Job Report

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Project Name: Studies of Blue Crab Populations of the Texas Coast

Period Covered: September 1, 1961 to December 31, 1962 Job No. 5

Population Studies of the Blue Crab, Callinectes sapidus Rathbun, in the Aransas Bay System

Abstract: Ten-foot trawl samples in 1962 had a lower crab catch by 65.6 per cent compared to 1960 figures. No data were gathered in 1961 as work was concentrated on habitat studies. Commercial crab production for three years starting in April 1960 averaged 1,451,240 pounds per year in the Aransas area. A total of 4,355,720 pounds of crabs were harvested commercially during those three years. Whether the crab fishery in Aransas Bay can be maintained cannot be ascertained at this time. When more records become available through more intensive sampling, it may be possible to predict the annual crab catch and predict a rise or fall in abundance.

Objectives: To determine the population and seasonal abundance of the blue crab in the Aransas Bay system.

Procedure: Sampling for blue crabs was conducted with trammel net or drag seine, minnow seine, otter trawls and a bar seine. Sampling was done at stations (Figure 1) scattered over the Aransas Bay area so most types of habitat were sampled.

Monthly collections were made up of four 20-foot otter trawl samples, eight 10-foot trawl samples, four trammel net or drag seine samples, four minnow seine samples, and two bar seine samples.

The trammel net as well as the drag seine used was of 3-inch stretch mesh. The trammel net was 1200 feet long and 40 inches deep with brails of 12-inch stretch mesh. The drag seine was 600 feet long and 6 feet deep with the bag near the center. The minnow seine used was 60 feet long, 6 feet deep, and had a stretched mesh of three-fourth of an inch. The bar seine was 6 feet wide and constructed of one-half of an inch stretch mesh. The 20-foot trawl was made of 1 1/2-inch stretch mesh and the 10-foot trawl was made of 1 1/4-inch stretch mesh with an inner liner of one-half of an inch stretch mesh in the cod end of the trawl.

All crabs taken by these methods were checked for external parasites, measured, sexed and counted. At each station the water temperature, turbidity and salinity were measured. The water temperature was measured with a centigrade thermometer. The turbidity was determined with the use of a U. S. Geological Turbidity Scale and the salinity was measured with specific gravity hydrometers and Knudsen's Hydrographic Tables.

Findings and Discussion: Information derived from this study may be found in Figures 2 through 8. It was found that the crab catch per unit of effort (one unit of effort is one 15-minute trawl) for the 10-foot trawl in 1962 was below that of 1960 by 65.5 per cent (Figure 2). Commercially, a total of 4,295,697 pounds of crabs were produced locally in the three years represented in Figure 8. This gives an average crab production from the Aransas area of 1,431,899 pounds per year.

As noted in Figure 2, a large difference in catch per unit of effort for 1960 and 1962 existed in the 10-foot trawl samples. All months except August had a higher catch per unit of effort in 1960. Overall, a 65.6 per cent drop in crab catch was experienced in 10-foot samples in 1962.

In Figures 2, 3 and 4, it is noted that a low catch in deep water trawl samples corresponds to a high catch in shallow water seine and net samples (Figures 5 and 6). It is evident from this finding that crabs moved from deep water to shallow water during that period of the year. In other words, as the waters warmed on the flats, crabs moved out of deep water into the shallows. Commercial crab production (Figure 8) does not show a sharp drop during those summer months because crab fishermen followed the crabs into shallow water with their traps. There was, however, a slight decline in crab production during the summer which was probably a result of female crabs leaving the bay for the Gulf for spawning. Starting about June for the last three years sponge crabs were seen moving toward the Gulf of Mexico through Cedar Bayou in large numbers.

If the crab population has been overfished in this area, it is not shown in crab production figures. The few months of low production (Figure 8) may be explained as natural disturbances. In 1960 and 1961, the month of May was extremely windy. Seas were so rough, it was almost impossible to conduct field work for this study. In September of 1961, Hurricane Carla disrupted crab production. A similar disruption was caused by a freeze early in January of 1962.

Aside from disturbances such as storms, freezes and high winds, the one factor which would hurt the crab industry in the Aransas Bay area would be extreme salinities. Past research in the upper Laguna Madre indicates that crabs become scarce at salinities exceeding 40 o/oo. How high salinities can get before a drop in commercial production occurs remains to be seen. In this area, salinities approached 40 o/oo in 1962. In the fall, rainfall increased and salinities dropped into the middle twenties.

In Figure 9, a comparison between male crabs and females collected in all methods of sampling is shown. Except for December 1961-1962, the males exceeded the females in number. The trend at the end of 1962 was toward a reduction in abundance of both male and female in the study catch, but in December the female again became more abundant than the male. This increase in abundance of females can be related to the movement of females back into the bays after spawning.

Monthly length frequency distributions of crabs from 10-foot, 20-foot and 60-foot seine catches are shown in Figure 10. From January through June, the largest portion of the crabs caught were less than 50 millimeters in size. November and December figures also indicate a crop of small crabs. For nine months out of the year, juvenile crabs dominated the catch.

In August, September and October, young-of-the-year entered the commercial catch as they became big enough to be used economically in the crab industry. In November, however, there were very few large crabs, and in December large commercial crabs were absent from study samples. This could mean that a large portion of the crabs had been harvested. Figures 8 and 10 show that a large commercial catch was made in March, thus reducing the dominant size class in February (Figure 10). The next four months show a decline in commercial production but there was an increase in large crabs caught in September and October (Figure 10). In October an increase in commercial harvest (Figure 8) probably caused a reduction in the number of large crabs present in November (Figure 10). This was followed by a further reduction in December when no large crabs were taken in study samples, and the commercial production dropped to 60,000 pounds.

Further study should enable predictions of catch and changes in abundance.

Young-of-the-year crabs did not fully enter the fishery until August, September and October of the next year. Since the crab spawning season is long, a steady introduction of juvenile crabs into the fishery each month should provide a steady catch. A heavy harvest occurred between July and December when most of the crabs reach a harvestable size.

It is indicated that the commercial catch should hold fairly steady in 1963. How high the catch will be may depend on the success of the spawn in 1962. If salinities were too high in the bay area, there may be a drop in production as compared with 1962. It must be realized that 61 per cent less rainfall occurred in this area than in 1961. If the relationship of crab abundance to salinity proves valid, it may be that the total production in 1963 will be lower than in 1962.

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Figure 1
Crab Sample Stations in the Aransas Bay Area

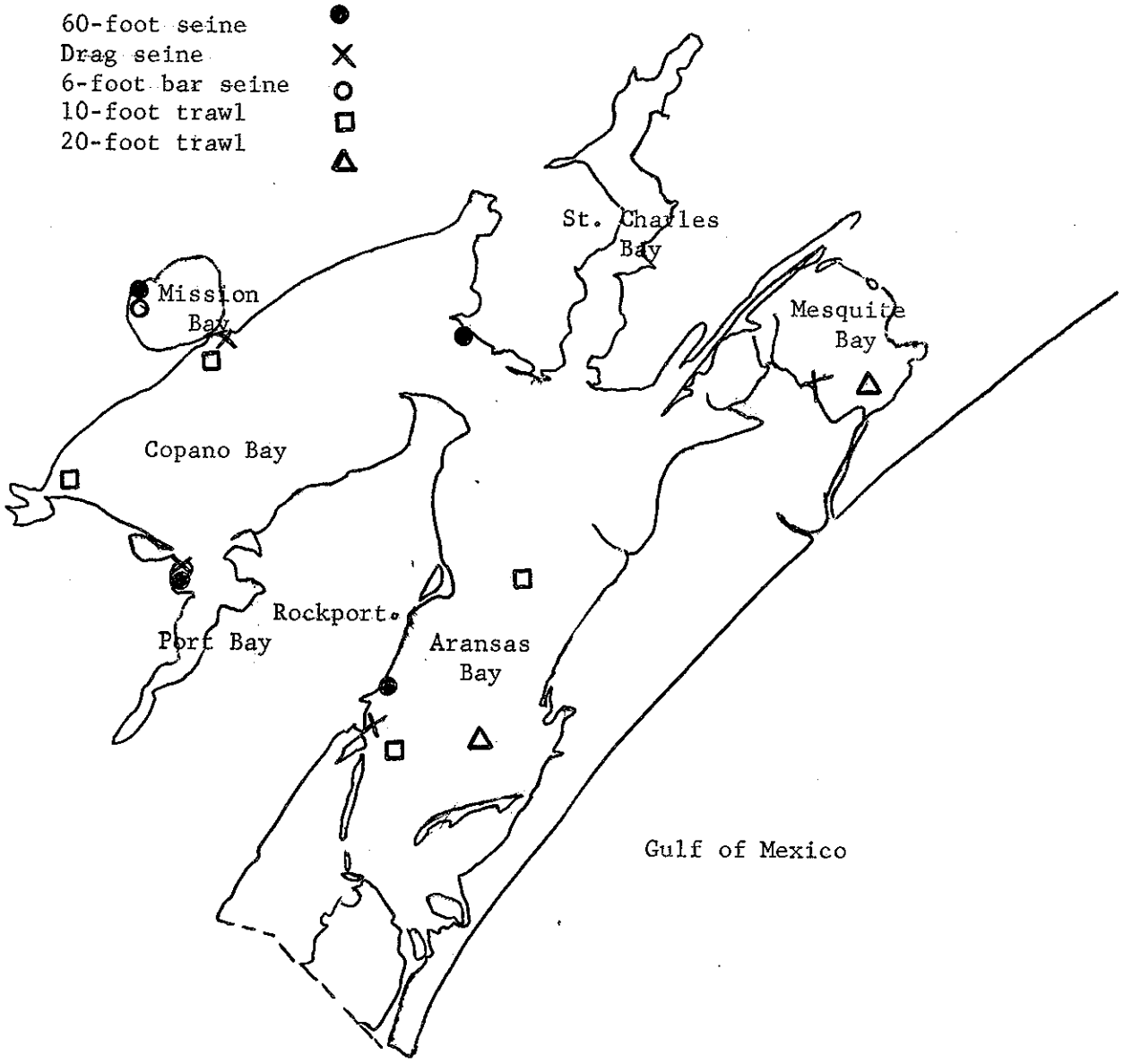

Figure 2
A Comparison of Monthly Catch of Crabs Per 15-minute 10-foot Trawl Sample
in 1960 and 1962

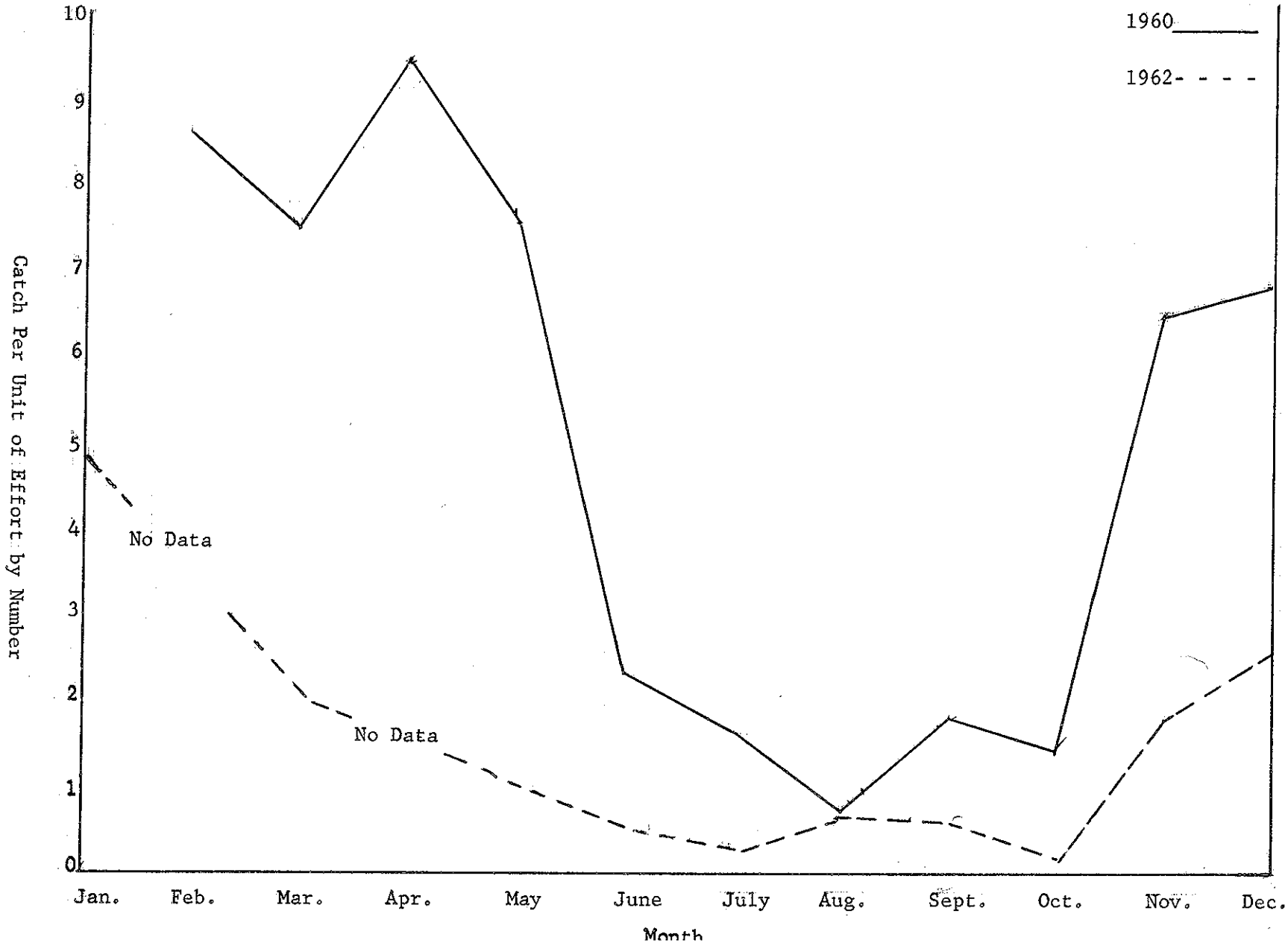

Figure 3
The Monthly Catch Per Five-Minute Bar Seine Sample
In 1962

Figure 4
The Monthly Catch Per 15-Minute 20-foot Trawl Sample
In 1962

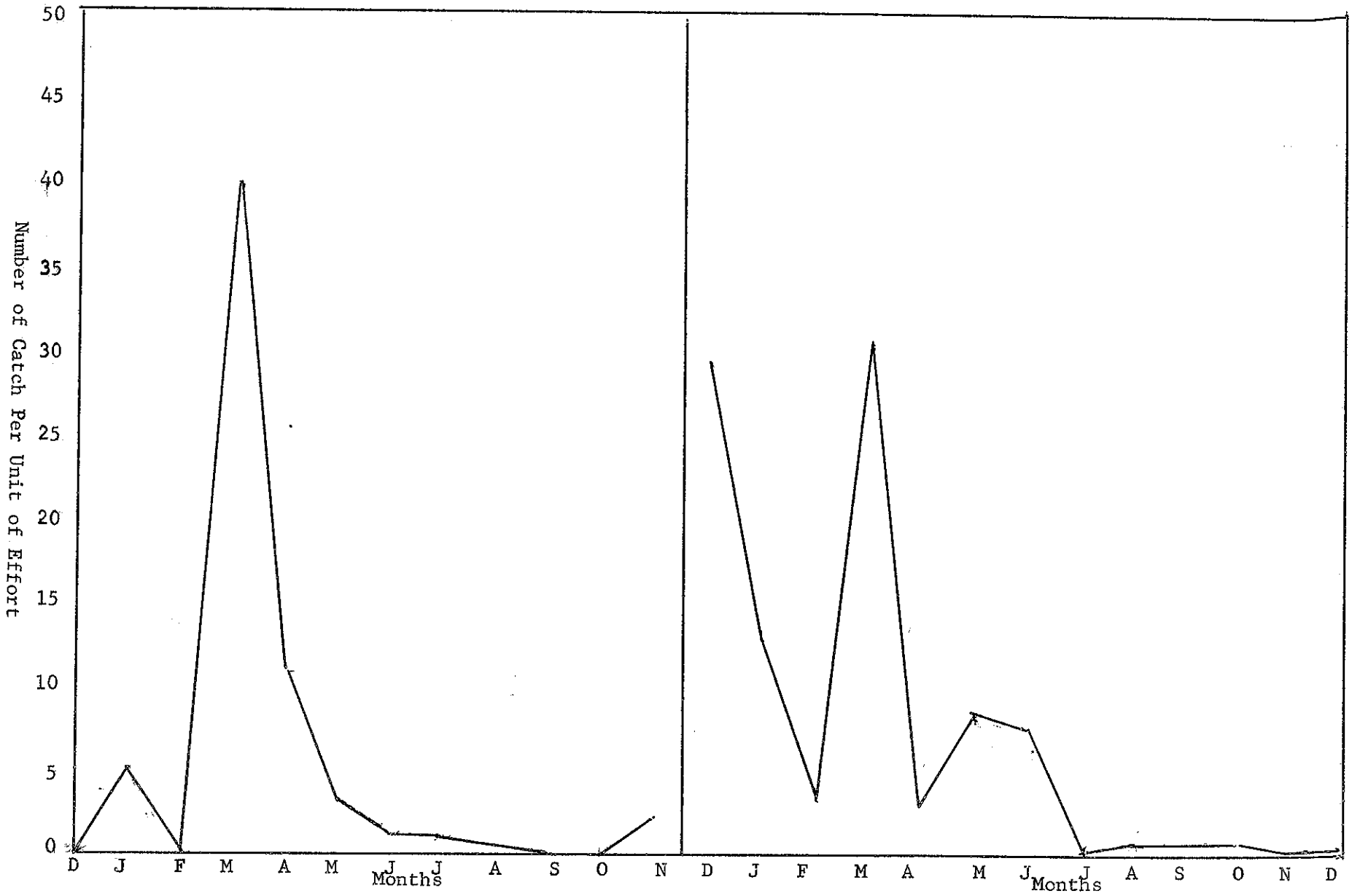

Figure 5
Monthly Catch Per Trammel Net or Drag Seine Haul of Crabs in Number Per Acre in 1962

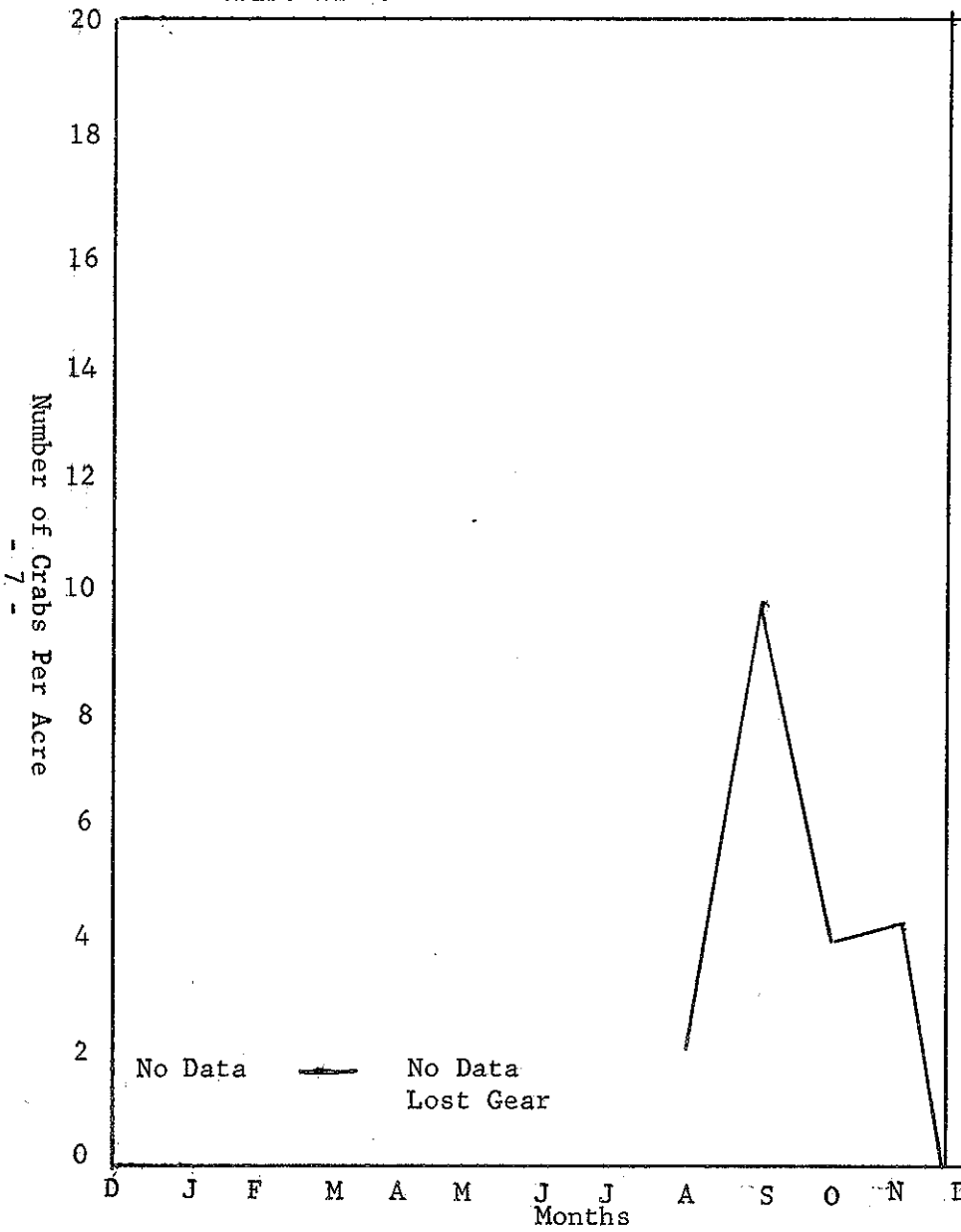

Figure 6
Monthly Catch Per 60-foot Seine Haul of Crabs In Number Per Acre in 1962

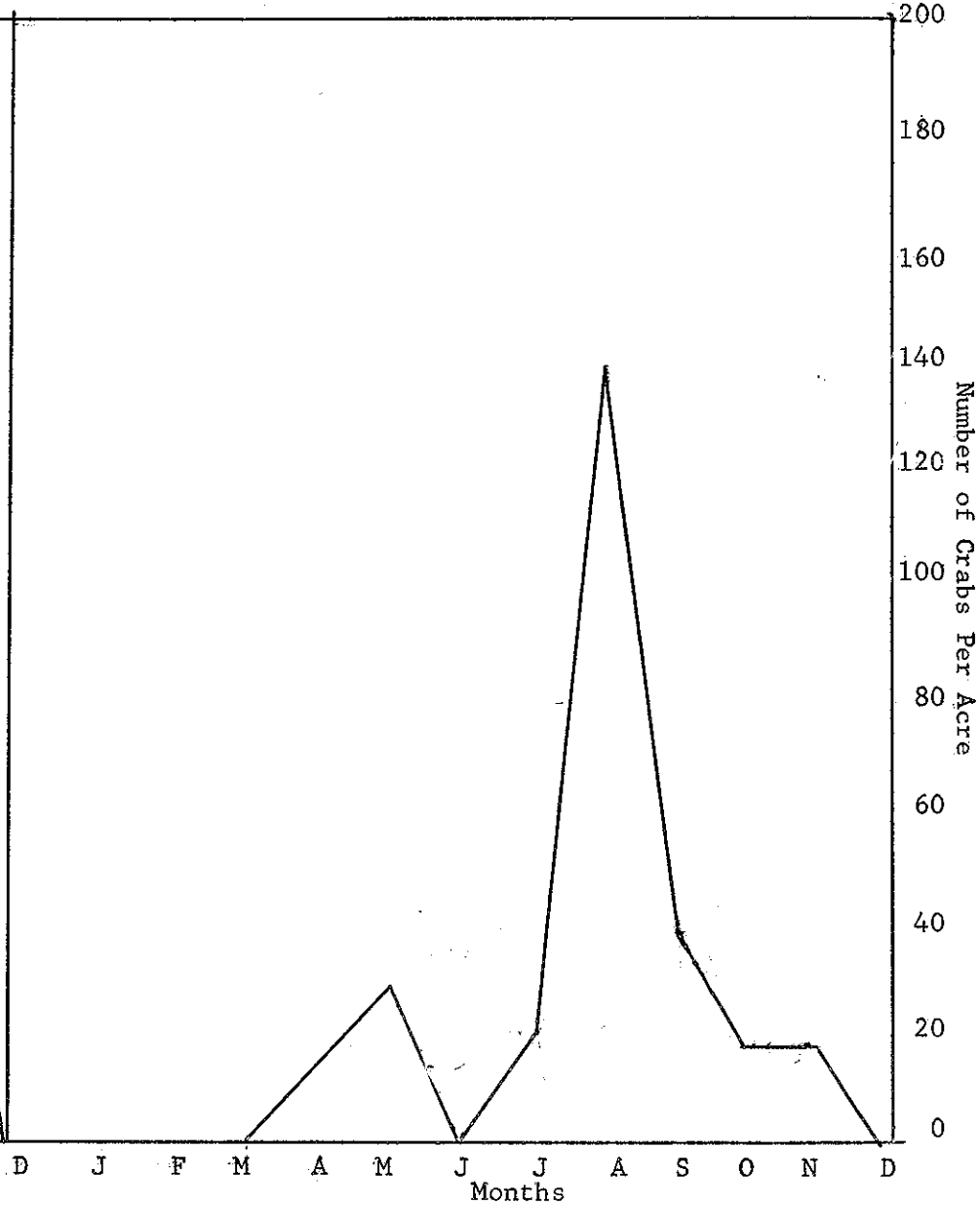

Figure 7
A Comparison of Fishing Gear in Crabs Per Haul in 1962

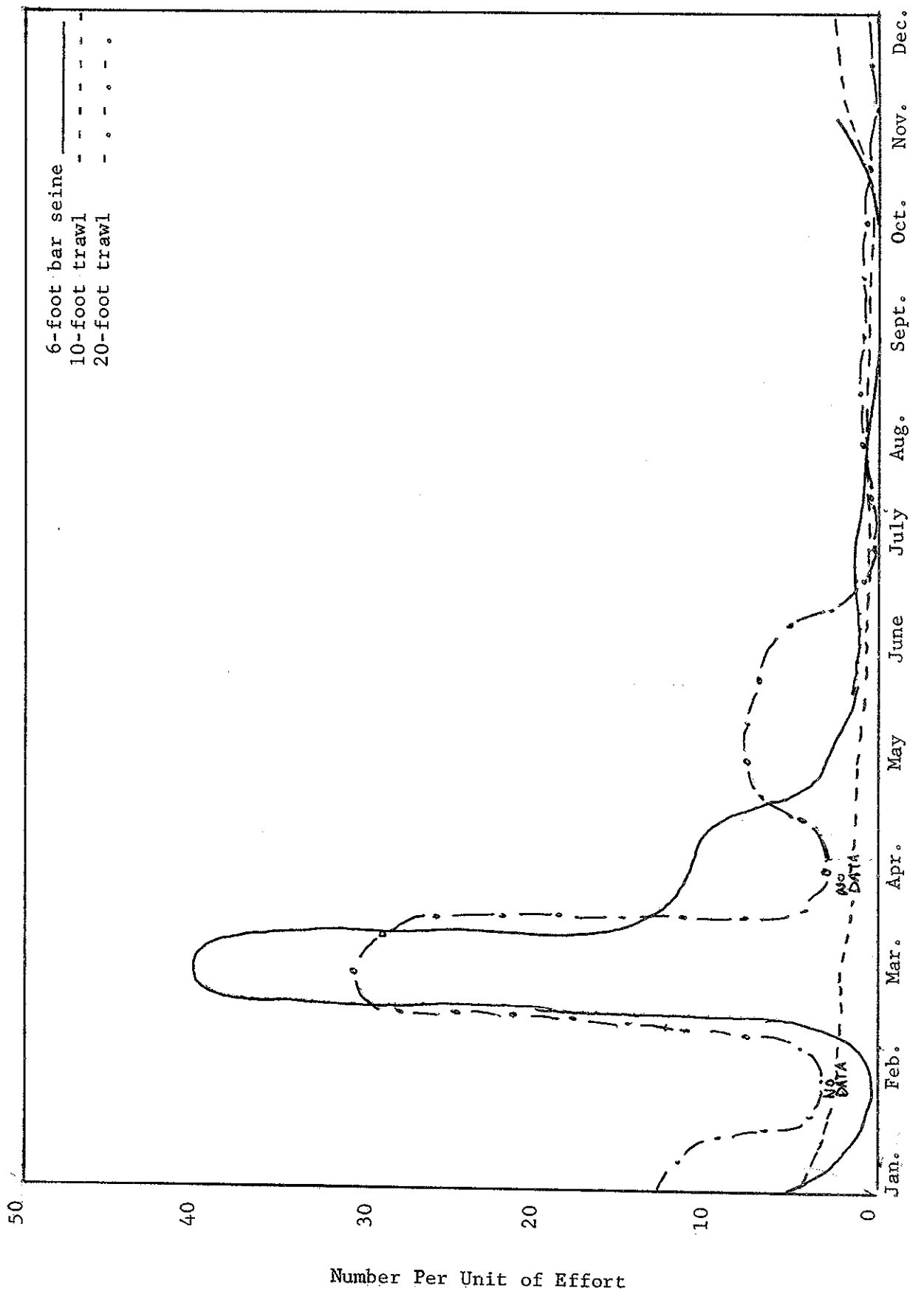

Figure 8
A Comparison of Monthly Crab Landings From the Aransas Bay Area-1960-1961-1962

Figure 9
A Comparison of Male to Female Catch From 1962 Study Samples

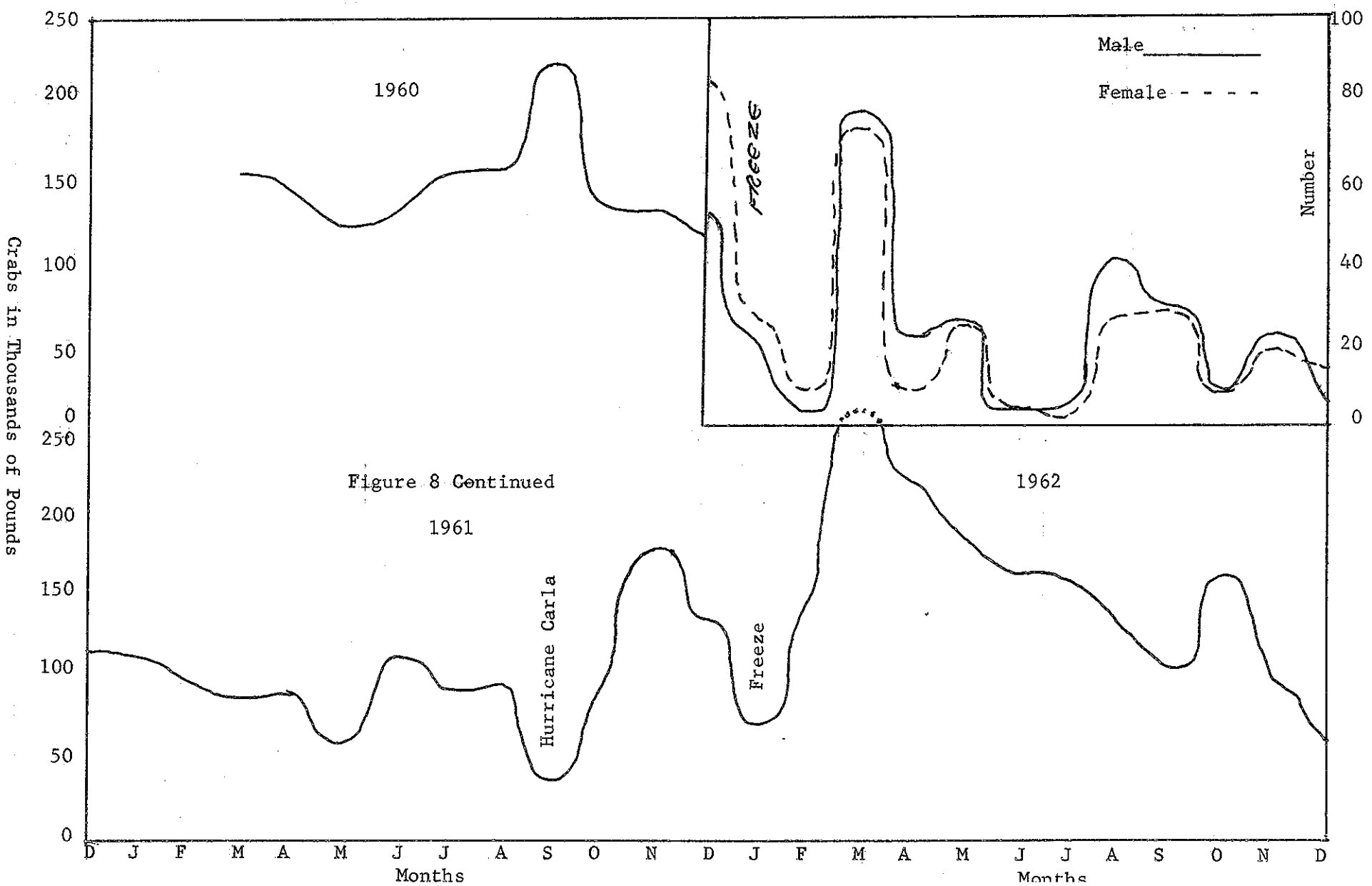

Figure 8 Continued

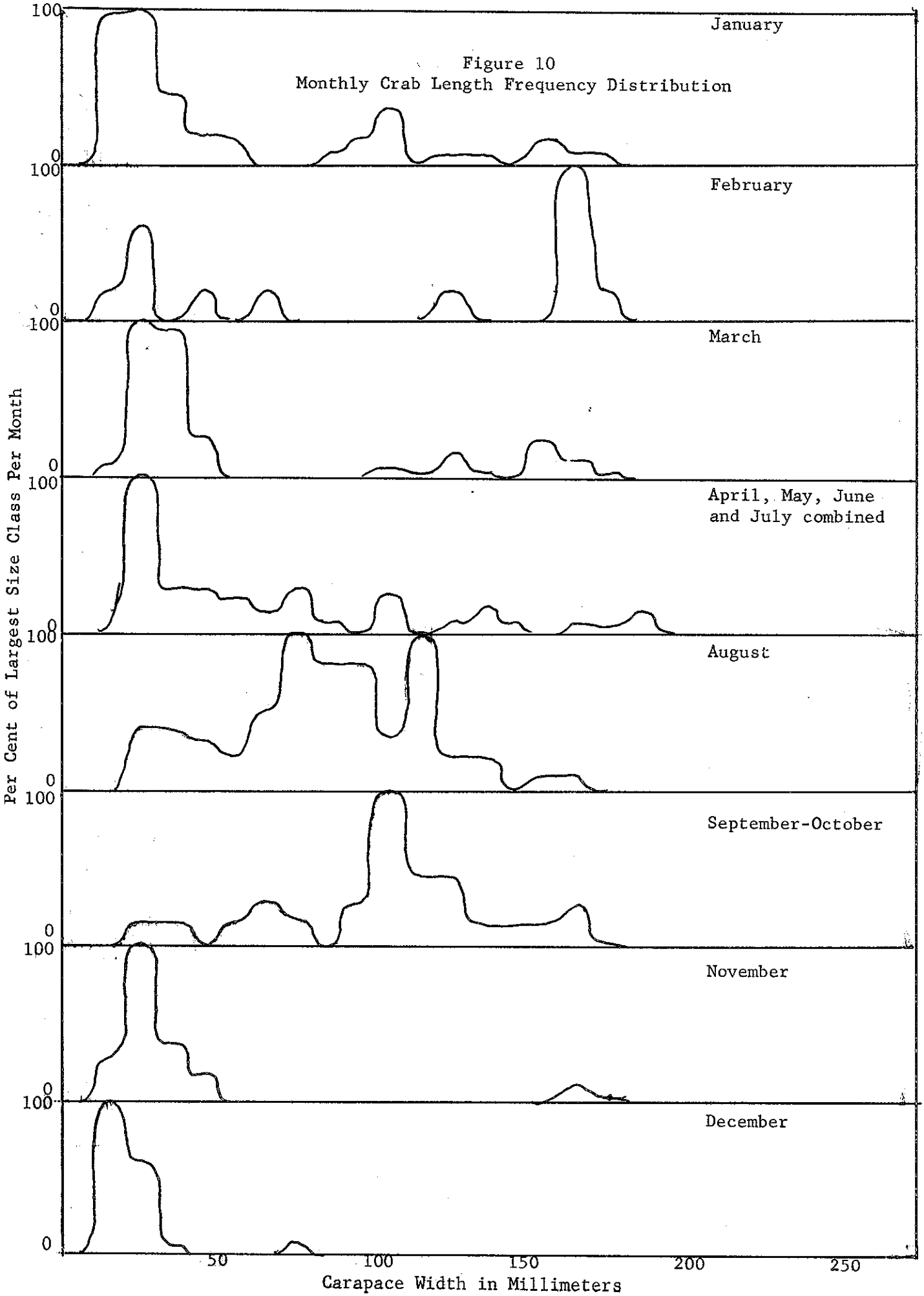

Figure 10
Monthly Crab Length Frequency Distribution