

Job Report

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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
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Population Studies of Fin-Fish on Artificial Shell Reefs in Corpus Christi Bay and the Upper Laguna Madre

Abstract: Perch traps, rods and reels and trammel nets were used to sample vertebrate and invertebrate populations on artificial shell reefs, none of these were found to be effective in regular sampling. A small trawl did not catch any large commercial fish, but did indicate the relative abundance of organisms on which these fish might feed.

In Corpus Christi Bay, Breakwater Reef contained more organisms than Oso Reef and was probably a better feeding ground for fin-fish. It appears; however, that this reef was placed in an area already populated with marine fauna and did not actually improve the bottom habitat for commercial fish as much as did Oso Reef.

In the Upper Laguna Madre, Green Hill Reef seems to have improved the ecology of the area in which it was placed more so than has Oil Channel Reef, which is in an area already suitable for feeding grounds. Some fishermen claim that the fishing is better near both reefs.

Objectives: To determine the effects of modifying habitat by the placement of two artificial reefs constructed of oyster shell in Corpus Christi Bay and the Upper Laguna Madre.

Procedures: 1963

In Corpus Christi Bay, collections were made each month over each reef with hook and line. The time period of sampling was noted. A clover leaf perch trap, constructed of one-fourth of an inch hardware cloth, was set on each reef each month. The traps were allowed to set overnight. A similar trap was set within one-fourth of a mile of the reef to serve as a control. All fish captured were counted, measured, and weighed. Once each month, when possible, each reef was encircled with a trammel net. This net was 600 feet long and 40 inches deep. The outer mesh measured 12 inches stretched while the inner mesh was 3 inches stretched. Fish were driven into the net by creating a disturbance within the enclosure. Similar sets were made within the control areas, one-fourth of a mile from the reefs. All fish captured were measured and weighed.

The sampling procedure in the Upper Laguna Madre was similar to that of Corpus Christi Bay.

1964

Control areas with similar bottoms as those on which the reefs were placed were set up within one-half of a mile of the reefs (Figures 1 and 2).

A modified shrimp trawl was pulled for a period of five minutes over each reef and control station every month beginning in June. The trawl was of 1 1/2-inch stretch mesh and measured 11 feet 3 inches along the lead line. A strip of canvas was sewn around the lead line to prevent snagging on the reef.

Two sizes of fish traps, 2 cubic feet and 12 cubic feet, of 1/2-inch hardware cloth were placed on each reef and control area in Corpus Christi Bay during June and July. The traps were left in place for a twenty-four hour period and then taken up and the contents examined and recorded.

Findings and Discussion:

Corpus Christi Bay

A summary of the results of sampling in 1963 is presented in Table 1. Trammel Net Stations 1 and 2, which are the reef stations, produced more than Station 3, which was used as a control for comparison. Trap Station 1 was more productive than Control Station 2. Hook and line stations were sampled for 45 minutes when possible. June and July of 1963 were the most productive months for hook and line sampling.

The hook and line was found to be a more effective method of sampling the reefs than was the trammel net. One reason for this was that it was possible for fish to escape over the cork line of the trammel net due to the depth of the water over the reefs. Also, it was not possible to set the nets when sports and commercial fishing boats were on the reefs.

The 1964 study began in June.

Fish traps were used regularly only during June and July because some were stolen and because inclement weather impeded the regularity with which they could be set out and recovered.

College Reef, located in front of the University of Corpus Christi, silted over with sand soon after construction. The layer of sand over the reef ranged in depth from 1 1/2 inches on the mainland side to almost 4 inches on the bay side. As a result of the siltation, no attempt was made to sample the reef.

A summary of the results of sampling in 1964 is presented in Table 2. The table is presented as the total number of each species taken at each sampling site.

On almost every trap or trawl sample, the reefs yielded more types and numbers of organisms than did the control sites.

Breakwater Reef yielded far more organisms than Oso Reef. This is probably because Breakwater Reef was constructed near the Corpus Christi Ship Channel and the breakwater North of the High Bridge, an area attractive to marine organisms; while Oso Reef was constructed in a flat, sandy area with apparently no other structure near to attract fish, shrimp, or other marine animals.

This theory is further borne out by the Breakwater Reef control samples which also yielded more organisms than the Oso Reef samples. The yield of the Oso Reef control samples was practically nil.

There were not many food or game fish in the samples, but the wide range of species taken indicate that the Corpus Christi Bay artificial reefs are good feeding grounds.

While Oso Reef yielded fewer specimens than Breakwater Reef, it appears to be an improvement over the surrounding habitat.

Breakwater did yield more organisms than the control area, but that could be because it was located closer to the breakwater. Whether or not this reef is actually valuable as an improvement of the habitat is a matter of conjecture.

Upper Laguna Madre

The results of the samples taken in 1963 are shown in Table 3. Perch traps throughout the year failed to be productive, regardless of the type bait used. Not enough organisms were taken to enable an objective conclusion as to the habitat-improving potential of the reefs.

The results of the net samples taken on each reef showed no marked differences in either the types or numbers of fish in the two areas.

Since perch trap, trammel net, and rod and reel samples did not yield enough evidence to justify any conclusions about the value of the reefs as an improvement of habitat, it was decided to change sampling methods in 1964 and to begin using a small trawl on the reefs and control areas. This study began in June.

The trawl proved to be a valuable means of sampling as it gave good indications of the amount of algal growth that developed on the reefs and the small organisms present which would be attractive to larger fish.

Green Hill Reef, which is east of Intracoastal Waterway Marker No. 65, became covered with a large amount of Acetabularia and Enteromorpha. This was in contrast with the rest of the bottom in the area which was of soft sand and not conducive to algal growth.

Large numbers of Palaemonetes, along with pipefish, gobies, mysids, and some juvenile penaeid shrimp were commonly taken from the algae of Green Hill Reef. The sandy-bottomed control site yielded very few organisms.

Oil Channel Reef, located just south of the Pure Oil channel, while also being a base for algal growth, did not present the contrast with the surrounding bottom that was found at Green Hill Reef. In the area of Oil Channel Reef were large patches of small shell which trapped dead algae and supported some live algae. In some cases, the control sample contained twice as many organisms as the reef sample.

The purpose of the artificial reefs in Corpus Christi Bay and the Upper Laguna Madre was to improve the ecology of the area for commercial fin-fish. In the cases of the Oso Reef in Corpus Christi Bay and Green Hill Reef in the Laguna Madre, it appears that new feeding grounds for food and game fish are developing in heretofore barren areas; thus, these reefs are serving their purpose.

While it is true that Breakwater Reef and Oil Channel Reef both appear to be excellent feeding grounds, it cannot be established that they actually improve the habitat, since they were placed in areas probably already suitable as feeding grounds.

Interviewed fishermen have stated that the fishing seems to be improved in the areas of the reefs.

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Table 1
Weight (in ounces) of Fish Taken by Various Means in 1963 on Artificial Reefs
and at Control Stations in Corpus Christi Bay

Month	Trammel Nets			Perch Traps		Hook and Line *	
	Station 1	Station 2	Station 3	Station 1	Station 2	Station 1	Station 2
February	8	0	0	4	3	16	10
March	16	0	0	6	2	0	0
April	8	17	8	2	0	8	4
May	NO SAMPLE			NO SAMPLE		16	8
June						48	80
July						64	16
August	64	24	18			0	0
September	16	24	12	4	3	16	8
October		NO SAMPLE			NO SAMPLE		4 6
November	0	16	0	4	0	6	8
December	<u>8</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>4</u>
TOTAL	120	81	38	20	9	178	144

Trammel Station 1 - Breakwater Reef

Trammel Station 2 - Oso Reef

Trammel Station 3 - Control, 1/4 mile from reefs, numbers indicate ounces of fish

Perch Trap Station 1 is at Breakwater Reef

Perch Trap Station 2 is the control station

Hook and Line Station 1 - Breakwater Reef

Hook and Line Station 2 - Oso Reef

* Fishing time at each station was 45 minutes

Table 2
Summary of 1964 Sampling Results From Corpus Christi Bay

Species	Breakwater Reef	Control	Oso Reef	Control
Anchoa mitchilli	3 (60mm-70mm)	7 (60mm-70mm)	2 (58mm-62mm)	0
Galeichthys felis	7 (100mm-130mm)	3 (110mm-130mm)	1 (125mm)	0
Eucinostomus gula	2 (50mm-53mm)	0	0	0
Chloroscombrus chrysurus	1 (100mm)	0	0	0
Orthopristes chrysopterus	2 (150mm-160mm)	0	0	0
Lagodon rhomboides	16 (110mm-150mm)	10 (125mm-140mm)	5 (115mm-140mm)	2 (120mm-123mm)
Bairdiella chrysura	1 (140mm)	1 (143mm)	3 (145mm-160mm)	0
Cynoscion arenarius	0	3 (45mm-60mm)	1 (50mm)	0
C. nothus	4 (90mm-100mm)	1 (95mm)	1 (80mm)	0
Micropogon undulatus	5 (120mm-180mm)	0	1 (55mm)	0
Leiostomus xanthurus	0	3 (135mm-150mm)	0	0
Chaetodipterus faber	7 (80mm-110mm)	4 (90mm-110mm)	0	0
Gobiidae	2 (35mm-40mm)	0	0	0
Prionotus rubio	3 (45mm-75mm)	0	0	1 (95mm)
Paralichthys lethostigma	2 (155mm-195mm)	0	3 (135mm-145mm)	0
Symphurus plagiata	1 (125mm)	5 (110mm-130mm)	0	0
Spheroides nephelus	21 (65mm-80mm)	9 (65mm-75mm)	0	0
Callinectes sapidus	7 (50mm-120mm)	4 (80mm-120mm)	1 (50mm)	0
C. danae	3 (25mm-35mm)	2 (35mm)	2 (35mm-40mm)	0
Menippe mercenaria	4 (95mm-100mm)	3 (95mm)	0	0
Penaeus setiferus	5 (90mm-100mm)	4 (95mm-105mm)	0	0
P. duorarum	9 (55mm-65mm)	2 (55mm-65mm)	3 (55mm-65mm)	1 (57mm)
P. aztecus	19 (60mm-75mm)	9 (45mm-60mm)	5 (55mm-70mm)	2 (60mm-70mm)
Trachypenaeus similis	0	3 (40mm-55mm)	0	0
Crassostrea virginica	4 (95mm)	0	7 (70mm-110mm)	0

Table 3
Summary of 1963 Samples From the Upper Laguna Madre

Date	Oil Channel Reef		Green Hill Reef	
	Perch Trap	Trammel Net	Perch Trap	Trammel Net
Jan.	No Samples Made			
Feb. (On)	0	-	2 Pinfish	-
(Off)	0	-	0	-
March (On)	0	-	0	-
(Off)	0	-	0	-
April	No Boat Available			
May (On)	7 Shrimp	-	0	-
(Off)	15 Shrimp	-	0	-
June	No Samples Made in Summer			
July				
Aug.				
Sept. (On)	0	1 Drum 20 Croaker 4 Pinfish 1 Spot	0	2 Drum 13 Croaker 6 Pinfish
(Off)	3 Pinfish 1 Silverperch	2 Drum 16 Croaker 4 Pinfish 2 Spot	0	4 Drum 14 Croaker 1 Spot
Oct. (On)	0	2 Drum 13 Croaker 6 Pinfish	0	17 Drum 2 Croaker 1 Pinfish
(Off)	8 Pinfish	4 Drum 14 Croaker	0	7 Drum
Nov. (On)	3 Pinfish	2 Drum	0	1 Trout 2 Drum
(Off)	4 Pinfish	2 Drum	1 Pinfish	2 Drum
Dec.	No Samples Made			

Figure 1
Artificial Reefs and Control Areas in Corpus Christi Bay

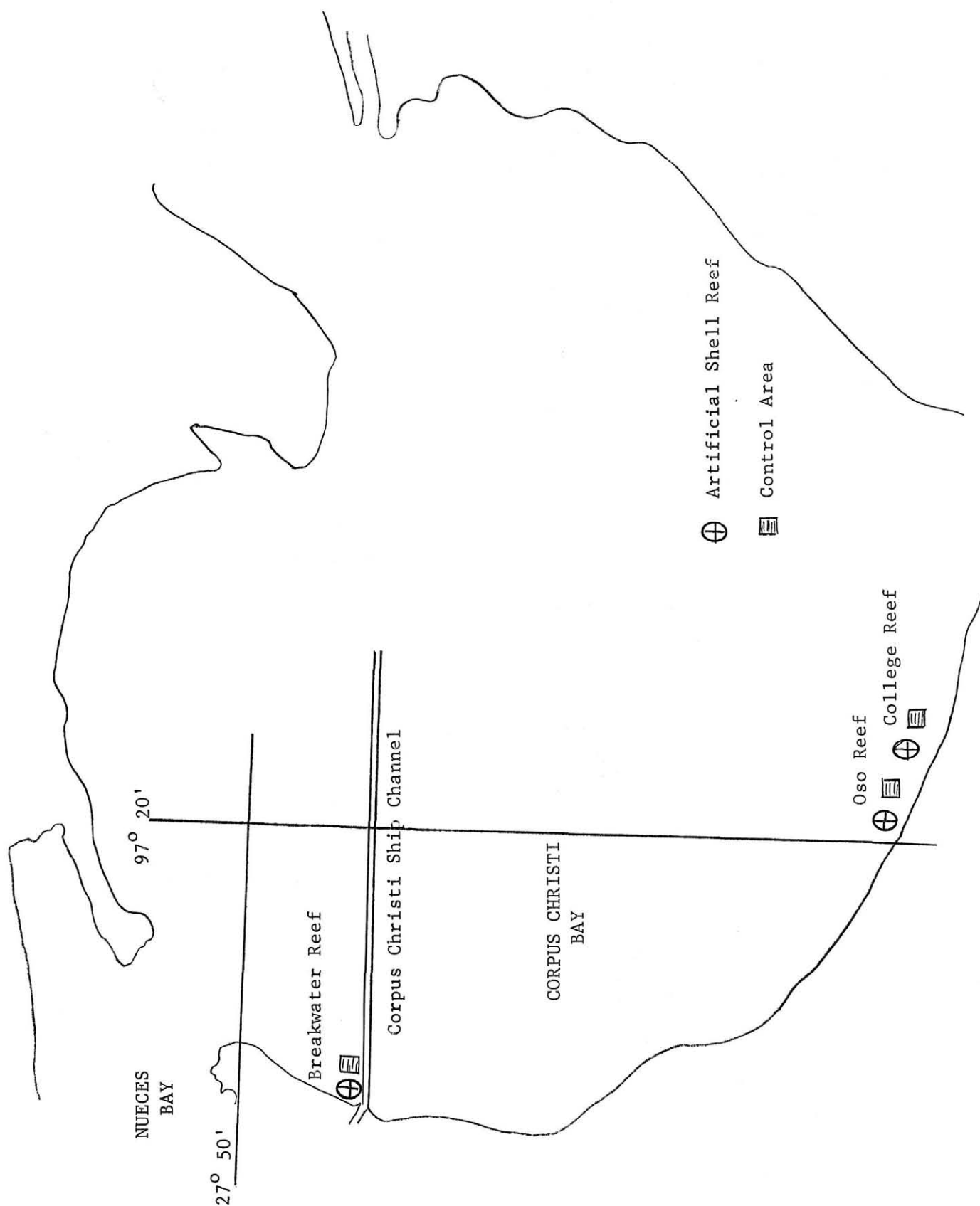


Figure 2
Artificial Reefs and Control Areas in the Upper Laguna Madre

