# The diet of Cape clawless otters at two sites along the Bloukrans River, Eastern Cape Province, South Africa

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**The diet of Cape clawless otters was assessed at two sites along the Bloukrans River using faecal analysis. Spraints ($n$ = 78) were collected during 2000 and 2001 and analysed using the relative frequency of occurrence and the reconstituted wet weight methods. Both methods found crab (*Potamonautes perlatus)* to be the most important component (>50%) of the diet. Frog, *Xenopus* and *Rana* spp., (11–42%) was the second most important component while fish (*Micropteris salmoides)* was relatively unimportant (<14%). Although the diet of Cape clawless otters in the Eastern Cape Province was similar to that reported elsewhere, the fact that they were preying on an alien invasive fish and not the indigenous endemic *Sandelia bainsii* is significant. The validity of faecal analysis methods is also discussed.**

**Key words:** ***Aonyx capensis*, Cape clawless otter, faecal analysis, diet.**

In freshwater habitats, the Cape clawless otter (*Aonyx capensis*) shows preference for crabs (Rowe-Rowe 1977a,b; Kruuk & Goudswaard 1990; Butler & du Toit 1994; Ligthart *et al.* 1994; Rowe-Rowe & Somers 1998). Consumption of fish is low although Cape clawless otters will prey on fish when it is freely available (such as in fish farms) or during cold conditions when fish are less active (Rowe-Rowe 1977a; Kruuk 1995). In addition, a study in the Bushman's River in the Eastern Cape Province showed that, under drought conditions, fish are important to Cape clawless otters (Somers & Purves 1996).

The Bloukrans River is one of a small number of river systems in which the endangered fish *Sandelia bainsii,* which is endemic to the Eastern Cape Province, is found (Cambray 1981). Cape clawless otters also occur in this river (D. Parker, pers. obs.) and in light of the results of Somers & Purves (1996), may represent a threat to the conservation of *S. bainsii.* Thus the broad aim of this study was to examine the diet of the Cape clawless otter in a freshwater system and to establish if it preyed on *S. bainsii.*

Two study sites were selected along the Bloukrans River: a man-made dam, and a natural pool (33°18′S, 26°35′E and 33°23′S, 26°41′E, respectively). Clarke's Dam is 7 km East of Grahamstown and the Bloukrans pool is situated in the Blaauwkrantz Nature Reserve, 23 km South East of Grahamstown. Spraints (otter faeces; $n$ = 78) were collected monthly from February to September 2000, and March to September 2001. Each spraint was air-dried and examined, scoring the presence or absence of prey items (crab, frog and fish). The relative frequency of occurrence of each prey item was determined by dividing the total number of occurrences for each prey component by the total number of occurrences of all prey items in all spraints examined for that month. Mean annual relative frequency of occurrence was calculated as the mean of the monthly data. The relative frequency of occurrence method may, as it does with *Lutra lutra,* underestimate dominant prey items in the diet (Carss & Parkinson 1996); thus, the reconstituted wet weight of crab and frog (the two dominant components of the diet) were determined for the data from Clarke's Dam in 2000. All crab eyestalks and frog pelvic girdles were removed from the spraints. The size and weight of the frogs consumed was estimated by comparison to reference samples of known weights. The anterior lengths of the eyestalks were used to estimate the size of the crabs consumed, which were then converted to wet weight using an existing equation (Purves *et al.* 1994). The reconstituted wet weights of crab and frog were standardized by dividing the weight of each spraint by the total spraint weight and expressing each component per 10 g of spraint weight.

Crab (*Potamonautes perlatus*) was the most important component (in terms of mean annual

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**Table 1**. Mean annual relative frequency of occurrence (M.A.F.O.) of prey items in the diet of the Cape clawless otter at two sites along the Bloukrans River during 2000 and 2001. Mean and standard deviation values are shown.

| | M.A.F.O. Clarke's Dam (%) | | M.A.F.O. Bloukrans Pool (%) | |
|---|---|---|---|---|
| | 2000 | 2001 | 2000 | 2001 |
| Crab | 50.69 ± 16.65 | 65.80 ± 21.72 | 77.78 ± 38.49 | 49.93 ± 13.76 |
| Frog | 42.36 ± 14.73 | 26.91 ± 16.73 | 11.11 ± 19.24 | 35.33 ± 10.51 |
| Fish | 6.94 ± 13.83 | 7.27 ± 9.75 | 11.11 ± 19.24 | 14.50 ± 17.06 |

relative frequency of occurrence) in the diet of the Cape clawless otter at both sites in both years of the study (Table 1). At Clarke's Dam, frog (*Xenopus laevis* and *Rana* spp.) was the second most important component of the diet, followed by fish (*Micropterus salmoides*). At Bloukrans Pool, frog (*X. laevis* and *Rana* spp.) and fish (fragments too few to identify) were of equal importance in 2000, while in 2001, both were significantly more important and frog was more important than fish (Table 1). At both sites, there was no significant difference in importance of the food types between years (Table 1; two-way ANOVA, $P > 0.01$, $F = 1.27$ for crab, 4.99 for frog and 0.06 for fish). Nor was there a significant difference between the two sites in the importance of crab, frog and fish (two-way ANOVA; $P > 0.01$ for all three; $F = 1.40$ for crab, 2.46 for frog and 0.06 for fish).

The small number of spraints (in 2000 May = 2, June = 2; in 2001 March = 1, May = 2, June = 3, July = 2; Total $n$ =12) collected from the Bloukrans Pool precluded any further analysis and only monthly data from Clarke's Dam are presented. In 2000, crab and frog had the same relative frequency of occurrence values for six of the eight months for which samples were collected (Fig. 1A). The importance of crab fluctuated significantly between months, being significantly more important in April than in other months (Kruskal-Wallis one-way ANOVA; $P < 0.05$, $H = 16.2$, d.f. = 7). However, the sample size in April was one and these results must be interpreted with caution. Fish was only recorded in the diet during February, May and June and its importance varied significantly (Fig. 1A; Kruskal-Wallis one-way ANOVA; $P < 0.05$, $H = 15.4$, d.f. = 7, but no pairs significantly different). The importance of crab was not significantly different from that of frog ($P > 0.05$), but crab was significantly more important than fish during all months (Student-Newman-Keuls; $P < 0.05$).

In 2001, crab dominated the diet (>40% in all months; Fig. 1B) and was significantly more important in June than in other months (Kruskal-Wallis one-way ANOVA; $P < 0.05$, $H = 56.1$, d.f. = 3). Frog was the second most important prey item (>25%) in all months (Student-Newman-Keuls; $P < 0.05$) and its importance varied significantly between months (Fig. 1B; Kruskal-Wallis one-way ANOVA; $P < 0.05$, $H = 56.1$, d.f. = 3). Fish was only recorded in three months and was relatively unimportant in May and August (<15%; Fig. 1B), but significantly more important in July (25% of the diet; Kruskal-Wallis one-way ANOVA; $P < 0.05$, $H = 56.1$, d.f. = 3). Crab was significantly more important than frog in all months except May and August (Student-Newman-Keuls; $P < 0.05$) and fish was the least important prey item during all months (Student-Newman-Keuls; $P < 0.05$).

Crab dominated the diet in terms of reconstituted wet weight, being the most important component in all months except June (Fig. 1C). The wet weight of crab fluctuated significantly (range 0.5–10 g per 10 g of spraint weight) between months, being most important in April, August and September (Fig. 1C; Kruskal-Wallis one-way ANOVA; $P < 0.01$, $H = 23.1$, d.f. = 1). The wet weight of frog was significantly greater in February and March than other months (Kruskal-Wallis one-way ANOVA; $P < 0.01$, $H = 60.9$, d.f. = 1). In April and August no frog remains were identified in the spraints (Fig. 1C). In general terms, the two methods generated values for crab that were broadly similar (i.e. approximately 40%).

While faecal analysis is perhaps the only way to study the diet of free-ranging otters, it has several weaknesses. In a study of the freshwater mussel (*Unio caffer*) in the Kowie River in the Eastern Cape Province, marked mussels were often lost to otter predation where the shell was broken open and just the flesh consumed (J.A. Cambray, pers. comm.). This implies that important components of Cape clawless otter diet may be underestimated, or even missed, when no diagnostic features pass into the spraints. The relative frequency of occur-

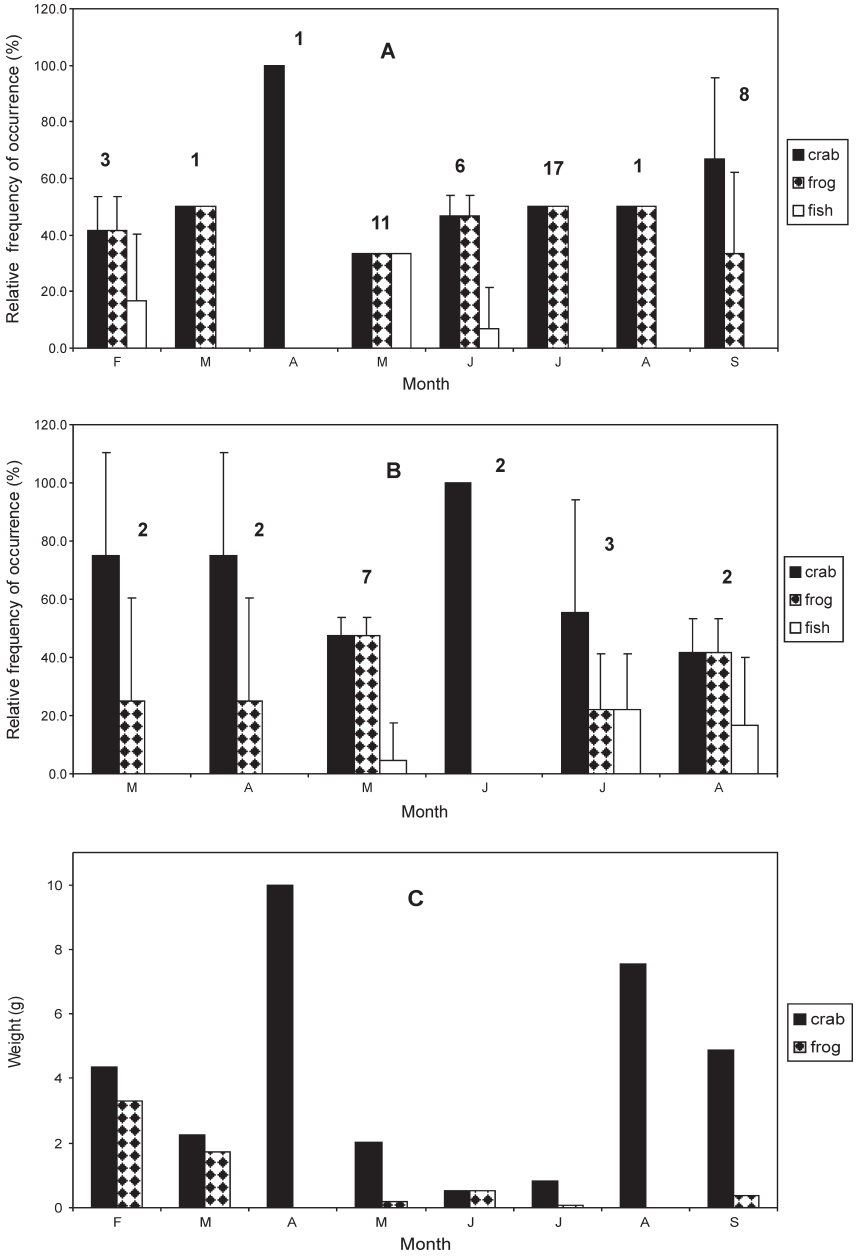


**Fig. 1**. Comparison between the seasonal importance of three prey items consumed by Cape clawless otters at Clarke's Dam as determined by (**A**) frequency of occurrence (%) in 2000 and (**B**) frequency of occurrence (%) in 2001; and (**C**) reconstituted wet weight (g) in 2000. Values above data bars indicate the number of spraints collected in that month.

rence method provides a useful overview of the diet but scores all occurrences as equal, regardless of the amount consumed, and underestimates dominant prey items (Carss & Parkinson 1996). This underestimation of dominant prey items is exaggerated when more prey categories are included in the analysis (Carss & Parkinson 1996). The wet weight method relies on diagnostic markers passing in to the spraint and therefore underestimates the importance of components when diagnostic markers, such as crab eyestalks, are difficult to locate (for example June and July at

Clarke's Dam; Fig. 1C). Evidence for the loss of diagnostic markers in the present study comes from the presence of odd numbers of paired structures in spraints. In spite of these inherent problems, this method is useful when used in conjunction with the relative frequency of occurrence method, as it provides an indication of the actual number of prey consumed. Furthermore, the combination of two methods rather than one increases the reliability of the results.

The predominance of crab and the relatively low importance of fish in the diet of Cape clawless otters in the Bloukrans River is consistent with other studies (Rowe-Rowe 1977a,b; van der Zee 1981; Verwoerd 1987; Kruuk & Goudswaard 1990; Butler & du Toit 1994; Ligthart *et al.* 1994; Purves *et al.* 1994; Somers & Purves 1996; Rowe-Rowe & Somers 1998). Observations on both wild and captive Cape clawless otters indicate that their predatory behaviour is specifically adapted to feeding on benthic crustaceans such as crabs in shallow water (Rowe-Rowe 1977b,c; Rowe-Rowe & Somers 1998). The nocturnal or crepuscular activity of Cape clawless otters reduces their ability to detect and catch fish (Rowe-Rowe 1977b). However, otters will consume more fish during cold conditions when fish are less active (Erlinge 1968; Rowe-Rowe 1977a,b; Kruuk 1995) and this was evident in our results as six of the nine months in which fish were consumed were during the winter. The importance of frog in the diet on the Bloukrans River was considerably higher than in the Bushman's River in the Eastern Cape Province, where fish was more important than frog (Somers & Purves 1996). However, this study was conducted during a severe drought, which caused the river to dry up into pools, trapping fish and making them more susceptible to predation by otters. Site position may also have boosted the importance of fish in this study, as estuarine fish tend to concentrate below weirs nearer the coast (J.A. Cambray, pers. comm.). In addition, the effects of the drought on frog populations may have accounted for the observed scarcity in the diet (Somers & Purves 1996). Our results indicate that Cape clawless otters supplement their diet with frog under normal conditions (Rowe-Rowe 1977a; Butler & du Toit 1994; Rowe-Rowe & Somers 1998).

All identifiable fish remains were largemouth bass (*Micropterus salmoides*), an alien invasive fish species in South Africa. Juvenile bass tend to seek refuge amongst reeds in shallow water, which is the preferred foraging ground for Cape clawless otters (Rowe-Rowe 1977b). The fact that only largemouth bass remains were found in the spraints suggests that the impact of otter predation on the endangered Eastern Cape rocky (*S. bainsii*) may be small. However, sample sizes were low and spraints were only collected from two sites and based on average home range sizes, it is possible that the data may reflect the diet of only 3–4 otters (Somers & Nel 2004). For this reason, and because of the importance of fish in the Bushman's River (Somers & Purves 1996) we recommend further work on the diet of Cape clawless otters in the Eastern Cape Province incorporating larger sample sizes from more than one river system and under various flow conditions.

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