

## The beach-seine fishery off Durban, KwaZulu-Natal

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The beach-seine fishery at Durban was investigated from July 1993 to June 1994. During this period the fishermen completed 270 hauls on 146 days of operation. In total, 119 species of fish as well as squid, cuttlefish and crabs were recorded in the catches. Most of these were small shoaling species belonging to the families Leiognathidae, Engraulidae and Clupeidae. Many species were caught at sizes below their reported size at first maturity. Based on this study and data from the National Marine Linefish System, there appears to be little overlap in the catches of the beach-seine netters and other fishery sectors in the area.

Records of beach-seine netting in KwaZulu-Natal date back to the 1850s when sporadic netting occurred in Durban Bay (Russell 1899). Regular seine netting commenced in the 1870s, when indentured sugar cane labourers began practising fishing skills brought with them from India. The traditional fishing method, involving the use of a rowing boat for setting the net in a semicircle from the shore and hauling it in by hand, is still used today. At the height of this fishery, when 40 boats were in use, large catches of edible fishes such as elf (*Pomatomus saltatrix*), geelbek (*Atractoscion aequidens*) and queen mackerel (*Scomberomorus plurilineatus*) were made (Anon 1912; Mara 1986). Over the years there has been a reduction in the number of beach-seine fishermen and by 1995 there were only two operations with open category licences. The licences differ from those issued to the other seine operations in KwaZulu-Natal for catching sardines (*Sardinops sagax*) and roundherrings (*Etrumeus* spp.) only (27 licences in 1995). Furthermore, the sardine fishermen operate exclusively during the annual KwaZulu-Natal 'sardine run' whereas the open category seine fishermen usually operate all year round.

The beach-seine fishermen in Durban currently launch in the lee of Vetch's pier, an artificial reef on the beachfront, which offers protection from rough surf. Several marine recreational craft, including skiboats, paddleskis, dive boats and sailing dinghies, also utilize this launch site. In recent years, conflict between the seine fishermen and paddleski anglers has escalated, the latter holding the seine fishermen responsible for declining catches, either directly through removal of target species or indirectly via removal of prey species (Vasilaros 1993). Similar user-conflict between seine fishermen and anglers has been the subject of an investigation in False Bay in the Western Cape (Penney 1991; Lamberth, Bennett & Clark 1994, 1995; Lamberth, Bennett, Clark & Janssens 1995).

Data on catches by the KwaZulu-Natal beach-seine fishermen are extremely limited, consisting merely of estimates of tonnage of fish caught, which are reported to the KwaZulu-Natal Fisheries Licensing Board (Junor & Coke 1994). To quantify catch composition, total catch and effort by the Vetch's pier beach-seine fishermen, a year-long investigation was initiated in 1993.

### Methods

The beach-seine fishermen use a 6 m rowing boat with a crew of four or five to deploy the net. One of the hauling ropes is

anchored on the beach while the net is set in a semicircle between 50 and 300 m from the shore. The head rope of the net is 115 m long and the net depth is 5.6 m. The wings of the net have a stretched mesh size of 4.2 cm while that of the cod end is 2.9 cm. The hauling ropes, which are normally 200 m, can be extended by attaching extra lengths if necessary. If a shoal of fish is observed, an attempt is made to set the net around it. On most occasions, however, the net is set 'blindly'. Once the boat has returned to the shore, the net is retrieved manually by the boat crew and other helpers.

The fishermen are required to submit monthly catch returns to the KwaZulu-Natal Fisheries Licensing Board. However, examination of these catch returns revealed insufficient detail for analysis as species are seldom identified. In consultation with the fishermen, and using prior qualitative data on species composition (Fennessy & Chater 1994), a daily catch return form was designed. The fishermen were trained to complete the forms and were given co-responsibility in monitoring their activities for the year-long study period (July 1993 to June 1994). In addition, all fishes in the the first haul of each week were measured by staff of the Oceanographic Research Institute for length frequency distributions, confirmation of species identifications and detection of seasonal trends.

To simplify the completion of catch returns by the fishermen and, because of the high species diversity in the catches, some taxa were classified only to family level. Quantities of fish caught were recorded as either numbers of individuals or numbers of crates. Crates were used when large numbers of small fish were caught. Numbers per crate were derived by either counting individuals per crate or by calculation, using the mean weight of a crate of fish, mean lengths of fish caught and length-weight relationships for the relevant species. An estimate of the total mass of the annual catch was made using total numbers, length-weight relationships and the mean lengths of the dominant species.

To assess user-conflict in terms of overlap of target species for the beach-seine fishery and the recreational paddleski fishery, catches by the latter were obtained from the National Marine Linefish System (NMLS) for 1993 and 1994. These data, which are derived from the club logbook, only reflect minimum declared catches made over weekends.

### Results

#### Effort

Over the 12 month study period, the seine fishermen launched their boat on 146 days and completed 270 hauls (Figure 1), of

which the Institute staff sampled 47 (31% of days fished and 17% of completed hauls). Seining was generally conducted on days following south-westerly winds when the sea was relatively calm and 88% of hauls were made on weekdays. The first haul was usually made shortly after sunrise and, on most mornings, seining was completed by 09:00. Although the number of hauls made per day ranged from one to six, generally, only one or two hauls were made. Fishing effort was curtailed by strong north-easterly winds in October and November 1993, by an abundance of jellyfish in the nearshore region during January and February 1994 and by seine fishermen taking part in the buying and selling of sardines on the KwaZulu-Natal south coast during the annual 'sardine run' in June 1994 (Figure 1).

### Catch

One hundred species of fish were identified by Institute staff during the weekly sampling of beach-seine catches. In addition, 19 other fish species were encountered by the netters, making a total of 119. A comprehensive species list dating from 1991 and including these 119 fish species is given in Appendix 1. Squid (*Loligo duvauceli*), cuttlefish (*Sepia* spp.) and crabs (including *Matuta banksii*, *Portunus sanguinolenta* and *Monomia gladiator*) were also caught. The number of fish species per haul recorded by Institute staff ranged from 2 to 24 with a mean of 10.1 (*SD* 5.1).

An estimated total of 103 583 fish amounting to approximately seven tonnes was caught during the 12 month study period. Numerically, the major components were small shoaling bait or bycatch species belonging to the families Leiognathidae (*Gazza minuta*, *Secutor insidiator*, *Secutor ruconius* and *Leiognathus equula*), Engraulidae (*Thryssa vitirostris* and *Thryssa setirostris*) and Clupeidae (*Sardinops sagax*, *Hilsa kelee* and *Etrumeus teres*) (Table 1). No taxon was ubiquitous, although pufferfish (Tetraodontidae) and squid (*L. duvauceli*) were recorded in almost half the catches (Table 2). The length frequency histograms given in Figure 2 indicate the small size of most of the fishes in the beach-seine catches. Although many were small species, juveniles of larger angling species were also caught (e.g. *Pomatomus saltatrix*). Several species were captured at sizes below their reported size at first maturity (Figure 2).

Seasonal trends in catches of some of the more commonly caught species during the study period are presented in Figure 2. Some species exhibited distinct seasonal patterns, sardines (*S. sagax*) and roundherrings (*E. teres*), for example, only occurred in June whereas glassnoses (*Thryssa* spp.) and snapper kob (*Otolithes ruber*) only occurred from August to January. Other species were caught throughout most of the year, but with peaks in abundance in particular months. Elf (*P. saltatrix*) and Indian mackerel (*Rastrelliger kanagurta*) were caught in greatest abundance in May and June while razorbellies (*H. kelee*) and squid (*L. duvauceli*) were recorded in high numbers in January and April, respectively. The following taxa were recorded in 10 or more months of the sampling period: bartail flathead (*Platycephalus indicus*), elf (*P. saltatrix*), grunthers (*Pomadasyss* spp.), piggy (*Pomadasyss olivaceum*), blacktail (*Diplodus sargus capensis*), stumpnoses (*Rhabdosargus* spp.), pouters (*Gerres* spp.), silver sillago (*Sillago sihama*), queenfish (*Scomberoides* spp.), largespot

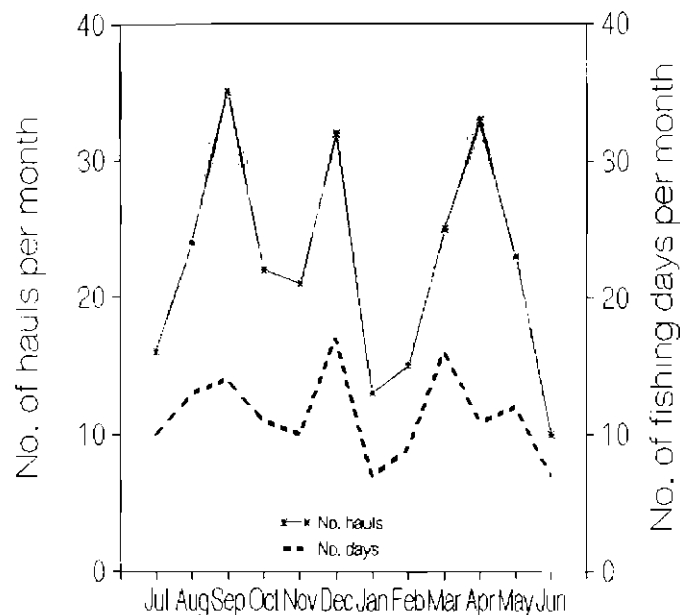


Figure 1 Fishing effort by the Durban beach-seine fishermen from July 1993 to June 1994.

pompano (*Trachinotus botla*), Indian mackerel (*R. kanagurta*), wolfherring (*Chirocentrus dorab*), cuttlefish (*Sepia* spp.), squid (*L. duvauceli*), kingfish (*Caranx* and *Carangoides* spp.), flatfish (Pleuronectiformes), pufferfish (Tetraodontidae), mullet (Mugilidae) and guitarfish (Rhinoobatidae).

### Discussion

The Vetch's pier beach-seine fishery is a remnant of a once thriving fishery. Fishing effort is not high and is concentrated on days when weather conditions are suitable. The fishermen, who are bound by current legislation pertaining to linefish (bag and size limits — Regulation No. R. 2221 of the Sea Fishery Act No. 12 of 1988 (7 August 1992) and the Natal Nature Conservation Ordinance No. 15 of 1974), are not allowed to set their net inside demarcated public bathing areas or beyond the Natal Sharks Board protective shark nets (approximately 300 m offshore).

Comparison of data collected by Institute staff and the fishermen for corresponding hauls showed that the fishermen did not always record all the species caught. Species that were omitted were mostly from the bycatch category and were generally small in size and few in number. Under-reporting of catches by fishermen was also reported in an investigation of the Cape beach-seine fishery (Lamberth *et al.* 1994). During the study period, catches by the Durban beach-seine fishermen comprised mainly species which were sold as bait rather than as a direct source of food for human consumption. Relative to the Western Cape beach-seine fishery, the total number of species recorded was higher in KwaZulu-Natal, but quantities caught were much lower (Lamberth *et al.* 1994).

The small mesh size and the slow speed of retrieval of the net resulted in mostly small species of fish being captured as is the case for other net fisheries in KwaZulu-Natal (Fennessy 1994; Mann 1995). Of the ten most commonly caught taxa (85% of the total catch by number) only two attain lengths > 30 cm (Smith & Heemstra 1986). Based on the length frequency data presented in Figure 2, seven fish species (*Secutor*

**Table 1** Relative abundance of taxa based on returns from 270 beach-seine hauls off Durban from July 1993 to June 1994

Species	Common name	No. of crates	No. per crate	No. in all crates	No. of individuals	Total no.	%	Category
Leiognathidae	Soapies (4 species)	16.3	2 000*	32 600	504	33 104	31.96	Bycatch
<i>Thryssa</i> spp.	Glassnoses (2 species)	28.3	500*	14 150	225	14 375	13.88	Bait
<i>Hilsa kelee</i>	Razorbelly	30.0	300*	9 000	167	9 167	8.85	Bycatch
<i>Sardinops sagax</i>	Pilchard	25.5	350#	8 925	–	8 925	8.62	Bait
<i>Chirocentrus dorab</i>	Wolf herring	23.0	100*	2 300	2 899	5 199	5.02	Bait
<i>Rastrelliger kanagurta</i>	Indian mackerel	13.0	130#	1 690	2 735	4 425	4.27	Bait
<i>Loligo duvauceli</i>	Indian squid	–	–	–	3 559	3 559	3.44	Bait
<i>Etrumeus teres</i>	East coast roundherring	10.0	350*	3 500	–	3 500	3.38	Bait
<i>Decapterus</i> spp.	Scad (2 species)	5.0	350*	1 750	1 560	3 310	3.20	Bait
<i>Trichiurus lepturus</i>	Cutlass fish	7.5	400*	3 000	306	3 306	3.19	Bait
<i>Alepes djedaba</i>	Shrimp scad	9.0	300*	2 700	–	2 700	2.61	Bait
Mugilidae	Mullet	12.5	100#	1 250	1 034	2 284	2.20	Bait•
<i>Sarpa salpa</i>	Karanteen	7.0	200*	1 400	67	1 467	1.42	Food
<i>Scomber japonicus</i>	Mackerel	–	–	–	1 441	1 441	1.39	Bait
<i>Pomadasys olivaceum</i>	Piggy	0.3	1 000*	300	963	1 263	1.22	Bycatch
<i>Pomatomus saltatrix</i>	Elf	–	–	–	1 063	1 063	1.03	Food
<i>Gerres</i> spp.	Pursemouths	–	–	–	461	461	0.45	Bycatch•
<i>Scomberoides</i> spp.	Queenfish	–	–	–	399	399	0.39	Bycatch
Tetraodontidae	Pufferfish	–	–	–	368	368	0.36	Bycatch
<i>Caranx</i> and <i>Carangoides</i> spp.	Kingfish	–	–	–	356	356	0.34	Bycatch•
<i>Scomberomorus plurilineatus</i>	Queen mackerel	–	–	–	278	278	0.27	Food
<i>Sphyræna</i> spp.	Barracudas	–	–	–	266	266	0.26	Bait
<i>Otolithes ruber</i>	Snapper kob	–	–	–	220	220	0.21	Food
<i>Trachinotus africanus</i>	Southern pompano	–	–	–	205	205	0.20	Bycatch•
<i>Rhabdosargus</i> spp.	Stumpnoses	–	–	–	188	188	0.18	Food
<i>Sillago sihama</i>	Silver sillago	–	–	–	163	163	0.16	Bycatch
Pleuronectiformes	Flatfish	–	–	–	161	161	0.16	Bycatch
<i>Diplodus sargus capensis</i>	Blacktail	–	–	–	156	156	0.15	Bycatch•
<i>Megalaspis cordyla</i>	Torpedo scad	–	–	–	154	154	0.15	Bycatch
<i>Mene maculata</i>	Ponyfish	–	–	–	116	116	0.11	Bycatch
Other	–	–	–	–	1 004	1 004	0.97	–

\* denotes estimates derived via length-weight relationships

# denotes estimates derived from actual counts

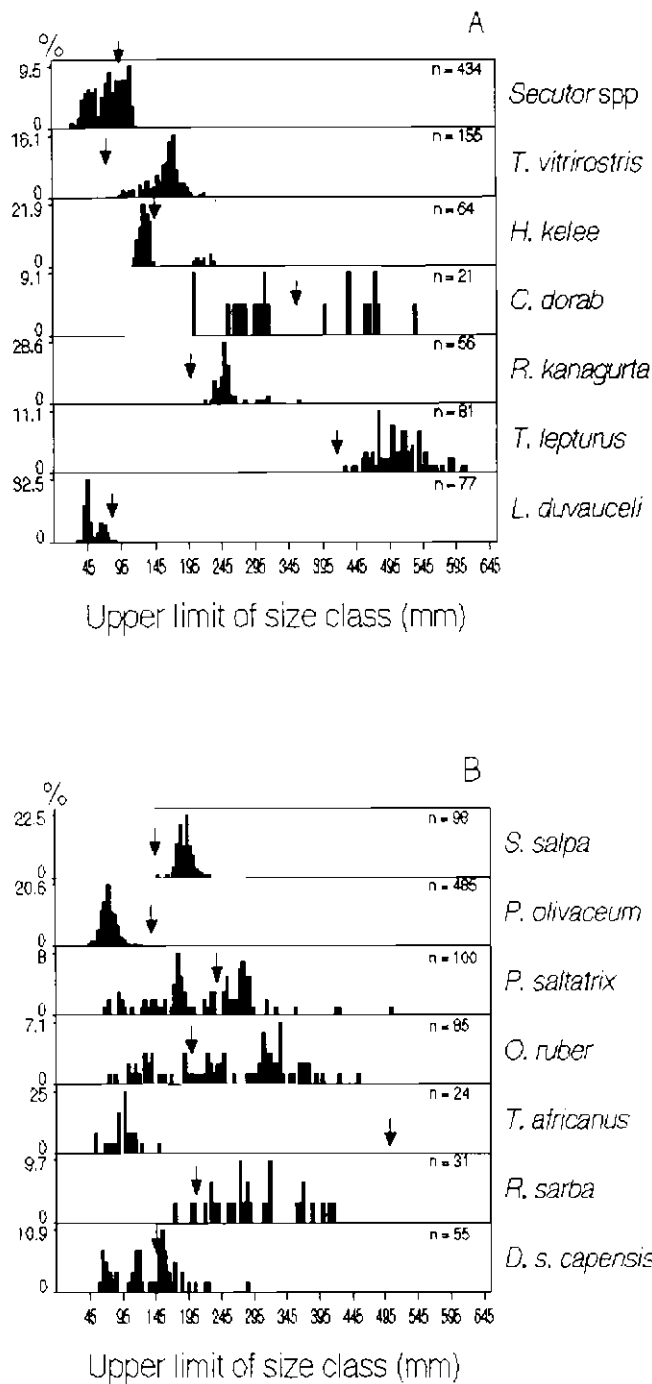
• denotes edible species used for food if sufficiently large

*insidiator*, *S. ruconius*, *H. kelee*, *P. olivaceum*, *T. africanus*, *P. saltatrix* and *D. sargus capensis*) and the squid *L. duvauceli* were predominantly caught at sizes less than their size at maturity. Of these, only *L. duvauceli* was retained by the netters, as the others, for example *P. saltatrix*, *T. africanus* and *D. sargus capensis*, were too small to be utilised or were below their minimum legal size limits. Although fish which were not retained were usually returned to the water, many did not survive the netting process. The occurrence of discarded fish along the shore line contributes to the opinion, widely held by anglers, that beach-seine netting has a negative impact on angling.

Some of the netted species showed clear seasonal trends in abundance and species from temperate waters, for example, *P.*

*saltatrix*, *S. sagax*, *S. japonicus* and *S. salpa*, were generally more abundant during the cooler months. Catches of *T. vittirostris*, *H. kelee* and *O. ruber* were greater in the high-rainfall, summer months and were often associated with discoloured water resulting from flooding of nearby rivers. Mugilids, leiognathids, *P. olivaceum* and *C. dorab* were caught throughout the year.

Examination of the NMLS data for 1993 and 1994 showed that catches by paddleski anglers were dominated by elf (*P. saltatrix*), snapper kob (*O. ruber*) and rockcod (Serranidae) (Table 3). Catches by seine fishermen of species targeted by the paddleski fishers were low during the sampling period. Similarly, few of the main species occurring in beach-seine catches were caught by the paddleski anglers. Based on anec-



**Figure 2** Length frequency distributions recorded by staff of the Oceanographic Research Institute of species caught by the Durban beach-seine netters from July 1993 to June 1994. A indicates species numerically important in the catches and B indicates species targeted by anglers in KwaZulu-Natal. All lengths are fork lengths except for *T. lepturus* and *O. ruber* (total lengths) and *L. duvauceli* (mantle length). Arrows indicate sizes at maturity. Maturity data obtained from various sources: *S. insidiator* (Murty 1990), *T. vitrirostris* (Blaber 1979), *H. kelee* (Gjosacter & Sousa 1983), *C. dorab* (Luther 1985), *R. kanagurta* (Sousa & Gislason 1985), *T. lepturus* (James, Gupta & Shanbhogue 1978), *L. duvauceli* (Supongpan, Chotiyaputta & Sinoda 1993), *S. salpa* and *P. olivaceum* (Joubert 1981), *P. saltatrix* (van der Elst 1976), *O. ruber* (Fennessy unpubl. data), *T. africanus* (van der Elst unpubl. data), *R. sarba* (Wallace 1975) and *D. sargus capensis* (Joubert 1981).

**Table 2** Frequency of occurrence of taxa occurring in more than 10% of 270 beach-seine hauls off Durban from July 1993 to June 1994

Species	Common name	No. of occurrences	%
Tetraodontidae	Pufferfish (4 species)	125	46.3
<i>Loligo duvauceli</i>	Indian squid	119	44.1
Mugilidae	Mullet (6 species)	107	39.6
Gerreidae	Pursemouths (3 species)	84	31.1
<i>Pomadasys olivaceum</i>	Pinky	71	26.3
Pleuronectiformes	Flatfish (4 species)	70	25.9
<i>Pomatomus saltatrix</i>	Elf	70	25.9
<i>Chirocentrus dorab</i>	Wolfherring	68	25.2
<i>Rhabdosargus</i> spp.	Stumpnose (2 species)	58	21.5
Leiognathidae	Soapies (4 species)	57	21.1
<i>Sillago sihama</i>	Silver sillago	47	17.4
<i>Scomberoides tol</i>	Needlescaled queenfish	43	15.9
<i>Caranx</i> and <i>Carangoides</i> spp.	Kingfish (9 species)	41	15.2
Sphyraenidae	Barracudas (4 species)	40	14.8
<i>Rastrelliger kanagurta</i>	Indian mackerel	40	14.8
<i>Platycephalus indicus</i>	Bartail flathead	38	14.1
Rhinobatidae	Guitarfish (3 species)	36	13.3
<i>Trichiurus lepturus</i>	Cutlass fish	29	10.7
<i>Sepia</i> spp.	Cuttlefish	28	10.4

Additional information and observations made by Institute staff for several years prior to this investigation, the greatest conflict between seine fishermen and paddleski anglers occurs during April to July, when juvenile elf are abundant off Durban beaches (Figure 3 and unpublished data, Oceanographic Research Institute). Good catches of squid, which is much sought after by the fishermen due to its high value, are also made around this time (Figure 3). The non-selective nature of beach-seine sometimes results in large catches of small elf along with the squid. In dragging the net onto the beach, numbers of small elf are stranded and many do not survive owing to scale loss, trauma, etc. To reduce unnecessary mortality of juveniles or bycatch species, it is suggested that a cod-end drawstring be installed in the net to enable the bag of the net to be opened to release fish while in the water.

**Table 3** Catches recorded by Durban Paddleski Club during weekend fishing in 1993 and 1994. Only taxa contributing more than two per cent by number are included. Data source: National Marine Linefish System

Species	Common name	Number	%
<i>Pomatomus saltatrix</i>	Elf	5 300	45.1
<i>Otolithes ruber</i>	Snapper kob	2 870	24.4
Serranidae	Rockcods	1 212	10.3
Chondrichthyes	Sharks and rays	384	3.3
<i>Diplodus sargus capensis</i>	Blacktail	282	2.4
Other		1 716	14.5

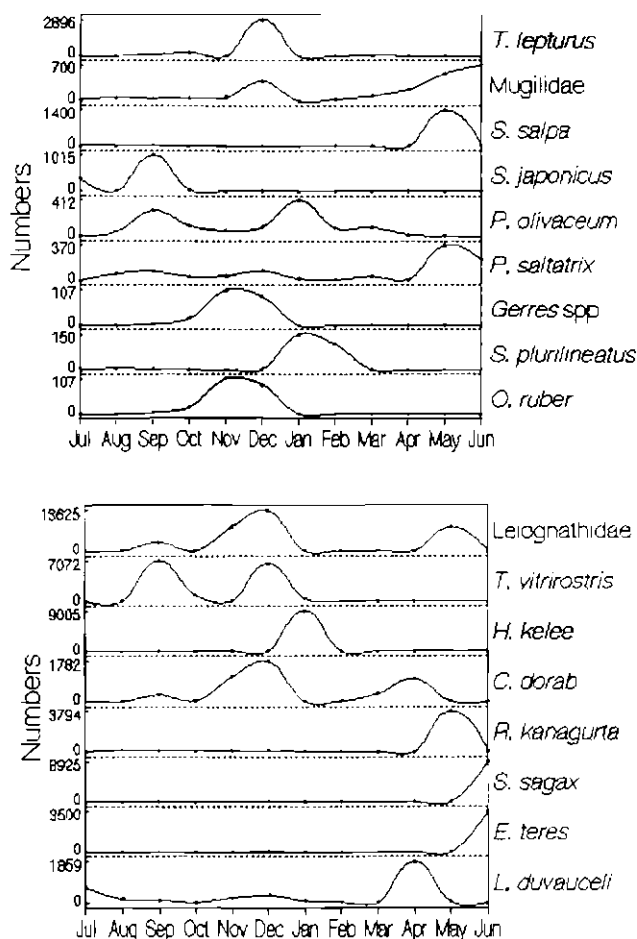


Figure 3 Seasonality of occurrence of species caught by the Durban beach-seine netters from July 1993 to June 1994.

To further minimize conflict between the fishing sectors, it is suggested that seine netting be restricted to weekdays with discretion in the application of effort (e.g. if a large shoal of *P. saltatrix* is accidentally caught, the seine fishermen should refrain from setting the net again). Finally, in the interests of monitoring the fishery, the management authorities should provide detailed catch return forms for completion by the seine fishermen and ensure that the data are adequately processed.

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### References

ANON 1912. Angling notes. *The Pictorial*, October 3: 22–23.  
 BLABER, S.J.M. 1979. The biology of filter-feeding teleosts in Lake St Lucia, Zululand. *J. Fish. Biol.* 15: 37–59.

FENNESSY, S.T. 1994. The impact of commercial prawn trawlers on linefish catches off the north coast of Natal. *S. Afr. J. mar. Sci.* 14: 263–279.  
 FENNESSY, S.T. & CHATER, S.A. 1994. The Vetch's Pier seine netters. *Bulletin. S. Afr. assoc. Mar. Biol. Res.* 19: 16–17.  
 GJOSAETER, J. & SOUSA, M.I. 1983. Reproduction, age and growth of the kelee shad, *Hilsa kelee* (Cuvier, 1829) (Pisces: Fam. Clupeidae) with information on its fishery in Maputo Bay, Mozambique. *Rev. Invest. Pesq. (Maputo)* 8: 53–82.  
 JAMES, P.S.B.R., GUPTA, T.R. & SHANBHOGUE, S.L. 1978. Some aspects of the biology of the ribbon fish, *Trichiurus lepturus* (Linnaeus). *J. mar. Biol. assoc. India* 20: 120–137.  
 JOUBERT, C.S.W. 1981. Aspects of the biology of five species of inshore reef fish on the Natal coast, South Africa. *Invest. Rep. oceanogr. Res. Inst.* 51: 1–16.  
 JUNOR, F.J.R. & COKE, M.M. 1994. Marine fish. In: NPB Scientific Services Yearbook 1993–1994. (ed.) P.M. Brooks. Natal Parks Board, Pietermaritzburg. 69–73.  
 LAMBERTH, S.J., BENNETT, B.A. & CLARK, B.M. 1994. Catch composition of the commercial beach-seine fishery in False Bay, South Africa. *S. Afr. J. mar. Sci.* 14: 69–78.  
 LAMBERTH, S.J., BENNETT, B.A. & CLARK, B.M. 1995. The vulnerability of fish to capture by commercial beach-seine nets in False Bay, South Africa. *S. Afr. J. mar. Sci.* 15: 25–32.  
 LAMBERTH, S.J., BENNETT, B.A., CLARK, B.M. & JANSSENS, P.M. 1995. The impact of beach-seine netting on the benthic flora and fauna of False Bay, South Africa. *S. Afr. J. mar. Sci.* 15: 115–122.  
 LUTHER, G. 1985. Age and growth of the fishes of the genus *Chirocentrus* Cuvier. *J. mar. Biol. assoc. India* 27(1/2): 50–67.  
 MANN, B.Q. 1995. Fish by-catch in the St Lucia bait prawn fishery. *Lammergeyer* 43: 30–38.  
 MARA, J. 1986. A fisherman's tale — fifty years of fishing along the Natal coast. Angler Publications and Promotions, Umhlanga Rocks. 92 pp.  
 MURTY, V.S. 1990. Biology and population dynamics of the silverbelly *Secutor insidiator* (Bloch) from Kakinada. *J. mar. Biol. assoc. India* 32(1/2): 10–24.  
 PENNEY, A.J. 1991. The interaction of net and line-fisheries in False Bay, South Africa. *Trans. Roy. Soc. S. Afr.* 47(4/5): 663–681.  
 RUSSELL, G. 1899. The history of old Durban and reminiscences of an emigrant of 1850. P. Davis & Sons, Durban. xi + 512 pp.  
 SMITH, M.M. & HEEMSTRA, P.C. (eds.) 1986. Smith's Sea Fishes. Macmillan, Johannesburg. xx + 1047 pp.  
 SOUSA, M.I. & GISLASON, H. 1985. Reproduction, age and growth of the Indian mackerel, *Rastrelliger kanagurta* (Cuvier, 1816) from the Sofala Bank, Mozambique. *Rev. Invest. Pesq. (Maputo)* 14: 1–28.  
 SUPONGPAN, M., CHOTIYAPUTTA, C. & SINODA, M. 1993. Maturity and length frequency distribution of the squid *Loligo duvauceli* caught in the Gulf of Thailand. *Nippon Suishan Gakkaishi* 59: 1963–1969.  
 VAN DER ELST, R.P. 1976. Game fish of the east coast of southern Africa. I. The biology of the elf, *Pomatomus saltatrix* (Linnaeus), in the coastal waters of Natal. *Invest. Rep. oceanogr. Res. Inst.* 44: 1–59.  
 VASILAROS, J. 1993. Seine netting plunders our coast — who is to blame? *Tight Lines*. March, 1993: 4–7.  
 WALLACE, J.H. 1975. The estuarine fishes of the east coast of South Africa. III. Reproduction. *Invest. Rep. oceanogr. Res. Inst.* 41: 1–51.

**Appendix 1** Ichthyofauna from Vetch's Pier beach-seine catches from July 1993 to June 1994. Additional species recorded during preliminary observations in 1991 and 1992 are indicated by an asterisk.

### Teleostei

<i>Acanthopagrus berda</i>	Perch	<i>Mene maculata</i>	Pony fish
<i>Albula vulpes</i>	Bonefish	<i>Monodactylus argenteus</i>	Natal moony
<i>Alectis ciliaris</i>	Threadfin mirrorfish	<i>Mugil cephalus</i>	Flathead mullet
<i>Alectis indicus</i> *	Indian mirrorfish	<i>Myxus capensis</i>	Freshwater mullet
<i>Alepes djeddaba</i>	Slender kingfish	<i>Neoscorpis lithophilus</i>	Stonebreem
<i>Amblyrhynchotes honckenii</i>	Evil eye puffer	<i>Otolithes ruber</i>	Snapper salmon
<i>Apogon</i> sp.	Cardinal	<i>Paralichthodes algoensis</i>	Measles flounder
<i>Archamia mozambiquensis</i>	Mozambique cardinal	<i>Paraplagusia bilineata</i>	Fringelip tonguefish
<i>Argyrosomus japonicus</i>	Dusky kob	<i>Parastromateus niger</i> *	Black pomfret
<i>Argyrosomus thorpeii</i>	Squaretail kob	<i>Parexocoetus mento</i>	African sailfin flyingfish
<i>Ariomma indica</i>	Indian driftfish	<i>Parupeneus macronema</i>	Band-dot goatfish
<i>Arothron hispidus</i> *	Whitespotted puffer	<i>Parupeneus rubescens</i> *	Blacksaddle goatfish
<i>Aulosomus chinensis</i> *	Trumpetfish	<i>Pellona ditchela</i>	Indian pellona
<i>Carangoides armatus</i>	Longfin kingfish	<i>Platax orbicularis</i>	Orbicular batfish
<i>Carangoides caeruleopinnatus</i>	Coastal kingfish	<i>Platycephalus indicus</i>	Bartail flathead
<i>Carangoides hedlandensis</i>	Bumpnose kingfish	<i>Plotosus lineatus</i>	Striped eel-catfish
<i>Carangoides malabaricus</i>	Malabar kingfish	<i>Polydactylus plebeius</i>	Striped threadfin
<i>Caranx ignobilis</i> *	Giant kingfish	<i>Polydactylus sextarius</i> *	Bastard mullet
<i>Caranx melampygus</i>	Bluefin kingfish	<i>Pomadasys commersonnii</i>	Spotted grunter
<i>Caranx sem</i>	Blacktip kingfish	<i>Pomadasys kaakan</i> *	Javelin grunter
<i>Caranx sexfasciatus</i>	Bigeye kingfish	<i>Pomadasys maculatum</i> *	Saddle grunter
<i>Chanos chanos</i>	Milkfish	<i>Pomadasys olivaceum</i>	Olive grunter
<i>Cheilidonochthys kumu</i>	Bluefin gurnard	<i>Pomatomus saltatrix</i>	Shad
<i>Cheilodactylidae</i> sp.*	Fingerfin	<i>Psenes whiteleggii</i>	Shadow driftfish
<i>Cheimerius nufar</i>	Santer	<i>Pseudorhombus elevatus</i>	Ringed flounder
<i>Chelinodon laticeps</i>	Bluespotted blaasop	<i>Pterois miles</i>	Devil firefish
<i>Chirocentrus dorab</i>	Wolf herring	<i>Rastrelliger kanagurta</i>	Sugar mackerel
<i>Cociella</i> sp.	Spotfin flathead	<i>Rhabdosargus sarba</i>	Natal stumpnose
<i>Crenidens crenidens</i>	White karanteen	<i>Rhabdosargus holubi</i>	Cape stumpnose
<i>Cynoglossus lida</i>	Roughscale tongue sole	<i>Sardinella gibbosa</i>	Goldstripe sardinelle
<i>Decapterus macrosoma</i>	Slender scad	<i>Sardinops sagax</i>	Pilchard
<i>Diplodus cervinus hottentotus</i>	Zebra	<i>Sarpa salpa</i>	Karanteen
<i>Diplodus sargus capensis</i>	Blacktail	<i>Saurida undosquamis</i>	Largescale lizardfish
<i>Drepane longimanus</i>	Concertina fish	<i>Scomber japonicus</i>	Mackerel
<i>Echeneis naucrates</i>	Remora	<i>Scomberoides commersonianus</i>	Talang queenfish
<i>Elops machnata</i>	Springer	<i>Scomberoides lysan</i>	Double-spotted queenfish
<i>Etrumeus teres</i>	East coast roundherring	<i>Scomberoides tol</i>	Salad fish
<i>Fistularia petimba</i>	Serrate flutemouth	<i>Scomberomorus commerson</i> *	King mackerel
<i>Galeichthyes</i> sp.	Seacatfish	<i>Scomberomorus plurilineatus</i>	Queen mackerel
<i>Gazza minuta</i>	Toothed soapy	<i>Secutor insidiator</i>	Slender soapy
<i>Gerres acinaces</i>	Smallscale pursemouth	<i>Secutor ruconius</i>	Pugnose soapy
<i>Gerres filamentosus</i>	Threadfin pursemouth	<i>Siganus sutor</i> *	Whitespotted rabbitfish
<i>Gerres rappi</i>	Evenfin pursemouth	<i>Sillago sihama</i>	Silver sillago
<i>Hemiramphus far</i> *	Spotted halfbeak	<i>Sparodon durbanensis</i>	White musselcracker
<i>Hilsa kelee</i>	Razorbelly	<i>Sphyraena acutipinnis</i>	Sharpfin barracuda
<i>Johnius amblycephalus</i>	Bellfish	<i>Sphyraena barracuda</i>	Great barracuda
<i>Johnius dussumieri</i> *	Mini-kob	<i>Sphyraena chysotaenia</i>	Yellow stripe barracuda
<i>Lactoria cornuta</i>	Longhorn cowfish	<i>Sphyraena jello</i>	Pickhandle barracuda
<i>Lagocephalus guentheri</i>	Blackback puffer	<i>Sphyraena putnamiae</i>	Sawtooth barracuda
<i>Leiognathus elongatus</i>	Elongate soapy	<i>Stephanolepis auratus</i>	Porgy
<i>Leiognathus equula</i>	Slimy	<i>Stolephorus holodon</i>	Thorny anchovy
<i>Lithognathus mormyrus</i>	Sand steenbras	<i>Strongylura leiura</i>	Yellowfin needlefish
<i>Lichia amia</i>	Garrick	<i>Terapon jarbua</i>	Thornfish
<i>Liza dumerilii</i>	Groovy mullet	<i>Thryssa setirostris</i>	Longjaw glassnose
<i>Liza macrolepis</i>	Largescale mullet	<i>Thryssa vitirostris</i>	Orangemouth glassnose
<i>Liza richardsonii</i>	Southern mullet	<i>Torquigener balteatus</i>	Slender puffer
<i>Liza tricuspidens</i>	Striped mullet	<i>Trachinotus africanus</i>	Southern pompano
<i>Megalaspis cordyla</i>	Torpedo scad	<i>Trachinotus botla</i>	Wave garrick
		<i>Trachurus delagoa</i>	African maasbanker
		<i>Trichiurus lepturus</i>	Ribbon fish
		<i>Tripteron orbis</i>	Spadefish
		<i>Umbrina</i> sp.	Baardman
		<i>Valamugil buehanani</i>	Bluetail mullet
		<i>Valamugil robustus</i> *	Robust mullet

**Elasmobranchii***Aetobatus narinari**Carcharhinus obscurus**Carcharhinus sealei*\**Dasyatis chrysonota chrysonota**Dasyatis kuhlii*\*

Spotted eagle ray

Dusky shark

Blackspot shark

Blue stingray

Blue spotted stingray

*Gymnura natalensis*\**Himantura gerrardi**Himantura uarnak**Rhinobatos annulatus**Rhinobatos leucospilus**Rhincobatos djiddensis**Torpedo sinuspersici*\*

Butterfly ray

Sharpnose stingray

Honeycomb stingray

Lesser guitarfish

Greyspot guitarfish

Giant guitarfish

Marbled electric ray