Natural History Note

A selective fish mortality and some notes on *Rhabdosargus sarba* at Kosi Bay, South Africa

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On 6 July 2000, while crossing Lake Nhlange, the largest of the Kosi Bay lakes, several dead fish were seen, lying bloated on the surface. On investigation they were found to be large Natal stumpnose *Rhabdosargus sarba*. Occasionally, during twenty years of residence at the Kosi lakes, the author has seen individual Natal stumpnoses dead or dying in this lake, particularly in winter, but never so many at one time.

On investigation, by questioning other local residents, it was found that the mortality had been taking place for several days and it subsequently extended for at least another 14 days. Efforts were made to identify and measure as many dead and dying fish as possible (Table 1) but those recovered were a small proportion of the total number of fish which died. The total mortality was probably several thousand fish. The vast majority of dead fish were mature *R. sarba* (Tables 1 &2) and dead fish were not reported in any of the other Kosi Bay lakes. Nearly all the fish were affected by a white fungal growth over much of their bodies, particularly behind the dorsal and anal fins. Initially there was deep concern among locally resident anglers that a sickness or poison was killing the fish, as many rely on the fish resource for their livelihood. Soon, however, they began collecting dead and dying fish on the lee shore each morning and eating or selling them. No illness or deaths were reported from people eating the fish and so the mortality was later regarded by local residents as fortuitous.

Results of several days' collecting and measuring of dead fish show that 85 % of the fish by number, and almost 94 % by mass, were *R. sarba* (Table 1). The next most common species were *R. holubi* (Cape stumpnose), a much smaller member of the genus, then *Pomadasys commersonni* (spotted grunter) followed by a few very small fish and a single *Acanthopagrus berda* (riverbream). Many other *R. sarba* were collected by locals but they reported few other species and

Table 1
Species composition and total mass estimates of dead fish found in lake Nhlange between 6 and 28 July 2000

Species	Number	%	Total mass estimate (Kg)	%
Rhabdosargus sarba	215	85	322.5	93.9
Rhabdosargus holubi	17	6.7	2.5	0.8
Pomadasys commersonni	6	2.4	12	3.5
Gilchristella aestuaria	6	2.4	0.1	0.0
Caranx spp.	4	1.6	6	1.7
Hyporhamphus capensis	3	1.2	0.1	0.0
Ambassis spp.	2	0.8	0.1	0.0
Acanthopargus berda	1	0.4	0.3	0.1
Total	254	100	343.6	100.1

Table 2
Species composition of gillnet catches in Lake Nhlange for May and June 2000 and for larger fish found dead during July 2000

Species	% Gillnet	% Mortality
Gerres methueni	56.9	0
Mugil cephalus	20.1	0
Rhabdosargus sarba	9.1	88.9
*Pomadasys commersonn*i	6.6	2.4
Myxus capensis	2.9	0
Acanthopagrus berda	2.3	0.4
Oreochromis mossambicus	1.7	0
Rhabdosargus holubi	0	6.7
Caranx spp.	0	1.6
Other species	0.4	0
Number of fish examined	145	253

would probably not have noticed the very small fish.

Mass fish mortalities have been recorded in several estuaries including Kosi Bay (Blaber & Whitfield 1976). Although many estuarine fish are resistant to extremes of temperature (Kyle 1984) this is often the reason suggested for mortalities. These have been ascribed to particularly high temperatures (Kyle 1998) or particularly low temperatures (Blaber & Whitfield 1976, Kyle 1989). They have also been ascribed to chemical pollutants (Ramm 1992) as well as a combination of low temperatures and low salinity (Blaber 1973a, 1973b) Sometimes they appear to have affected most fish present (Blaber & Whitfield 1976; Kyle 1989) while often they only affect certain species or size classes (Blaber 1973a, 1973b; Kyle 1998).

A large amount of information is now available on the fish and the environment of the Kosi Bay lakes, and it is possible to use this to examine the selectivity of this mortality. The mortality took place in winter and there were no records of, or information on any unusual chemicals in the lake at the time. The catches of the legal gillnet fishery, operating in these margins, should give an insight into the fish species and size present at the time. Although gillnetting is a selective way of catching fish, gillnet catch species composition (Table 2) shows that there were large numbers of species other than *R. sarba* present, which were not recorded in the mortality. The gillnet catch species composition in the two months prior to the mortality (Table 2) show that *Gerres methueni*, *Mugil cephalus*, *Myxus capensis* and *Oreochromis mossambicus*, together comprised over 80 % of the catch but were not recorded in the mortality. *Pomadasys commersonni* and *Acanthopagrus berda* appeared to die in numbers lower than expected. Only *Rhabdosargus sarba*, *R. holubi* and *Caranx* species were found in numbers greater than their gillnet catch abundance would have suggested, had all fish been equally affected. The mean total length of gillnetted *R. sarba* (395 mm) was similar to that of the fish found dead (389 mm).

Although local residents occasionally report dead and dying fish, when questioned they said that they had never seen so many. Temperatures are recorded daily at a jetty in the NE of Nhlange lake and these showed levels no lower than usual for this time of year. Salinity is also recorded in the lake and over the last few years it had been slowly rising, from about 0.5 parts per thousand to almost three parts per thousand. Extremely heavy rainfall in late summer, more than double the average, flushed the system and reduced salinities markedly and rapidly back to about 0.5 parts per thousand in Nhlange Lake. The salinity in Lakes Mpugwini and Makawulani, which also contained large *R. sarba*, remained above 3 parts per thousand.

Data from Kosi Bay National Marine Linefish Survey voluntary catchcards (Pradervand *pers. comm.*) show an increase in mean *R. sarba* mass, from 0.7 kg in 1994 to 1.4 kg. in 1999, which was the period of rising salinity. Most of the *R. sarba* found dead were well above the size reported to be found in estuaries by Whitfield (1998) who stated that a proportion of the spent individuals return to estuaries but these are confined to fish less than 35 cm (standard

length). Whitfield also reported in an earlier publication (Blaber & Whitfield 1976) that a combination of salinities below 3 parts per thousand and temperatures below 12 ºC were lethal to *R. sarba*. The lowest daily water temperature recorded in Nhlange in July 2000 was 15 ºC. Most of Whitfield's work was carried out south of, and thus in cooler areas, than in Kosi Bay. Data reported here suggest that salinities of around 3 parts per thousand and warmer temperatures allowed much larger *R. sarba* than previously reported to enter or grow up in the Kosi Bay lakes. When temperatures and salinities fell, the *R. sarba* probably suffered severe osmoregulatory stress which led to often fatal fungal infections (Blaber & Whitfield 1976). It appears that, in the preceding years a combination of salinities above 3 parts per thousand and temperatures above 15 ºC allowed *R. sarba* well above the predicted maximum size, to live in the Kosi Bay lakes.

It seems likely that the larger *R. sarba* will now disappear from Lake Nhlange until salinities rise again. Other larger marine-origin fish species found in estuaries seem to be much more resistant to falling salinities and temperatures.

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References

Blaber, S.J.M. 1973a. Temperature and salinity tolerance of juvenile Rhabdosargus holubi (Steindachner) (Teleostei). Journal of Fish Biology. 5 : 593 - 599.

Blaber, S.J.M. 1973b.Population size and mortality of juveniles of the marine teleost Rhabdosargus holubi (Pisces : Sparidae) in a closed estuary. International Journal on Life in oceans and Coastal Waters. 21 (3) : 219 - 225.

Blaber, S.J.M. & Whitfield, A.K. 1976. Large scale mortality of fish at St. Lucia. South African Journal of Science. 72: 218.

Kyle, R. 1984. Tolerance of high temperature by the Cichlid Oreochromis mossambicus in the Kosi System. Lammergeyer. 32:50.

Kyle, R. 1989. A mass mortality of fish at Kosi Bay. Lammergeyer. 40:39.

Kyle, R. 1998. An interesting, possibly man enhanced, fish mortality at Kosi Bay. Lammergeyer 45:37-38.

Ramm, A.E. L. 1992. Aspects of the biochemistry of sulphur in Lake Mpugwini, Southern Africa. Estuarine, Coastal and Shelf Science 34: 253 - 261.

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