Seasonal abundance, distribution and catch per unit effort of fishes in the Swartkops estuary

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Catch per unit effort was obtained for the nekton of the Swartkops estuary near Port Elizabeth by means of gill netting. Fifty gill net catches were made in which 1 269 fish were caught in areas representative of the mouth, middle and upper reaches of the estuary. *Pomadasys commersonni*, already shown to be the most abundant angling species in the estuary, dominated gill net catches both in terms of mass (29%) and numbers (17%). The family Mugilidae (five species) comprised 25% of the mass and 42% of the numbers caught. Environmental factors and availability of food that might determine distribution of fish in the estuary are discussed. The largest mean mass per individual was found in *Chanos chanos* (4 473 g), *Elops machnata* (1 656 g) and *Valamugil buchanani* (1 580 g). Lowest mean masses were recorded for *Monodactylus falciformis* (63 g), *Rhabdosargus holubi* (88 g) and *Liza dumerili* (94 g).
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Vangs per eenheid poging is bepaal vir die nekton van die Swartkopsstrandmeer naby Port Elizabeth. Vyftig vangste, wat 1 269 visse gelewer het, is gemaak in gebiede verteenwoordigend van die mond, middel en boonste dele van die strandmeer. *Pomadasys commersonni*, wat hengelaarsvangste in die Swartkops oorheers, was ook die volopste spesie in die kiefnette. Dit het 29% van die massa en 17% van die getal visse wat gevang is, verteenwoordig. Die familie Mugilidae (vyf spesies) het 25% van die totale massa en 42% van die aantal visse uitgemaak. Beskikbaarheid van voedsel en omgewingsfaktore wat moontlik die verspreiding van visse in die strandmeer bepaal, word bespreek. Die hoogste gemiddelde liggaamsmassa is gevind in die geval van *Chanos chanos* (4 473 g), *Elops machnata* (1 656 g) en *Valamugil buchanani* (1 580 g). Laagste gemiddelde massa is gevind vir *Monodactylus falciformis* (63 g), *Rhabdosargus holubi* (88 g) en *Liza dumerili* (94 g).
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The lack of base line data on the nekton of the Swartkops estuary, despite its importance from both an aesthetic and recreational point of view, has been discussed by Marais and Baird (1980). Although information was presented on the relative abundance of angling species, the present status of non-angling species is virtually unknown. The angling data were such that CPUE (catch per unit effort) could not be calculated. This makes comparison with data from other estuaries as well as the determination of trends in fish abundance and species composition in future very difficult. The only information on the relative abundance of fish species in the Swartkops estuary, is a publication by Grindley (1974) which cites data from Gilchrist (1918).

The main aim of the present study was to obtain CPUE information on the relative abundance of all larger fish (angling and non-angling) that would not be adequately sampled by seine nets. This would also confirm whether the abundance of species caught by anglers (Marais & Baird 1980) was due to greater catchability of certain species or, in fact, to larger numbers present in the estuary. It would also place the position of non-angling species in perspective. Similar information from other eastern Cape estuaries could then be compared with results from the Swartkops estuary. This could lead to a better understanding of the factors that determine the suitability of an estuary for utilization by any species.

Methods

CPUE (numbers and biomass) of nekton in the estuary was obtained from 50 gill net catches. Nets were set occasionally from September 1975 to November 1977 and monthly from December 1977 to January 1979. During this period 1 269 fish with a total mass of 653 kg were caught. These data enabled estimation of the relative abundance of all larger species of nekton in the estuary. Nets were set in different regions of the estuary to determine preference of species for particular environmental conditions. Each gill net consisted of five 10 m sections 3 m deep with stretched mesh sizes of 55, 70, 85, 110 and 145 mm. Each net covered 150 m^2 and was laid for 12 h periods (from dusk till dawn) at a 45° angle with the shore. One unit of effort is regarded as the number or mass of fish caught by the 150 m^2 net during a 12 h period.

Netting sites were selected to cause least interference with boat traffic on the estuary and also to be representative of

Table 1 Mean temperatures of Algoa Bay and the Swartkops estuary measured at Humewood beach, the mouth area (1), middle reaches (2), upper reaches (3) and head (4) of the estuary. Number of recordings between 1972–1978 is given in brackets

Month	Sea	Station 1	Station 2	Station 3	Station 4
January	21,0 (372)	24,1 (6)	24,6 (3)	24,7 (4)	26,0 (1)
February	20,5 (337)	22,2 (5)	23,8 (3)	24,6 (4)	26,1 (1)
March	19,0 (372)	22,0 (6)	23,4 (4)	24,0 (5)	19,9 (1)
April	18,3 (360)	20,4 (3)	21,7 (5)	20,7 (4)	21,3 (1)
May	17,0 (372)	18,3 (5)	20,6 (4)	18,7 (4)	16,6 (1)
June	16,0 (360)	16,4 (5)	15,9 (4)	14,8 (5)	12,2 (1)
July	15,7 (372)	17,1 (3)	16,4 (6)	15,6 (3)	11,2 (1)
August	15,3 (372)	16,3 (6)	16,9 (6)	16,6 (6)	13,1 (1)
September	16,1 (360)	17,8 (7)	18,7 (5)	18,9 (6)	16,0 (1)
October	17,4 (372)	19,2 (4)	19,1 (4)	19,3 (5)	18,0 (1)
November	18,3 (360)	20,6 (6)	22,3 (4)	22,2 (5)	23,1 (1)
December	19,9 (372)	22,3 (5)	24,0 (5)	23,6 (5)	21,8 (2)

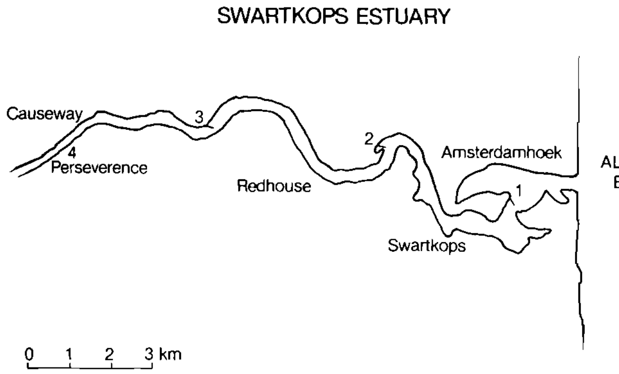

Fig. 1 Map of the Swartkops estuary to show location of sampling sites.

Table 2 Mean salinities at four stations in the Swartkops estuary representative of the mouth area (1), middle reaches (2), upper reaches (3) and head of the estuary (4). Number of recordings between 1972–1978 is given in brackets

Month	Station 1	Station 2	Station 3	Station 4
January	35,2 (5)	28,6 (4)	27,9 (5)	6,6 (1)
February	35,5 (6)	34,1 (4)	29,0 (6)	7,1 (1)
March	34,9 (9)	31,9 (7)	27,4 (7)	4,1 (2)
April	32,7 (6)	27,7 (7)	23,1 (5)	1,2 (2)
May	29,8 (5)	29,6 (4)	26,1 (6)	2,0 (1)
June	32,1 (7)	28,8 (6)	21,6 (6)	1,9 (2)
July	34,2 (6)	28,5 (6)	22,3 (5)	2,0 (1)
August	34,9 (6)	30,0 (6)	24,7 (7)	2,0 (1)
September	31,5 (9)	22,4 (7)	21,0 (8)	1,2 (2)
October	34,8 (6)	21,9 (7)	21,0 (8)	0,1 (2)
November	34,4 (7)	26,0 (5)	20,7 (6)	5,6 (1)
December	34,7 (5)	25,7 (7)	23,1 (7)	1,5 (2)

the mouth (Station 1), middle (Station 2), and upper (Station 3) reaches of the estuary (Fig. 1). Surface water temperature and salinity were taken on each occasion. These values were supplemented by measurements of research workers of the University of Port Elizabeth from 1972—1978. Temperature and salinity measurements from shallow pools at the head of the estuary were also recorded (Station 4). Sea-water temperatures for the same period were obtained from the beach office of the City Engineer at Humewood beach.

CPUE is presented monthly as well as separately for each of the three stations at which nets were set. Body mass of some fish (especially at Stations 2 & 3) which were eaten by an isopod (tentatively identified as *Cirolana fluriatilis*) were determined from length-mass regressions calculated from undamaged fish samples. Regression equations for the conversion of standard length (SL) to fork length (FL) and total length (TL) were calculated for the major species. Gill net catch data were supplemented by results from seine netting to ensure more than 50 measurements per species. Length-frequency distribution histograms were constructed for all major species.

Results

Tables 1 and 2 present temperature and salinity data at each station. Sea temperature, although taken only at Humewood beach, was assumed to be representative of the shallower parts of Algoa Bay. In general, the temperature near the mouth of the estuary was lower in summer and higher in winter than at the head of the estuary (Station 4). Salinity was very close to sea water at the mouth and decreased steadily towards the head of the estuary where salinities were nearly fresh. No seasonal pattern in temperature and salinity changes emerged during the study period.

CPUE data (Table 3) show that largest numbers of fish were caught during July (31), September (31), January (27) and March (26). Lowest catches were made during November (15), December (16), February (19) and May (19). No seasonal pattern is evident from these data.

The most abundant species caught in the estuary was the spotted grunter (*Pomadasys commersonni*), both in terms of number (17% of total) and mass (29%) (Table 4). In terms of numerical dominance the spotted grunter was followed by the southern mullet *Liza richardsoni* (16%), flathead mullet *Mugil cephalus* (14%), striped mullet *Liza*

Table 3 Mean number and mass of fish caught monthly by gill net over 12 h with 50 nettings at three localities in the Swartkops estuary

	January		February		March		April		May		June		July		August	
Species	n	mass	n	mass	n	mass	n	mass	n	mass	n	mass	n	mass	n	mass
L. richardsoni	1,0	250,3	3,8	1 078,8	0,7	161,0	5,3	1 569,3	1,0	265,7	12,0	4 448,0	8,7	2 375,0	3,0	599,5
M. cephalus	6,3	2 093,5	1,0	367,5	3,0	1 215,7	9,0	3 293,0	8,7	2 981,7	2,5	784,5	6,3	2 033,3	0,5	
L. tricuspidens	2,5	833,3	3,8	2 206,3	1,0	443,3	0,3	52,0	0,3	66,7	0,5	241,0	—	—	5,0	1 851,8
L. dumerili	—	—	0,8	98,3	—	—	—	—	0,3	42,0	0,5	57,0	1,0	121,3	—	—
V. buchanani	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
P. commersonni	4,5	4 208,3	3,0	2 118,0	1,0	887,0	1,7	333,0	1,7	5 801,0	1,0	1 575,0	4,0	4 801,0	4,5	6 775,0
R. holubi	4,3	593,8	3,8	414,8	4,7	362,0	3,0	155,3	1,3	86,0	1,5	67,0	3,0	208,0	1,0	142,0
L. amia	2,0	1 210,5	1,0	216,5	3,0	2 081,0	0,7	216,0	0,3	100,3	0,5	312,5	0,7	296,7	—	—
T. feliceps	1,5	732,8	0,3	168,5	3,3	1 732,0	0,3	183,3	—	—	0,5	215,0	—	—	—	—
M. falcifornis	0,5	21,8	0,8	37,5	1,3	132,0	2,7	135,7	3,3	181,0	1,5	94,0	2,7	126,3	3,0	399,0
E. machnata	0,8	1 380,0	—	—	—	—	0,3	800,0	1,0	1 897,0	—	—	0,3	500,0	3,5	4 914,0
A. hololepidotus	1,3	325,0	—	—	2,0	661,0	0,3	71,3	0,7	419,0	1,5	596,0	2,3	1 355,3	1,5	913,9
M. aquila	0,3	325,0	0,3	116,0	0,7	279,0	1,0	388,3	—	—	—	—	1,0	442,7	1,0	225,5
P. indicus	1,8	1 017,0	—	—	—	—	1,0	371,7	—	—	—	—	—	—	0,5	525,0
P. saltatrix	0,5	142,8	—	—	0,3	32,3	—	—	0,3	216,7	—	—	0,7	614,3	—	—
L. lithognathus	—	—	—	—	—	—	—	—	—	—	0,5	66,5	—	—	—	—
S. salpa	—	—	0,8	461,5	—	—	—	—	—	—	—	—	—	—	—	—
C. chanos	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
A. berda	—	—	—	—	—	—	0,3	132,0	—	—	—	—	—	—	—	—
Caranx sp.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
T. sinuspersici	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	27	13 134	19	7 284	21	7 986	26	7 701	19	12 057	23	8 457	31	12 873	24	16 569

tricuspidens (10%) and Cape stumpnose *Rhabdosargus holubi* (9%). The family Mugilidae represented 42% of all fish caught. Taking mass as a criterion for abundance, spotted grunters contributed 29% of total mass and the family Mugilidae 25%. The most important other species were the tenpounder *Elops machnata* (15%), *M. cephalus* (10%), *L. richardsoni* (9%), sea-catfish *Tachysurus feliceps* (6%) and leervis *Lichia amia* (6%).

Heaviest mean mass per individual was registered for the milkfish *Chanos chanos* (4 473 g) followed by *E. machnata* (1 656 g), Blue tail mullet *Valamugil buchanani* (1 580 g), electric ray *Torpedo sinuspersici* (1 201 g) and *P. commersonni* (879 g). Lowest mass were recorded for the Cape moony *Monodactylus falciformis* (63 g), *R. holubi* (88 g) and groovy mullet *Liza dumerili* (94 g).

Table 4 also shows that there was little difference between the number of fish caught at the different stations. The mean number at each station varied between 24,7 and 25,7 fish per catch. However, largest mass per net was obtained from Station 2 (15 664 g), followed by Station 3 (13 669 g) and lastly the mouth area (Station 1; 11 849 g).

Regression equations for the relationship between length and body mass which were used to determine body mass when only length measurements were taken, are given in Table 5. Equations for the determination of either fork or total length from standard length are given in Table 6. The latter equations enable comparison of the present length measurements with other estimates, irrespective of type of length measurement employed. Length-frequency histograms are presented in Fig. 2 to illustrate length ranges of major species obtained in the nets.

Discussion

Temperatures presented in Table 1 conform closely with those found for the Swartkops estuary by Macnae (1957) and MacLachlan (1972). The moderating effect of the sea on fluctuations in estuarine temperature is clear when differences between warmest and coldest months are compared for stations varying in distance from the sea (Fig. 1). Table 1 shows that the range of temperatures between extremes increases the further the stations are situated from the sea. A similar observation was made by Day (1964) who reported that the difference between maximum and minimum temperatures at the head of the temperate Knysna estuary was 10,1°C as compared to 6,6°C at the mouth.

As expected, the salinity of water in the mouth region was only slightly lower than in the sea (Table 2). Mean salinity recordings for the major part of the estuary are not excessively low (Table 2). Reversed salinity gradients are occasionally encountered during periods of prolonged reduced fresh water inflow and increased evaporation (42% ; Grindley 1974) but are never as severe as found in the St Lucia Lake system (90% ; Wallace 1974). During and after

September		October		November		December		
n	mass	n	mass	n	mass	n	mass	Species
5,1	1 432,6	1,7	639,7	3,5	1 292,8	3,6	1 341,6	*L. richardsoni*
2,6	1 045,2	1,2	333,8	0,3	127,5	3,1	1 303,1	*M. cephalus*
2,1	514,6	0,7	395,3	1,3	806,3	1,9	751,0	*L. tricuspidens*
1,8	200,0	0,3	34,3	—	—	—	—	*L. dumerili*
—	—	—	—	—	—	0,3	451,4	*V. buchanani*
10,7	6 572,6	5,3	4 000,5	1,0	1 476,5	1,4	1 480,9	*P. commersonni*
1,4	102,0	0,3	113,3	1,0	49,0	—	—	*R. holubi*
1,9	695,8	0,7	255,0	2,0	1 211,5	1,4	1 102,9	*L. amia*
0,5	298,3	7,3	4 491,7	0,3	163,0	0,1	65,3	*T. feliceps*
0,5	32,4	0,7	32,8	0,5	52,0	0,6	43,3	*M. falciformis*
2,4	4 301,4	2,2	3 128,3	1,0	1 507,5	0,4	585,7	*E. machnata*
1,4	1 130,6	0,3	556,2	1,3	271,0	0,7	814,3	*A. hololepidotus*
0,1	20,4	1,2	287,8	0,5	314,3	0,6	338,9	*M. aquila*
0,2	53,0	0,2	178,0	0,5	365,0	0,9	369,0	*P. indicus*
—	—	—	—	0,8	376,8	0,3	193,6	*P. saltatrix*
0,3	132,0	—	—	—	—	0,6	159,4	*L. lithognathus*
—	—	0,2	113,3	0,3	102,5	0,3	88,9	*S. salpa*
—	—	1,0	3 613,3	0,5	3 525,0	—	—	*C. chanos*
—	—	—	—	0,3	112,5	—	—	*A. berda*
—	—	—	—	—	—	0,1	50,0	*Caranx* sp.
0,1	120,0	—	—	—	—	—	—	*T. sinuspersici*
31	16 650	23	18 173	15	11 754	16	9 139	Total

floods salinity may be considerably reduced in large parts of the estuary depending on severity and duration of the flood (Marais 1976). One day after a major flood in March 1974, salinity at low water was 2% but large seine net catches made at the time indicated that the typical estuarine species were unaffected by the reduced salinity conditions (Marais 1976). The long-term effect of flood conditions on the estuarine fish has not yet been studied.

CPUE varied considerably between different months of the year (Table 3). No clear seasonal trends emerged as was found with anglers' catch data which showed that largest catches were made during spring and autumn months (Marais & Baird 1980). It is possible that 50 gill net catches were insufficient to accurately reflect seasonal abundance. Strong tidal currents occasionally shifted the anchors so that nets folded or were lined up almost parallel to the water flow. It was impossible to assess to what extent catch efficiency was influenced by such conditions. This again emphasizes the need for extended sampling when a sensitive parameter such as seasonality of abundance is determined.

Distribution of fish within an estuary is probably primarily determined by the presence of the natural food source of a species. The large CPUE (mass, see Table 4) obtained at Station 2, in the middle reaches of the estuary (according to Macnae's (1957) classification) was caused by the dominance of *P. commersonni* at this station. The preferred natural food item of this species, *Upogebia africana* (Van der Westhuizen & Marais 1977) is plentiful in the rich silty substrate characteristic of this area. The sandy nature of Station 3, in the upper reaches of the estuary (Macnae 1957) is ideally suited for *L. richardsoni* (Masson & Marais 1975) which dominated catches there numerically. The presence of *Zostera* beds and filamentous algae in the mouth region was probably responsible for the large numbers of *M. cephalus* and *L. tricuspidens* caught at Station 1 (Masson & Marais 1975). *R. Holubi,* another plant eater (Blaber 1973), also occurred in large numbers (Table 4). *M. falciformis* showed a preference for lower salinity and was caught more frequently at Station 3, whereas the opposite was true for *Myliobatus aquila.* Piscivorous species such as *A. hololepidotus, E. machnata, L. amia* and *P. saltatrix* were fairly evenly distributed throughout the estuary.

Gill net selectivity probably influenced the relative abundance of species netted to some extent. The low mean body mass of *M. falciformis, R. holubi* and *L. dumerili* (<100 g; Table 4) indicates that smaller specimens of these species were more catchable than other species. Depth of body was probably the reason for the catching of such small fish in the case of the Cape moony and Cape stumpnose. On the other hand *L. lithognathus* was only eighth in abundance of angling species caught in the gill nets whereas it was the second most abundant species caught by anglers (Marais & Baird 1980). Lower vulnerability to gill nets or increased catchability by anglers, compared to other species, could be responsible for this discrepancy.

Table 4 Mean number and mass of fish caught per gill net at three localities in the Swartkops estuary. Total number and mass of fish caught, as well as individual body mass is also given

	Station 1 (26)*		Station 2 (9)*		Station 3 (15)*		Total		Mean mass	
Species	n	mass	n	mass	n	mass	n	mass	per net	per individual
L. richardsoni	3,0	1 030,1	1,6	509,8	7,0	2 010,3	197	61 518,1	1 230,4	317,3
M. cephalus	4,9	1 810,0	0,7	218,2	2,6	886,2	172	62 316,8	1 246,3	362,3
L. tricuspidens	3,6	642,1	1,0	597,2	1,7	769,6	129	33 613,4	672,3	260,6
L. dumerili	0,7	84,9	0,4	49,4	0,3	36,7	34	3 202,5	64,1	94,2
V. buchanani	—	—	0,2	351,1	—	—	2	3 159,9	63,2	1 579,9
Mugilidae	12,2	3 567,1	3,9	1 725,7	11,6	3 702,8	534	163 810,7	3 276,2	306,8
P. commersonni	3,9	3 851,9	8,6	5 324,9	2,7	2 960,7	219	192 483,6	3 849,7	878,9
R. holubi	2,9	272,6	2,2	205,8	0,9	44,7	109	9 610,3	192,2	88,2
L. amia	1,0	433,5	1,7	774,1	2,1	1 230,1	73	36 689,4	733,8	502,6
T. feliceps	1,0	539,2	4,8	2 852,8	0,1	75,4	71	39 807,5	796,2	560,7
M. falciformis	0,2	21,7	0,2	19,0	3,7	216,6	63	3 984,2	79,7	63,2
E. machnata	1,0	1 844,0	1,2	1 578,9	1,5	2 478,7	60	99 334,6	1 986,7	1 655,6
A. hololepidotus	0,8	430,5	0,6	1 302,7	1,7	650,4	52	32 673,3	653,5	628,3
M. aquila	0,9	383,3	0,3	126,6	—	—	26	11 105,2	222,1	427,1
P. indicus	0,3	231,7	1,1	635,2	0,3	93,3	23	13 140,5	262,8	571,3
P. saltatrix	0,1	92,0	0,3	244,0	0,4	102,4	11	6 148,0	123,0	558,9
L. lithognathus	0,1	37,3	0,3	74,0	0,2	62,2	8	2 568,8	51,4	321,1
S. salpa	0,2	65,8	0,3	205,1	—	—	8	3 556,7	71,1	444,6
C. chanos	—	—	0,2	595,6	0,4	2 028,0	8	35 780,4	715,6	4 472,6
A. berda	0,1	32,5	—	—	—	—	2	845,0	16,9	422,5
Caranx spp.	—	—	—	—	0,06	23,3	1	350,0	7,0	350,0
T. marmorata	0,04	46,2	—	—	—	—	1	1 201,2	24,0	1 201,2
Total	24,7	11 849,3	25,7	15 664,4	25,7	13 668,6	1 269	653 089,4	13 061,8	514,6

*No. of nets

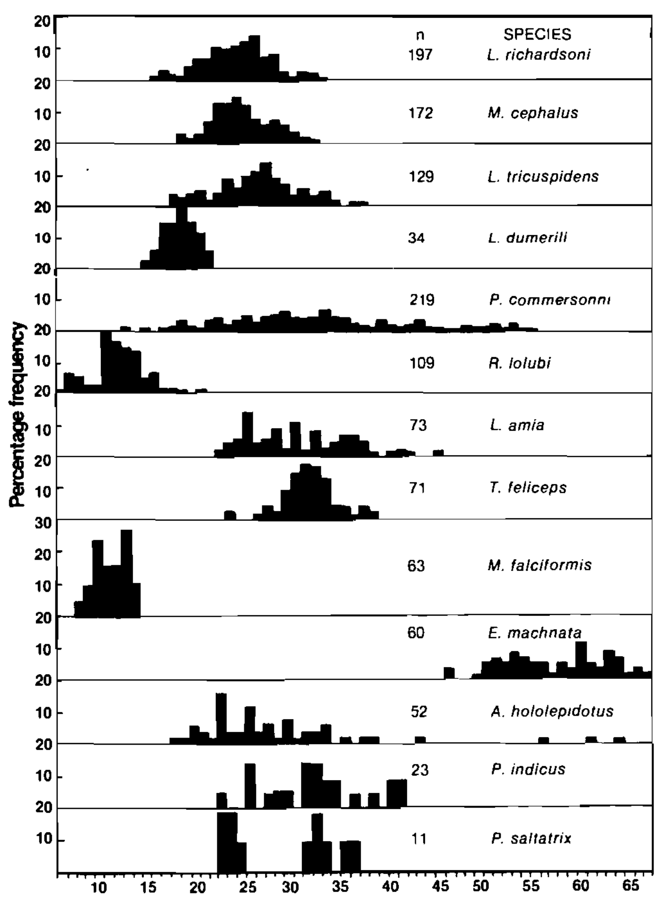

Fig. 2 Size frequency distribution of the 13 most abundant species caught by means of gill nets in the Swartkops estuary.

P. commersonni dominated the nekton of the Swartkops estuary, as has also been indicated by anglers' catches (Marais & Baird 1980). This confirms that *P. commersonni* did not dominate anglers' catches because fishermen tried for spotted grunters but because this species was indeed present in largest numbers. It also shows that major changes have occurred in the relative abundance of species since early this century when *R. holubi* dominated in seine net catches and *P. commersonni* was only the seventh most abundant species (Grindley 1974). Apart from the mullet species, angling species such as the white steenbras and kob were then more abundant than the spotted grunter while only slightly less elf than spotted grunters were caught.

The reasons for the increase in relative abundance of *P. commersonni* and also *L. amia* and the decrease in numbers of *L. lithognathus, A. hololepidotus* and *P. saltatrix* since 1918 are still unknown. These trends could only be explained once a better understanding of life cycles, food preferences, predator-prey relationships and CPUE of dominant species from all Eastern Cape estuaries have been obtained. Research along these lines has already been undertaken by the University of Port Elizabeth on the Swartkops, Sundays and Krom estuaries.

The relative abundance of the family Mugilidae (42% of all catches and 25% of mass; Table 4) is noteworthy. Mullets form the major part of the diet of piscivorous species such as the kob, leervis and tenpounder (Gilchrist 1918; Day, 1951; Day & Morgans 1956) and are consequently used as live bait by fishermen. However, the extensive utilization of estuaries during the juvenile phase of their life cycles renders them vulnerable, not only to predatory

Table 5 Regression equations for conversion f standard length (X) to length at caudal fork (Y) and to total length (Y). (Y = a + b X)

Species	n	Size range (cm)	SL(X) to FL(Y)	*r*	SL(X) to TL(Y)	*r*
M. cephalus	50	6,1—10,0	Y = 0,647 + 1,099X	0,991	Y = 0,461 + 1,240X	0,988
M. cephalus	29	10,1—15,0	Y = 0,194 + 1,149X	0,998	Y = 0,216 + 1,123X	0,988
M. cephalus	21	21 >15	Y = 0,497 + 1,129X	1,000	Y = 0,701 + 1,149X	0,996
L. dumerili	50	6,1—10,0	Y = 0,135 + 1,158X	0,996	Y = 0,024 + 1,269X	0,996
L. dumerili	50	10,1—15,0	Y = 0,429 + 1,134X	0,994	Y = 0,142 + 1,267X	0,993
L. dumerili	50	>15	Y = 1,245 + 1,081X	0,991	Y = 2,244 + 1,124X	0,968
L. richardsoni	50	6,1—10,0	Y = 0,105 + 1,116X	0,970	Y = 0,206 + 1,065X	0,996
L. richardsoni	50	10,1—15,0	Y = 0,228 + 1,128X	0,991	Y = 0,039 + 1,253X	0,988
L. richardsoni	50	>50	Y = 0,469 + 1,114X	0,999	Y = 0,722 + 1,072X	0,993
L. tricuspidens	50	Whole size range	Y = 1,067 + 1,105X	0,970	Y = 0,934 + 1,250X	0,995
P. commersonni	95	Whole size range	Y = 1,495 + 1,103X	0,999	Y = 1,360 + 1,192X	0,999
R. holubi	50	Whole size range	Y = 0,185 + 1,160X	0,998	Y = −0,218 + 1,368X	0,998
L. amia	50	Whole size range	Y = 0,785 + 1,047X	0,999	Y = 0,718 + 1,252X	0,994
T. feliceps	50	Whole size range	Y = 2,667 + 0,987X	0,979	Y = 3,152 + 1,139X	0,969
M. falciformis	56	Whole size range			Y = −0,523 + 1,322X	0,992
E. machnata	50	Whole size range	FL to TL: Y = 2,869 + 1,130	0,994		
A. hololepidotus	50	Whole size range			Y = 1,634 + 1,430X	1,000

Table 6 Relationship between length and body mass of major species caught in gill nets

Species	Mean Value	n
L. richardsoni	0,01724 $L^{3,023}$	100
M. cephalus	0,02533 $L^{2,919}$	100
L. tricuspidens	0,01342 $L^{3,1024}$	50
L. dumerili >15 cm ♂	0,01565 $L^{3,034}$	25
L. dumerili >15 cm ♀	0,00663 $L^{3,347}$	25
L. dumerili <15 cm	0,02026 $L^{2,950}$	100
P. commersonni	0,0571 $L^{2,6997}$	93
R. holubi	0,0424 $L^{2,9266}$	50
L. amia	0,0207 $L^{2,9117}$	50
T. feliceps	0,0312 $L^{2,8165}$	50
M. falciformis	0,0323 $L^{3,1313}$	56
E. machnata	0,0072 $L^{3,0257}$	50
A. hololepidotus	0,0182 $L^{2,9716}$	50

fish and birds (Blaber 1973), but also to exploitation by man. The present world food situation suggests that future exploitation of mullets in South Africa may become concentrated on the utilization of these species for their food production potential. This is already the case in countries like Taiwan, Israel, Hawai, Egypt and India, Japan and Russia (Oren 1975).

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