

Job Report

Thomas L. Heffernan
Marine Biologist

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Project Name: Survey of Oyster Populations and Associated Organisms
Period Covered: September 1, 1961 to December 31, 1962 Job No. 1

Computation, Analysis and Preparation of Coastwide Oyster
Population Data

Abstract: Galveston Bay, Matagorda Bay, San Antonio Bay, Aransas Bay and South Bay areas were sampled at a total of nineteen stations to determine the population characteristics and fluctuations of oysters on the Texas coast.

Population samples taken at monthly intervals from these stations showed heavy spat setting occurred in June 1962 and continued in moderation through December 1962.

Survival of spat and seed class oysters ranged from moderate in Galveston Bay to excellent in the lower coastal bays.

No extensive natural mortalities were noted in any of the bay areas and the number of market-size oysters increased in nearly all the bays.

Dermocystidium marinum incidence maintained a high level, but no mortalities were associated with the fungus.

Oyster populations in Aransas Bay have recovered from the 1959 die-off and are once again approaching an overcrowded condition for lack of harvesting.

Artificial reefs, built in Aransas and Matagorda Bays, have been extremely successful and have attained the characteristics of natural oyster reefs.

Objectives: To prepare for dissemination, the trends and developments of Texas oyster populations as determined through computation and analysis of data received from area biologists.

Procedure: Monthly oyster population sample reports were obtained from each area biologist. Data were analyzed for population characteristics, fluctuations and class comparison of spat, seed and market-sized oysters. Class or group comparisons of sizes were obtained by measuring one U. S. standard bushel of unculled oysters. Preliminary count data were recorded in millimeters on a length-frequency sheet. From the length-frequency sheet, the data were transferred to an oyster population sheet. Figure 1 shows an oyster population sample sheet used for this purpose. The sizes indicated on the sheet are mid-points of five millimeter groups. Spat are those oysters from 1 millimeter to 25 millimeters in length from hinge to bill. Seed oysters are those from 26 millimeters to 85 millimeters in length. Market oysters are those oysters 86 millimeters or over.

Additional data obtained from the oyster population sample sheet include salinity, temperature, sample type, method of obtaining sample, area sampled, sample volume and associated organisms.

Oyster population samples were taken each month from Galveston Bay, Trinity Bay, East Galveston Bay, East Matagorda Bay, Tres Palacios Bay, Matagorda Bay, Lavaca Bay, Espiritu Santo Bay, San Antonio Bay, Mesquite Bay, Aransas Bay, Copano Bay and South Bay below Port Isabel. This provided a coverage of the entire oyster-producing areas on the Texas coast.

Monthly population samples were normally collected with a sample dredge which closely resembles a commercial-type Louisiana dredge except for size. The volume of the sample dredge was approximately one bushel. The sample dredge was pulled over a reef by a power boat in a manner which collected oysters from a wide spread area, thus reducing the degree of selectivity. Some reefs had areas that were worked more extensively than others by commercial oystermen and a sample from this type of reef area was not indicative of the actual reef population. On areas where there was this marked difference, several samples were collected and averaged.

The volume of the sample was calibrated by using a U. S. standard bushel box (2,150 cubic inches). All area biologists utilized this device as a standardization of technique which enabled a comparison of all samples. As indicated on the oyster population sample sheet (Figure 1), one sample could be used for as many as four purposes. The first is a population count; the second is a selective count of market oysters to determine dredging effect; the third is a Dermocystidium marinum check, which is made on all monthly samples; and the fourth is a check for diseases other than Dermocystidium marinum.

The Dermocystidium marinum check was made on ten oysters from the bushel population sample. The area biologist removed the posterior gut section and placed it in a tube containing thioglycollate medium and a mixture of chloromycetin and mycostatin. The ten tubes were then sent to the Marine Laboratory at Rockport for analysis. The results of this study are shown in Job Report No. 6 under Project MO-R-4. Checks for diseases other than D. marinum were made in a similar manner. Ten oysters were taken from a sample, prepared for microscopic study and sent to Dr. J. G. Mackin at Texas A&M College for analysis. This method of processing samples for the disease study was discontinued in October 1962. Samples were then obtained from trays suspended from platforms constructed in Aransas and Galveston Bays. Results are presented in Job Report No. 7 under Project MO-R-4.

Findings and

Discussion: Findings obtained under this study are directed toward efficient management of the species. The basic information presented herein is concerned primarily with the number and percentage of commercial oysters present in the bays, the abundance of seed, the spat set and survival throughout the year. This report is only a segment of the overall oyster study and will be combined with data obtained from additional studies on mortality rates, diseases, hydrographic conditions, pollution, commercial pressure and other factors which influence the production of oysters on the Texas coast in a forthcoming project report.

Galveston Bay Area

Six oyster population sample stations were established in the Galveston Bay system. These were: Redfish Bar in Galveston Bay, Todd's Dump in Galveston Bay, Hanna's Reef in East Galveston Bay, Scott's Reef in Galveston Bay, Beasley's Reef in Trinity Bay and Bart's Pass in Trinity Bay. The two major oystering areas in the Galveston Bay area are Todd's Dump and Hanna's Reef. These two

areas are heavily worked by commercial oystermen throughout the season which runs from November through March in Galveston Bay.

Population samples from Todd's Dump for the sixteen-month period of this study showed an average of 20.1 commercial-sized oysters (3.5 inches) per bushel. Seed oysters averaged 250.8 oysters per bushel and spat averaged 119.5 to the bushel. The seed oyster population on Todd's Dump has maintained adequate numbers even during periods of heavy dredging and culling. Survival in this group appears to be adequate to replenish oysters of commercial size and to insure a harvest during the 1963-1964 oyster season.

The spat set on Todd's Dump began and reached a peak in June 1962 and continued to August 1962 when a smaller peak occurred. Light spat setting continued into December 1962. Survival of spat on Todd's Dump was low and the percentage of mortality was low and the percentage of mortality was higher than normal. This was attributed to a good early spat set which was about 20 to 30 per cent above normal. However, the number of spat, surviving the early mortality, was comparable to that of an average year.

Hanna's Reef, in Galveston Bay, had an average of 16.6 commercial oysters per bushel sample. Seed oysters averaged 340.8 per bushel, while spat averaged 310.7. The numbers of seed and spat are considerably higher than those of Todd's Dump which is smaller in area than Hanna's Reef and sustains a heavier degree of dredging pressure. The significant difference in data between Hanna's Reef and Todd's Dump Reef is the heavier spat set recorded on Hanna's Reef. The 310.7 spat per bushel for Hanna's Reef, compared to the 119.5 spat per bushel for Todd's Dump, indicates that conditions for survival were apparently better on Hanna's Reef, although salinity and temperature recordings were comparable.

The other four sample stations in the area, Redfish Bar, Scott's Reef, Bart's Pass and Beasley's Reef, were used as indicators of the overall population characteristics of the area.

Matagorda Bay Area

Matagorda Bay, East Matagorda Bay, Tres Palacios Bay and Lavaca Bay were studied as one unit for comparison. The Matagorda area was, in years past, one of the centers of oyster production on the Texas coast. In the past two decades, the production from this area has declined to the point of insignificance. Only one major reef, Middle Ground Reef, is of commercial value. However, it has been closed to oystering since September 1961 when Hurricane Carla destroyed the sewage treatment plant at Palacios and the State Health Department closed the area in which the reef is located. There are several other reefs in the Matagorda Bay area, but none are worked extensively because of either poor quality oysters or shallow water.

East Matagorda Bay produces a fine quality oyster and is apparently a good growing area. This bay has several factors which are detrimental to extensive commercial oystering. It is a shallow bay and many of the larger boats cannot navigate in it. The oysters are not found on the common reef type bottom but are usually lying in mud and have to be harvested by tongs or by hand. In some areas of East Matagorda Bay, the oysters are heavily clustered with small mussels which reduce their value.

Hurricane Carla caused extensive damage to the oysters in East Matagorda Bay. High tides and wind action washed many of the oysters from the bay bottom and deposited them on land. In Matagorda Bay, there were two small reefs, located in the eastern portion of the bay, that were covered by sand moved by the hurricane.

Gadwall Reef, an artificially constructed reef located near Carançahua Bay, is used as a sample station. This reef was not seeded at the time of its construction in September 1961. Natural spat setting was first noticed in November 1961. Monthly population counts were begun in April 1962. The April count showed a total of ten seed oysters and 42 spat. The next count was made in July 1962 when 4,184 spat were counted in the sample. The survival rate of spat has been exceedingly high and growth has been excellent. In December 1962, 1,088 seed oysters and 1,936 spat were counted. Eight per cent of the seed oysters approached the 3.5 inches market-size limit. Seven monthly population counts for Gadwall Reef showed an average of 0.14 market oysters, 295.3 seed oysters and 2,326.3 spat per bushel sample.

Tres Palacios Bay had one sample station at Middle Ground Reef. This reef had a 16-month average of 22.3 market size oysters, 177.3 seed oysters and 254.3 spat per bushel sample.

East Matagorda Bay showed a 16-month average of 14.1 market oysters, 102.8 seed oysters and 114.3 spat per bushel.

One station was established in Lavaca Bay at Sand Point Reef which averaged 12.5 market oysters, 295.3 seed oysters and 485.8 spat per bushel for a six-month period. This reef had not been worked extensively in the past few years but has shown indications of becoming a highly productive reef.

San Antonio Bay Area

San Antonio Bay and Espiritu Santo Bay were combined under a joint study. Four stations were established in this area. Three of these were in San Antonio Bay at Mosquito Point Reef, Chicken Foot Reef and Panther Point Reef. Espiritu Santo had one station established at Josephine Reef. Percentage and number comparisons are shown in Figure 3 for the Espiritu Santo-San Antonio Bay area.

San Antonio Bay has had many fluctuations in oyster production over the past five years. In 1957-1961, the San Antonio Bay oysters reached a peak in commercial production and helped create a 25-year high in pounds of oyster meats from the Texas coast. In the last two years San Antonio Bay oyster production has decreased, but the bay still remains as one of the better oystering areas on the coast.

Thirteen samples collected from Josephine Reef, located in Espiritu Santo Bay, had an average of 19.4 market oysters, 196.1 seed oysters and 135.2 spat per bushel sample. This reef, prior to the 1961-1962 oyster season, was one of the more productive on the Coast. During the latter part of the 1961-1962 season, several large oyster boats worked the reef extensively utilizing two large dredges each. The population was drastically decreased and the reef now is open on a day-to-day basis, subject to being closed if the population is further reduced.

Measures were enacted during the early portion of the 1962-1963 oyster season (September-April) to reduce commercial oystering pressure in San Antonio and Espiritu Santo Bays. San Antonio Bay was closed for two months, September and October. Espiritu Santo Bay was closed for three months, September, October and November. Dredging pressure has not been as heavy as in recent years; however, should dredging pressure increase significantly during the present open season, it may become necessary to further reduce the length of the season.

Aransas Bay Area

Aransas, Mesquite and Copano Bays were grouped under a joint study. A total of five sample stations were established in this three-bay area on a

basis of ecological environment. Three of the sample stations were established in Aransas Bay at Pintail Reef, Long Reef and Half Moon Reef. One station was located at Bray's Cove Reef in Mesquite Bay and one in Copano Bay at Lap Reef.

Aransas Bay has had a past history of epidemic mortalities which have retarded production. Studies, begun in 1958, disclosed the presence of a parasitic fungus, Dermocystidium marinum, which had been associated with mortalities of oysters on the Atlantic coast. In September 1959, the fungus was associated with a mass mortality of oysters in Aransas Bay. Populations were severally reduced and the bay was closed to oystering from January 1960 until September 1961.

In July 1960, Pintail Reef was built by the Game and Fish Commission as an experimental reef to determine if an artificial reef could be constructed to produce oysters of commercial quantity and quality. Averages for 16 population samples taken from Pintail Reef showed 10.2 market-size oysters, 213.5 seed oysters and 304.5 spat per bushel. Indications are that the reef could be worked commercially under controlled conditions.

In December 1960 and January 1961, heavy rains flooded Copano Bay causing extensive mortalities to some reefs in this bay. Copano Reef, used prior to that time as a sample station, was completely killed out and the station was moved to Lap Reef which was only slightly affected by the fresh water. Conditions have favored the growth of oysters in Copano Reef since the flood and the reef has re-established itself as a productive area.

South Bay

South Bay, near Port Isabel, is a shallow, muddy bay which produced small quantities of commercial oysters during past years. Redredging of the Intracoastal Waterway, near Port Isabel, in 1961 added to the overabundance of silt present in the bay causing mortalities. Oyster density has decreased drastically and future production from the bay is questionable.

Monthly population samples from South Bay were collected by hand and culled of dead shell. This method varies from the normal technique of measuring the uncultured dredge samples and cannot be used for comparison with other areas. The averages for a twelve-month period showed 37.8 market oysters, 490.9 seed oysters and 1,195.6 spat per bushel sample.

Texas Oyster Production

Texas oyster production has had a sustained peak of harvest of approximately one million pounds of meats per year from 1960 through 1962. This three-year period of production has been the highest ever recorded for Texas and was attributed to favorable hydrographic conditions which allowed Galveston Bay to maintain a high production level and San Antonio Bay, Espiritu Santo Bay and some of the smaller bays to contribute a large quantity of oysters to the fishermen.

Texas production has been found to fluctuate with hydrographic and climatological conditions. In 1938, production from Texas bays was over 1,200,000 pounds of oyster meats (Figure 6). Oyster production during the following years decreased to slightly over 50,000 pounds in 1950, the lowest point of oyster production recorded for Texas. Following 1950, a period of drouth created hyper-saline conditions in the bays and production was poor until 1957 when rains freshened the bay waters and production rose above the 1,000,000-pound level. However, the drouth-ending rains soon decreased salinities beneath the point of survival for oysters in many areas. Trinity

Bay and a large portion of Galveston Bay oysters suffered severe losses from the floods. San Antonio Bay lost many of its oysters and the quality of the survivors was below market acceptance, further restricting production. In 1958, production dropped below 300,000 pounds. As the rains decreased, salinities and conditions for oyster survival became favorable and production increased significantly. In 1959 there were 897,000 pounds of oyster meats harvested during the season. The following years of 1960, 1961 and 1962 showed over 1,000,000 pounds harvested during each year.

Galveston Bay conditions are normally optimum for good oyster growth and survival. For this reason, Galveston Bay continues year after year to lead the remainder of the Texas bays in oyster production. However, in 1960 the Espiritu Santo-San Antonio Bay area produced a total of over 8,000,000 pounds of meats, producing more than Galveston Bay for the first time. Production from this area, was curtailed by local flooding in 1951 and 1962. Indications are that the Espiritu Santo-San Antonio Bay area is capable of becoming a highly productive area again if conditions remain favorable.

Production records for the first half of the 1962-1963 oyster season (September through December) showed a total of 362,354 pounds of meats. Of this total, Galveston Bay produced 308,654 pounds and should continue as the highest producing bay for the remainder of the season. Production by bay areas is presented in Table 6.

Prepared by: Thomas L. Heffernan
Marine Biologist

Ernest G. Simmons
Regional Supervisor

Approved by

Terrence R. Lear
Coordinator

Figure 1
OYSTER POPULATION SAMPLE

Biologist _____ Date of Sample _____

Name of Reef _____ Name of Bay _____

Bottom Salinity _____ o/oo Bottom Temperature _____ °C _____

Sample Type: Population _____ Market _____ D. marinum _____ Disease _____

Sample Method: Dredge _____ Tong _____ Hand _____

Area Sampled _____ Sample Volume _____

Oysters - No./Sample

Class	Spat		Seed		Market	
Group	3	28	58	88	118	
	8	33	63	93	123	
	13	38	68	98	128	
	18	43	73	103	133	
	23	48	78	108	138	
		53	83	113	143	

Class	Number	Percentage
Spat		
Seed		
Market		
Total		

% of Trash: _____

Associated Organisms:

Predators _____

Fouling Organisms _____

Other Organisms _____

Remarks _____

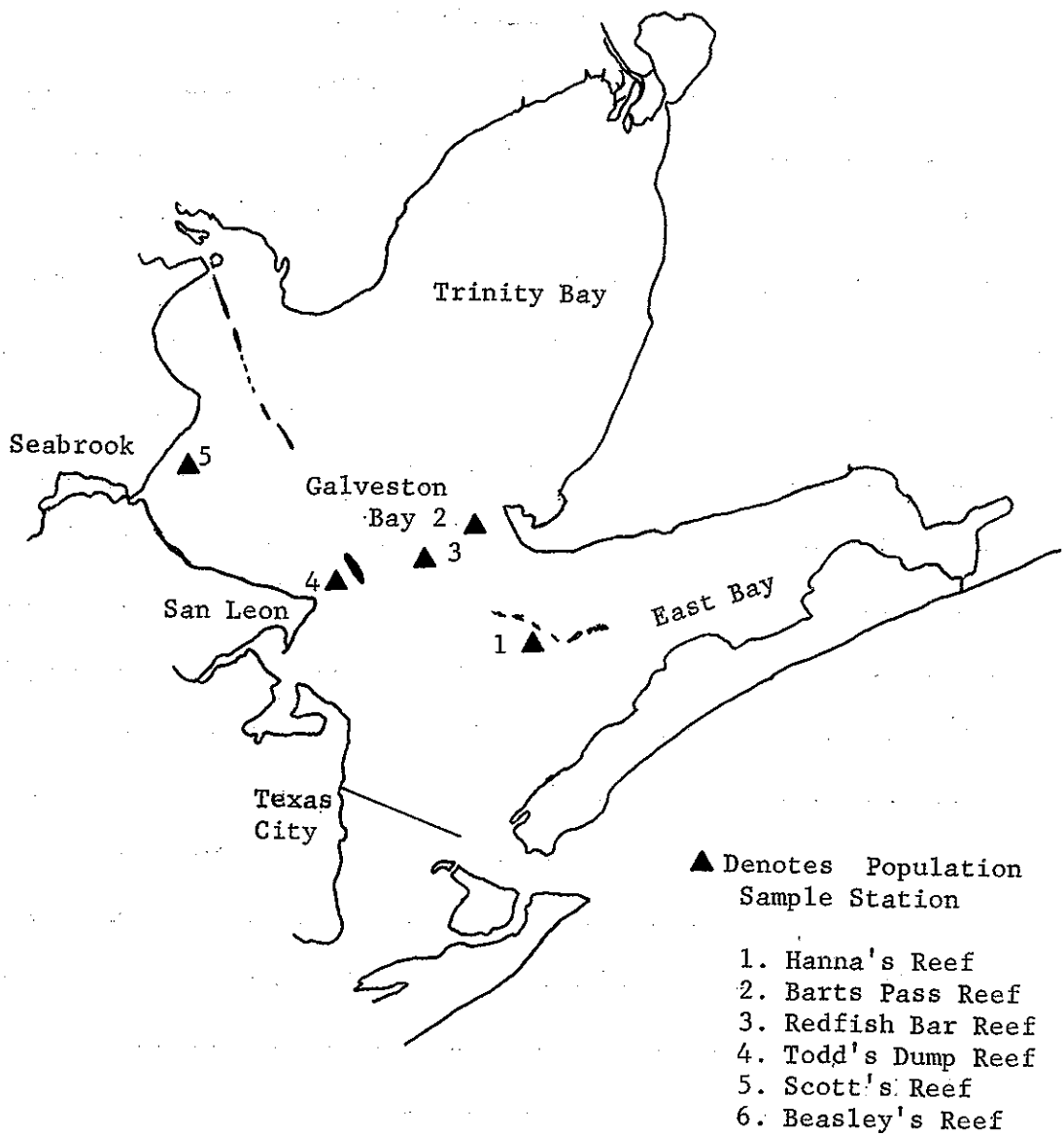


Figure 2. Galveston Bay Area Population Sample Stations

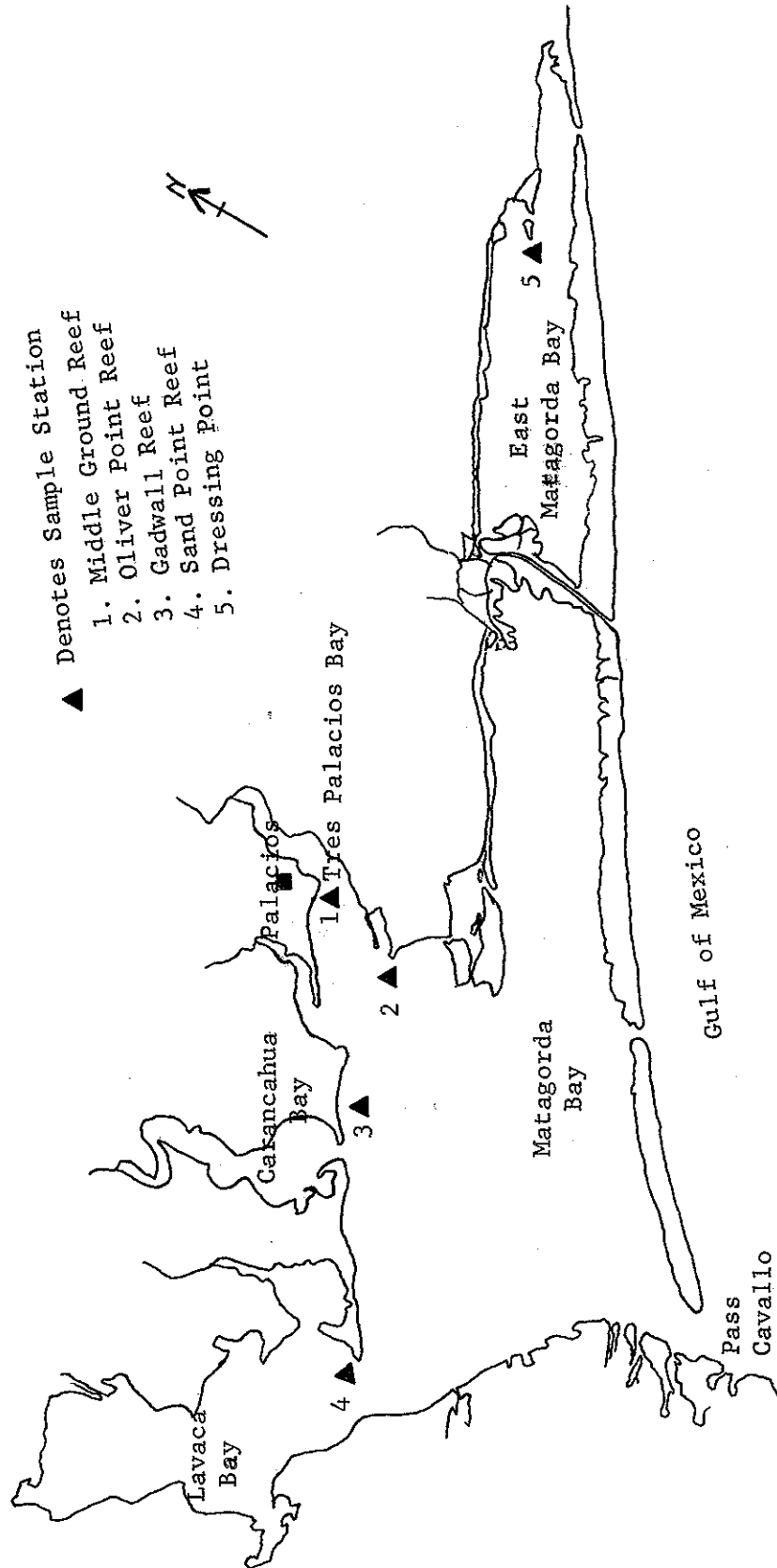


Figure 3

Matagorda Bay Area Population Sample Stations

Figure 4

San Antonio Bay Area and Aransas Bay Area Showing Population Sample Stations

