

# Inshore small-mesh trawling survey of the Cape south coast. Part 1. Introduction, methods, stations and catches

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The main objective of this survey was to investigate the occurrence of marine nursery grounds of inshore fishes, with particular reference to species whose juveniles are abundant in estuaries. The sampling programme is described and station data are tabulated for 132 otter trawl, 10 try-net and seven blanket-netting localities. Catch data are tabulated for each station and include a total of 111 265 fishes, comprising 27 Chondrichthyes and 80 teleost species. The length composition of teleost catches is recorded and invertebrate catches are tabulated. These data are interpreted in Parts 2 to 5 of this series.

*S. Afr. J. Zool.* 1984, 19: 154 – 164

Die hoofdoel van hierdie opnames was om te bepaal of daar seegebiede is waar jong kuswatervis spesies versamel. Daar is spesiale aandag gegee aan die vissoorte waarvan die jongvisies in groot getalle in getyrieviere aangetref word. Die monster-nemingsprogram word beskryf en vangstdata vir elk van die 132 treilinet-, 10 toetsnet-, en sewe kombensnetvanggebiede word getabelleer. 'n Totaal van 111 265 visse wat uit 27 Chondrichthyes- en 80 beenvisspesies bestaan, is gevang. Die lengtesamestelling van die beenvisvangste word weergegee en die invertebraat- vangste word getabelleer. Hierdie gegewens word in Deel 2 tot 5 van hierdie reeks geïnterpreteer.

*S. Afr. Tydskr. Dierk.* 1984, 19: 154 – 164

## Introduction

The prime objective of this study was to establish whether estuarine-associated fishes utilize the inshore marine environment on the southern Cape coast as a nursery area. This information was required in order to interpret the significance of the estuarine nursery function reported by numerous workers, which has been generally regarded as essential for the maintenance of viable stocks of many fish species (Day 1951; Talbot 1955; Blaber 1974; Wallace & van der Elst 1975; Day, Blaber & Wallace 1981). These include the white steenbras (*Lithognathus lithognathus*), Cape and white stumpnose (*Rhabdosargus holubi* and *R. globiceps*), spotted grunter (*Pomadasys commersonii*), leervis (*Lichia amia*), six species of mullet (*Liza* spp. and *Mugil cephalus*) as well as 10 species of less direct significance to man. Clarity concerning the nursery areas utilized by these fishes is required to enable planning authorities to make balanced judgements concerning the need to conserve estuaries in the face of development projects that are frequently incompatible with maintenance of the biological viability of these important areas.

To meet this objective a benthic trawling survey of the inshore zone of the Cape south coast was conducted using the R.V. *Thomas B. Davie*. This survey was complemented by studies on the occurrence of juvenile fishes in the intertidal zone and out to immediately beyond the surf zone (Lasiak 1981, 1982, 1983a, 1983b; Beckley L.E. 1983 unpubl.) and a survey of juvenile fish inhabiting rocky substrates within the depth range readily accessible to SCUBA divers (Wallace, Kok & Beckley 1984).

A secondary objective of the programme was to investigate the occurrence of inshore nursery areas for typically marine fish and to record aspects of the biology of these species where possible. The survey also yielded catches of a number of invertebrate species.

The results of the survey are presented as follows:

Part 1: Introduction, methods, stations and catches.

Part 2: Occurrence of estuarine-associated fishes.

Part 3: Occurrence and feeding of *Argyrosomus hololepidotus*, *Pomatomus saltatrix* and *Merluccius capensis*.

Part 4: Contributions to the biology of some Teleostei and Chondrichthyes.

Part 5: Crustacea, Stomatopoda, Isopoda and Decapoda.

## Methods

### Sampling programme

During February, May, August and November 1980, surveys were conducted between Algoa Bay in the east (33°53'S/

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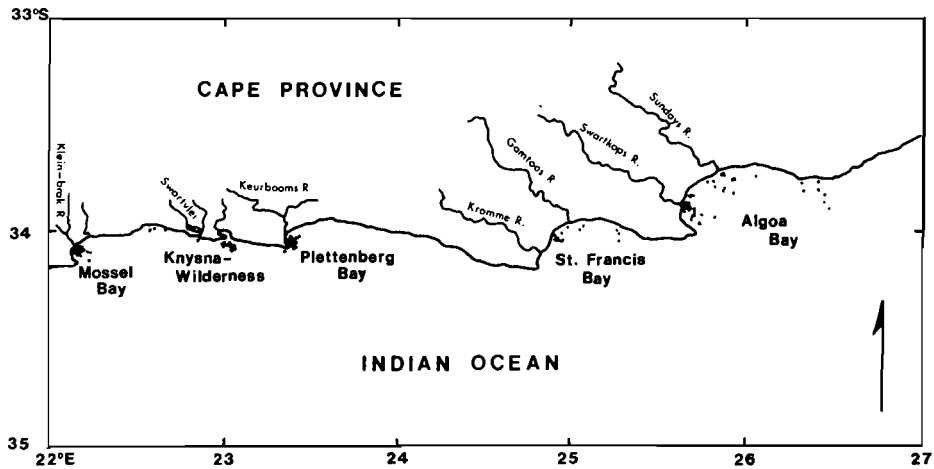


Figure 1 Stations sampled by the R.V. *Thomas B. Davie* between Mossel Bay and Algoa Bay.

26°28'E) and St Sebastian Bay (34°06'S/22°09'E) in the west (Figure 1). Because of the prime objective it was necessary to occupy as many stations as possible. This involved processing catches in quick succession and limited the attention that could be given to details of the biology of individual species of fish and to searching through the catch for small or cryptic invertebrates. Despite these constraints the study yielded valuable results.

### Selection of stations

Sampling stations were selected in the following areas:

- (i) Off the mouths and beaches adjacent to estuarine systems in which the juvenile fish faunas had already been or were in the process of being investigated (viz. Sundays River, Swartkops River, Gamtoos River, Kromme River, Knysna Lagoon, Swartvlei/Sedgefield estuarine system, Klein Brak River and Breede River). Trawling was generally conducted parallel to the coast, from depths as shallow as 4,5 m and at distances from the shore of as little as 400 m.
- (ii) In protected bays (Algoa Bay, St Francis Bay, Plettenberg Bay, Mossel Bay, Vleesbaai and St Sebastian Bay), which were considered relatively suitable for juveniles of estuarine-associated species because wave action is less than that of the open coast and hence more similar to the sheltered conditions prevalent in estuarine nurseries. Since most south coast estuaries open into embayments an association between the fish faunas of these areas seemed more probable than between estuaries and the open coast. Trawling was most intensive in depths down to approximately 40 m and at distances from the shore of less than 8 km, although some stations were worked down to approximately 100 m.
- (iii) Off open, unprotected coasts in order to sample near the Knysna/Swartvlei estuarine systems and to gain insight into the composition of the faunas of such areas.

An attempt was made to sample the benthic fish communities of a wide diversity of substrate types, thereby increasing the chances of encountering juveniles of estuarine-associated species. In Algoa Bay surficial sediment (Bremner 1978) and bathymetric (Bremner 1979) data were available, while for the rest of the study area insight into the bathymetry was obtained from Birch (1981) and general substrate characteristics were obtained from 1:150 000 S.A. Naval charts. The substrate characteristics of each trawling area were assessed by use of a van Veen grab and occasionally a light dredge. (These yielded incidental samples of the invertebrate fauna.)

### Station data

The following data were collected for each station: station number; date; locality; distance from the beach; water depth; latitude and longitude; type of sampling gear; time of day and duration of fishing time (usually 10-min trawls); cloud cover; wind force and direction and sea state. A 150-g aliquot of sediment was preserved for later screening through a set of six sieves, between 31 – 1 000  $\mu\text{m}$  mesh diameter, for 15 min. The dry mass of sediment retained by each sieve was expressed as a percentage of the total mass of the sample and plotted against mesh size to obtain the modal diameter of substrate (presented in Table 1). Substrate types have been classified according to the Wentworth scale (King 1972).

### Fishing gear

Most benthic sampling between Mossel Bay and Algoa Bay was conducted with a 20 m otter trawl of 50 mm stretch mesh. The 3 m cod end was lined with 12 mm stretch, knotless anchovy netting. Wooden otter boards of 1,7 × 0,88 m were used. This gear fished very well and bottom time was generally restricted to 10 min to keep the size of the catch within manageable limits.

Benthic sampling west of Mossel Bay was conducted with a 20 m otter trawl of 70 mm stretch mesh. The 5 m cod end was lined with 12 mm stretch, knotless anchovy netting.

Limited benthic sampling was conducted with a 4 m try-net of 35 mm stretch mesh, which also had the cod end lined with 12 mm stretch, knotless anchovy netting; steel trawl doors 0,95 × 0,55 m were used. Catches were poor, possibly as a result of net avoidance.

Blanket-netting was conducted at night close inshore in the vicinity of estuary mouths. A 13,4 × 13,4 m net with 13 mm stretch mesh was used according to the method described by Davies (1957). Catches were generally poor.

### Catch data

For each catch the following data were recorded: species composition and numerical abundance of all fish; length composition of teleost species (either by measuring every specimen or in the case of large catches the length of a randomly selected sub-sample of 50–200 specimens); stomach contents of selected species; the numerical abundance of Loliginidae and invertebrates to the extent that time permitted. Unless otherwise stated, fish length was measured as the total length from the tip of the snout to the tip of the upper caudal rotated to the mid-line.

**Table 1.1** Station data: Mossel Bay to Algoa Bay, February 1980

Stn	Date	Start		End		Depth (m)		km offshore	Start time	Effort (min)	Gear	Hauls	Substrate modal $\mu$ m	Fish species	Fish catch
		latitude	longitude	latitude	longitude	Start	End								
1	800214	335220	253840	335320	253780	4.5	9.1	0.4	11.27	13	1	1	125	22	6236
2	800214	335332	254003	335185	254082	16.7	18.3	4.6	14.13	20	1	1	125	15	362
3	800214	335352	254215	335272	254280	26.5	29.3	7.6	15.54	20	1	1	125	21	1106
4	800214	335490	254430	335425	254527	29.0	34.0	8.7	18.06	31	1	1	125	16	948
5	800214	335561	254910	335630	254790	41.0	41.0	17.0	20.15	20	1	1	0	20	1124
6	800214	335660	254830	334560	254830	17.0	17.0	2.8	22.43	37	2	1	0	4	447
7	800215	334712	254910	334690	254950	27.0	27.0	5.3	8.07	9	1	**1	250	19	236
8	800215	334910	255540	334850	255610	49.0	49.0	11.7	12.20	15	1	1	250	25	308
9	800215	334530	255510	334490	255610	32.0	32.0	3.9	14.55	20	3	1	125	10	67
10	800215	334392	255110	334405	255417	25.0	25.0	2.2	16.23	15	3	**1	125	0	0
11	800215	334360	255114	334345	255170	12.8	8.2	1.2	18.24	10	3	1	125	4	5
12	800215	334613	261860	334613	261860	25.6	25.6	3.3	23.05	85	3	3	0	5	5
13	800216	334600	262450	334605	262505	20.0	14.6	0.9	7.46	18	3	**1	0	0	0
14	800216	334810	262460	334760	262380	45.0	36.0	5.0	9.28	7	1	1	0	24	911
15	800216	334940	262680	334925	262592	69.5	69.5	6.7	10.55	16	1	1	63	7	155
16	800216	335142	262657	335085	262730	84.0	80.0	10.0	12.26	18	1	1	0	16	412
17	800216	335315	262835	335320	262730	97.0	97.0	13.9	14.14	17	1	1	125	11	346
18	800216	334830	261960	334875	261980	33.0	33.0	3.5	16.48	15	1	**1	250	19	249
19	800216	334392	255130	334392	255130	12.0	12.0	1.4	20.53	97	2	5	0	2	77
20	800217	335150	253927	335100	253950	9.0	9.0	0.7	8.08	15	1	1	125	16	2148
21	800217	335195	253937	335247	253864	35.0	7.3	0.6	9.14	12	1	1	1000	12	534
22	800218	340568	230441	340584	230340	47.5	35.0	1.7	7.54	17	1	1	125	12	1655
23	800218	340619	230449	340635	230341	47.5	47.5	2.6	9.14	17	1	1	125	17	446
24	800218	340680	230449	340680	230225	55.0	55.0	4.6	10.39	15	1	1	125	12	155
25	800218	340490	230070	340492	230005	14.6	13.7	1.5	11.58	15	1	1	125	6	16
26	800218	340156	223960	340150	224024	22.0	22.0	1.5	15.28	15	1	1	125	11	186
27	800218	340080	223504	340095	223470	29.0	29.0	2.4	17.25	15	1	1	125	20	1715
28	800218	340215	224750	340215	224750	11.0	11.0	0.8	20.20	90	2	4	0	7	70
29	800219	340567	221010	340637	220930	13.0	13.0	0.7	10.12	15	1	1	63	10	1583
30	800219	340635	221080	340665	220950	22.0	22.0	2.6	11.12	15	1	1	63	14	1652
31	800219	340707	221175	340760	221120	31.0	31.0	5.0	13.16	15	1	1	125	20	3556
32	800219	340750	221340	340794	221300	41.0	41.0	7.7	15.40	11	1	1	0	13	64
33	800219	340945	221465	340985	221420	51.0	51.0	7.4	17.23	10	1	1	125	9	131

Co-ordinates in minutes, seconds and decimal seconds.

\*\* = Net damaged; Gear 1 = Otter trawl-net, 2 = Blanket-net, 3 = Try-net, 4 = Dredge, 5 = Scoop-net.

**Table 1.2** Station data: Mossel Bay to Algoa Bay, May 1980

Stn	Date	Start		End		Depth (m)		km offshore	Start time	Effort (min)	Gear	Hauls	Substrate modal $\mu$ m	Fish species	Fish catch
		latitude	longitude	latitude	longitude	Start	End								
34	800521	341036	220848	341036	220848	8.0	8.0	0.0	12.30	20	5	2	0	3	191
35	800521	340945	220790	340970	220850	11.0	11.0	1.6	15.03	10	1	1	125	11	996
36	800521	340975	220780	340990	220830	8.0	7.0	0.7	16.00	10	1	1	125	11	369
37	800521	340625	220930	340665	220975	13.0	13.0	0.9	17.07	18	1	1	0	13	1099
38	800521	340660	221020	340600	221085	24.0	24.0	2.6	17.56	10	1	1	63	21	2661
39	800521	340975	220840	340975	220840	10.0	10.0	1.1	22.15	60	2	3	0	5	442
40	800522	340705	221170	340735	221145	33.0	33.0	5.0	8.17	10	1	1	125	23	3095
41	800522	340770	221330	340825	221295	42.0	42.0	8.0	9.43	10	1	1	0	22	710
42	800522	340070	223500	340060	223560	24.0	24.0	2.3	12.52	8	1	1	125	12	275
43	800522	340495	225950	340520	225990	9.0	20.0	0.8	16.19	10	1	1	125	12	609
44	800522	340572	230335	340568	230385	27.0	24.0	0.9	17.05	10	1	1	1000	20	3372
45	800522	340634	230430	340644	230357	46.0	46.0	2.4	17.45	10	1	1	125	15	100
46	800522	340585	230352	340585	230352	31.0	31.0	1.3	20.00	120	2	3	0	1	2
47	800523	340715	232300	340720	232240	38.0	40.0	1.3	8.29	10	1	1	125	16	478
48	800523	340580	232360	340590	232430	8.0	9.0	0.6	9.51	10	1	1	125	7	2049
49	800523	340535	232310	340540	232390	13.0	12.0	1.0	10.58	10	1	1	125	7	1259
50	800523	340455	232290	340460	232355	25.0	29.0	2.4	11.40	10	1	1	125	13	3173
51	800523	340395	232410	340350	232455	36.0	36.0	2.4	13.00	10	1	1	125	0	0
52	800523	340270	232330	340205	232370	12.0	9.0	0.7	14.38	10	1	1	250	22	1568
53	800523	340245	232325	340195	232450	24.0	21.0	1.3	15.20	10	1	1	125	22	3811
54	800523	340315	232690	340285	232765	58.0	58.0	5.1	16.16	15	1	1	0	12	716
55	800523	340265	232345	340265	232345	13.0	13.0	0.6	20.15	55	2	2	0	1	1
56	800525	340305	245605	340260	245615	10.0	10.0	1.0	10.03	10	1	1	125	15	569
57	800525	340360	245680	340315	245690	21.0	22.0	1.9	10.59	10	1	1	500	14	105
58	800525	340260	250030	340305	245980	33.0	33.0	7.8	11.50	10	1	1	125	10	128
59	800525	335965	250145	340000	250085	19.0	19.0	1.2	14.20	10	1	1	250	21	717
60	800525	335955	250665	335930	250730	29.0	29.0	3.2	16.00	10	1	1	250	7	93
61	800526	335735	254380	335675	254420	38.0	38.0	5.6	8.18	10	1	1	125	18	224
62	800526	335535	254150	335470	254195	27.0	27.0	7.2	9.06	10	1	1	125	16	814
63	800526	335320	254050	335265	254070	18.0	18.0	5.0	9.45	10	1	1	125	11	158
64	800526	335290	253935	335240	253925	14.0	14.0	2.1	10.31	10	1	1	125	15	477
65	800526	335255	253825	335195	253865	9.0	6.0	0.7	11.03	10	1	1	125	13	387
66	800526	334535	254590	334665	254520	16.0	16.0	1.7	12.54	10	1	**1	500	16	292
67	800526	334355	255165	334370	255100	12.0	8.0	1.0	14.36	10	1	1	0	7	157
68	800526	334420	260305	334420	260380	31.0	33.0	3.7	16.10	10	1	1	0	6	86
69	800527	334950	254115	334980	254005	13.0	13.0	1.1	8.09	20	1	1	125	13	508
70	800527	335250	253850	335305	253830	9.0	11.0	0.9	9.26	15	1	1	125	16	1132

Co-ordinates in minutes, seconds and decimal seconds.

\*\* = Net damaged; Gear 1 = Otter trawl-net, 2 = Blanket-net, 3 = Try-net, 4 = Dredge, 5 = Scoop-net.

Specimens of teleost and elasmobranch fishes were lodged in the collection of the J.L.B. Smith Institute of Ichthyology, a representative collection of teleost otoliths was added to the collection of the Port Elizabeth Museum, while invertebrates were made available to various specialists and specimens were lodged in the collection of the South African Museum.

**Stations**

In the area from Mossel Bay eastwards 123 otter trawl, 10 try-net trawl and seven blanket-net stations were occupied. West

of Mossel Bay nine otter trawl stations were worked. These station data are summarized in Tables 1 and 2 respectively.

**Catches**

Catches included 27 elasmobranch and 80 teleost species, totaling 111 265 specimens. Catch data are tabulated separately for the areas Mossel Bay eastwards (Table 3), and west of Mossel Bay (Table 4). The length composition of teleost catches is recorded in Tables 5 and 6. Invertebrate catches are listed in Tables 7 and 8.

**Table 1.3 Station data: Mossel Bay to Algoa Bay, August 1980**

Stn	Date	Start		End		Depth (m)		km offshore	Start time	Effort (min)	Gear	Hauls	Substrate modal $\mu\text{m}$	Fish species	Fish catch
		latitude	longitude	latitude	longitude	Start	End								
71	800812	340600	220920	340552	220970	13.0	13.0	.6	12.50	11	1	1	63	23	720
72	800812	340620	221080	340680	221020	25.0	25.0	3.1	13.59	10	1	1	63	15	3685
73	800812	340740	221110	340705	221175	35.0	35.0	4.8	15.13	10	1	1	125	7	228
74	800812	340765	220770	340710	220810	14.6	16.5	.8	16.51	10	1	1	0	24	5716
75	800814	340200	232420	340255	232380	14.6	11.0	.8	13.22	13	1	1	125	16	1833
76	800814	340285	232425	340230	232450	24.0	24.0	1.9	14.10	10	1	1	125	15	262
77	800814	340195	232443	340260	232400	20.0	20.0	1.3	14.54	10	1	1	125	13	714
78	800814	340400	232400	340400	232400	15.0	15.0	1.7	15.15	20	4	1	0	5	215
79	800814	340570	232330	340580	232390	9.0	9.0	.6	16.10	10	1	1	0	6	44
80	800814	340520	232430	340515	232350	15.0	16.0	1.5	16.43	10	1	1	0	11	51
81	800815	340330	245610	340270	245630	11.0	8.0	1.0	12.00	10	1	1	125	11	252
82	800815	335980	250070	335940	250130	22.0	22.0	1.2	13.20	10	1	1	250	70	14
83	800815	335990	250640	335970	250735	31.0	33.0	4.1	14.14	10	1	1	0	9	150
84	800815	335925	251580	335960	251660	14.0	14.0	3.7	15.42	15	3	1	0	15	38
85	800815	340025	251660	340090	251645	40.0	46.0	8.1	16.29	10	3	1	0	21	197
86	800815	340375	251720	340375	251501	73.0	69.0	6.2	17.51	25	1	1	0	20	349
87	800816	335160	253880	335220	253857	11.0	7.0	.9	8.40	10	1	1	125	19	344
88	800816	335250	253860	335310	253840	11.0	11.0	.9	9.16	10	1	1	125	18	708
89	800816	335240	254020	335285	253990	15.0	15.0	3.0	10.02	10	1	1	125	11	169
90	800816	335380	254200	335310	254210	22.0	22.0	6.2	10.56	10	1	1	125	18	373
91	800816	334950	254040	334950	254090	12.0	11.0	.9	13.27	10	1	1	125	5	20
92	800816	334950	254170	335000	254130	9.0	15.0	2.1	14.12	10	1	1	125	0	14
93	800816	334330	255210	334350	255120	9.0	8.0	.5	16.46	10	1	1	0	20	387
94	800816	334510	255490	334490	255580	27.0	27.0	4.4	17.52	10	1	1	125	20	1239
95	800817	334870	255580	334830	255637	47.5	47.5	12.4	8.23	10	3	1	250	13	26
96	800817	334820	255205	334860	255150	39.0	39.0	9.1	9.45	10	3	1	125	4	10
97	800818	340565	230403	340569	230358	27.0	27.0	1.1	6.56	10	1	1	1000	12	363
98	800818	340646	230667	340633	230418	46.0	43.0	3.3	7.30	10	1	1	125	10	153
99	800818	340642	230370	340626	230321	46.0	42.0	2.5	9.30	10	4	1	125	2	4
100	800818	340500	225940	340520	225985	16.0	23.0	1.2	8.50	10	1	1	125	12	523
101	800818	340048	223424	340036	223506	23.0	23.0	1.9	11.30	10	1	1	125	19	879

Co-ordinates in minutes, seconds and decimal seconds.

\*\* = Net damaged; Gear 1 = Otter trawl-net, 2 = Blanket-net, 3 = Try-net, 4 = Dredge, 5 = Scoop-net.

**Table 1.4 Station data: Mossel Bay to Algoa Bay, November 1980**

Stn	Date	Start		End		Depth (m)		km offshore	Start time	Effort (min)	Gear	Hauls	Substrate modal $\mu\text{m}$	Fish species	Fish catch
		latitude	longitude	latitude	longitude	Start	End								
102	801105	340640	220978	340595	221010	24.0	23.0	2.4	14.36	10	1	1	63	2	8
103	801105	340640	220978	340595	221010	24.0	24.0	2.4	15.13	10	1	1	0	7	7
104	801105	340640	220978	340595	221010	24.0	24.0	2.4	19.13	10	3	1	63	7	13
105	801105	340620	220905	340565	220977	14.6	14.6	.7	17.08	10	1	1	63	10	26
106	801106	340650	220955	340502	221000	24.0	24.0	2.6	17.19	10	1	1	63	12	425
107	801106	340620	220905	340565	220977	13.0	11.0	.6	17.21	9	1	1	63	10	2447
108	801106	340620	220905	340565	220977	12.0	12.0	.6	19.44	10	1	1	0	14	992
109	801106	340650	220955	340605	221040	24.0	24.0	3.0	20.29	10	1	1	63	10	46
110	801107	340620	220905	340565	220977	13.0	13.0	.6	8.15	10	1	1	63	13	407
111	801107	340620	220905	340565	220977	13.0	13.0	6.0	9.05	10	1	1	0	11	159
112	801107	340705	221130	340665	221180	33.0	33.0	4.4	9.52	10	1	1	0	12	697
113	801107	340793	221090	340745	221344	42.0	42.0	8.7	10.37	10	1	1	0	2	3
114	801107	340510	225925	340540	225980	16.5	20.0	1.3	15.00	10	1	1	125	15	548
115	801107	340580	230404	340588	230352	31.0	31.0	1.4	15.55	10	1	1	0	11	130
116	801107	340647	230427	340653	230386	47.0	47.0	2.2	16.40	10	1	1	125	7	182
117	801108	340580	232300	340578	232380	9.0	9.0	.7	8.15	10	1	1	125	7	2062
118	801108	340542	232380	340555	232370	13.0	11.0	1.2	8.54	15	1	1	125	7	703
119	801108	340510	232370	340493	232438	16.5	20.0	1.7	9.43	10	1	1	0	5	58
120	801108	340470	232270	340460	232345	22.0	31.0	2.6	10.27	10	1	1	125	21	682
121	801108	340400	232408	340353	232440	33.0	36.5	2.4	11.09	10	1	1	63	14	268
122	801108	340322	232410	340250	232412	25.0	25.0	2.0	12.48	10	1	1	0	17	401
123	801108	340300	232370	340250	232420	20.0	24.0	1.2	13.23	10	1	1	125	11	31
124	801108	340238	232400	340287	232373	16.0	18.0	1.1	14.09	10	1	1	125	10	51
125	801108	340220	232370	340281	232310	9.0	13.0	.9	14.59	12	1	1	250	13	900
126	801108	340365	232523	340460	232490	42.0	42.0	3.9	15.35	10	1	1	125	2	11
127	801108	340470	232270	340460	232345	25.0	33.0	3.0	16.51	10	1	1	125	14	212
128	801109	340310	245600	340270	245610	8.0	9.0	.5	8.50	10	1	1	125	8	528
129	801109	340370	245660	340342	245636	19.0	19.0	2.0	9.31	10	1	**1	500	16	62
130	801110	335165	253880	335225	253835	5.4	9.0	.6	8.16	10	1	1	125	19	5450
131	801110	335205	253852	335285	253815	9.0	9.0	.8	9.17	10	1	1	125	17	3221
132	801110	335740	254380	335690	254415	36.0	36.0	8.2	10.32	10	1	1	125	12	177
133	801110	335492	254182	335420	254210	28.0	28.0	7.7	11.30	10	1	1	125	7	135
134	801110	335315	254060	335252	254086	19.0	19.0	5.6	12.44	10	1	1	125	10	147
135	801110	335285	253920	335220	253937	15.0	14.0	2.4	13.37	10	1	1	250	2	10
136	801110	335200	253900	335278	253870	12.0	12.0	1.3	4.25	10	1	1	250	10	242
137	801110	335190	253880	335250	253852	11.0	11.0	.9	15.10	10	1	1	125	14	436
138	801110	334973	254028	334927	254090	13.0	14.0	.9	16.46	10	1	1	125	17	751
139	801110	335200	253900	335278	253870	12.0	13.0	1.3	19.52	10	1	1	0	3	7
140	801110	335398	254196	335325	254223	19.0	19.0	5.6	20.37	10	1	1	125	12	203
141	801111	334480	255580	334520	255483	27.0	27.0	4.4	8.07	10	1	1	125	18	274
142	801111	334517	255590	334553	255517	29.0	27.0	4.6	8.45	10	1	1	63	13	103
143	801111	334755	255247	334800	255180	40.0	40.0	8.3	9.36	10	1	1	125	14	133

Co-ordinates in minutes, seconds and decimal seconds.

\*\* = Net damaged; Gear 1 = Otter trawl-net, 2 = Blanket-net, 3 = Try-net, 4 = Dredge, 5 = Scoop-net.

**Table 2 Station data: west of Mossel Bay**

Stn	Date	Start		End		Depth (m)		km offshore	Start time	Effort (min)	Gear	Hauls	Substrate modal $\mu\text{m}$	Fish species	Fish catch
		latitude	longitude	latitude	longitude	Start	End								
1	800528	341430	215740	341410	215780	20.0	20.0	.5	15.55	10	1	1	125	12	1982
2	800528	341430	215690	341400	215720	8.0	10.0	.2	16.35	10	1	1	125	12	572
3	800529	342630	205540	342590	205560	51.0	51.0	2.5	8.55	10	1	1	125	16	313
4	800529	342510	205410	342460	205440	36.0	36.0	1.7	10.05	10	1	1	125	16	124
5	800529	342470	205320	342410											







**Table 5** Length composition of teleosts for which more than 10 specimens were measured

	Total length (mm)												Number measured	
	0	25	50	75	100	125	150	175	200	225	250	275		300
<i>Acanthistius sebastoides</i>	-	-	-	-	-	-	2	5	2	1	-	-	-	10
<i>Amblyrhynchotes honckenii</i>	-	-	-	2	5	24	17	6	-	-	-	-	-	54
<i>Argyrozona argyrozona</i> <sup>a</sup>	-	-	-	6	7	-	-	1	4	3	2	-	1	24
<i>Argyrosomus hololepidotus</i>	1	9	43	169	390	723	617	438	189	106	71	45	62	2863
<i>Ariomma indica</i>	-	1	6	1	48	22	-	-	-	-	-	-	-	78
<i>Atractoscion aequidens</i> <sup>a</sup>	-	-	1	3	-	4	8	1	-	1	-	-	1	19
<i>Austroglossus pectoralis</i>	-	-	-	-	1	9	7	21	39	34	18	34	35	198
<i>Chelidonichthys capensis</i>	-	3	1	5	4	4	7	6	4	4	1	1	21	61
<i>Chelidonichthys quicketti</i>	-	-	-	1	2	-	-	1	3	4	2	1	-	14
<i>Cheilodactylus pixi</i>	-	-	1	4	3	6	7	5	-	-	-	-	-	26
<i>Cheimerius nufar</i> <sup>a</sup>	-	-	-	7	36	60	2	1	-	1	-	-	-	107
<i>Cynoglossus capensis</i>	-	11	34	80	103	143	120	119	62	18	-	1	-	691
<i>Cynoglossus zanzibarensis</i>	-	-	4	9	6	8	4	5	2	8	6	8	5	65
<i>Diplodus sargus</i>	-	-	-	-	5	11	1	2	1	1	-	-	-	21
<i>Engraulis japonicus</i>	-	-	-	-	1	25	7	-	-	-	-	-	-	33
<i>Etrumeus teres</i>	-	7	-	1	7	92	19	7	7	3	-	-	-	143
<i>Galeichthys</i> sp.	-	39	766	40	61	42	90	108	138	168	130	149	1021	2752
<i>Gonorynchus gonorynchus</i>	-	-	-	1	7	2	-	-	-	-	-	-	1	11
<i>Lithognathus mormyrus</i>	1	-	30	345	264	889	1140	238	21	1	1	-	-	2930
<i>Merluccius capensis</i>	-	-	1	7	26	83	209	233	207	199	135	71	100	1271
<i>Pagellus natalensis</i> <sup>a</sup>	-	85	88	146	193	687	1603	249	104	-	-	-	-	3156
<i>Pomadasys olivaceum</i>	7	81	375	499	437	1246	776	151	11	-	-	-	-	3583
<i>Pomatomus saltatrix</i> <sup>a</sup>	-	3	3	57	1087	1797	1087	303	45	7	9	-	-	4398
<i>Priacanthus hamrur</i>	-	-	1	10	5	3	2	-	-	-	-	-	-	21
<i>Pterogymnus lanarius</i> <sup>a</sup>	-	-	-	-	-	3	8	10	7	6	18	32	107	191
<i>Rhabdosargus globiceps</i>	-	-	1	9	42	34	10	2	-	-	-	-	-	98
<i>Rhabdosargus holubi</i>	-	-	-	-	2	17	55	34	6	-	-	-	-	114
<i>Sardinops ocellata</i>	-	-	-	20	-	-	-	1	-	-	-	-	-	21
<i>Sarpa salpa</i>	-	-	41	34	1	4	8	-	4	-	-	-	-	92
<i>Scomber japonicus</i>	-	-	-	-	-	1	4	1	1	5	1	-	-	13
<i>Solea bleekeri</i>	-	-	-	25	33	8	-	-	-	-	-	-	-	66
<i>Sphyræna africana</i> <sup>a</sup>	-	-	1	1	-	-	-	3	23	14	-	-	-	42
<i>Spondyliosoma emarginatum</i>	-	-	1	29	39	7	2	3	11	8	1	-	-	101
<i>Stromateus fiatola</i>	-	-	4	4	27	21	12	6	8	16	3	5	6	112
<i>Trachurus</i> spp.	7	185	135	321	466	185	632	453	379	101	43	-	4	2911
<i>Trichiurus lepturus</i>	-	-	-	-	-	-	1	-	1	1	-	3	13	19
<i>Umbrina canariensis</i>	-	-	4	57	74	41	20	10	5	8	2	2	3	226

<sup>a</sup>Species measured using fork length.

**Table 6** Individual lengths of teleosts for which less than 10 specimens were measured

Species	Total lengths (mm)									
<i>Boopsoidea inornata</i>	181	187	198	201	202	204	209	220	241	
Bothidae	106	-	-	-	-	-	-	-	-	
<i>Champsodon</i> spp.	68	-	-	-	-	-	-	-	-	
<i>Chatrabus</i> spp.	137	-	-	-	-	-	-	-	-	
<i>Cheilodactylus fasciatus</i>	325	-	-	-	-	-	-	-	-	
<i>Chelidonichthys kumu</i>	46	126	146	155	168	-	-	-	-	
<i>Chrysolephus cristiceps</i> <sup>a</sup>	542	572	-	-	-	-	-	-	-	
<i>Diplodus cervinus</i>	165	-	-	-	-	-	-	-	-	
<i>Gaidropsarus capensis</i>	131	-	-	-	-	-	-	-	-	
<i>Helicolenus dactylopterus</i>	260	-	-	-	-	-	-	-	-	
<i>Hepsetia breviceps</i>	74	86	88	-	-	-	-	-	-	
<i>Heteromycteris capensis</i>	50	-	-	-	-	-	-	-	-	
<i>Macrorhamphosus gracilis</i>	74	82	88	90	93	94	98	-	-	
<i>Pachymetopon aeneum</i> <sup>a</sup>	331	-	-	-	-	-	-	-	-	
<i>Paracallionymus costatus</i>	68	-	-	-	-	-	-	-	-	
<i>Pomadasys commersonii</i>	684	688	817	-	-	-	-	-	-	

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Table 6 Continued

Species	Total lengths (mm)						
<i>Scombrops dubius</i>	210	—	—	—	—	—	—
<i>Stephanolepis auratus</i>	90	—	—	—	—	—	—
<i>Syngnathus acus</i>	201	226	275	—	—	—	—
<i>Thyrstites atun</i> <sup>a</sup>	340	—	—	—	—	—	—
<i>Xiphiurus capensis</i>	528	885	—	—	—	—	—

<sup>a</sup>Species measured using fork length.

Table 7 Invertebrate species recorded between February and November 1980

Species <sup>b</sup>	Stations	Specimens preserved	Species <sup>b</sup>	Stations	Specimens preserved
<b>Nemertea</b>	2, 5, 18, 23, 29	7	<i>Sabellides ?otocirrata</i>	14	1
<b>Annelida</b>			<i>Scolecopsis</i> sp.	21	1
<b>Polychaeta</b>			<i>Serpula vermicularis</i>	7, 8, 18	3
<i>Arabella</i> sp.	32	1	<i>Sphaerodorum gracile</i>	8	1
<i>Aricidea longobranchiata</i>	14	1	<i>Spiochaetopterus vitrarius</i>	14	2
<i>Asychis capensis</i>	8	8	<i>Spiophanes bombyx</i>	5, 8, 27	1 + 2 juv
<i>Cauleria</i> sp.	21	2	<i>Sternaspis scutata</i>	17	7
<i>Cauleriella aciculata</i>	20	2	<i>Sthenelais limicola</i>	2, 20	1 + 3 juv
<i>Diopatra neopolitina</i>	2, 8, 33	10 + 1 juv	<i>Tharyx filibranchia</i>	18	1
<i>Diopatra</i> sp.	1, 9	6	<i>Timarete capensis</i>	18	2
<i>Drilonereis</i> sp.	8	2	<b>Arthropoda</b>		
<i>Eulalia capensis</i>	18	1	<b>Pycnogonida</b>		
<i>Eunice australis</i>	18	4 + 3 juv	<i>Endeis clipeata</i>	85	1 ♂
<i>Eunice</i> sp.	8	4	<i>Pallenopsis intermedia</i>	7, 78, 85, 86, 95, 96	9 all ♀
<i>Euphrosine myrtosa</i>	8	2	<i>Parapallene calmani</i>	8	1 ♀
<i>Eupolymnia nebulosa</i>	7	2	<b>Crustacea (Stomatopoda, Isopoda and Decapoda — see Part 5 of this series)</b>		
<i>Euthalenessa oculata</i>	18	1	<b>Mysidacea</b>		
<i>Glycera rouxi</i>	20	1 juv	<i>Gastrosaccus psammodytes</i>	28	11
<i>Glycera</i> sp.	27	1 juv	<i>Gastrosaccus sanctus</i>	18, 27	4
<i>Glycera unicornis</i>	30	1	<i>Mesopodopsis slabberi</i>	11, 20	5
<i>Glycinde kameruniana</i>	9, 17	3	<i>Mysidopsis major</i>	11	1
<i>Glycinde</i> sp.	20	1	<b>Amphipoda</b>		
<i>Goniada</i> sp.	5	1	<i>Lilejeborgia</i> sp.	25	1
<i>Harmothoe waahli</i>	18	1	<b>Mollusca</b>		
<i>Lumbrineris coccinea</i>	18	1	<b>Gastropoda</b>		
<i>Lumbrineris dubeni</i>	7, 18	2	<i>Afrocominella elongata</i>	7	2
<i>Lumbrineris</i> sp.	29	1	<i>Afrocominella ?turtoni</i>	8	1
<i>Magelona mirabelis</i>	20	5 juv	<i>Afrocominella</i> sp.	95	1
<i>Magelona</i> sp.	2, 14	1 + 1 juv	<i>Amblichilepas scutella</i>	18	1
<i>Maldane sarsi</i>	33	1	<i>Ancilla fasciata</i>	58, 95, A <sup>a</sup>	3
<i>Megalomma quadrioculatum</i>	7	1	<i>Ancilla obtusa</i>	58, 85, A <sup>a</sup>	3, Stn 85 shell only
<i>Neoleanira</i> sp.	14	1	<i>Ancilla</i> sp.	10, 14, 86	2 + 1 juv, Stn 86 shell only
<i>Nephtys hombergi</i>	9, 14	2	<i>Argobuccinum argus</i>	7, 8, 18, 86, 95	8
<i>Nephtys</i> sp.	30	1	<i>Arminia gilchristi</i>	78, 85	2
<i>Nereis lamellosa</i>	2	2 + 1 juv	<i>Babylonia papillaris</i>	18, 58, 78	3
<i>Nicolea macrobranchia</i>	7, 8, 18	8 + 1 juv	<i>Bullia annulata</i>	A <sup>a</sup> , B <sup>a</sup>	1
<i>Onuphis eremita</i>	1, 8, 29	3	<i>Bullia callosa</i>	58	1
<i>Orbinia dubia</i>	9	4 juv	<i>Bullia laevis</i>	9, 58, A <sup>a</sup>	20
<i>Orbinia</i> sp.	27, 32	4 juv	<i>Bullia tenuis</i>	9, 85, A <sup>a</sup>	3
<i>Owenia fusiformis</i>	8	1 juv	<i>Calliostoma ornata</i>	8, 18, 58, 85, 86, 101, B <sup>a</sup>	27
<i>Paraprionospia pinnata</i>	17	6	<i>Clanculus ?miniatus</i>	7, 18	3
<i>Pectinaria neapolitana</i>	7	1	<i>Clavatula gravis</i>	86	1
<i>Pherusa monroi</i>	8	1	<i>Clavatula taxis</i>	95	1 shell only
<i>Pherusa swakopiana</i>	9, 14	2 juv	<i>Clavatula</i> sp.	7	1
<i>Phyllochaetopterus socialis</i>	8	1	<i>Coralliophila fritschi</i>	86	1
<i>Phylo foetida ligustica</i>	14	1			
<i>Potamilla reniformis</i>	7	1			
<i>Protula ?bispiralis</i>	8	1			
<i>Sabellastarte longa</i>	18	1			

**Table 7** Continued

Species <sup>b</sup>	Stations	Specimens preserved	Species <sup>b</sup>	Stations	Specimens preserved
<i>Coralliophila rasacens</i>	101	1	<b>Cephalopoda</b>		
<i>Crepidula</i> sp.	18	1	<b>Loliginidae</b> (See Table 8)		
<i>Cylichna tubulosa</i>	14, 40	2	<b>Seplidae<sup>c</sup></b>	1, 2, 8, 22, 36, 39, 42	
<i>Cymatium klenei</i>	95	1		43, 44, 62, 63, 71, 75	
<i>Cypraea edentula</i>	58, 85	2, Stn 85 shell only		76, 85, 86, 87, 98, 136	
<i>Diodora elevata</i>	8	2	<b>Brachiopoda</b>		
<i>Drillia fultoni</i>	95	1 shell only	<i>Kraussina rubra</i>	51, 57, 86, 95	28
<i>Facelina olivacea</i>	59	2	<i>Terebratulina abyssicola</i>	95	7
<i>Fasciolaria heynemanni</i>	7	1	<b>Echinodermata</b>		
<i>Fasciolaria</i> sp.	86	1	<b>Crinoidea</b>		
<i>Fusinus ocelliferus</i>	8	1 juv	<i>Tropiometra carinata</i>	7, 8, 18, 57, 129	7
<i>Marginella bairstowi</i>	97	1	<b>Asteriodea</b>		
<i>Marginella nebulosa</i>	86, 95	1 + 1 juv, Stn 95 shell only	<i>Astropecten irregularis</i>	1, 4, 5, 7, 9, 14, 17, 51, 57, 61, 85, 103, 104, 120, 134	34
<i>Marginella</i> sp.	14, 20	2	<i>Marthasterius glacialis rarispina<sup>d</sup></i>	4, 8, 9, 16, 17, 51, 61, 85, 119, 125, 129	6
<i>Mayena gemnifera</i>	8	1	<b>Ophiuroidea</b>		
<i>Melapium lineatum</i>	A <sup>a</sup>	1	<i>Amphioplus falcatus</i>	27	1
<i>Murex uncinarius</i>	58, 85, B <sup>a</sup>	11	<i>Amphioplus integer</i>	5, 9, 20, 32	12
<i>Nassarius analogica</i>	8, 86 <sup>e</sup>	2	<i>Amphioplus</i> sp.	7	1
<i>Nassarius capensis</i>	B <sup>a</sup>	1	<i>Amphiura incana</i>	7, 10	2 + 1 juv
<i>Nassarius kochina</i>	14	1	<i>Astrocladus capensis<sup>f</sup></i>	7, 18, 23, 24, 26, 27, 31, 40, 51, 52, 58, 59, 66, 85, 86, 87, 98, 116	6
<i>Nassarius speciosa</i>	17, 73, 78, 85, 86, A <sup>a</sup>	5	<i>Dictenophiura anoidea</i>	86	1
<i>Natica fasciata</i>	B <sup>a</sup>	1	<i>Ophiactus carnea</i>	8, 18	7
<i>Natica</i> sp.	41	1	<i>Ophiomitrella corynephora</i>	18	1
<i>Ocenebra seperata</i>	8, 85	2	<i>Ophiothrix fragilis</i>	7, 8, 18	21
<i>Phalium labiatum zeylandica</i>	A <sup>a</sup>	1	<b>Echinoidea</b>		
<i>Phaxos pellucidus</i>	3, 4, 5, 24, 29, 30, 73	9	<i>Echinodiscus bisperforatus</i>	36	1
<i>Philine aperta</i>	5, 14, 23	5	<i>Echinocardium cordatum</i>	3, 11, 18, 20, 26, 29, 30, 57, 58, 104, 105	33
<i>Philine</i> sp.	85	1	<i>Parechinus angulosus</i>	52	1
<i>Pleurobranchaea tarda</i>	59	1	<b>Holothuroidea<sup>d</sup></b>		
<i>Polinices</i> sp.	97	1	<i>Rynkatorpa</i> sp. nov.	3, 14, 24, 30	5
<i>Tritonia</i> sp.	85	1	<i>Rhopalodinoopsis</i> sp.	20	1 juv poss. <i>R. capensis</i>
<i>Turitella carinifera</i>	7, B <sup>a</sup>	2	<b>Chordata</b>		
<i>Turitella sanguinea</i>	10, 59	101	<i>Branchiostoma capensis</i>	2, 5, 7, 18, 20, 27, 32	16
<b>Pelecypoda</b>					
<i>Chlamys tinctus</i>	8, 86, 95	8			
<i>Donax</i> sp.	86	1			
<i>Lima rotunda</i>	18	1			
<i>Pecten sulcicostata</i>	95	1			
<i>Pholas</i> sp.	101	1			

<sup>a</sup>Station A – Dredge off Swartkops River ± 20 m; Station B – Grab on north side of St Croix Island ± 25 m; Station C – Dredge 34°36,20'S/20°40,01'E ± 35 m. <sup>b</sup>Specimens are lodged at the South African Museum. <sup>c</sup>Recorded on board not kept. <sup>d</sup>Sent to A. Thandar, University Durban-Westville. <sup>e</sup>Obtained from the stomachs of *Pterogymnous lanarius*.

**Table 8** Loliginidae<sup>a</sup> collected between February and November 1980  
♂♂ – males, ♀♀ – females, juv – juveniles, stn – stations

Stn	♂♂	♀♀	juv	Stn	♂♂	♀♀	juv	Stn	♂♂	♀♀	juv	Stn	♂♂	♀♀	juv
1	1	2	–	41	2	14	12	70	1	4	1	101	37	36	–
2	3	4	6	42	1	3	3	71	2	3	–	106	3	4	–
3	11	2	55	43	3	2	12	72	37	59	–	112	3	4	4
4	–	24	24	44	3	1	–	73	1	5	17	115	20	10	21
5	7	13	2	47	8	9	–	74	3	6	–	116	12	6	–
14	6	5	36	48	10	30	40	75	2	8	1	117	–	1	–
16	9	18	18	49	6	6	97	76	–	4	1	118	–	2	7
17	5	10	4	50	6	4	1	77	1	14	1	119	10	27	27
18	2	–	22	51	39	47	33	79	–	7	49	120	37	16	4
21	1	–	–	53	21	18	5	80	9	16	1	121	6	5	12

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Table 8 Continued

Stn	♂♂	♀♀	juv	Stn	♂♂	♀♀	juv	Stn	♂♂	♀♀	juv	Stn	♂♂	♀♀	juv
22	1	6	5	54	4	8	11	81	2	10	—	122	10	6	2
23	4	3	7	56	2	2	—	82	—	2	5	123	7	2	4
24	4	—	7	57	—	1	—	83	17	22	11	124	—	2	3
25	—	—	9	58	7	8	16	84	—	—	7	125	3	2	2
26	4	4	—	59	1	2	—	85	—	—	1	126	45	—	1
27	6	8	—	60	—	—	15	86	1	—	—	127	45	16	—
29	2	—	—	61	3	4	10	87	—	2	14	128	1	5	—
30	4	6	—	62	—	—	40	88	4	1	21	129	3	5	3
31	4	4	—	63	28	16	48	89	2	—	16	131	—	1	57
33	22	7	32	64	4	3	52	90	1	1	18	133	—	1	38
35	78	78	53	65	3	7	—	95	—	—	3	134	1	2	102
36	9	18	165	66	—	3	—	96	2	—	7	135	—	4	48
37	22	20	10	67	—	1	—	97	12	19	1	138	—	—	1
38	87	24	1	68	1	—	—	98	21	16	13	142	—	1	—
40	9	9	76	69	13	10	9	100	—	6	—	143	1	1	36

\*Two species, *Loligo reynaudi* and *Lolliguncula mercatori*, were caught but were not separately identified. Squid eggs were recorded from Stations 3, 38, 45, 61, 85, 98, 120–127, 128, 130, 132–135, 138.

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