



Distribution and abundance of deep sea spiny lobster *Puerulus sewelli* in the Indian Exclusive Economic Zone

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Abstract

The distribution pattern and abundance of deep sea spiny lobster *Puerulus sewelli* in the Indian Exclusive Economic Zone (EEZ) is described based on the exploratory surveys by the survey vessels of Fishery Survey of India employing various bottom trawls in the east and west coast of India from 1984 to 2006. The survey revealed that the best catches of spiny lobsters occurred in area 11°N lat. along the Kerala coast in the depth zone of 300-500m with mean catch per unit effort of 29.18 kg/hr, followed by the area between 8° and 9°N lat. in the Arabian Sea off Kerala coast in the same depth contour. The catch rate recorded for the species from the east coast between the area 7° N and 13°N lat. ranged from a minimum of 0.23kg/hr to maximum of 3.42 kg/hr. The study indicates that there is a depletion of deep sea lobster *P. sewelli* in the outer continental shelf and slope areas. Further investigations to understand the biology and population dynamics of the deep-sea lobster is a prerequisite for their management.

Keywords: *Puerulus sewelli*, deep sea lobster, abundance, Arabian Sea, Bay of Bengal

Introduction

Investigations on the distribution of deep sea spiny lobster *Puerulus sewelli* in seas around India were initiated as early as at the beginning of the 20th century (Alcock, 1901). The discontinuous distribution of *P. sewelli* in the west coast was reported by Kurian (1965), and Oommen and Philip (1974). Occurrence of *P. sewelli* in commercially exploitable quantity was first brought to light by the trawlers of the Indo-Norwegian Project, Cochin (Joseph, 1972). The declaration of the Exclusive Economic Zone (EEZ) in 1982 under the United Nations Convention on the Law of the Sea (UNCLOS) gave coastal states a legal guarantee to explore and exploit the marine resources beyond territorial waters. As a result, many government agencies in India, such as the Fishery Survey of India (FSI) and the Department of Ocean Development (DOD), started extensive exploration for *P. sewelli* in deeper waters. Joseph (1984) stated that *P. sewelli* occurred in considerable quantities

along the southwest coast. FSI survey vessels *Matsya Nireekshani* and *Matsya Varshini* established its occurrence along the west coast from the Gulf of Mannar to Karwar, while in the lower east coast Oommen (1985) noted that this species was available in the 180-275m depth range, estimating a standing stock of 12,940 tonnes between 7° and 13° lat. Sulochanan and John (1988) have their observation that the species has its abundance from August to February. Sulochanan *et al.* (1991) noted that the availability of deep sea lobster in the Palk Bay in the east coast was negligible. Suseelan *et al.* (1990) reported that trawl surveys carried out by the research vessel, *Sagar Sampada*, off Trivandrum yielded the highest catch rates in the west coast. However, the studies carried out by the FSI survey vessels on the abundance of the species during 1984-2006 from the east and west coasts of the Indian EEZ indicate that the abundance of this species is declining and that the resource structure is in different dimension. In this paper an attempt is made to analyse the

distribution pattern and seasonality of *P. sewelli* in the east and west coasts of India during the period of 1984 - 2006.

Material and Methods

Data were collected in surveys conducted by the vessels *Matsya Nireekshani* (OAL: 40.5m) using 47m shrimp trawl and *Matsya Varshini* (OAL: 36.5m) employing 45m shrimp trawl along the west coast of India in the depth contour of 200-500m (between 7° and 22°N lat.). The east coast was surveyed by *Matsya Shikari* (OAL: 39.5 m), *Matsya Darshini* (OAL: 36.5 m), *Matsya Jeevan* (OAL: 36.5 m) and *M.F.V.Samudrika* (OAL: 28.8 m) employing 45 m, 47 m, 42 m and 30 m shrimp trawl net respectively in the depth contour of 200-500m (between 8° and 15°N lat.). The surveys were conducted over two decades from 1984 to 2006, using stratified random sampling design. Catch and effort were used to estimate the catch per unit effort (CPUE) in kg/hr, and the distribution and seasonality of *P. sewelli* in the study area.

Though the sampling distribution covered the east and west coasts, more effort was expended in the west coast during the survey. A total of 2685 hauls were made in the depth zone of 200-500m with a total trawling efforts of 5301 hours, out of which 1499 hauls with 3004 hours were expended in the west coast. Most sampling effort was spent in west coast from 8° N to 9°N lat., followed by the area from 10°N to 12°N lat. In the east coast maximum sampling effort was in 8°N lat.

Results and Discussion

The highest catch rate of 29.18 kg/hr was obtained in 200-500 m depth contour of the west coast in 11°N lat., followed by 9°N, and 8°N lat., with a CPUE of 11.63 kg/hr and 11.51 kg/hr. In the east coast, the maximum catch was from 11°N lat. registering a CPUE of 3.42 kg/hr. Overall catch rates of *P. sewelli* were higher in the west coast than in the east coast of the Indian EEZ (Fig. 1 and 2).

During 1984 to 2006, the catch rate in the west coast was high initially, but declined drastically afterwards. During 1984, the mean catch rate was 4.71 kg/hr, which increased to 16.66 kg/hr in 1987 (Fig. 3a). The catch rate subsequently declined and

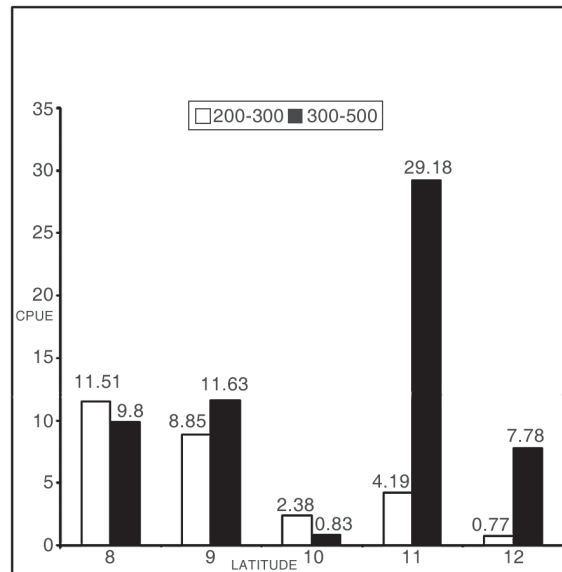


Fig.1. Mean catch rates (kg/hr) of *P. sewelli* by latitude along west coast of India in the depth range of 200-500 m (1984-2006)

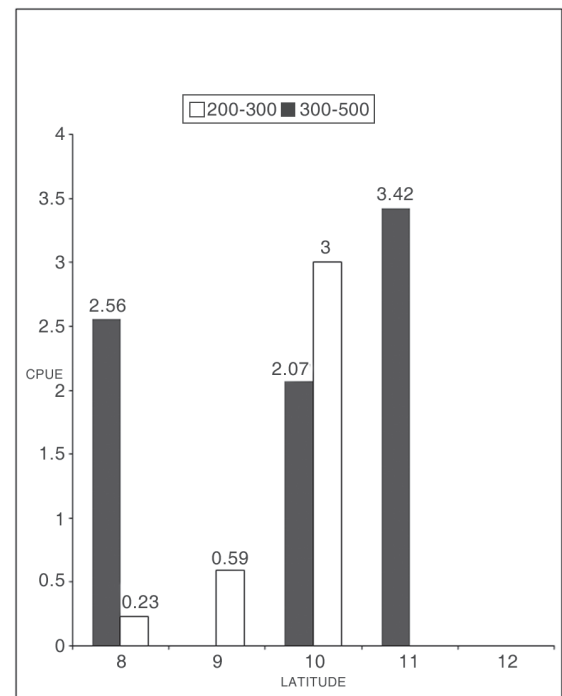


Fig.2. Mean catch rates (kg/hr) of *P. sewelli* by latitude along east coast of India in the depth range of 200-500m (1984-2006)

the lowest (0.03 kg/hr) was recorded in 1992. After a lull of more than a decade, it grew only up to 0.41 kg/hr

hr in 2006. In the east coast the maximum mean catch rate (d² 0.45 kg/hr) was obtained in 1985 (Fig. 3b).

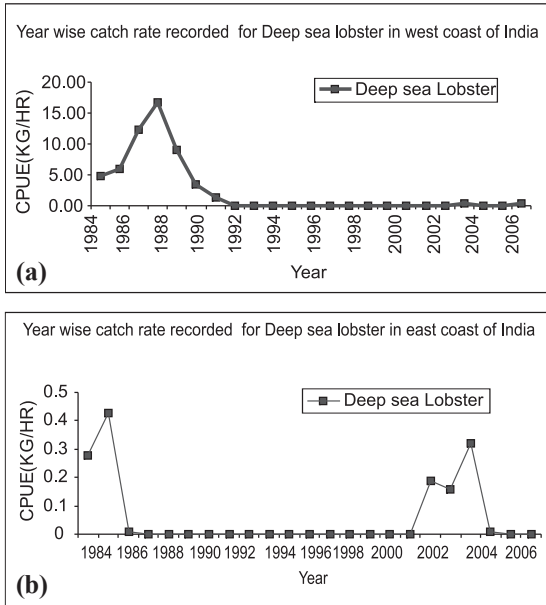


Fig. 3 a & b. Mean annual catch rates (kg/hr) of *P. sewelli* along west and east coast of India in the depth range of 200-500m (1984-2006)

Three periods relating to monsoon were defined: pre monsoon (Jan-April), monsoon (May-August) and post monsoon (September-December). In west coast the post-monsoon period registered the highest catch rate with 6.03 kg/hr, followed by the pre-monsoon with 4 kg/hr (Fig. 4a). In the east coast, though the catch rate is meager in general, the maximum was registered during the pre-monsoon period with 0.15 kg/hr, followed by the monsoon period with 0.11kg/hr (Fig. 4b).

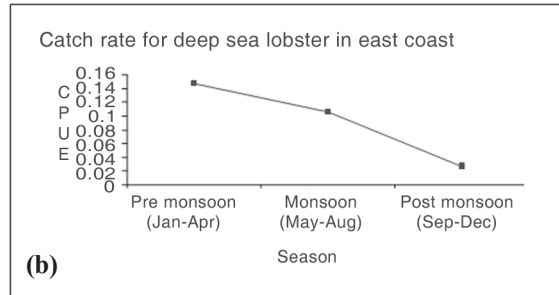
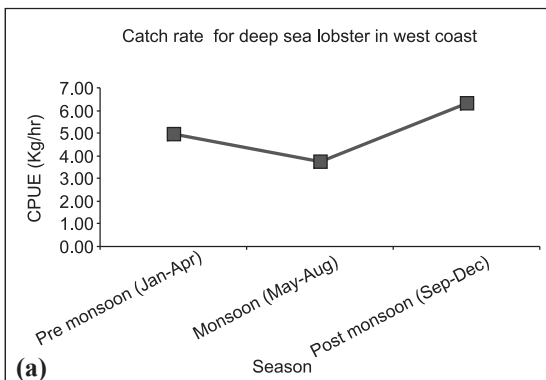


Fig. 4 a & b. Mean seasonal catch rates (kg/hr) of *P. sewelli* along west and east coast of India in the depth ranges of 200-500m (1984-2006)

Nephropsis stewarti, *Metanephropsis andamanicus*, *Munida scobina*, *Polychelus phosphorus*, *Linuparus somniosus*, *Scyllarus rubens* and *Polychelus andamanensis* and *P. sewelli* are the deep sea lobsters reported in the Indian EEZ, but only *P. sewelli* is exploited in commercial fishery with high value. Investigations by different agencies confirmed the economical viability of this resource. In the west coast, the potential catch was estimated as 3000 tonnes (Dixitulu, 1998). The FSI vessels landed 550 kg of *P. sewelli* from Quilon Bank in the west coast during February 1986 which is an indication of the magnitude of the resource. In the east coast during March 1998, the CPUE recorded in Andaman & Nicobar (A&N) waters was 60 kg/hr. But after a decade the average catch in the Quilon Bank declined to a meager 0.11kg/hr and in the A & N waters, it declined to 36 kg/hr. The size ranges of *P. sewelli* obtained in southwest coast during the early 1986 was between 132 and 145mm (total length, TL), whereas after a decade, during 2006, the size caught was between 50 and 110mm TL only. *P. sewelli* was indiscriminately exploited along the Indian coast with no ban on catching juveniles and berried lobsters. This resulted in substantial decline of the resource, which is evident by the lower catch rate recorded at present and also the decline in the length range as compared to those in the 1980s. Even though *P. sewelli* has high fecundity, its growth rate is low and it has a protracted larval life. As a result of these factors and also because of wanton destruction by catching berried females the stock of most of the lobster species have declined. The classical case in India is that of *Thenus orientalis*

from the west coast. This species is recorded in small numbers at the landing centers along the west coast recently. A large number of species has shown decline since the introduction of shrimp trawlers employing very small codend mesh size. A holistic approach on the proper management of the resource involving the fishers is required for sustainable exploitation of deep sea lobsters in India.

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