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ON

LIVING RESOURCES *of* THE SEAS AROUND INDIA

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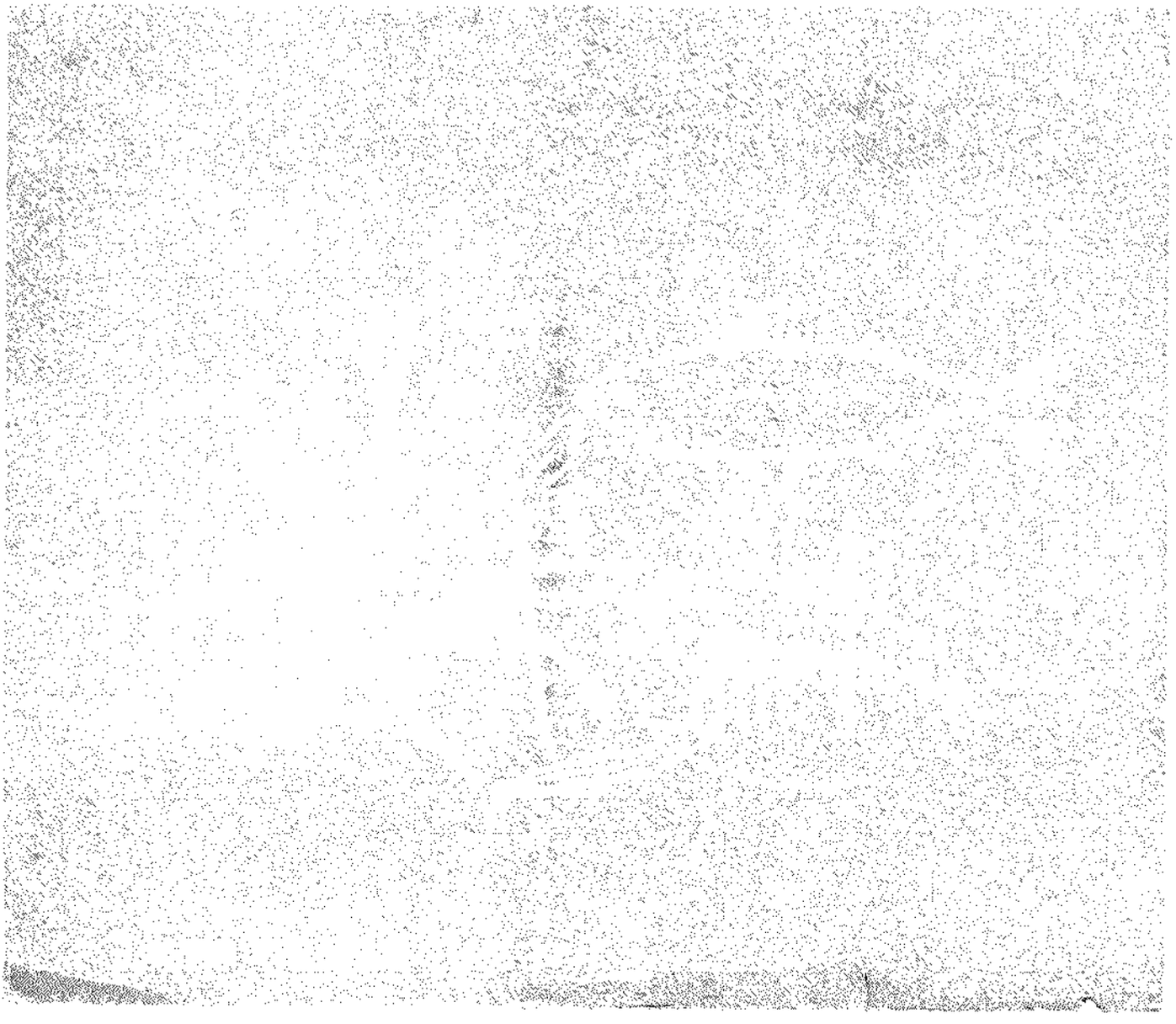

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SPECIAL PUBLICATION
CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
COCHIN-11
1973

THE DORAB FISHERY RESOURCES OF INDIA

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ABSTRACT

Two species of dorab, *Chirocentrus nudus* and *C. dorab* contribute to the commercial fishery along the east and west coasts of India. Their contribution of about 8,000 tonnes to the annual total marine fish catch forms about 1%. Madras State alone contributes to about half the annual total dorab catch of India, and Andhra Pradesh and Maharashtra contributing to 19% and 12% respectively come next. In Madras State, Andhra Pradesh and Orissa and Bengal dorab holds a place in their fisheries contributing to nearly 2–3% of the States' total fish catch.

The Palk Bay and the Gulf of Mannar contribute to a major portion of dorab catch of the Madras State. Some details about the dorab fishery resources of the Palk Bay and the Gulf of Mannar around Rameswaram Island are presented in the paper. Reference is also made to *Scomberomorus* spp., *Tachysurus* spp. and a variety of other fishes caught along with dorab. The dorab catch of the Island has shown a sharp increase during the course of the past 15 years. This is primarily due to settlement of enterprising fishermen in the Island from other places along the Gulf of Mannar, who launched into more offshore waters employing nylon drift nets on more sea-worthly boats. It is possible that with increased efforts the dorab catch could be stepped up in States where it is now low.

I. INTRODUCTION

DORAB is the popular name of the fishes of the clupeiform genus *Chirocentrus* of the family Chirocentridae. These fishes, which are also known as Wolf Herrings, are marine in habitat and Indo-Pacific in distribution. Two species of dorab, *viz.*, *Chirocentrus dorab* (Forskål) and *C. nudus* Swainson are now known to occur in India (Luther, 1968). The overall consideration of the dorab resources in this study is based primarily on the catch statistics of these fishes from the commercial landings obtained by the Fishery Survey Division of the Central Marine Fisheries Research Institute. Though the dorab fishery extends along the east and west coasts of the country the major contribution is from the Madras State where the bulk of the catch comes from the Palk Bay and the Gulf of Mannar. In this paper, therefore, a general account of the dorab fishery resources of India and an account of these resources of the Palk Bay and the Gulf of Mannar in relation to those of the Madras State are presented against which the dorab fishery resources of the Rameswaram Island are presented in greater detail.

II. ALL-INDIA ESTIMATES OF DORAB CATCH

The estimated annual landings of dorab in India during the year 1950–67 ranged from 1,269 to 9,015 tonnes, with an average at 5,973 tonnes. (For detailed annual landing figures Annexure X to this Symposium volume may be referred to.) During the years 1951–55 and 1957–60 dorab landings were below the average of 5,973 tonnes. From 1961 onwards dorab landings improved. The average annual dorab catch for the period 1961–67 was 7,882 tonnes which formed 1·01% of the total annual marine fish catch. Although dorab occur in the fisheries of almost all the maritime States of India, nearly 76% of the total dorab catch comes from the east coast. In the total marine fish catch dorab formed 2·2–3·4% in the States along the east coast with an average at

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2·92%, and 0·14–0·77% in the States along the west coast with an average at 0·33%. Madras State as mentioned earlier occupies the foremost place in the dorab fishery of the country by contributing to a little over half the total dorab catch. Next come Andhra Pradesh and Maharashtra, which however contribute together to only about 3/5 the landings in the Madras State. Dorab landings of the three States constitute 85% of the total dorab landed in India.

III. The Dorab Fishery Resources of the Palk Bay and Gulf of Mannar in Relation with Those of the Madras State

The dorab fishery resources of the Palk Bay and the Gulf of Mannar are considered here under three broad zones, *viz.*, (*a*) the Palk Bay Zone from Point Calimere to Mandapam, (*b*) the Gulf of Mannar Zone from Mandapam to Cape Comorin and (*c*) the Rameswaram Island Zone (Fig. 1).

Data for the period 1964–67 were analysed for the purpose. In the Palk Bay the dorab catch ranged from 280·04 to 1103·32 tonnes with the average at 698·12 tonnes, which formed 2·05–7·07% of the total fish catch, with the average at 4·61%. In the Gulf of Mannar the dorab catch ranged from 771·90 to 1012·40 tonnes with the average at 929·33 tonnes forming 4·34–6·02% of the total fish catch, with the average at 5·04%. In the Rameswaram Island the dorab catch ranged from 564·72 to 985·61 tonnes, with the average at 763·15 tonnes, forming 3·28–13·26% of the total fish catch, with the average at 7·62%. The dorab catch of the above three regions together ranged from 2098·33 to 2724·37 tonnes with the average at 2390·61 tonnes, forming 4·03–6·68% of the total fish catch, with the average at 5·48%. A comparison of the dorab landing figures from the three regions with that of the Madras State for the same period (1964–67) shows that the catch from the three regions together constituted 56·13–65·98% of the State total with the average at 61·10%. The dorab landed on the Palk Bay Coast formed 6·97–29·30% with the average at 17·84%; on the Gulf of Mannar Coast it formed 20·50–28·81% with the average at 23·75%; from the Rameswaram Island it formed 16·07–24·54% with an average at 19·51% of the State's total.

IV. Size and Species Composition of Dorab around the Rameswaram Island

C. nudus is dominant and constitutes nearly 80% of the total of the two species by number, annually. But, during September to December *C. dorab* accounts for about 50% of the total dorab catch. However, the contribution of *C. dorab* by weight to the total dorab fishery is far below that by number since *C. dorab* weighs less than *C. nudus* of the same length.

C. nudus of the size range of 14–83 cm. in fork length occur in the fishery, the bulk of the catch being supported by fish ranging between 38 cm. and 60 cm. Fish of 38 cm. weigh about 300 gm. and of 60 cm. weigh about 1,300 gm. Five modal sizes, 24–25 cm., 32–33 cm., 42–43 cm., 52–53 cm. and 62–63 cm. generally occur in the fishery, the third and fourth being, as mentioned earlier, the main supporting sizes. The spawning season extends from December to August with the peak between May and June/July. More than 50% of the females are mature at 42–43 cm. Males mature at a smaller size.

C. dorab of 14–71 cm. in fork length occur in the fishery with common size ranging between 34 and 56 cm. Fish of 34 cm.weigh about 170 gm. and of 56 cm. weigh about 800 gm. The spawning season extends from December to October with the peak between September and October. More than 50% of the females are mature at 42–43 cm. Males mature at a smaller size.

V. Regional and Seasonal Variation in the Dorab Catch around Rameswaram Island

Rameswaram Island is more advantageously situated than many near-by places for exploiting the fishery resources of the Palk Bay and the Gulf of Mannar in that the important gear for dorab fishing is operated by the Rameswaram fishermen, and both the Palk Bay ad the Gulf of Mannar

could be exploited with ease using the Island as the base. Although dorab is caught in drift-net, gill net, shore-seine and boat-seine, the drift-net operated from Tuticorin type of boat (Krishnamurthi, 1957) is the most successful gear and accounts for the bulk of dorab catch of the Island. 146, 166, 170 and 175 Tuticorin type of fishing units were in operation consecutively during the four years 1964 to 1967. Field enquiries revealed that areas ranging in depths between 5 and 15 fathoms, with the water being a little turbid, are ideal for the dorab catch by drift-net. Drift-net fishing is done around the Island almost throughout the year. Fishing operations frequently, sometimes daily, shift between the Palk Bay side and the Gulf of Mannar side in search of better catches. During January to March and August to October when the catch in the inshore, area dwindles, and calm and favourable weather prevails over the Palk Bay most of the drift-net boats go for week-long fishing, locally known as *Thangal* (a Tamil name meaning 'staying'), which is generally done in the central and eastern part of the Palk Bay. This area lies beyond the limits of exploitation of the daily fishing trips, and offers better profitable fishing returns compared with inshore area during these months. The nearshore fishing grounds and the *Thangal* fishing ground are shown in Fig. 1.

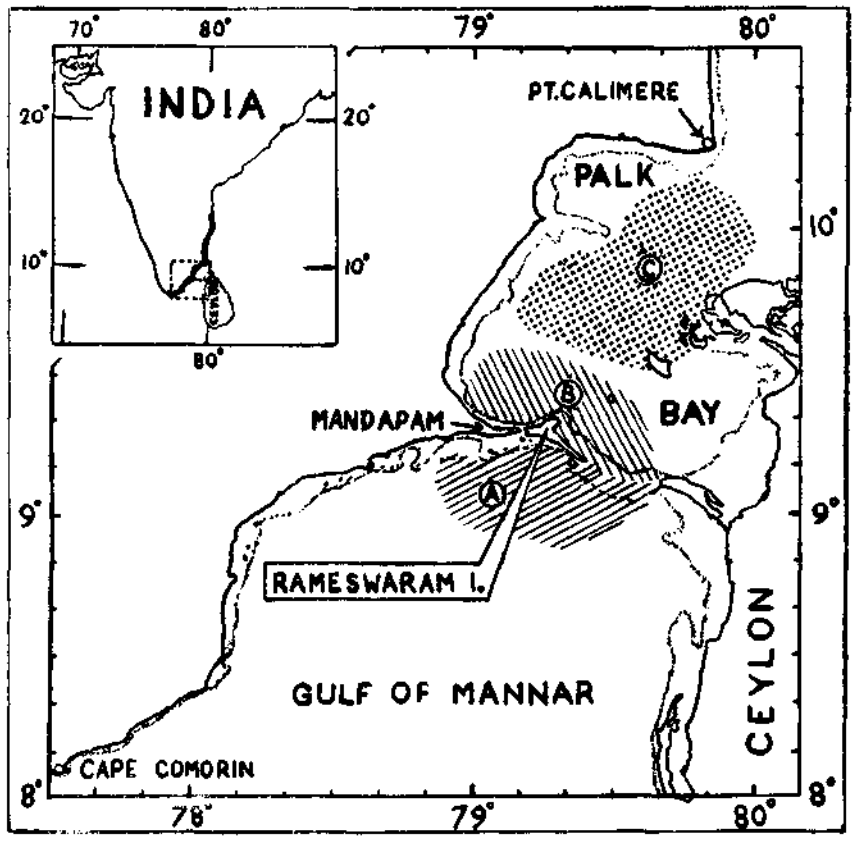

FIG. 1. Map of the Gulf of Mannar and the Palk Bay showing the nearshore drift-net fishing grounds (A and B) around the Rameswaram Island, and the offshore *Thangal* fishing ground (C). Inset shows the Indian coast; the portion enclosed by broken lines is enlarged in the map. The coast line of Madras State is drawn in thick line.

A picture of the dorab fishery of these waters as shown by the changes in the catch per unit effort (C.P.U.E.) and the percentage composition for a period of three years (1964–65 to 1966–67)

is presented. Data for these aspects of study were collected by the author. The area for this purpose is considered in three zones, *viz.*, (1) Palk Bay side, nearshore fishing area from where fish is landed daily, (2) offshore *Thangal* fishing area (Palk Bay) and (3) Gulf of Mannar side, nearshore

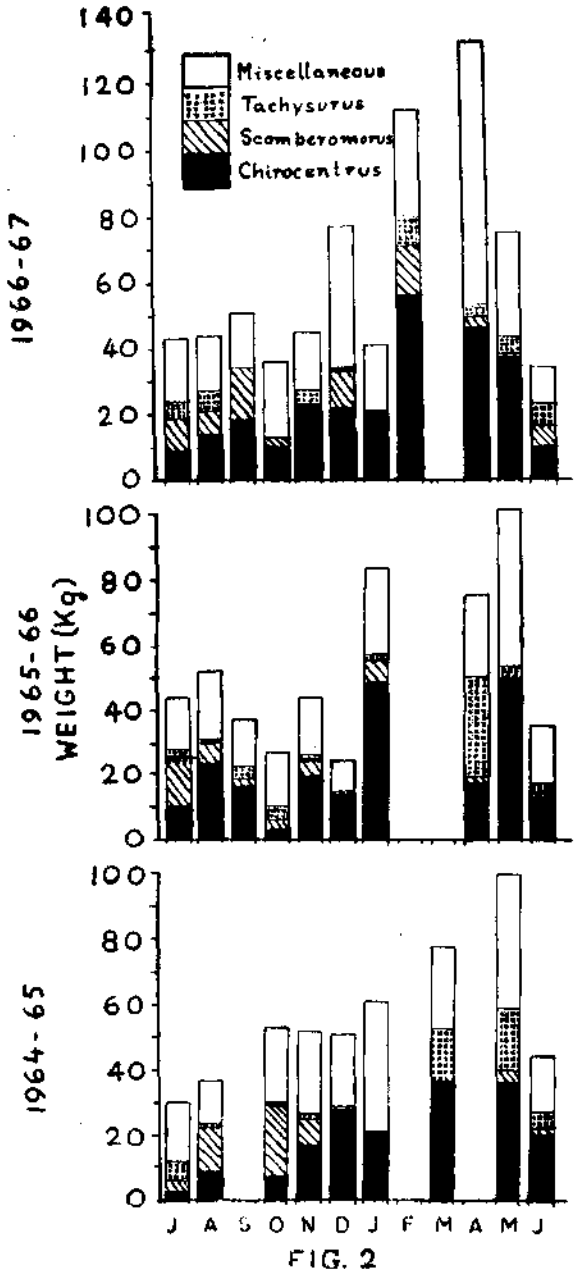

FIG. 2

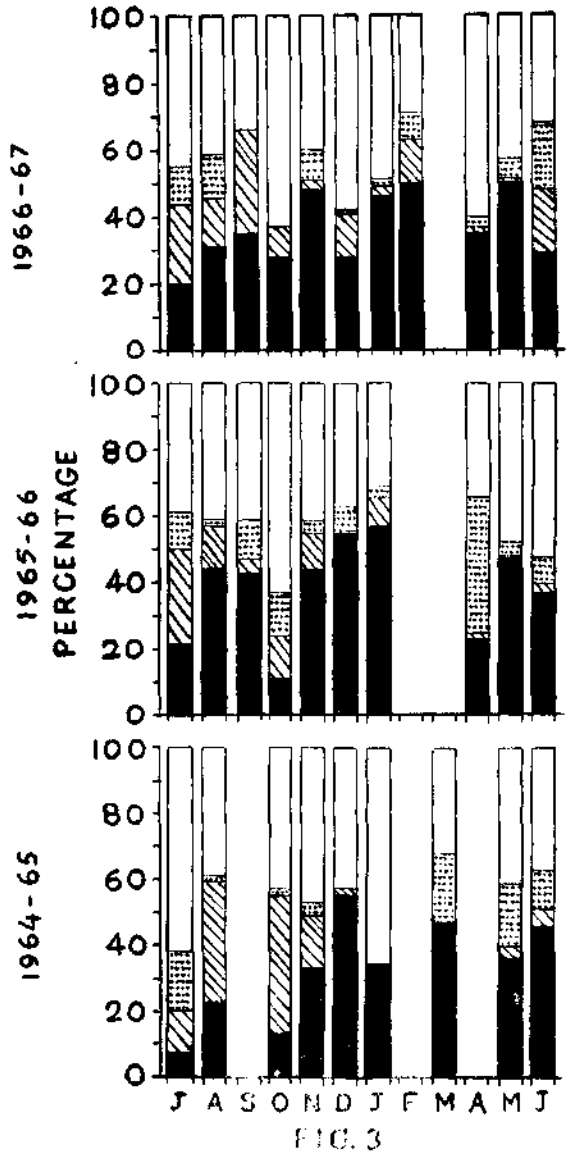

FIG. 3

FIGS. 2 and 3. Seasonal variation in the catch per unit effort (Fig. 2) and in the percentage composition (Fig. 3) for dorab and other groups of fishes in drift-net from the Palk Bay nearshore fishing ground during the three years from July 1964 to June 1967.

fishing area from where fish is landed daily. Here unit effort has been taken to be one night's fishing per boat, and the percentage composition implies the percentage composition of dorab by weight in the total fish catch per night per boat.

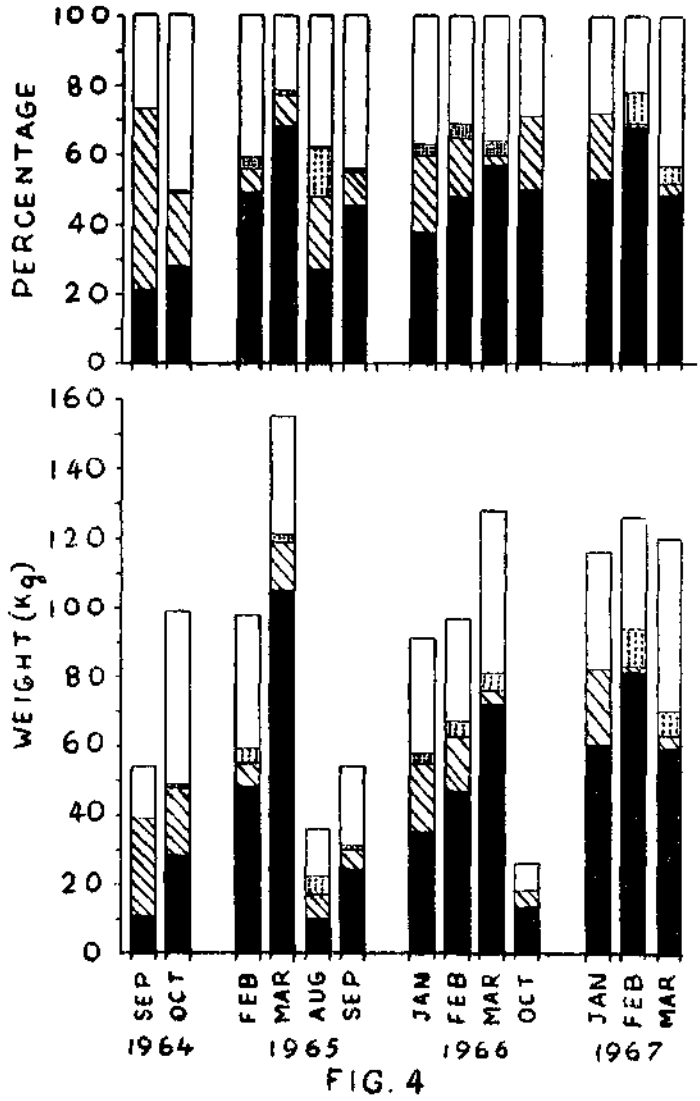

FIG. 4

FIG. 4. Seasonal variation in the catch per unit effort (bottom flag.) and in the percentage composition (top fig) for dorab and other groups of fishes in drift-net from the *Thangal* fishing ground. Symbols same as in Figs. 2 and 3.

In the drift-net, besides dorab, are also caught many other fishes which are categorized here into three groups and their composition in the total fish catch is also represented along with the dorab in the histograms presented in this article (Figs. 2–6). The three groups besides *Chirocentrus*, are: (i) *Scomberomorus* spp., (ii) *Tachysurus* spp. and (iii) miscellaneous fishes comprising sciaenids, carangids, tuna, billfishes, mackerel, *Lactarius*, *Stromateus*, *Hilsa*, *Sardinella*, sharks, rays, skates and saw fishes, and a variety of perches.

Doral Catch on the Palk Bay Side

Daily landings from nearshore fishing area.—The annual average C.P.U.E. for dorab during the three years 1964–65, 1965–66 and 1966–67 was 17·43 kg, 22·07 kg. and 24·33 kg. respectively. The monthly C.P.U.E. was higher than the annual C.P.U.E. in December, January, March, May and June during 1964–65; in August, January and May during 1965–66; and in February, April and May during 1966–67 (Fig. 2). The average annual percentage composition was 33·68%, 40·53% and 37·91% during the three consecutive years. The percentage composition of dorab was above the monthly average of that year in December, January, March, May and June during the first year; in August, September, November to January and May during the second year; and in November, January, February and May during the third year (Fig. 3). May appears to be the best month for dorab in the Palk Bay daily fishing area, January to April being the other months when fairly good catches could be expected.

Thangal fishing.—The week-long *Thangal* fishing was done in September, October, February and March during 1964–65; in August–September, January to March during 1965–66; and in October and January to March during 1966–67. The average C.P.U.E. for dorab by *Thangal* fishing was 51·26 kg., 45·92 kg. and 55·16 kg. respectively during the three years. The C.P.U.E. was higher than the respective annual average in March 1965, in February and March 1966 and during January to March 1967 (Fig. 4). The average percentage composition of dorab in the catches by *Thangal* fishing was 47·84%, 48·86% and 56·24% during the three years. The composition of dorab was above the average for that year in February and March 1965, in March and October 1966 and in February 1967 (Fig. 4). It may therefore be stated that very good catches could be expected by *Thangal* fishing during February and March. The overall picture suggests that January to May is the best season for dorab fishing in the Palk Bay.

Dorab Catch in the Gulf of Mannar Side

Generally nearshore fishing and daily landings are the practice on the Gulf of Mannar side of the Island. The average C.P.U.E. for dorab was 16·97 kg., 32·51 kg. and 31·78 kg. respectively during the three years. The C.P.U.E. was higher than the average for the year during April to June in 1964–65; during May and June in 1965–66; and in March, May and June in 1966–67 (Fig. 5). The average percentage composition during the three years (1964–65 to 1966–67) was in the order of 26·72%, 40·12% and 36·94% respectively. The monthly composition of dorab was above the average for that year in July, October and April to June during 1964–65; in November, May and June during 1965–66; and in July and April to June during 1966–67 (Fig. 6). As indicated by the higher values of both catch per unit effort and percentage composition of dorab in April to June during the three years, this period appears to be the best season for dorab fishery in the Gulf of Mannar.

A critical appraisal of the dorab fishery in the Palk Bay and the Gulf of Mannar side of the Rameswaram Island clearly indicates the facts that the *Thangal* fishing area is a very rich fishing ground for dorab (C.P.U.E. range: 10–105 kg.; average: 49 kg.) and the daily fishing ground of Gulf of Mannar (C.P.U.E. range: 4–76 kg.; average: 30 kg.) is more productive than that of Palk Bay (C.P.U.E. range: 2–56 kg.; average: 23 kg.).

Considerable seasonal variation in the dorab landings was observed on the Island. The monthly dorab landings ranged from 0·45 tonnes (in October) to 163·76 tonnes (in May) in 1964; from 8·11 tonnes (in December) to 145·40 tonnes (in June) in 1965; from 7·15 tonnes (in January) to 476·38 tonnes (in March) in 1966; and from 9·09 tonnes (in July) to 354·74 tonnes (in February) in 1967. On an average the monthly dorab landings during the four years (1964–67) were in the order of 47·06, 60·97, 82·13 and 74·38 tonnes respectively. Over the four-year period the monthly average catch stood at 66·92 tonnes. The dorab landings were above the monthly average

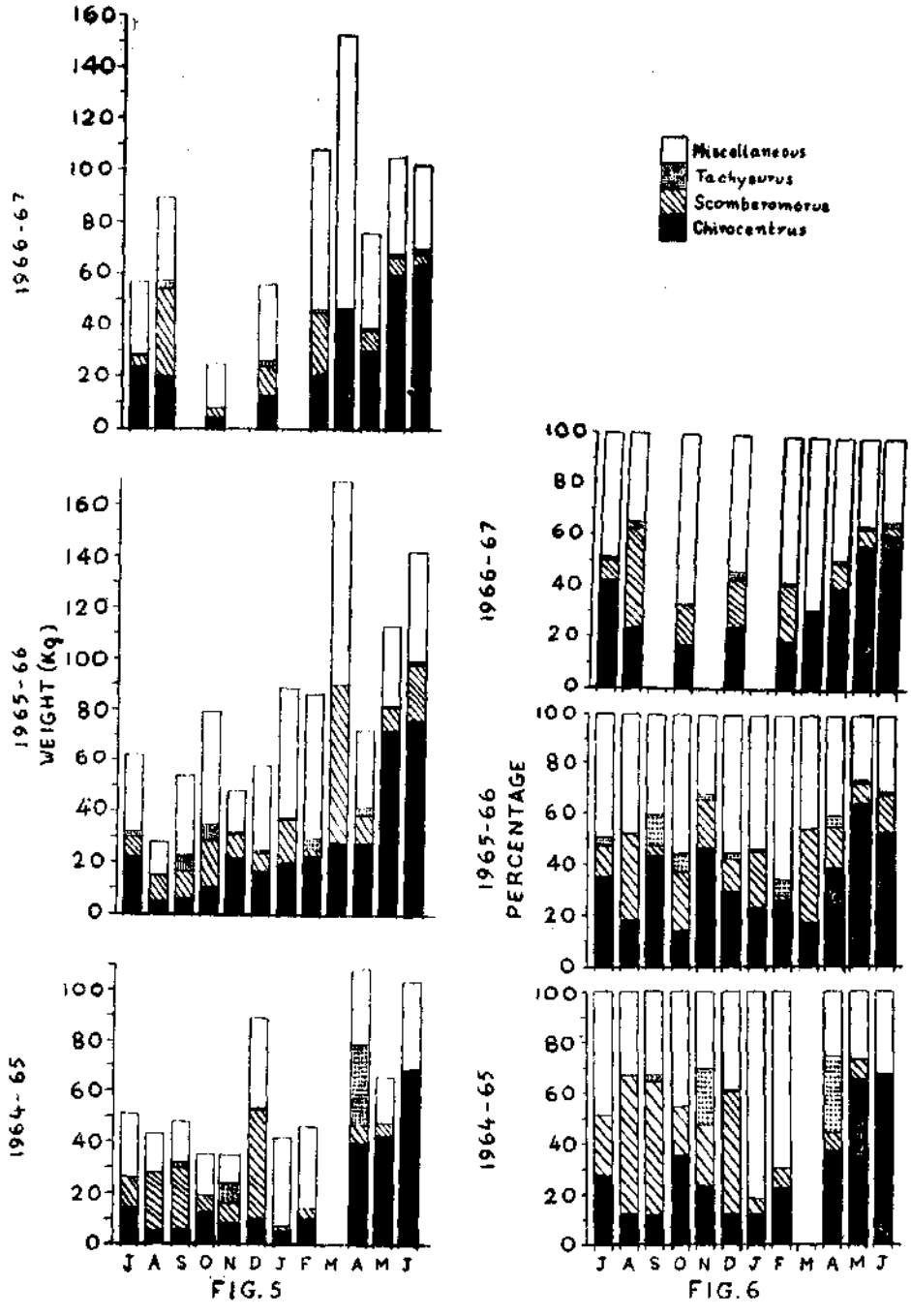

FIG. 5 FIG. 6

FIGS. 5 and 6. Seasonal variation in the catch per unit effort (Fig. 5) and in the percentage composition (Fig. 6) for dorab and other groups of fishes in drift-net from the Gulf of Mannar nearshore fishing ground during the three years from July 1964 to June 1967.

from April to June and during November to December in 1964; from June to August and in October in 1965; in March and December in 1966; in February and June in 1967 (Fig. 7). Over the whole period (1964–67) three peaks were evident during February–March, May–June and December in that order of magnitude (Fig. 8). During 1952–53 the dorab catch of the Island showed peaks in December, March and June, the major one being in December, and during 1953–54 in November, March and June, the major one being in November (Krishnamurthi, 1957). The shifting of the major peak from November/December of 1952–53 and 1953–54 to February–March in recent years appears to be due to the enhanced fishing activity by *Thangal* fishing, which is said to have been introduced in the Island by about 1962. Krishnamurthi (*op. cit.*) estimated the total fish catch of the Rameswaram Island for the two-year period at 1571·39 tonnes and 1650·54 tonnes and the dorab catch at 146·60 tonnes and 102·12 tonnes respectively, the averages being 1610·97

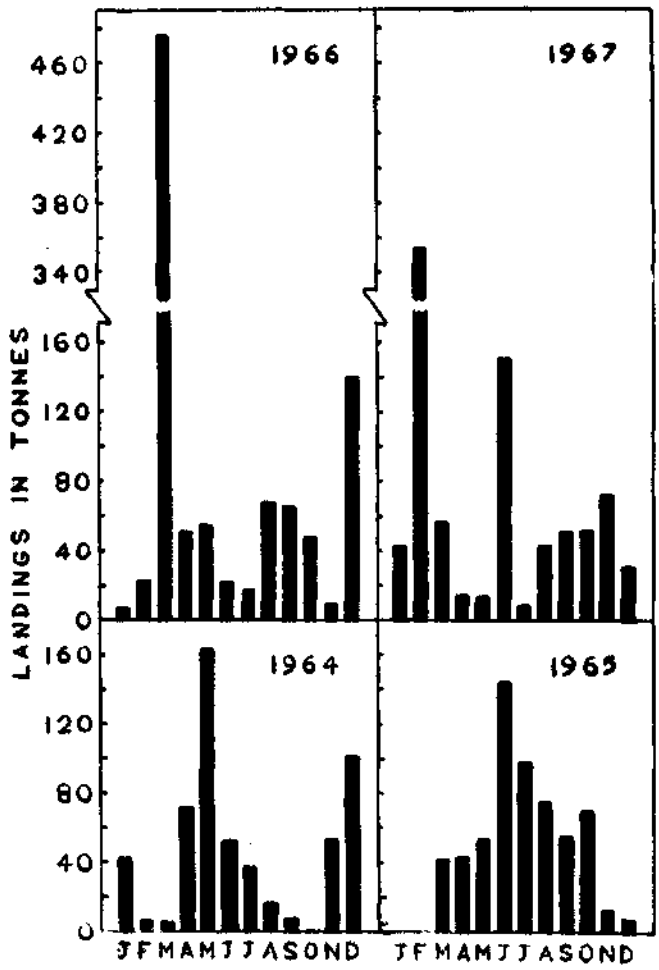

FIG. 7. Annual seasonal variation in the dorab catch around Rameswaram Island from 1964 to 1967.

tonnes for the total fish and 124·36 tonnes for dorab. In recent years (1964–67) the average catch of 10,008·97 tonnes for total fish and of 763·15 tonnes for dorab indicate a sharp increase in the total as well as in the dorab catch. This appears to be primarily due to the introduction of nylon yarn (replacing 'Dunlop', cotton yarn) for making drift-nets since 1960, the greater effort put in and the greater area exploited by the drift-net units in particular. If this reading of the situation is

true and increased production has been effected through more efficient and intensive fishing, then it is a clear indication that the dorab resources of our waters are such as could sustain greater exploitation. Techniques that had proved effective in these waters, *viz.*, *Thangal* type of fishing, adoption of nylon gear and extension of areas of fishing operations could be adopted in other areas of dorab fishery, where enhanced catches of dorab could be reasonably expected.

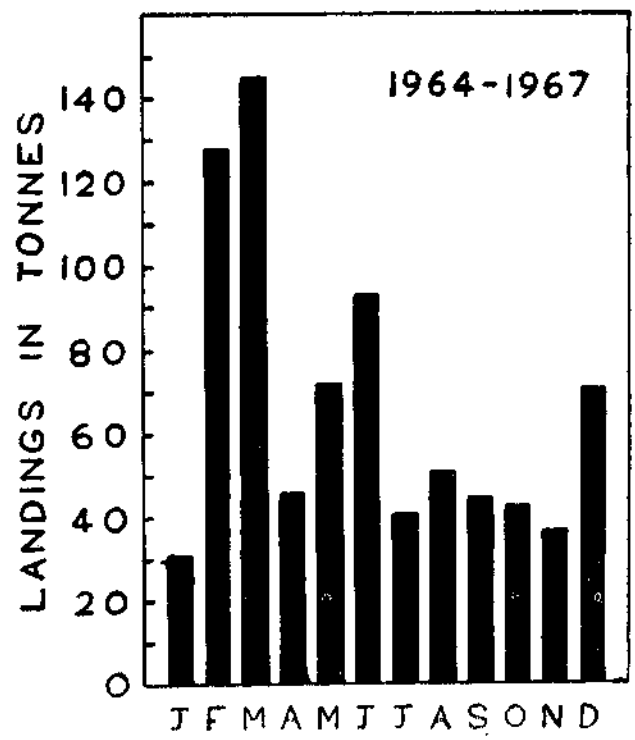

FIG. 8. Combined seasonal variation in the dorab catch over the fouryear period, 1964–67.

SUMMARY

A general account of the dorab fishery resources of India is presented together with an account of these resources of the Palk Bay and the Gulf of Mannar in relation to those of the Madras State. Against this background the dorab fishery resources of the Rameswaram Island are discussed in greater detail. From the estimated annual average figures for the period of the study (1961–67) dorab (7,882 tonnes) was found to make up 1·01% of the total all-India fish catch. While nearly 76% of the dorab catch came from the east coast, Madras State contributed to a little over half the total dorab catch in India.

During 1964–67 the annual average for dorab landings at the mainland fishing centres of the Gulf of Mannar and the Palk Bay and from the Rameswaram fish landing centres amounted to 929, 698 and 763 tonnes respectively. These landings constituted respectively 4·61%, 5·04% and 7·62% of the total fish catch, and together formed 61·10% of the dorab landings in the Madras State. The catch per unit effort from the nearshore fishing grounds in the Palk Bay and the Gulf of Mannar and of the offshore *Thangal* fishing ground (Palk Bay) of the Rameswaram Island and the best seasons for dorab fishery in the three areas are given. The pattern of seasonal variation in the dorab catch of the Island during the period 1964–67 is presented and the changes from the

pattern of earlier years discussed. Suggestions are given for stepping up the dorab production in India.

ACKNOWLEDGEMENTS

The author wishes to thank Dr. S Jones, Director, Central Marine Fisheries Research Institute, for the kind encouragement in the present study and to Shri C. Mukundan for critically going through the manuscript.

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