Natural History Note

More information from the mark and recapture of fish at Kosi Bay, South Africa

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A considerable amount of work has been carried out on the mark and recapture of fish at Kosi bay (Kyle 1986). This resulted in the publication of data (Kyle & Robertson 1997) suggesting fairly low rates of exploitation by man but warning that further information was needed to confirm apparent levels. Fish marking has been ongoing (Kyle 2000) and results of more recent mark and recaptures are given here.

The methodology employed was similar to that described in Kyle & Robertson (1997) and tagging has continued since the early 1980s at similar levels, apart from a focal study in 1984/1985. Fish were marked in the southern lakes of Kosi Bay and most recoveries were made in the northern channels as the fish migrated out of the lakes towards the ocean to spawn (Garratt 1992). To facilitate recoveries, the fish marking was widely discussed with local fishermen. All the fish marked were caught on rod and line.

Most recoveries are made by trap, rod and line or gillnet subsistence fishermen. The mean time between marking and recovery was 186 days, with a minimum of 98 days between marking and recovery.

From August 1988 to July 1999 a total of 73 marked fish were recovered, giving a mean annual recovery rate of 6.6 fish from the lakes and ocean. During the twelve month period August 1999 to July 2000 a total of 17 fish were recovered from local subsistence fishermen, suggesting a higher level of exploitation.

Analysis of mark and recapture data for the lakes, for the period August 1999 to July 2000 (Table 1), shows that 24.3 % of all the fish were recovered within one year of marking and 38.9 % of the *Acanthopagrus berda* were recovered. This compares with 4.7 % from a similar multispecies exercise in 1983/1984 and 5.4 % for a focal study on *A. berda* in 1984/1985 (Kyle & Robertson 1997). Although little has changed in the technique of fish mark and recapture in the Kosi lakes, it is possible that notification of the capture of tagged fish improved, as knowledge of the small financial reward for marked fish spread, resulting in some of the increase in the proportion of fish recovered.

Over the whole period of marking and recovery, three *Sphyraena jello* gave useful information on growth rates (Table 2) as well as suggesting their residence for several years in the lakes. Data suggest a remarkably standard growth rate of about 1 mm/day. Three *Caranx ignobilis* of between 10–13 kg each, were marked. One was recovered in a fishtrap inside the lakes. Another was recaught by a recreational angler in the ocean, about 30 km south of Kosi Mouth, released again and recovered and released again back in the lakes by another recreational angler. This suggests heavy fishing pressure on these large fish and the marine recovery is the first for a fish marked inside the Kosi lakes. The subsequent

Table 1
Data on marking and recapture of fish in the Kosi lakes from August 1999 to July 2000

Species	Marked	Recaptures	%
Acanthopagrus berda	18	7	38.9
Lutjanus argentimaculatus	5	0	0
Caranx ignobilis	5	1	20
Caranx sexfasciatus	4	0	0
Caranx papuensis	4	0	0
Sphyrnidae	1	1	100
Total	37	9	24.3

Table 2
Growth information, of total length in millimetres, from three Sphyraena jello *marked and recovered in the Kosi lakes*

Date Marked	Date recovered	Days free	Mark L.	Recovery L.	Growth
29 December 1999	10 March 2000	120	800	940	140
31 March 1999	9 April 2000	390	550	940	390
11 December 1997	15 April 2000	540	380	920	540

recovery again, inside the lakes, confirms the multiple entry and exit of this species, the usefulness of fish mark and recovery generally, and the suitability of the species for mark and recapture work.

One 12 kg *C. ignobilis* was hooked on light tackle and played gently for about 1.5 h before being carefully tagged, "walked" in the shallows to recover, and released. It was found dead two days later. A second, similar fish was caught the day following the first capture, but it was hooked on heavy tackle, brought in as soon as possible, marked quickly and released immediately. It was not seen again and it is assumed to have survived. This phenomenon has been reported before (Bagnall 2000) and it appears that survival of marked fish may be enhanced by rapid capture and release, while gentle tactics result in exhausted fish which may die after release.

Many recaptured *A. berda* were recovered very close to the marking sites suggesting a high degree of residency in this species (Kyle 2000). Although not as many data are available, there is little such evidence for other species marked at Kosi bay.

The Kosi lakes fishery is probably the most important true subsistence fishery in South Africa and the recreational fishery is of increasing importance to the local and national economy. To date, it has been thought that fish stocks are adequate for these, plus a limited gillnet fishery, to exist in relative harmony without unduly impacting fish stocks. Data presented here, however, suggest that total offtake levels have increased in recent years and would suggest a cautious approach to allowing any significant increase in fishing effort. Some recovered marked fish are still, however, probably not recorded and known recovery levels of almost 40 % for some species are cause for alarm about overexploitation.

Little accurate information is available on illegal fishing, such as unlicensed gillnetting, and no recoveries were recorded recently from this method. As it is known that numbers of *A. berda* are caught by these fishermen it is likely that true overall fish catch rates are markedly higher than those indicated above. Marked fish recovery data thus suggest that if Kosi Bay fish stocks are to be maintained, illegal fishing at Kosi Bay should be greatly reduced and no new fishing should be allowed unless there is a marked reduction in some present fishing levels or methods.

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