

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: White shrimp, Penaeus setiferus, landings were higher than catches in 1962 by 22 per cent. Brown shrimp, Penaeus aztecus were most abundant in 10-foot trawl catch in April, May, and June when the shrimp were 60-90 mm long. In 1963, brown shrimp catches with the 6-foot bar seine and the 10-foot trawl were higher than in 1962. In 1963, fewer brown shrimp were caught in 20-foot trawl samples than in 1962. White shrimp increased in 20-foot trawl samples by 8 per cent. White shrimp also showed an increase in 6-foot bar seine samples in 1963. Rainfall was 15 per cent less than in 1962. There were two periods, one in June and one in September, when 5 and 6 inches of rain fell, respectively. Immediately after these periods of rain, juvenile white shrimp were taken in tertiary samples.

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

Procedure: Seven 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 1½-inch stretch mesh was used to sample shrimp in Aransas and Mesquite Bays (Figure 1) at 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 liner in the cod end was used for shrimp sampling at two stations in Aransas Bay and two stations in Copano Bay (Figure 1). The mesh size of the 10-foot trawl without the liner was 1½-inch stretched. The mesh size of the 20-foot otter trawl was 1½-inch stretched. Both trawls were pulled for a sample period of 15 minutes. A 6-foot bar seine of one-half of an inch stretch mesh was used for sampling post-larval (5 to 25 mm long) and juvenile shrimp (25 to 100 mm long) in the tertiary bay (Mission Bay). The seine was pulled by hand for 500 feet parallel to shore.

Water temperature was determined with 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 filed at the Marine Laboratory in Rockport.

All shrimp captured were measured to the nearest millimeter from the tip of the rostrum to the tip of the telson and weighed in pounds.

Findings and

Discussion: In comparing the results of shrimp sampling in 1962 and 1963 (Tables 1-6, Figures 1-8) there is some disagreement between sample data and

commercial bay landings. Commercial bay landings for the Aransas area (Figure 2) show an apparent decline in brown shrimp in 1963. After August, bay landings were reported as white shrimp, and no distinction was made between species. This may affect comparisons of commercial landings and sample catches.

In 1963 (Figure 3), rainfall was 15 per cent lower than in 1962, yet white shrimp landings were 22 per cent higher in 1963. Gunter (1954) indicated white shrimp abundance was related to rainfall. It was found that 5 inches of rainfall (Figure 3) occurred in the Aransas area in June. In July, following this rainfall and with no appreciable drop in salinity, white shrimp were taken in tertiary bay samples. This sequence of events was repeated again following a 6-inch rain in September. These data further substantiate Gunter's findings, but also indicate that white shrimp catches can be made during drouth years if sufficient rainfall occurs at critical times. It further means that post-larval white shrimp were present when conditions, triggered by a heavy rainfall, became conducive to white shrimp survival and growth.

In 1962 modal sizes for brown shrimp caught in the 10-foot trawl from July through September were 70 to 80 mm, 10 mm higher than for the same months in 1961 (Schultz 1961-62). In 1963 (Figure 4), the mode for brown shrimp was generally 80 to 90 mm from July to September. Salinities were higher in 1963 than in 1961 or 1962 (Project MF-R-5, Job 16, 1963). This increase in salinity in the bays, and the increase in the modal size, indicates that brown shrimp, during years of high salinity, remain in the bays longer before going to the Gulf.

When modal sizes of shrimp were compared (Figure 4 and 5), it was found that 10-foot trawl samples and 20-foot trawl samples contained different groups of shrimp. Shrimp caught in the 10-foot trawl were generally 10 mm smaller than those caught in the 20-foot trawl. This was especially clear in 1962 samples. This difference can be attributed to the difference in trawl size and the area in which the trawls were worked (Figure 1).

Figure 6 agrees well with peaks of commercial landings (Figure 2) indicating that 20-foot trawl samples resemble commercial catches.

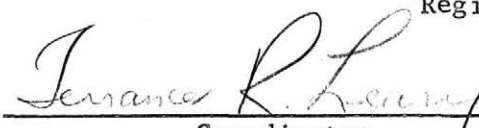
Brown shrimp were most abundant in samples collected in May at all stations (Figure 7). The largest brown shrimp were found in the primary bay (Figure 8). This was also true of white shrimp. These data indicate that brown shrimp in the fall shrimp season seldom were large enough to meet the legal minimum size (108 mm). White shrimp were of average legal size during November and December only. If sample catches were valid, the biggest part of the shrimp catch during the fall shrimp season was made up of undersized shrimp.

Reduction in modal sizes at various intervals indicate recruitment of small shrimp (Figure 8). For brown and white shrimp in 1963 this occurred at least three times during the year.

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- Schultz, R. L. 1962. A study of the Texas shrimp populations. A study of the juvenile shrimp in the Aransas Bay complex. Texas Game and Fish Commission Project Reports 1961-1962.
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Table 1
A Comparison in Catch Per Unit of Effort of Brown Shrimp for 10-foot Trawls
for 1960, 1961, 1962 and 1963 (Pounds)

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Average</u>
1960	-----	3.10	1.30	30.75	30.28	32.00	15.40	3.00	2.25	7.66	9.54	3.66	12.63
1961	-----	.00	.33	1.75	7.30	61.70	53.10	4.80	18.00	.50	2.00	1.00	13.69
1962	.80	-----	.00	-----	14.33	18.37	8.37	1.75	1.00	9.00	7.62	3.00	6.42
1963	-----	-----	.00	.50	77.25	35.50	22.75	4.37	2.00	6.25	7.00	1.25	15.68

Table 2
A Comparison of Catch Per Unit of Effort of White Shrimp Taken in 10-foot Trawls
in 1960, 1961, 1962 and 1963

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Average</u>
1960	-----	.09	.20	-----	.71	69.90	134.09	13.72	40.90	5.41	9.54	11.58	28.61
1961	-----	2.00	.11	6.75	1.50	2.00	25.60	7.30	47.70	30.60	7.10	2.60	12.11
1962	.20	-----	.00	-----	.00	.00	.00	.87	9.10	5.83	22.50	4.00	4.25
1963	-----	-----	.00	.00	.00	.25	12.52	.60	2.12	5.50	10.50	8.00	3.94

Table 3
A Comparison of Monthly Catch Per Unit of Effort for Brown Shrimp Taken in the 20-foot Trawl
in 1961, 1962 and 1963

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Average</u>
1961	----	.00	----	.25	451.50	137.20	96.50	34.20	14.00	25.20	----	10.20	85.45
1962	.00	.00	.25	.50	93.00	119.00	10.00	.50	.50	15.00	4.50	1.00	20.35
1963	----	----	.00	.50	79.70	4.00	32.50	12.00	4.75	6.00	1.50	10.00	15.09

Table 4
A Comparison of Monthly Catch Per Unit of Effort for White Shrimp Taken in the 20-foot Trawl
in 1961, 1962 and 1963

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Average</u>
1961	----	.00	----	1.75	.50	1.00	25.00	98.20	24.00	125.50	----	69.50	38.38
1962	1.50	2.50	.50	----	.25	.00	.00	.00	.00	4.00	13.50	65.00	6.98
1963	----	----	.00	.00	.00	.00	22.00	24.25	3.25	13.33	15.50	22.50	10.08

Table 5

A Comparison of Catch Per Unit Effort for Brown Shrimp Taken in 6-foot Bar Seine Samples
in 1961, 1962 and 1963

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Average</u>
1961	----	.00	.00	39.75	96.00	111.50	36.00	----	4.50	33.00	6.00	3.00	32.97
1962	.00	.00	.00	22.50	59.50	10.00	11.00	9.00	.00	3.00	.00	.00	9.58
1963	----	----	.00	11.00	73.50	40.00	47.00	18.50	10.50	7.00	3.50	----	23.44

Table 6

A Comparison of Catch Per Unit Effort for White Shrimp Taken in 6-foot Bar Seine Samples
in 1961, 1962 and 1963

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Average</u>
1961	----	.00	.00	.00	.00	.25	3.00	----	4.70	40.00	3.00	1.00	15.19
1962	NO WHITE SHRIMP TAKEN IN 1962 SAMPLES												.00
1963	----	----	.00	.00	.00	.00	2.50	.00	2.50	5.50	1.50	----	1.33

Figure 1
Aransas Bay Area Shrimp Sample Stations

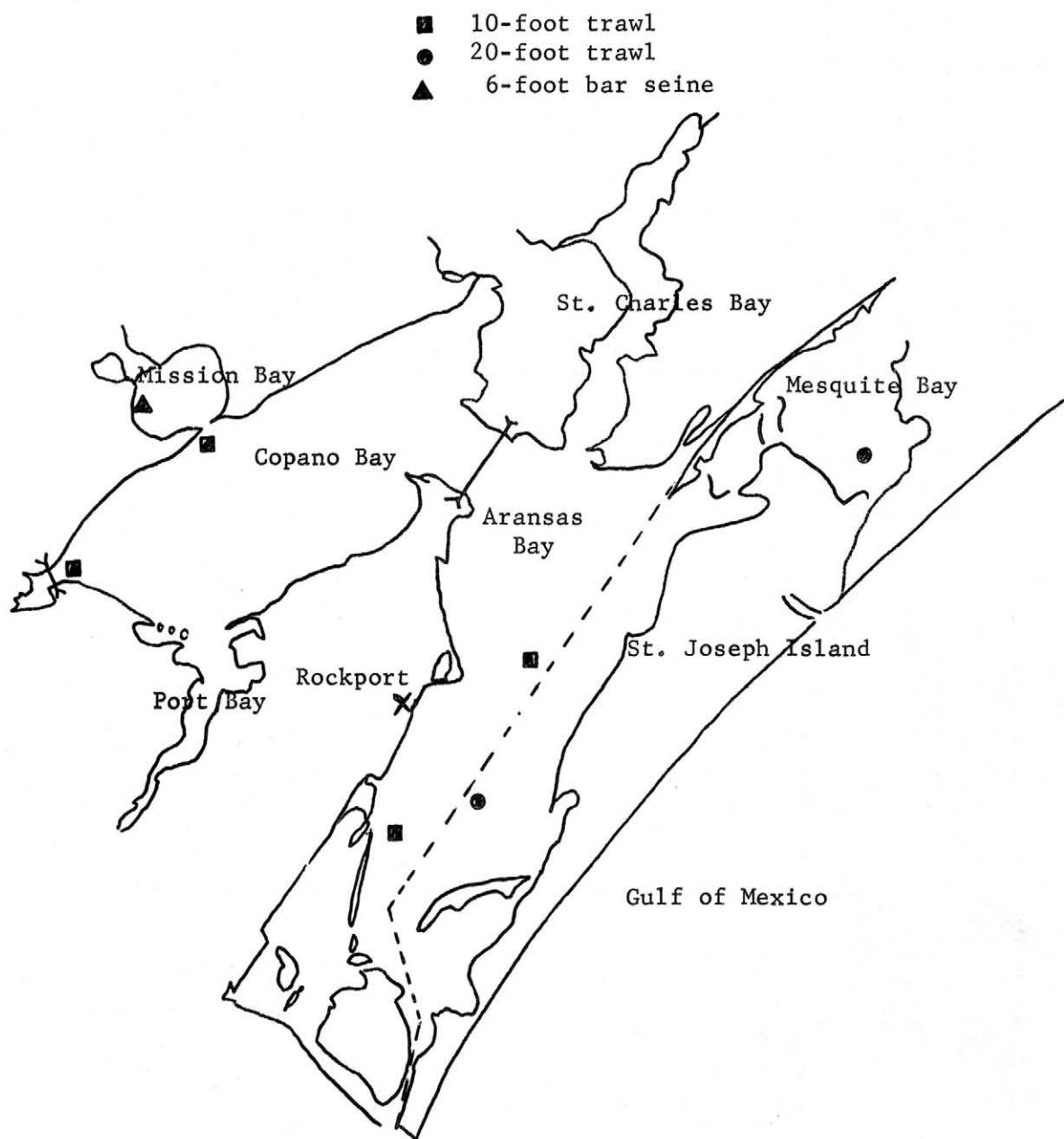


Figure 2
A Comparison of Commercial Landings of Shrimp in 1961, 1962, and 1963

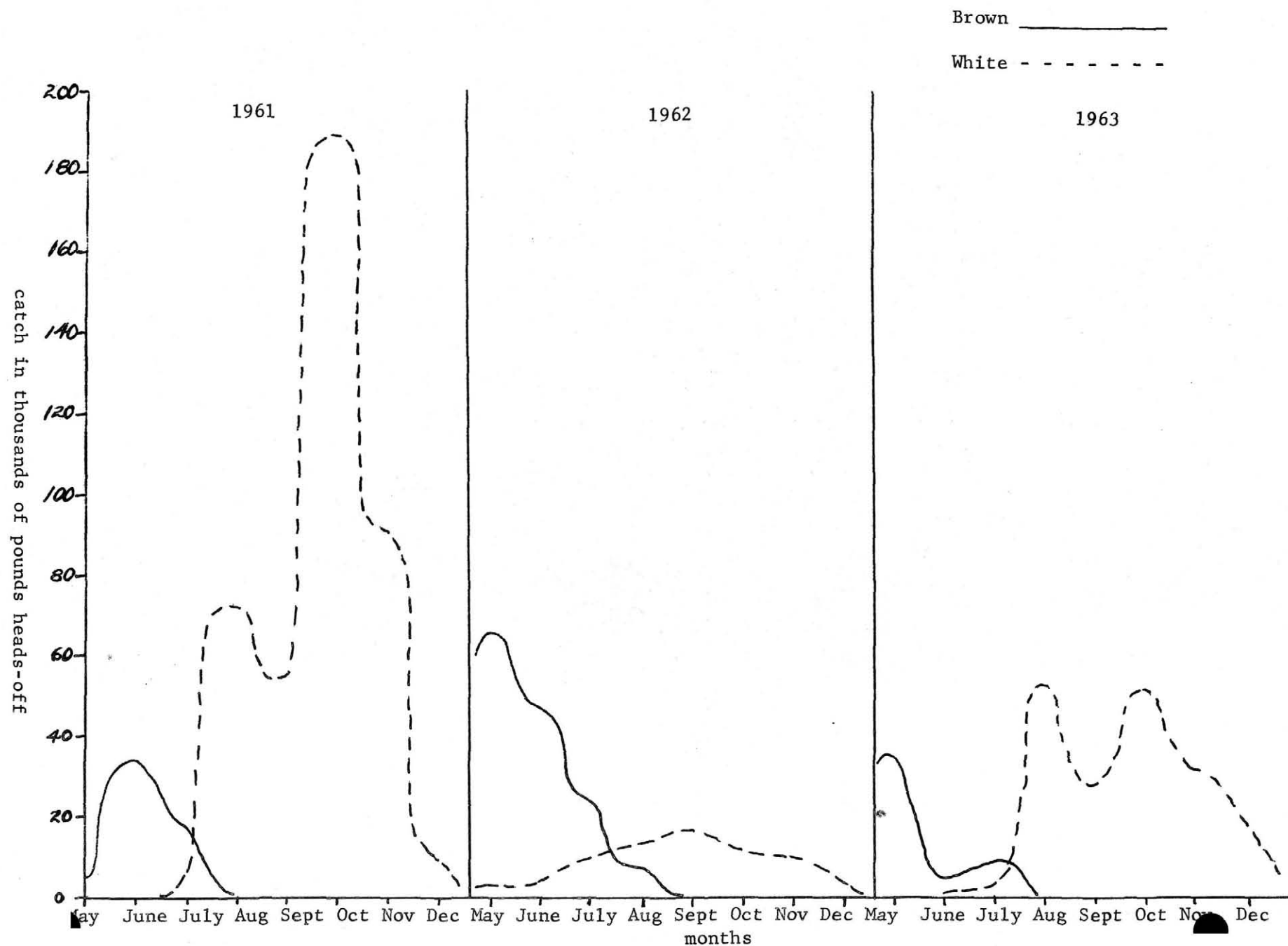


Figure 3
Catch Per Unit Effort of White and Brown Shrimp in the 6-foot Bar Seine in 1962 and 1963
as Related to Rainfall

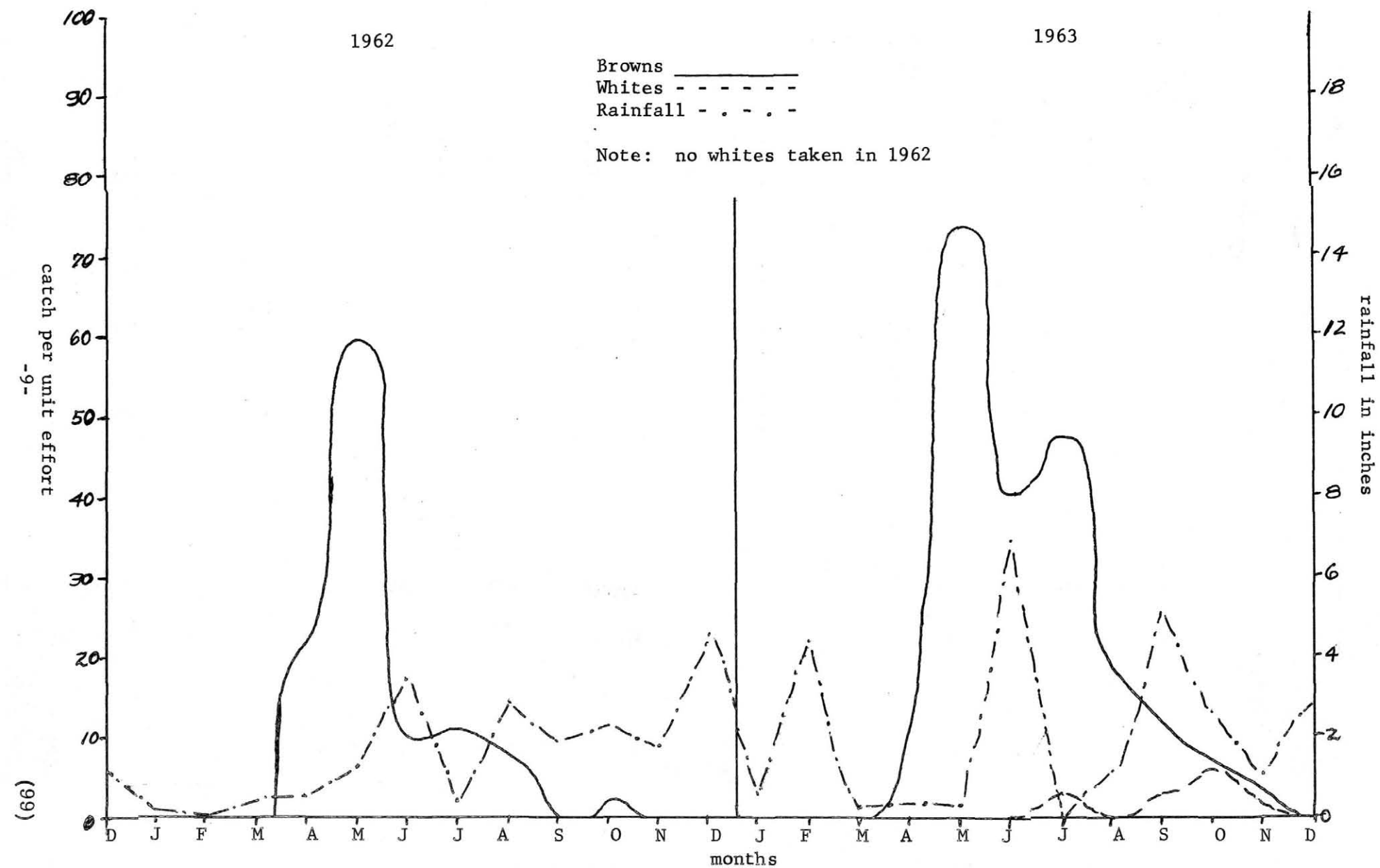


Figure 4
Shrimp Modal Size Class for 1962 and 1963 from 10-foot Trawl Catches

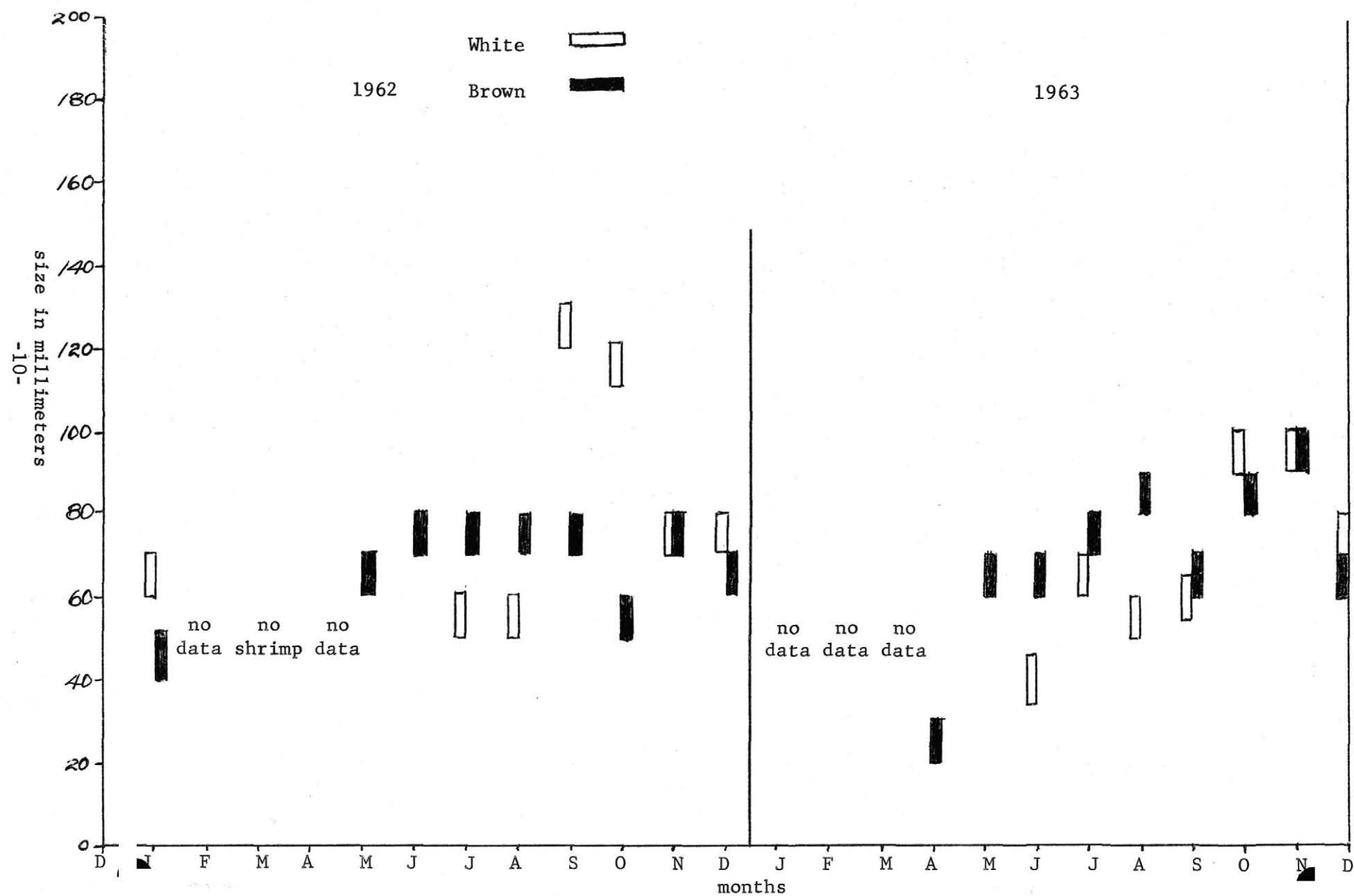
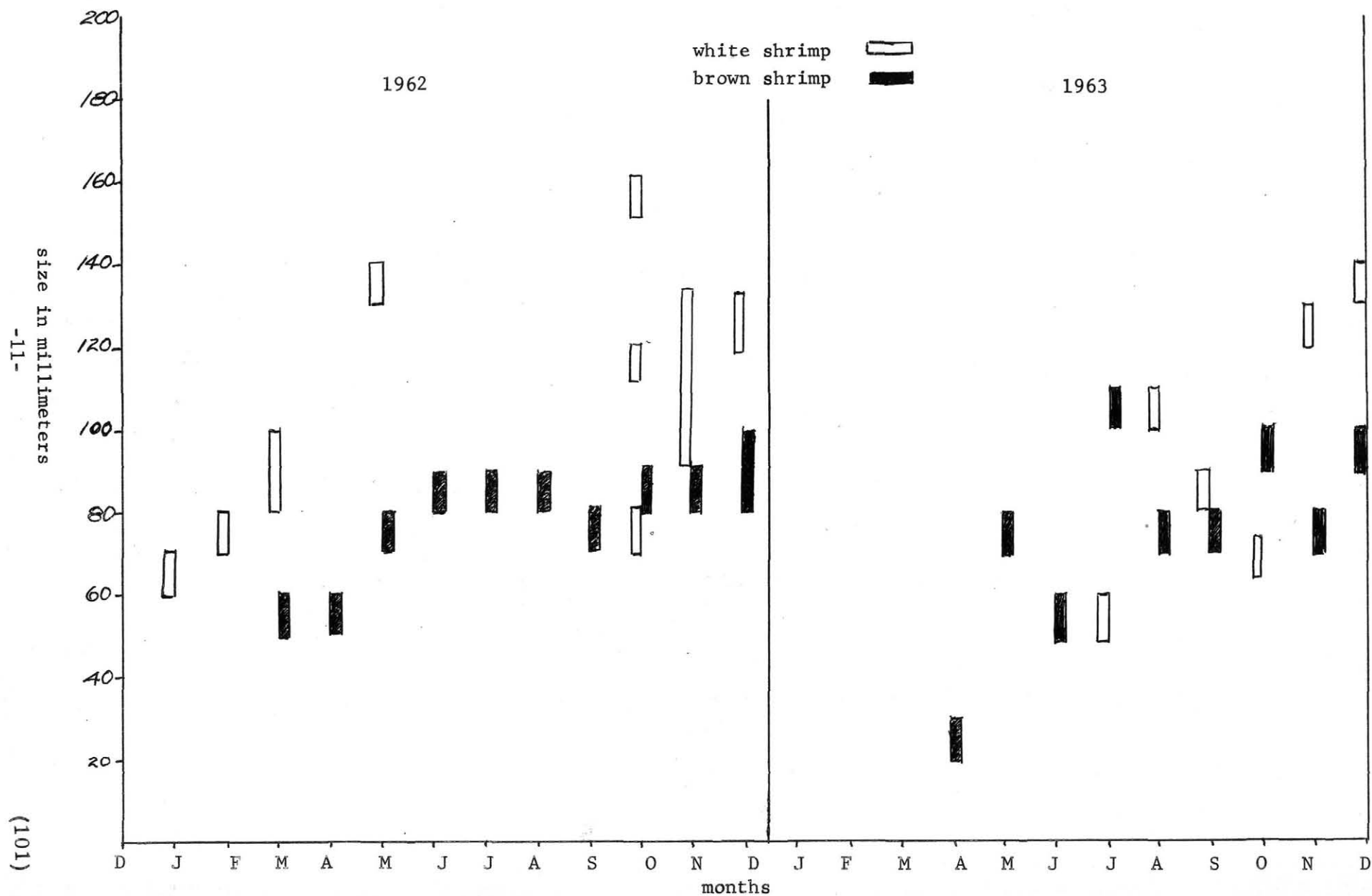


Figure 5
Shrimp Modal Size Class in 1962 and 1963 from 20-foot Trawl Samples



1963

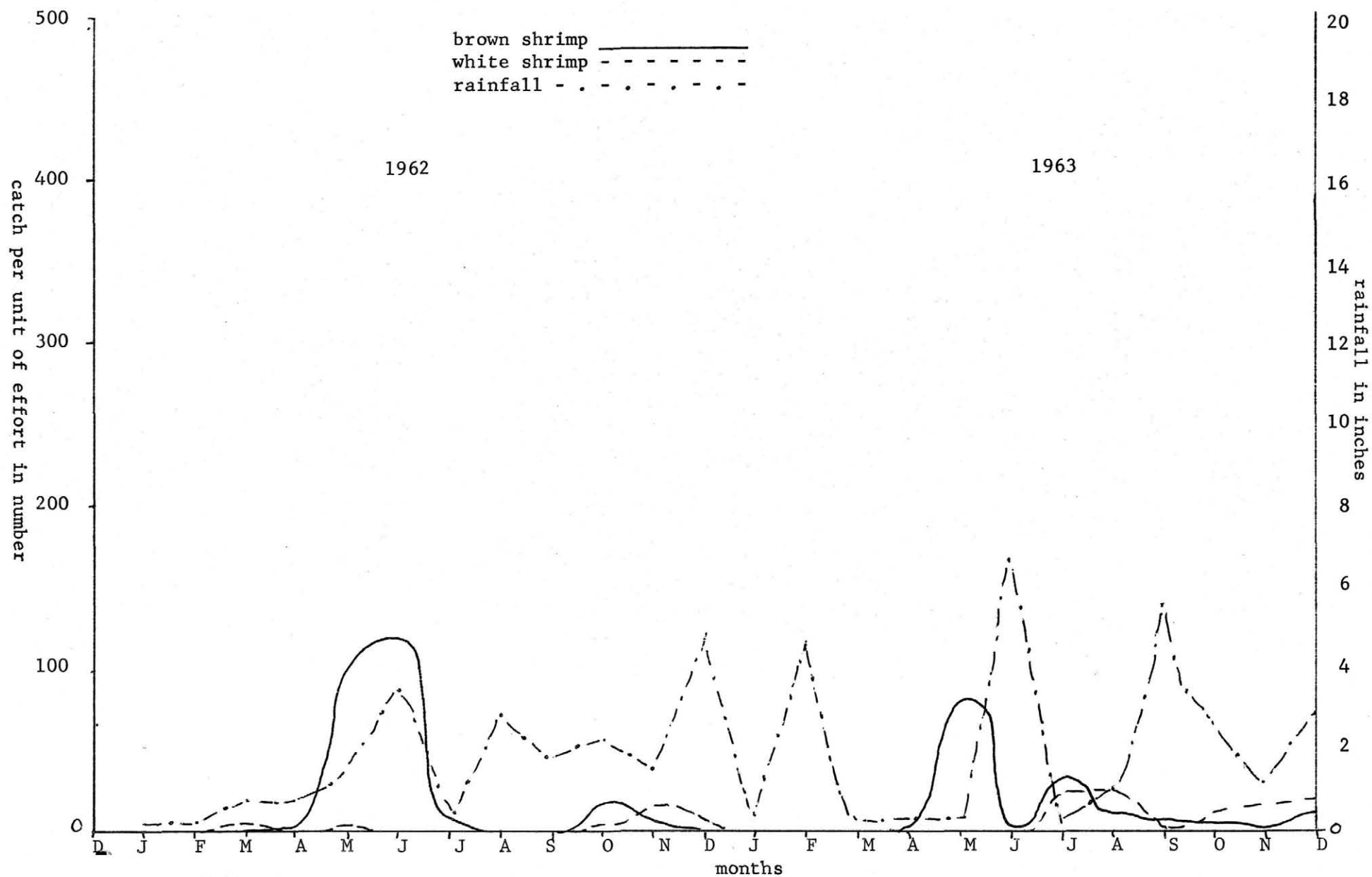


Figure 7
Catch Per Unit of Effort Comparison for Primary, Secondary, and Tertiary Bay Samples in 1963

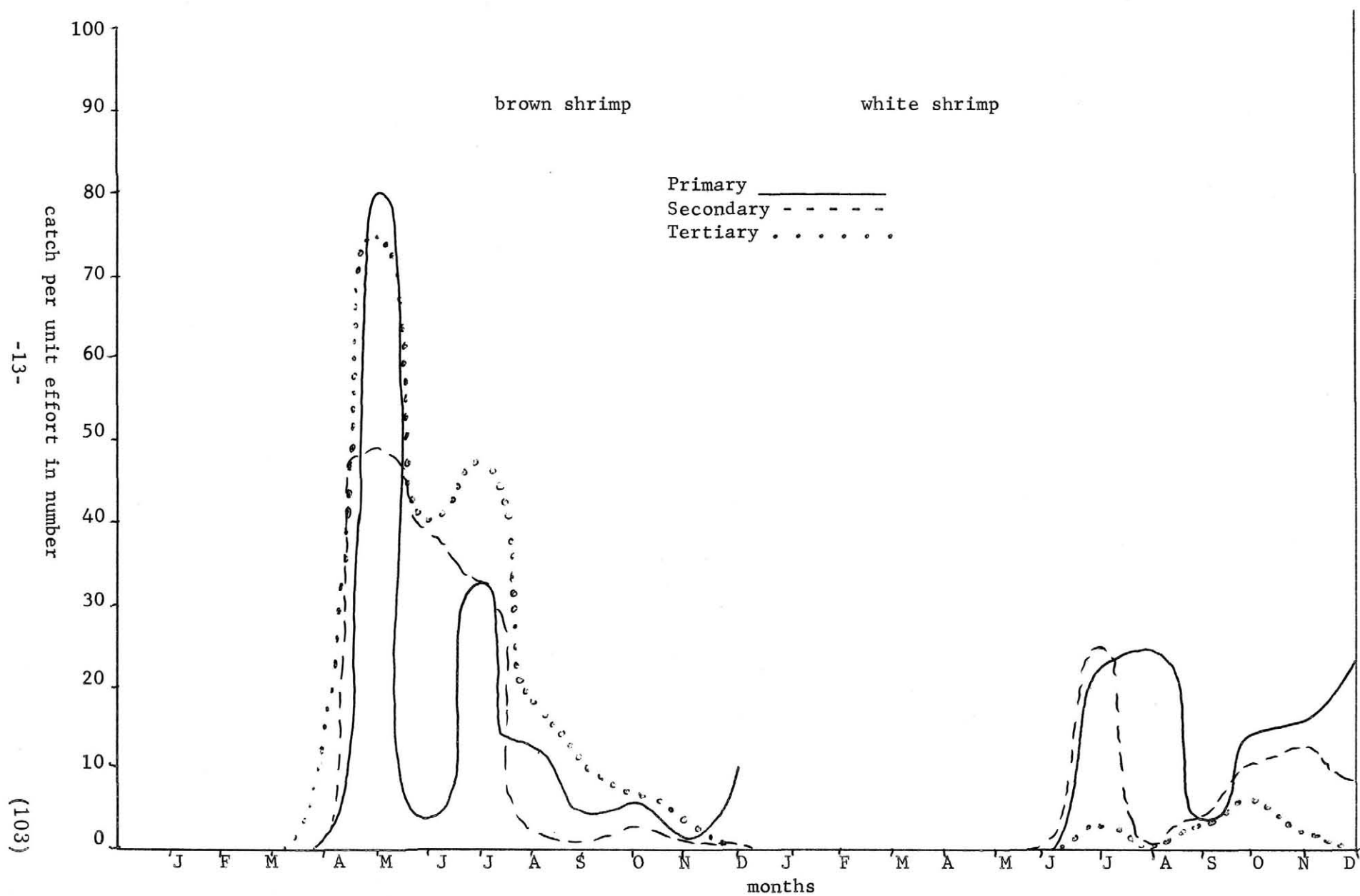


Figure 8
Modal Sizes of Shrimp in Primary, Secondary, and Tertiary Bay Catches in 1963

