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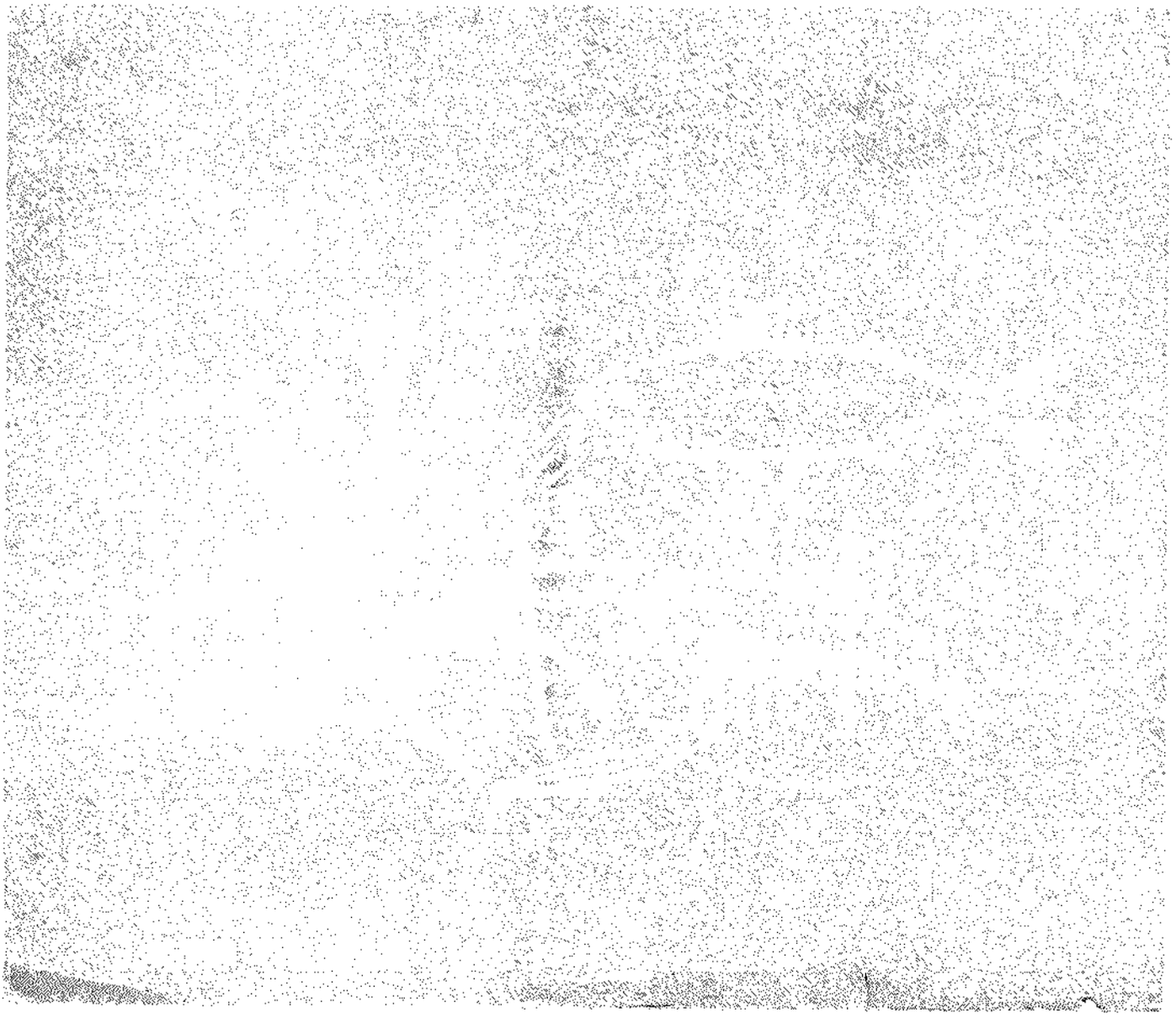

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THE FISHERY POTENTIAL OF SILVER-BELLIES

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ABSTRACT

In recent years, the catches of silver-bellies from the seas around India have shown a steep rise, from 15,274 m. tons in 1950 to 43,823 m. tons in 1967, at present forming 5·08% of total marine fish production and offer scope for further development. While they are caught all along the Indian coast, a significant fishery exists only in the southern States. It is essentially a round-the-year coastal fishery, its range not exceeding about 30 metres in depth. Although the fish school together at the bottom, perhaps with the exception of one or two species which seem to live in, or at least migrate to surface waters, they do not seem to migrate long distances. The peak season for the fishery varies with the dominant species at a place which in turn is dependent on the type of bottom to a large extent.

As many as 17 species are now known to be available in the seas around India, but from the fishery point of view, seven species, *viz.*, *Leiognathus jonesi*, *L. splendens*, *L. bindus*, *L. dussumieri*, *L. equulus*, *Secutor insidiator* and *Gaz minuta* seem to be important, of which *L. splendens* is widely distributed along the Indian coast. As most of the species are small and appear to be short-lived, and since the present method of exploitation leaves enough brood for replenishing the stocks, it is desirable to catch fish of all sizes for the best utilisation of the resource.

The best and most suitable gear for these fishes are the trawl nets, followed by boat seines and shore seines. Hitherto unexploited sheltered coastal areas with muddy or coral-sandy bottom are likely to be the new grounds for these fishes forming further supplies of food, fish meal and fertilizer.

INTRODUCTION

THE fishes of the family Leiognathidae, popularly called silver-bellies, have gained importance in recent years due to the discovery of new fishing grounds for them and the consequent steep and steady rise in their catches constituting an ample source of cheap food, fish meal and fertilizer. Ten years ago, these fishes were mainly caught by indigenous craft and gears like catamarans and bag nets. In recent years, the catches have been substantially increased by modern methods of harvesting, employing mechanised boats and trawl nets. Though the other gears like shore seines, bag nets and drift-nets continue to be the subsidiary gears for these fishes, the landings by the trawl nets are considerably high at a number of places. This gear appears to be quite effective since the fishes habitually live at or nearer the bottom in large schools and do not seem to migrate long distances. The few references of importance on some species of this group from the fishery point of view are those of Arora (1951), Jones (1966) and Balan (1967). Other information is contained in the Annual Reports of CMFRI.

CATCH PARTICULARS

The total catch of silver-bellies in India during the period 1950–67 ranged from 9,408 to 43,823 m. tons, contributing from 1·45 to 5·08 % of the total marine fish production in the country. The catch of silver-bellies and also their percentage contribution was maximum in 1967, while the catch was minimum in 1953 but the percentage lowest in 1957. The average catch for the ten years from 1958 to 1967 was 23,255 m. tons, forming 2·96 per cent of total marine fish catch.

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Silver-bellies are caught all along the Indian coast, but good fishing grounds seem to be present only off the coasts of the southern states. They are landed almost round the year, but peak season for the fishery varies with the dominant species at a place. The depth range of the fishing grounds does not usually exceed 30 metres, the fishery therefore mostly confined to the coastal belt.

In West Bengal and Orissa, the catch of silver-bellies was very poor till 1956. But from 1957 to 1967, there was some improvement when the catches ranged from 121 to 2,145 m. tons with the highest catch in 1967. In Andhra Pradesh also, though the fishery was not good till 1956, considerable rise in production was achieved, the catches thereafter ranging between 908 to 5,978 m. tons. The catches appear to be comparatively better in the northern region (especially off Visakhapatnam and Srikakulam Coasts) than in the southern region. The silver-belly catches in Madras State have been more or less uniformly good, recording maximum production compared to all the other States. The catches were especially remarkable since 1964, ranging between 10,556 and 19,839 m. tons. The most productive areas in the State appear to be in the Palk Bay and Gulf of Mannar regions along the south-east coast, where a lucrative fishery operates. In this region, 15 species occur but about 6 of them are important; *Leiognathus splendens* is the dominant species. At Cape Comorin, for the period 1958–63 it was estimated that a total of 117·89 tonnes of silver-bellies were landed with an average of 19·64 tonnes, forming 1·1% of total catch of fish (Chacko *et al.*, 1967). Off Pondicherry, 16·55, 202·00 and 840 m. tons of silver-bellies were landed in 1964, 1965 and 1966 respectively. In Kerala, silver-bellies constitute one of the important fisheries. The catches fluctuated considerably between 1950 and 1963 but thereafter they steadily increased to a maximum of 12,970 m. tons in 1966. In 1967, the total quantity landed was 11,987 m. tons. The northern section of the State from Cannanore to Calicut accounts for about 65 to 75% of the catch, the central section from Palghat to Ernakulam 25–30% and the rest from the southern section. The catches of silver-bellies were generally poor in Mysore State, with a maximum of 3,746 m. tons in 1962. The catches have been highly fluctuating in other years and showed a decline since 1964. In Goa, the catches of silver-bellies are of the order of about 1,000 m. tons per year. In Maharashtra the silver-bellies are caught in very poor quantities, generally not exceeding a thousand m. tons per year but in 1967 there was a significant rise to 3,167 m. tons. The silver-belly catches are the poorest in Gujarat, of all the maritime States of India. While silver-bellies occur only as stray specimens in the Laccadive group of Islands, small quantities of the order of about 50 m. tons are landed in the Andaman and Nicobar Islands where there seems to be some scope for further development.

From the above data, it is clear that silver-bellies form a substantial fishery in the States of Andhra Pradesh, Madras and Kerala, to some extent in Mysore and Maharashtra. It is poor in West Bangal and Orissa, Gujarat, Goa and the Island groups mentioned.

All available information on the catch particulars of silver-bellies in different areas by trawling is given in Table I. It may be seen that best catch rates are obtained in the Palk Bay and Gulf of Mannar region in the vicinity of Mandapam, followed by the Tuticorin area of Gulf of Mannar. Fairly good catch rates are recorded off Karwar, Puri and Visakhapatnam.

The catch data at Mandapam (Palk Bay) was studied from 1964 through 1968, for understanding the trend of the fishery, as this is one of the areas of abundance of silver-bellies accounting for about 90% of the trawl catch of a boat. The average catch of silver-bellies per boat per day in different months (at Mandapam) for the period 1964 to 1968 is given in Table II. It is clear from this that the catches of silver-bellies have increased in each successive years and that the peak catches are obtained generally in August-September period. Some aspects of the fishery, species composition, size range and catch rates area-wise (25 square miles each) in the Palk Bay and the Gulf of Mannar off Mandapam were given by James and Clement Adolph (MS, 1966).

TABLE I

Particulars of places, depth, season, nature of bottom of the sea, catch rate by trawling and percentage composition of silver-bellies along the Indian Coast

[Data compiled from the Annual Reports of (CMFRI) from 1960-61 to 1966-67]

Place and Year	Depth (metres)	Bottom	Season	Catch/hr. (kg.)	Percentage composition of silver-bellies in total catch	Remarks
1. West Bengal and Orissa (1962–63)	11–68	..	..	4·6–35·7	..	Puri Coast has been found to be rich.
2. Off Chilka, Puri and River Devi (1960–61)	..	..	..	..	..	Availability of large silver-bellies indicated (size not known).
3. Visakhapatnam (1961–63)	30–124	Muddy sand, mud or sand	..	1·09–6·90	..	..
4. Madras (1965–66)	..	..	August-January	..	..	About 20,000 kg. per year. 8 species occur 5 species of fishery importance.
*5. Mandapam (1964)	10–26	Muddy, sandy and coral	Throughout the year April-October (PB) Nov.–March (GM)	37·77–320·00 (PB) 182·95–372·23 (GM)	92·0–96·0 (PB) 85·0–90·0 (GM)	15 species occur, 6 species of fishery importance.
6. Tuticorin (1961–67)	3·60–40·26	Muddy, sandy or sand and mud	Throughout the year Peak January–March	2·80–70·72	4·5–60·3	Predominantly silver-bellies in 7–14 m. depth.
7. Overi (1960–61)	10–14	..	..	..	48·5	..
8. Cape Comorin (1960–61)	..	..	..	..	2·6	..
9. Cochin (1962–63)	up to 57	..	September–March	..	2·6	..
10. Calicut (1965–66)	..	..	April-December	..	..	Two species important from fishery point of view.
11. Cannanore (1966–67)	10–20	..	August–November (peak)	..	15·20–16·32	..
12. Mangalore (1964–66)	11–54	..	..	..	..	Chiefly silver-bellies.
13. Karwar (1963–66)	..	..	September–March	0·39–50·44 (Highest 140·00)	24·78	..

* Data from the *Quarterly Reviews of the Indo-Norwegian Project for the year* 1964. P.B., Palk Bay; G.M., Gulf of Mannar.

TABLE II

Average catch (kg.) of silver-bellies per boat per day landed by trawl nets operated from pablo boats off Mandapam in Palk Bay and Gulf of Mannar during the period 1964 to 1968. Total number of boats operated and total number observed for calculating averages are also given

Month	1964 *			1965			1966			1967			1968		
	Total No. of boats operated	Total No. of boats observed	Average catch per boat	1	2	3	1	2	3	1	2	3	1	2	3
January	1	1	209·64†	..	..	..	..	1	480·82	69	69	976·41	51	51	199·95
February	2	2	554·47†	..	..	..	..	1	406·84	120	101	882·85	151	124	740·24
March	2	2	502·32† 580·00	..	1	791·85	..	90	999·27	299	122	1,216·45	290	137	625·50
April	2	2	478·56	..	74	1,116·85	..	123	1,022·41	308	142	1,211·63	608	128	940·96
May	2	2	686·08	..	151	1,013·74	..	198	1,472·48	516	137	1,433·84	684	138	1,356·04
June	2	2	810·68	..	166	1,168·64	..	184	1,405·63	580	117	1,572·19	1,104	129	1,524·47
July	2	2	1,075·68	623	152	1,301·22	..	185	1,159·20	713	143	1,505·57	1,219	143	1,108·44
August	2	2	1,511·24	746	142	1,136·15	756	150	1,050·60	659	130	1,850·96	958	137	970·87
September	2	2	1,034·97	367	146	1,337·84	488	134	1,533·39	504	113	1,786·43	290	121	547·90
October	2	2	1,396·00	122	121	1,285·27	220	128	1,198·77	369	92	1,476.08	372	79	1,283·89
November	2	2	616·70†	47	47	1,290·44	150	144	1,091·23	..	..	..	42	32	847·89
December	2	2	1,376·45†	..	..	..	92	92	1,223·56	..	..	..	218	112	461·09†

+ Data from INP medium boats; † Data refer to Gulf of Mannar.

Notes on Important Species

It is now known that 17 species of silver-bellies inhabit the seas around India, of which seven species, *Leiognathus jonesi, L. splendens, L. bindus, L. dussumieri, L. equulus, Secutor insidiator* and *Gazza minuta* are important from the fishery point of view. An account of some species of fishery importance is given below:

Leiognathus jonesi—The life span of the species has been estimated to be about three years, attaining a maximum size of 152 mm. total length. The commercial catches generally include the total size range from 26–100 mm. fork length, with 40–75 mm. size group dominant. The species spawns from March to September, individuals maturing at the end of first year. Juveniles, 17–40 mm. occur from January–June, October–November. It mainly feeds on diatoms. Large shoals of the fish inhabit shallow areas of the coastal waters usually between 12–20 m. depth with muddy or sandy bottom. One and two-year old fish mainly support the fishery but juveniles also form variable percentage of the catch in different months. It is of interest to mention here, this species forms about 90% of the catches of silver-bellies in the Palk Bay near Mandapam, supporting almost exclusively the silvery-belly fishery, yielding the highest catch rate along the Indian Coast. In the same place, in the Gulf of Mannar, it does hardly contribute to 10% of the silver-belly catch. In both the regions, the species occurs with other species of the group. Since the species appears to be short-lived breeding at the end of first year, and as the present method of exploitation leaves enough brood to replenish the future stocks, it is advisable to catch fish of all sizes for the best utilization of this resource.

Leiognathus splendens.—It appears to be the species most widely distributed along the Indian coast. It contributes to the fishery along with other species, especially along the west coast of India. Commercial catches generally include fish between 50 to 100 mm T.L. It attains a maximum size of about 150 mm. T.L. Juveniles (30 mm. T.L.) have been found to enter estuaries (at Mangalore).

Leiognathus dussumieri.—Perhaps this should be considered the next important species to *L. splendens* on an all-India basis. Apart from other localities, it is the dominant species in Gulf of Mannar off Mandapam and Tuticorin where the catch rates are high. The total size range is 19–145 mm. total length, the 75–100 mm. fork length being the commercial size. Mature fish were recorded in January–March, May, July, October, November and juveniles (19–54 mm.) in April, May and November. The species mainly feeds on gastropods, bivalves, tubiculous polychaetes, copepods, etc. It appears to inhabit coral-sandy bottom areas, at depths usually ranging from 12–26 m.

Leiognathus bindus.—This species is also widely distributed both on east and west coasts of India, contributes to a fairly high percentage of the catches of silver-bellies and also forms the dominant species in certain localities. It appears to be especially abundant in the Calicut area where large quantities are caught in bag nets, the 55–95 mm. group mainly supporting the fishery. The size at first maturity was found to be 87 mm., average egg production being 6,162. The species spawns once a year from December to February. Shoaling in surface waters was reported, luminescent shoals yielding heavy catches on dark nights. At Mandapam, it has been found to be more abundant in the Gulf of Mannar than in Palk Bay and mature specimens and juveniles (31–66 mm.) are recorded in November, February and March and November and May respectively.

Secutor insidiator.—This species appears to be dominant in the silver-belly catches at Madras where seven other species are also known to occur. The overall size range varies from 21–100 mm. fork length. Advanced stages occur in August–September and February–March, indicating possibility of spawning more than once. Juveniles, 13–31 mm., were noticed in March. Fish in advanced stages were also recorded at Mandapam during October and February and juveniles (16–38 mm.) in April and May.

Leiognathus equulus.—Perhaps this species attains the largest size in the group. The maximum size so far recorded is 242 mm. T.L. from Rameswaram (Palk Bay). Only stray specimens are caught in the trawl nets but better catches are obtained in drift gill nets during April, May when it is known to appear in shoals in surface waters at depths ranging from 8 to 10 metres. Mature specimens were recorded in January to March and May and juveniles (44–67 mm.) in March, which enter into shallow waters and creeks, mainly around islands.

Gazza minuta.—Although does not form a fishery by itself or dominate the catch at any particular locality, it contributes substantially to the silver-belly catches along both the coasts of the country. The maximum size recorded is 141 mm. T.L. Mature specimens have been recorded in January, March and April, and juveniles (26–60 mm.) in May, November and December.

As the silver-bellies are mostly small, and scanty of flesh and fat, they are not consumed much in fresh condition. Therefore, the bulk of the catches are salt-cured, and in certain seasons, depending on market demand, sun-dried and sent to interior places and scarcity areas for fresh fish. Apart from being directly utilized as food, these fishes are suitable for conversion as nutritive fish powder which, if manufactured in a suitable way, might find a good market. Excess catches, if any, can profitably be converted into fish meal and fertilizer, greatly needed in the country for agriculture and livestock development. Incidentally it may be mentioned that for a long time these fishes formed the chief ingredient in certain preparations given as tonics for livestock in poor health, *e.g.*, to elephants employed in forests for dragging logs (Hornell, 1927).

Though all the species of silver-bellies are small, the quantities at present being landed regularly at several places along the Indian coast are Considerable and form an important source of food, fish meal and fertilizer. Available biological information on some of the commercially important species, the composition and trend of catches and present methods of exploitation and the areas covered show that the fishery is generally sustaining and to utilize the resource properly, it is perhaps reasonable to catch fish of all sizes as most of the species appear to be short-lived. Hitherto unexploited shallow areas of the coastal belt with muddy or coral-sandy bottom are likely to be the new grounds for these fishes.

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