

Portunus spinimanus Latreille, a Portunid Crab With Resource Potential in the U.S. Virgin Islands

DAVID A. OLSEN, ARTHUR E. DAMMANN,
and JOSEPH A. LaPLACE

ABSTRACT—An initial investigation into the resource potential of *Portunus spinimanus* in the U.S. Virgin Islands is reported. The crabs appear to be widely distributed and are caught best in wire fish traps that are baited and set for less than a week. Female crabs were smaller than male crabs in carapace width and exhibited a different weight-carapace width relation. Sex ratio changed from 48 percent male to over 91 percent male. Periods of reproductive activity were observed twice throughout the study period.

Virgin Islands fishery resources currently supply about 60 percent of the local consumption (Dammann, 1969). Almost 90 percent of the reported catch is taken in West Indian fish traps (Olsen, Dammann, and LaPlace, 1975). Despite the introduction of significant technological advances, the total catch has gradually declined in the past 44 years (Dammann, 1969). This decline has not resulted from a decrease in the fishing population which has remained constant over this time period. During this period, deep-water snapper and grouper resources have been opened to exploitation (Brownell and Rainey, 1971) and there have been changes in fishing boat design and power from sail to engines, as well as marketing-related communications.

This decrease in total yield is indicative of potential overfishing. As a consequence, local research efforts have centered on the discovery and development of unexploited resources like the snapper and grouper resources on the shelf edge. In 1974, fishermen

extension activities led to the discovery of a potential portunid crab resource (later identified as *Portunus spinimanus* Latreille, Fig. 1). The present study represents an initial investigation into

David A. Olsen is with the Island Resources Foundation, P.O. Box 4187, St. Thomas, VI 00801. Arthur E. Dammann and Joseph A. LaPlace are with the Bureau of Fish and Wildlife, #86 Estate Frydenhoj, Charlotte Amalie, St. Thomas, VI 00801.

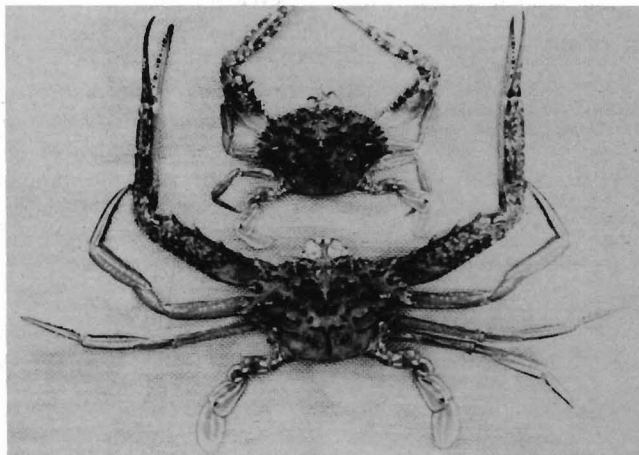
the resource potential of *P. spinimanus* in the Virgin Islands.

We undertook exploratory trapping around the shelf to discover the distribution and abundance of the crabs. We investigated the potential market value of the crabs by informal interviews with restaurant and market personnel. We set traps of various designs in one area in an attempt to assess an optimal trap design and soak length. Measurements of weight and length, as well as reproductive state and sex ratio of the samples, were also taken in order to assess annual trends in the population.

MATERIALS AND METHODS

Small (1 m × 1 m × 0.1 m) and regular sized (1.5 m × 1.5 m × 0.5 m) rectangular West Indian fish traps were set in areas on the shelf where interviews with fishermen led us to believe the crabs would be found (Fig. 2). The traps were hauled weekly during the exploratory period. An additional study site was established in July 1975 south

Figure 1.—*Portunus spinimanus* Latreille, is a potential fisheries resource in the Virgin Islands. The male crab (lower) has longer chelipeds (22 mm in this specimen) than the female (upper).



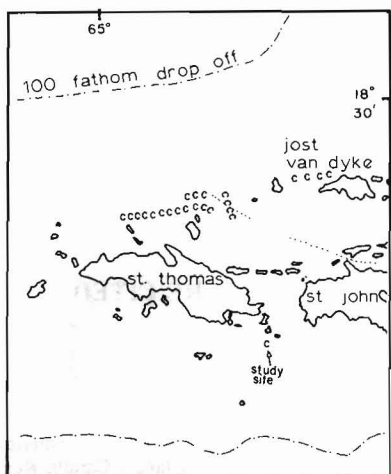


Figure 2.—Map of the Virgin Islands shelf showing the area where *Portunus spinimanus* were caught as a line of c's. The study site is the locale where trap design and soak experiments were carried out.

of St. Thomas (Fig. 2) where traps of varying design were set and hauled at intervals between 16 hours and 22 days to assess trap design and soak length.

All crabs were returned to the laboratory where carapace width was measured to the nearest 0.1 mm and total weight was measured to the nearest gram. Batches of the crabs were given to local restaurants and markets and to individuals in order to obtain an initial estimate of their market value.

RESULTS

The traps were hauled 440 times between May 1975 and July 1976. They caught 474 crabs for an average CPUE of 1.08 crabs per haul (SD = 0.47). The average sized crab had a carapace width of 9.89 cm (SD = 1.21) and weighed 168 g. The size-frequency distribution for the measured catch (Fig. 3) indicates that the females (average carapace width 9.11 cm, SD = 0.88) were smaller than the males (average carapace width 10.3, SD = 1.18).

Regression of weight on carapace width indicated that this relation was different for the sexes. The data were fit to the equation

$$W = aL^b$$

where: W is the weight in grams,

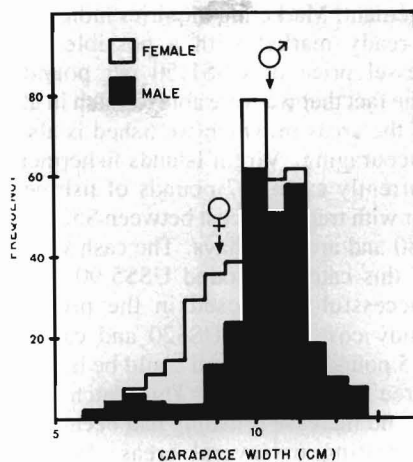


Figure 3.—Size-frequency distribution of *Portunus spinimanus* caught during exploratory fishing. Mean sizes for both sexes are shown by the arrows.

L is the carapace width in centimeters and,
 a and b are constants;

with a program in a pocket calculator. The results are given in Table 1. All of the results were significant at the 0.01 percent level or better.

Catch was highest during September 1975 and again in March 1976 (Fig. 4a, b). All of the crabs were caught in depths ranging between 14 and 32 fathoms. Fathometer tracings and sediment on the traps indicated that most of the catch came from a flat sand bottom found offshore from shoal areas.

The sex ratio of the population also changed over the study period (Fig. 4b) from 48 percent male to 91 percent male. Most of the females with eggs were captured from February to May 1976. The smallest berried female measured 7.7 cm carapace width.

The variability between the various fish trap designs tested (Table 2) was significant at the 0.001 percent level ($F=4.83$; $df = 4,193$). The most effective design was the 1 m \times 1 m \times 0.1 m West Indian fish trap. When set singly it caught almost four times as much as the individual traps when a string of four was set.

Catch was highest when the traps

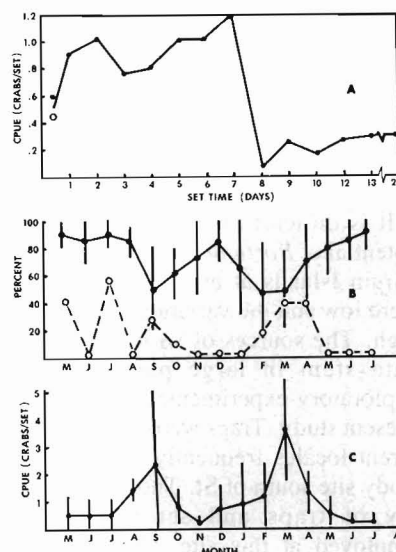


Figure 4.—A. CPUE for *Portunus spinimanus* using a variety of trap designs set for time periods from 12 hours to 21 days. The open circle represents a 12-hour set during daylight hours. Total sample size was 440 sets (average CPU = 1.08 crabs/haul, SD = 0.47). B. Percent of males (closed circles given with one standard deviation) in the samples of *P. spinimanus*. Percent of females bearing eggs is shown by the open circles. Study period was from May 1975 until July 1976. C. CPUE for *P. spinimanus* over the study period is given with one standard deviation.

Table 1.—The constants for the carapace width relation (text equation 1) of *Portunus spinimanus* were different for the two sexes.

Sex	N	a	b	r	p
Male	217	0.11	3.19	0.99	<.01
Female	85	0.24	2.02	0.87	<.01
Combined	302	0.12	3.16	0.95	<.01

Table 2.—Analysis of variance of the CPUE for the various trap designs indicated that there was significant variability between designs ($F = 4.83$; $df = 4,193$, $p < .001$). These traps were all set at one site south of St. Thomas. (See Fig. 2.)

Trap design	No. hauls	Total catch	Mean catch	SD
Wire fish traps	20	70	1.53	1.92
String of 4 wire traps	76	75	0.99	1.15
West Indian fish traps	22	15	0.76	1.14
Fish trap (tubular funnel)	69	23	0.37	0.83
Fish trap (net funnel)				
Net funnel crab trap	11	2	0.18	0.23

were set for between 1 and 8 days (Fig. 4a). Thereafter, the catch decreased sharply.

DISCUSSION AND CONCLUSIONS

It is difficult to assess the resource potential of *Portunus spinimanus* in the Virgin Islands at present. Catch rates were low and the variability in the data high. The sources of variability in the data stem in large part from the exploratory-experimental nature of the present study. Traps were moved to different locales frequently except at the study site south of St. Thomas. A variety of traps and set times were employed at this site which also introduced variability in the CPUE.

The results do offer some encour-

agement. Marketing inquiries indicated a ready market with a possible ex-vessel price of US\$1.50 per pound. The fact that we were able to catch in all of the areas in which we fished is also encouraging. Virgin Islands fishermen currently catch 4.7 pounds of fish per set with traps that cost between \$50 and \$80 and are set 7 days. The cash value of this catch is around US\$5.90. The successful traps used in the present study cost around US\$20 and caught 0.5 pounds per set and could be hauled three times a week. This catch rate would increase if fishing had been concentrating in several areas. With a higher catch rate, the low investment may indicate that there is potential for development of the resource. An added benefit to the Virgin Islands fishery would be the diversification of effort

with consequent reduction of effort on other resources.

ACKNOWLEDGMENTS

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