

JOB SEGMENT REPORT

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Project Name: Biological Survey of the Waters of the Laguna Madre of Cameron
and Willacy Counties and Adjacent Waters.

Period Covered: June 1, 1959 to May 31, 1960. Job No. E-1

Life History Studies of the Important Sports and Commercial Fish of the
Lower Laguna Madre.

Objective: To determine the life histories of the spotted trout, redbfish, black drum, flounder, and other species of fish of importance to sports and commercial fishermen within the area.

Procedure: Used the standard methods of collecting biological samples to determine the time and circumstances of spawning, rate of growth, food habits, and movements and migrations of the fishes concerned; determine the physical, chemical and meteorological factors which tend to influence the spawning, rate of growth, food habits, movements and migrations of these fish; and to correlate all information obtained so as to be able to recommend applications of these known facts toward proper management of these important fisheries species.

Findings: Meteorological and climatological factors appeared to be normal during the period. Northers arrived early and were numerous but none were of great severity. There were a few sow trout killed by cold weather in the Three Islands area in December 1959 and two hardhead catfish kills in the Port Isabel Bay area at about the same time. There were not enough trout killed to matter and not enough catfish killed to help. Spring tides were about six weeks late this year and the ecological pattern of the bay has been retarded to date. This same delayed pattern was also evident in 1959.

Salinities in July 1959 ranged from 38.7 ppt in South Bay to 40.8 ppt in the north end of Redfish Bay. Salinities gradually increased from south to north. August 1959 salinities were the same as in July at Brazos Santiago Pass but averaged 2 to 4 ppt higher at all other stations. December 1959, salinities ranged from 34.0 ppt at Brazos Santiago Pass to 51.6 ppt at the south end of the land cut. In general, December salinities ranged from 35 to 40 ppt from Port Isabel to Port Mansfield and increased rapidly from 40 to 51 ppt from Port Mansfield to the land cut. This higher winter salinity in Redfish Bay is an annual occurrence and is due to the hypersaline waters of the upper Laguna Madre and Baffin Bay being brought south through the landcut by the prevailing northerly winds. By February of 1960, salinities were about the same as two months previous; slightly higher over most of the area but lower in the Redfish Bay region. Salinities in April 1960 showed a range of from 35.4 ppt to 43.7 ppt from south to north. June salinities were 2 ppt higher than for April and were comparable to the July salinities of 1959.

Plankton samples were poor from late summer of 1959 to spring of 1960 with both zoo- and phytoplankton being very scarce at all stations. Dinoflagellates were moderately abundant with most samples heavy with detritus and ctenophores. The spring tides in late April brought in the rich gulf waters which are characteristically dense with all plankton forms, including copepods, diatoms and larval fish and invertebrates. These rich waters enter the area through Brazos

Santiago Pass and gradually move north, replacing all of the water to Port Mansfield in about six weeks. Waters north of Port Mansfield, although richer with plankton in summer than in winter, do not support the variety or abundance of planktonic forms as those waters south of the Port due to higher salinities and to reduced water circulation caused by the opening of Port Mansfield (East) Pass.

Vegetation in the project area appears to be on the increase both in range and in stand. Both shoal grass and widgeon grass have appeared in areas where they did not exist last year and have established substantial beds where it was only sparsely established last year. Widgeon grass is now abundant on the perimeter of almost all spoil banks from Port Isabel to Port Mansfield. It is also present in several areas of the Arroyo Colorado, the Cayo Atascosa and at the mouth of the floodway and the old mouth of the Arroyo Colorado some five miles south of Port Mansfield. It is also well established near the spoil banks of the two oil rig channels in Redfish Bay as well as those erected by the dredging of East Channel from Port Mansfield to the Gulf of Mexico. Widgeon grass lives in this area only in waters of from one to two feet in depth.

Shoal grass has increased its stand and now can be found throughout the entire project area from Port Isabel to the land cut in waters of from 18 inches to 5 feet in depth. Waters of less than 18 inches in depth appear to become too turbid in windy weather, too saline in summer due to high rate of evaporation and subject to excessive temperature changes in winter to provide substantial shoal grass beds. Shoal grass has not been found in waters of more than five feet in depth.

Manatee grass and turtle grass dominate the flora of South Bay and the lower Port Isabel Bay area although the vast turtle grass beds of South Bay have been reduced greatly due to silting caused by the dredging of the Brownsville Ship Channel during this project period.

An analysis of vegetation production in this area for the past seven years shows that the increase in shoal and widgeon grass in areas where there was no appreciable amounts of these grasses previously is due, in part, to the dredging of channels and the resulting deposition of spoil. In shallow areas, previously void of vegetation the dredging of a channel and resulting deposition of spoil have provided substantial vegetation to the area. The protection offered by the spoil banks provides locations for widgeon grass and the sloping sides of the channel provides water of sufficient depth for shoal grass. Both grasses benefit from increased water circulation. This is illustrated in Figure 1.

This situation has resulted in benefit to some of the Port Mansfield - Redfish Bay area. Dredging of channels in areas of substantial existing vegetation or the sweeping out or dredging of existing channels, however, can cause damage to the existing vegetation and may do more harm than good. Oil rig channels in the Three Islands area, for example, have provided some benefit locally to vegetation. The drifting silt from the dredging operation, however, has covered over much of the existing vegetation resulting in the elimination of large areas of substantial grass beds. In the Three Islands area, this destruction may become permanent in as much as the water depth was near the critical minimum depth for shoal grass and the silting may result in water too shallow for shoal grass growth. Other damage can result from decreased current flow and resulting further sediment deposition. The most recent sweeping of the Brownsville Ship Channel caused a similar problem to the turtle grass and oyster beds of South Bay.

It appears that a reevaluation of the effects of dredging and spoil deposition on marine ecology is necessary, in this area at least, to clarify the knowledge of the effects of these operations.

The brown shrimp population in the area has been very abundant in 1960, even more so than in 1959 which had been the best year since work began in this area in 1953. This is due in part to the increase in shoal grass areas which provide the suitable nursery areas for this species. The establishment of shrimp sampling stations in April 1960 and the increased work in the pass areas of the project area has increased the knowledge of the brown shrimp in this area. Larval brown shrimp enter the bay system at Brazos Santiago Pass as early as late January and early February and continue until May. Sizeable juvenile brown shrimp are present at Port Isabel by early April and by early May have extended their range to the mouth of the Arroyo Colorado. The average brown shrimp size in late April was 25 to 40 mm. By mid May, the average size of these shrimp had increased to 55 to 75 mm. with a new size class of 25 to 35 mm appearing. By mid June, the larger size had left the area, presumably to the gulf as several reports were received of large shrimp migrations to the gulf on nocturnal outgoing tides at East Pass. In previous years, this migration out of this area was noted in June going north through the land cut toward the upper Laguna Madre. This movement has not been noted as yet this year. By mid June, the 25 to 35 mm class of mid May had reached 50 to 65 mm. It appears that the movement of larval and small juvenile shrimp into the area extends from January to May; the emigration extending from June to October and the size at which these shrimp leave the bay area for the gulf at 75 to 85 mm.

White shrimp were plentiful in the El Morro area NW of the Mouth of the Arroyo during the summer months of 1959. These shrimp usually leave for parts unknown in late September with the arrival of the fall flood tides when they have reached a length of 130 to 150 mm. In late August of 1959, however, these shrimp left prematurely due to the occurrence of a hurricane tide when their length was only 105 to 120 mm in length. A few 15 to 21 mm white shrimp were found here in late June of this year but no others have been found to date. A few large whites of 150 to 210 mm were found in various shallow areas of the Arroyo in November of 1959 at an area known as Goat Island which is at a point midway between the Laguna Madre and Rio Hondo. At this same location, whites of from 24 to 52 mm and an average of 36 mm were found on June 27th of this year.

A few trachypeneaid shrimp were taken in the Port Isabel industrial basin in April and contributed to the live bait industry at that time. Palaemonetes and Tozeuma are common the the entire area, especially during warmer months and contribute to the diet of the smaller fishes.

A study of the bait fishes of the area shows that the silversides, anchovies and mullet are the only normal winter residents of the bay area. Juvenile pin perch enter the area as early as February but general distribution does not occur until April. Numbers of these fish as well as the piggie have increased greatly in the past two years due to the extension of shoal grass beds which constitute their preferred habitat. Juvenile golden croaker were common to the area in March and juvenile spot croaker appeared in Redfish Bay in numbers for the first time. Juvenile mullet and anchovies of 20 to 30 mm were very abundant at East Pass in mid April. Fingerling mullet are now (July) present in the Cayo Atascosa and adult mullet common everywhere.

Considerable information was gained on the black drum during this period. Reports and observations by contract netters during the period were of great value. Drum of all sizes were present over almost all of the bay area. Some 514,000 pounds of dressed drum were harvested by contract nets alone this year. Drum were becoming ripe in January and were fully ripe by March. Drum eggs were taken by plankton tow in early April from South Bay to Three Islands. Drum ranging in length from 165 to 205 and averaging 188 mm were found to be abundant in the Arroyo in late December of 1959. Drum of 74 to 111 and averaging 95 mm

were found in the Cayo Atascosa on July 7, 1960. The food of the adult drum in this area consists primarily of mollusc shell (both live and dead), algae, grass and small crabs.

Sow trout were found to be gravid in March with smaller trout ripening the succeeding month. Juvenile trout of 18 to 49 mm (SL) and an average of 38 mm were found throughout the shoal grass beds of Redfish Bay in late June of 1960. The majority of the summer trout populations of the area spread through the bay system along with the shrimp and bait fish in March.

Efforts to locate spawning and larval redfish were to no avail. Reports of a few 2 to 4 inch redfish in the Three Islands area in April and at the mouth of the Arroyo in May were received but efforts to locate others were futile. A small fish trap has been in operation since July 1st to check this size redfish moving up the Cayo Atascosa toward the Laguna Atascosa but without results to date. Twelve to fifteen inch redfish were present in large numbers in December in the Three Islands area. This situation was identical to that of the previous winter which resulted in a large bay population of 1+ and 2 year redfish in the summer of 1959. One year redfish were common in the Arroyo in February and 2 and 3 year reds present south of Three Islands in January and February; although most of this age were still in the gulf. This larger size was found abundant in the Redfish Bay area by June.

A large sheepshead population was located in the north end of Redfish Bay in January and proceeded southward, arriving at Port Isabel by early March. The progress of the school was readily discernable by the contract netters.

Flounder have been very abundant in the bay again this year with sizable concentrations in almost all areas of the bay. Most abundant populations were at the passes in March and at Port Isabel, Three Islands, Mouth of the Arroyo and in east Redfish Bay in June and July.

Comments: During the next period, particular emphasis will be made on the effects of channel dredging and spoil deposition on vegetation; maturity and spawning of trout, redfish and drum; location of trout, redfish and drum nursery grounds and on shrimp movements and migrations.

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Date

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FIGURE I

Suitable Bottoms for Grass Around Channels in Shallow Areas

