

## Job Report

Kenneth W. Osborn  
Marine Biologist

Project No. MS-R-4 Date March 19, 1963  
Project Name: A Study of Texas Shrimp Populations  
Period Covered: September 1, 1961 to December 31, 1962 Job No. 9

### Populations of Juvenile Shrimp in the Lower Laguna Madre

Abstract: Grooved shrimp, Penaeus aztecus and P. duorarum, were the most abundant shrimp in the lower Laguna Madre in 1962 and were present from March to December 1962. They were most abundant from April to August. White shrimp, Penaeus setiferus, were present from July to November 1962. They were most abundant in August, October and November. Grooved shrimp were found in the open areas of the bay, while white shrimp were found primarily in sloughs and backwaters which connect with the bay. Jackass shrimp, Trachypeneus sp. and the sea bob, Xiphopeneus kroyeri were abundant in the deep waters of the Brownsville Ship Channel during the winter.

Objectives: To determine seasonal abundance and size of juvenile shrimp in the lower Laguna Madre.

Procedures: Near the first and middle of each month, samples of shrimp were taken using a 10-foot trawl of 1 1/4-inch stretch mesh with an inner liner of one-fourth of an inch mesh and a 6-foot beam trawl of one-fourth of an inch mesh. From samples taken during previous years, it was determined that three sampling locations would give a representative picture of shrimp populations in the lower Laguna Madre. The locations of these stations are shown in Figure 1. The first station (S-1) is adjacent to the Intracoastal Waterway, approximately 16 miles from Brazos-Santiago Pass, in the Three Islands area. The station is east of the channel, between the channel and the spoil banks. Water depth varies from two to three feet. The bottom is mud, covered by shoal grass and patches of widgeon grass. The ten-foot trawl was used here. The second station (S-2) is located in a large slough northwest of the mouth of the Arroyo Colorado, approximately 23 miles from Brazos-Santiago Pass. The water is one to two feet in depth and the bottom is mud with little or no vegetation present. The six-foot trawl was used here. The third station (S-3) is two miles southeast of Port Mansfield and lies west of the Intracoastal Waterway, between the spoil banks and the mainland. It is approximately 36 miles from Brazos-Santiago Pass. The water is three to four feet deep and the bottom is mud covered with shoal grass. The ten-foot trawl was used at this station.

All samples were multiplied by a factor to convert to fifteen minutes if the actual time was less than that. All shrimp were measured from the tip of the telson to the tip of the rostrum and length-frequency sheets were completed. For each sample, an attempt was made to determine the modal size of the population. Where this was not successful, peaks of abundance were plotted.

In addition to the regular samples, random samples were taken at various locations noted in Figure 1, using the following equipment: a 20-foot trawl of 1 1/2-inch stretch mesh, a 100-foot minnow seine of three-eighths of an inch bar mesh and a larval sampler of about one-millimeter mesh.

### Findings and

Discussion: Penaeus setiferus: The slough at the mouth of the Arroyo Colorado (S-2) was the only regular station where white shrimp were found with any degree of regularity. Figure 2 shows the monthly abundance and modal size of white shrimp at this station. Approximately 40 shrimp per drag were taken in October and November 1961. A comparison of modal size indicates these shrimp grew approximately 30 millimeters in the two-month period. They then migrated from the area. In 1962, white shrimp first appeared early in July at a modal size of 18 to 45 millimeters. In August 1962, 900 shrimp per drag were taken. The modal size for these shrimp was 52 to 85 millimeters. No shrimp were taken in mid-August 1962. At this time the slough became landlocked by drifting shoal grass and low tides and salinity increased to 86.4 o/oo. Apparently all shrimp were killed or found some way out of the slough. By early September 1962, the slough was opened by high tides and salinity decreased to 50.0 o/oo. White shrimp with a modal size of 16-24 millimeters were found in the slough at this time. In October 1962, 1075 shrimp were taken per drag. The modal size was 52.83 millimeters. By December 1962, white shrimp were down to 268 per drag. Thus two waves of white shrimp moved into and out of this slough at the mouth of the Arroyo Colorado during 1962.

Small populations of large white shrimp were found in four backwater areas (Figure 1): (1) 10 miles up the Arroyo Colorado from its mouth, (2) the Callo Atascosa, which connects with the Arroyo Colorado, (3) a slough off the Brownsville Ship Channel and (4) in the mouth of South Bay. Samples taken several days before and on August 10, 1962 in these four locations, contained large numbers of white shrimp about 120 millimeters long. Samples taken at these locations on and several days after August 13, 1962, contained no shrimp. There was a rise in tide between these dates. A large scale emigration of white shrimp from the lower Laguna Madre to the Gulf is indicated by these observations. These dates coincide with the dates of the decline in shrimp in the slough at the mouth of the Arroyo Colorado (S-2) during the period of extremely high salinity in that slough. This would indicate that the absence of white shrimp in this slough may have been independent of the extreme salinity.

Grooved shrimp: Originally, grooved shrimp were separated into pink and brown shrimp. However, there was difficulty in identification of shrimp under 20 millimeters in length. Samples of grooved shrimp from this area were examined by personnel of the Marine Laboratory and it was found that positive identification of grooved shrimp up to and in some cases greater than, 50 millimeters was impossible. There is some doubt that two distinct taxonomic groups exist. For these reasons, what were previously called pink and brown shrimp are grouped as grooved shrimp in this report. Figure 3 shows monthly abundance and modal size of grooved shrimp at Three Islands (S-1) and the slough at the mouth of the Arroyo Colorado (S-2). Grooved shrimp were not found with any degree of regularity at Port Mansfield (S-3). Grooved shrimp were present in the slough at the mouth of the Arroyo (S-2) from mid-April to early December 1962 and were most abundant from early May to early June 1962. Twenty-three hundred grooved shrimp per 15-minute trawl were taken in

June 1962. In 1961, shrimp were present and abundant on the same dates, but only 200 shrimp per drag were taken in June 1961.

Comparison of monthly population modes for 1962 indicates four or more "waves" of shrimp which came in, grew up and emigrated. At Three Islands (S-1) grooved shrimp were present from mid-April to mid-August 1962 and abundant from mid-June to mid-August 1962. Three thousand nine hundred and fifteen grooved shrimp per 15-minute trawl were taken in early July 1962. This peak was one month later than the peak in 1961 and there was a 40 per cent decrease in number of shrimp per 15-minute trawl in 1962. It should be noted that the mode at Three Islands (S-1) remained between 20 and 60 millimeters from April to August 1962, which would indicate continued loss and recruitment to the population rather than distinct "waves" of shrimp moving in and out. At the beginning of the study period a small peak occurred at Three Islands (S-1). Approximately 300 shrimp per 15-minute trawl were taken from mid-October to mid-November 1961.

In June 1962, 40,000 grooved shrimp were stained and released in the Port Mansfield area. For two weeks no stained shrimp were recovered except near the point of release. When these shrimp began to leave the area, they were picked up along the Intracoastal Waterway as far south as the Arroyo Colorado. No stained shrimp were picked up south of the Arroyo or north of Port Mansfield. On July 8, 1962, two stained shrimp were caught by a commercial boat 15 miles north of Port Mansfield and 9 miles offshore in 14 fathoms. On the nights of July 3 and 4 large numbers of shrimp were observed congregated inside the jetties of Port Mansfield Pass. On the night of July 5, shrimp were observed moving out through the jetties into the Gulf. From these observations it would appear that grooved shrimp used Port Mansfield Pass, opened May 5, 1962, as an exit to the Gulf. There is no evidence that grooved shrimp used the landcut to the north or Brazos-Santiago Pass to the south as routes of egress, although stained shrimp did move south as far as the Arroyo Colorado.

Additional information may be found on recoveries of stained shrimp in Job Report No. 10 "Migration Study on Brown Shrimp in the Lower Laguna Madre". Small shrimp from 6 to 13 millimeters were collected in the Gulf surf in January 1962 and from June to November 1962 and were also found on the bay side of Padre Island, six miles north of Port Isabel in September 1962. These shrimp were identified by personnel of the Marine Laboratory as penaeid shrimp. Identification to species was not attempted.

Jackass shrimp, Trachypeneus sp. and the sea bob, Xiphopeneus kroyeri, were taken with the 20-foot trawl in the winter in the Brownsville Ship Channel.

Comments: Shrimp were almost completely absent from the regular stations at Port Mansfield (S-3) in 1962 and were present at other locations in the same general area. An additional station established in Port Mansfield Channel, east of the Intracoastal Waterway, should yield valuable information. A new station established near Brazos-Santiago Pass in the Port Isabel area would provide more accurate data on when shrimp first enter the bay.

Sampling should be done in the passes with a special net of small mesh to obtain larval shrimp as they enter the bay. In connection with this, work should be continued with the one millimeter samples in the bay and in the Gulf surf to determine the distribution and seasonal abundance of larval shrimp in these areas.

Work is needed on the taxonomy of Penaeus aztecus and P. duorarum so that accurate records can be kept on size, abundance and seasonal distribution of each species present in the lower Laguna Madre.

Prepared by: Kenneth W. Osborn  
Marine Biologist

Edward J. Pullen  
Project Leader

Ernest G. Simmons  
Regional Supervisor

Approved by

Terance R. Lee  
Coordinator

Figure 1

Location of Shrimp Sampling Stations  
in the Lower Laguna Madre

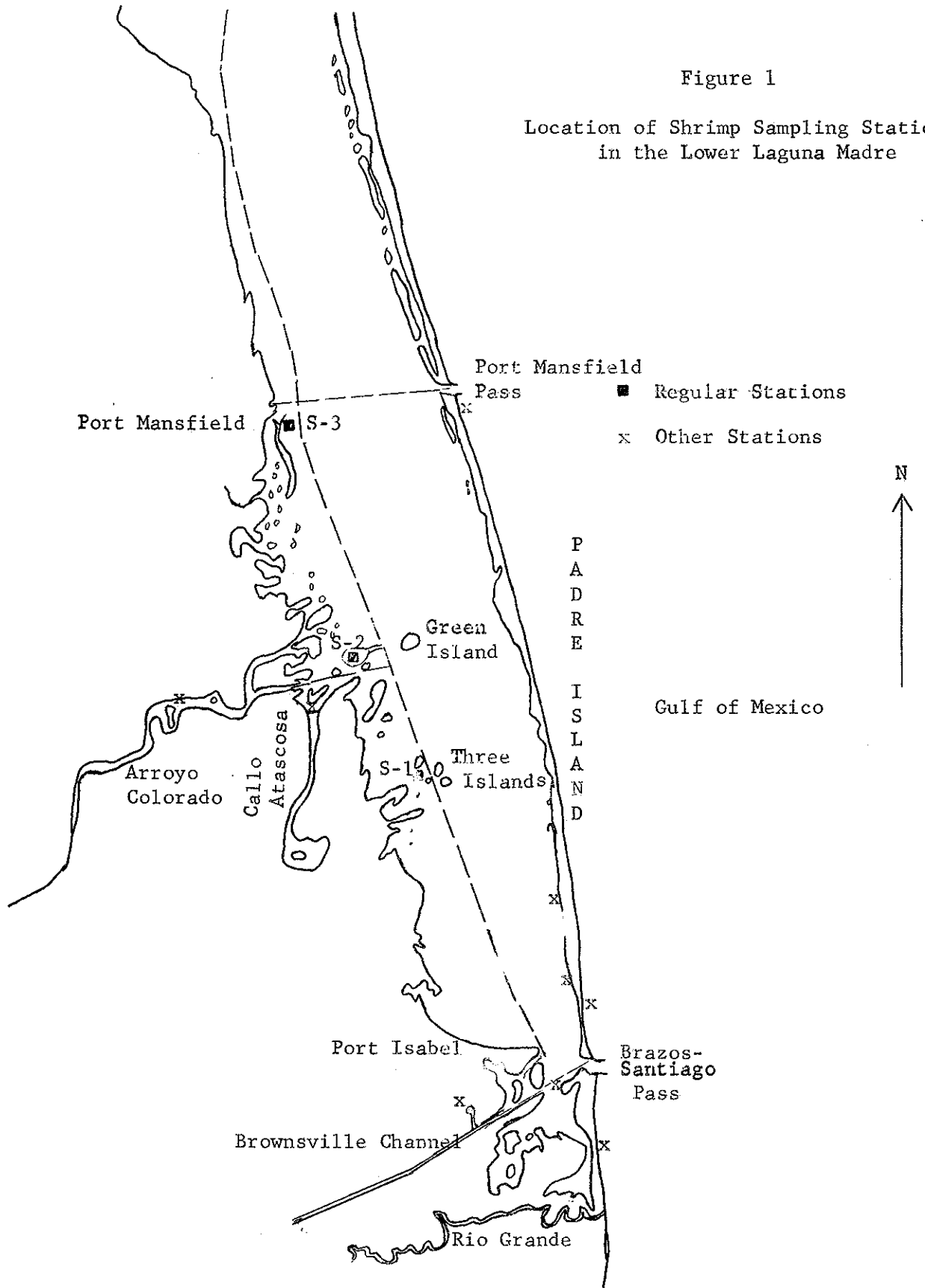


Figure 2  
 Number and Population Mode of White Shrimp by Month  
 Mouth of the Arroyo (S-2)

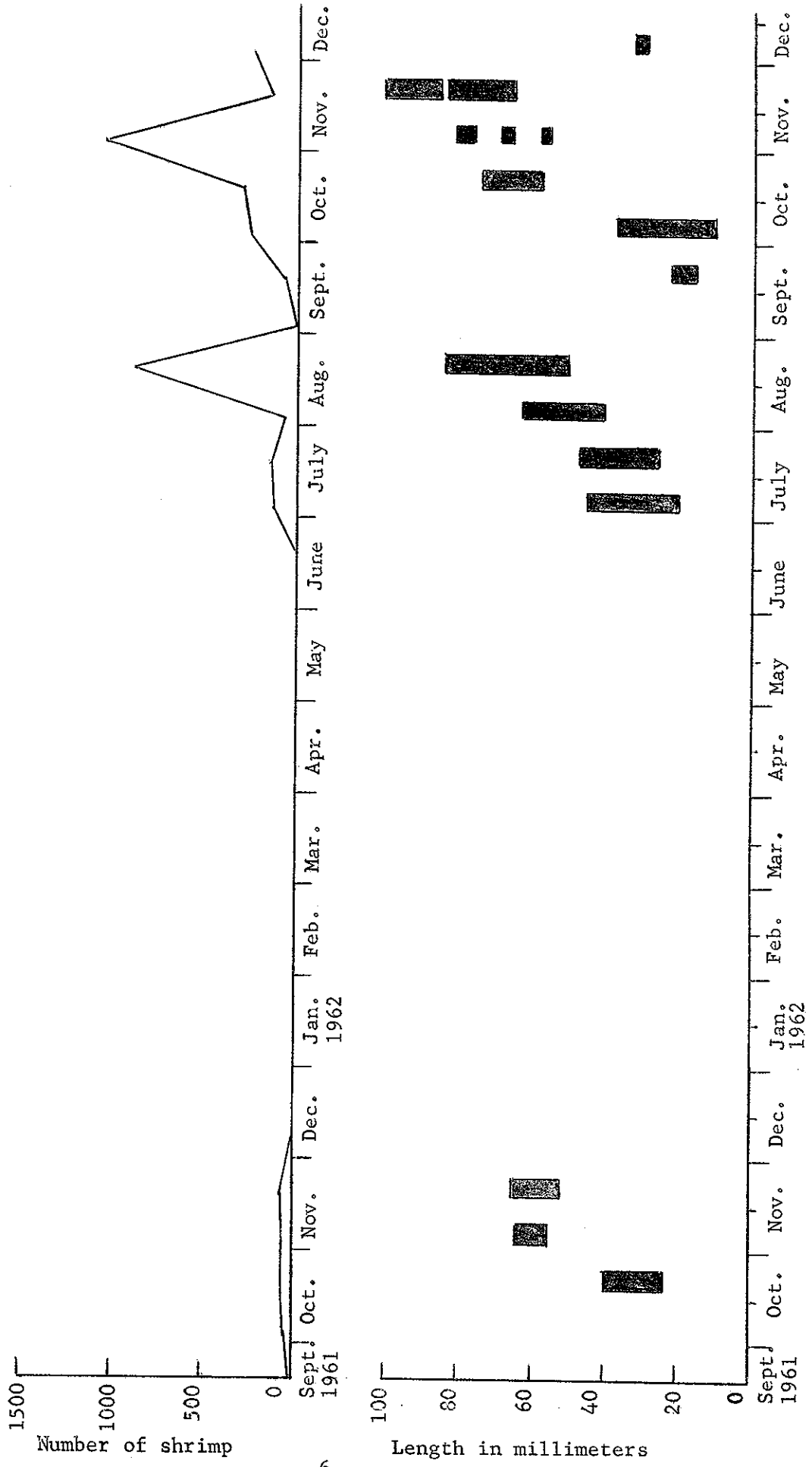


Figure 3  
 Number and Population Mode of Grooved Shrimp by Month  
 At Two Representative Stations in the Lower Laguna Madre

