

Job Report

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Project Name: A Study of the Texas Shrimp Populations
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A Study of Populations of Juvenile Shrimp in the Aransas Bay Complex

Abstract: Brown shrimp were 69.1 per cent less abundant in 10-foot trawl samples in 1962 than in 1961. White shrimp were 69.3 per cent less abundant. Twenty-foot trawl samples had 96.7 per cent less browns and 93.2 per cent less whites. There was 61 per cent less total rainfall in 1962 than in 1961. Bar seine samples in tertiary Mission Bay were void of white shrimp in 1962. Shrimp achieved a higher modal size in 1962 than in 1961. Commercial shrimp production in the Aransas Bay area increased 37.7 per cent for brown shrimp and dropped 86.2 per cent for white shrimp in 1962. It is difficult to compare commercial production to figures from this study because commercial landings reflect legal sized shrimp only.

Higher salinities in Mission Bay caused habitat changes in 1962.

Objectives: To determine the seasonal abundance and size of juvenile shrimp in the Aransas Bay area.

Procedure: Six shrimp sample stations previously established in Aransas, Mesquite, Copano and Mission Bays, were sampled on the first and the fifteenth of each month. A 20-foot otter trawl of 1 1/2-inch stretch mesh was used to sample shrimp in Aransas and Mesquite Bays (Figure 1) at what was termed "Roving Trawl Stations". These stations were determined by the presence of the working commercial fleet.

A 10-foot otter trawl with a one-fourth of an inch mesh inner liner in the cod end of the trawl was used for shrimp sampling at 2 stations in Aransas Bay and 2 stations in Copano Bay (Figure 1). The 10-foot and 20-foot trawls were pulled behind a work boat at 1200 rpm, for 15-minute sample periods. A small 6-foot bar seine of one-half of an inch stretch mesh was used for sampling juvenile shrimp in tertiary Mission Bay. It was pulled by hand for five minutes in shallow waters near shore.

At each station water temperature, turbidity and salinity was measured. Water temperature was determined with the use of a centigrade thermometer and the water turbidity with a U. S. Geological Survey Turbidity Scale. Salinities were calibrated with specific gravity hydrometers and the use of Knudsen's Hydrographic Tables. Climatological information was taken from data recorded at the Marine Laboratory in Rockport.

Commercial species of shrimp captured during the course of the study were measured in millimeters from the tip of the rostrum to the tip of the telson and weighed in pounds. The information thus derived was recorded and filed for later analysis.

Findings and

Discussion: In comparing the results of 1962 shrimp biological sampling with that of 1961, it was found that the abundance of white and brown shrimp dropped appreciably. The actual decrease for the three most productive months of the year (May, June and July) for brown shrimp was 69.1 per cent (Figure 2). The drop for white shrimp during August, September, October and November was 69.3 per cent (Figure 2). Further evidence of a smaller crop of shrimp in 1962 is shown in Figure 3 which compares the results of sampling with the 20-foot trawl in 1961 and 1962. The drop per unit of effort for the 20-foot trawl for browns was 96.7 per cent and for whites 93.2 per cent. Only the months of greatest abundance were used in deriving the above catch percentages. A unit of effort is one 15-minute trawl sample.

Figure 4 indicates that the most drastic decrease in abundance took place in the white shrimp population. This reduction in white shrimp may be explained by the reduced total rainfall in 1962. There was actually 61 per cent less rainfall at Rockport in 1962 than in 1961. Gunter (1954) suggests that rainfall is a determining factor in white shrimp abundance. This study further substantiates his findings.

Less rainfall would allow an increase in salinities in the bays and thus affect a change in the floral components therein. In Mission Bay in 1961, white shrimp were quite abundant at the bar-seine station (Figure 5). The salinity average for that station was 14.6 o/oo and there was a heavy growth of widgeon grass, Ruppia maritima Linnaeus, present. In this year's study the salinity average for the same station was 22.2 o/oo and the widgeon grass had been displaced by scattered tufts of shoal grass, Diplanthera wrightii (Ascherson) Ascherson.

It cannot be assumed, however, that white shrimp were completely absent from Mission Bay. Ten-foot trawls caught many white shrimp leaving Mission Bay and entering Copano Bay where the two bays connect (Figure 1). This indicates that due to habitat changes at the bar-seine station, white shrimp had used more suitable portions of Mission Bay as a nursery area.

A presentation of modal size classes of shrimp taken by the three methods of sampling is found in Figures 5, 6 and 7. Figure 5 shows the dominant sizes of shrimp taken in 1961. Figures 5 and 6 show that brown shrimp achieved a larger modal size in 1962 by some 10 millimeters.

White shrimp were taken in 10-foot trawl samples in the late winter and early spring in 1961 but not in 1962. In Figure 6, 20-foot trawl samples indicated that white shrimp were present although not captured by the 10-foot trawl.

A comparison between commercial catches in 1961 and 1962 is found in Figure 8. The data for this graph were taken from records of the U. S. Fish and Wildlife Service for the Aransas Bay area. The percentage difference between the two years showed that brown shrimp production was up 37.7 per cent and whites were down 86.2 per cent.

The increase in brown shrimp production per unit of effort may be related to reduced rainfall. The decrease in white shrimp in biological samples by some 93.2 per cent agrees well with the 86.2 per cent drop in total commercial production.

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Figure 1
Aransas Bay Area Shrimp Sample Stations

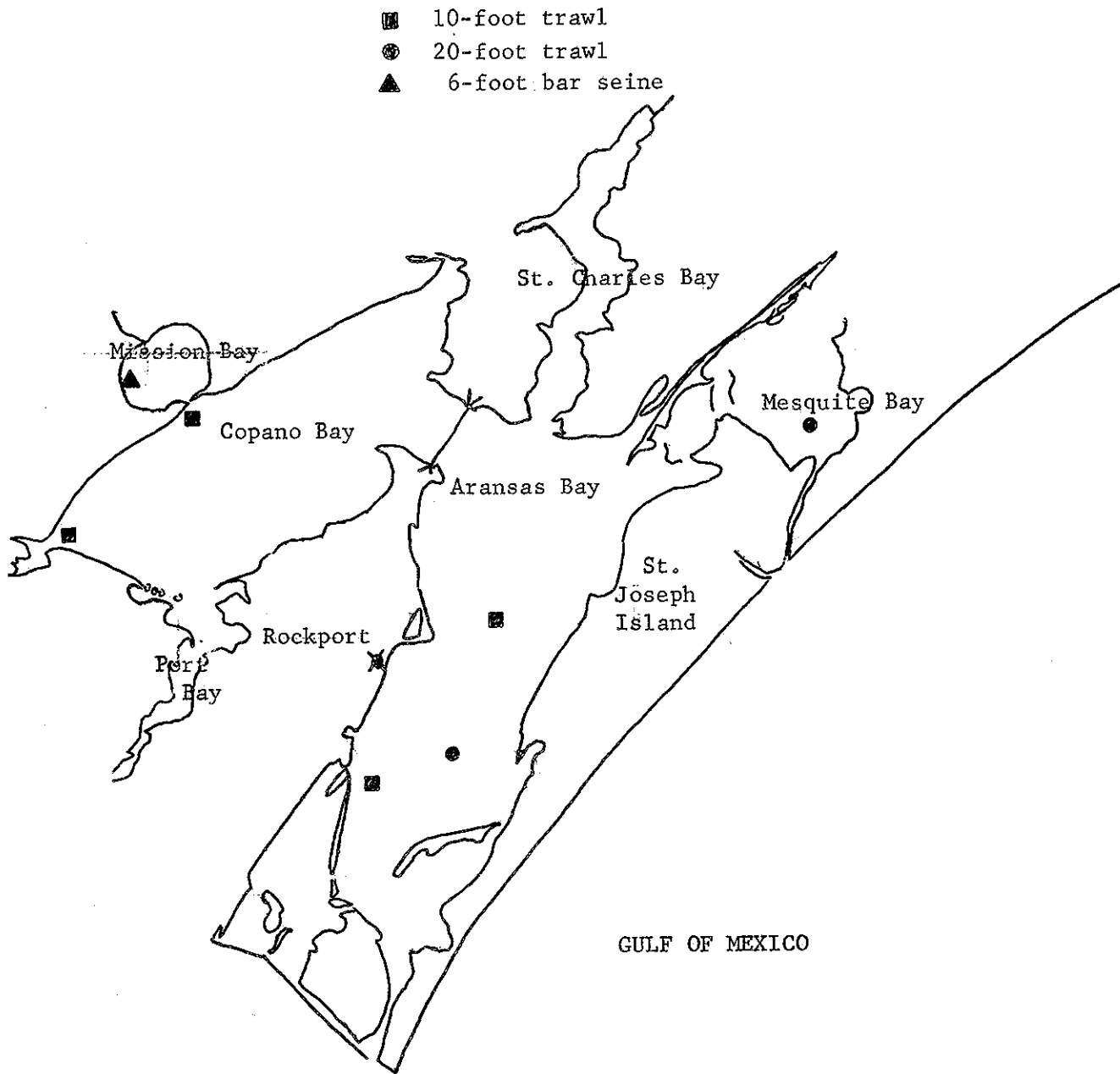


Figure 2
 A Monthly Comparison of White and Brown Shrimp Catch Per Unit of Effort
 Related to Rainfall in 1961 and 1962 for the 10-foot Otter Trawl

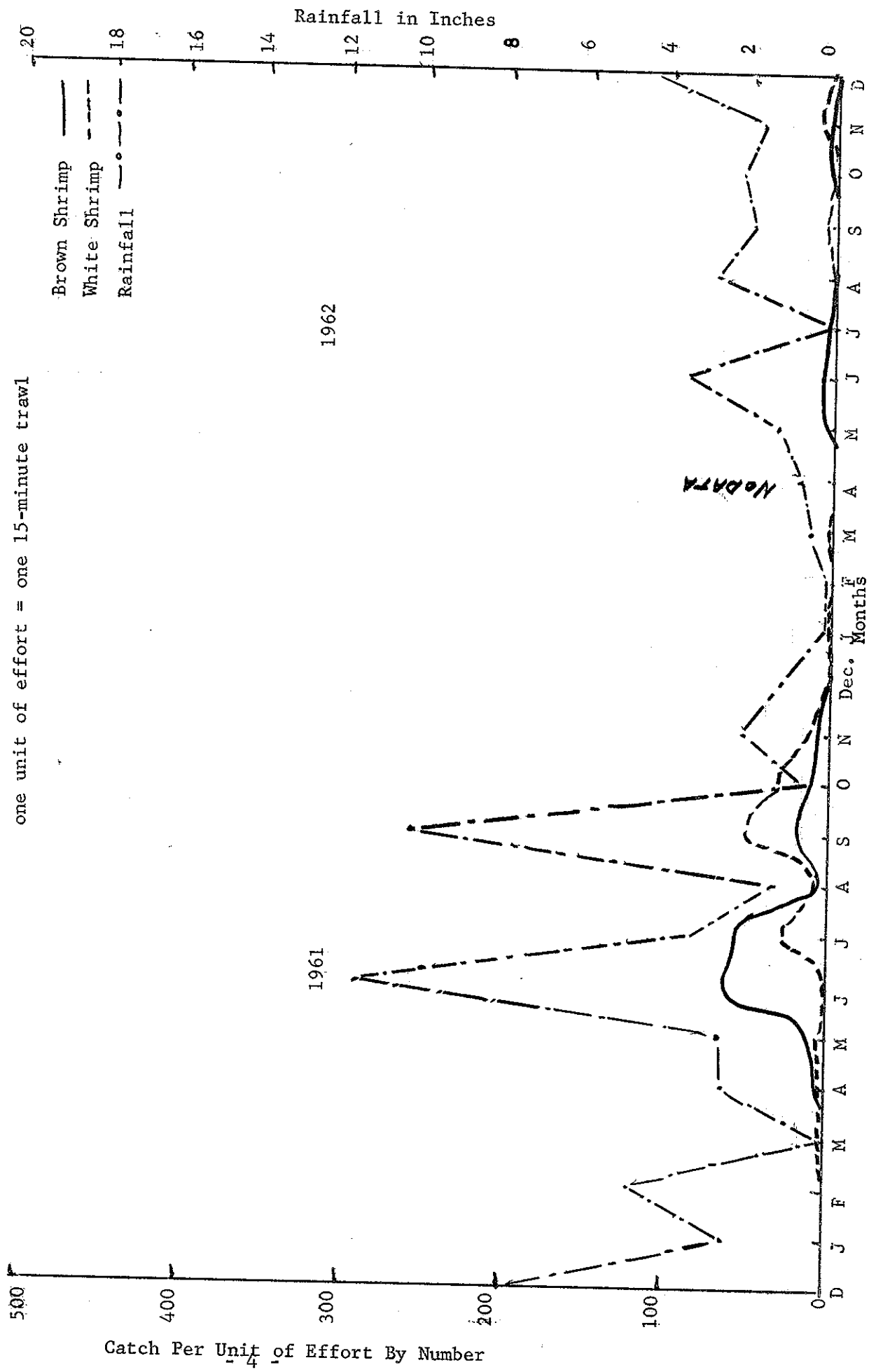


Figure 3
 A Monthly Comparison of White and Brown Shrimp Catch Per Unit of Effort
 Related to Rainfall in 1961 and 1962 in the 20-foot trawl

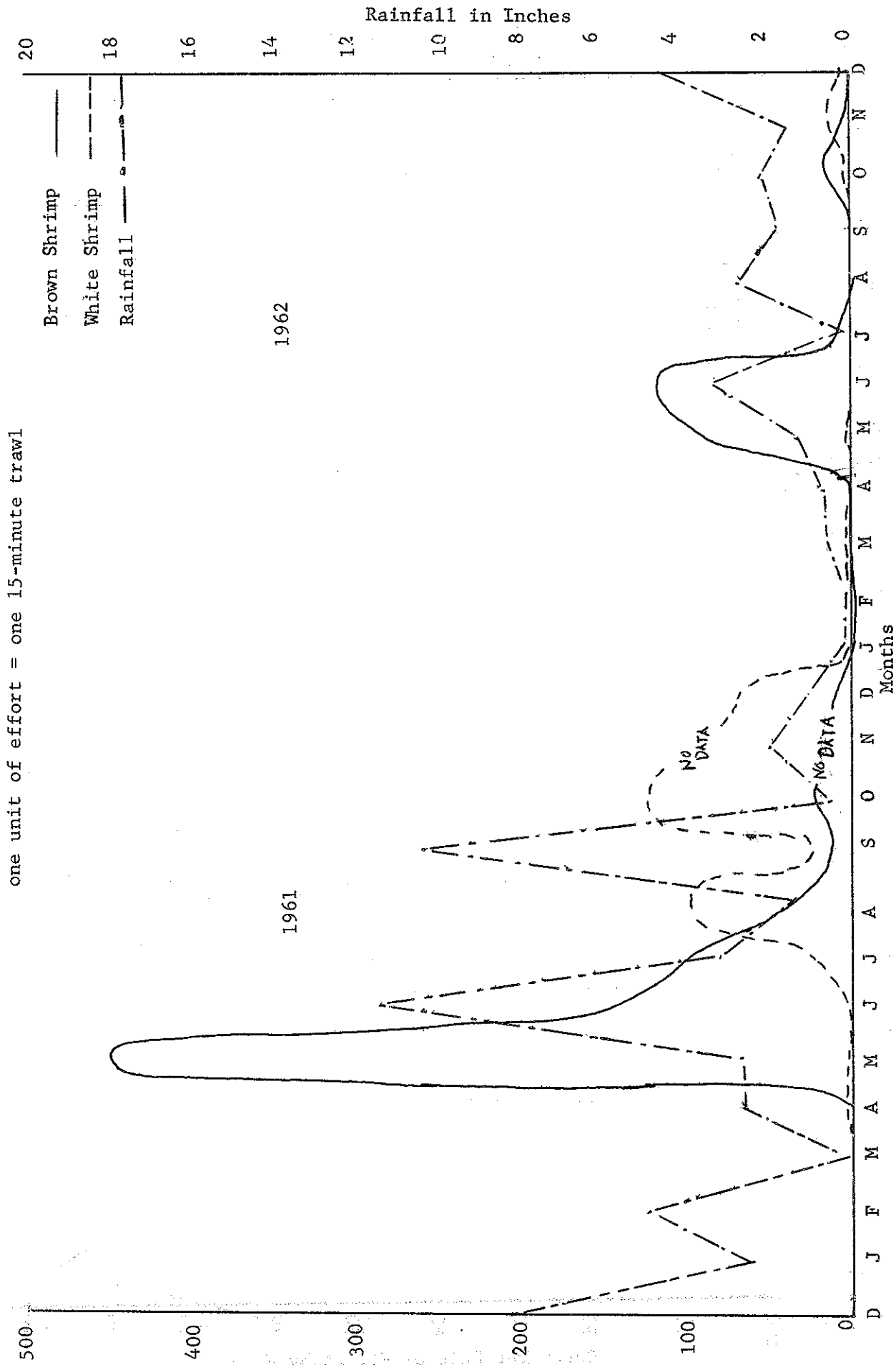


Figure 4

A Monthly Comparison of White and Brown Shrimp Catch Per Unit of Effort Related to Rainfall in 1961 and 1962 for the 6-foot bar seine

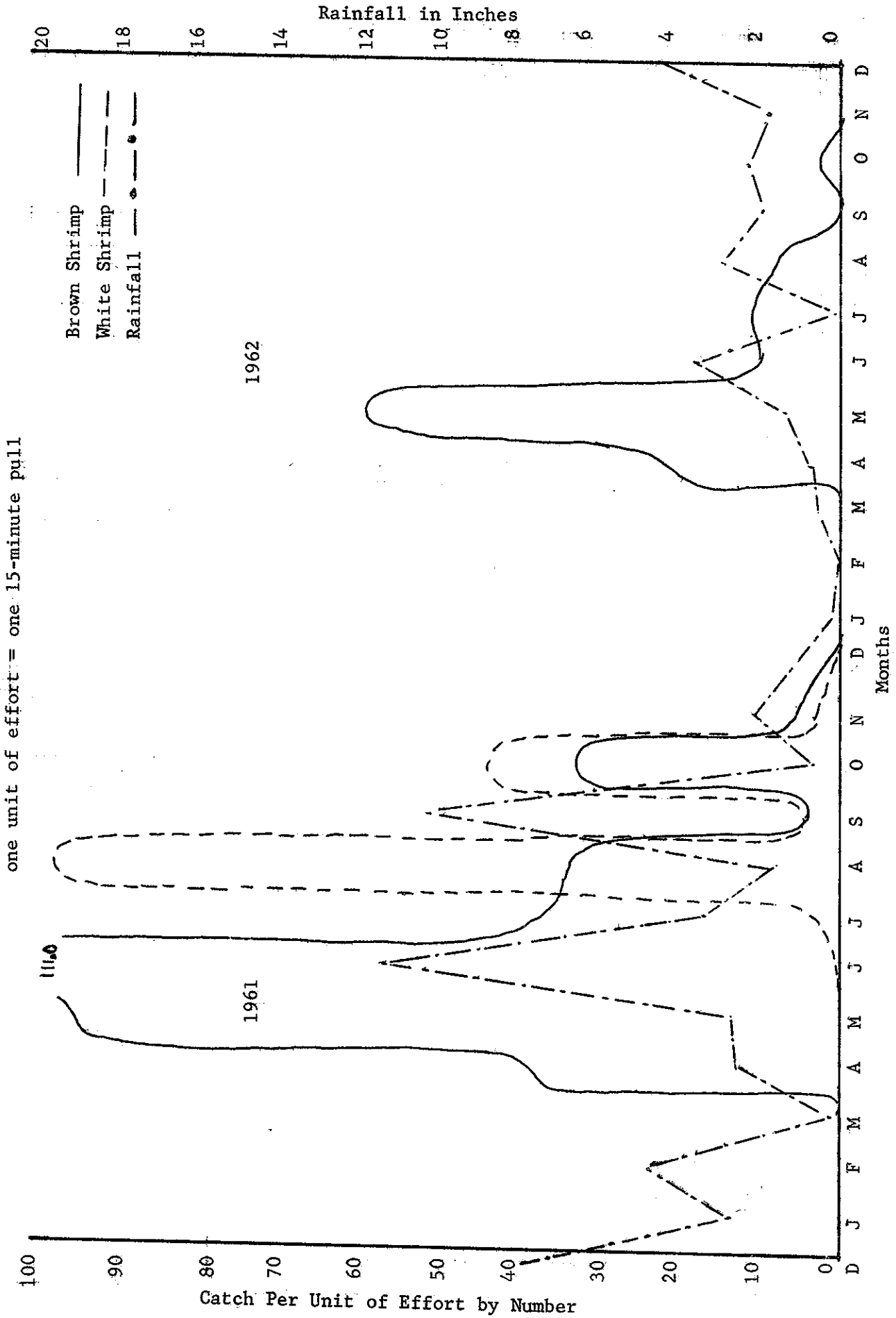


Figure 5
 Monthly 10-foot Trawl Catch of Brown and White Shrimp in Modal Size Classes
 in 1961 and 1962

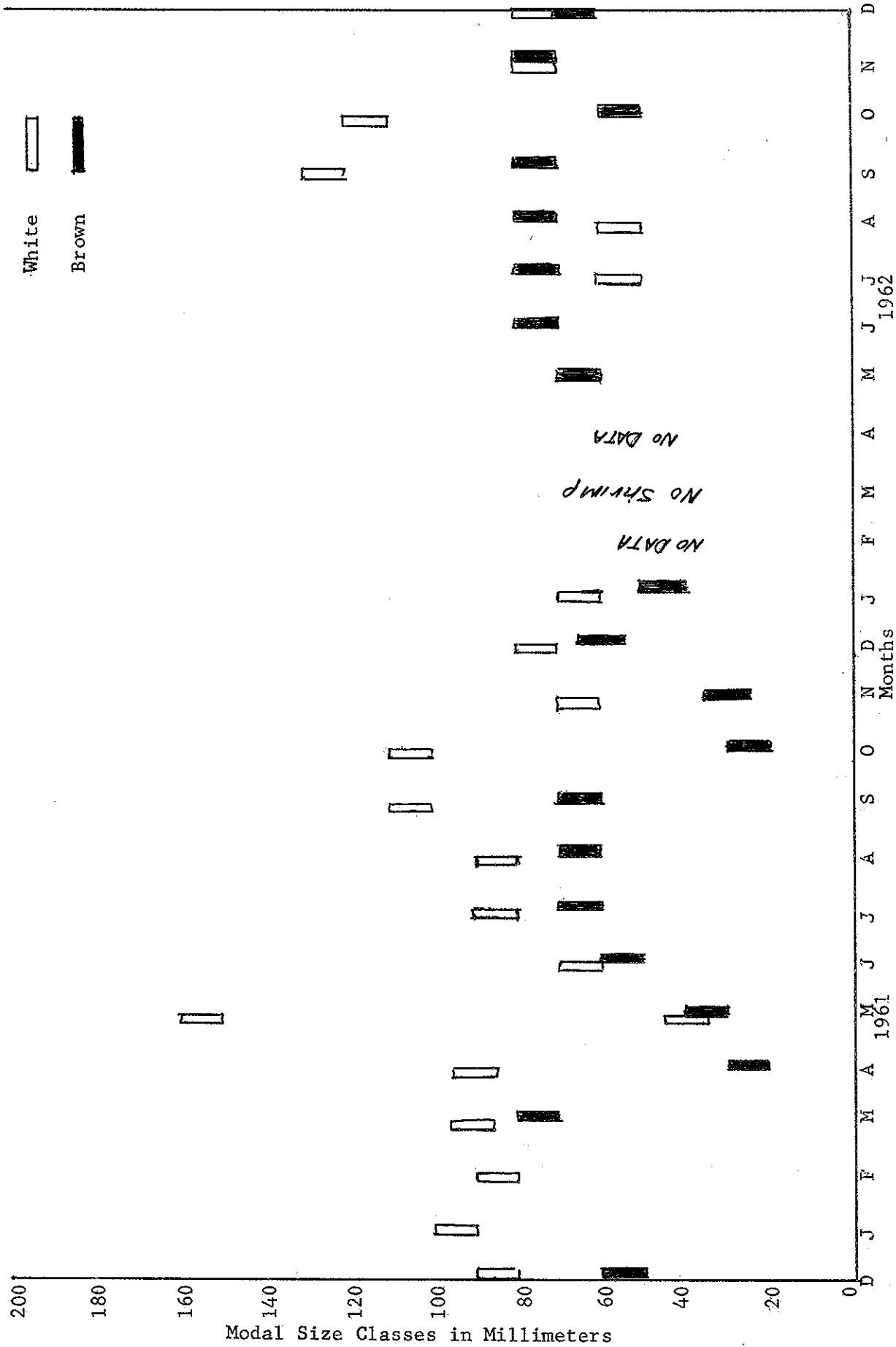


Figure 6
 Monthly 20-foot Trawl Modal Size Classes of Brown and White Shrimp
 for 1961 and 1962

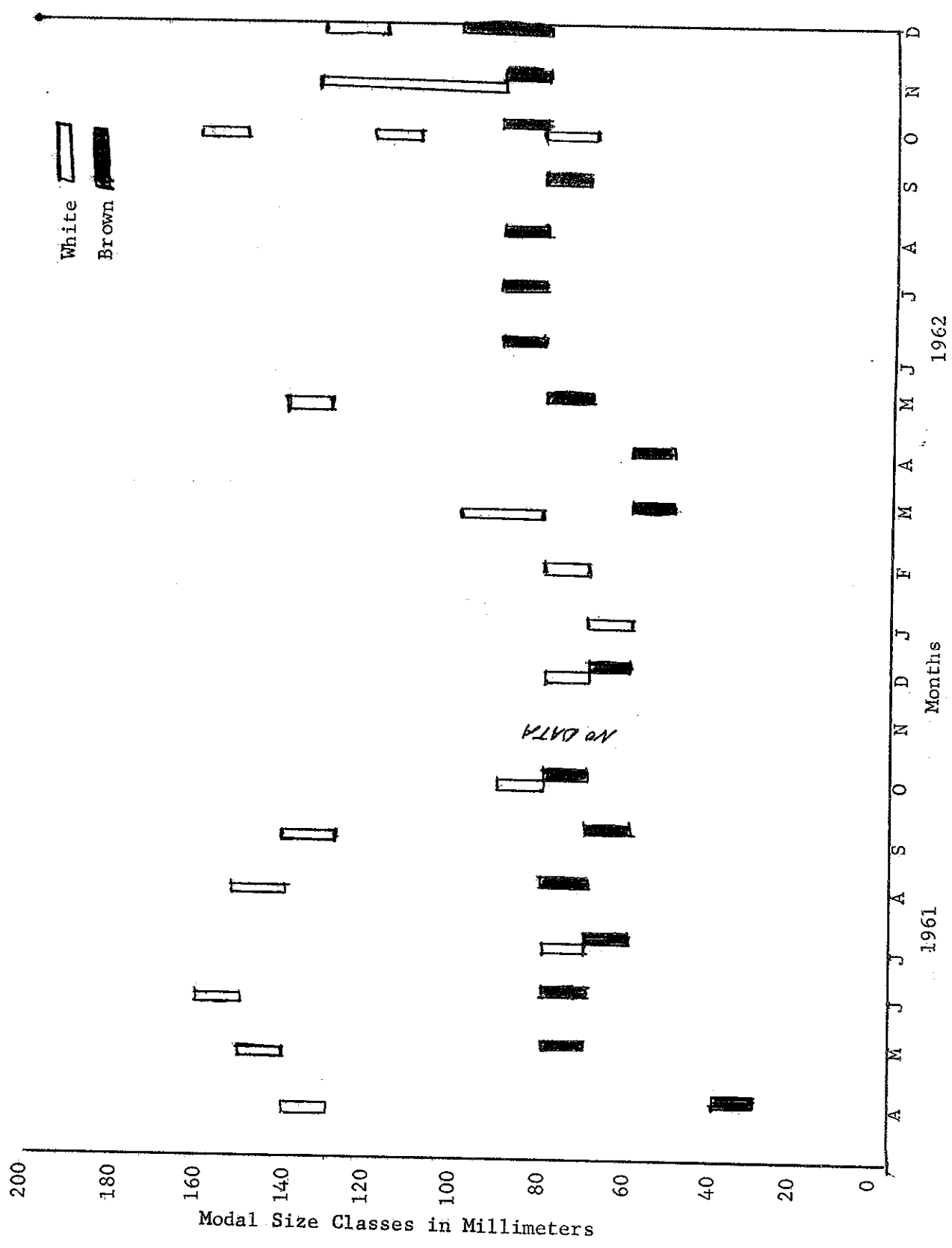


Figure 7
 Shrimp Modal Size Comparison for 1961-1962 From Bar Seine Samples

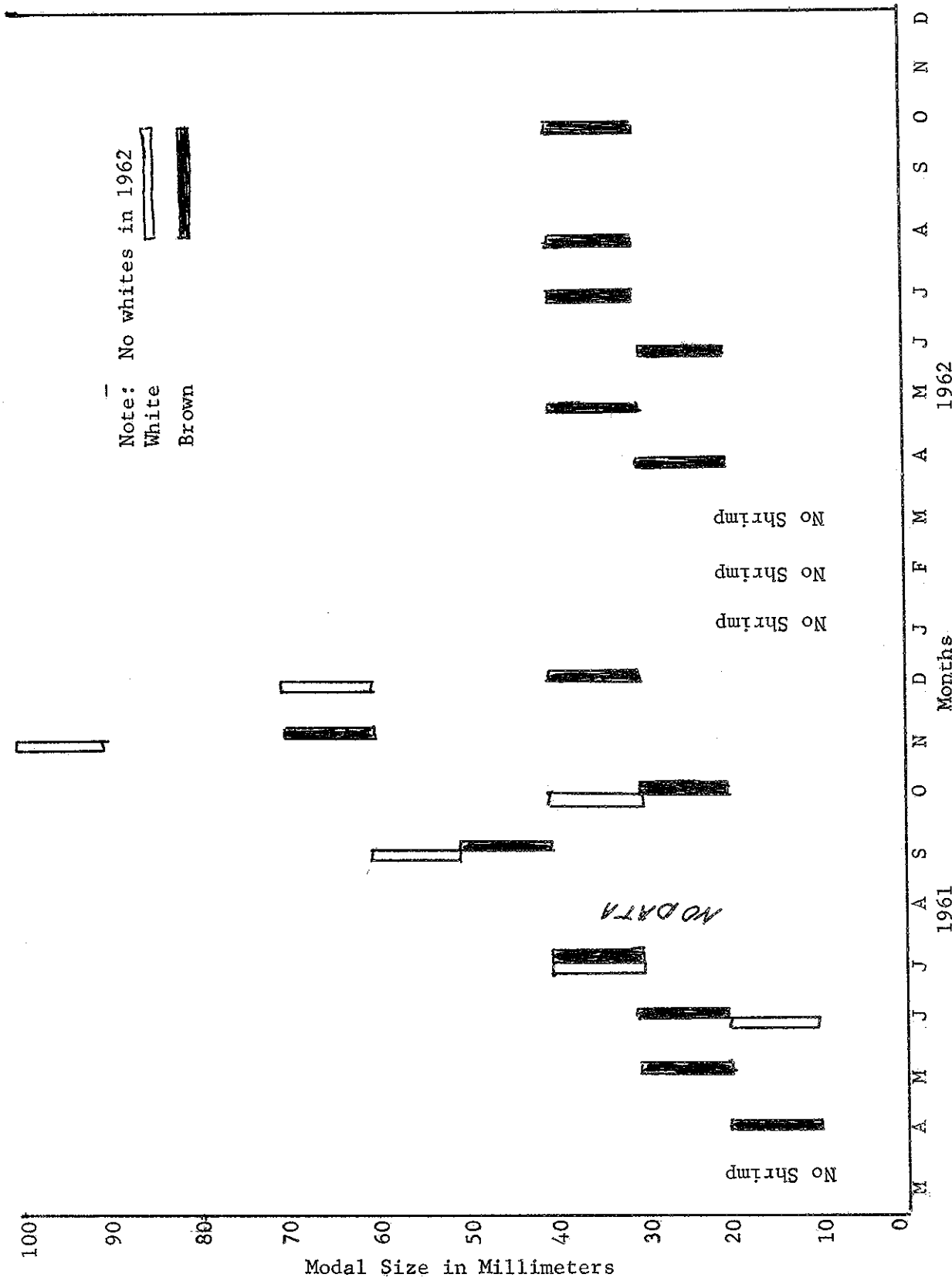


Figure 8
 Monthly Commercial Shrimp Landings From Arkansas Bay Area in 1961-1962

