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ON THE DISTRIBUTION AND RELATED ECOLOGY OF POMFRETS FROM THE INDIAN SEAS

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ABSTRACT

Fishable stocks of pomfrets occur along the States of Gujarat, Maharashtra, West Bengal and Orissa. These fishing areas are located between latitudes 18°N to 22°N. A gradual decline in the abundance of these stromateid fishes is observed from north to south on either side of the Indian coastline. The areas of abundance are characterised by broad continental shelves. Of the various oceanic properties high values of chlorophyll-*a* and primary and zooplankton production in the regions of commercial fishing are of interest.

INTRODUCTION

Pomfrets constitute one of the main groups of table fishes in India. On account of their soft flesh and delicate flavour, they are often referred to as 'butter fishes'. Because of their high commercial value they are eagerly sought after by the fishermen. The fishery is contributed by three species, *viz*., silver pomfret *Pampus argenteus* (Euphrasen), chinese pomfret *Pampus chinensis* (Euphrasen) and black pomfret *Parastromateus niger* (Bloch). Of the three, silver pomfret is the most common species contributing to nearly 90% of the pomfret landing. Oceanographic studies aimed at the study of environment of these fishes, so as to understand their distribution and abundance, have not yet been attempted. This paper deals with the distribution and abundance of pomfrets from the Indian coasts.

MATERIALS AND METHODS

The present study is based on the statistics of landing maintained by the Central Marine Fisheries Research Institute, Cochin. This is the only organisation estimating the total marine fish production of different maritime States of India and the country as a whole on the basis of sampling design involving space–time stratification. For oceanic properties of the coastal waters, the data collected during the International Indian Ocean Expedition (1960–65) have been taken into consideration (Prasad, 1968; Kasturirangan, Saraswathi, Saraladevi, Stephen, Gopalkrishnan and Kunjamma, 1970; Miller and Jefferies, 1967; Wooster, Schaefer and Robinson, 1967; Wyrtki, 1971; Krey and Babenerd, 1976).

RESULTS

Distribution and Abundance

The three species have a wide range of distribution in the Indo–Pacific from Japan along the coasts of India to the Iranian Gulf. However, *P. niger* has a

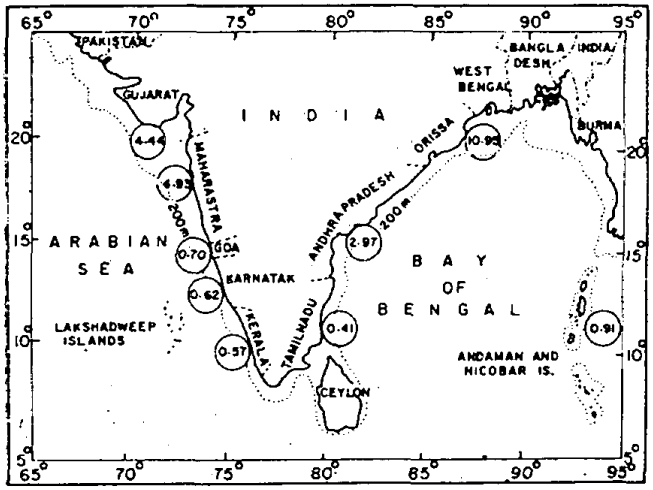

Fig. 1. Statewise percentage of pomfret.

further westward distribution up to the east coast of South Africa. The distribution of pomfrets along the Indian coasts is continuous and their abundance shows regional variation. The present annual production of marine fish from India is of the order of 1·5 million tonnes, of which the pomfret contribute nearly 2-3 percent of the total catch.

The statewise total landings of marine fish and pomfrets from 1969 to 1978 are shown in Table I and the percentage contribution of pomfret to the marine catch is diagrammatically given in Fig. 1.

Pomfrets occur in the fishery of different States except for the island groups of Lakshadweep. They occur in commercially fishable concentration along the coasts of West Bengal and Orissa, Gujarat and Maharashtra. In other States their percentage contributions to the total landing of sea-fish are insignificant. The landings of pomfrets appear to be the highest along West Bengal – Orissa coast (10·95%) followed by Maharashtra (4·93%) and Gujarat (4·44%). At present Maharashtra is the leading pomfret-producing State of India and is succeeded by Gujarat and West Bengal–Orissa which rank second and third in the production of pomfrets.

Distribution

Fishes occur in maximum numbers at certain optimum conditions of the evnvironment. Some of the oceanic properties, collected from the literature pertaining to the coastline of India are given in Table II.

Table I. Statewise landings of marine fish and pomfrets in different maritime States of India during 1974 to 1978 (in tonnes).

Sl. No.	Name of the State	Total landing of marine fish	Total landing of pomfrets	Percentage of pomfrets
1	West Bengal and Orissa	201,272	22,053	10·95
2	Andhra Pradesh	628,649	18,704	2·97
3	Tamil Nadu and Pondichery	1081,212	4,446	0·41
4	Kerala	1890,516	10,806	0·57
5	Karnataka	509,052	3,160	0·62
6	Goa	135,514	961	0·70
7	Maharashtra	1283,877	63,358	4·93
8	Gujarat	901,945	40,072	4·44
9	Andamans	11,967	110	0·91
10	Lakshadweep	10,498	—	—

Table II. Oceanic properties along the Indian Coast.

Oceanic properties	Range of variation	
Surface temperature (°C)	23—30	La Fond (1958), Miller and Jefferies (1967), Wooster, Schaefer and Robinson (1967)
Surface salinity (‰)	17—36	-do-
Depth of euphotic layer (m)	50—65	Krey and Babenerd (1976)
Phosphate-phosphorus (μg-at/l)	0·2—0·6	Wyrtki (1971)
Silicate-silicon (μg-at/l)	3·0—10·0	-do-
Nitrate-nitrogen (μg-at/l)	0·5—1·0	-do-
Chlorophyll-*a* (mg/m³)	0·3—0·5	Krey and Babenerd (1976)
Primary production (mg C/m²/d)	100—500	-do-
Zooplankton biomass (ml per haul)	5—20	Prasad (1968)
Density of copepod (no. per haul)	3,000—27,000	Kasturirangan, Saraswathi, Saraladevi, Stephen, Gopalkrishnan and Kunjamma (1970)
Density of decapod larva (no. per haul)	300—2,700	-do-

Pomfrets, which are distributed throughout the coast of India are exposed to a narrow range of temperature, but a wide fluctuation in salinity. The concentrations of nutrients in seawater show regional variation during different parts of the year. Primary productivity, standing crop of zooplankton, density of copepods and decapod larvae also vary from place to place, presumably influencing the abundance of fish stock.

DISCUSSION

Pomfrets are coastal fishes largely inhabiting upto a depth of about 100 metres in the continental shelf (Haedrich, 1967; Fischer and Whitehead, 1974). They move in shoals which may be incredibly large, with more than 2000 individuals in each school (Moses, 1947). Their food consists mainly of zooplankton dominated by copepods and decapod elements (Rege, 1958; Basheeruddin and Nayar, 1962: Nath, 1966; Kuthalingam, 1967; Rao, 1967; Sivaprakasam, 1967 and Pati, 1978).

The concentration of fish in a particular area can largely be attributed to feeding and spawning. Although pomfrets are distributed throughout the coastline of India commercially fishable concentrations occur only along Gujarat, Maharashtra, West Bengal and Orissa. These areas lie between Lat. 22°N to 18°N, where sea is shallow with a broad continental shelf. On the west coast of India pomfrets contribute 4–5% of the marine catch from Gujarat and Maharashtra, while they represent 10–11 percent of the total sea fish from the West Bengal and Orissa along the east coast. They thus indicate their highest concentrations in the latter zone. Although the highest landing of pomfrets is from Maharashtra followed by Gujarat, Orissa and West Bengal, it is of interest to note that landing of pomfret decrease on both sides of the Indian coastline as one passes from north to south (Fig. 1).

Surface temperature along the coastline undergoes seasonal changes ranging between 23–30°C. Surface salinity shows even a wider variation (17–36 ‰). Along the

West Bengal and Orissa coast salinity goes down to 17‰ (La Fond, 1958), largely because of the river systems opening into the Bay of Bengal. In addition to these characteristics the coasts of Gujarat, Maharashtra, West Bengal and Orissa have wide continental shelves in which maximum values of surface chlorophyll-*a* (70·5 mg/m^3) and primary production (500 mg C/m^2/d) have been recorded (Krey and Babenerd, 1976). Therefore, these areas with a rich crop of phyto and zooplankton perhaps provide suitable conditions for the pomfrets to feed and spawn.

It has also been established that pomfrets from the Arabian Sea spawn in the Gulf of Cambay adjacent to Gujarat and Maharashtra coasts (Rege, 1958; Sivaprakasam, 1965; Gopalan, 1969) and those from the Bay of Bengal breed along the coasts of West Bengal and Orissa, north of the river Mahanadi (Kuthalingam, 1967; Pati, 1978). The three species spawn from February to November (Pati, 1978), and their stay for the greater parts of the year in the vicinity of spawning ground also accounts for their commercial fishing in the adjacent areas.

Blackburn (1969) in his review on the ecology of the tuna distribution considers temperature and feed supply as important factors governing their concentration. But in pomfrets, out of the various factors chlorophyll *a*, primary and secondary (zooplankton) production seems to influence the regional abundance of the fish in the Indian seas.

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