

Job Report

George J. Munro
Marine Biologist

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Project Name: Analysis of Populations of Sports and Commercial Fin-Fish and of Factors Which Affect These Populations in the Coastal Bays of Texas.
Period Covered: May 1, 1964 - December 31, 1964 Job No. 13

A Study on the Effects of the Closure of Brown Cedar Cut

Abstract: Brown Cedar Cut, a natural pass into East Matagorda Bay, closed in March 1964. A study was immediately begun to determine the effects of this closing on the fisheries of East Matagorda Bay. White shrimp, Penaeus setiferus; brown shrimp, P. aztecus; speckled trout, Cynoscion nebulosus; redfish, Sciaenops ocellata; black drum, Pogonias cromis; southern flounder, Paralichthys lethostigmus; sheepshead, Archosargus probatocephalus; and forage species were found in the study area.

Objective: To determine the effect of the closing of Brown Cedar Cut on the fisheries of East Matagorda Bay.

Procedures: Three 60-foot seine stations were designated within East Matagorda Bay for sampling of juvenile fin-fish and shrimp. Collections were made monthly using a seine 60 feet long and 6 feet deep of 3/4-inch stretched mesh. All juvenile game fish, forage fish, shrimp and associated organisms were counted and measured. Fin-fish were measured in millimeters for total length and the count was converted into catch per acre. Juvenile shrimp were measured in total length from the tip of the rostrum to the tip of the telson in millimeters.

The three sampling stations in East Matagorda Bay were as follows:

Brown Cedar Cut: Located in the immediate vicinity of Brown Cedar Cut. This area has a hard sandy bottom, and an extensive Diplanthera wrightii bed during summer and fall.

Eidlebach Flats: Located on Matagorda Peninsula six miles west of Brown Cedar Cut. This area has a silt bottom with some scattered shell. The shoreline supports Spartina alterniflora, and scattered beds of D. wrightii can be found in the area during the summer.

Hog Island: Located on Matagorda Peninsula twelve miles west of Brown Cedar Cut. This area has a silt bottom with scattered shell. The shoreline supports S. alterniflora.

For comparative purposes two 60-foot seine stations were sampled in Matagorda Bay. All data collected were handled in the same manner as those taken from East Matagorda Bay. The two stations in Matagorda Bay are located in the vicinity of natural passes from the Gulf into the bay in order to give a comparison of an area in the vicinity of a natural pass as opposed to an area in which there is no natural pass present. The two stations in Matagorda Bay were:

Port O'Connor: Located at the mouth of the Intracoastal Canal at Port O'Connor. This station is approximately three miles due south of the mouth of Pass Cavallo. The area supports a hard sand bottom with some scattered D. wrightii beds. The ecology of this station is similar to that of Brown Cedar Cut in East Matagorda Bay.

Matagorda Club: Located at the Matagorda Club on Matagorda Peninsula, approximately five miles west of Green's Bayou. This area supports an extensive D. wrightii bed during the summer, and has a sand bottom. This area was selected because of its similarity to Eidlebach Flats in East Matagorda Bay.

Two hydrographic stations were sampled in East Matagorda Bay. Hydrographic and meteorological observations were made at these two stations and at the three 60-foot seine stations. Water temperatures were recorded in degrees centigrade, and salinities were recorded in parts per thousand using a specific gravity hydrometer.

Figures 1 and 2 illustrate the sampling stations in East Matagorda and Matagorda Bays.

Findings and

Discussion:

Historical Background

Brown Cedar Cut located at the extreme southeast end of East Matagorda Bay was the only natural pass into the Gulf of Mexico. This pass has, in the past, closed temporarily during periods of drought or of abnormally low tides and it closed again in March 1964.

Brown Cedar Cut has been opened twice since that date. In August 1964 the pass was opened with draglines, but closed within 68 hours. In October 1964 it was opened by high tides from Hurricane Hilda. As soon as the tides subsided the pass closed.

There have been two previous studies done on Texas bays in conjunction with the opening and closing of a fish pass. Reid (1955) found evidence of a population increase in some forms and a decrease of others after the opening of Rollover Pass. Golden croaker, Micropogon undulatus; speckled trout, Cynoscion nebulosus; sand trout, C. arenarius; and brown shrimp, Peneus aztecus, decreased, while white shrimp, Peneus setiferus and horse oysters, Ostrea equestris, increased with the opening of a pass. Simmons and Hoese (1959) in their study of Cedar Bayou found that movement of marine organisms to and from the Gulf was delayed nearly one month when the pass was closed, and the annual cycle of fish population was similar to a secondary bay. They concluded that open Cedar Bayou: (1) provided a means of escapement of fishes during cold weather; (2) may be important to the immigration and development of young penaeid shrimp; (3) may diminish oyster mortality by flushing out fresh water at flood time; (4) may introduce more stenohaline fish and oyster predators; and (5) may increase the opportunities for fishing along the pass.

Hydrography

Temperatures in degrees centigrade and salinities in parts per thousand recorded each month in East Matagorda and Matagorda Bays are shown in Table 1. Temperatures showed the normal seasonal trends, and salinities tended to be higher at the two stations located in Matagorda Bay.

The lower salinities in East Matagorda Bay indicated that there was a fresh water runoff from Live Oak Bayou, Caney Creek and the Colorado River. The higher salinities at Port O'Connor and Matagorda Club are probably due to the influx of Gulf water coming through the passes.

Juvenile Game Fish

Juvenile speckled trout, redbfish, Sciaenops ocellatus; black drum, Pogonias cromis; southern flounder, Paralichthys lethostigma, and sheepshead, Archosargus probatocephalus, were collected in East Matagorda Bay indicating a successful spawn for 1964. Table 2 shows that all juvenile game fish, with the exception of sheepshead, had a higher catch per acre in East Matagorda Bay than in Matagorda Bay.

Juvenile speckled trout were collected throughout 1964 in East Matagorda Bay and reached peaks of abundance during August and October. Speckled trout were collected during the summer and fall in Matagorda Bay, and reached peaks of abundance in June, July and August. Catch per unit of effort for speckled trout was 44 per cent higher in East Matagorda Bay than Matagorda Bay.

Juvenile redbfish were collected in early summer and fall in East Matagorda Bay, and reached a peak of abundance in November when 13 redbfish of the 1964 fall spawn were collected. This showed that juvenile fishes migrated into East Matagorda Bay even though Brown Cedar Cut was closed. Juvenile redbfish were taken during the summer in Matagorda Bay and reached a peak of abundance in May. The catch per unit of effort for juvenile redbfish was 20 per cent higher in East Matagorda Bay than it was in Matagorda Bay.

Juvenile black drum were collected in July and August in East Matagorda Bay, and in June and September in Matagorda Bay. The catch per unit of effort for black drum was 40 per cent higher in East Matagorda Bay than it was in Matagorda Bay.

Juvenile sheepshead were taken during June, July and August in East Matagorda Bay, and were taken throughout the year in Matagorda Bay. Catch per unit of effort was 40 per cent higher for juvenile sheepshead in Matagorda Bay than East Matagorda Bay.

Forage Species

Numbers and kinds of forage species collected in East Matagorda Bay and Matagorda Bay are shown in Tables 3 and 4. In processing forage species samples, all forage species taken were counted, and, in the case of shrimp, measured in millimeters. The data indicated that forage species were much more abundant in East Matagorda Bay than in Matagorda Bay. The seine station at Port O'Connor was almost devoid of forage species during the summer and fall. Brown shrimp, white shrimp, golden croaker and pinfish, Lagodon rhomboides, were the most abundant forage species collected in East Matagorda Bay.

The data indicates that the forage species present in East Matagorda Bay are normal for secondary bay area, while those present in Matagorda Bay followed the normal pattern of a primary bay.

Comments: Because this study was initiated this year, it would be difficult to determine the effect of the closing of Brown Cedar Cut upon East Matagorda Bay. Juvenile game fishes and major forage species were present in East Matagorda Bay in 1964, but it is not known whether the larvae moved into the bay through Brown Cedar Cut before it completely closed in March, or whether they entered the bay through the Intracoastal Canal. This study will be carried on through 1965.

Prepared by: George J. Munro
Marine Biologist

Joe P. Breuer
Project Leader

James R. Stevens
Regional Supervisor

Approved by:

Terrance R. Henry
Coordinator

Literature Cited

Reid, G. K., Jr. 1955. A summer study of the biology and ecology of East Bay, Texas. 1. Tex. Jour. Sci., 7(3):316-343

Simmons, E. G. and Hoese, H. D. 1959. Studies on the hydrography and fish migrations of Cedar Bayou, a natural tidal inlet on the Central Texas Coast. Publ. Inst. Mar. Sci. Univ. Texas., 6:56-80.

Table 1
Temperatures and Salinities for the Brown Cedar Cut Study

Matagorda Bay

Temperature in °C

<u>Station</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sep.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
Port O'Connor	28.4	32.5	30.6	30.0	29.5	20.0	18.0	--
Matagorda Club	27.8	28.6	32.2	31.6	--	20.0	16.6	--
Average	28.1	30.5	31.4	30.8	29.5	20.0	17.3	--

East Matagorda Bay

Temperature in °C

<u>Station</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sep.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
Dressing Point	27.3	29.3	--	28.3	--	20.4	21.0	--
Brown Cedar Cut	30.0	30.0	--	28.0	--	22.8	20.0	--
Eidlebach Flat	30.0	30.8	27.0	28.0	--	22.8	21.0	--
Hog Island	27.5	32.2	27.2	--	--	22.0	21.6	--
Raymond Landing	26.8	30.6	27.4	28.0	--	22.0	21.4	--
Average	28.3	30.6	27.2	28.1	--	22.0	21.0	--

Matagorda Bay

Salinity in p.p.t.

<u>Station</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sep.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
Port O'Connor	24.9	28.6	33.3	35.8	34.3	31.7	30.9	--
Matagorda Club	28.1	20.5	32.0	33.8	--	31.7	29.8	--
Average	26.5	24.5	32.6	34.8	34.3	31.7	30.3	--

East Matagorda Bay

Salinity in p.p.t.

<u>Station</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sep.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
Dressing Point	29.8	27.6	--	26.3	--	23.8	24.2	--
Brown Cedar Cut	22.5	28.6	--	25.4	--	24.6	24.3	--
Eidlebach Flat	24.9	28.7	26.2	26.5	--	25.9	25.1	--
Hog Island	27.8	28.7	31.5	--	--	25.4	25.3	--
Raymond Landing	24.6	28.6	29.1	26.1	--	25.7	25.3	--
Average	25.9	28.4	28.9	26.1	--	25.1	24.8	--

Table 2
Juvenile Fin-Fish Found in the Brown Cedar Cut Study

Station	East Matagorda Bay								N	C/U	C/A
	May C/A	June C/A	July C/A	Aug. C/A	Sept. C/A	Oct. C/A	Nov. C/A	Dec. C/A			
Brown Cedar Cut											
Trout	6.0	11.8	--	44.4	--	21.4	0	--	14	2.8	16.7
Redfish	0	11.8	--	5.5	--	0	57.1	--	11	2.2	14.9
Black Drum	0	0	--	27.7	--	0	0	--	5	1.0	5.5
Flounder	4.1	0	--	0	--	0	0	--	7	1.4	8.2
Sheepshead	0	11.8	--	11.1	--	0	0	--	4	.8	4.6
Eidlebach Flat											
Trout	0	0	0	28.6	--	47.1	14.3	--	12	2.0	15.0
Redfish	11.8	17.7	0	0	--	0	35.7	--	12	2.0	10.9
Black Drum	0	0	0	14.3	--	0	0	--	2	.3	2.4
Flounder	0	0	0	0	--	0	0	--	0	0	0
Sheepshead	6.0	0	0	0	--	0	0	--	2	.3	1.0
Hog Island											
Trout	0	0	0	--	--	0	0	--	0	0	0
Redfish	6.0	0	0	--	--	0	0	--	1	.2	1.2
Black Drum	0	0	50.0	--	--	0	0	--	7	1.4	10.0
Flounder	0	6.0	0	--	--	0	5.9	--	2	.4	2.4
Sheepshead	6.0	0	7.1	--	--	0	0	--	2	.4	6.5
Station	Matagorda Bay								N	C/U	C/A
	May C/A	June C/A	July C/A	Aug. C/A	Sept. C/A	Oct. C/A	Nov. C/A	Dec. C/A			
Port O'Connor											
Trout	0	0	0	0	0	0	0	--	0	0	0
Redfish	35.7	11.8	6.0	7.7	7.1	5.9	0	--	11	1.1	7.4
Black Drum	0	0	0	0	21.4	0	0	--	3	.3	2.1
Flounder	0	6.0	0	0	7.1	0	0	--	3	.3	2.0
Sheepshead	0	0	0	0	0	0	0	--	0	0	0
Matagorda Club											
Trout	0	22.2	17.7	21.4	--	7.1	7.1	--	10	1.4	10.8
Redfish	23.5	11.1	0	0	--	0	0	--	11	1.6	10.0
Black Drum	0	33.3	0	0	--	0	0	--	3	.4	4.8
Flounder	6.0	0	0	0	--	0	0	--	1	.1	.9
Sheepshead	6.0	222.2	6.0	0	--	7.1	7.1	--	24	3.4	35.5

N - Number present.
C/A - Catch per acre.
C/U - Catch per unit of effort.

Table 3
Composition of Forage Species Present in East Matagorda Bay - 1964

<u>Brown Cedar Cut Study</u>										
<u>East Matagorda Bay</u>										
Station	May N	June N	July N	Aug. N	Sep. N	Oct. N	Nov. N	Dec. N	N	C/U
Brown Cedar Cut										
Brown Shrimp	141	150	--	350	--	15	0	--	656	131.2
White Shrimp	0	75	--	6	--	3	15	--	99	19.8
Croaker	100	100	--	0	--	8	0	--	208	41.6
Spot Croaker	100	0	--	0	--	0	1	--	101	20.2
Pinfish	100	50	--	20	--	0	0	--	170	34.0
Pigfish	0	0	--	0	--	0	0	--	0	0
Anchovy	0	0	--	0	--	0	0	--	0	0
Mullet	10	20	--	15	--	6	4	--	55	11.0
Bay Whiff	50	0	--	0	--	1	12	--	63	12.6
Silversides	0	0	--	0	--	0	30	--	30	6.0
Menhaden	0	0	--	0	--	0	0	--	0	0
Mojarra	0	0	--	0	--	0	0	--	0	0
Blue Crabs	33	24	--	36	--	0	0	--	93	18.6
Eidleybach Flat										
Brown Shrimp	69	33	0	4	--	0	5	--	111	18.5
White Shrimp	0	6	20	13	--	15	5	--	59	9.8
Croaker	150	0	50	0	--	0	0	--	200	33.3
Spot Croaker	0	0	0	20	--	10	0	--	30	5.0
Pinfish	100	0	0	0	--	2	0	--	102	17.0
Pigfish	0	0	0	0	--	0	0	--	0	0
Anchovy	0	0	0	0	--	30	0	--	30	5.0
Mullet	0	12	20	8	--	16	4	--	60	10.0
Bay Whiff	0	0	0	0	--	0	0	--	0	0
Silversides	0	0	0	0	--	0	0	--	0	0
Menhaden	0	0	0	0	--	0	0	--	0	0
Mojarra	0	0	0	0	--	0	0	--	0	0
Blue Crabs	0	7	1	3	--	1	5	--	17	2.8
Hog Island										
Brown Shrimp	70	16	0	--	--	15	0	--	101	20.2
White Shrimp	0	10	23	--	--	30	30	--	93	18.6
Croaker	150	20	50	--	--	0	0	--	220	44.0
Spot Croaker	0	0	0	--	--	0	0	--	0	0
Pinfish	0	0	0	--	--	0	0	--	0	0
Pigfish	0	0	0	--	--	0	0	--	0	0
Anchovy	0	0	0	--	--	0	0	--	0	0
Mullet	0	10	20	--	--	4	12	--	46	9.2
Bay Whiff	0	0	0	--	--	0	0	--	0	0
Silversides	0	0	0	--	--	0	0	--	0	0
Menhaden	0	0	0	--	--	0	0	--	0	0
Mojarra	0	0	0	--	--	0	0	--	0	0
Blue Crabs	0	3	0	--	--	0	5	--	8	1.6

N - Number present.

C/U - Catch per unit of effort.

Table 4
Composition of Forage Species Present in Matagorda Bay - 1964

<u>Brown Cedar Cut Study</u>										
<u>Matagorda Bay</u>										
Station	May N	June N	July N	Aug. N	Sep. N	Oct. N	Nov. N	Dec. N	N	C/U
Port O'Connor										
Brown Shrimp	0	50	0	0	0	0	0	--	50	7.1
White Shrimp	0	0	0	0	0	0	0	--	0	0
Croaker	20	20	0	0	0	0	0	--	40	5.7
Spot Croaker	0	0	30	0	0	8	0	--	38	5.4
Pinfish	0	0	0	20	0	4	0	--	24	3.4
Pigfish	20	20	0	0	0	0	0	--	40	5.7
Anchovy	0	0	0	0	0	0	0	--	0	0
Mullet	0	10	25	6	15	6	0	--	62	8.9
Bay Whiff	0	0	0	0	0	0	0	--	0	0
Silversides	0	0	0	0	0	0	0	--	0	0
Menhaden	0	0	50	0	0	0	0	--	50	7.1
Mojarra	0	0	0	0	30	0	0	--	30	4.3
Blue Crabs	5	9	0	0	0	0	0	--	14	2.0
Matagorda Club										
Brown Shrimp	163	24	0	0	--	0	0	--	187	31.1
White Shrimp	0	0	20	0	--	0	6	--	26	4.3
Croaker	0	0	0	0	--	0	0	--	0	0
Spot Croaker	0	0	0	25	--	0	0	--	25	4.2
Pinfish	0	0	50	20	--	11	0	--	81	13.5
Pigfish	0	0	10	0	--	0	0	--	10	1.7
Anchovy	0	0	0	0	--	0	0	--	0	0
Mullet	0	0	0	15	--	3	1	--	19	3.2
Bay Whiff	0	0	0	0	--	0	0	--	0	0
Silversides	0	0	0	0	--	3	0	--	3	.6
Menhaden	0	0	0	0	--	0	0	--	0	0
Mojarra	0	0	0	0	--	8	0	--	8	1.3
Blue Crabs	14	0	4	1	--	0	0	--	19	3.2

N - Number present.

C/U - Catch per unit of effort.

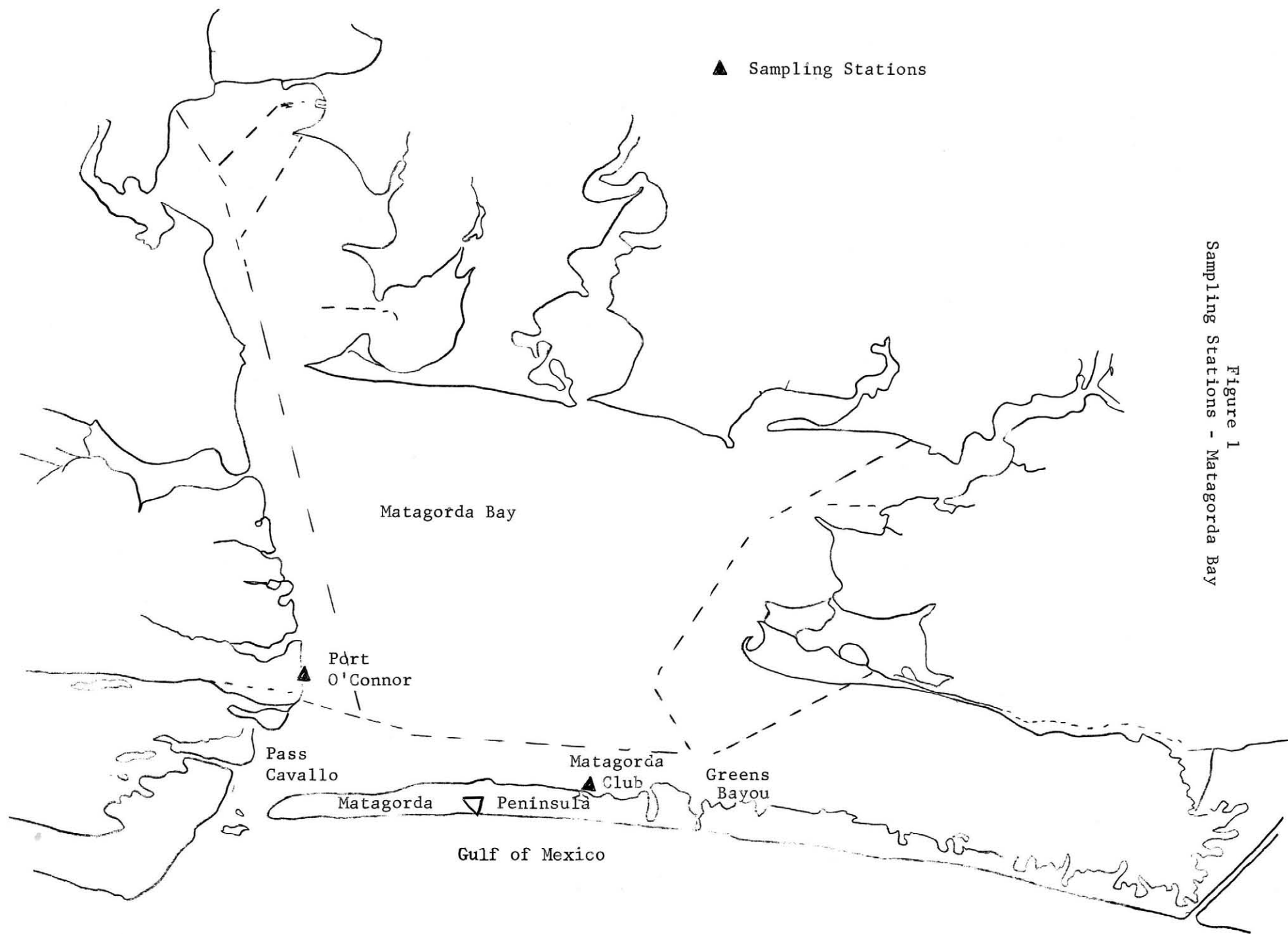


Figure 1
Sampling Stations - Matagorda Bay

