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DISTRIBUTION AND GROWTH OF SPINY LOBSTER PANULIRUS HOMARUS (LINNAEUS) IN THE CENTRAL WATERS OF VIETNAM

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ABSTRACT In the central waters, the green scalloped rock lobster (Panulirus homarus) distributes mainly from Hue - Danang to Ninhthuan provinces, wherein reached 50% of total exploited yield every year. These waters have narrow continental shelf and bottom topography rather intricate in comparison to others in Vietnam. Dispersion of the green scalloped rock lobster is governed clearly by these.

The growth, parameters of male and female Panulirus homarus were investigated in Hue - Danang waters. The Von Bertalanffy growth equations of this species were $lt = 119 [1- e^{- 0,403 (t - (- 0,1392)}]$ for female and $lt = 127 [1- e^{- 0,365 (t - (- 0,1622)}]$ for male. There is no significant difference on growth rate between sexes. And length-weight relationship was expressed as $W = 0.0010 L^{3.0077}$ for female and $W = 0.0012 L^{2.9442}$ for male. The slopes (b) are significantly near 3.00 and do differ little between males and females.

PHAN BO VA SINH TRÖÔNG CUA TOM HUM ÑA (PANULIRUS HOMARUS LINNAEUS) TRONG VUNG BIEN MIEN TRUNG VIET NAM

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Tãm t¾t ë vïng biÓn MiÒn Trung, t«m hïm ®¸ (Panulirus homarus) phæn bè chñ yÕu tõ vïng biÓn HuÕ-Đà Nẵng đến vùng biển Phú Yên-Khánh Hoà, chiếm khoảng 50% sản lượng khai thác hàng n¨m. Đây là vùng có thềm lục địa hẹp và địa hình đáy biển phức tạp trong dải ven biển Việt Nam, đáy biển dốc và nhiều đường phân cắt với các rạn ngầm và rạn ghềnh xen kẽ, đặc biệt có nhiều rạn san hô với đa dạng thành phần giống loài, nên đã chi phối phân bè cña t«m hïm ®¸ kh¸ râ rÖt.

Về sinh trưởng, ở hai giới tính đực và cái đã được điều tra, thu thập mẫu tại vùng biển Huế-Đà Nẵng để xác định các thông số sinh trưởng. Phương trình sinh trưởng von Bertalanffy đã được x©y dùng cho mçi giíi tÝnh cã d¹ng $lt = 119 [1- e^{- 0,403 (t - (- 0,1392)}]$ đối với con cái, và $lt = 127 [1- e^{- 0,365 (t - (- 0,1622)}]$ đối với con đực. Đồng thời, mối quan hệ giữa chiều dài giáp đầu ngực (L) và trọng lượng cơ thể (W) của con cái là $W = 0.0010 L^{3.0077}$; và con đực $W = 0.0012 L^{2.9442}$; như vậy hệ số b của cả hai giới tính xấp xỉ bằng 3, nghĩa là sự sinh trưởng của tôm hùm đá không có sự khác biệt rõ rệt giữa cá thể đực và cái.

INTRODUCTION

The central coastal waters spread between latitude 10^0 30'N (Kyvan cape) and 18^0N (Ngang pass) with plenty of reefs, advantage of natural and climatic conditions, and suitable habitat on the continental shelf. The area has created the concentrated distribution of 7 species of spiny lobsters with highly economic value. The green scalloped rock lobster (Panulirus homarus) plays an important role among commercial lobster exploitations in Central Vietnam. The annual live exporting shares about 30% of total catch of spiny lobsters in the region (Nguyen 1993). It is important to determine distribution and

growth of P. homarus for the resource management of this species. This paper provides the information on physical factors concerning with distribution of P. homarus and estimates the growth parameters and length-weight relationship of male and female by using the size data measurement.

MATERIALS AND METHODS

Distribution of the lobster P. homarus was investigated monthly at some waters with high landing, including Hue-Danang, Binhdinh and Khanhhoa from 1992 to 1994. Collected data consisted of offshore exploitation, season and sizes.

Length-frequency data of P. homarus were sampled from the commercial lobster catches in Hue-Danang provinces from April 1992 to March 1993. Carapace length (CL) was measured for males and females, separately. The Bhattacharya's method (Gayanilo et al, 1994) was used to analyze the perception. Based on the results of the Bhattacharya analysis, the growth parameters were estimated for the Von Bertalanffy equation. The asymptotic length ($L\infty$) was estimated with the Gulland and Holt plot (Sparre & Venema, 1992). The growth constant (K) was chosen providing "best fit" to the available length-frequency data.

The length-weight relationship of male and female P. homarus was determined by the equation: $W = a W^b$, where W is the weight of the lobster in gram (g); L is the carapace length in millimeter (mm); and a, b are constants. Length-weight data of 373 males and 491 females of P. homarus are treated by biostatistical methods.

RESULTS AND DISCUSSION

Surveyed data showed that the green scalloped rock lobster is found naturally along continental shelf from the offing of Haivan pass to Ninhthuan province (Fig.1), that had the depths of roughly 15-30m, seawater temperatures of 26.5-28.0^oC and salinities of 33.0-34.4‰ for the summer months; and 23.5-25.2^oC and 33.0-34.5‰ for the winter months (Vo Van Lanh et al., 1995). In this offing, shelf was precipitous with a lot of division-lines, submarine canyons and skew reefs interchanged together. There especially are a lot of coral reefs with variety of species. The nearshore skew reefs of Haivan pass, Sontra peninsula, Anhoa edges, and offshore submarine reefs belonging to Culaocham islands, Co, Mo islets... (Hue and Danang province), and the outer Vonca, Namtram edges...(Quangngai province), then pulling down Kim Bong, An Du, Thanhhy edges... and Lyson, Nghien-Kim Chieu, Kho, Roi islets..., Cumong pass (Binhdinh province) and Do, Vinhtruong, Sonhai islets...(Ninhthuan province) are major fishing areas for P. homarus. Almost the habitats of the offing P. homarus are sand and rock substrate with overlying big and small sediment types.

The fishing season for the green scalloped rock lobster often lasts during January and August. Concurrently, the obtained data (Table 1) reveal that fishermen exploited P. homarus mainly in the 35 – 75 mm CL size range (Fig. 2).

Table 1: Percentage of P. homarus from the Hue-Danang seawater fisheries

Carapace length classes (mm)	Quantities of P. homarus (animals)	Percentages (%)
20	35	4.05
21 - 40	116	13.43
41 - 60	608	70.37
61 - 80	75	8.68
81 - 100	30	3.47
Total	864	100

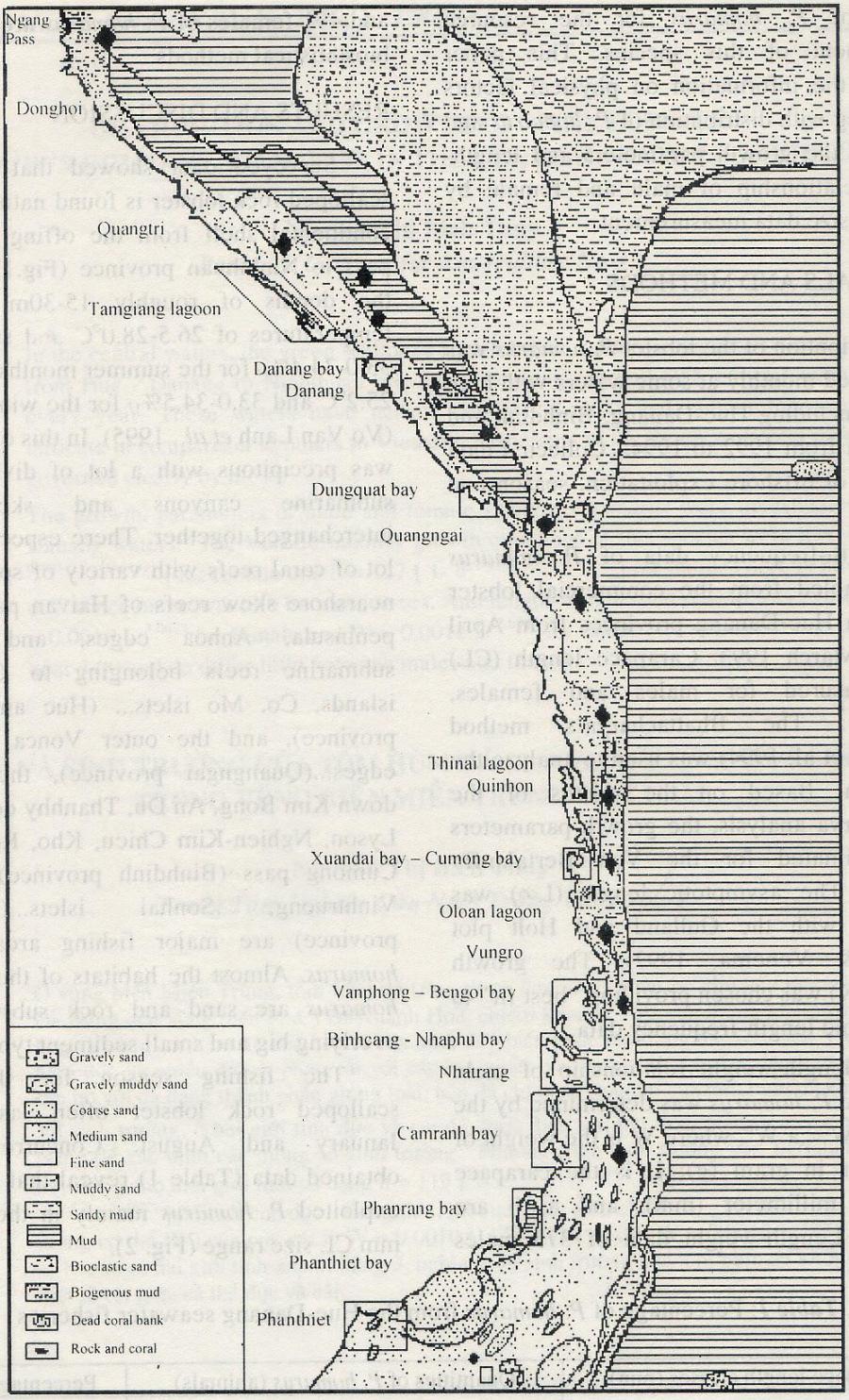

Figure 1: Distribution of the green scalloped rock lobster (*Panulirus homarus*) in the coastal waters of Central Vietnam (Geological map was prepared by Trinh The Hieu, 1992 & 1994)

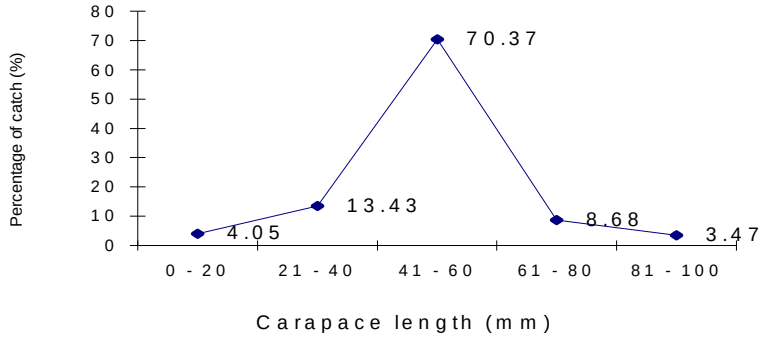

Fig.2: Exploited proportion of P. homarus in the Hue-Danang waters (1992-1993)

The growth parameters are given in Table 2. The asymptotic carapace length (Lt) was calculated at 119 mm for females and 127 mm for males. This indicates that the maximum length depends on the sexes of the species. The species have different asymptotic length by habitats, for example larger asymptotic length from rock area than sandy area (Berry, 1971). The growth constant K or also called "curvature parameter" was calculated at 0.403 for females and 0.365 for males P. homarus. This fact shows that the males need many years more than the females to reach their maximum length are 127 mm CL.

Table 2: The growth parameters of males and females Panulirus homarus caught off Hue-Danang

Sex	L∞ (mm)	K (year $^{-1}$)	t^0 (year)
Female	119	0.403	-0,1392
Male	127	0.365	-0,1622

The Von Bertalanffy growth equation of P. homarus has the following form:

$$E : lt = 119 [1- e^{- 0,403 (t - (- 0,1392)}]$$

$$\Gamma : lt = 127 [1- e^{- 0,365 (t - (- 0,1622)}]$$

These equations showed that the growth rate does not differ significantly between males and females P. homarus. The male would increase from about 43.8 mm to 69.2 mm CL and female from about 43.7 mm to 68.7 mm CL in the second to third year of age. However, the growth rate of males becomes faster than that of females, after approximately 4 years, because normally the female growth rate is slower than that of male during the mature old years.

The parameters of length-weight relationship of male and female P. homarus are estimated and given in Fig. 3. The values of the intercepts (a) for both sexes are approximately equal (0.0010 for female and 0.0012 for male). The slopes (b) are 2.94 ($t = 21.346$, d.f. = 48, $p < 0.05$) for the male and 3.00 ($t = 16.598$, d.f. = 48, $p < 0.05$) for the female. The slope for males is not different from females ($t = 1.20$, d.f. = 98, $p > 0.05$), connoting that the both sexes of P. homarus in Hue-Danang waters are similar in term of length-weight relationship.

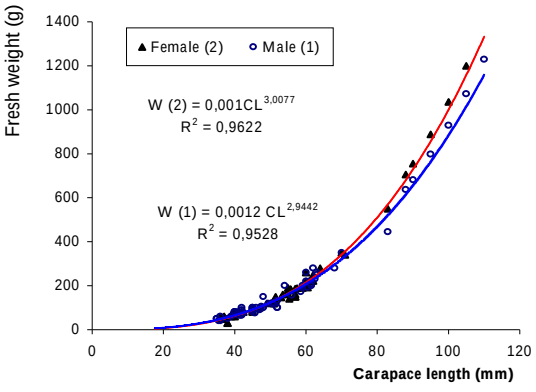

Fig.3: Length-weight relationship for P. homarus caught off Hue-Danang waters

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