A survey of the fish fauna of Transkei estuaries Part Three: The Mtata River estuary

E.E. Plumstead* and J.F. Prinsloo
Department of Zoology, University of Transkei, Private Bag X1001, Unitra, Umtata, Republic of Transkei

H.J. Schoonbee
Department of Zoology, Rand Afrikaans University, P.O. Box 524, Johannesburg, 2000 Republic of South Africa

Received 30 December 1985; accepted 28 February 1989

The species composition, seasonal abundance and spatial distribution of the fish fauna of the Mtata estuary (8,5 km long) was determined by means of gill nets. Nine hundred and ninety fish (462,9 kg) comprising 26 species were caught of which *M. cephalus* (43,3%), *A. hololepidotus* (18,9%), *P. commersonnii* (7,9%), *E. machnata* (7,1%) and *L. amia* (5,45) were most abundant in terms of biomass. Mullet species constituted 48,3% of the biomass caught, representing 25,6% of the numbers. Seasonal patterns were ascertained for *M. cephalus, M. capensis, V. buchanani, A. hololepidotus, P. commersonnii, P. kaakan, E. machnata, L. amia, J. dussumieri, T. vitrirostris* and *L. equula*. A mean of 19,4 fish with a mean mass of 9,1 kg were caught per net per station. Numerically the highest catches were made in the upper reaches; gravimetrically in the middle reaches. Temperatures ranged from 10,5–25,5°C; a salinity gradient was usually present in all reaches; oxygen levels and turbidities were high.

Die spesiesamestelling, seisoensverspreiding en voorkeurgebiede van visse is m.b.v. kiefnette in the Mtatariviermonding (8,5 km lank) bepaal. Nege honderd en negentig visse (462,9 kg) is gevang en 26 spesies geïdentifiseer waarvan *M. cephalus* (43,3%), *A. hololepidotus* (18,9%), *P. commersonnii* (7,9%), *E. machnata* (7,1%) en *L. amia* (5,4%) die vangste oorheers het (biomassa). Hardersoorte het 25,6% van die aantal visse, wat 48,3% van die totale biomassa uitgemaak het, verteenwoordig. Seisoenale patrone is vir *M. cephalus, M. capensis, V. buchanani, A. hololepidotus, P. commersonnii, P. kaakan, E. machnata, L. amia, J. dussumieri, T. vitrirostris* en *L. equula* bepaal. 'n Gemiddeld van 19,4 vis, waarvan die gemiddelde massa 9,1 kg was, is per net gevang. Die grootste aantal visse is in die boonste gedeelte gevang terwyl die hoogste biomassa in die middelgedeelte voorgekom het. Die temperatuur in die riviermonding het tussen 10,5–25,5°C gevarieeer; 'n soutgehaltegradient was gewoonlik in al die gedeeltes teenwoordig en die suurstofvlakke asook die turbiditeit was hoog.

*To whom correspondence should be addressed

The Mtata estuary completes the trio of rivers surveyed (Kei: Plumstead, Prinsloo & Schoonbee 1985; Mbashe: Plumstead, Prinsloo & Schoonbee 1989) which drain the Transkei interior. In a report on inland water ecosystems in South Africa, Noble & Hemens (1978) considered the state of knowledge of this estuary to be very poor. The only reference to the fish fauna of this estuary was contained in a report by Marais & Prinsloo (1980).

This paper (Part Three) deals with the species composition, seasonal abundance and spatial distribution of fish caught in gill nets set in the Mtata estuary.

Study area

The Mtata estuary (31°56,8'S / 29°10,6'E) (Figure 1A & 1B) has a catchment area of 2585 km^2, mean annual precipitation of 893 mm and a mean annual runoff (MAR) of 299 Mm^3 (Eksteen, Van der Walt & Nissen Inc. 1979).

The upper and middle reaches of the Mtata River flow over Beaufort group sediments with the lower reaches dissecting Ecca shales and mudstones. Above the Umtata Dam the Mtata River flows through Highland Sourveld and Dohne Sourveld while below it the river is bounded by Valley Bushveld which is surrounded by Eastern Province Thornveld and, nearer the coast, by Coastal Forest and Thornveld.

The narrow upper part of the estuary is bounded by steep hills on the west and by cultivated lands on the east. The intertidal banks are narrow and overgrown with *Phragmites* sp. Further towards the river mouth the eastern banks are densely wooded hills fringing a narrow

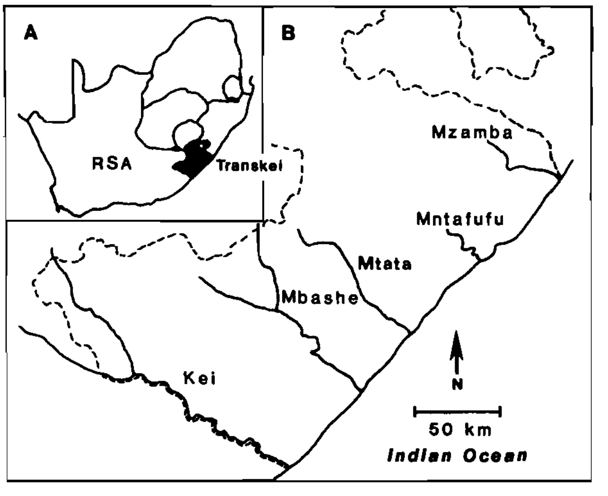

Figure 1 Geographical position of the Transkei (A) and estuaries (B) investigated within the confines of southern Africa.

floodplain. Extensive saltmarshes are present on the western banks of the middle reaches, and eastern banks of the lower reaches. A narrow fringe of *Avicennia marina* extends along the banks of the middle reaches.

A rocky promontory rising steeply from the sea prevents the mouth migrating in a westerly direction (Figure 2). To the east of the mouth a well-developed sandspit and stabilized sand dunes are present. The mouth opens into a broad lagoon which has a 10 m deep channel, shallow mudflats and is bounded on both sides by the mangal *Avicennia marina*.

A series of rapids 8,5 km upstream delimits the upper extent of the tidal and saline influence. The estuary is shallow for much of its length and the bottom very silty.

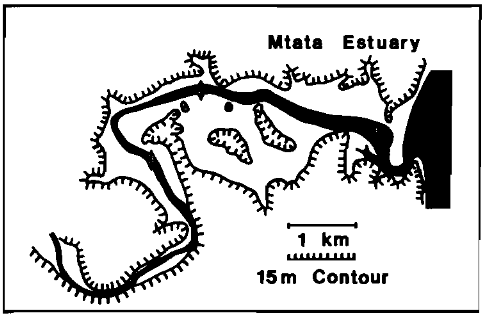

Figure 2 The Mtata estuary with position of sampling sites indicated.

Stations 1, 2 and 3 were 1 km, 3,5 km and 6 km respectively, from the mouth (Figure 2).

At Umtata, approximately 70 km inland from the mouth is a dam which holds 256 Mm^3 of water. The dam supplies two small hydro-electrical schemes with water, resulting in a fairly constant flow of water, possibly preventing severe floods occurring further down the river.

Methods

Sampling of the Mtata estuary extended from December 1980 to January 1982, with additional samples taken in April, July and September 1982. A description of the gear and methods used to collect the physico-chemical and biological data is given by Plumstead *et al.* (1985). Fish were identified according to Smith 1977 and Smith & Heemstra 1986.

Results

Physico-chemical properties of the estuary

Summer temperatures decreased from the upper reaches to the mouth (Table 1) with this situation reversing itself in winter. The vertical temperature gradient was slight in summer when surface temperatures were warmer than at the bottom, but was more pronounced in winter when the sea was warmer than the river and the bottom water therefore warmer than the surface (Figure 3).

During periods of low freshwater inflow a marked

Table 1 Physico-chemical properties measured in the lower (Station 1), middle (Station 2) and upper (Station 3) reaches of the Mtata estuary

	Station 1				Station 2				Station 3			
	$\bar{x}$	*SD*	(Range)	*n*	$\bar{x}$	*SD*	(Range)	*n*	$\bar{x}$	*SD*	(Range)	*n*
Temperature (°C)												
Surface												
Summer	22,3	1,5	(20,1–23,8)	8	22,5	1,8	(20,5–25,0)	8	23,1	1,7	(21,2–25,5)	8
Winter	17,3	1,9	(12,6–19,0)	9	16,5	2,2	(11,0–18,3)	9	16,3	2,3	(10,8–18,3)	9
Bottom												
Summer	20,6	2,4	(17,0–23,5)	8	22,0	1,5	(20,0–24,5)	8	22,8	1,3	(21,0–24,5)	8
Winter	19,0	1,5	(17,6–22,0)	9	18,1	1,6	(16,0–21,0)	9	16,8	2,5	(10,5–18,6)	9
Salinity (‰)												
Surface												
Summer	14,4	10,2	(0,0–33,0)	8	12,0	11,4	(0,0–34,0)	8	5,4	8,1	(0,0–25,0)	8
Winter	11,4	11,5	(2,0–31,0)	9	5,0	8,4	(0,0–24,0)	9	1,4	2,9	(0,0–7,0)	9
Bottom												
Summer	34,1	4,3	(24,0–37,0)	8	27,0	13,1	(0,0–35,0)	8	16,1	13,1	(0,0–30,0)	8
Winter	35,9	2,4	(34,0–38,0)	9	22,2	16,9	(0,0–38,0)	9	9,2	13,5	(0,0–32,0)	9
Oxygen mg l^{-1}												
Surface	7,9	1,3	(5,1–9,9)	13	8,1	1,4	(4,9–10,6)	12	8,9	1,2	(7,4–11,2)	11
Bottom	8,1	1,2	(6,2–10,3)	13	7,2	1,7	(4,3–10,3)	12	8,5	1,7	(6,7–11,7)	11
pH												
Surface	8,08	0,4	(6,88–8,52)	14	7,95	0,39	(6,83–8,40)	15	7,71	0,39	(6,88–8,20)	14
Bottom	8,09	0,38	(7,05–8,58)	14	7,97	0,41	(6,85–8,42)	15	7,8	0,38	(6,88–8,27)	15
Secchi disc (cm)	78,5	58,7	(11,5–200,0)	17	33,1	33,5	(2,0–91,0)	15	14,2	11,7	(2,0–47,0)	17
Depth (cm)	540,3	295,8	(111,5–964,0)	17	106,8	40,5	(60,0–188,0)	16	143,9	56,6	(70,0–290,0)	17

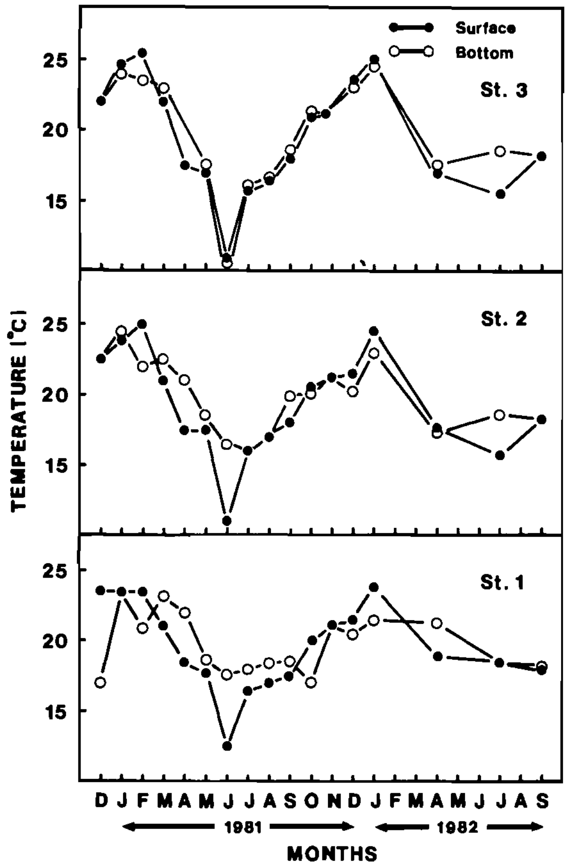

Figure 3 Monthly temperatures (°C) recorded at three stations in the Mtata estuary.

salinity gradient existed at Stations 1 to 3 (Figure 4, Table 1). From April to August 1981 the water in the upper reach was usually fresh (0‰) in contrast to the lower reach where with the exception of December 1980 (23‰) the salinity of the bottom water was always above 30‰.

Although oxygen levels as low as 4,3 mg l^{-1} were measured (Station 2), values were usually higher and mean levels ranged from 7,2 mg l^{-1} (Station 2) to 8,4 mg l^{-1} (Station 3, Table 1). With the exception of the bottom water at Station 2 (Table 1) dissolved oxygen decreased from the upper reaches to the mouth and was usually lower in the bottom waters.

Light penetration in the Mtata estuary was extremely poor (Table 1). In the upper reaches secchi disc transparency never exceeded 47 cm and the mean value obtained was 14,2 cm or 9,9% of the depth. Transparency did, however, improve downstream with a mean secchi value of 78,5 cm obtained in the lower reaches.

Surface water pH values were lower than at the bottom for all stations while the values increased from Station 3 to 1 (Table 1).

Fish fauna

The total monthly catch over the study period consisted of 990 fish comprising 26 species (Table 2). In this estuary nine species accounted for 92,8% of the total number *(N)* and in decreasing order of abundance were:

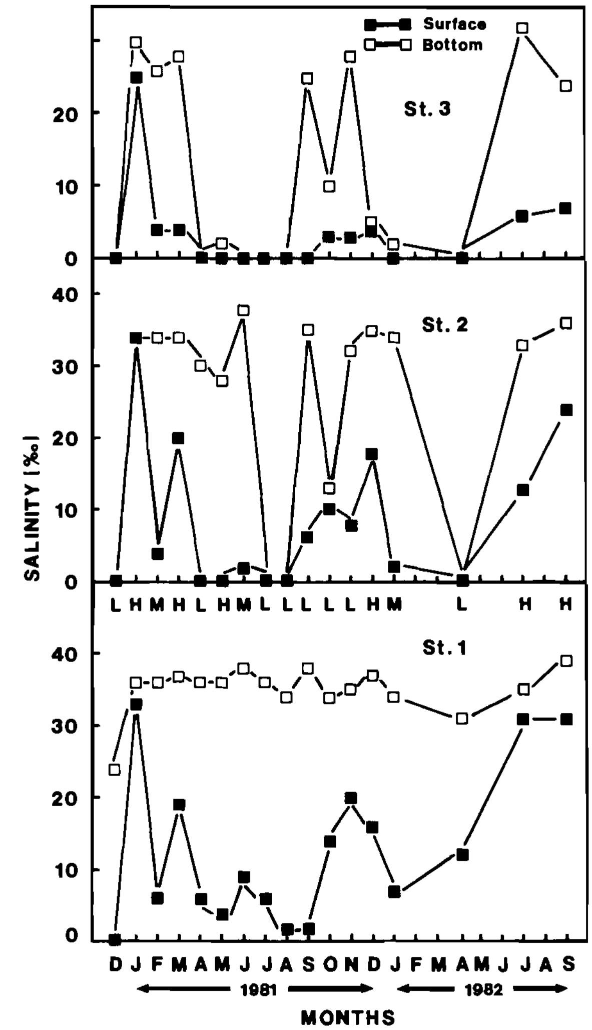

Figure 4 Monthly salinities (‰) recorded at three stations in the Mtata estuary (L – low tide, M – mid-tide, H – high tide).

Mugil cephalus (Linnaeus) (22,4%), *Argyrosomus hololepidotus* (Lacepede) (18,5%), *Johnius dussumieri* (Cuvier) (17,7%), *Thryssa vitrirostris* (Gilchrist & Thompson) (17,4%), *Pomadasys commersonnii* (Lacepede) (5,4%), *Leiognathus equula* (Forsskal) (3,8%), *Pomadasys kaakan* (Block) (3,5%), *Elops machnata* (Forsskal) (2,4%) and *Lichia amia* (Linnaeus) 1,7% (Table 3). Nine species contributed 93,9% to the total biomass (B) of 462,9 kg. A comparison of numbers and biomass (Table 3), however, reveals that *Valamugil buchanani* (Bleeker) and *Carcharhinus leucas* (Muller & Henle) displaced the smaller species *L. equula* and *P. kaakan* and that the smaller species become less important because of their decreased contribution to the total biomass. *Mugil cephalus* and *A. hololepidotus* still dominated, constituting 43,3% and 18,9% of the biomass respectively, while the other seven species collectively comprised 31,7%.

On grouping the catch data into seasons (summer – December, January, February; autumn – March, April, May; winter – June, July, August; spring – September, October, November) some seasonal patterns emerged. Numerically the biggest catches were made in spring, the least in winter (Table 2). Fish biomass peaked in spring/

Table 2 Mean number and biomass (g) of fish caught monthly using gill nets over 12-h periods with 17 nettings at each of three localities in the Mtata estuary

		12/80	1/81	2/81	3/81	4/81	5/81	6/81	7/81	8/81	9/81	10/81	11/81	12/81	1/82	4/82	7/82	9/82
Mugil cephalus	No.	4,7	1,3	1,3	4,0	2,7	7,0	3,0	2,7	9,0	6,7	5,0	3,3	6,7	3,0	4,3	6,7	2,7
	Mass	2926	548	1153	5877	4214	6889	2394	3086	5291	7042	4010	3215	4879	3098	3990	6161	2075
Argyrosomus	No.	1,0	4,3	2,0	2,7	5,0	4,3	2,7	2,0	3,0	3,3	6,7	6,7	5,7	4,7	1,3	1,3	4,3
hololepidotus	Mass	1256	1706	960	3834	1170	1670	1146	1026	823	933	3516	1004	1760	3963	1171	1294	1810
Pomadasys	No.	2,0	0,3	1,7		0,7		1,3	1,3	1,0	0,3	3,0	1,7	2,0	1,3	1,3		
commersonnii	Mass	2744	23	1391		24		584	2100	630	819	1657	1179	806	93	192		
Elops machnata	No.			1,3			0,7	1,0	0,3	0,3		1,3		1,7	1,0	0,3		
	Mass			1915			605	870	2O8	488		2337		2542	1789	207		
Lichia amia	No.	1,0		0,7	0,3	0,3			0,3	0,3	0,3	0,7	0,7	0,3	0,3		0,3	
	Mass	1333		1087	373	293			1357	293	233	800	759	20	87		1721	
Valamugil	No.	0,3	2,0	0,3							0,3			0,3	0,7			
buchanani	Mass	296	2669	397							461			435	919			
Johnius	No.	1,0	2,0	4,0	4,0	2,7	2,3	0,3		2,7	5,7	5,7	13,7	7,7	3,3	0,3		3,7
dussumieri	Mass	47	175	248	262	218	165	27		188	470	624	1241	581	198	69		459
Carcharhinus	No.	1,0																
leucas	Mass	4224																
Thryssa	No.	0,7	5,7		7,0	5,3	9,7	1,0	2,0	0,3	3,0	7,3	6,7		4,0	1,0	2,0	1,7
vitrirostris	Mass	24	216		384	250	568	32	78	24	160	446	396		182	74	91	88
Liza alata	No.					0,3							0,3	0,3				
	Mass					561							452	471				
Muraenesox bagio	No.				0,3								0,7	0,7			0,7	
	Mass				599								459	387			189	
Myxus capensis	No.						0,3	0,3		2,0		0,3	0,3			0,7		
	Mass						141	60		444		36	45			252		
Megalops	No.											0,3						
cyprinoides	Mass											926						
Pomadasys	No.			1,7	0,3	3,3	1,7			1,3		0,7	0,7	0,7	1,0			0,3
kaakan	Mass			61	12	142	83			151		229	36	37	127			47
Caranx spp.	No.			1,7		0,3	1,3	0,3		0,3								
	Mass			36		563	42	612		26								
Platycephalus	No.		0,3										0,3		0,3	0,3		
indicus	Mass		56										260		240	129		
Chanos chanos	No.	0,3																
	Mass	684																
Acanthopagrus	No.										0,3							
berda	Mass										343							
Leiognathus	No.	0,3	0,3	3,0	4,7	2,0	0,3		0,7		0,3				0,3			0,7
equula	Mass	13	10	42	78	33	5		19		5				13			15
Oreochromis	No.			0,3														
mossambicus	Mass			144														
Pomatomus	No.													0,3				
saltatrix	Mass													138				
Torpedo	No.						0,3											
sinuspersici	Mass						116											
Valamugil	No.									0,3				1,0				
cunnesius	Mass									20				79				
Rhabdosargus	No.					0,7			0,3									
holubi	Mass					26			9									
Monodactylis	No.										0,3	0,3				0,3		
falciformis	Mass										7	6				5		
Solea bleekeri	No.															0,3		
	Mass															11		
		12,3	16,2	18,0	23,3	23,3	27,9	9,9	9,6	20,5	20,5	31,3	35,1	27,4	19,9	10,1	11,0	13,4
		13547	5403	7434	11419	7494	10284	5725	7883	8378	10533	14587	9046	12135	10709	6100	9456	4494

Table 3 Mean number and biomass of fish caught by gill net at three sampling stations in the Mtata estuary. Results are based on 17 nettings per station

	Station 1		Station 2		Station 3		Total				Mean mass	
Species	*n*	Mass (g)	*n*	Mass (g)	*n*	Mass (g)	*n*	%N	Mass (g)	%B	Per net	Per individual
M. cephalus	1,29	1397,4	4,88	5005,4	6,90	5393,8	222	22,4	200540	43,3	3932,2	903,3
A. hololepidotus	1,80	2246,2	4,18	1552,8	4,76	1336,7	183	18,5	87307	18,9	1711,9	477,1
P. commersonnii	1,47	1658,6	1,00	438,5	0,71	63,1	54	5,5	36724	7,9	720,1	680,1
E. machnata	0,59	891,6	0,71	1005,8	0,12	43,2	24	2,4	32992	7,1	646,9	1374,7
L. amia	0,82	1152,0	0,06	303,6	0,12	18,9	17	1,7	25067	5,4	491,5	1474,5
V. buchanani	0,29	338,0	0,18	248,9	0,24	326,9	12	1,2	15535	3,4	304,6	1294,6
J. dussumieri	0,59	56,1	1,76	151,4	7,94	670,4	175	17,7	14924	3,2	292,6	85,3
C. leucas			0,12	476,5	0,06	268,8	3	0,3	12671	2,7	248,4	4223,7
T. vitrirostris	6,29	332,6	3,12	168,5	0,71	36,6	172	17,4	9141	2,0	179,2	53,1
L. alata					0,18	261,9	3	0,3	4453	1,0	87,3	1484,3
Caranx spp.	0,12	207,4	0,41	15,8	0,18	2,5	12	1,2	3836	0,8	75,2	319,7
M. bagio			0,18	66,1	0,24	151,8	7	0,7	3703	0,8	72,6	529,0
M. capensis	0,41	117,8	0,18	37,8	0,12	16,9	12	1,2	2933	0,6	57,5	244,4
P. kaakan			1,41	129,1	0,65	34,7	35	3,5	2784	0,6	54,6	79,5
M. cyprinoides	0,06	163,4					1	0,1	2777	0,6	54,5	2777,0
P. indicus	0,12	52,3	0,12	68,8			4	0,4	2058	0,4	40,4	514,5
C. chanos	0,06	120,6					1	0,1	2051	0,4	40,2	2051,0
A. berda			0,06	60,5			1	0,1	1029	0,2	20,2	1029,0
L. equula	0,47	12,3	0,71	12,1	1,06	16,9	38	3,8	702	0,2	13,8	18,5
O. mossambicus					0,06	25,4	1	0,1	431	0,1	8,5	431,0
P. saltatrix	0,06	24,3					1	0,1	413	0,1	8,1	413,0
T. sinuspersici	0,06	20,5					1	0,1	349	0,1	6,8	349,0
V. cunnesius			0,06	3,5	0,18	13,9	4	0,4	296	0,1	5,8	74,0
R. holubi	0,06	1,6	0,12	4,5			3	0,3	104	< 0,1	2,0	?34,7
M. falciformis	0,06	0,9			0,12	2,2	3	0,3	53	< 0,1	1,0	17,8
S. bleekeri	0,06	1,9					1	0,1	32	< 0,1	0,6	32,0
	14,71	8795,6	19,24	9749,4	24,29	8684,7	990		462905			

summer and was at its lowest in winter but fluctuated about a mean of 9,1 kg/net (*SD* 2,9) throughout the sampling period. Combined mullet catches were lowest in summer with numbers reaching a peak in winter and biomass in autumn. Because *M. cephalus* constituted 87,5% of the mullet catch its seasonal distribution was similar to that of the total mullet catch. While no *Myxus capensis* (Valenciennes) ($n = 12$) were caught in summer, numbers peaked in winter, whereas all *V. buchanani* ($n = 12$) except one were caught during the summer months.

The following species were least abundant in winter: *A. hololepidotus, J. dussumieri, T. vitrirostris, P. kaakan* and *L. equula*. *Thryssa vitrirostris* and *L. equula* were most abundant (N and B) in autumn and *J. dussumieri* in spring. Largest numerical catches of kob were made in spring and biomass in autumn. Quite the opposite occurred in the case of *P. kaakan*, largest numbers in autumn and biomass in spring. The abundance of both *P. commersonnii and E. machnata* peaked in summer and fell to their lowest in autumn. *Lichia amia* was most common in summer. Although this species appeared least often in winter, the highest biomass was taken at this time when large specimens were caught.

The mean number of fish caught per net declined from 24,3 at Station 3 to 14,7 at Station 1 (Table 3), where the largest specimens were caught (Table 3). The highest biomass was taken in the middle reaches with mean catches at Stations 1 and 3 very similar (*cf.* 8,8 kg, Station 1: 8,7 kg, Station 3) (Table 3). An assessment based on biomass indicates that *J. dussumieri* and *L. equula* showed a preference for the upper reaches; *M. cephalus* for upper and middle reaches; *P. kaakan* for the middle reaches; *E. machnata* for the middle and lower reaches; *A. hololepidotus, P. commersonnii, L. amia, T. vitrirostris, Caranx* spp. and *Myxus capensis* for the lower reaches; and *V. buchanani* for the entire estuary. Numerically *A. hololepidotus* became more abundant from Station 1 to 3, although the mean biomass decreased.

Discussion

Physico-chemical properties

With the exception of June 1981 when the temperature of the surface and bottom water of the upper reaches and the surface waters of Stations 1 and 2 fell below 11°C, temperatures (15,5–25,5°C) were close to the range suggested by Day (1981b) for the subtropical estuaries of the east coast of southern Africa. Maximum fluctuation at the mouth was 6°C with a difference in mean summer and winter bottom water of only 1,6°C which is similar to that of the Mbashe estuary (0,9°C variation) (Plumstead *et al.* 1989) and Mzamba (Plumstead 1984) estuaries. The temperature patterns were similar to those associated with south, south-eastern and east coast estuaries of southern Africa (Day 1981b; Branch & Grindley 1979; Plumstead *et al.* 1985, 1989).

The Mtata estuary was well stratified particularly in the lower reaches where saline water was trapped in a 10 m deep channel in which the mean bottom water salinity was 35‰ and only once dropped below 30‰. Salinity in the estuary remained high during the summer but decreased to 0‰ from April to August 1981 at Station 3. The occurrence of low salinities over so long a period during winter was also seen in the upper reaches of the Kei estuary (Plumstead *et al.* 1985).

Light penetration of the estuarine water was at its lowest in winter when the freshwater input was at its greatest although this period does not coincide with the annual rainfall season. The high turbidities were similar to those reported for the Kei (Plumstead *et al.* 1985) but those of the Mbashe (Plumstead *et al.* 1989) were much lower. Although silt deposition was high in the upper and middle reaches, depth in the lower reaches was unaffected and probably maintained by tidal currents.

Fish fauna

Of the 25 marine species caught in Mtata estuary, 18 (72%) were of tropical or subtropical origin. This was 20% more than in the Kei (Plumstead *et al.* 1985) and 9% more than in the Mbashe (Plumstead *et al.* 1989). This is similar to the values given by Branch & Grindley (1979) for Mngazana and those that Day, Blaber & Wallace (1981) expected to find in Transkei. In the Transkei estuaries surveyed many of the species were caught in very low numbers. Nineteen fish species caught in the Kei and Mbashe represented 4,7% and 3,8% of the total catches respectively, with 14 species making up 3,5% of the Mtata catch. This trend in numbers was also reflected in the total biomass. Reasons for this must be found in the limitations of the sampling gear and the fact that some of the species were at the limit of their distribution.

In comparing estuaries, four species netted in the Mtata were not found in either the Kei or the Mbashe. Single specimens of *Chanos chanos* (Forsskal) and *Megalops cyprinoides* (Broussonet) and seven *Muraenosox bagio* (Hamilton-Buchanan) and 35 *Pomadasys kaakan* (Bloch) were netted. The milkfish *C. chanos* is said to occur as far south as the Krom (Smith & Heemstra 1986) although not caught in this estuary by Marais (1983a). Several were caught in the Swartkops (Marais & Baird 1980) and one in the Nqabara (Marais & Prinsloo 1980). This species was also taken from the Mntafufu and Mzamba estuaries (Plumstead 1984) but not from the Mtamvuna, Mgeni and Mkomazi (Begg 1984a), the Umlalazi (Hill 1966), Richards Bay (Millard & Harrison 1954), St Lucia (Day, Millard & Broekhuysen 1954; Millard & Broekhuysen 1970) or Kosi Bay (Broekhuysen & Taylor 1959). *Pomadasys kaakan* the javelin grunter frequently occurs in Natal estuaries (Millard & Harrison 1954; Hill 1966; Begg 1984a & b). During this survey and the investigation of Marais & Prinsloo (1980) this species was not found south of the Mtata estuary which concurs with the distribution given by Smith & Heemstra (1986) for this species. *Megalops cyprinoides* or oxeye tarpon is usually a solitary species (Van der Elst 1981) found along the coast as far south as Algoa Bay (Smith & Heemstra 1986). No previous reference to this fish having been caught in Transkei estuarine waters was found. Begg (1984 a & b), while surveying 62 Natal estuaries caught one specimen only, in the Mvuzi estuary. Smith & Heemstra (1986) state that this fish prefers mangrove swamps and estuaries yet it did not occur in the Mngazana (Branch & Grindley 1979) or Mntafufu (Plumstead 1984). The pike conger *M. bagio* is known from Knysna eastwards (Smith & Heemstra 1986) although not reported from eastern Cape estuaries (Marais & Baird 1980; Marais 1981, 1983a & b). In Transkei it was found in the Mtata and Mntafufu (Plumstead 1984), and in Natal, in the Umlalazi (Hill 1966), Richards Bay (Millard & Harrison 1954) and St Lucia (Day, Millard & Broekhuysen 1954) estuaries.

Numerically (19,4/net) and gravimetrically (9,1 kg/net) the mean monthly catch in the Mtata estuary was very much less than catches from the Kei (31,7 kg/net, Plumstead *et al.* 1985), Mbashe (23,4 kg/net, Plumstead *et al.* 1989), Gamtoos (33,3 kg/net, Marais 1983b), Sundays (20,5 kg/net, Marais 1981) and the Krom (17,9 kg/net, Marais 1983a) but similar to that of the Swartkops estuary (13,1 kg/net, Marais & Baird 1980). The catch composition resembled that found in the eastern Cape (Marais & Baird 1980; Marais 1981, 1983a & b) and southern Transkei (Plumstead *et al.* 1985, 1989) in that the family Mugilidae dominated the catches (25,6%N & 48,3%B), *Mugil cephalus* being particularly abundant, comprising 89,6% of the mullet biomass. Not surprisingly, *A. hololepidotus* which uses scent and lateral line senses (Van der Elst 1981) to hunt for its prey *Gilchristella aestuaria, Thryssa vitrirostris* and mullet juveniles (Whitfield & Blaber 1978; Plumstead pers. obs.) was the second most important species in this very turbid estuary. The lack of a suitably firm substrate in the middle and upper reaches probably limits the number of *Upogebia africana* the preferred food item of *P. commersonnii* (Van der Westhuizen & Marais 1977) thus limiting the numbers of the latter species present. Those species which procure their prey mainly by sight, e.g. *L. amia* and *E. machnata* were uncommon, although owing to their size they did make fairly significant contributions (total 12,5%) to the total biomass. Two of the most abundant fish, *J. dussumieri* and *T. vitrirostris*, the former feeding on benthic invertebrates (Van der Elst 1981) the latter a filter feeder (Blaber 1979) were very abundant numerically but owing to their small size were insignificant gravimetrically.

Spatially *M. cephalus, A. hololepidotus, J. dussumieri, L. equula* were more abundant in the very turbid upper reaches. The stomach contents of the minikob *J. dussumieri* contained identifiable remains of *G. aestuaria* and various other organisms including unidentified crabs and mysids, but mostly fish (Plumstead pers. obs.). According to Van der Elst (1981), *L. equula* has a diet which is very similar to that of *J. dussumieri*, thus explaining its presence in the upper reaches where the required food items appear to be abundant. Small *A. hololepidotus* (mean mass 281 g) were abundant in the upper and middle reaches where they were also feeding on *G. aestuaria*, mysids and juvenile mullet (Plumstead pers. obs.). *Mugil cephalus*, abundant in the upper and middle reaches of the Kei (Plumstead *et al.* 1985) and Mbashe (Plumstead *et al.* 1989), were also abundant in those reaches of the Mtata estuary where the intertidal banks are covered with the reed *Phragmites* sp. which serves as a source of benthic detritus as well as a surface area for the growth of epiphytic algae and diatoms which form part of the diet of the flathead mullet (Whitfield 1980). Highest catches of *L. amia* a predominantly visual predator, were made in the clearer waters of the lower reaches. The spotted grunter was also most abundant in the lower reaches where the substratum was more suitable for the burrowing of *Upogebia africana*, its favoured food item (Van der Westhuizen & Marais 1977).

The Mtata River is very similar to both the Kei and Mbashe in that the middle and lower reaches dissect Beaufort group sediments and Ecca shales and mudstones, respectively. The result is a very turbid estuary with a silty bottom sediment. Temperatures are within the range expected in Transkei. Lowest salinities were recorded in winter which was also the case in the Kei but not the Mbashe estuary. As seen in the Gamtoos, Kei and Mbashe the family Mugilidae dominated the catch followed by *A. hololepidotus*. *Johnius dussumieri* and *T. vitrirostris*, two small fish species, were the next most abundant in Mtata. Geographically several species viz. *P. kaakan*, *C. chanos*, *M. bagio* and *M. cyprinoides* appeared to be at the southern limits of their distribution. Although the catch composition was similar to that of the Kei and Mbashe the CPUE was much lower. CPUE in the Kei and Mbashe were highest in the middle reaches, however, in the Mtata, highest numbers were taken in the upper reaches with the highest biomass coming from the middle.

Acknowledgements

We acknowledge the following individuals and institutions for their assistance and financial support: Dr J.F.K. Marais for advice and help in the planning of the project; Mr E. Makanandana and Mr A. Qina for their help in the field and laboratory; the University of Transkei; the Department of Agriculture and Forestry of the Republic of Transkei and the Department of Cooperation and Development and the Department of Foreign Affairs of the Republic of South Africa for funding the project.

References

BEGG, G.W. 1984a. The estuaries of Natal. Part 2. Report 55. Natal Town and Regional Planning Commission, Pietermaritzburg.

BEGG, G.W. 1984b. The comparative ecology of Natal's smaller estuaries. Report 62. Natal Town and Regional Planning Commission, Pietermaritzburg.

BLABER, S.J.M. 1979. The biology of filter feeding teleosts in Lake St Lucia, Zululand. *J. Fish Biol.* 15: 37–59.

BRANCH, G.M. & GRINDLEY, J. 1979. The ecology of southern African estuaries. Part XI. Mngazana, a mangrove estuary in Transkei. *S. Afr. J. Zool.* 19(2): 63–77.

BROEKHUYSEN, C.J. & TAYLOR, H. 1959. The ecology of South African estuaries. Part 8. Kosi Bay estuary system. *Ann. S. Afr. Mus.* 44: 279–296.

DAY, J.H. 1981. Summaries of current knowledge of 43 estuaries in southern Africa. In: *Estuarine ecology with particular reference to southern Africa,* (ed.) Day, J.H., A.A. Balkema, Cape Town.

DAY, J.H., BLABER, S.J.M. & WALLACE, J.H. 1981. Estuarine fishes. In: *Estuarine ecology with particular reference to southern Africa,* (ed.) Day, J.H., A.A. Balkema, Cape Town.

DAY, J.H., MILLARD, N.A.H. & BROEKHUYSEN, C.J. 1954. The ecology of South African estuaries. Part 4. The St Lucia system. *Trans. roy. Soc. S. Afr.* 34(1): 129–156.

EKSTEEN, VAN DER WALT & NISSEN INC. 1979. Report on the general hydrological properties of Transkei. Vol. 2. Department of Agriculture and Forestry, Republic of Transkei.

HILL, B.J. 1966. A contribution to the ecology of Umlalazi estuary. *Zool. Afr.* 2: 1–24.

MARAIS, J.F.K. 1981. Seasonal abundance, distribution and catch per unit effort using gill nets, of fishes in the Sundays estuary. *S. Afr. J. Zool.* 16(3): 144–150.

MARAIS, J.F.K. 1983a. Seasonal abundance, distribution and catch per unit effort of fishes in the Krom estuary, South Africa. *S. Afr. J. Zool.* 18(2): 96–102.

MARAIS, J.F.K. 1983b. Fish abundance and distribution in the Gamtoos estuary with notes on the effects of floods. *S. Afr. J. Zool.* 18(2): 103–109.

MARAIS, J.F.K. & BAIRD, D. 1980. Seasonal abundance, distribution and catch per unit effort of fishes in the Swartkops estuary. *S. Afr. J. Zool.* 15(2): 66–71.

MARAIS, J.F.K. & PRINSLOO, J.F. 1980. Species composition and catch per unit effort of fishes in four Transkeian estuaries. Unpublished report.

MILLARD, N.A.H. & BROEKHUYSEN, C.J. 1970. The ecology of South African estuaries. Part 10. St Lucia: a second report. *Zool. Afr.* 5(2): 277–307.

MILLARD, N.A.H. & HARRISON, A.H. 1954. The ecology of South African estuaries. Part 5. Richards Bay. *Trans. roy. Soc. S. Afr.* 34(1): 157–179.

NOBLE, R.G. & HEMENS, J. 1978. Inland water ecosystems in South Africa – a review of research needs. *S. Afr. natl. Sci. Programmes,* Rep. 34, CSIR, Pretoria.

PLUMSTEAD, E.E. 1984. The occurrence and distribution of fish in selected Transkei estuaries. M.Sc. thesis, University of Transkei, Republic of Transkei.

PLUMSTEAD, E.E., PRINSLOO, J.F. & SCHOONBEE, H.J. 1985. A survey of the fish fauna of Transkei estuaries. Part One. The Kei River estuary. *S. Afr. J. Zool.* 20: 213–220.

PLUMSTEAD, E.E., PRINSLOO, J.F. & SCHOONBEE, H.J. 1989. A survey of the fish fauna of Transkei estuaries. Part Two. The Mbashe River estuary. *S. Afr. J. Zool.* 24: 000–000.

SMITH, J.L.B. 1977. Smith's sea fishes. 4th impression. Valiant Publishers, Sandton.

SMITH, M.M. & HEEMSTRA, P.C. 1986. Smith's sea fishes. Macmillan, Johannesburg.

VAN DER ELST, R.P. 1981. A guide to the common sea fishes of southern Africa, (ed.) P. Borchert, C. Struik, Cape Town.

VAN DER WESTHUIZEN, H.C. & MARAIS, J.F.K. 1977. Stomach content analysis of *Pomadasys commersonnii* from the Swartkops estuary (Pisces: Pomadasyidae). *Zool. Afr.* 12: 500–504.

WHITFIELD, A.K. 1980. A quantitative study of the trophic relationships within the fish community of the Mhlanga estuary, South Africa. *Estuar. Coast. Mar. Sci.* 10: 417–435.

WHITFIELD, A.K. & BLABER, S.J.M. 1978. Food and feeding ecology of piscivorous fishes in Lake St Lucia, Zululand. *J. Fish Biol.* 13: 675–691.