

# Observations on the Fishery and Biology of Pink Spotted Shrimp, *Penaeus brasiliensis* Latreille, of Margarita Island, Venezuela

N. ALAM KHANDKER and LUIS B. LARES

*Instituto Oceanografico  
Universidad de Oriente  
Cumana, Venezuela*

## INTRODUCTION

The pink spotted shrimp, *Penaeus brasiliensis* Latreille, is widely distributed from Cape Hatteras in the West Atlantic Ocean through the Gulf of Mexico and Caribbean Sea to Rio Grande-Lagoa dos Patos, Brazil, but is of commercial importance only in several Latin American countries (Perez-Farfante, 1969). In Venezuela, this species is caught along the whole coast (Ewald, 1967; Khandker, 1965). In the Gulf of Venezuela, where the shrimp fishery is most extensive, it sometimes comprises as much as 20% of the catch (Ewald, 1967). It is of greater commercial importance in the shrimp landings from the Island of Margarita. At present, some 30 trawlers based in the ports of Cumana, Puerto La Cruz and Juan Griego operate in that area. Due to its scarcity in the commercial catch in western Venezuela, no detail work had been done on the fishery and biology of this pink spotted shrimp. This paper reports a phase of the work undertaken by our Institute on this species.

## MATERIALS AND METHODS

All data were collected from commercial trawlers based in Cumana fishing in the area of the Island of Margarita, as shown in Figure 1. The trawlers are of Italian type averaging 20 m in length. In Venezuela, they have been modified to operate two trawls simultaneously. Trawls measure 21 m across the mouth and 26 m in length. Although trips were made in different boats at different times, all boats used the same kind of net. Monthly trips of about 8 days each were made between February 1971 and January 1972. One assistant from our laboratory went on all the trips, noted fishing information in a log book and collected and iced samples of shrimp for later laboratory analysis. All measurements and weights were taken from fresh shrimp.

Catches shown in this paper are from a pair of trawls operated simultaneously. Weights reported here are for whole shrimp.

## COMPOSITION OF SPECIES

Pink spotted shrimp, *P. brasiliensis*, constituted 95% of the catch of shrimp; in deeper waters (31-40 fm) almost 100%. Other Penaeid species were *P. duorarum notalis* and *P. aztecus subtilis*. Even in the field it was not difficult to identify *P. brasiliensis* since invariably a reddish brown spot was present on both sides of the tail between the third and fourth abdominal segments (Fig. 2).

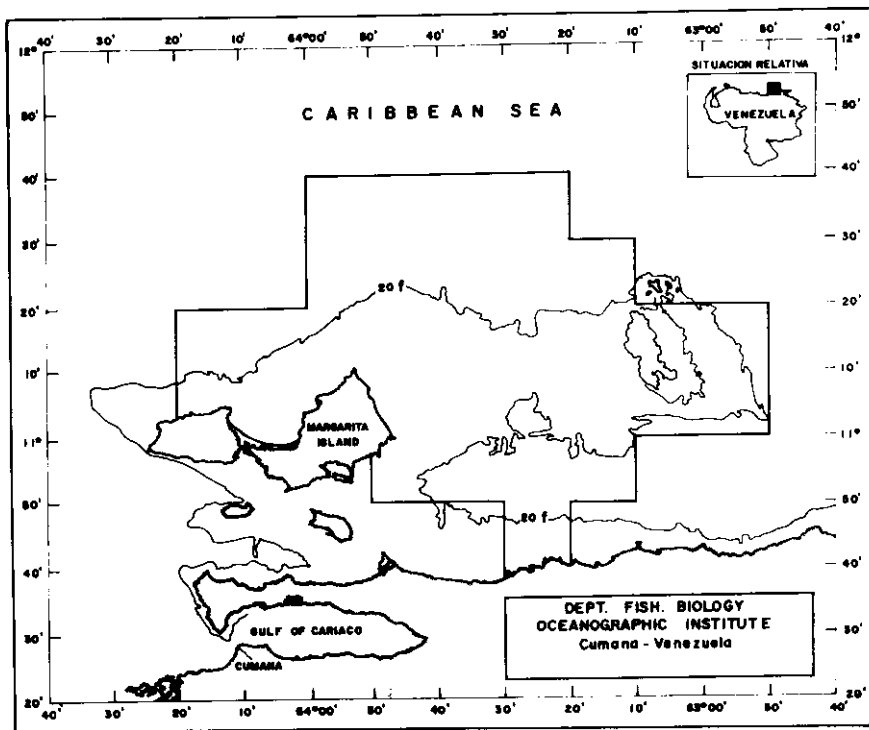


Fig. 1. Fishing area around the Island of Margarita.

Holthuis (1959) also reported such a spot on specimens from Surinam and French Guiana.

#### CATCH

In total, 494 hauls were examined during the 12-month period. Of these, 62.8% contained shrimp. Percentages of shrimp in the total catch varied widely between 5 and 60%. The maximum catch per hour of trawling was 73.3 kg, and averaged 14.4 kg.

Analysis of the catch of shrimp at different depths (Table 1) shows the maximum catch rate was obtained from depths between 31-40 fathoms, averaging 16.9 kg per hour. This generally agrees with Holthuis (1959) who reported *P. brasiliensis* to be abundant in waters off Surinam at depths between 20-30 fathoms, and off French Guiana between 22-38 fathoms. The pink spotted shrimp is also abundant in our area in depths shallower than 20 fathoms, but the size is small. Sometimes large quantities of juvenile shrimp between 90-120 mm total length (t.l.) were caught and discarded.

The substream preferred by adult *P. brasiliensis* seemed to be hard sandy bottom often mixed with dead molluscan shells. Juveniles seemed to prefer sandy silt bottom.

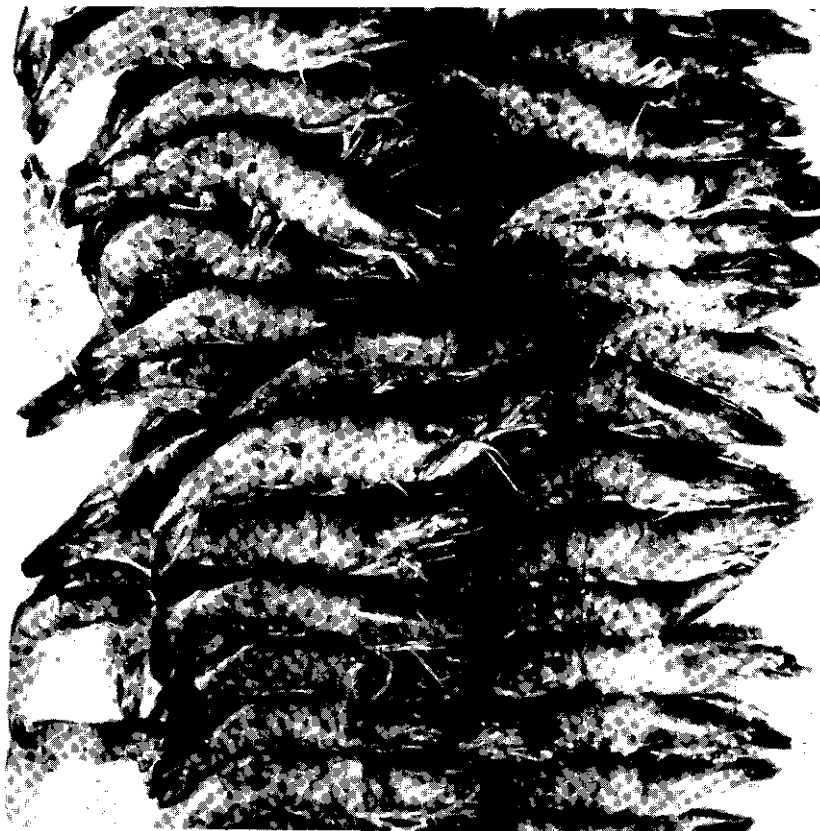


Fig. 2. Pink spotted shrimp, *Penaeus brasiliensis*, showing reddish brown spot.

Both daytime and nighttime trawling was conducted, but virtually all shrimp were taken at night. Catches were less during twilight hours. Catches in daytime were very insignificant in the area where shrimp were caught at night. *P. brasiliensis* is definitely nocturnal, which is in agreement with the findings of Bullis and Thompson (1959).

On each trip of 8 days, 41-44 hauls usually were made, each of 3 hours duration. During the trips, the captain of the boat conducted fishing operations without any instruction or interference from the scientists. So the operations were typical commercial fishing trips. The average catch per day has been calculated for each month (Table 2). The catch does not show any significant seasonal trend. The maximum catch was in the month of May, when the least number of hauls was made. The annual average catch rate was 141.0 kg per day. This compares favorably with 150 kg taken by the same type of trawlers in the Gulf of Venezuela (Lundberg *et al*, 1970). After adjusting our catches to a 24-hour trawling day, they were about average compared to catches in most areas off the

Table 1. Catch of shrimp according to depth (catch/haul/hour)

| Depth (fm) | Average catch (kg) |
|------------|--------------------|
| > - 20     | 15.5               |
| 21 - 30    | 12.2               |
| 31 - 40    | 16.9               |

United States where 133-237 kg per day (heads on) have been reported (U.S. Fish & Wildlife Service, 1958).

#### SEX-RATIO

The sex-ratio was calculated for each monthly sample and the combined 12 monthly samples (Table 3). Females dominated in samples from 4 months (February, March, May and December), the ratio being significantly different from 1:1 as shown by the chi-square value (.05 level). In one month (July), males were significantly greater in number. For the combined 12-month sample, the sex ratio was significantly different from 1:1, and females predominated.

#### SIZE FREQUENCY

Record sizes for both sexes were recorded for this species. The largest female was 63.9 mm c.l., 250 mm t.l. and weighed 142.0 gm. The largest male was 45.1 mm c.l., 200 mm t.l. and weighed 69.9 gm.

Table 2. Shrimp catch per day by months (weight in kg - heads on)

| Months       | Length<br>Trip<br>(days) | Number<br>of<br>Hauls | Total<br>Catch | Average<br>Catch<br>(day) |
|--------------|--------------------------|-----------------------|----------------|---------------------------|
| February '71 | 8                        | 44                    | 820            | 102.5                     |
| March        | 8                        | 41                    | 1020           | 127.5                     |
| April        | 8                        | 43                    | 1330           | 166.3                     |
| May          | 8                        | 32                    | 1980           | 247.5                     |
| June         | 8                        | 42                    | 810            | 101.3                     |
| July         | 8                        | 41                    | 1165           | 145.6                     |
| August       | 8                        | 44                    | 985            | 123.1                     |
| September    | 8                        | 44                    | 849            | 106.1                     |
| October      | 8                        | 41                    | 1715           | 214.4                     |
| November     | 7                        | 38                    | 470            | 67.1                      |
| December     | 8                        | 43                    | 1244           | 155.5                     |
| January '72  | 8                        | 44                    | 1008           | 126.0                     |
| Totals       | 95                       |                       | 13396          | 141.0                     |

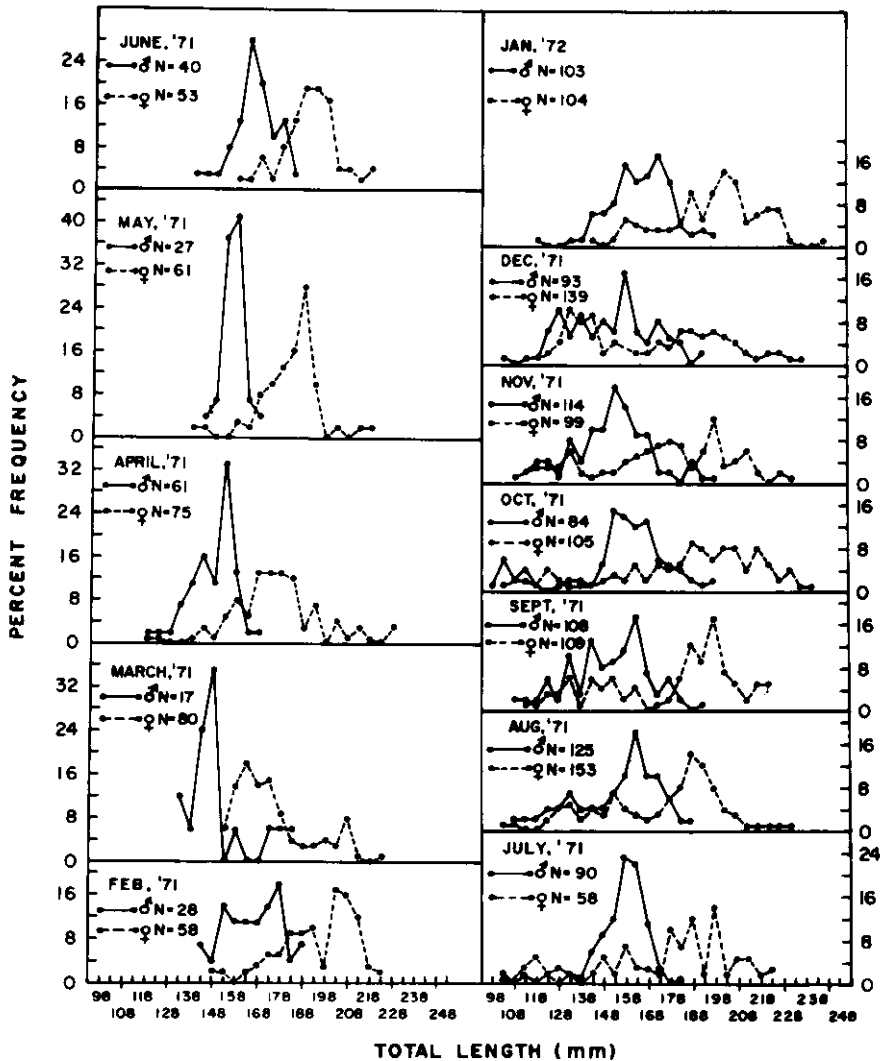


Fig. 3. Size frequency distribution of *P. brasiliensis*.

The smallest male was 19.8 mm c.l. and 99 mm t.l. The smallest male with a joined petasma was 24.3 mm c.l. and 114 mm t.l. This size is larger than the 15 mm c.l. and 69 mm t.l. noted by Perez-Farfante (1969) for this condition. It seems that in our area large numbers of juveniles in subadult condition migrate to the sea from inshore nursery grounds.

The size frequency diagram (Fig. 3) showed strong modal values, especially for males. The modal value for males varied between 148-178 mm t.l. and for

Table 3. Sex ratio of pink spotted shrimp, *Penaeus brasiliensis*

| Month        | Male |      | Female |      | Chi-square value |
|--------------|------|------|--------|------|------------------|
|              | No.  | %    | No.    | %    |                  |
| February '71 | 28   | 32.6 | 58     | 67.4 | 10.460 **        |
| March        | 17   | 17.5 | 80     | 82.5 | 40.910 **        |
| April        | 61   | 44.9 | 75     | 55.1 | 1.440            |
| May          | 27   | 30.7 | 61     | 69.3 | 13.130 **        |
| June         | 40   | 43.0 | 53     | 57.0 | 1.810            |
| July         | 90   | 60.8 | 58     | 39.2 | 6.910 **         |
| August       | 125  | 45.0 | 153    | 55.0 | 2.820            |
| September    | 108  | 49.8 | 109    | 50.2 | .004             |
| October      | 84   | 29.1 | 105    | 70.9 | 2.330            |
| November     | 114  | 53.5 | 99     | 46.5 | 1.050            |
| December     | 93   | 40.1 | 139    | 59.9 | 9.120 **         |
| January '72  | 103  | 49.8 | 104    | 50.2 | .004             |
| Totals       | 890  | 44.9 | 1094   | 55.1 | 20.970 **        |

\*\*Significant at .05 level

females between 163-203 mm t.l. There is an average difference of about 30 mm in modal value between males and females, showing clearly the size discrepancy between the two sexes. From July to December, there was a greater size range of shrimp, especially the smaller sizes. This may indicate the months of recruitment to the fishery.

From the size frequency, it appears that male *P. brasiliensis* live at least 2 years and female as long as 3 years. Probably the males above 140 mm t.l. are 1-year old, and above 180 mm 2 years old. Females above 170 mm t.l. are 1-year old, above 210 mm 2 years old and above 240 mm 3 years old.

#### LITERATURE CITED

- Bullis, H. R., Jr. and J. R. Thompson.  
1959. How's shrimping off Guianas? Here is FWS research report. The Fish Boat 4(8): 33-35, 41.
- Ewald, J. J.  
1967. The Venezuelan shrimp industry. FAO Fish. Rep. 3(57): 765-74.
- Holthuis, Lipke B.  
1959. The crustacea decapoda of Surinam (Dutch Guiana). Zool. Verh., Leiden, Rijkmus. Natuurl. Hist. 44, 296 p.

Khandker, N. Alam

1965. Some observations on the distribution of penaeid shrimp in eastern Venezuela. *Comm. Fish Rev.* 27(7): 12-14.

Lundberg, H., W. Brandhorst and E. Raca

1970. La flota de arastreros de Venezuela en 1968. *Minstr. Agric. Cria, Informe Tech.* 10, 18 p.

Perez-Farfante, Isabel

1969. Western Atlantic shrimp of the genus *Penaeus*. *U.S. Fish Wildl. Serv. Fish. Bull.* 67(3): 461-591.

U.S. Fish Wildlife Service

1958. Survey of the United States shrimp fishery. Vol. I. *U.S. Fish Wildl. Serv. Spec. Sci. Rep. Fish.* 277, 311 p.