	2	13	0	1	35	0	1	85	0	0	75	06/23/77	27.0	09.0	09.0	20 C.NERULOSUS
508123221402	7	22	25	2	32	35	2	39	42	3	75	06/28/77	29.8	29.2	29.2	20 C.NERULOSUS
508123221402	1	15	0	1	6	0	0	85	0	0	95	06/28/77	29.8	31.3	31.3	16 C.NERULOSUS
508123221402	1	50	0	1	6	0	0	85	0	0	55	07/06/77	32.1	08.0	08.0	11 C.NERULOSUS
508123221402	1	36	0	1	6	0	0	85	0	0	75	07/06/77	32.8	23.5	23.5	14 C.NERULOSUS
508123221402	1	43	2	1	6	2	0	85	0	0	4T	07/12/77	31.0	04.0	00.0	15 C.NERULOSUS
508123221404	2	58	0	1	82	0	1	85	0	0	1T	06/15/77	32.0	20.0	00.0	6 CINOTHUS
508123221404	12	44	82	12	6	0	0	85	0	0	3T	06/15/77	31.8	21.0	00.0	15 CINOTHUS
508123221404	4	82	84	2	93	8	1	209	0	1	2T	06/21/77	30.1	19.5	00.0	12 CINOTHUS
508123221404	2	23	4	2	4	0	0	85	0	0	1T	06/30/77	30.2	13.8	00.0	11 CINOTHUS
508123221404	7	50	68	7	6	0	0	85	0	0	3T	06/30/77	31.0	02.0	00.0	22 CINOTHUS
508123221404	6	68	0	1	82	84	2	117	0	1	4T	07/06/77	30.9	02.2	00.0	16 CINOTHUS
508123221404	11	122	14	4	146	23	6	263	0	1	6T	07/06/77	31.3	14.0	26.3	10 CINOTHUS
508123221404	3	67	0	3	78	2	1	87	0	1	4T	07/12/77	31.0	04.0	00.0	15 CINOTHUS
508123221406	3	55	1	1	56	0	1	74	0	1	3T	06/15/77	31.8	21.0	00.0	15 C.PEGALTS
508123221406	4	65	77	2	74	90	2	0	0	0	2T	06/21/77	30.1	19.5	00.0	12 C.PEGALTS
508123221406	1	65	2	1	6	0	0	85	0	0	3T	06/21/77	30.1	03.8	00.0	8 C.PEGALTS
508123221406	4	39	45	2	55	65	2	0	0	0	3T	06/30/77	31.0	07.0	00.0	22 C.PEGALTS
508123221406	9	72	84	4	0	0	0	85	0	0	4T	06/30/77	30.2	03.8	00.0	13 C.PEGALTS
508123221406	3	115	0	1	120	0	2	0	0	0	6T	07/06/77	31.3	14.0	26.3	10 C.PEGALTS
508123221406	2	100	0	1	124	0	1	0	0	0	5T	07/12/77	32.0	10.5	00.0	11 C.PEGALTS
508123221406	1	95	0	1	0	0	0	85	0	0	2S	06/23/77	32.0	18.2	18.2	4 LIXANTHURUS
508123221407	1	88	0	1	0	0	0	85	0	0	2T	06/21/77	30.1	19.5	00.0	12 M.AMERICANUS
508123221407	1	45	0	1	0	0	0	85	0	0	5T	06/22/77	30.4	20.5	00.0	9 M.AMERICANUS
508123221407	1	118	0	1	0	0	0	85	0	0	5T	07/12/77	32.0	10.5	00.0	11 M.AMERICANUS
508123221408	1	58	0	1	0	0	0	85	0	0	1T	06/30/77	30.2	13.8	00.0	11 M.SAXATILIS
508123221408	3	175	0	1	0	0	0	85	0	0	1T	07/12/77	30.2	07.0	00.0	8 M.SAXATILIS
508123221408	1	190	0	1	0	0	0	85	0	0	1T	06/16/77	32.0	20.0	00.0	6 MUNDULATUS
508123221409	75	72	74	72	89	30	2	163	0	1	3T	06/16/77	31.8	21.0	00.0	15 MUNDULATUS
508123221409	1	94	0	1	0	0	0	85	0	0	6T	06/16/77	29.4	28.0	34.0	5 MUNDULATUS
508123221409	10	50	58	3	62	55	3	70	85	4	2T	06/21/77	30.1	19.5	00.0	12 MUNDULATUS
508123221409	1	45	0	1	0	0	0	85	0	0	3T	06/21/77	30.1	03.8	00.0	8 MUNDULATUS
508123221409	8	62	79	5	141	147	2	201	0	1	4T	06/21/77	29.6	16.0	00.0	6 MUNDULATUS
508123221409	11	28	44	2	52	92	8	234	0	1	1T	06/30/77	30.2	13.8	00.0	11 MUNDULATUS
508123221409	4	65	68	2	75	83	2	0	0	0	2T	06/30/77	30.8	14.8	00.0	16 MUNDULATUS
508123221409	215	25	89	147	171	104	18	0	0	0	3T	06/30/77	31.0	02.0	00.0	22 MUNDULATUS
508123221409	26	28	0	1	49	98	24	134	0	1	4T	06/30/77	30.2	03.8	00.0	13 MUNDULATUS
508123221409	2	177	0	1	203	0	1	0	0	0	5T	07/01/77	29.6	10.5	00.0	6 MUNDULATUS
508123221409	12	26	74	2	62	74	9	165	0	1	6T	07/01/77	29.6	20.5	28.0	10 MUNDULATUS
508123221409	2	38	0	1	74	0	1	0	0	0	1T	07/06/77	29.8	07.8	00.0	5 MUNDULATUS
508123221409	72	25	34	58	56	87	4	184	260	5	3T	07/06/77	28.7	01.5	00.0	14 MUNDULATUS
508123221409	32	35	45	4	55	94	24	156	181	2	4T	07/06/77	30.9	02.2	00.0	16 MUNDULATUS
508123221409	67	33	45	7	66	97	57	162	191	3	6T	07/06/77	31.3	14.0	26.3	10 MUNDULATUS
508123221409	6	33	0	1	76	37	3	39	40	2	3T	07/12/77	30.8	03.0	00.0	12 MUNDULATUS
508123221409	23	38	41	8	64	96	14	197	0	1	4T	07/12/77	31.0	04.0	00.0	15 MUNDULATUS
508123221409	26	70	75	26	7	0	0	85	0	0	5T	07/12/77	32.0	10.5	00.0	11 MUNDULATUS
508123221409	19	37	44	6	72	98	12	200	0	1	6T	07/12/77	31.2	14.5	26.0	9 MUNDULATUS
508123221409	14	59	64	4	66	70	5	72	96	5	1T	08/16/77	29.4	03.5	00.0	13 MUNDULATUS
508123221409	2	69	0	1	26	0	1	0	0	0	3T	08/16/77	30.8	12.0	00.0	8 MUNDULATUS

PAGE 14 GENUS-SPECIE TAXON NUMBER	PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77												08/15/78	
	TOTAL IND	SIZE CLASSI	NO.IND CLASSI	SIZE CLASSI	NO.IND CLASSI	SIZE CLASSI	NO.IND CLASSI	STATION NUMBER	DATE NO.DAY YR	TEMP C	SAL TOP	SAL BOTTOM	NO. OF GENUS TINIT AND SPECIES SPECIE NAME	
508123221201	10	68.77	5	78.92	3	117215	2	4T	08/16/77	30.0	12.0	00.0	9	MUNDULATUS
508123221201	2	254.0	2	0.0	0	0	0	3T	08/16/77	31.4	21.0	00.0	15	P.CRONIS
508123221201	1	254.0	1	0.0	0	0	0	3T	08/16/77	31.0	02.0	00.0	22	P.CRONIS
508123221201	1	273.0	1	0.0	0	0	0	3T	07/04/77	28.7	01.5	00.0	14	P.CRONIS
508123221201	1	260.0	1	0.0	0	0	0	3T	07/12/77	30.4	03.0	00.0	12	R.CROMIS
508123221401	1	23.0	1	0.0	0	0	0	4T	02/08/77	21.0	14.0	00.0	3	S.OCELLATA
508123266101	1	61.0	1	0.0	0	0	0	5T	06/16/77	32.0	26.0	00.0	10	C.FARER
508123266101	1	42.0	1	0.0	0	0	0	5T	06/22/77	30.4	20.5	00.0	9	C.FARER
508123266101	2	164.0	1	116.0	1	0	0	5T	07/01/77	29.6	10.5	00.0	6	C.FARER
508123266101	1	247.0	3	0.0	0	0	0	6T	07/01/77	29.6	20.5	28.0	10	C.FARER
508123266101	1	41.0	1	0.0	0	0	0	7T	07/01/77	29.4	30.5	30.5	6	C.FARER
508123131502	1	24.0	1	0.0	0	0	0	8S	06/19/77	31.8	35.0	35.0	18	H.BIVITT/TUS
508123131502	1	20.0	1	0.0	0	0	0	7S	06/23/77	27.0	09.0	00.0	20	H.BIVITT/TUS
508123131502	5	8.0	5	0.0	0	0	0	8S	08/16/77	31.4	35.0	35.0	17	H.BIVITT/TUS
508123131502	1	11.0	1	0.0	0	0	0	9S	08/16/77	31.8	34.5	00.0	16	H.BIVITT/TUS
508123246300	2	23.0	1	72.0	1	0	0	7S	06/28/77	29.8	29.2	29.2	20	SCARUS SP.
5081231347300	5	22.42	5	0.0	0	0	0	8S	08/16/77	31.4	35.0	00.0	17	SCARUS SP.
508123346400	1	28.0	1	0.0	0	0	0	9S	06/15/77	32.0	27.0	27.0	17	SPARASOMA SP.
508123346400	1	31.0	1	0.0	0	0	0	7S	06/23/77	27.0	09.0	09.0	20	SPARASOMA SP.
508123346400	1	48.0	1	0.0	0	0	0	7S	06/28/77	29.8	29.2	29.2	20	SPARASOMA SP.
508123346400	2	14.0	1	23.0	1	0	0	9S	06/28/77	29.8	31.3	31.3	16	SPARASOMA SP.
508123346400	1	15.0	1	0.0	0	0	0	8S	07/07/77	29.6	10.5	30.5	10	SPARASOMA SP.
508123346400	2	33.37	2	0.0	0	0	0	8S	07/13/77	31.8	30.5	30.5	12	SPARASOMA SP.
508123346400	1	11.0	1	0.0	0	0	0	9S	08/16/77	31.8	34.5	00.0	16	SPARASOMA SP.
508123354201	1	65.0	3	0.0	0	0	0	7S	06/28/77	32.2	01.8	00.0	6	M.CEPHALUS
5081233560201	1	48.0	3	0.0	0	0	0	3T	06/30/77	31.0	02.0	00.0	22	M.CEPHALUS
5081233560202	1	19.0	1	0.0	0	0	0	7S	06/15/77	30.8	18.0	18.0	9	M.CUREMA
5081233560202	1	25.0	1	0.0	0	0	0	10S	06/15/77	33.0	35.0	35.0	10	M.CUREMA
5081233560202	1	18.0	1	0.0	0	0	0	6S	06/28/77	31.0	15.8	15.8	4	M.CUREMA
508123357202	3	43.47	1	0.0	0	0	0	7S	07/06/77	28.7	01.5	00.0	7	M.CUREMA
508123357202	1	54.0	1	0.0	0	0	0	1S	07/12/77	30.2	08.0	08.0	5	M.CUREMA
508123151702	5	37.55	5	0.0	0	0	0	3S	07/12/77	30.8	03.0	00.0	6	M.CUREMA
508123152202	1	56.0	1	0.0	0	0	0	4S	07/12/77	31.9	04.5	04.5	9	M.CUREMA
508123166102	1	51.0	1	0.0	0	0	0	2S	06/15/77	30.4	24.0	24.0	1	S.BARRACUDA
508123166102	2	56.0	1	58.0	1	0	0	3S	06/15/77	30.8	18.0	18.0	9	S.BARRACUDA
508123166102	1	42.0	1	0.0	0	0	0	4S	06/15/77	26.8	22.0	22.0	4	S.BARRACUDA
508123366102	1	21.0	1	0.0	0	0	0	5S	06/15/77	31.0	27.0	27.0	11	S.BARRACUDA
508123366102	15	24.35	8	39.48	4	53.69	3	7S	06/15/77	31.4	34.0	34.0	13	S.BARRACUDA
508123366102	4	24.0	1	17.42	3	0	0	9S	06/15/77	32.0	27.0	27.0	17	S.BARRACUDA
508123366102	1	66.0	1	0.0	0	0	0	1S	06/23/77	33.0	14.5	14.5	8	S.BARRACUDA
508123366102	2	60.62	2	0.0	0	0	0	2S	06/21/77	32.0	18.2	18.2	4	S.BARRACUDA
508123366102	1	79.0	1	0.0	0	0	0	4S	06/21/77	32.5	07.8	07.8	5	S.BARRACUDA
508123366102	1	71.0	1	0.0	0	0	0	5S	06/23/77	33.8	15.2	15.2	4	S.BARRACUDA
508123366102	9	15.0	2	21.30	5	34.44	2	7S	06/23/77	27.0	09.0	09.0	20	S.BARRACUDA
508123366102	2	65.48	2	0.0	0	0	0	3S	06/28/77	33.1	16.0	16.0	5	S.BARRACUDA
508123366102	1	56.0	1	0.0	0	0	1	5S	06/28/77	32.4	14.0	14.0	10	S.BARRACUDA
508123366102	16	18.76	11	57.74	4	175.0	1	7S	06/28/77	29.8	29.2	29.2	20	S.BARRACUDA
508123366102	6	17.27	4	54.0	1	65.0	1	9S	06/28/77	29.8	31.0	31.0	16	S.BARRACUDA
508123366102	1	54.0	1	0.0	0	0	0	2S	07/06/77	29.7	09.5	09.5	4	S.BARRACUDA
508123366102	1	86.0	1	0.0	0	0	0	4S	07/06/77	31.5	02.0	02.0	9	S.BARRACUDA
508123366102	1	78.0	1	0.0	0	0	0	5S	07/06/77	32.7	08.0	08.0	11	S.BARRACUDA
508123366102	4	17.22	3	26.17	3	47.78	3	7S	07/06/77	32.8	23.5	23.5	14	S.BARRACUDA
508123366102	1	94.0	1	0.0	0	0	0	9S	07/07/77	29.8	23.5	23.5	11	S.BARRACUDA
508123366102	1	115.0	1	0.0	0	0	0	1S	07/07/77	30.2	33.5	33.5	4	S.BARRACUDA

PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77												08/15/78				
GENUS-SPECIES TOTAL TAXON NUMBER	SIZE IN.	NO.IND. TND	SIZE IN.	NO.IND. CLASSI	SIZE IN.	NO.IND. CLASSII	STATION CLASSII	DATE CLASSIII	TEMP MO.DAY.YR	SAL C	SAL TOP	NO. OF GENUS INITIAL AND SPECIES SPECIE NAME				
508123368102	2	55	57	2	0	0	0	0	0	45	07/12/77	31.9	04.5	04.5	9	S. BARRACUDA
508123368102	22	17	23	12	26	33	4	38.51	4	75	07/12/77	32.4	21.5	21.5	10	S. BARRACUDA
508123368102	29	19	24	28	38	0	1	0	0	95	07/13/77	32.2	30.0	30.0	16	S. BARRACUDA
508123368102	1	94	0	1	0	0	0	0	0	45	08/16/77	30.8	11.8	00.0	5	S. BARRACUDA
508123368102	2	14	0	1	31	0	1	0	0	75	08/16/77	32.2	31.0	00.0	11	S. BARRACUDA
508123368102	4	17	0	1	21	28	2	43.7	1	95	08/16/77	31.8	34.5	00.0	16	S. BARRACUDA
508123368102	1	17	0	1	0	0	0	0	0	105	08/16/77	32.2	33.0	33.0	10	S. BARRACUDA
508123428101	1	23	0	1	0	0	0	0	0	105	06/15/77	33.0	35.0	35.0	10	D. CROSSLATUS
508123441007	1	36	0	1	0	0	0	0	0	75	07/06/77	32.8	23.5	23.5	14	L. NUCHIPINNUS
508123441007	1	71	0	1	0	0	0	0	0	45	07/07/77	29.8	23.5	23.5	11	L. NUCHIPINNUS
508123568403	1	49	0	1	0	0	0	0	0	45	07/04/77	30.4	02.2	00.0	16	R. SORPATOR
508123568403	1	57	0	1	0	0	0	0	0	75	07/12/77	32.4	21.5	21.5	10	R. SORPATOR
508123568403	4	11	0	1	44	0	1	54.67	2	95	07/13/77	32.2	30.0	30.0	16	R. SORPATOR
508123568400	1	22	0	1	0	0	0	0	0	45	07/12/77	31.9	04.5	04.5	9	G. GORDONILLUS SP.
508123561401	6	21	30	6	0	0	0	0	0	85	06/15/77	31.8	35.0	35.0	10	G. GOLFOSONA
508123561401	2	22	0	1	28	0	1	0	0	95	06/15/77	32.0	27.0	27.0	17	G. GOLFOSONA
508123561401	1	26	0	1	0	0	0	0	0	35	06/28/77	32.2	01.8	00.0	6	G. GOLFOSONA
508123561401	7	15	20	7	0	0	0	0	0	95	06/28/77	29.8	31.3	31.3	16	G. GOLFOSONA
508123561401	12	18	32	12	0	0	0	0	0	95	07/07/77	29.8	23.5	23.5	11	G. GOLFOSONA
508123561401	3	11	0	2	16	0	1	0	0	85	07/13/77	31.8	30.5	30.5	12	G. GOLFOSONA
508123561401	1	11	0	1	0	0	0	0	0	95	07/13/77	32.2	30.0	30.0	16	G. GOLFOSONA
508123561401	2	22	24	2	0	0	0	0	0	85	08/16/77	31.4	35.0	00.0	17	G. GOLFOSONA
508123561401	3	24	0	1	25	0	1	29.0	1	95	08/16/77	31.8	34.5	00.0	16	G. GOLFOSONA
508123561501	2	19	21	2	0	0	0	0	0	45	07/16/77	32.0	26.0	00.0	10	G. ROSCI
508123561501	2	19	25	2	0	0	0	0	0	2T	06/21/77	30.1	19.5	00.0	12	G. ROSCI
508123561501	3	15	0	1	17	0	1	22.0	1	35	06/28/77	32.2	01.8	00.0	6	G. ROSCI
508123561501	1	20	0	1	0	0	0	0	0	55	06/28/77	32.4	14.0	14.0	10	G. ROSCI
508123561501	1	72	0	1	0	0	0	0	0	45	07/06/77	30.9	02.2	00.0	16	G. ROSCI
508123561501	2	16	0	1	21	0	1	0	0	35	07/12/77	30.8	03.0	00.0	6	G. ROSCI
508123561501	7	4	14	7	0	0	0	0	0	45	07/12/77	31.8	04.5	04.5	9	G. ROSCI
508123561501	1	23	0	1	0	0	0	0	0	85	08/16/77	31.4	35.0	00.0	17	G. ROSCI
508123562302	7	11	19	7	0	0	0	0	0	45	07/12/77	31.9	04.5	04.5	9	M. ALIOSUS
508123562304	1	26	0	1	0	0	0	0	0	45	07/12/77	31.2	14.5	26.0	0	M. THALASSINUS
508123610703	1	34	0	1	0	0	0	0	0	105	06/15/77	33.0	35.0	35.0	10	S. MACULATUS
508123678409	1	37	0	1	0	0	0	0	0	95	06/15/77	32.0	27.0	27.0	17	S. GRANDICORNIS
508123678409	1	25	0	1	0	0	0	0	0	95	06/28/77	29.8	31.3	31.3	16	S. GRANDICORNIS
508123678412	1	38	0	1	0	0	0	0	0	95	07/07/77	29.8	23.5	23.5	11	S. PLUMIFERI
508123681300	2	32	37	2	0	0	0	0	0	7T	07/01/77	29.4	30.5	30.5	6	SPATONOTUS JUV.
508124011406	1	73	0	1	0	0	0	0	0	95	06/15/77	32.0	27.0	27.0	17	C. SPILOPTERUS
508124011406	3	55	0	3	68	0	1	65.0	1	3T	06/15/77	31.8	21.0	00.0	15	C. SPILOPTERUS
508124011406	4	57	58	2	70	83	2	0	0	2T	06/21/77	30.1	19.5	00.0	12	C. SPILOPTERUS
508124011406	1	61	0	1	0	0	0	0	0	6T	06/22/77	29.8	24.0	29.0	3	C. SPILOPTERUS
508124011406	1	92	0	1	0	0	0	0	0	95	06/28/77	29.8	31.3	31.3	16	C. SPILOPTERUS
508124011406	7	48	52	2	42	67	3	80.17	2	2T	06/30/77	30.8	14.8	00.0	16	C. SPILOPTERUS
508124011406	6	48	55	3	59	63	1	71.72	2	3T	06/30/77	31.0	02.0	00.0	22	C. SPILOPTERUS
508124011406	7	62	64	2	73	74	2	78.85	2	4T	06/30/77	30.2	03.8	00.0	13	C. SPILOPTERUS
508124011406	1	42	0	1	0	0	0	0	0	7T	07/01/77	29.4	30.5	30.5	6	C. SPILOPTERUS
508124011406	3	55	0	1	44	0	1	115.0	1	4T	07/06/77	30.8	02.2	00.0	16	C. SPILOPTERUS
508124011406	2	71	0	1	42	0	1	0	0	5T	07/06/77	31.4	08.5	00.0	6	C. SPILOPTERUS
508124011406	8	43	48	2	71	41	6	0	0	6T	07/06/77	31.3	14.0	26.3	10	C. SPILOPTERUS
508124011406	4	52	0	1	73	75	2	85.0	1	4T	07/12/77	31.0	04.0	00.0	15	C. SPILOPTERUS
508124011406	1	51	0	1	0	0	0	0	0	5T	07/12/77	32.0	10.5	00.0	11	C. SPILOPTERUS
508124011401	1	29	0	1	0	0	0	0	0	7T	06/30/77	31.0	02.0	00.0	22	A. LINEATUS
508124011401	2	21	0	1	42	0	1	0	0	3T	07/12/77	30.8	03.0	00.0	12	A. LINEATUS

PAGE 16 GENUS-SPECIE TAXON NUMBER	PHYLOGENETIC SORT OF ST. LUCIE FISH FAUNA BY DATE 6/15/77 - 8/16/77												08/15/78			
	TOTAL IND	SIZE NU.	IND	SIZE NU.	IND	SIZE NU.	IND	STATION CLASSIFI	DATE MO. DAY YEAR	TEMP C	SAL TOP	SAL C	NO. OF GENUS SPECIE INITIAL AND NAME			
50812403101	1	29	0	1	0	0	0	0	0	11	08/16/77	29.4	03.5	00.0	13 A.ATINATUS	
50812403102	2	88	0	1	92	0	1	0	0	0	3T	06/30/77	31.0	02.0	00.0	22 T.MACULATUS
50812403103	2	88	0	1	98	0	3	0	0	0	3T	07/12/77	30.8	03.0	00.0	12 T.MACULATUS
50812404109	1	73	0	1	0	0	0	0	0	0	3T	06/16/77	31.8	21.0	00.0	15 S.PLAGIUSA
50812404109	3	58	0	1	73	0	1	98	0	1	3T	06/30/77	31.0	02.0	00.0	22 S.PLAGIUSA
50812404109	1	62	0	1	0	0	0	0	0	0	4T	06/30/77	30.2	03.8	00.0	13 S.PLAGIUSA
50812404109	1	10	0	1	0	0	0	0	0	0	10S	08/16/77	32.2	13.0	33.0	10 S.PLAGIUSA
508125029500	1	27	0	1	0	0	0	0	0	0	8S	07/13/77	31.8	30.5	30.5	12 MONACANTHUS SP.
508125029500	1	12	0	1	0	0	0	0	0	0	7S	08/16/77	32.2	31.0	31.0	11 M.HISPIDUS
508125029500	1	48	0	1	0	0	0	0	0	0	7T	08/16/77	30.2	32.0	00.0	6 M.HISPIDUS
508125029500	1	12	0	1	0	0	0	0	0	0	10S	08/16/77	32.2	33.0	33.0	10 MONACANTHUS SP?
50812503105	1	13	0	1	0	0	0	0	0	0	7S	06/23/77	27.0	09.0	09.0	20 L.TRIOUFTER
50812503105	2	17	0	1	24	0	1	0	0	0	7S	07/12/77	32.4	21.5	21.5	10 L.TRIOUFTER
50812503105	1	22	0	1	0	0	0	0	0	0	8S	08/16/77	31.4	35.0	00.0	17 L.TRIOUFTER
50812503105	1	20	0	1	0	0	0	0	0	0	9S	08/16/77	31.8	34.5	00.0	16 L.TRIOUFTER
508125040300	1	11	0	1	0	0	0	0	0	0	9S	06/15/77	32.0	27.0	27.0	17 SPHOEROTIDES SP.
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50812504100	1	16	0	1	0	0	0	0	0	0	7S	07/06/77	32.8	23.5	23.5	14 CHILOMYCTERUS SP.
50812504105	1	33	0	1	0	0	0	0	0	0	5S	06/15/77	31.0	27.0	27.0	11 C.SCHAEFFERI
50812504105	1	17	0	1	0	0	0	0	0	0	7S	06/15/77	31.4	34.0	34.0	13 C.SCHAEFFERI
50812504105	1	168	0	1	0	0	0	0	0	0	6T	06/16/77	29.4	28.0	34.0	5 C.SCHAEFFERI
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50812505115	1	27	0	1	0	0	0	0	0	0	7S	06/28/77	29.8	29.2	29.2	20 C.SCHAEFFERI
50812505115	2	32	0	1	48	0	1	0	0	0	7S	07/06/77	32.8	23.5	23.5	14 C.SCHAEFFERI
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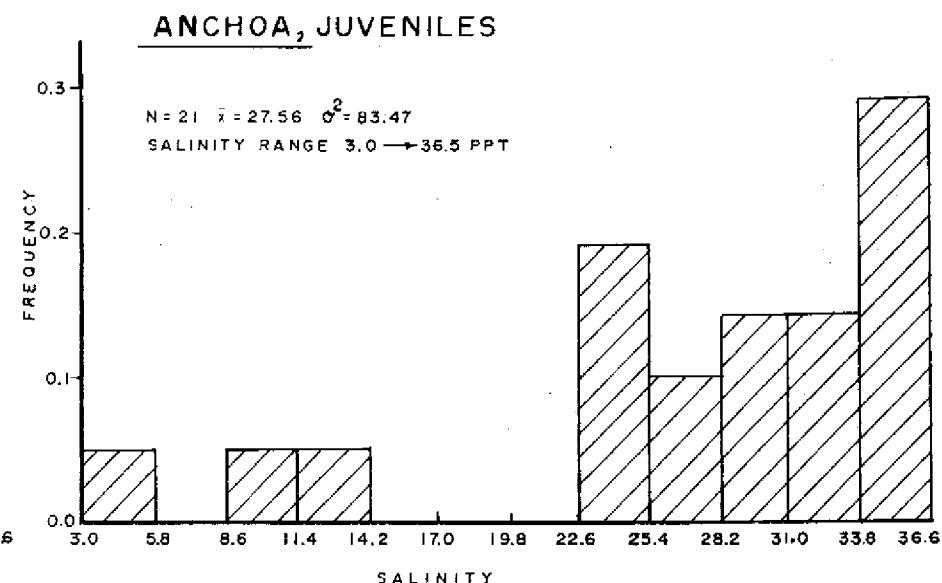
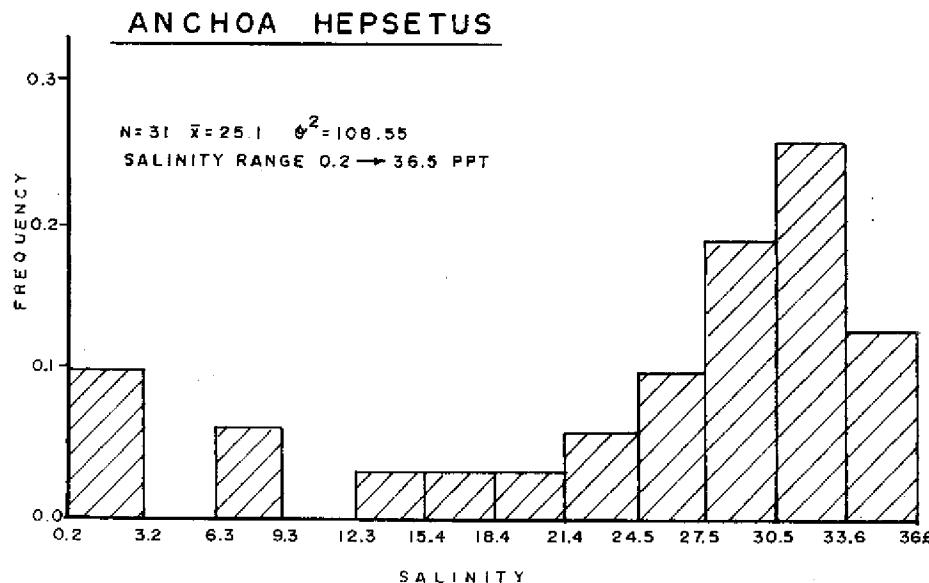
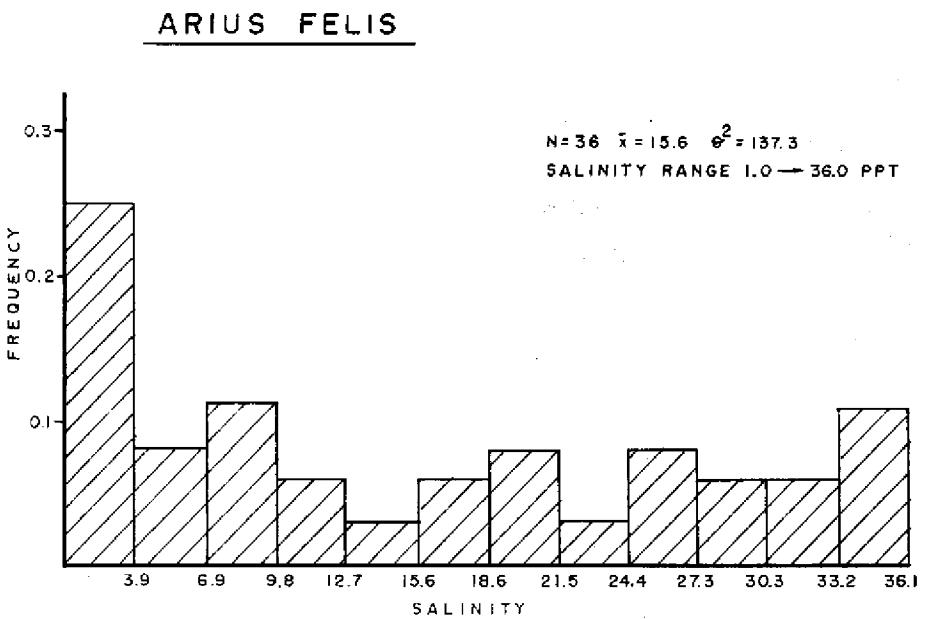
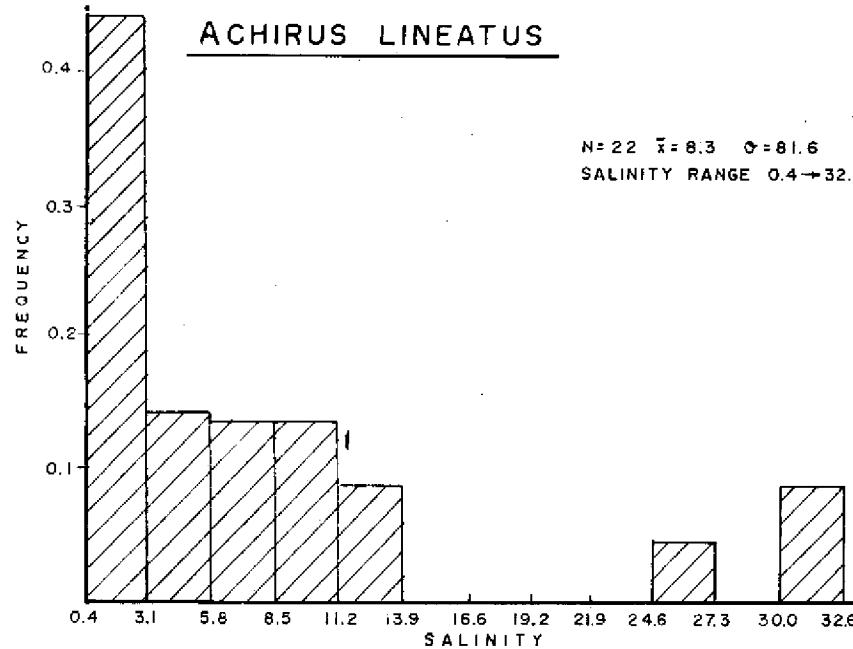
APPENDIX II

FISH HISTOGRAMS FOR BASELINE STUDY

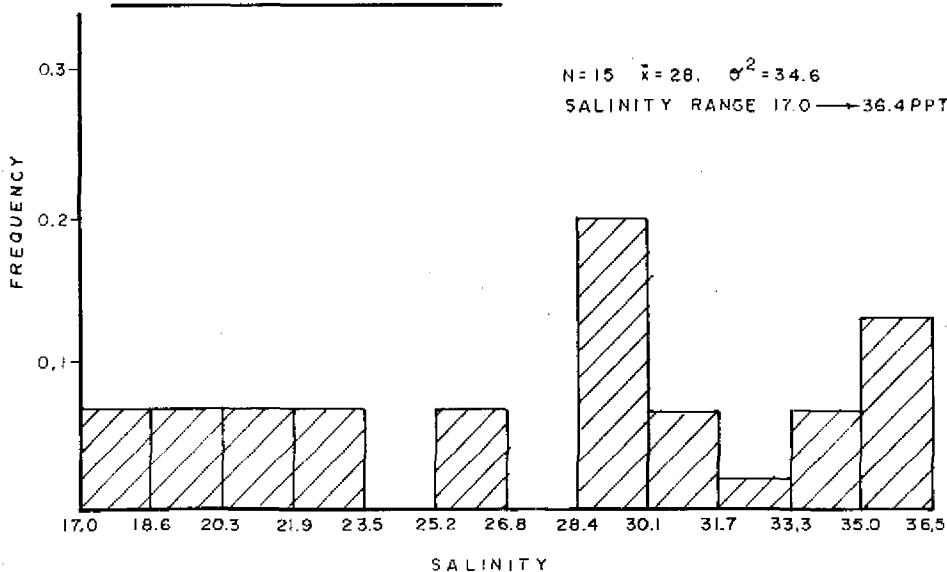
APPENDIX II FISH HISTOGRAMS FOR THE BASELINE STUDY - 1/28/75 - 9/22/76

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I-2	<i>Anchoa hepsetus</i>	I-8	<i>Haemulon parrai</i>
I-2	<i>Anchoa, juv.</i>	I-8	<i>Lagodon rhomboides</i>
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I-3	<i>Anchoa mitchilli</i>	I-8	<i>Lutjanus synagris</i>
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I-4	<i>Bathygobius saporator</i>	I-9	<i>Mugil cephalus</i>
I-4	<i>Caranx hippos</i>	I-9	<i>Mugil curema</i>
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I-5	<i>Chloroscombrus chrysurus</i>	I-11	<i>Sphaeroides testudineus</i>
I-5	<i>Clupeidae, juv.</i>	I-11	<i>Sphyraena barracuda</i>
I-6	<i>Cynoscion nebulosus</i>	I-11	<i>Strongylura marina</i>
I-6	<i>Diapterus olithostomus</i>	I-11	<i>Syngnathus scovelli</i>
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I-7	<i>Eucinostomus gula</i>	I-12	<i>Trachinotus falcatus</i>
I-7	<i>Eucinostomus, juv.</i>		

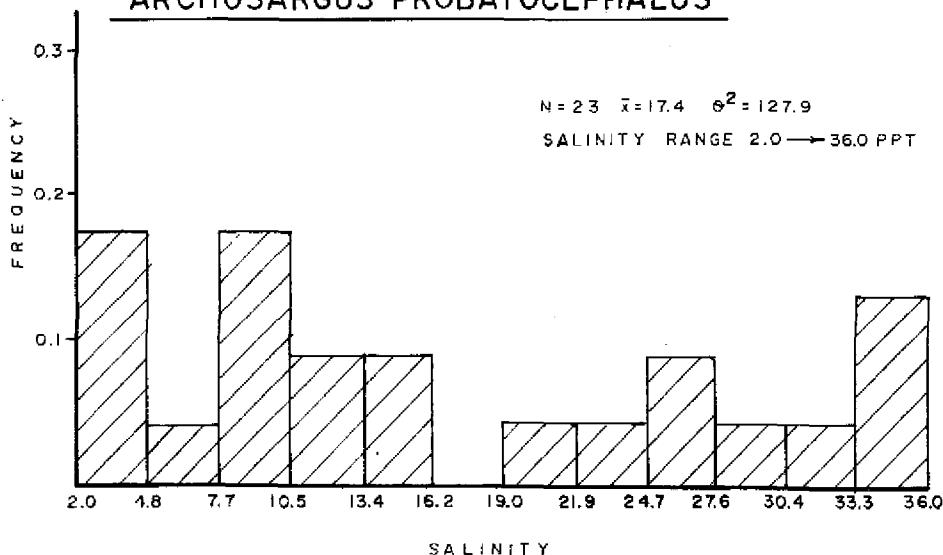


ANCHOA LYOLEPIS

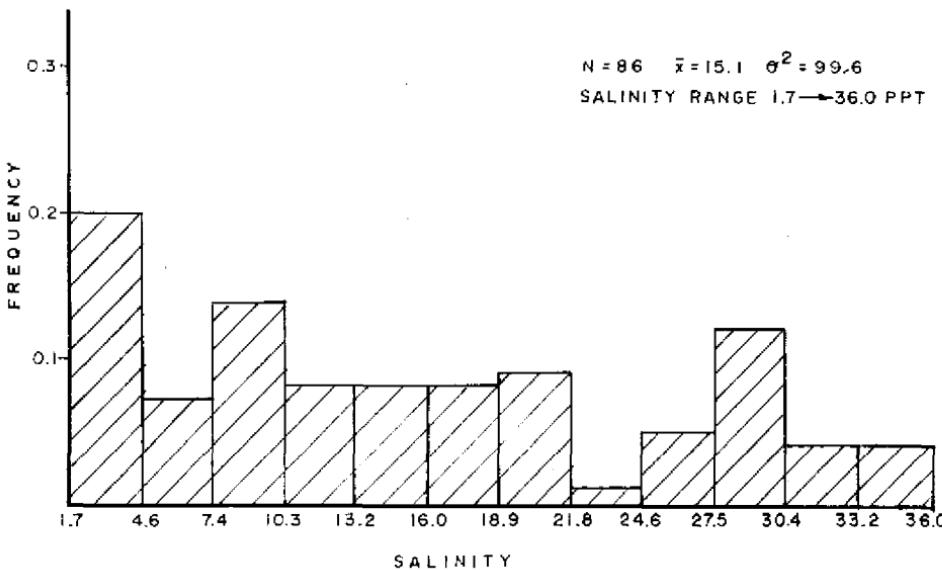


E-II

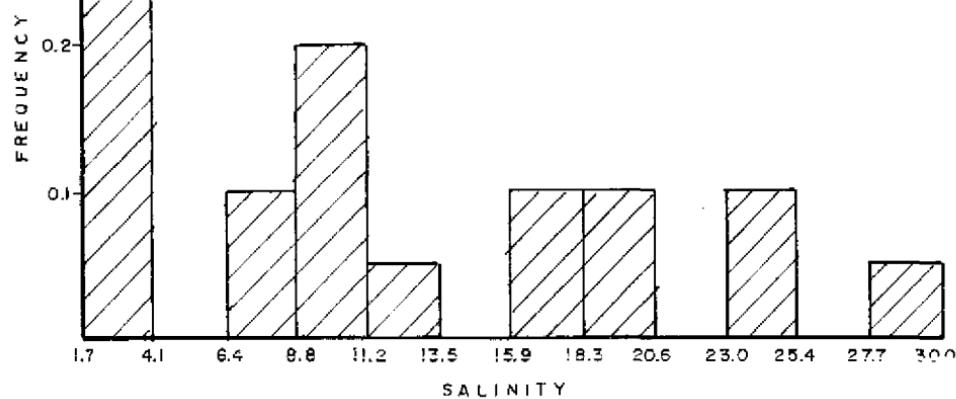
ARCHOSARGUS PROBATOCEPHALUS



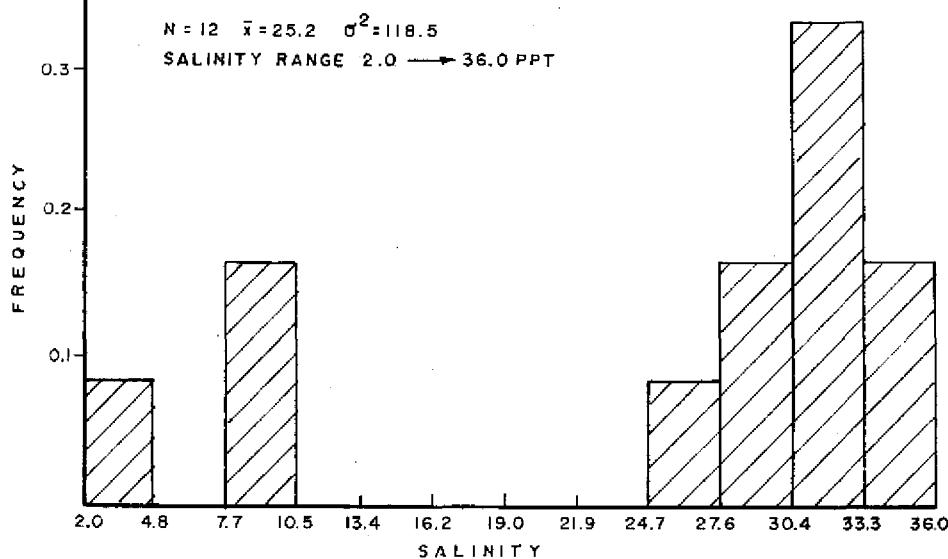
ANCHOA MITCHILLI



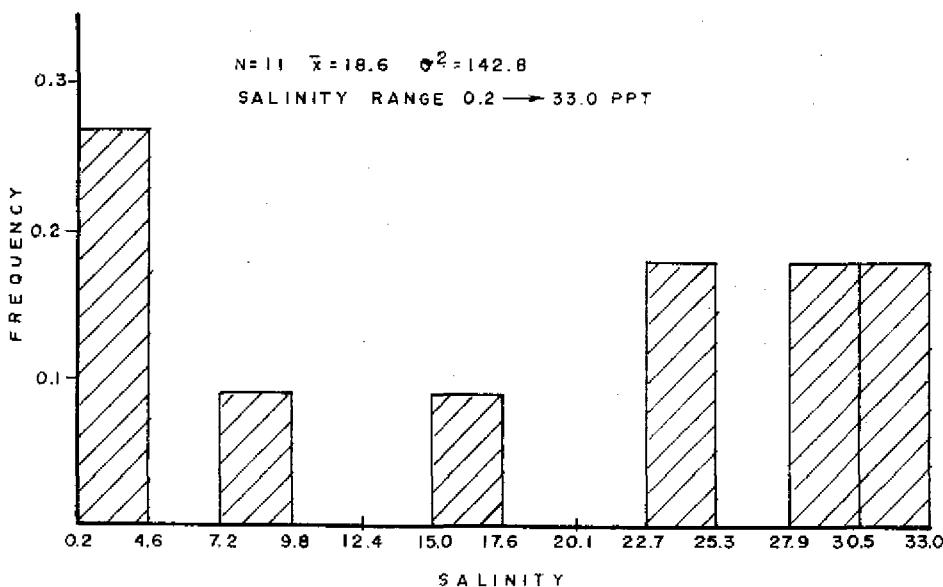
BAIRDIELLA CHRYSURA



BATHYGOBIUS SAPORATOR



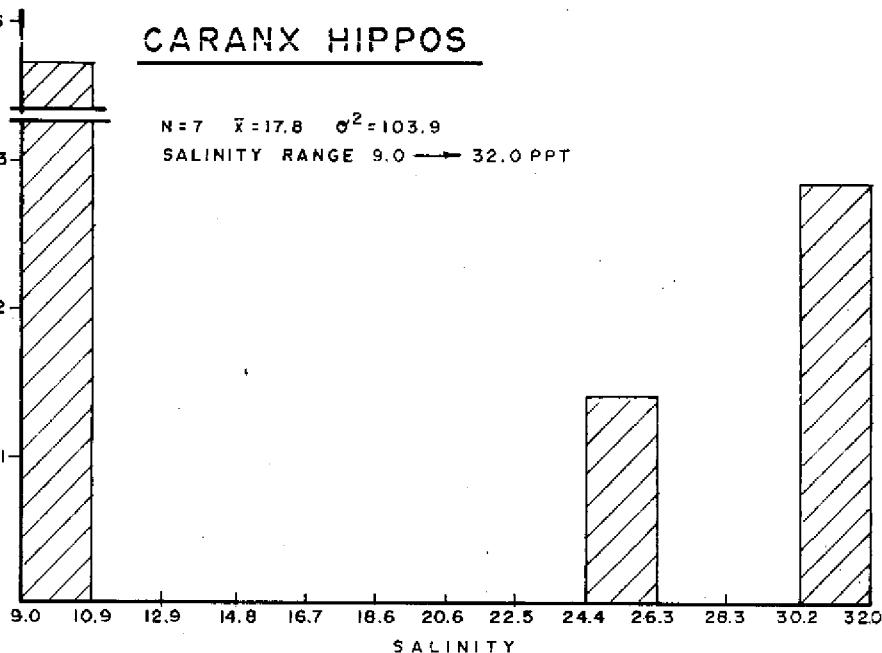
CARANX LATUS



CARANX HIPPOS

N = 7 $\bar{x} = 17.8$ $\sigma^2 = 103.9$
SALINITY RANGE 9.0 → 32.0 PPT

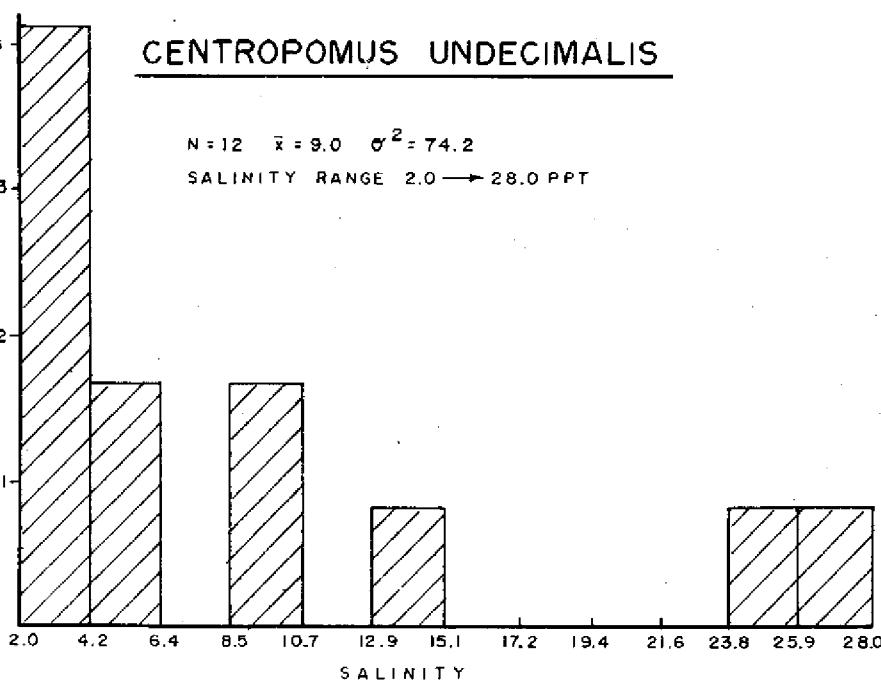
FREQUENCY



CENTROPOMUS UNDECIMALIS

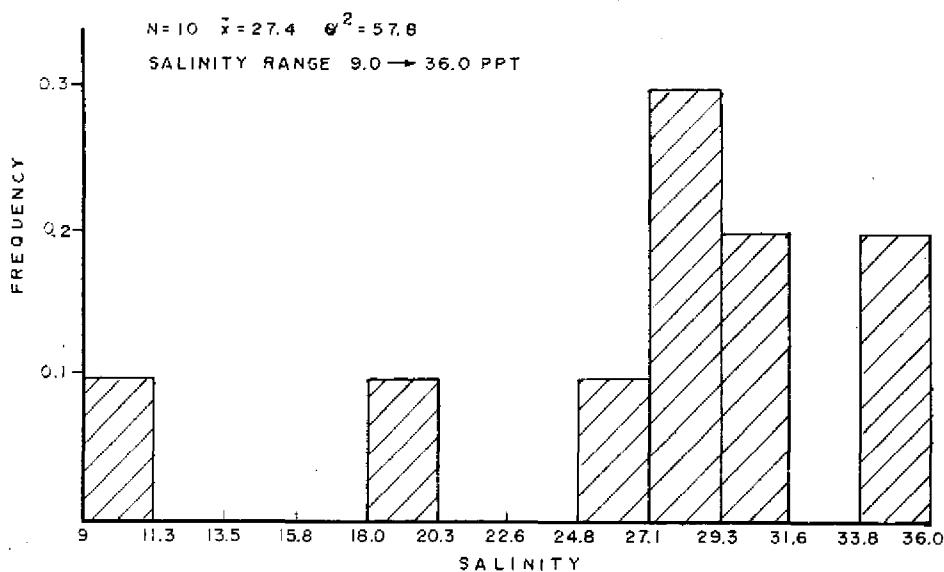
N = 12 $\bar{x} = 9.0$ $\sigma^2 = 74.2$
SALINITY RANGE 2.0 → 28.0 PPT

FREQUENCY

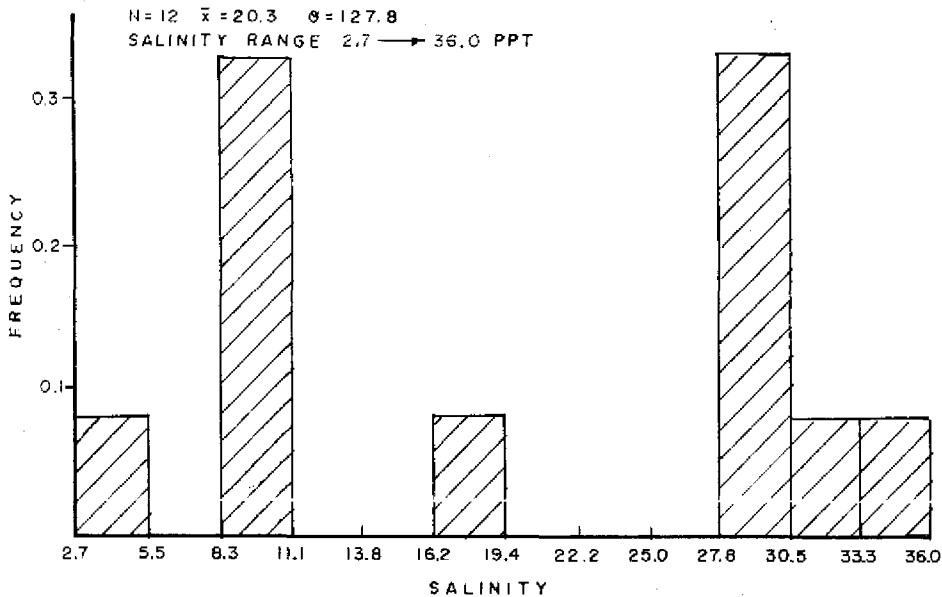


S-II

CHILOMYCTERUS SCHOEPFI



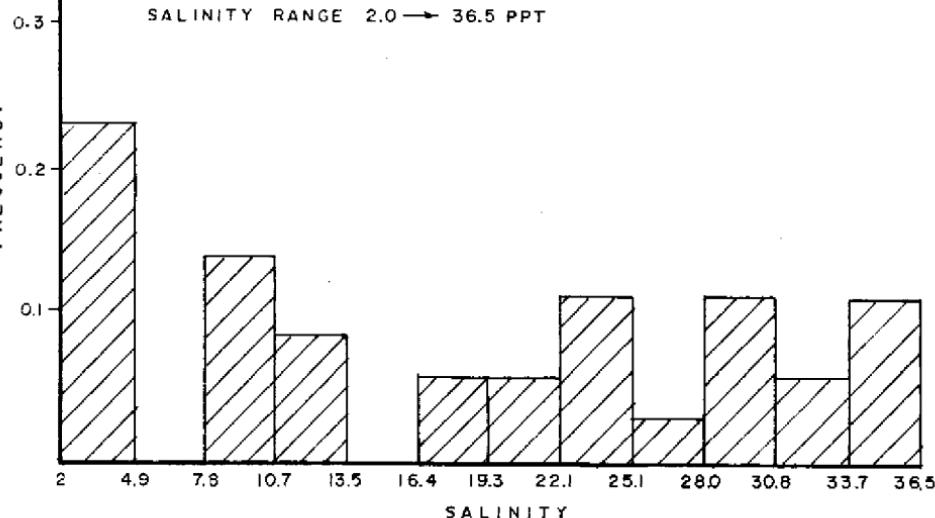
CHLOROSCOMBRUS CHRYSURUS



CITHARICHTHYS SPILOPTERUS

N = 35 $\bar{x} = 17.9$ $\sigma^2 = 142.3$
SALINITY RANGE 2.0 → 36.5 PPT

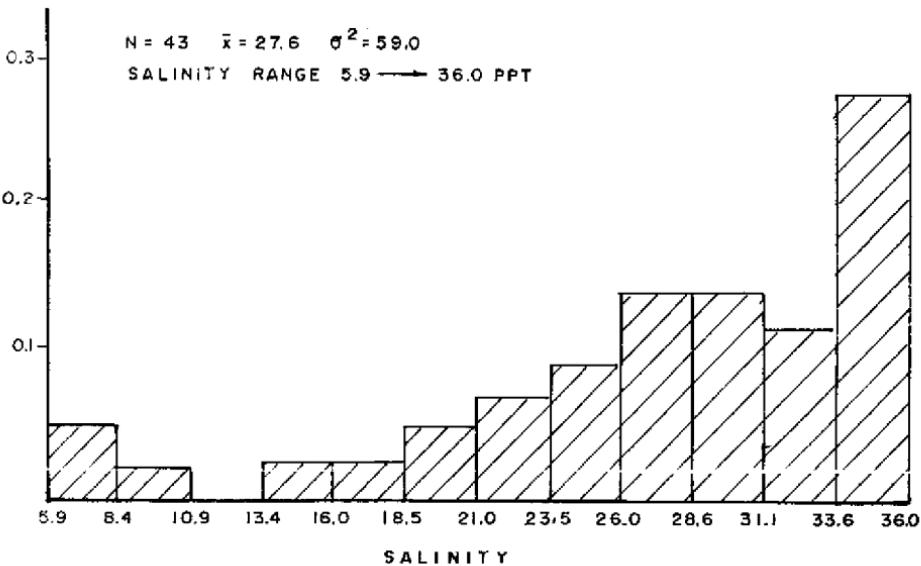
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CLUPEIDAE , JUVENILES

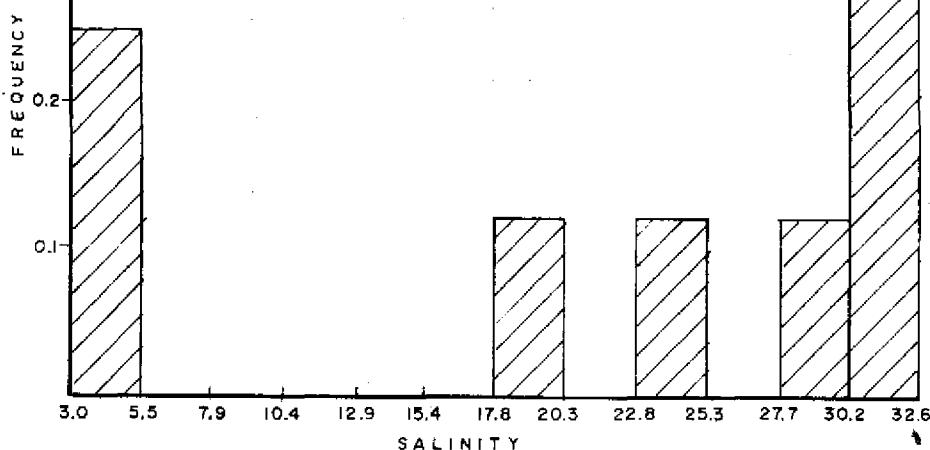
N = 43 $\bar{x} = 27.6$ $\sigma^2 = 59.0$
SALINITY RANGE 5.9 → 36.0 PPT

FREQUENCY



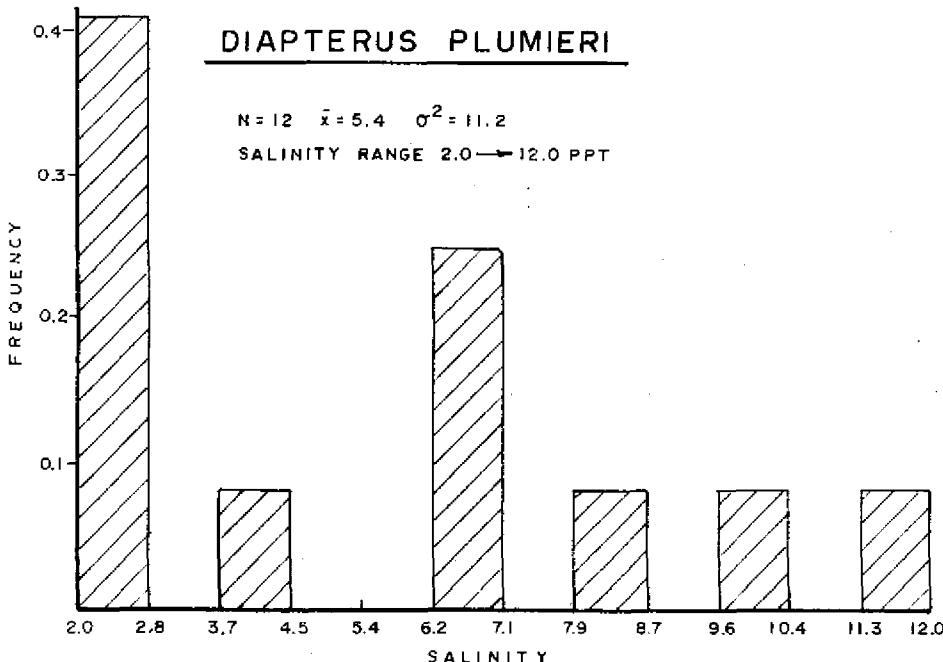
CYNOSCIUS NEBULOSUS

$N=8 \bar{x}=22.1 \sigma^2=137.1$
SALINITY RANGE 3.0 → 32.6 PPT



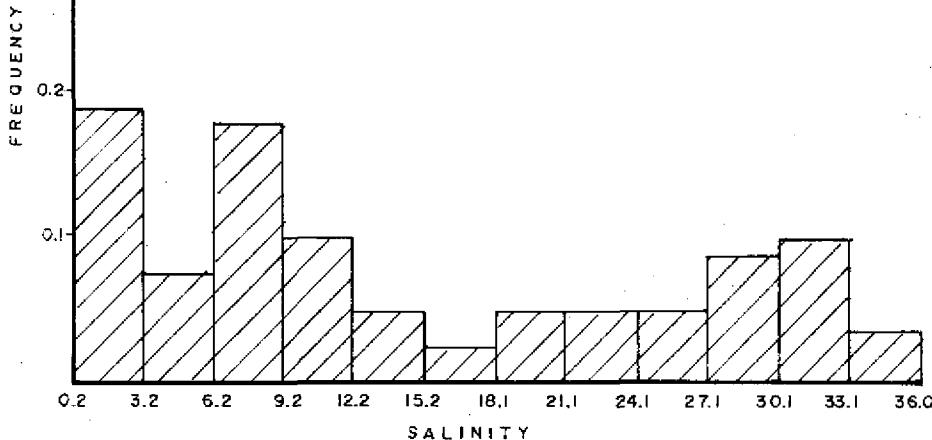
DIAPTERUS PLUMIERI

$N=12 \bar{x}=5.4 \sigma^2=11.2$
SALINITY RANGE 2.0 → 12.0 PPT



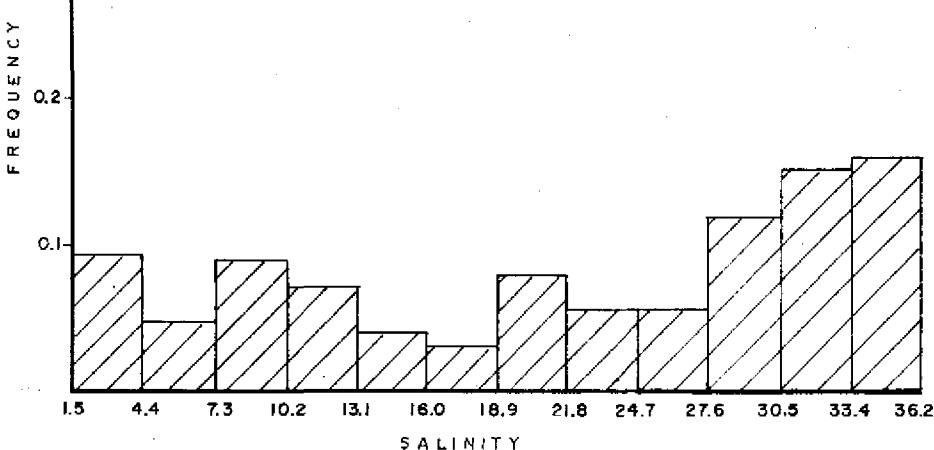
DIAPTERUS OLISTHOSTOMUS

$N = 79 \bar{x} = 15.0 \sigma^2 = 126.3$
SALINITY RANGE 0.2 → 36.0 PPT

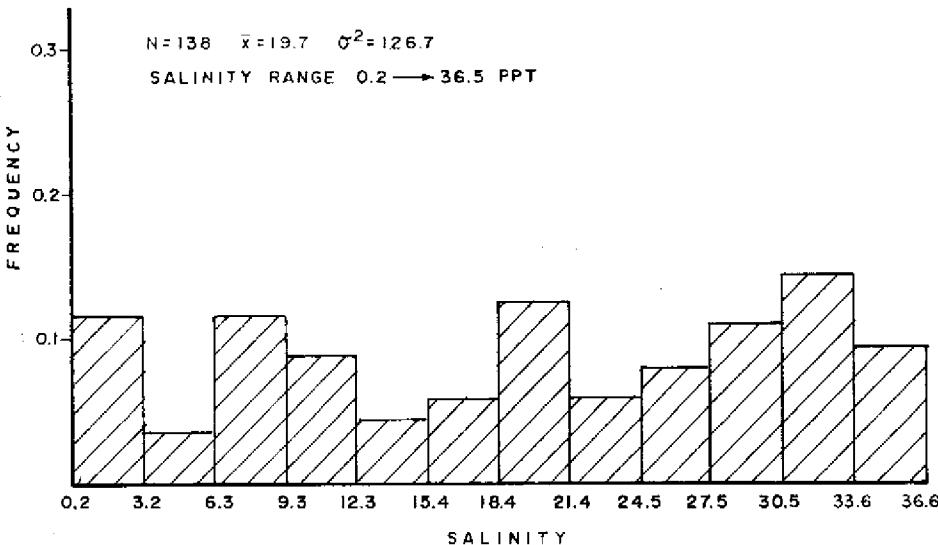


EUCINOSTOMUS · ARGENTEUS

$N = 125 \bar{x} = 21.7 \sigma^2 = 125.7$
SALINITY RANGE 1.5 → 36.2 PPT

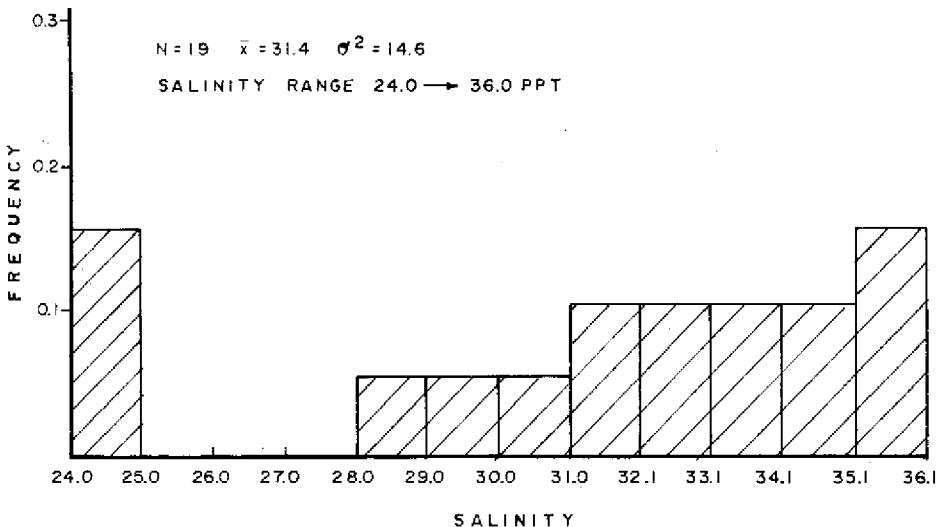


EUCINOSTOMUS GULA

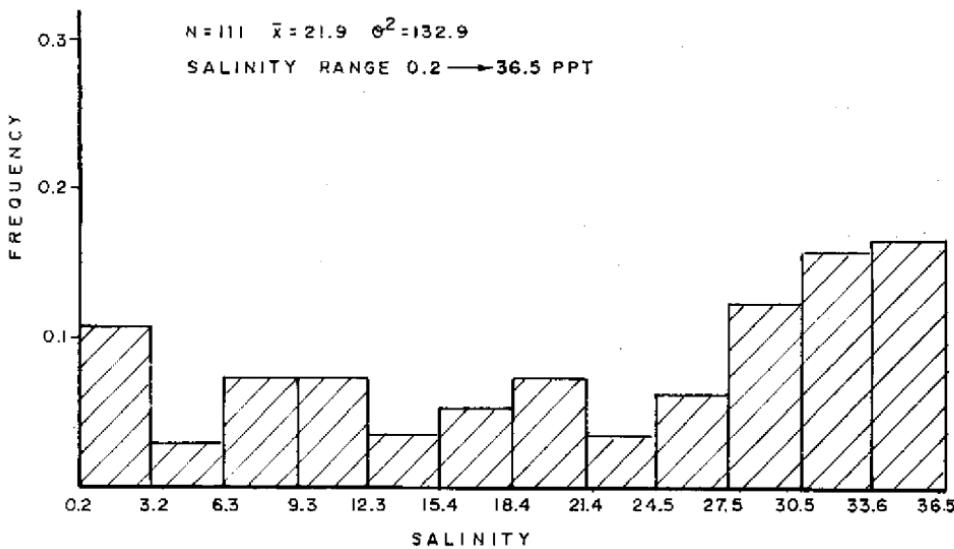


L-II

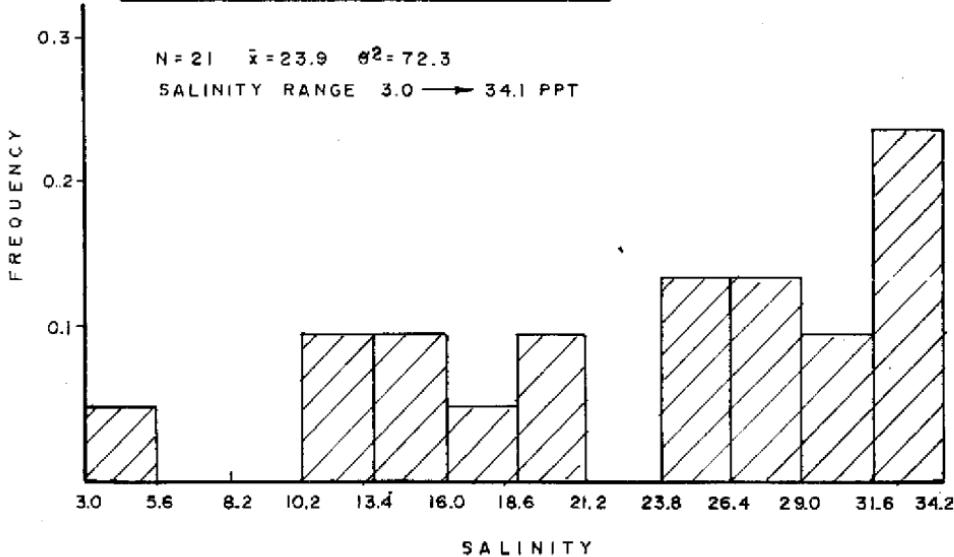
GOBIONELLUS BOLEOSOMA



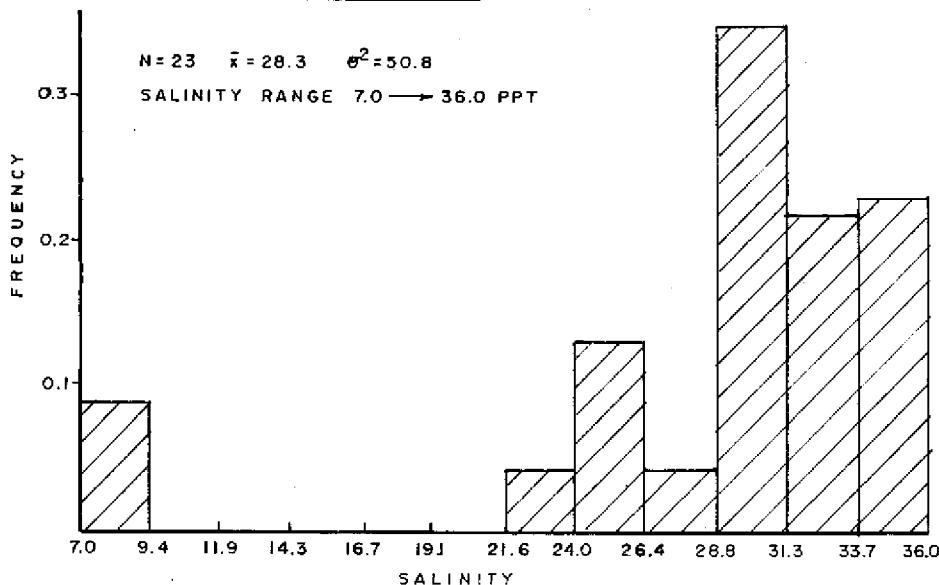
EUCINOSTOMUS, JUVENILES



HARENGLA PENSACOLAE

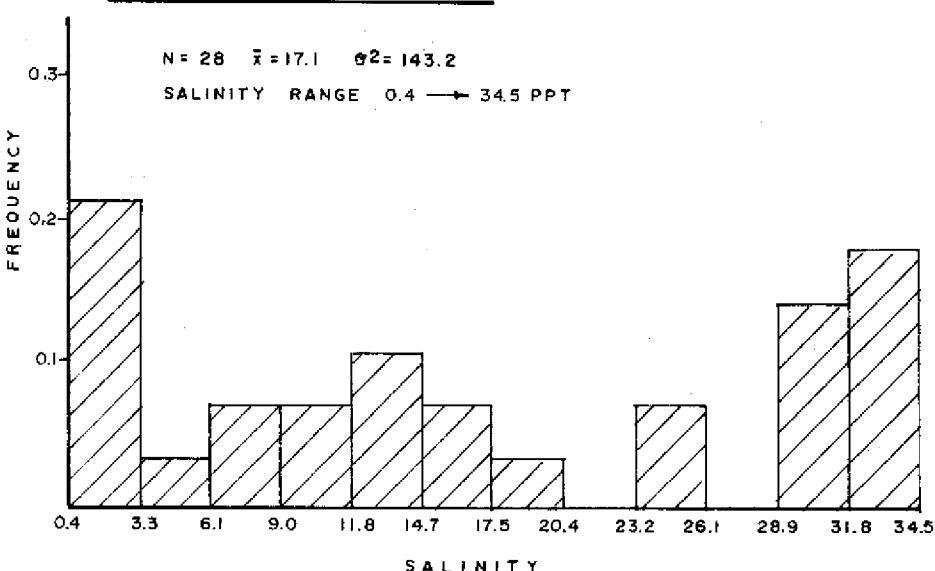


HAEMULON PARRAI



8-II

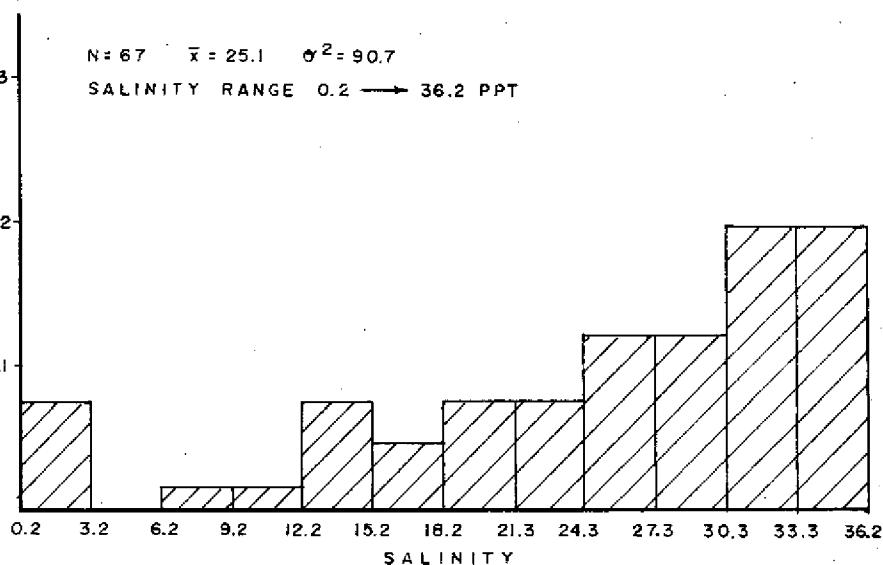
LUTJANUS GRISEUS



LAGODON RHOMBOIDES

N = 67 $\bar{x} = 25.1$ $\sigma^2 = 90.7$
SALINITY RANGE 0.2 → 36.2 PPT

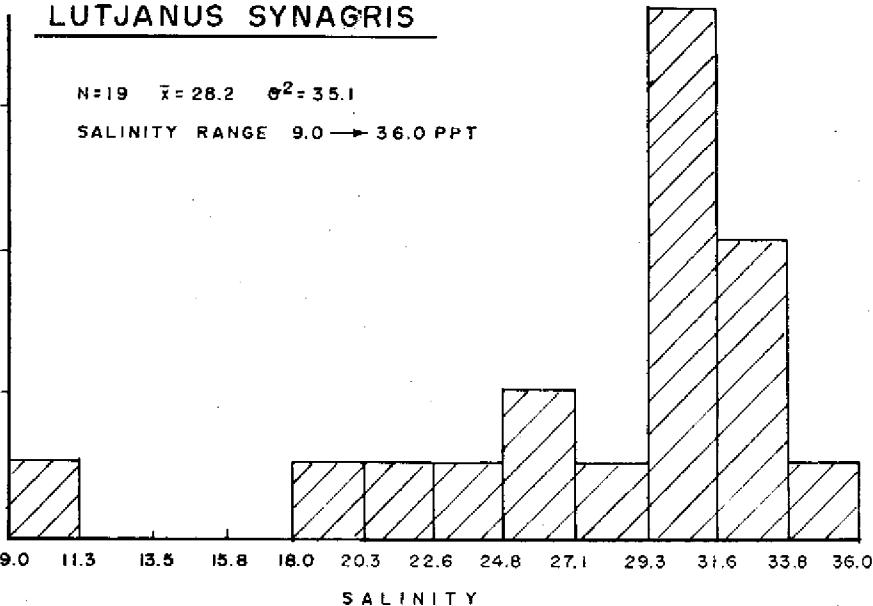
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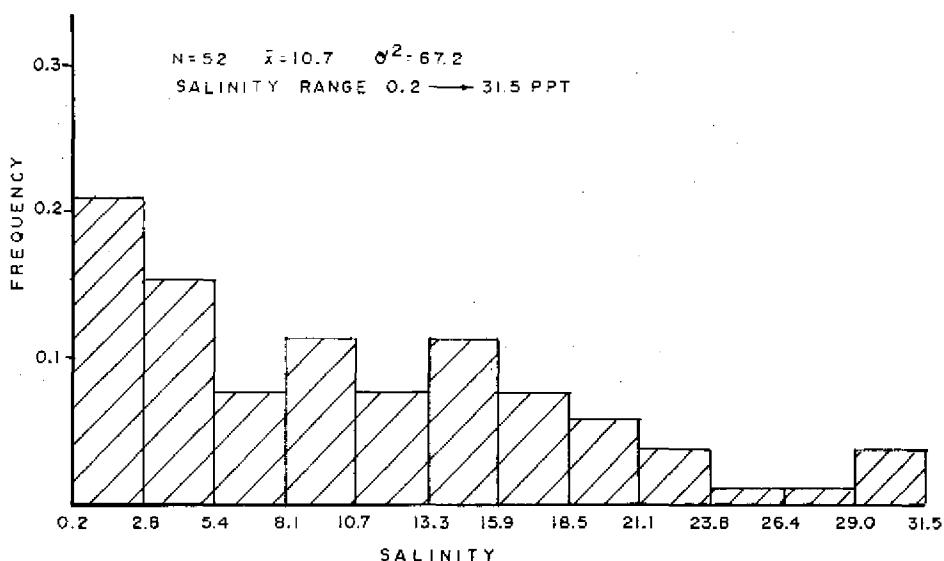
LUTJANUS SYNAGRIS

N = 19 $\bar{x} = 28.2$ $\sigma^2 = 35.1$
SALINITY RANGE 9.0 → 36.0 PPT

FREQUENCY

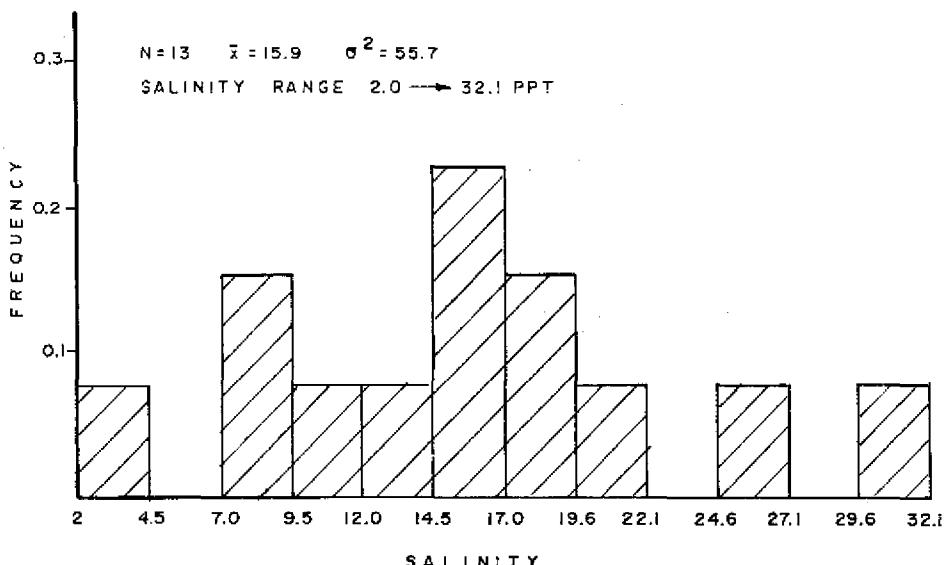


MENIDIA BERYLLINA

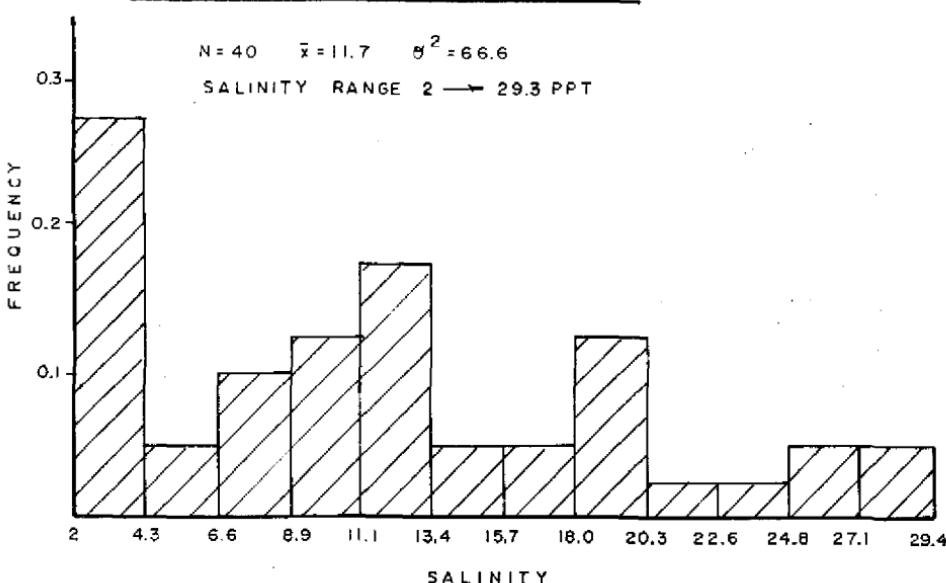


6-II

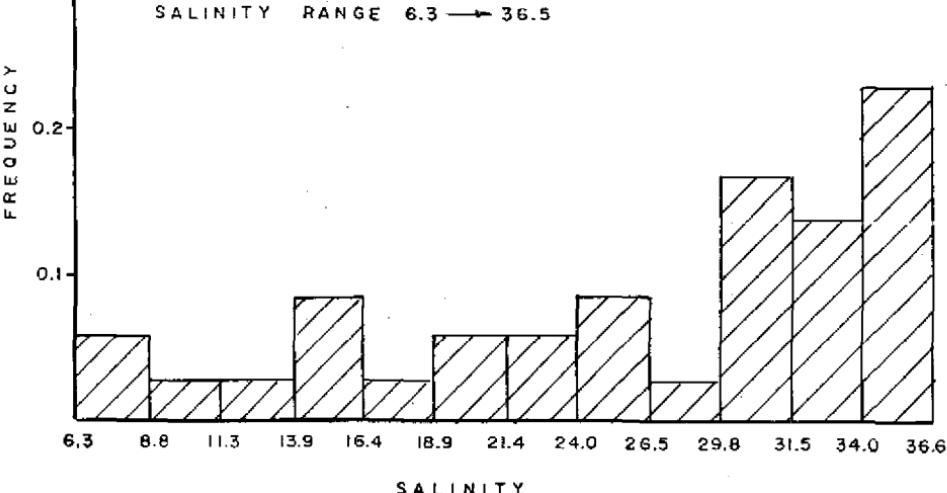
MUGIL CEPHALUS

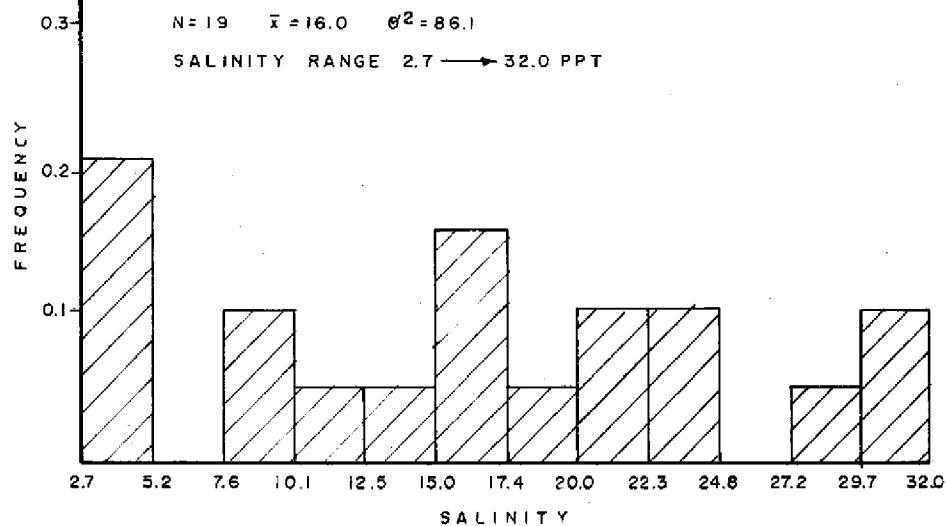
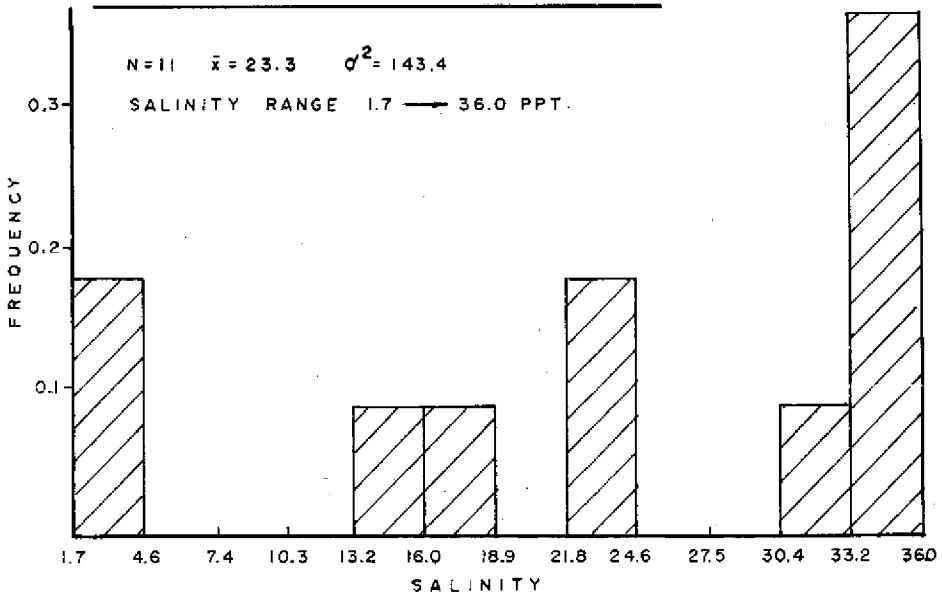
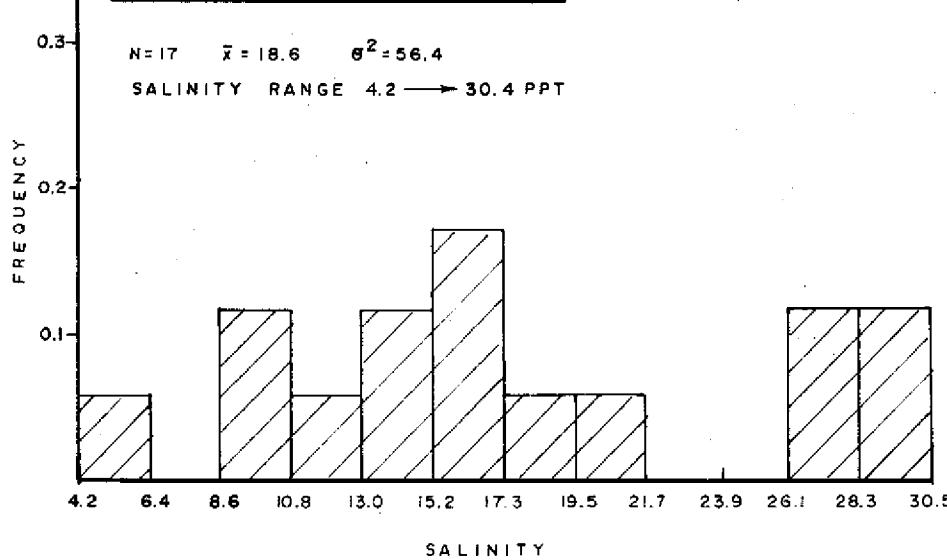
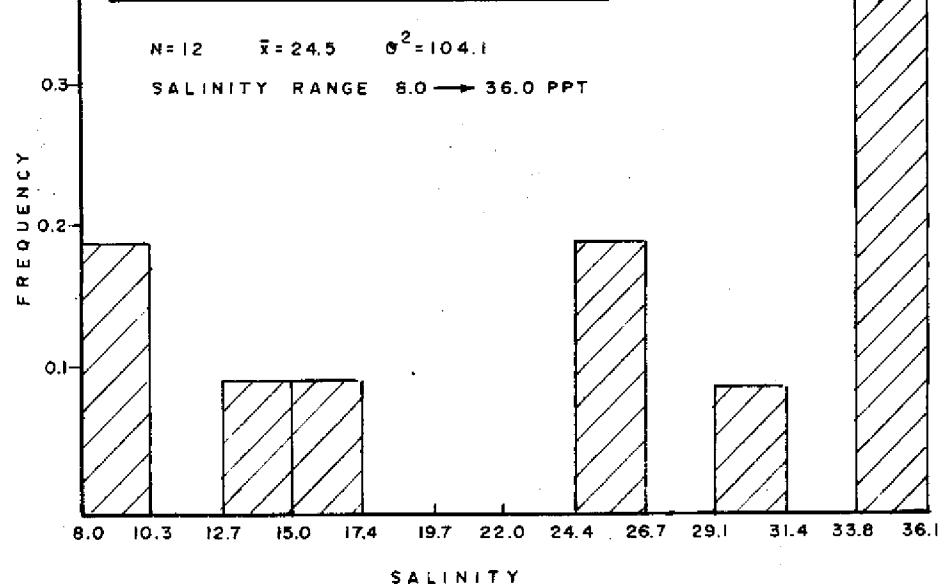


MICROPOGON UNDULATUS

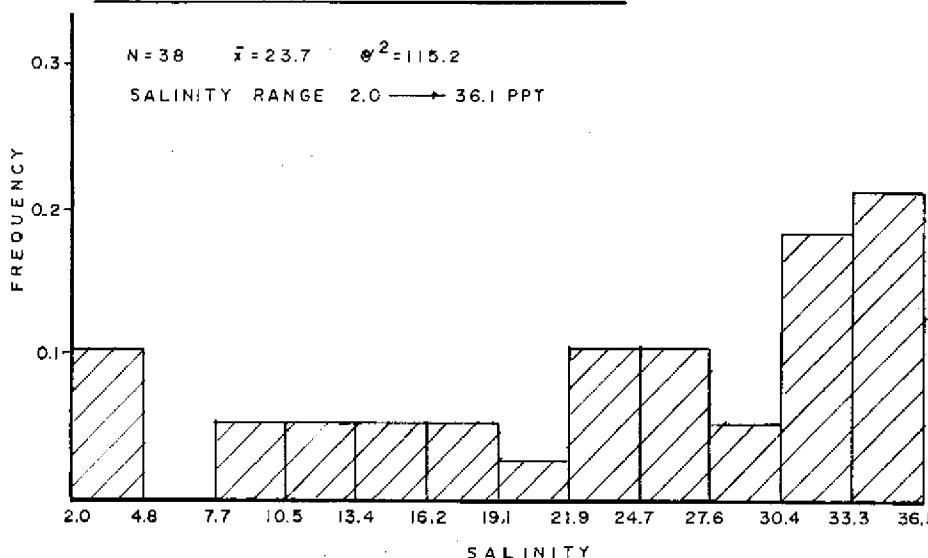


MUGIL CUREMA



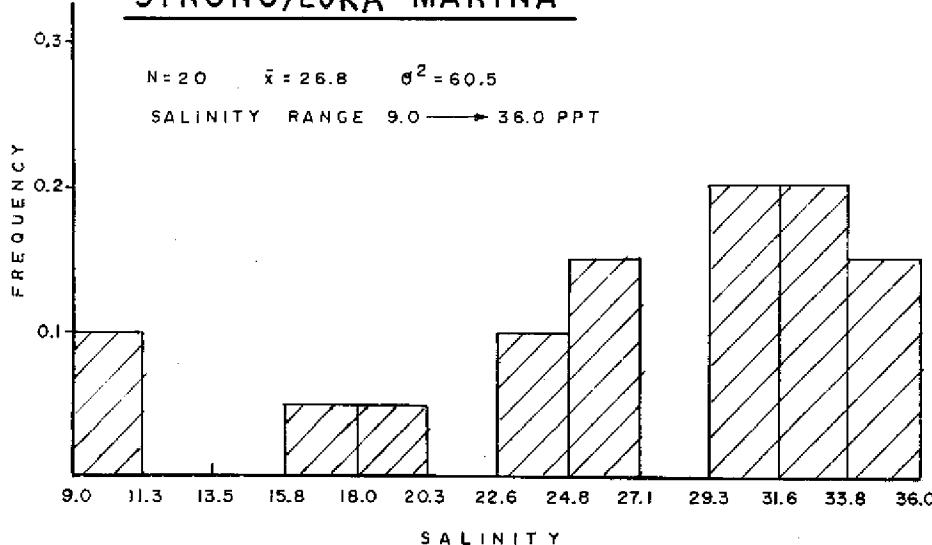
OLIGOPLITES SAURUS**ORTHOGRIPSIS CHRYSOPTERA****SCIAENOPS OCCELLATA****SPHOEROIDES NEPHELUS**

SPHAEROIDES TESTUDINEUS

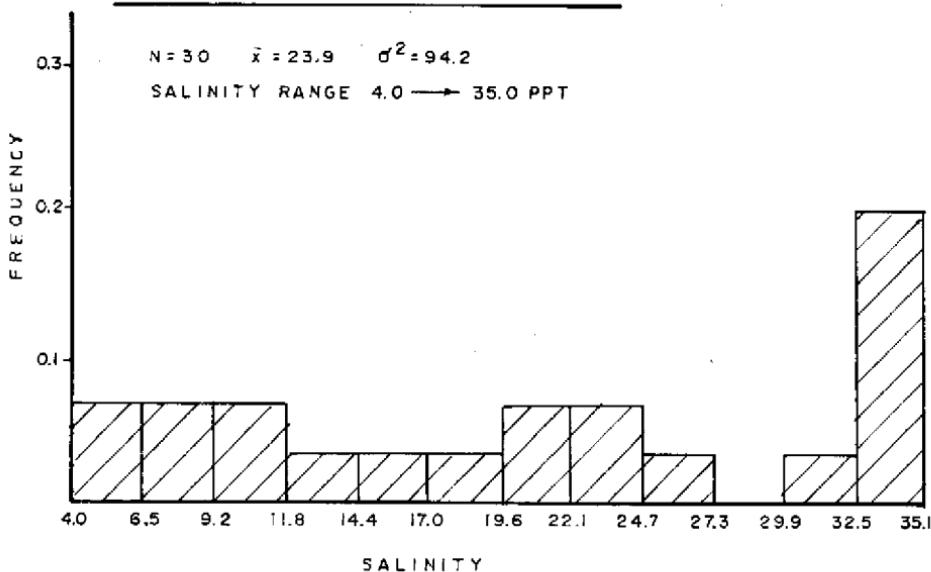


II-II

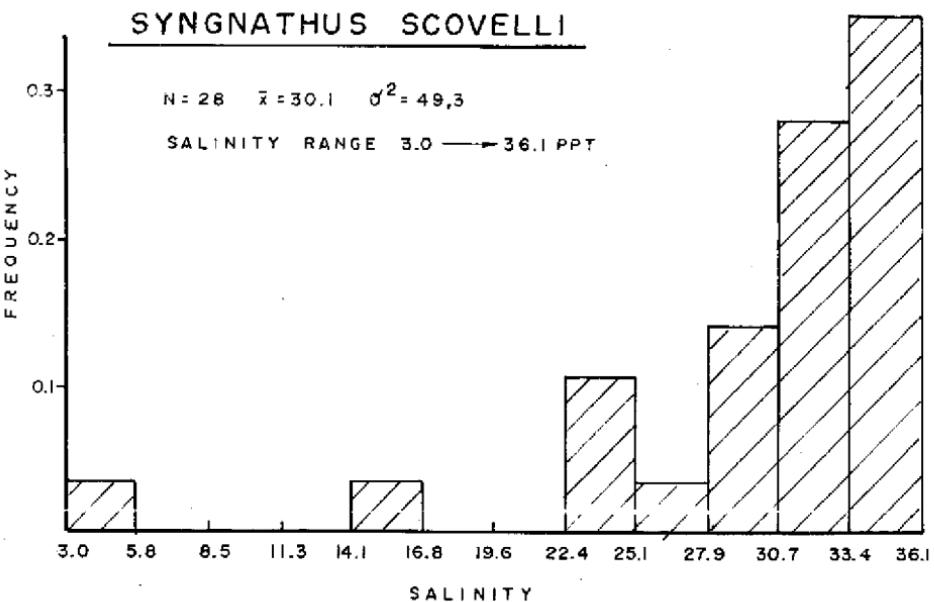
STRONGYLURA MARINA



SPHYRAENA BARRACUDA

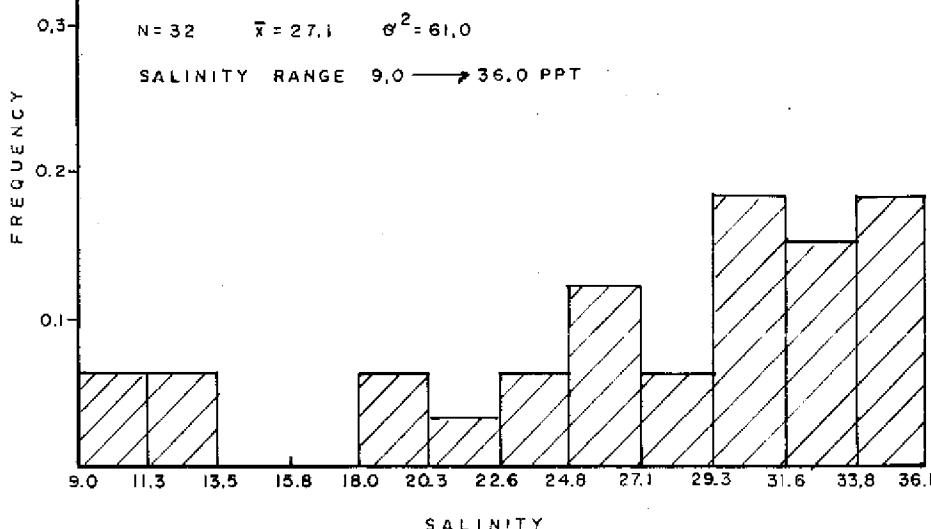


SYNGNATHUS SCOVELLI

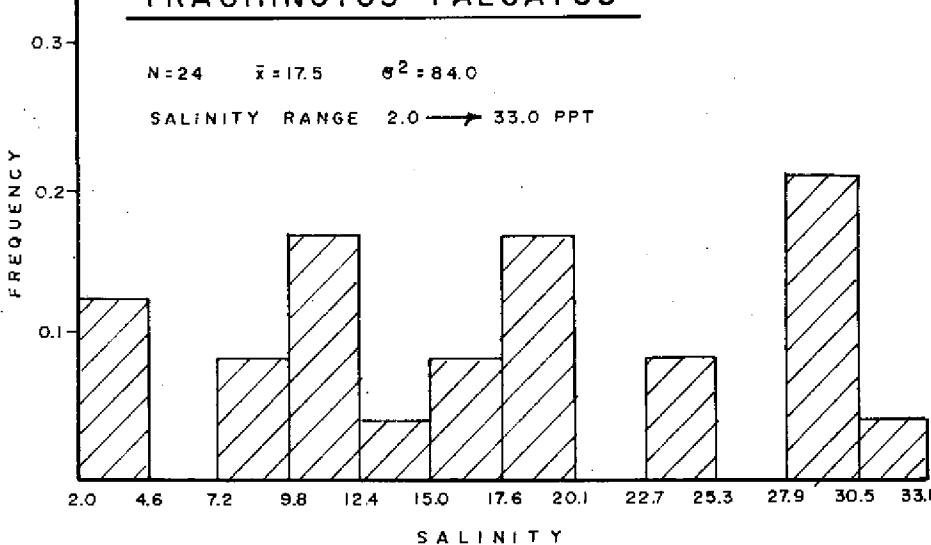


I-1-12

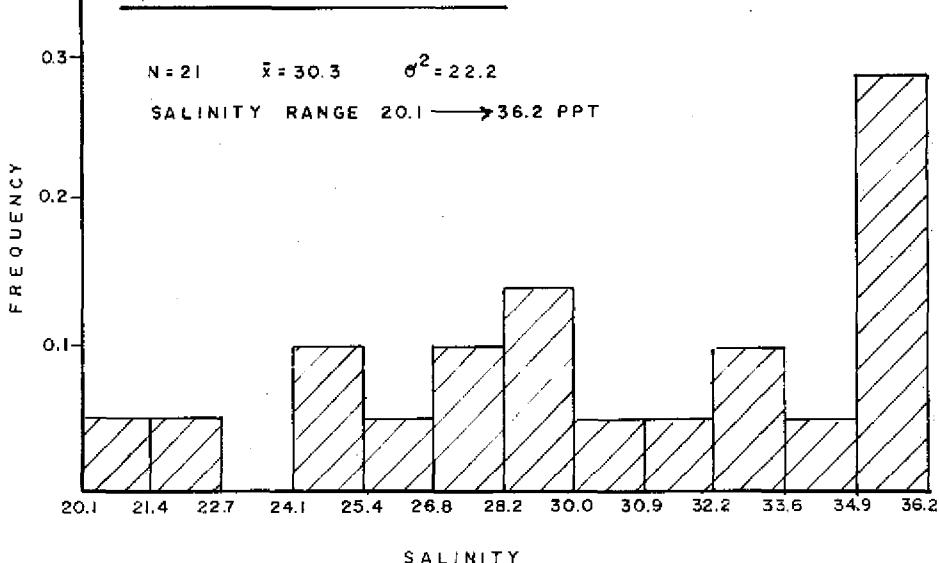
SNYGNATHUS LOUISIANAE



TRACHINOTUS FALCATUS



SYNODUS FOETENS



APPENDIX III

**FISH SPECIES PRESENCE AND SURFACE SALINITY VALUES
FOR THE BASELINE STUDY**

APPENDIX III FISH SPECIES PRESENCE AND SURFACE SALINITY VALUES FOR THE BASELINE STUDY 9-16-75 THROUGH 9-22-76

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II-2	<i>Clupeidae</i> , juveniles	II-7	<i>Cynoscion nothus</i>
II-3	<i>Menidia beryllina</i>	II-7	<i>Sciaenops ocellata</i>
II-3	<i>Lagodon rhomboides</i>	II-8	<i>Trachinotus falcatus</i>
II-3	<i>Dipterus olithostomus</i>	II-8	<i>Arius felis</i>
II-4	<i>Eucinostomus gula</i>	II-8	<i>Haemulon parrae</i>
II-4	<i>Anchoa hepsetus</i>	II-9	<i>Lutjanus synagris</i>
II-4	<i>Harengula pensacolae</i>	II-9	<i>Syngnathus scovelli</i>
II-5	<i>Eucinostomus argenteus</i>	II-9	<i>Orthopristis chrysoptera</i>
II-5	<i>Engraulidae</i> , juveniles	II-10	<i>Citharichthys spilopterus</i>
II-5	<i>Anchoa lyolepis</i>	II-10	<i>Haemulon sciurus</i>
II-6	<i>Micropogon undulatus</i>	II-10	<i>Gobionellus boleosoma</i>
II-6	<i>Mugil cephalus</i>	II-11	<i>Sphyraena barracuda</i>

SALINITY VALUES

	1S	1T	2S	2T	3S	3T	4S	4T	5S	5T
9-16-75	4.7	4.7	5.9	5.9	6.3	6.3	9.3	9.3	14.1	14.1
10-21-75	2.0	0.4	2.7	2.7	4.2	4.2	6.3	6.3	12.0	8.8
11-18-75	11.3	11.3	15.5	16.0	10.4	10.4	11.3	13.9	24.0	NSD
12-16-75	18.5	19.0	16.0	16.0	15.8	NSD	22.0	22.0	NSD	25.8
1-15-76	14.2	14.2	NSD	NSD	14.2	NSD	20.8	20.8	28.5	28.5
2-17-76	25.0	25.0	26.5	26.5	18.5	NSD	21.2	NSD	28.0	NSD
3-16-76	21.0	21.0	27.0	27.0	19.0	19.0	27.0	27.0	26.1	26.1
4-21-76	15.0	15.0	21.0	21.0	17.0	17.0	18.0	18.0	25.0	25.0
5-25-76	2.0	2.0	3.0	3.0	8.0	8.0	10.0	10.0	9.0	9.0
6-23-76	0.2	2.0	0.2	2.7	2.0	2.0	2.0	2.0	3.0	3.0
7-20-76	5.0	8.0	4.0	12.0	9.0	9.0	8.0	NSD	NSD	12.0
8-24-76	9.0	9.0	NSD	NSD	NSD	NSD	9.0	NSD	NSD	NSD
9-22-76	2.0	2.0	2.5	2.5	2.0	2.0	NSD	NSD	11.5	11.5
	6S	6T	7S	7T	8S	8T	9S	9T	10S	
9-16-75	NSD	20.6	32.7	32.7	34.1	34.1	32.7	29.2	32.0	
10-21-75	19.2	19.2	30.2	30.2	36.0	36.0	26.9	26.9	32.0	
11-18-75	28.0	29.3	32.7	20.9	30.2	30.9	30.2	30.7	33.0	
12-16-75	29.2	29.2	36.0	36.0	36.0	40.0	36.0	36.0	36.5	
1-15-76	17.0	NSD	NSD	36.0	36.0	36.5	36.0	36.0	NSD	
2-17-76	26.5	33.2	35.0	36.0	36.0	36.0	36.0	36.0	35.0	
3-16-76	31.0	NSD	34.0	35.0	35.0	36.0	33.8	36.0	36.2	
4-21-76	27.0	27.0	35.0	35.0	36.0	36.0	35.0	35.0	36.0	
5-25-76	12.0	12.0	20.0	20.0	31.0	31.0	24.0	24.0	29.5	
6-23-76	3.0	3.0	9.0	9.0	24.0	NSD	15.0	15.0	23.0	
7-20-76	16.0	16.0	17.0	28.0	30.0	NSD	32.0	15.0	32.0	
8-24-76	NSD	NSD	29.5	36.0	31.0	NSD	30.0	30.0	33.0	
9-22-76	12.5	28.0	26.0	NSD	33.0	NSD	32.6	29.3	28.0	

Anchoa mitchilli

	1S	1T	2S	2T	3S	3T	4S	4T	5S	5T	6S	6T	7S	7T	8S	8T	9S	9T	10S
9-16-75	X				X	X		X					X						
10-21-75				X	X	X	X	X	X	X		X		X	X				
11-18-75					X	X	X						X		X	X			
12-16-75*	X				X		X												
1-15-76*	X								X										
2-17-76*	X					X		X		X			X	X			X		
3-16-76	X	X			X	X		X	X				X	X					
4-21-76	X	X			X	X		X	X										
5-25-76	X	X			X	X		X	X				X	X				X	
6-23-76	X	X			X	X		X	X				X	X			X		
7-20-76	X				X	X		X					X	X					
8-24-76	X				X	X		X					X	X			X	X	
9-22-76		X			X			X		X			X	X			X	X	

Eucinostomus juveniles

9-16-75				X	X			X					X	X	X	X		X
10-21-75			X		X	X	X	X	X			X	X	X	X		X	X
11-18-75	X		X		X	X	X		X			X	X	X	X		X	X
12-16-75*	X			X		X						X	X	X	X		X	X
1-15-76*	X				X													
2-17-76*	X				X							X						
3-16-76	X											X						
4-21-76							X		X			X		X				X
5-25-76	X	X	X	X	X				X				X	X			X	X
6-23-76	X		X		X				X			X	X				X	X
7-20-76	X			X								X		X			X	X
8-24-76	X				X				X			X	X	X	X		X	X
9-22-76		X			X		X		X			X	X	X	X			

Clupeidae juveniles

9-16-75					X									X				X
10-21-75														X	X			
11-18-75																		
12-16-75*								X					X	X	X	X		X
1-15-76*	X												X	X	X	X		
2-17-76*	X							X		X			X	X	X	X		X
3-16-76			X			X		X					X	X	X	X		
4-21-76																		X
5-25-76																		X
6-23-76																		X
7-20-76		X																X
8-24-76																		X
9-22-76														X				

* No Trawl samples taken

Menidia beryllina

	1S	1T	2S	2T	3S	3T	4S	4T	5S	5T	6S	6T	7S	7T	8S	8T	9S	9T	10S
9-16-75	X				X		X												
10-21-75	X				X		X			X									
11-18-75	X		X		X		X												
12-16-75*	X					X		X											
1-15-76*	X					X		X											
2-17-76*	X					X		X											
3-16-76	X					X		X											
4-21-76	X																		
5-25-76	X		X					X											
6-23-76	X		X		X		X		X		X		X						
7-20-76	X		X		X		X		X		X		X						
8-24-76	X		X		X		X		X		X		X						
9-22-76	X				X		X												

Lagodon rhomboides

9-16-75																X	X	
10-21-75																		
11-18-75															X			
12-16-75*																X		
1-15-76*																	X	
2-17-76*	X		X													X	X	
3-16-76	X		X		X											X	X	
4-21-76	X				X											X	X	
5-25-76		X	X		X											X	X	
6-23-76		X			X			X								X	X	X
7-20-76																X	X	X
8-24-76				X												X	X	X
9-22-76																X	X	X

Diapterus olithostomus

9-16-75	X		X	X	X	X		X							X		X	
10-21-75		X		X	X	X	X		X						X		X	
11-18-75		X			X	X	X	X							X		X	
12-16-75*			X				X											
1-15-76*																		
2-17-76*						X		X										
3-16-76				X			X	X	X									
4-21-76													X					
5-25-76	X	X		X	X								X					
6-23-76	X		X	X			X						X					
7-20-76		X		X	X		X						X					
8-24-76	X		X	X	X	X	X	X	X				X		X	X	X	
9-22-76	X			X	X	X	X	X	X				X		X	X	X	

* No Trawl samples taken

Eucinostomus gula

	1S	1T	2S	2T	3S	3T	4S	4T	5S	5T	6S	6T	7S	7T	8S	8T	9S	9T	10S
9-16-75	X		X				X	X		X		X	X	X	X	X	X	X	
10-21-75	X	X	X		X						X	X	X		X	X	X	X	
11-18-75	X	X				X	X				X		X		X	X	X	X	
12-16-75*						X	X				X				X	X		X	
1-15-76*							X								X				
2-17-76*						X	X		X		X				X			X	
3-16-76	X		X		X	X	X			X	X	X							
4-21-76	X				X	X	X			X	X	X	X	X	X	X	X	X	
5-25-76			X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	
6-23-76		X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	
7-20-76		X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	
8-24-76	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
9-22-76	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	

Anchoa hepsetus

9-16-75															X		X	
10-21-75																X	X	X
11-18-75															X		X	X
12-16-75*															X	X		X
1-15-76*																		X
2-17-76*																		X
3-16-76																		X
4-21-76																		X
5-25-76		X	X												X		X	X
6-23-76			X												X		X	X
7-20-76															X			X
8-24-76																	X	X
9-22-76															X			X

Harengula pensacolae

9-16-75														X		X		
10-21-75														X		X		X
11-18-75														X		X		X
12-16-75*															X			X
1-15-76*																		X
2-17-76*																		X
3-16-76																		X
4-21-76																		X
5-25-76														X				X
6-23-76														X				X
7-20-76																		X
8-24-76																		X
9-22-76														X				X

* No Trawl samples taken

Eucinostomus argenteus

	1S	1T	2S	2T	3S	3T	4S	4T	5S	5T	6S	6T	7S	7T	8S	8T	9S	9T	10S	
9-16-75	X		X				X		X	X		X	X		X	X	X	X	X	
10-21-75	X		X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	
11-18-75	X		X				X				X	X	X				X	X	X	X
12-16-75*																	X	X		
1-15-76*								X									X	X		
2-17-76*								X											X	
3-16-76	X		X				X	X		X		X	X					X	X	
4-21-76			X					X			X		X					X	X	
5-25-76							X			X		X		X				X	X	
6-23-76		X		X	X	X		X			X							X	X	
7-20-76		X		X	X	X			X	X			X					X	X	
8-24-76	X		X		X		X			X		X	X					X	X	
9-22-76	X			X			X			X	X	X	X	X					X	

Engraulidae juveniles

9-16-75		X															X			
10-21-75																	X	X		
11-18-75									X								X	X		
12-16-75*										X									X	X
1-15-76*																			X	X
2-17-76*	X																			
3-16-76																		X		
4-21-76											X									X
5-25-76											X									X
6-23-76											X									
7-20-76																				
8-24-76																				
9-22-76																				

Anchoa lyolepis

9-16-75																X	X			X
10-21-75																X	X			
11-18-75																				
12-16-75*																				X
1-15-76*																				
2-17-76*																				
3-16-76																	X			
4-21-76																				X
5-25-76																				X
6-23-76																				
7-20-76																	X			X
8-24-76																	X			
9-22-76																	X			X

* No Trawl samples taken

Micropogon undulatus

	1S	1T	2S	2T	3S	3T	4S	4T	5S	5T	6S	6T	7S	7T	8S	8T	9S	9T	10S
9-16-75							X		X				X						
10-21-75				X			X			X									
11-18-75						X							X						
12-16-75*																			
1-15-76*																			
2-17-76*																			
3-16-76	X		X			X	X	X			X		X						
4-21-76	X					X		X			X			X		X			
5-25-76	X		X					X			X		X						
6-23-76	X		X			X		X			X		X						
7-20-76	X		X			X		X			X		X						
8-24-76						X		X			X		X						
9-22-76			X			X		X			X		X						

Mugil cephalus

9-16-75																			
10-21-75																			X
11-18-75																			
12-16-75*																			
1-15-76*																			
2-17-76*	X																		
3-16-76	X																		
4-21-76	X																		
5-25-76																			
6-23-76																			
7-20-76																			
8-24-76																			
9-22-76																			

Mugil curema

9-16-75									X							X			
10-21-75									X		X				X		X		X
11-18-75									X		X				X		X		X
12-16-75*		X		X											X		X		X
1-15-76*															X		X		X
2-17-76*	X														X		X		X
3-16-76															X		X		
4-21-76																			
5-25-76																			
6-23-76																			
7-20-76																			
8-24-76																			
9-22-76																			

* No Trawl samples taken

Bairdiella chrysura

	1S	1T	2S	2T	3S	3T	4S	4T	5S	5T	6S	6T	7S	7T	8S	8T	9S	9T	10S
9-16-75																			
10-21-75																	X		
11-18-75																			
12-16-75*																			
1-15-76*																			
2-17-76*																			
3-16-76							X												
4-21-76						X			X										
5-25-76									X	X	X						X	X	
6-23-76	X		X						X		X								
7-20-76						X			X										
8-24-76						X			X									X	
9-22-76							X		X										

Cynoscion nothus

9-16-75				X			X											
10-21-75		X			X			X								X		
11-18-75					X													
12-16-75*																		
1-15-76*																		
2-17-76*			X															
3-16-76						X			X									
4-21-76							X			X								
5-25-76	X			X					X			X					X	
6-23-76	X				X						X					X		
7-20-76					X				X			X					X	
8-24-76						X			X			X					X	
9-22-76					X		X		X			X						

Sciaenops ocellata

9-16-75																		
10-21-75									X									
11-18-75	X		X				X	X								X	X	
12-16-75*	X					X												
1-15-76*	X																	
2-17-76*	X													X				
3-16-76	X																	
4-21-76																		
5-25-76																		
6-23-76																		
7-20-76																		
8-24-76																		
9-22-76																		

* No Trawl samples taken

Trachinotus falcatus

	1S	1T	2S	2T	3S	3T	4S	4T	5S	5T	6S	6T	7S	7T	8S	8T	9S	9T	10S
9-16-75																			
10-21-75																X			
11-18-75	X								X										X
12-16-75*													X						
1-15-76*													X						
2-17-76*													X						
3-16-76																			
4-21-76							X												
5-25-76	X										X								
6-23-76									X		X					X			
7-20-76										X									
8-24-76													X						
9-22-76											X								

Arius felis

9-16-75	X		X				X												
10-21-75			X																
11-18-75					X														
12-16-75*																			
1-15-76*																			
2-17-76*																			
3-16-76	X			X			X									X			
4-21-76	X				X			X			X				X		X		X
5-25-76	X					X			X			X					X		
6-23-76			X			X			X			X				X			
7-20-76	X						X		X		X			X		X			X
8-24-76					X			X		X		X			X				
9-22-76			X			X		X		X		X			X				

Haemulon parrae

9-16-75																X		X	
10-21-75																X		X	
11-18-75																			X
12-16-75*																			
1-15-76*																			
2-17-76*																			
3-16-76																			X
4-21-76																			
5-25-76																	X		
6-23-76																X			
7-20-76																X			X
8-24-76																X			
9-22-76																X			X

* No Trawl samples taken

Lutjanus synagris

	1S	1T	2S	2T	3S	3T	4S	4T	5S	5T	6S	6T	7S	7T	8S	8T	9S	9T	10S
9-16-75														X			X		
10-21-75															X		X		
11-18-75													X		X		X		
12-16-75*																			
1-15-76*																			
2-17-76*																			
3-16-76																			
4-21-76														X					
5-25-76															X				
6-23-76															X	X			
7-20-76																			
8-24-76													X				X		
9-22-76													X					X	

Syngnathus scovelli

9-16-75															X		X		
10-21-75																			
11-18-75																			
12-16-75*																			
1-15-76*														X		X		X	
2-17-76*															X		X		X
3-16-76														X		X		X	
4-21-76														X		X		X	
5-25-76														X		X		X	
6-23-76															X		X		X
7-20-76																			X
8-24-76													X			X		X	
9-22-76													X			X		X	

Orthopristis chrysoptera

9-16-75																X			
10-21-75																			
11-18-75																			
12-16-75*																			
1-15-76*																			
2-17-76*																			
3-16-76																			X
4-21-76							X		X										X
5-25-76																			X
6-23-76														X					X
7-20-76																			X
8-24-76																			X
9-22-76																			X

* No Trawl samples taken

Citharichthys spilopterus

	1S	1T	2S	2T	3S	3T	4S	4T	5S	5T	6S	6T	7S	7T	8S	8T	9S	9T	10S
9-16-75									X										
10-21-75																			
11-18-75																			
12-16-75*																			
1-15-76*																			X
2-17-76*																			
3-16-76			X		X		X												X
4-21-76			X		X		X												X
5-25-76	X		X				X				X								X
6-23-76	X		X		X		X			X								X	X
7-20-76	X		X		X					X									X
8-24-76							X												
9-22-76			X		X		X												

Haemulon sciurus

9-16-75																			
10-21-75																			
11-18-75																			
12-16-75*																			
1-15-76*																			
2-17-76*																		X	
3-16-76																		X	
4-21-76													X						
5-25-76																		X	
6-23-76																			X
7-20-76																			
8-24-76																			
9-22-76																			

Gobionellus boleosoma

9-16-75																			X
10-21-75																			X
11-18-75																			
12-16-75*																			
1-15-76*																			
2-17-76*																		X	
3-16-76																X			X
4-21-76																X			X
5-25-76																X			X
6-23-76																X			
7-20-76																		X	
8-24-76																			
9-22-76																			X

* No Trawl samples taken

Sphyraena barracuda

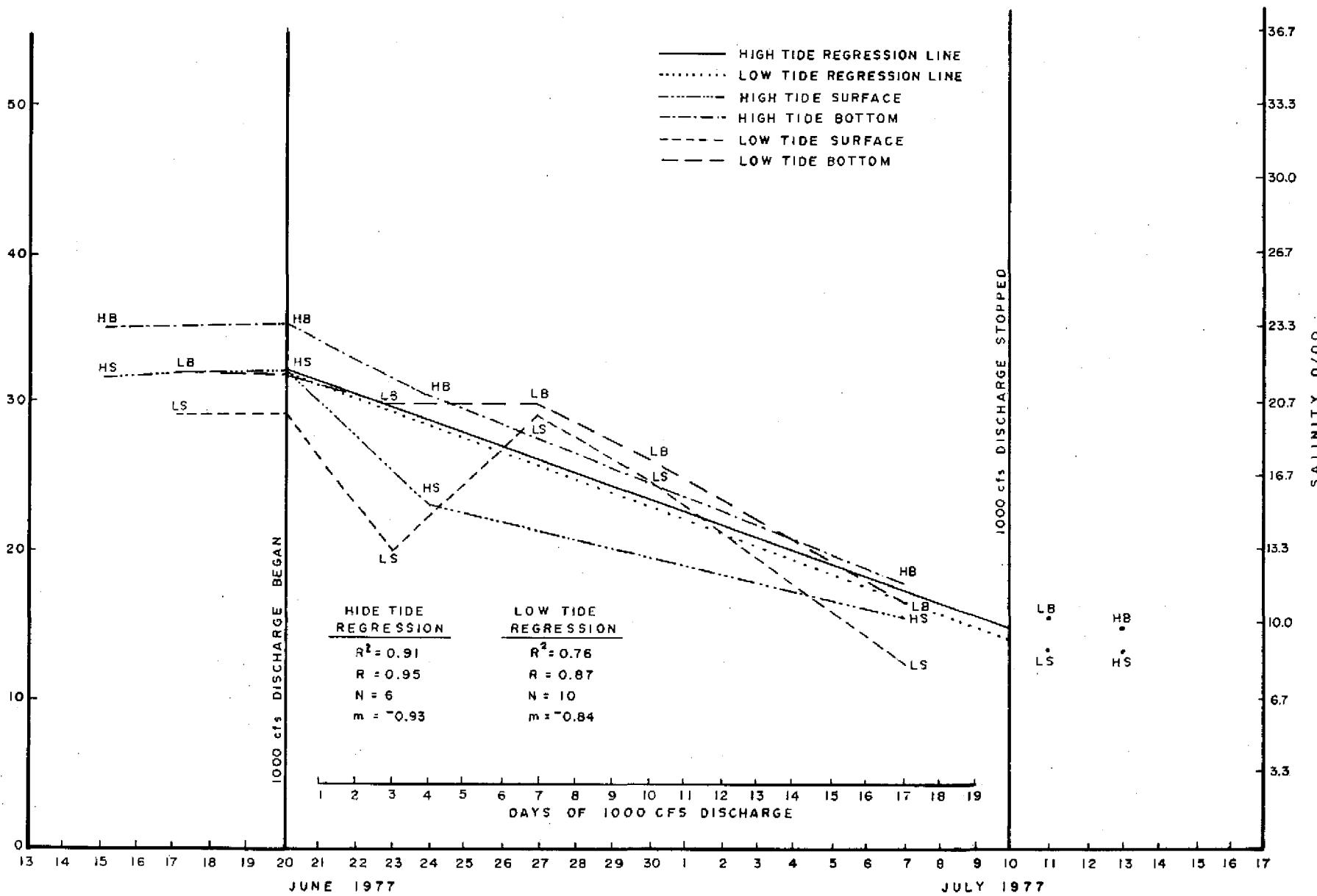
	1S	1T	2S	2T	3S	3T	4S	4T	5S	5T	6S	6T	7S	7T	8S	8T	9S	9T	10S
9-16-75									X				X			X			
10-21-75						X							X					X	
11-18-75		X											X				X		
12-16-75*																		X	
1-15-76*																			
2-17-76*																			
3-16-76																			
4-21-76													X						
5-25-76													X						
6-23-76													X				X		
7-20-76		X							X				X			X		X	
8-24-76									X				X			X		X	
9-22-76												X			X				

* No Trawl samples taken

APPENDIX IV

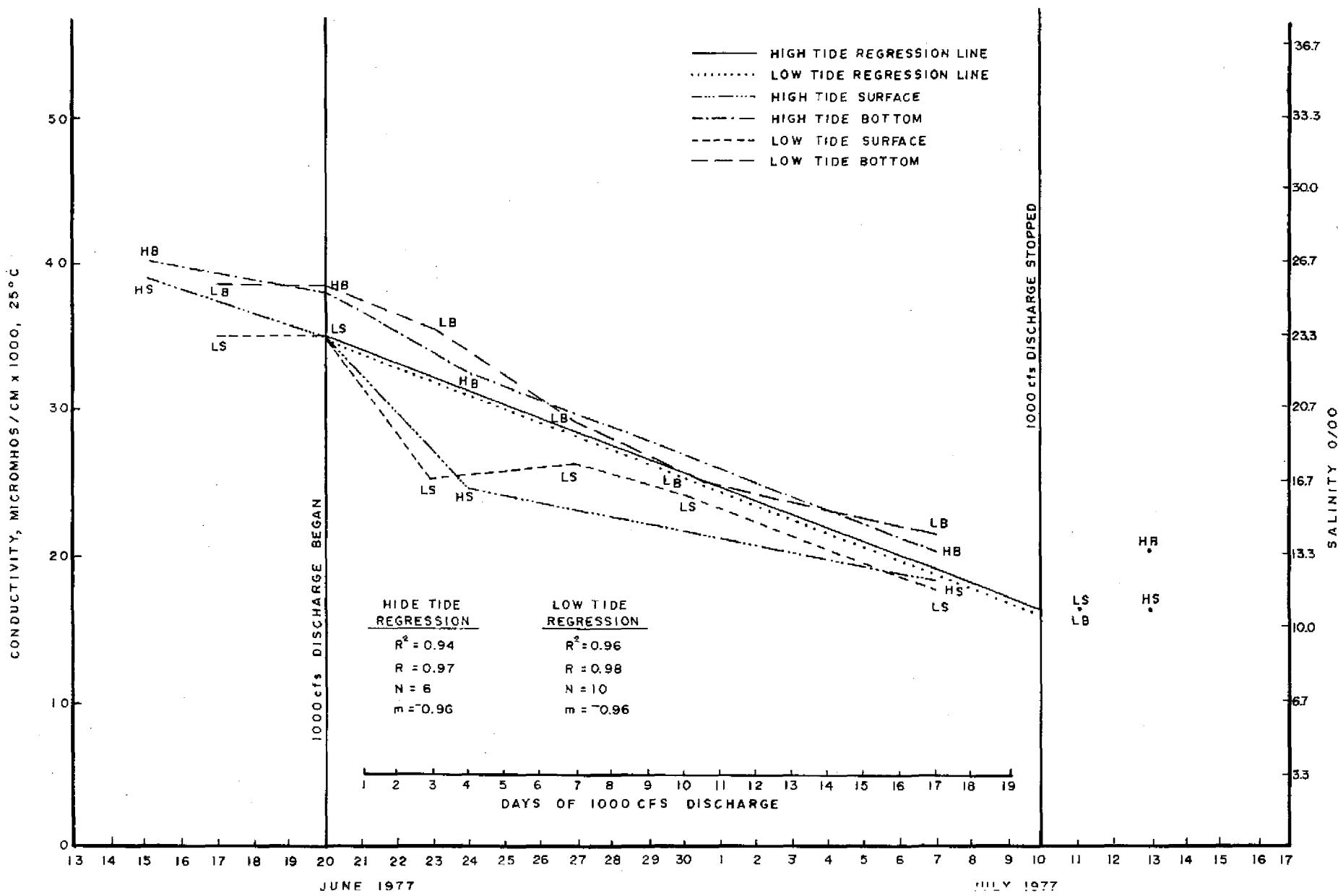
**HIGH AND LOW TIDE STUDY REGRESSIONS OF CONDUCTIVITY
VS. TIME FOR EACH STATION AT THE SURFACE AND
BOTTOM DURING THE 5 WEEK STUDY**

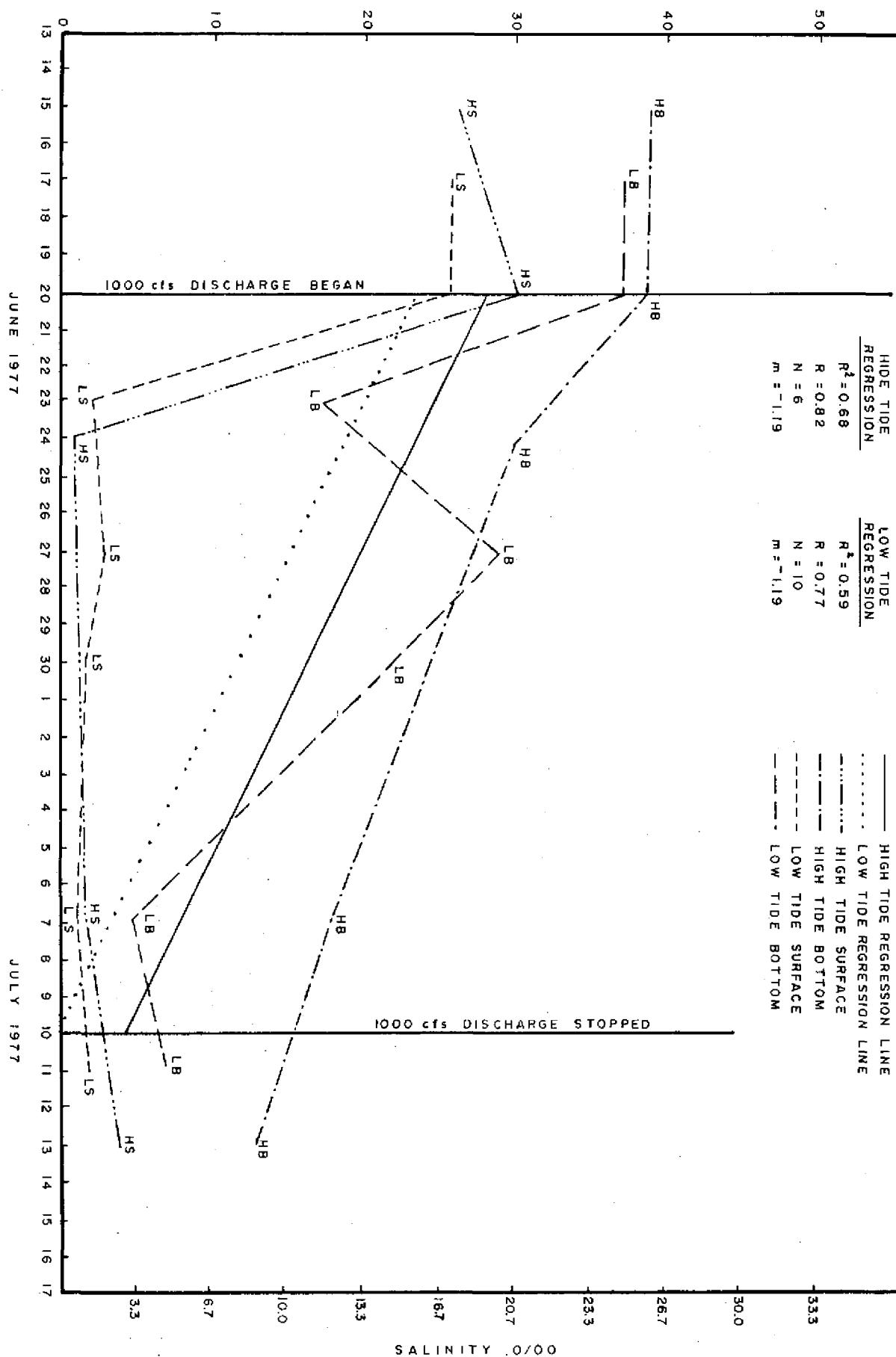
Z-W-2
CONDUCTIVITY, MICROMHOS / CM X 1000, 25°C



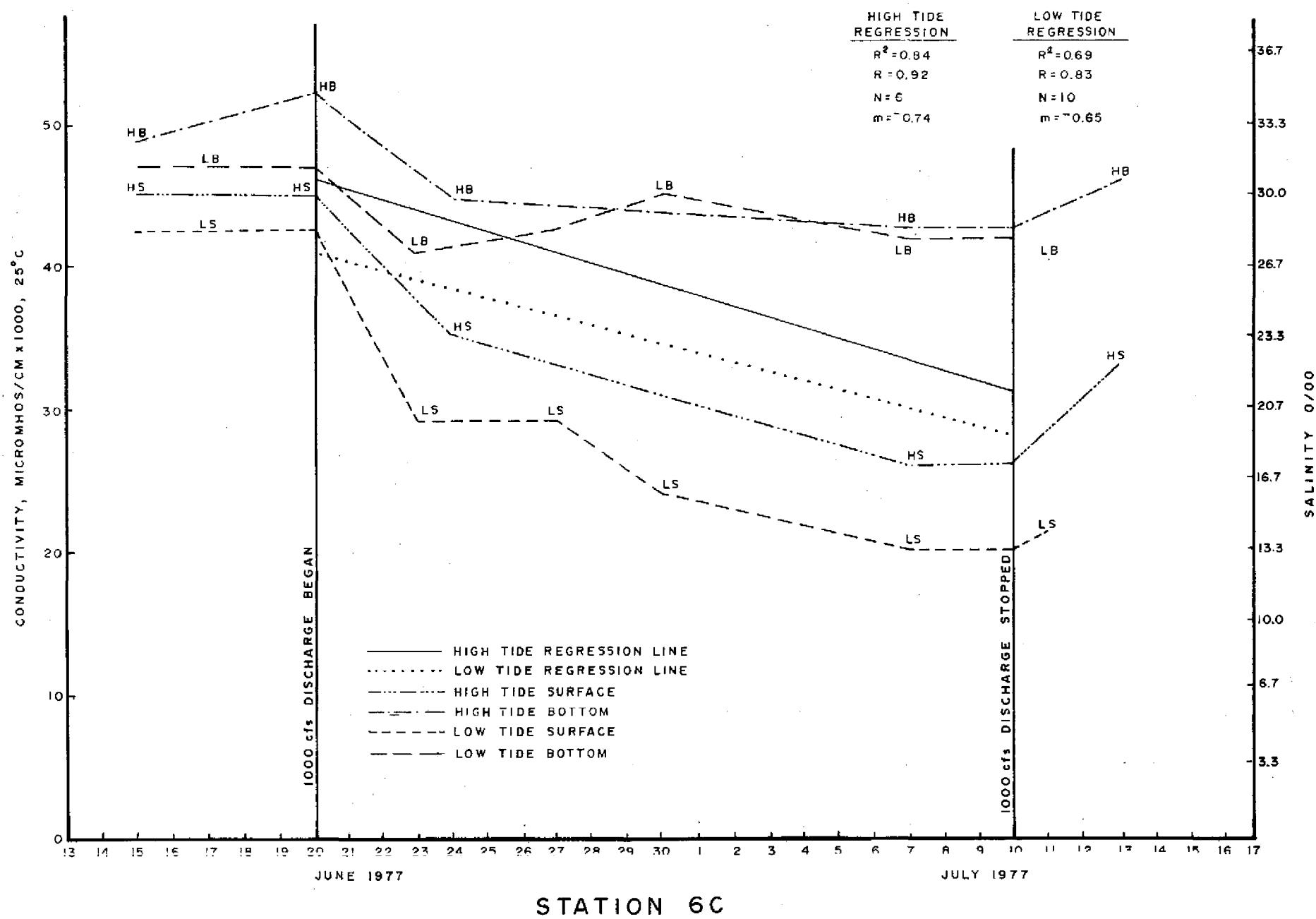
STATION IC

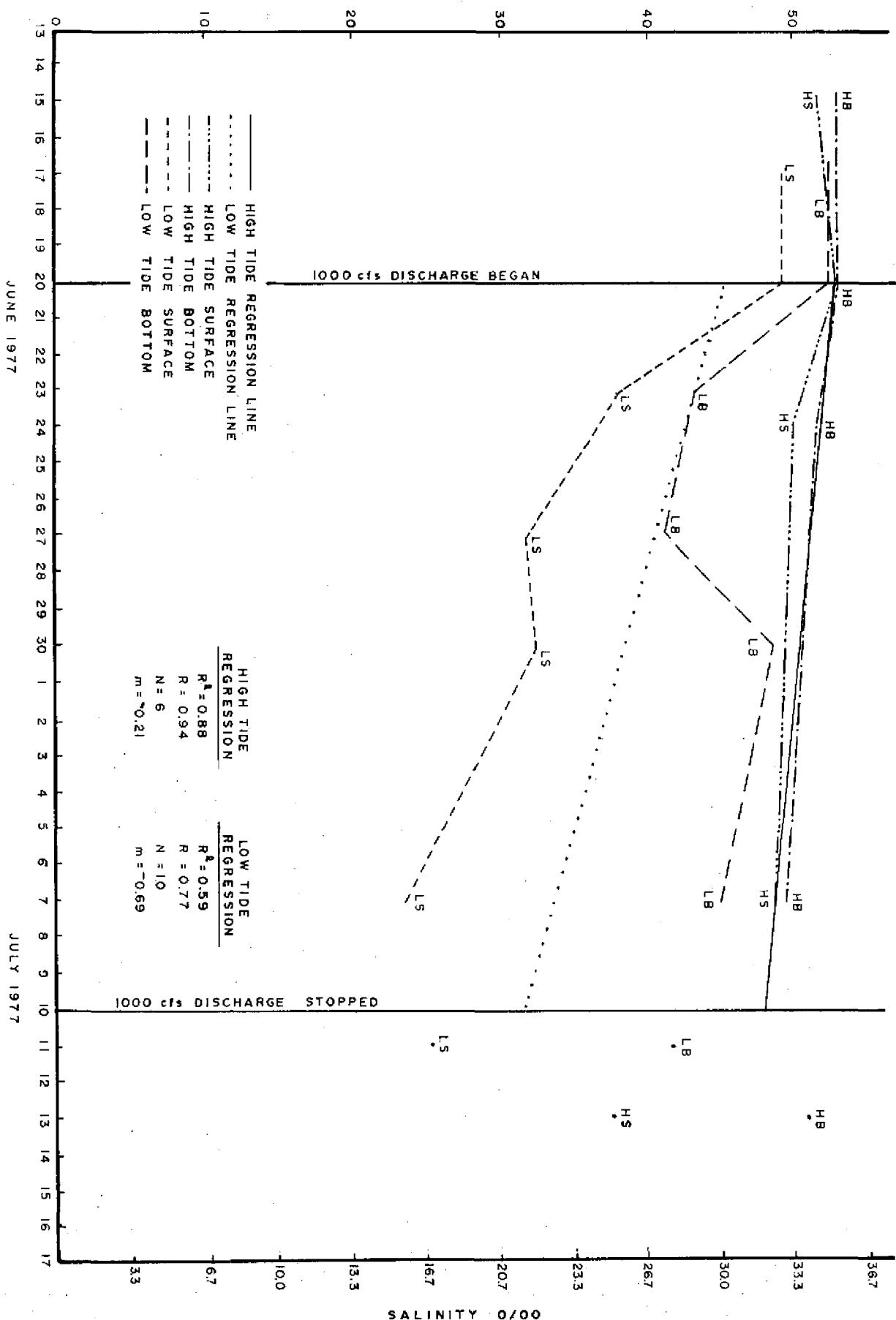
E-AI



CONDUCTIVITY, MICROMHOS/CM $\times 1000$, 25°C

L-AI



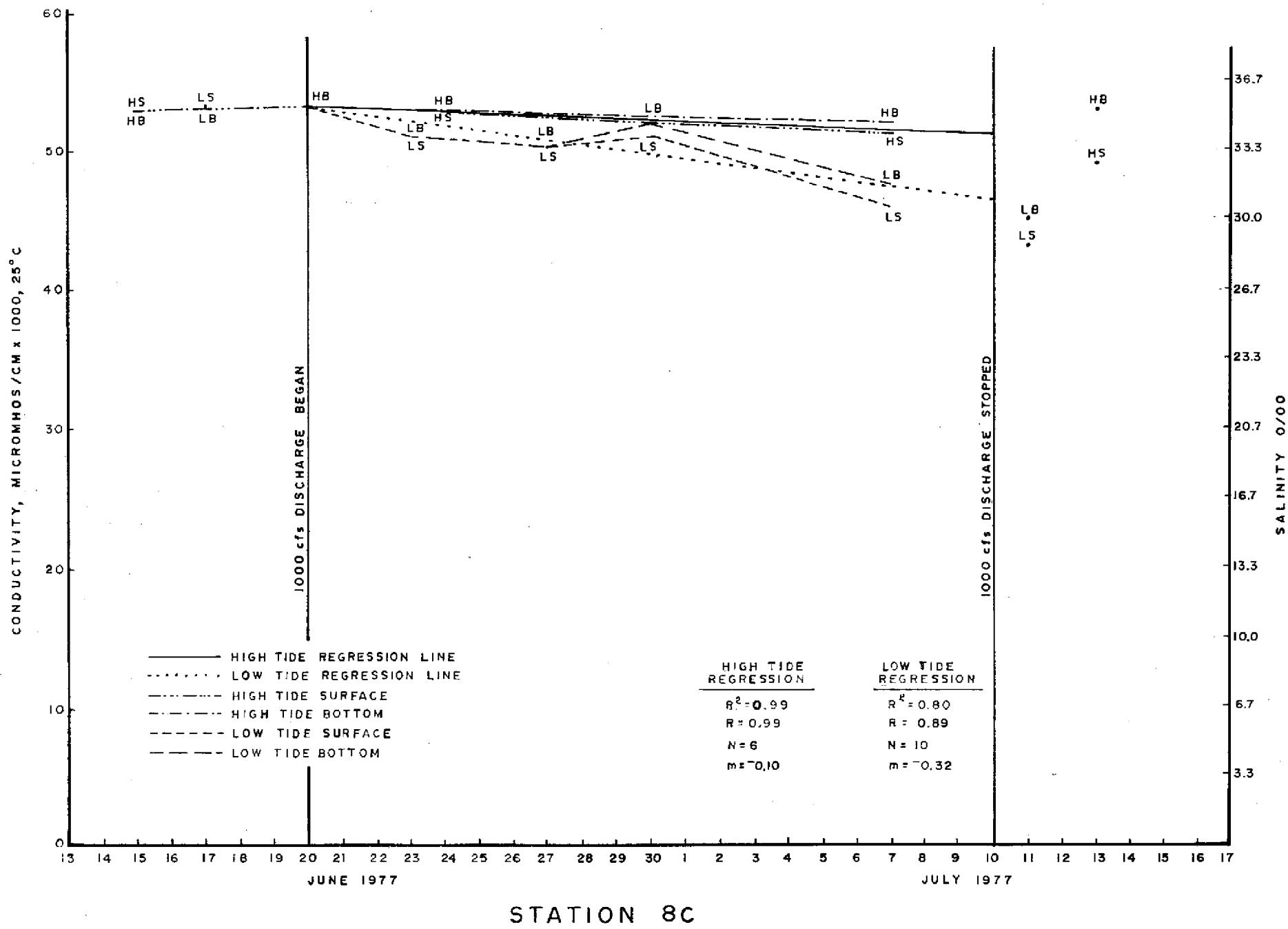
CONDUCTIVITY, MICROMHOS/CM $\times 1000$, 25°C

STATION 7C

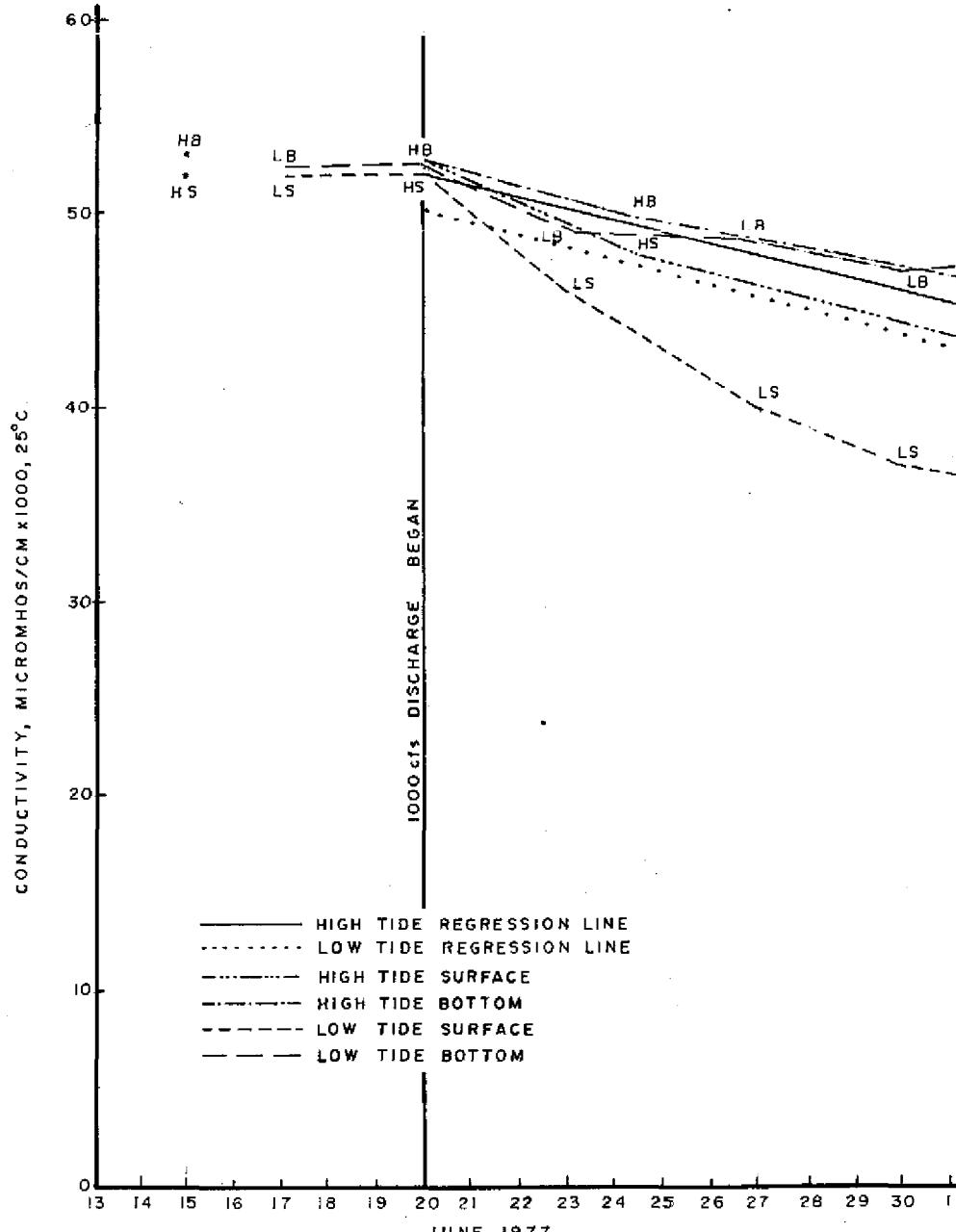
JUNE 1977

JULY 1977

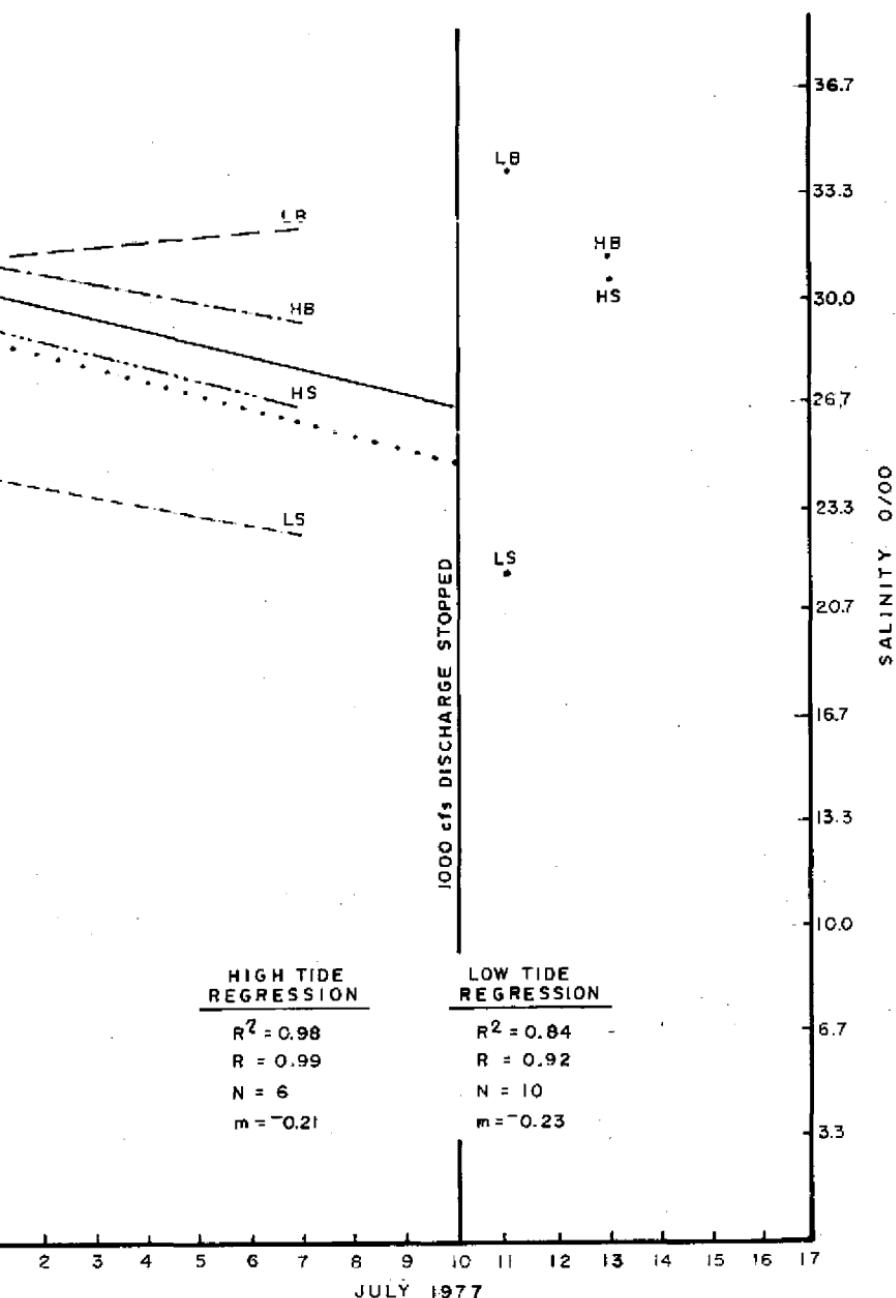
GWI

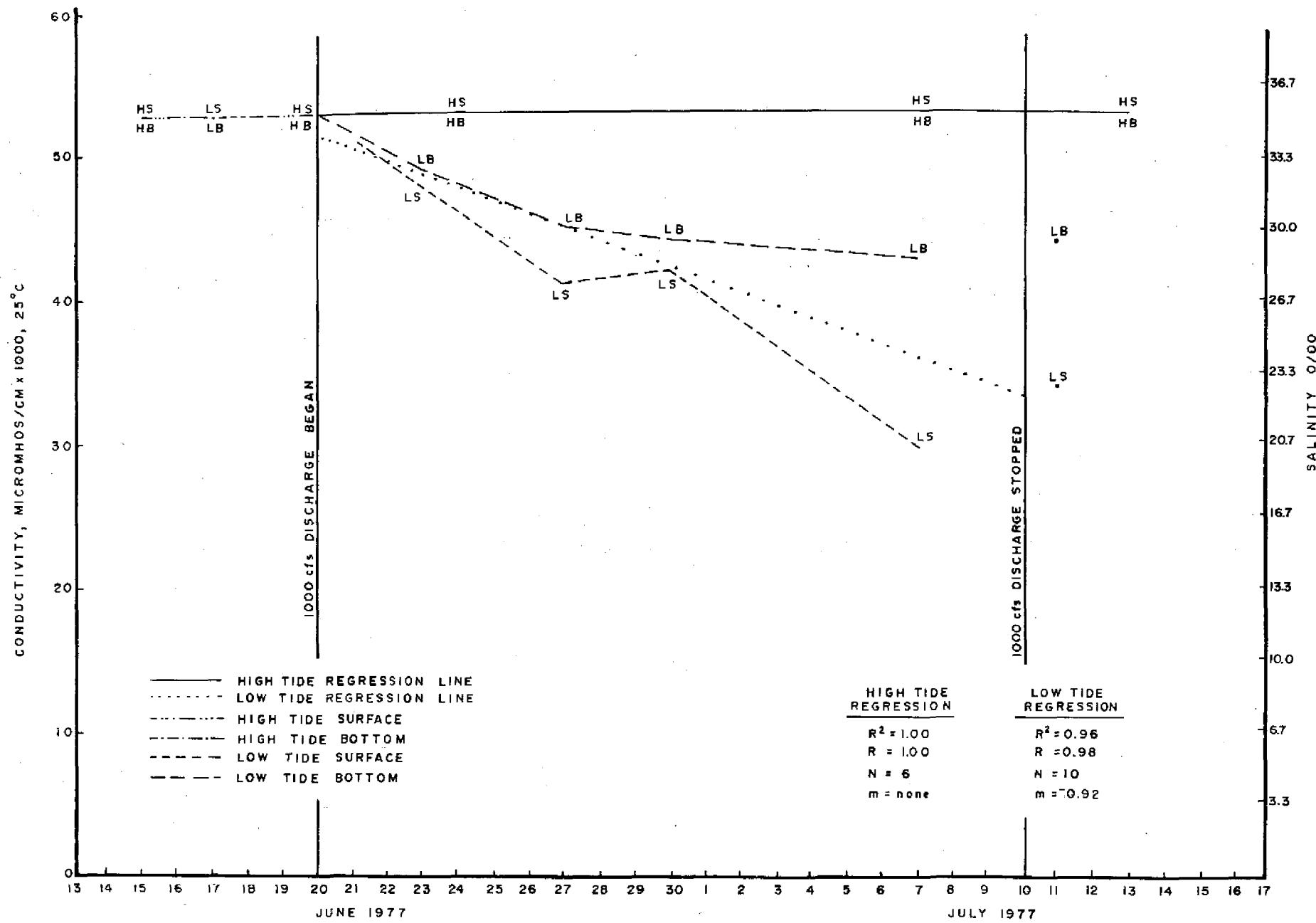


IV-10



STATION 9C





STATION IOC