Diet and food selection of *Barbus aeneus*, *Clarias gariepinus* and *Oncorhynchus mykiss* in a clear man-made lake, South Africa

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Abstract

The diet and food selection of *Barbus aeneus* (Burchell, 1822), *Clarias gariepinus* (Burchell, 1822) and *Oncorhynchus mykiss* (Walbaum, 1792) were investigated in Sterkfontein Dam. Prey organisms were sampled from the stomachs of fish over a one-year period and in the environment over a two-year period. Stomach analyses and the Strauss index of food selection revealed a herbivorous/benthivorous diet for *B. aeneus*, a benthivorous diet for *C. gariepinus* and a planktivorous diet for *O. mykiss*.

Introduction

Most reservoirs in South Africa are turbid, with modal mean Secchi disc transparencies between 0 and 50 cm (Walmsley and Bruwer, 1980). Feeding studies on freshwater fish in South African reservoirs have frequently been carried out in turbid environments (Eccles, 1983; Gaigher and Fourie, 1984; Tomasson et al., 1983). Sustained high suspensoid loads decrease the food availability and feeding efficiency of fish (Kirk and Akhurst, 1984), which in turn could change their feeding pattern.

Sterkfontein Dam is situated on the Vaal River system, a tributary of the Orange River, and has a low turbidity (Dörgeloh, 1986) compared to Verwoerd Dam (Walmsley and Bruwer, 1980) and Le Roux Dam (Allanson et al., 1983) which are part of the Orange River system. Fish species residing in Sterkfontein Dam (Dörgeloh, 1987) are also found in the latter reservoirs (Hamman, 1980; Jackson et al., 1983).

This study investigated the diet and food selection of the indigenous *Barbus aeneus* and *Clarias gariepinus* under clear conditions. The dietary composition of these species was compared with those in Le Roux Dam. The diet and food selection of the introduced alien *Oncorhynchus mykiss*, a piscivore at larger sizes (Marrin and Erman, 1982), was monitored in order to detect whether predation on indigenous fish occurred.

Study area

Sterkfontein Dam (28°23' to 28°35'S and 28°58' to 29°04'E) is situated in the Eastern Orange Free State, close to the rim of the lower Drakensberg escarpment, at an altitude of 1 620 m (Fig. 1). This reservoir with a mean turbidity of $\leq$10 NTU for the largest part of the surface area (about 80%) has a capacity at full supply level of 2 656 x 10^6 m^3, a total surface area of 6 940 ha and a maximum depth of 82 m. Sterkfontein Dam runs from north to south and is located on the Nuwejaarspruit, which is a tributary of the Orange-Vaal River system. Construction of the dam wall started in 1969 and was completed in 1985. Regular pumping of water from the Tugela River in Natal via Kilburn Dam and into Sterkfontein Dam began in November 1974.

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Methods and materials

Methods

Four permanent sampling localities, based on turbidity and depth (Dörgeloh et al., 1993) were used for sampling fish and zooplankton (Fig. 1). Localities 1 and 2 were in the less turbid area ($\leq$ 10 NTU) and localities 3 and 4 were in the turbid area (>10 NTU). Two localities (1 and 3) were stationed in deep water ($\geq$ 30 m), while Localities 2 and 4 were used to sample fish closer to the shore-line. The constantly changing water level necessitated the shifting of Localities 2 and 4 to stay at depths of 2 to 5 m and about 50 m from the shore.

Gill nets were placed parallel to the shore. Each gill net measured 25 m x 2 m in size with stretched mesh sizes of 35, 50, 65, 73, 85, 100, 120 and 150 mm respectively. These were connected in series with spaces of 2 m between each and were left overnight for 16 h at each locality.

Fish

From March 1984, for a period of 13 months, fish were sampled monthly using gill nets at each of these 4 localities. It is recognised that the length of time which fish spend in gill nets after being caught might affect the fullness of stomachs and therefore the accuracy of the data. Data of stomach contents for each locality and the various months within each season were combined.

The oesophagi and foreguts (anterior third of intestine) of *B. aeneus*, and the oesophagi and stomachs of *C. gariepinus* and *O. mykiss*, were cut out and preserved in 5% formaldehyde. The stomach contents of each fish was filtered through a 100 µm mesh plankton net and the residue retained. The latter was examined under a stereo microscope. Each prey item was identified at least to order and, if possible, to family or genus and separated into taxonomic groups. Each taxonomic group and the total contents of each stomach were weighed to determine the percentage composition.

The food selection of the 3 fish species for certain prey items was calculated by using the Strauss index of food selection (Strauss, 1979), which is simply the numerator of Ivlev's index:

$$L = r_i - p_i$$

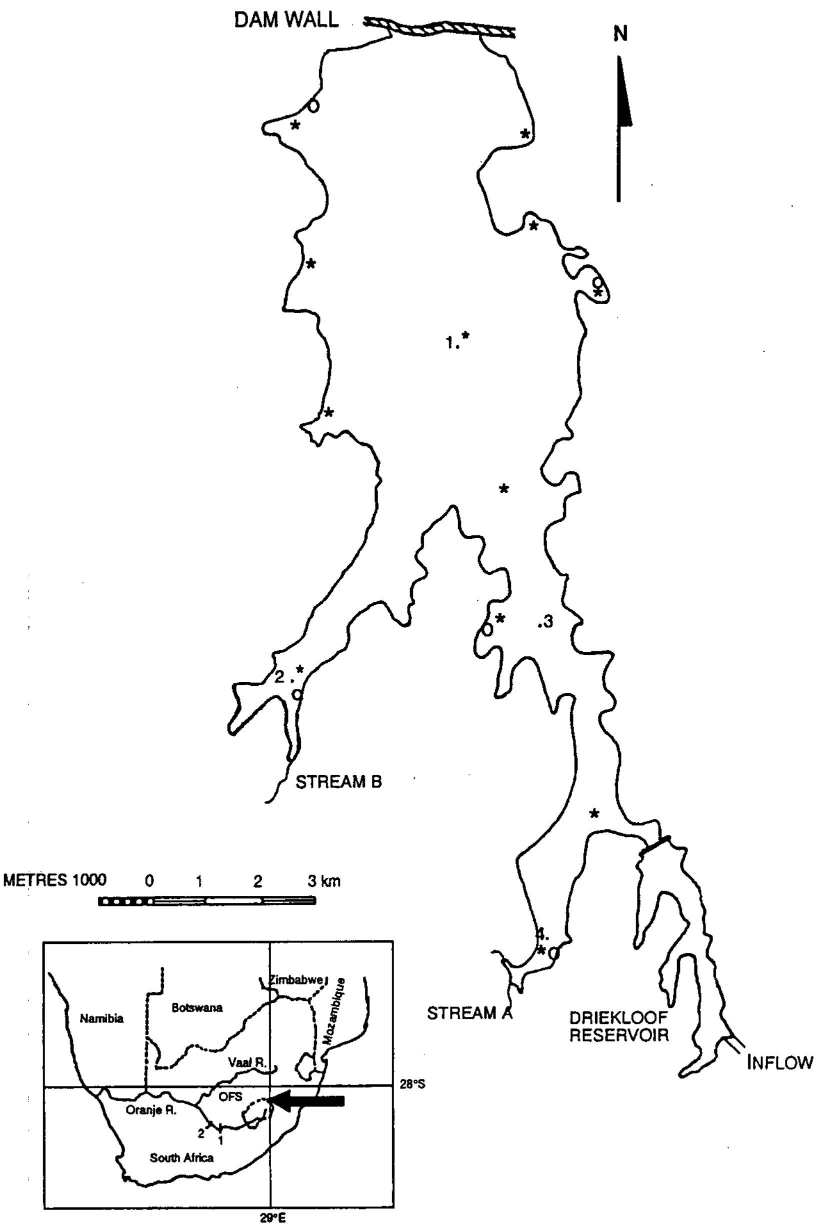

Figure 1
Map of Sterkfontein Dam indicating the sampling points for fish and zooplankton (Localities 1 to 4), mikronekton (o) and zoobenthos (*). Insert map of Southern Africa indicates the positions of Sterkfontein Dam (arrow), Verwoerd Dam (1) and Le Roux Dam (2)

where:

L = index of food selection
r_i = relative abundance in the stomach (expressed as proportions or % of mass, volume or number)
p_i = relative abundance of the same item in the environment

The index ranges from -1 to +1 with positive values indicating preference and negative values indicating avoidance or inaccessability. The measure assumes extreme values only when the prey item is rare but consumed almost exclusively, or is very abundant but rarely consumed. Zero indicates random feeding under all conditions (Strauss, 1979).

Zooplankton

Zooplankton composition and densities were monitored monthly from June1983 to February 1985 at the 4 localities. The water column (bottom to surface) was sampled by one vertical haul with a 100 µm mesh plankton net. Samples were preserved in 5% formaldehyde.

In the laboratory, 2 subsamples were taken with a 10 mℓ syringe. The subsamples were analysed under a stereo microscope for the numerical composition of each zooplankton group. The length (top of head to base of spine for Cladocera and top of head to end of furcae for Copepoda) of approximately 40 individuals of the common zooplankton species was measured. Body mass, expressed as µg dry mass, was calculated from the body length by means of a linear regression, as proposed by Bottrell et al. (1976). The mean body mass of each species was further converted to biomass for each locality and month.

Micronekton

Micronekton was sampled monthly with a 16 x 2,5 m seine net (3 mm stretched mesh size) at 5 localities along the shore (Fig.1) from June 1983 to February 1985. One haul was made at each locality. The organisms caught were washed into a container filled with 60 ℓ of water. Two subsamples of 500 mℓ each were taken and preserved in 5% formaldehyde.

These subsamples were filtered through a 300 µm sieve. Organisms larger than 300 µm were collected and counted under a stereo microscope. Approximately 46 individuals from each species, but only 5 individuals of Odonata, were weighed. The mean mass per individual was calculated. The latter was used to determine the monthly biomass per locality.

Zoobenthos

Zoobenthic organisms were sampled bi-annually, once during winter (June to August) and once during summer (December to February) from October 1983 to January 1985. Two sediment samples were taken at each of the 12 localities spread over the impoundment (Fig. 1). Zoobenthic organisms were sampled with an Ekman-Berge dredge in the profundal areas and a 22 cm wide spade on the receding shore-line. Bottom sediments sampled using these 2 methods had similar volumes. Samples were preserved in 5% formaldehyde.

Each sample was sieved through a 2,36 mm and then a 500 µm sieve. Organisms remaining on the 2,36 mm sieve were counted macroscopically and organisms from the 500 µm sieve were suspended in 1 ℓ of water. Five 20 mℓ subsamples were taken, and the organisms identified and counted under a stereo microscope. The mean individual mass of each group (n = 54) and the total sample mass were calculated.

The data of zoobenthos used in the analysis of food selection were incomplete because of technical inadequacies normally associated with benthic sampling.

Terrestrial insects

Terrestrial insects were not sampled, since they were preyed on only by *O. mykiss* during summer. Data on terrestrial insect utilisation were therefore not listed in Table 1 or incorporated in the Strauss index of food selection (Table 4).

Results

Diet and food selection

Foregut and stomach contents for each species per season is indicated in Table 1. The data show the mean and range of percentage mass for all length groups. These data serve to substantiate the findings of the Strauss index of food selection shown in Tables 2 to 4.

B. aeneus

The largest proportion (86,7%) of all foreguts analysed (n = 330), contained food. Zooplankton (almost entirely Cladocera) was consumed to a larger extent in winter and spring (Table 1). The foregut contents revealed the largest proportion of micronekton and zoobenthos (green chironomid larvae; Scholtz and Holm, 1985) during winter (Table 1). Plant material (*Potamogeton* and *Lagarosiphon* fragments) was present in large quantities in the foreguts during summer and autumn and least during winter and spring (Table 1). Unidentifiable material, mainly partially digested zooplankton, formed the highest proportion (Table 1) of the gut contents throughout the year and was present in all fish.

The Strauss index of food selection indicated that Cladocera was selected by all length groups throughout the year, except for fish ≥40 cm during summer. Copepoda was avoided during each season. The most abundant micronekton taxa (Corixidae, Notonectidae and Ephemeroptera) were generally avoided by fish throughout the year (Table 2). Green chironomid larvae were the most preferred benthic group, while red chironomid larvae (also called blood-worms; Scholtz and Holm, 1985) were avoided by all length groups. The group "Other benthos" (Table 2) included Neorhabdocoela and chaoborid larvae, and were eaten on an irregular basis.

C. gariepinus

Of the 191 stomachs analysed, 87,4% contained food. Zooplankton (Cladocera and Copepoda) was consumed mainly in autumn and spring, while micronekton was preyed on to a large extent in autumn and summer (Table 1). Zoobenthos (mainly green chironomid larvae) was least preyed on during winter. The highest proportion of plant material (*Potamogeton*, *Lagarosiphon* and root fragments of *Phragmites*) found in the stomachs was in summer (Table 1). Unidentifiable material formed the largest proportion of the stomach contents of all length groups from winter to summer (Table 1).

The index of food selection indicated a large variability in prey selection during all seasons (Table 3). Cladocera was selected only by larger fish ≥50 cm in summer. Copepoda was generally selected, except during summer. A large variation in the selection and avoidance of micronektic prey was found between length groups and seasons. Red chironomid larvae (blood-worms) were avoided. Green chironomid larvae were selected during winter and summer. Other benthic organisms were preyed on at random.

Few catfish were caught during winter (7,1% of total) which possibly distorted the feeding data for that season.

O. mykiss

The feeding study done on *O. mykiss* was based on one cohort only, which was stocked in February 1984. Only a few fish from previous stockings were caught and therefore these data were omitted. Of the 399 stomachs analysed, 92,5% contained food.

Stomach analyses indicated that zooplankton (mainly Cladocera) was consumed in large quantities from autumn to spring, while micronekton was the most abundant prey item in the stomachs during summer (Table 1). Zoobenthos was found in small quantities (< 1%) in the stomachs (Table 1). Terrestrial insects were eaten to a large extent in summer ($\bar{x}$ mass = 22,5% of stomach content; range = 18 to 27%). Plant material was present in most stomachs (>60% of total), but only in small quantities (< 10%) (Table 1). Plant material consisted of *Potamogeton*, *Lagarosiphon* and a few root fragments of *Phragmites* reeds. Unidentifiable material formed a large proportion of the stomach contents (Table 1).

The index of food selection showed that Cladocera was selected by all length groups <40 cm FL. The selection for micronekton varied between seasons (Table 4) and between length groups. The 2 common Chironomidae groups, i.e.red and green species, were respectively avoided and selected. Other benthic organisms were avoided or preyed on at random.

Discussion

B. aeneus

Sterkfontein Dam is a clear reservoir, with a mean turbidity of ≤10 NTU for about 80% of the surface area. Most other reservoirs in

TABLE 1
COMPOSITION OF THE STOMACH CONTENTS (% MASS) OF ALL LENGHT GROUPS OF *B. AENEUS*, *C. GARIEPINUS* AND *O. MYKISS* FOR EACH SEASON

B. aeneus

Food type	**autumn** (n = 86) x̄ range	**winter** (n = 76) x̄ range	**spring** (n = 56) x̄ range	**summer** (n = 68) x̄ range
Zooplankton	4,7% (2-9%)	8,7% (5-15%)	10,0% (2-18%)	5,7% (3-8%)
Micronekton	6,0% (4-8%)	12,7% (8-22%)	8,0% (4-12%)	7,3% (6-9%)
Zoobenthos	5,0% (4-7%)	15,3% (11-21%)	3,5% (<4%)	2,0% (<4%)
Plant material	31,7% (24-38%)	10,3% (8-13%)	13,5% (10-17%)	25,3% (20-34%)
Unidentifiable	51,7% (42-63%)	54,3% (50-57%)	66,5% (66-67%)	59,0% (52-64%)

C. gariepinus

Food type	**autumn** (n = 45) x̄ range	**winter** (n = 8) x̄ range	**spring** (n = 54) x̄ range	**summer** (n = 60) x̄ range
Zooplankton	16,3% (0-32%)	7,5% (5-10%)	14,0% (7-21%)	1,7% (<3%)
Micronekton	36,3% (19-68%)	13,0% (12-15%)	16,5% (16-17%)	25,7% (17-35%)
Zoobenthos	13,0% (6-19%)	9,0% (5-13%)	15,0% (10-20%)	11,3% (10-13%)
Plant material	12,3% (3-18%)	7,0% (6-8%)	17,5% (14-21%)	22,0% (17-28%)
Unidentifiable	20,7% (14-26%)	58,5% (58-59%)	33,0% (26-40%)	36,0% (32-38%)

O. mykiss

Food type	**autumn** (n = 29) x̄ range	**winter** (n = 151) x̄ range	**spring** (n = 130) x̄ range	**summer** (n = 64) x̄ range
Zooplankton	46,3% (32-54%)	40,7% (39-44%)	36,0% (16-59%)	9,5% (0-19%)
Micronekton	18,7% (2-37%)	18,7% (12-22%)	16,7% (9-25%)	33,5% (22-45%)
Zoobenthos	0,7% (<2%)	0,7% (<2%)	0,7% (<1%)	0,2% (<0,5%)
Plant material	1,0% (<2%)	7,7% (7-8%)	9,7% (4-18%)	9,5% (8-11%)
Unidentifiable	32,3% (26-44%)	32,0% (25-42%)	37,7% (14-56%)	48,0% (48-48%)

TABLE 2
SEASONAL VALUES OF THE STRAUSS INDEX OF FOOD SELECTION FOR EACH LENGTH GROUP OF *B. AENEUS*. THE INDEX RANGES FROM -1 TO +1 WITH POSITIVE VALUES INDICATING PREFERENCE AND NEGATIVE VALUES INDICATING AVOIDANCE. ZERO INDICATES RANDOM FEEDING

	Autumn 1984			Winter 1984			Spring 1984		Summer 1984/85		
FL (cm)	**<30**	**30-39,9**	**≥40**	**<30**	**30-39,9**	**≥ 40**	**30-39,9**	**≥ 40**	**<30**	**30-39,9**	**≥ 40**
Zooplankton											
Cladocera	0,28	0,28	0,28	0,31	0,27	0,27	0,08	0,08	0,17	0,17	-0,01
Copepoda	-0,27	-0,27	-0,27	-0,31	-0,27	-0,27	-0,08	-0,08	-0,18	-0,18	-0,01
Micronekton											
Corixidae	-0,54	-0,54	0,46	-0,51	0,49	-0,51	-0,32	-0,32	-0,64	-0,64	-0,64
Notonectid.	-0,24	-0,24	-0,24	-0,07	-0,07	-0,07	-0,003	-0,003	-0,21	-0,21	-0,21
Ephemeropt.	-0,13	-0,13	-0,13	-0,43	-0,43	-0,43	-0,66	0,34	-0,15	-0,15	-0,15
Odonata	-0,09	-0,09	-0,09				-0,02	-0,02			
Zoobenthos											
Chiron. red				-0,52	-0,52	-0,48			-0,63		-0,63
Chiron. green				0,14	0,18	0,49			0,29	0,52	0,74
Chiron.pup.											0,03
Trichoptera				-0,17	-0,05	-0,15			0,43	0,05	-0,01
Mollusca				0,54	0,04	-0,03			-0,24	-0,24	-0,20
Annelida				0,02	-0,04	-0,03					
Nematoda									-0,05	-0,05	-0,05
Ostracoda				-0,001	0,995	0,30			0,20	0,13	
Other ben.					0,30	0,18				0,22	0,11

TABLE 3
SEASONAL VALUES OF THE STRAUSS INDEX OF FOOD SELECTION FOR EACH LENGTH GROUP OF *C. GARIEPINUS*. THE INDEX RANGES FROM -1 TO +1 WITH POSITIVE VALUES INDICATING PREFERENCE AND NEGATIVE VALUES INDICATING AVOIDANCE. ZERO INDICATES RANDOM FEEDING

	Autumn 1984			Winter 1984		Spring 1984		Summer 1984/85		
FL (cm)	**30-49,9**	**50-69,9**	**70**	**50-69,9**	**70**	**50-69,9**	**70**	**30-49,9**	**50-69,9**	**70**
Zooplankton										
Cladocera	-0,72	-0,25	-0,19	-0,19	-0,23	-0,20	-0,15	-0,83	0,17	0,09
Copepoda	-0,27	0,26	0,20	0,19	0,22	0,21	0,15	-0,18	-0,18	-0,10
Micronekton										
Corixidae	-0,23	0,46	0,07	-0,51	-0,51	-0,16	0,06	-0,34	0,03	-0,10
Notonectid.	-0,24	-0,24	-0,24	-0,07	-0,07	-0,003	-0,003	-0,21	-0,21	-0,21
Ephemeropt.	-0,13	-0,13	0,26	-0,43	-0,43	-0,37	-0,47	0,44	0,12	0,08
Odonata	0,60	-0,94	-0,09			0,54	0,40	0,11	0,06	0,24
Zoobenthos										
Chiron.red				-0,52	-0,52			-0,63	-0,63	-0,63
Chiron. gr.				0,19	0,25			0,50	0,41	0,25
Chiron.pup.								0,09	0,08	0,26
Trichoptera				0,09	-0,17			-0,03	0,08	0,01
Mollusca				-0,04	0,44			-0,03	0,01	0,04
Annelida				0,20	-0,06			0,09	0,06	0,08
Nematoda								-0,05	-0,05	-0,05
Ostracoda				0,09	0,07			0,02	0,02	0,03
Other ben.								0,04	0,01	0,01

TABLE 4
SEASONAL VALUES OF THE STRAUSS INDEX OF FOOD SELECTION FOR EACH LENGTH GROUP OF *O. MYKISS*. THE INDEX RANGES FROM -1 TO +1 WITH POSITIVE VALUES INDICATING PREFERENCE AND NEGATIVE VALUES INDICATING AVOIDANCE. ZERO INDICATES RANDOM FEEDING

	Autumn 1984			Winter 1984			Spring 1984			Summer 1984/85	
FL (cm)	<20	20-24,9	25-29,9	25-29,9	30-34,9	35-39,9	25-29,9	30-34,9	35-39,9	35-39,9	40-44,9
Zooplankton											
Cladocera	0,27	0,07	0,22	0,26	0,24	0,30	0,06	0,03	0,01	0,17	-0,83
Copepoda	-0,27	-0,06	-0,20	-0,26	-0,24	-0,30	-0,06	-0,03	-0,01	-0,18	-0,18
Micronekton											
Corixidae	-0,54	-0,50	0,28	0,06	-0,34	-0,46	-0,27	-0,32	-0,31	-0,45	0,29
Notonectidae	-0,24	0,23	-0,06	0,00	-0,05	-0,07	-0,003	0,09	0,02	-0,21	-0,21
Ephemeroptera	-0,13	0,37	-0,13	-0,10	0,14	0,47	0,29	-0,45	-0,03	0,40	-0,15
Odonata	-0,09	-0,09	-0,09	0,04	0,24	0,05	-0,02	0,68	0,31	0,26	0,07
Zoobenthos											
Chironomidae. red				-0,52	-0,41	-0,51				-0,63	-0,63
Chironomidae. gr.				0,78	0,64	0,74				0,93	-0,05
Chironomidae pup.				0,06	0,12	0,14				0,01	
Trichoptera				-0,16	-0,17	-0,17				-0,03	-0,03
Mollusca				-0,09	-0,11	-0,13				-0,24	-0,24
Annelida				-0,06	-0,06	-0,06					
Nematoda										-0,05	-0,05
Ostracoda					-0,001	-0,001	-0,001				
Other benthos										0,001	

South Africa have higher turbidities (Walmsley and Bruwer, 1980). Turbidities of up to 99 NTU were recorded in the upper section (Locality 4) of Sterkfontein Dam. This area had the highest concentration of *B. aeneus* (56,6% of total). The zooplankton density (mass and numbers) was generally lower in the turbid section of the reservoir compared to areas with a higher transparency (Dörgeloh, 1986). It can therefore be assumed that *B. aeneus* in Sterkfontein Dam lived under similar conditions (high turbidity and low zooplankton density) to those in Le Roux Dam, which is a turbid reservoir (Allanson et al., 1983).

Eccles (1983) and Gaigher and Fourie (1984), who worked in Le Roux Dam and in Wuras Dam respectively, showed that the diet of *B. aeneus* (15 to 30 cm FL) changed from planktivorous food to plant material at approximately 30 cm long. It is suggested that larger *B. aeneus* could no longer maintain their energy requirements from zooplankton and therefore had to resort to plant material. The upper size limit at which *B. aeneus* can sustain itself on zooplankton is determined by zooplankton density and water clarity (Tomasson et al., 1983). Eccles (1983) indicated that the preference index for plant material correlated positively with fish length and negatively with the absence of zooplankton. Larger *B. aeneus* in Le Roux Dam returned to a benthic mode of living, incorporating a wide variety of food in their diet including benthic invertebrates, detritus, filamentous algae and vascular plants (Tomasson et al., 1983). A similar physical environment in Le Roux Dam and the upper section of Sterkfontein Dam could partly explain the herbivorous/benthivorous diet of larger specimens (≥30 cm) in the latter reservoir. A switch in diet could not be detected in Sterkfontein Dam, because only a few fish smaller than 30 cm were caught.

Chironomid larvae of various species are found in red, green and yellow colourations (Scholtz and Holm, 1985). Red chironomid larvae (also called blood-worm) are benthic, living in the mud at the bottom of ponds, whereas green chironomid larvae remain near the water surface (Skaife, 1979). The difference in habitat preference between the 2 groups of larval chironomid could be responsible for the difference in prey selection.

C. gariepinus

Stomach analyses indicated that *C. gariepinus* preyed on a large variety of food items, as was also found by Bruton (1979) in Lake Sibaya. In Sterkfontein Dam, *C. gariepinus* consumed zoobenthos, plant material, zooplankton and micronekton, in this order. From identifiable material it appeared that *C. gariepinus* preyed less selectively throughout the year than either *B. aeneus* or *O. mykiss*.

Tomasson *et al.* (1983) indicated that *C. gariepinus* in Le Roux Dam changed to a piscivorous diet when about 40 cm long. Since no *C. gariepinus* smaller than 30 cm and only a few of about 40 cm length were caught in Sterkfontein Dam, a switch in diet could not be determined. Only a few (3,3%) of the larger specimens (≥70 cm) caught, preyed on fish, although minnows (*Barbus anoplus* and *Barbus pallidus*) were abundant in Sterkfontein Dam. The insignificant occurrence of piscivory in Sterkfontein Dam could be ascribed to the low turbidity (or high transparency) of the water (≤10 NTU). The visibility of predators would favour the prey and not a sensory-feeding predator such as *C. gariepinus*. Furthermore, the abundance of vegetation in the littoral zone serves as protection for forage fish, thereby reducing the feeding efficiency of *C. gariepinus*.

O. mykiss

Stomach analyses and the Strauss index of food selection showed that Cladocera (mainly *Daphnia*), micronekton and green chironomid larvae were the most selected prey species by *O. mykiss* in Sterkfontein Dam (Table 4). This parallels the findings of Marrin and Erman (1982) who worked in Stampede Reservoir (California), Taylor and Gerking (1980) and Irvine and Northcote (1982). The fairly large amount of plant material was probably ingested while feeding on micronekton. Because of the greater abundance of insects during summer, terrestrial insects became more important as a food source.

Marrin and Erman (1982) found that rainbow trout becomes piscivorous at a size of approximately 30 cm. *O. mykiss* in Sterkfontein Dam did not become piscivorous, although minnows were abundant (Dörgeloh, 1986). The abundance of inundated grass in the littoral zone which potential forage fish can use as a refuge probably reduced the predation success of *O. mykiss*.

Conclusion

The herbivorous/benthivorous diet of larger *B. aeneus* (≥30 cm) in Sterkfontein Dam follows the general dietary trend of larger specimens in other turbid lentic systems.

The low turbidities in Sterkfontein Dam probably force *C. gariepinus* to resort to a benthivorous feeding strategy. *C. gariepinus* is a "non-specialised" predator relying on its sensory organs to locate prey. Hunting in clear water is therefore to its disadvantage and will consequently affect its feeding efficiency. A reduced feeding efficiency can be indicated by a poor physical condition. Dörgeloh (1986) showed that *C. gariepinus* in Sterkfontein Dam was in a poorer condition than that in Verwoerd Dam. The latter reservoir has high turbidity levels (Walmsley and Bruwer, 1980). It appears that Sterkfontein Dam, with low mean turbidities and minimum and maximum temperatures of 8°C and 22°C respectively, is not an optimal habitat for *C. gariepinus*.

O. mykiss is predominantly planktivorous. The absence of fish in its diet probably stems from the abundance of zooplankton and the sufficient cover available for forage fish to hide in. It can be concluded that *O. mykiss* in Sterkfontein Dam does not prey on the indigenous fish species to any measurable degree and will have little effect on these populations.

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