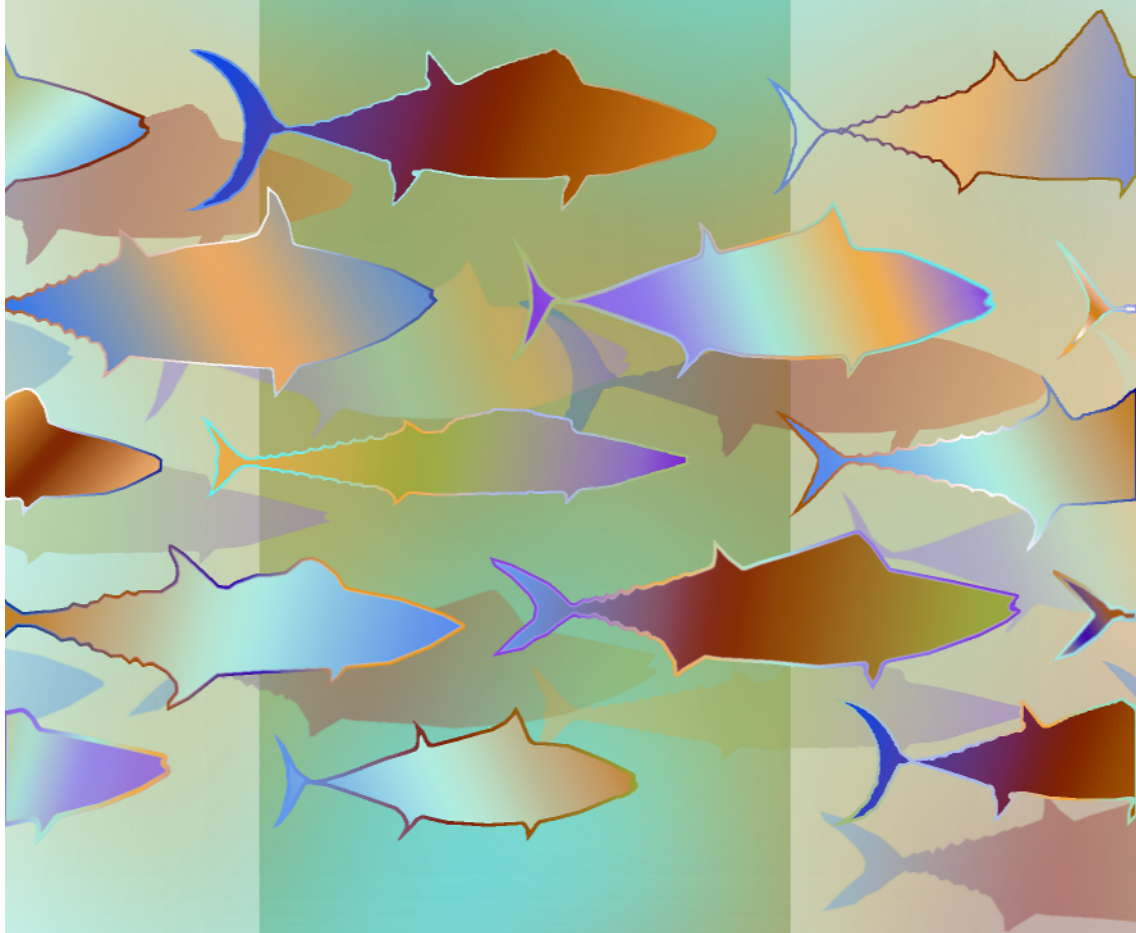


Status of Exploited  
Marine Fishery  
Resources of India



**STATUS OF EXPLOITED  
MARINE FISHERY  
RESOURCES OF INDIA**

**Editors**

**M. Mohan Joseph**

and

**A.A. Jayaprakash**



**CENTRAL MARINE FISHERIES RESEARCH INSTITUTE**

(Indian Council of Agricultural Research)

Post Box No. 1603, Tatapuram P.O.

Kochi – 682 014, India

# 17

## Sciaenids

G. Mohanraj, Hameed Batcha and Gomathy

1. Introduction .....	133
2. Production trends .....	133
3. Biology .....	137
4. Stock assessment .....	140
5. Suggested reading .....	140

### 1. Introduction

Sciaenids, commonly called croakers, grunters and jewfishes are small to moderately sized fishes inhabiting muddy bottom in coastal waters. Two larger species of sciaenids *Otolithoides biauritus* and *Protonibea diacanthus*, popularly called Koth and Ghol in Marathi, and Goyani and Ghol in Gujarathi, form substantial component of the sciaenid fishery in the northwest region. Other smaller sciaenids are known as Dhoma in Gujarati and Marathi; Dhodi in Kannada; Kora in Malayalm; Kathalai in Tamil; Gorasa in Telugu; Gullura in Oriya and Bhola in Bengali. Sciaenids sustain one of the major demersal marine fisheries of India and contributed to 6.5% (1,71,687 t) of the total marine fish production during 2000.

### 2. Production trends

The annual average landing of sciaenids for the 1961-2000 period was 95,319 t. The landing of sciaenids registered an increasing trend over the decades in all the regions (Fig.1) with the northwestern region contributing to more than 50% to the total catch of this resource. In the northwest region the annual average catch of 55,194 t (58%) was recorded during 1961-2000

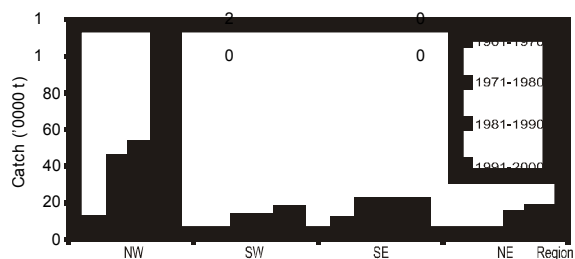


Fig. 1 Annual average catch of sciaenids in the major regions during the past four decades

(Fig. 2). The coast-wise annual mean production during 1961-2000 indicated that the west coast recorded substantial landing of 67,485 t (71 %). The annual average catch landed during the four decades in various maritime states showed that Gujarat ranked always first followed by Maharashtra (Fig. 3). The contribution of Gujarat was 36,902 t (39%), followed by Maharashtra with 18,292 t (19%) during the same period (Fig. 4). Post-monsoon months recorded heavy catches at centres like Veraval, Mumbai and Calicut whereas pre-monsoon period recorded peak landing at Cochin.

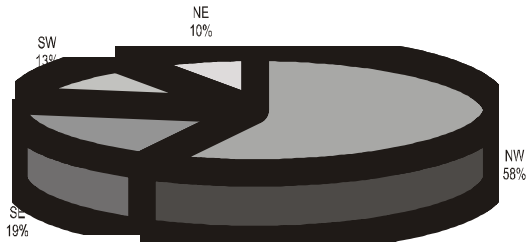


Fig. 2. Annual average catch of sciaenids in four regions during 1981-2000

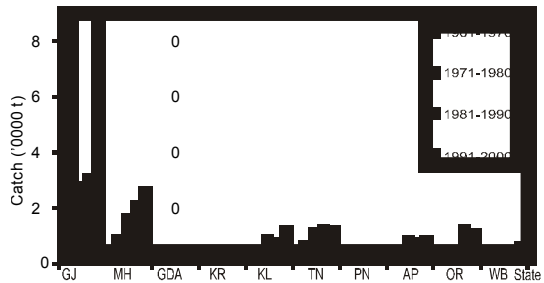


Fig. 3. Statewise annual average catch of sciaenids during past four decades

**Gearwise landings**

Sciaenids are landed by a variety of gears such as trawl nets, dol nets, gill nets, shore seines and hook and line. However, the trawl nets landed substantial catches compared to other gears. During 2000, trawl nets contributed 78% of the total sciaenids catch followed by drift gill nets (Fig. 5). Gearwise contribution of sciaenids in different states indicated that the trawl net was the principal gear in all the states and the dol net was also important gear in both Gujarat and Maharashtra (Fig. 6).

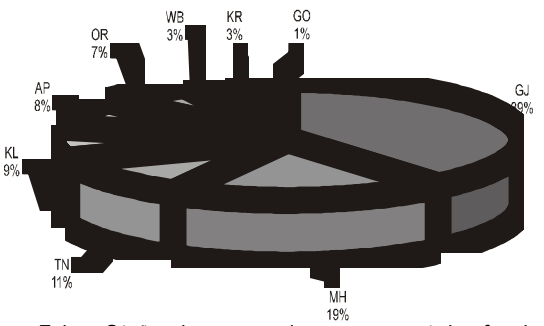


Fig. 4. Statewise annual average catch of sciaenids during 1961-2000

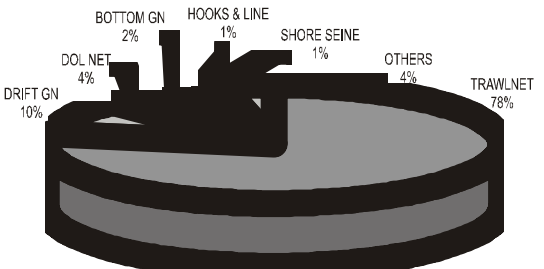


Fig. 5. Gearwise landings of sciaenids in India during 2000

**Species composition**

The sciaenid fishery is sustained by about 20 species though more than 30 species

under 14 genera of the family Sciaenidae are distributed in the Indian waters. *Otolithes cuvieri* is the most abundant sciaenid in the Indian waters. At Veraval, in the trawl catches, out of the 20 species which constituted the fishery, *O. cuvieri* was the dominant species (47%) followed by *Johnius glaucus* (23.8%). In the dol net catch also *O. cuvieri* (37.8%) dominated followed by *Otolithoides biauritus* (Fig. 7). In the gill net catch, *Otolithes* spp. (24%) dominated followed by *Protonibea diacanthus* (13%) (Fig. 8). At

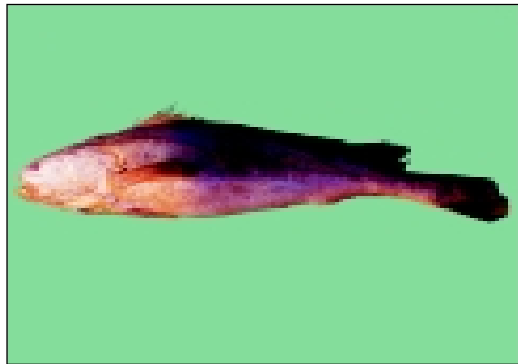
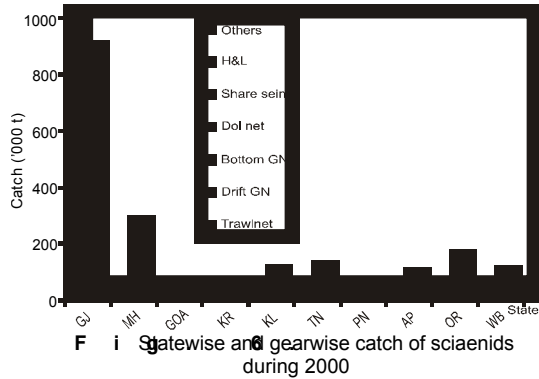


Fig. 7. *Otolithoides biauritus*

Mumbai, *Johnieops vogleri* (64%) was dominant followed by *J. macrorhynchus* and *O. cuvieri*. It is reported that *J. sina*, which was dominant till the eighties, has been replaced by *Johnius elongatus*. At Karwar, *O. cuvieri* was the dominant species (58.3%) followed by *O. ruber* and *J. coitor*. At Calicut, *Johnieops sina* dominated the catches forming 72.2% followed by *Johnius belangerii* and *O.*

*ruber*. At Cochin, *J. sina* was the dominant species forming 74.4% followed by *O. ruber* (22%) and other species observed were *Nibea maculata*, *O. cuvieri* and *Kathala axillaris*.

At Tuticorin, *N. maculata* was the dominant species (92%) followed by *O. ruber* (7.9%). At Mandapam, *Pennahia macrophthalmus* followed by *N. maculata* and *O. ruber* constituted the fishery. Of the eighteen species, *O. ruber* was dominant (43.6%) followed by *J. carutta* (24.7%) at Chennai. At Kakinada, among the nineteen species which constituted the fishery, *O. ruber* (15.5%) was the

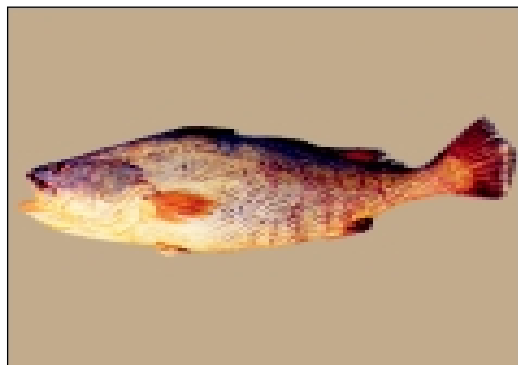


Fig. 8. *Protonibea diacanthus*

dominant species followed by *Johnius carutta* (10.9%). At Visakhapatnam, *P. macrophthalmus* (29%) was the dominant species followed by *O. ruber* (15.3%) (Fig. 9).

Length composition

The centrewise, gearwise size range of the dominant species of sciaenids landed during 2000 (Table 1) revealed that larger sized fishes of different species were landed at Veraval and Mumbai when compared to the other centres. It is apparent from the scrutiny of the data on the trawl net catch at Chennai for a ten year period, that the mean size recorded in the fishery has come down from 164 to 158 mm in *O. ruber* (Table 2).



Fig. 9. *Otolithes ruber*

Table 1. Centrewise and gearwise size range of dominant species of sciaenids during 2000

Centre	Species	Gear	Size range (mm)	Dominant modal size group (mm)
Veraval	<i>Otolithes cuvieri</i>	TN	90-359	-
	<i>Johnius glaucus</i>	TN	90-319	-
	<i>Protonibea diacanthus</i>	TN	200-1259	-
Mumbai	<i>Johnieops macrorhynchus</i>	TN	119-329	-
	<i>J. sina</i>	TN	89-219	-
	<i>O. cuvieri</i>	TN	109-379	-
	<i>J. vogleri</i>	TN	129-339	-
	<i>Johnius dussumieri</i>	TN	109-269	-
Karwar	<i>O. cuvieri</i>	TN	95-219	100-104
	<i>O. cuvieri</i>	SS	65-119	105-109
Calicut	<i>Johnieops sina</i>	TN	95-175	131-140
	<i>O. ruber</i>	TN	109-320	151-160
Tuticorin	<i>O. ruber</i>	TN	140-269	-
	<i>N. maculata</i>	TN	130-249	-
Chennai	<i>O. ruber</i>	TN	90-250	160-169
	<i>Johnius carutta</i>	TN	100-290	-
Kakinada	<i>Nibea maculata</i>	TN	105-245	140-149
Visakha-patnam	<i>J. carurtta</i>	TN	110-229	150-159

(TN = Trawl net, SS = Shore seine)

Table 2. Mean length and range recorded for *Otolithes ruber* at Chennai during 1990-99

Year	Length range (mm)	Mean length (mm)
1990	100-269	164
1991	110-319	167
1992	90-229	133
1993	110-229	161
1994	110-229	165
1995	100-259	158
1996	110-310	163
1997	110-270	165
1998	120-290	160
1999	90-260	159

#### Contribution of the juveniles to the fishery

Juveniles are caught mostly by trawl nets, dol nets and seine nets. The contribution of juveniles i.e immature fish to the fishery was more during the monsoon and post monsoon months at Veraval, Mumbai and Kakinada. For instance, at Kakinada during 2000, an estimated catch of 27 t of juveniles were landed by the trawlers which formed 1.8% of the group's catch and 0.13% of the total finfish catch. Even very small juveniles of 32 mm TL were caught during second and third quarters (April-September).

#### Utilization of the catches

The swim bladders of larger species like ghol and koth are dried and exported to far eastern countries for the manufacture of isinglass used in the wine industry as a clarifying agent. The larger sciaenids are filleted and processed for local and export markets. The smaller species are sold in fresh condition at the local markets or iced and transported to distant interior markets for disposal. It is observed at Visakhapatnam and Kakinada, that the bulk of the catches of sciaenids caught during the multiday trawling operations are salted and sundried and brought ashore as dry fish for ready disposal. The catch of very small juveniles goes as trash fish for making fish meal.

### 3. Biology

#### Spawning period

The smaller sciaenids attain maturity in the second year and breed in shallow coastal waters. The spawning season for the majority of sciaenid species is during the monsoon and post-monsoon months (Table 3). During the protracted spawning period spanning over six months, the individual fish spawns twice.

Table 3. Spawning season of sciaenids in Indian waters

Species	Area	Spawning period	Peak spawning
Johnnieops vogleri	Veraval	Nov.-June	May-June
	Mumbai	Nov.-July	June-July & Oct.-Nov.
Otolithes cuvieri	Kakinada	Nov.-June	May-June
	Veraval	Nov.-May	
Johnius glaucus	Mumbai	July & Dec.	
	Veraval	Sep.-Nov. & Dec.-Apr.	
Johnnieops macrorhynchus	Mumbai	July-Aug. & Nov.-Dec.	
O. ruber	Mumbai	Nov.-Dec. & July-Oct.	
J. sina	Porto-Novu	July-Sep.	
	Cochin	Jan.-Apr. & Sep.-Oct.	
Nibea maculata	Calicut	Sep.-May	Sep., Nov. & May
	Kakinada	Throughout the year	Mar.-Aug.
Johnius carutta	Mandapam	Apr-Aug.	Apr., May & Aug.
	Madras		June-July
J. dussumieri	Kakinada	Jan.-June	
	Visakhapatnam	Jan.-April	
Pennahia macrophthalmus	Mumbai	Jan.-Feb. & June-Sep.	
	Porto-Novu	July-Sep.	
Atrobucca nibe	Kakinada	Mar.-Aug.	
	Kakinada	Oct.-June	May-June
Protonibea diacanthus	Kakinada	Feb.-July	
Otolithoides biauritus	Mumbai	June-Sep.	
Johnnieops aneus	Mumbai	Aug.-Jan.	
Argyrosomus amoyensis	Porto-Novu	Sep.-Oct.	
	Visakhapatnam	Feb.-May	

#### Recruitment

At Kakinada, the recruitment to the exploited phase takes place at a modal length range of 75-115 mm during May-July for *N. maculata*. At Mumbai, recruitment of smaller fishes of less than 140 mm size of *J. macrorhynchus* are recorded during monsoon season. At Cochin, juveniles are recruited to the stock during monsoon and post-monsoon months.

#### Food

Sciaenids are macrophagous carnivores. When young, they primarily feed on crustaceans, especially prawns and with growth they show a piscivorous tendency. The major food items of *J. vogleri*, *Otolithoides biauritus* and *Protonibea diacanthus* of Bombay waters constituted of teleosts followed by crustaceans. *J. sina* and *Otolithes ruber* in Cochin waters fed mainly on fishes such as *Stolephorus* spp., silverbellies, *Saurida* spp. and flatfishes. *Pennahia macrophthalmus* of Mandapam area fed mainly on *Stolephorus commersonii* and *Acetes indicus*.



Table 4. The growth coefficient (K), asymptotic length (L<sub>∞</sub>) and mean size at various ages reported for different sciaenid species in India

Species	Area	K	Average length (mm)															
			L <sub>∞</sub>	I yr	II yr	III yr	IV yr	V yr	VI yr	VII yr	VIII yr	IX yr	X yr	XI yr	XII yr	XIII yr		
<i>Otolithes cuvieri</i>	Veraval	0.53	382	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mumbai	0.52	398	170	260	318	-	-	-	-	-	-	-	-	-	-	-	-
	Karwar	0.52	385	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>O. ruber</i>	Cochin	0.64	315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tuticorin	0.47	469	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Chennai	0.65	315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Johinieops sina</i>	Cochin	0.91	195	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Johnius glaucus</i>	Veraval	0.87	300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Johnieops macrodynamus</i>	Mumbai	0.7	345	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>J. vogleri</i>	Mumbai	0.72	350	158	240	290	-	-	-	-	-	-	-	-	-	-	-	-
<i>J. aneus</i>	Calicut	0.8	185	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Pennahia macrophthalmus</i>	Mandapam	0.98	260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Nibea maculata</i>	Mandapam	0.85	284	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Tuticorin	0.72	314	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Kakinada	0.61	315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Kathala axillaris</i>	Chennai	0.86	220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Johnius carutta</i>	Visakha-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	patnam	0.56	281	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mumbai	0.96	269	169	231	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Pseudosciaena diacanthus</i>	Mumbai	-	1180	464	641	805	934	1102	1059	1270	-	-	-	-	-	-	-	-
<i>Otolithoides biauritus</i>	Mumbai	-	-	418	600	741	831	1079	1279	1347	1361	1385	1420	1482	1490	1520	-	-

#### Growth and life span

The majority of the sciaenid species have short life span of 2-3 years excepting the larger sciaenids such as *P. diacanthus* and *O. biauritus* (Table 4). For the Koth *O. biauritus*, the average size determined for a 13-year old fish was 1520 mm. *P. diacanthus* has been found to attain a length of 1270 mm at the end of 7 years. The life span of *N. maculata* off Kakinada waters has been estimated as 4 years.

#### 4. Stock assessment

The stock estimates of *Johnius glaucus* from Veraval; *Johnieops macrorhynchus*, *J. vogleri*, and *Pennahia macrophthalmus* from Mumbai waters; *O. cuvieri* from Karwar; *J. aneus* from Calicut; *J. sina* and *O. ruber* from Cochin; *P. macrophthalmus* and *N. maculata* from Mandapam; *N. maculata* and *O. ruber* from Tuticorin; *O. ruber* and *Kathala axillaris* from Chennai; *Johnius carutta* from Visakhapatnam and *N. maculata* from Kakinada have been made. The estimated exploitation rate of 0.5 and above except for *O. cuvieri* from Gujarat and Maharashtra waters suggest that the fishing effort is to be maintained at the present level in all the regions, as further increase is detrimental to the stocks of sciaenids.

#### 5. Management

As a regulatory measure, ban on trawling is imposed during the monsoon or pre-monsoon period in many maritime states to sustain the spawning and juvenile populations. The period of closure varies from state to state with the duration ranging from 40 days to 90 days. Closure during breeding season could be implemented in all the remaining maritime states. It is also suggested that the fishes below the size of first maturity are not allowed to be exploited so as to give them a chance to grow and breed for contributing to the recruitment process. It is proposed that the present cod end mesh size of 25-30 mm can be retained or increased by 10% without increasing the fishing effort in all the regions. The shallow protected coastal areas which serve as nursery grounds for many fishes and shell fishes may be declared closed areas prohibiting any kind of fishing so as to aid in replenishing the stocks.

#### 6. Suggested reading

Chakraborty, S. K., P. Devadoss, P. P. Manojkumar, M. Feroz Khan, P. Jayasankar, S. Sivakami, V. Gandhi, Y. Appanna Sastry, A. Raju, P. Livingston, K. M. S. Ameer Hamsa, M. Badrudeen, P. Ramalingam, V. M. Dhareshwar, C. V. Seshagiri Rao, K. Nandakumaran, B. B. Chavan and P. K. Seetha. 2000. The fishery, biology and stock assessment of jewfish resources of India. In: V. N. Pillai and N.G. Menon (Eds.) Marine Fisheries Research Management, Central Marine Fisheries Research Institute, Cochin, p 604-616.

Mohan, R. S. Lal. 1982. An illustrated synopsis of the fishes of the family Sciaenidae of India. *Indian J. Fish.*, 28 (1&2): 134-145

Rao, T. Appa., R. S. Lal Mohan, S. K. Chakraborty, V. Sriramachandra Murty, K. V. Somasekaran Nair, E. Vivekanandan and S. G. Raje. 1992. Stock assessment of sciaenid resources of India. *Indian J. Fish.*, 39 (1&2): 85-103.