

A COMPARISON OF POST LARVAL AND JUVENILE
BROWN SHRIMP, (Penaeus aztecus), CATCHES IN
TWO GEAR TYPES

by

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MANAGEMENT DATA SERIES
No. 14
1989

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INTRODUCTION

Brown shrimp (Penaeus aztecus) have been sampled with standardized gear in all major Texas bay systems since 1958 (Benefield 1982). The sampling program provided data to determine growth rates, size distribution, relative abundance and approximate time of migrations and emigrations. These findings were used to determine the optimum closed season period in Gulf of Mexico waters to protect the migrating juvenile shrimp as they moved from the bays to the inshore Gulf waters (Fuls and Bryan 1986).

A device called a "bar seine", as described by Renfro (1963), was used from 1963 to 1981 (Benefield 1982) to sample the shallow shoreline areas where a trawl could not be used. The bar seine was pulled behind a person as he waded through the sample area. Concerns over sampling bias created by disturbing the area while wading in front of the collecting gear and interest in sampling post larval shrimp <20 mm initiated the utilization of the marsh net (Pullen et al. 1968).

This study was initiated in 1979 to evaluate the two gear types for collecting post larval and juvenile brown shrimp with regard to catch efficiency and size distribution. The bar seine and marsh net gears were discontinued in 1982 and replaced with a bag seine which would collect both juvenile shrimp and finfish species. The bag seine was used in conjunction with a coastwide random sampling program (Benefield 1983).

MATERIALS AND METHODS

The marsh net and bar seine were each used to collect post larval and juvenile brown shrimp each week in April and May, 1979, at one historical bar seine station (Figure 1, No. 624) in Redfish Bay near Aransas Pass. In 1980, an additional station was sampled (Figure 1, No. 623) in Aransas Bay at weekly intervals from March through May. A total of 35 samples were collected with each gear type.

The bar seine was constructed of a flat funnel shaped multifilament nylon mesh net (1.27 mm bar) with a mouth of 1.8 m. Each side of the mouth was secured to an iron rod which served as a spreading device as well as the bridle support for a 20-m tow line.

The standard sample procedure was to tow the bar seine by walking for 74.4 m next to the emergent vegetation line along shore, turn away from shore for 3.7 m and turn and pull in a parallel path back to the original start point. Bottom area covered was 278.9 m².

The marsh net was a sled device with a mouth opening of 52.1 x 17.8 cm. The sides, top and back were covered with 1-mm square nylon mesh. The collecting procedure was to place the net in the water next to the vegetation line and walk to a location 30.5 m away without disturbing the sample area. A line attached to the net provided accuracy in measurement and was used to pull the net toward the pickup location. Rate of retrieval was 0.5 m/sec. The area covered by each marsh net sample was 15.8 m².

For comparison sampling, the two sample areas were located where bottom and vegetation types were similar. The areas were separated by a minimum of 15 m. The bar seine preceded the marsh net in sample order.

Shrimp collected in each gear type were identified, counted and up to 100 individuals measured to nearest 1 mm. Lengths were recorded as distance from tip of rostrum to tip of telson. References to size classes of shrimp follow Renfro (1964) for post larval as <25 mm, juveniles as 25-89 mm, sub-adult as 90-139 mm and adult at >140 mm.

Tests of whether mean shrimp size and number per sampled area (m^2) differed between paired marsh net and bar seine samples were done with the Wilcoxon signed rank test. Data were analyzed on an IBM-PCAT with the "Statgraphics" statistical package.

RESULTS

The number of brown shrimp captured per sampled area (m^2) were significantly greater for marsh net samples while mean sizes of brown shrimp were significantly greater for bar seine samples (Table 1). The corresponding Wilcoxin large sample test statistics were 4.058 and 2.695, which carried probabilities of Type I error of 0.00005 and 0.007, respectively.

DISCUSSION

The marsh net appears to be more efficient than the bar seine, however the differences in the catch rates may be due to sample procedure or other effects which cannot be determined from this study. The effects of walking in front of the bar seine, mesh size differences and actual area sampled may have caused catch relationship differences.

The size distribution of post larval brown shrimp collected in the marsh net shows potential for determining occurrence of post larval shrimp and a relationship to density or wave strength. This feature may have value in predicting brown shrimp abundance during the spring migration period.

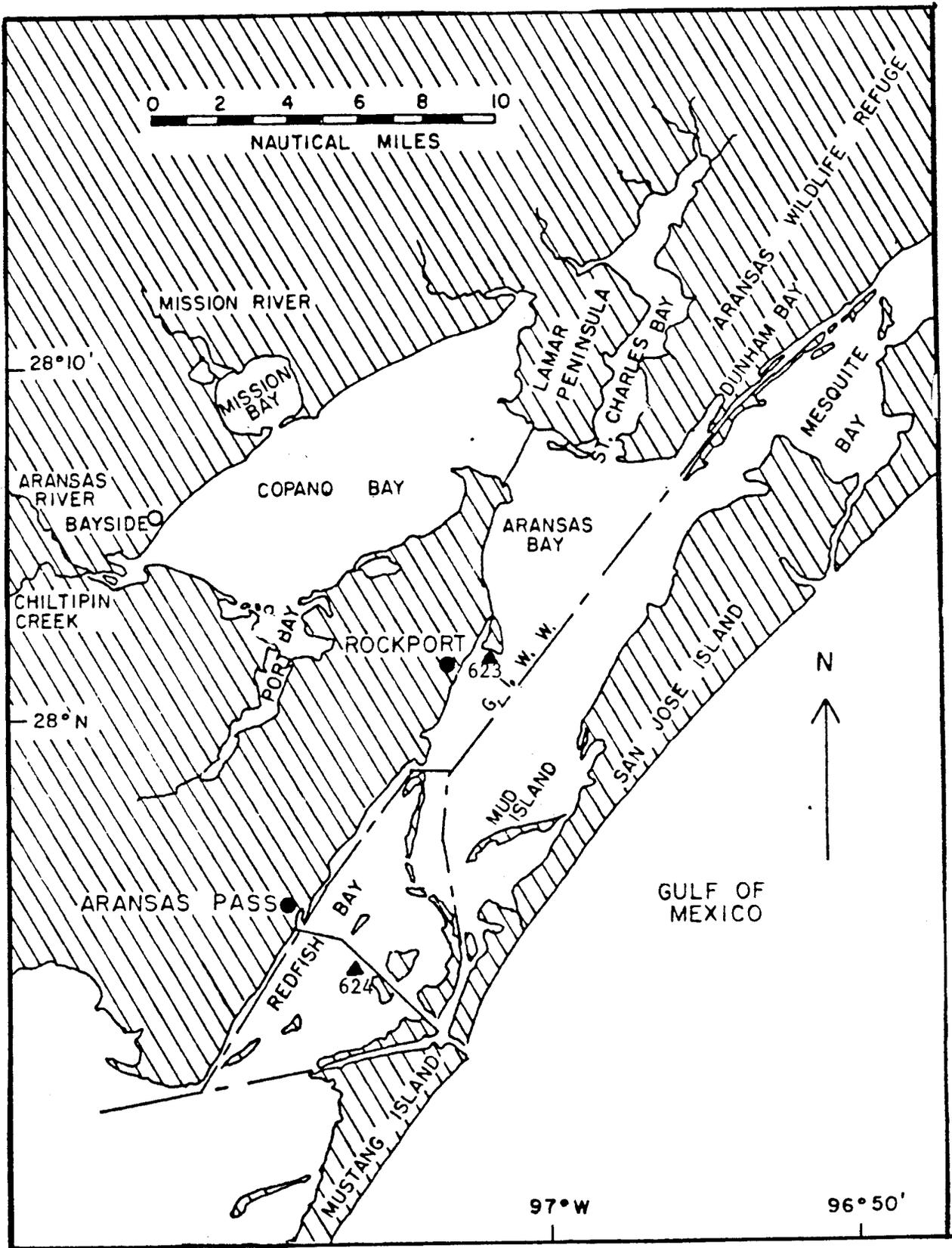
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Table 1. Total number, number per m², mean length (with standard deviation) and length range of brown shrimp caught with marsh nets (MN) and bar seine (BS). Blank indicate no data.

Date	Total No.		No./m ²		Mean length (SD)		Size range	
	MN	BS	MN	BS	MN	BS	MN	BS
1979								
04-02-79	3	0	0.19	0.00	13.3 ± 3		10-17	
04-09-79	51	8	3.22	0.03	12.6 ± 3	26.5 ± 4	10-26	20-32
04-16-79	64	31	4.04	0.11	27.2 ± 10	33.2 ± 4	10-42	23-42
04-23-79	109	55	6.88	0.19	35.5 ± 16	43.8 ± 8	10-72	27-67
04-30-79	38	30	2.40	0.11	43.7 ± 15	47.3 ± 12	10-67	18-65
05-07-79	156	89	9.84	0.32	49.1 ± 15	47.3 ± 16	13-84	16-76
05-14-79	67	45	4.23	0.16	52.2 ± 18	56.6 ± 15	10-82	30-84
05-21-79	12	60	0.76	0.22	51.0 ± 25	52.6 ± 14	12-80	24-84
05-29-79	70	18	4.42	0.06	54.6 ± 15	51.5 ± 14	18-88	33-78
1980								
03-03-80	4	0	0.13	0.00	20.5 ± 8		12-34	
03-10-80	15	6	0.47	0.01	12.5 ± 1	30.6 ± 8	11-15	17-42
03-17-80	155	1	4.89	<0.01	13.2 ± 4	37.0 ±	10-37	37
03-24-80	128	3	4.03	<0.01	13.0 ± 2	23.3 ± 2	10-20	21-25
03-31-80	100	20	3.15	0.04	13.4 ± 3	28.8 ± 8	10-30	22-59
04-07-80	34	132	1.07	0.24	15.9 ± 6	27.8 ± 5	10-33	16-56
04-15-80	404	127	12.74	0.23	17.1 ± 5	32.7 ± 7	10-37	19-61
04-22-80	212	214	6.69	0.38	14.1 ± 5	32.6 ± 9	10-41	14-63
04-28-80	323	156	10.19	0.28	21.4 ± 9	37.7 ± 8	10-50	19-58
05-05-80	118	221	3.79	0.40	23.3 ± 0	42.4 ± 10	11-54	21-65
05-12-80	64	304	2.02	0.54	41.5 ± 17	52.0 ± 12	9-66	23-79
05-19-80	7	136	0.22	0.24	52.4 ± 10	55.7 ± 15	32-64	16-84
05-27-80	18	193	0.57	0.35	57.8 ± 12	55.3 ± 15	32-84	28-90

Figure 1. Sampling sites in Aransas Bay (Station 623) and Redfish Bay (Station 624) with marsh nets and bag seines during April-May 1979 and March-May 1980.



PWD-RP-3400-306-9/89

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