

Some ecological and socio-economic impacts of an angling competition in the Zambezi River, Namibia

Tor F. Næsje, Clinton J. Hay, Servatius Kapirika,
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Abstract

Næsje, T.F., Hay, C.J., Kapirika, S., Sandlund, O.T. & Thorstad, E.B. 2001. Some ecological and socio-economic impacts of an angling competition in the Zambezi River, Namibia. – NINA•NIKU Project Report 14: 1 – 31.

This report describes and discusses some ecological and socio-economic aspects of the Nwanyi Millennium Open Fishing Competition. The competition was organised by the Nwanyi Angling Club, Katima Mulilo, 14 – 16 September 2000.

The competition was held at the Kalimbeza Fishing Camp on a side channel to the Zambezi River approximately 30 km downstream from Katima Mulilo, Namibia. In this section of the Zambezi, the river forms the border between Namibia and Zambia. September is in the low water period of the river, with a mean water discharge of 236 m³/s in September 2000. Only the main channel, the deeper side channels and backwaters were filled with water.

A total of 40 anglers were registered as participants. Three of these anglers were women, and four were juniors (< 16 years old). This is approximately 50% of the number expected after the wide distribution of the invitation. The interest this year was probably restricted by recent hostilities in Western Caprivi, causing travellers from parts of Namibia to depend on military convoys to reach Eastern Caprivi.

Thirtyfour of the 40 participants were from Namibia. Fourteen were locals from Katima Mulilo, 12 were from Windhoek, and four from Rundu. Six participants came from Zambia and Zimbabwe (Victoria Falls).

The participants were organised in ten four-person teams. Nine of the teams used two boats with two anglers per boat, while the last team used one boat with four anglers. The boats used were relatively small speed boats with engines between 25 and 2 x 60 hp. The fishing period lasted from 0600 to 1800 hrs on 14 and 15 September, and from 0600 to 1600 hrs on 16 September. The river section available to anglers (148 km) was restricted to Namibian territory, which goes out to the deepest part of the main river. The positions of the participants on the river were recorded by means of GPS. The first two days the anglers used a river stretch of 84 km, including both upstream and downstream areas from Kalimbeza. The third day, fishing was located to a 24 km stretch approximately 30 km downstream from Kalimbeza.

The competition rules were based on a system with bag limits for each species or species group. In addition weight points were given for individual fish above a certain minimum size. A total of 538 fish were brought ashore, and 293

additional fish were reported as caught and released during the competition. These 831 fish weighed a total of 1190 kg, and represented 13 species or species groups. The dominant species in terms of number of fish were nembwe (*Serranochromis robustus*), sharptooth catfish (*Clarias gariepinus*) and spotted squeaker (*Synodontis nigromaculatus*). In terms of weight, the dominant species were sharptooth catfish and nembwe. The largest catfish weighed 9.7 kg, whereas the largest tigerfish (*Hydrocynus vittatus*) weighed 7.5 kg. The largest cichlid was a nembwe weighing 3.0 kg. The average catch per hour of allowed fishing time was 0.88 kg, but the success of the anglers varied greatly. Maximum attainable number of points per day was 66. Only one angler attained an average score between 50 and 60 points, whereas 28 % of the anglers reached an average of 0 - 10 points.

The anglers' catches are clearly size selective, catching larger fish than the scientific survey catches from the same area and season. Moreover four cichlid species caught by the anglers were not recorded in the survey catches. An index of relative importance of the different fish species (% IRI) differed greatly between anglers' catches and survey catches. Based on this index the only two species represented both among the 13 most important species in the anglers' and survey catches were the squeakers (*Synodontis* spp., ranked as 2. in the survey and 9. in anglers catches) and tigerfish (ranked as 3. in both catches).

The total expense laid down by the participants to take part in the competition is calculated at approximately N\$ 73,000 (US\$ 9,417), or N\$ 1,825 (US\$ 235) per angler. Out of this, approximately 60% (N\$ 43,000; US\$ 5,547, or N\$ 1,075; US\$ 139, per angler) were spent locally. The organisers' budget for the event was approximately N\$ 55,000 (US\$ 7,097).

Key-words: Fish catch, sport fishery, CPUE, exploitation, selectivity, socio-economic returns, gear use, area use

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Preface

The White Paper «Responsible Management of the Inland Fisheries of Namibia» was finalised in December 1995, and forms the basis for a new law and regulations concerning fish resources management in the different freshwater systems in Namibia. These have the objectives of ensuring a sustainable and optimal utilisation of the freshwater resources, and to favour utilisation of fish resources by subsistence households over commercialisation. The Zambezi River is one of the most important of the perennial rivers in Namibia, and freshwater fish are a very important food source for local inhabitants. The exploitation of fish resources in the river may be classified into three categories: subsistence, commercial and recreational fisheries. Fishing competitions are an important part of the recreational fisheries. The objectives of this report are to document the ecological and socio-economical impact of a fishing competition in the Namibian sector of the Zambezi River held during low water. The results from this study will be incorporated in a later report where we will give applicable guidelines for regulations of the inland fisheries in the Zambezi River. The studies of the fish resources and the utilisation of the fish populations will further enable the Ministry of Fisheries and Marine Resources to implement the proposed law and regulations necessary for sustainable management of the fish resources in the river.

This project has been a collaboration between Freshwater Fish Institute of the Ministry of Fisheries and Marine Resources (MFMR), Namibia, and the Norwegian Institute for Nature Research (NINA). The work has received economic support from the Norwegian Agency for Development Cooperation (NORAD), MFMR and NINA. We would like to express our sincere thanks to all the participants in the competition, and the organisers Doug Wegner, Strijs Coertzen, Dirk Roets, Lue Scheepers and Tommy Rocher for their collaboration. We would also like to thank Rolly and Nicoline Thomson for extensive help during our stay in Caprivi. We are also thankful to Finn Økland, Randi Saksgård, Knut Kringstad, Kari Sivertsen, and the Department of Water Affairs, Namibia, for giving valuable help with the report. Øystein Aas provided valuable comments on an earlier draft of the report.

Windhoek and Trondheim, March 2001

Clinton J. Hay
Project leader, MFMR

Tor F. Næsje
Project leader, NINA

1 Introduction

Tourism and recreational activities are important elements bringing new income opportunities and economic activities to rural areas in Africa and elsewhere. Along the great African rivers, angling opportunities are excellent and among the most important attractants for tourists. Together with wildlife viewing, angling forms one of the foundations for numerous tourist lodges and other businesses catering for the needs of tourists. This is also the case in Namibia, particularly in the eastern Caprivi. Both the Zambezi and the Chobe Rivers have a large number of excellent fish species for the recreational fishermen, such as tigerfish (*Hydrocynus vittatus*) and nembwe (*Serranochromis robustus*). The tourist establishments usually provide jobs and income opportunities to the local community. Thus, angling differs from the subsistence fisheries, particularly because it brings money instead of food to the local communities.

Angling may to a certain extent compete with subsistence and commercial fisheries for the same fish resources. Although subsistence fisheries do not only target the large individuals of the attractive angling species of fish, heavy subsistence fisheries and commercial fisheries may deplete the fish stocks so that there are very few large fish left (Hay et al. 2000). Tourist and sport fishing activities may also exert a considerable fishing pressure on the local fishing stocks and attractive fishing species for local fisherfolk. In addition, the exercise of subsistence and commercial fisheries, for example when gill nets and seines are used, may also create hindrance for angling activities, and vice versa, as for example the use of speedboats and angling gear may create problems for the traditional fishing activities.

Angling may be an important element in the utilisation of the fish stocks in the Namibian rivers. In particular, angling competitions attract many people and may mean a substantial harvest of fish over a few days. Still, very little is known about the economic and ecological impacts of fishing competitions in this area. Hence, as background data for a management plan for utilisation of the fish resources in Zambezi, it is imperative to study the possible impact of the recreational fisheries.

This report describes a fishing competition in the Namibian part of the Zambezi River from 14 to 16 September 2000. Information was collected regarding socio-economic aspects of the participants, their catch, fishing methods and effort, the geographical areas fished, and the biological characteristics of their catches.

2 Study area

Within Africa, Namibia's climate is second in aridity only to Sahara. The country's average annual rainfall is less than 250 mm, and the mean annual evaporation may be as high as 3,700 mm in some areas. Steep gradients characterise the rainfall in Namibia, from tropical semi-humid in our study area in the northeast (Caprivi) to hyper arid in the west (Blackie et al. 1998). Sixty nine percent of the country is regarded as semi-arid.

The Kwando - Linyanti and Zambezi – Chobe river systems in north-eastern Namibia have gentle gradients and extensive seasonal flood plains, backwaters and seasonal and permanent swamps. In years with high flooding, which happened regularly in the period 1947 – 1981, the systems are inter-linked and large parts of the eastern Caprivi become a large flood plain filling the presently desiccated Lake Liambezi.

The annual flood cycle of the Zambezi River reflects the seasonal rainfall in the catchment area. The water level usually reaches its peak during March, April and May with low water levels during September - November. Mean annual flows may vary from less than 500 m³/s to more than 2000 m³/s. The low water period has a concentration effect on the fish resource when the water is mainly restricted to the main stream, channels and some back water habitats. Flood plain habitats only become inundated during the summer months when the water level starts to rise. The length of the period these flood plains are submerged depends on the duration and magnitude of the flood. Certain fish species migrate onto these flood plains to feed or spawn during different times of the flood cycle (Welcomme 1979), and most Namibian fish species (78 %) are floodplain dependent for larval and juvenile stages and migrate between flood plains and the main river (Barnard 1998).

The angling competition described in this report was based at the Kalimbeza Fishing Camp, situated on the Kalimbeza Channel, which is a side channel of the Zambezi River approximately 30 km downstream from Katima Mulilo (**figure 1**). In this area the border between Namibia and Zambia follows the Zambezi River, with the deepest part of the river forming the borderline. The anglers in the competition were instructed to restrict their fishing activities to the Namibian side of the river.

The competition was held during the low water period (September) which restricted the fish to the main stream, channels and backwater habitats. In this area, the Zambezi River had a mean annual water discharge of 921 m³/s in year 2000, and the mean discharge was 236 m³/s in September 2000 (Department of Water Affairs, Namibia).

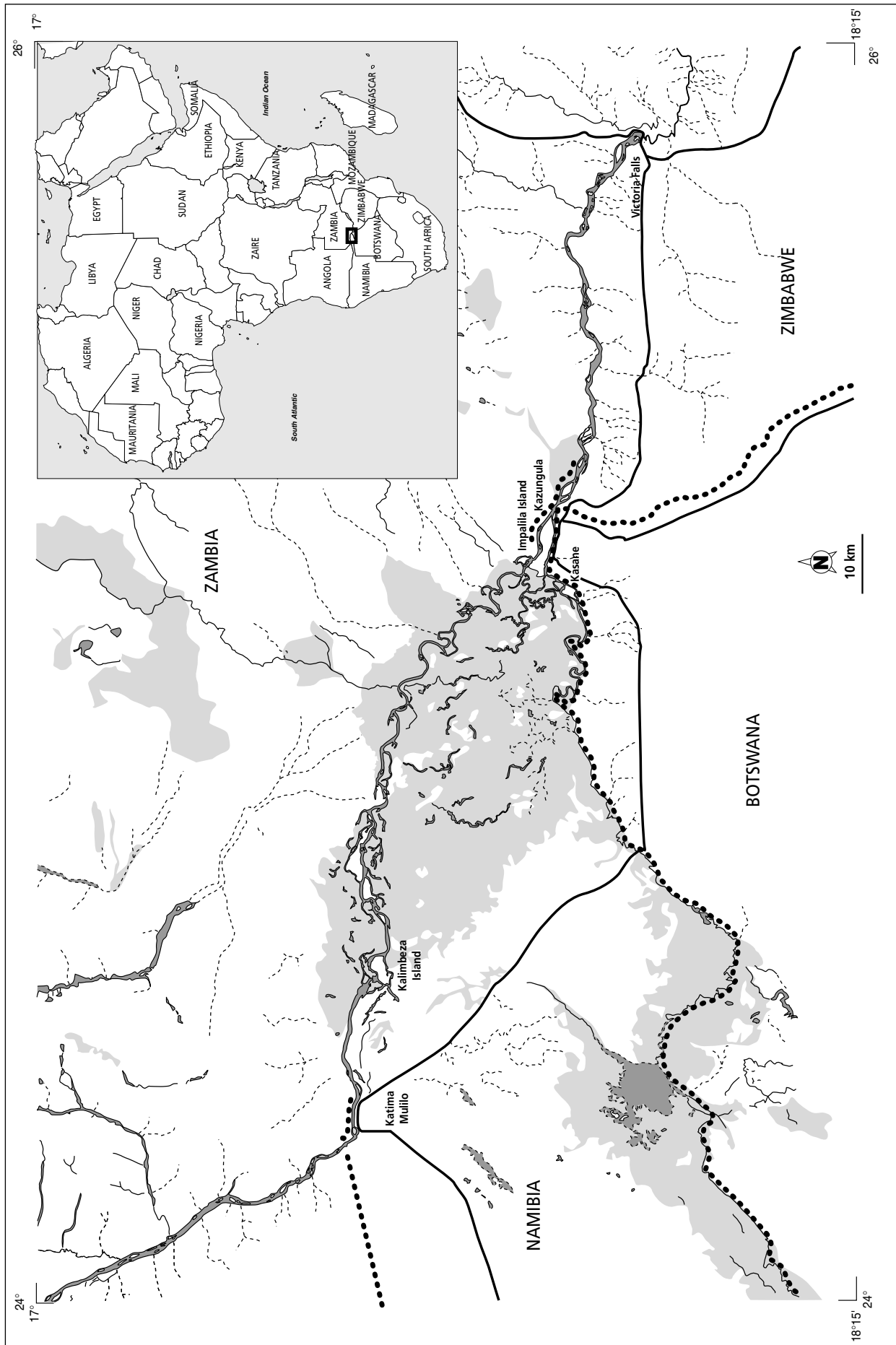


Figure 1. The Zambezi River in the north-eastern Namibia where the fishing competition was held 14 - 16 September 2000. The competition was based at Kalimbeza Channel.

3 Material and methods

3.1 The arrangement and participation

The Nwanyi Millennium Open Fishing Competition was organised by the Nwanyi Angling Club, Katima Mulilo. The Club has been organising fishing competitions for their members as often as once a month since 1986, but this was their first arrangement of an open, international competition. However, various lodges in the area have previously arranged similar events.

The invitation (see **annex 1**) was distributed widely to angling clubs, sports shops, etc. The response to the invitation was lower than expected (approximately 50 %), most likely due to hostile activities along the Angolan border. Many potential participants might have declined the invitation because they did not want to travel in military convoy through Western Caprivi.

In total, 40 participants registered as 4 person teams, i.e., 10 teams. Most teams consisted of two boats, with two persons in each boat. The rules permitted two rods in use per person at the same time, and two hooks per rod. Nineteen speedboats were used in the competition. The competition fishing period lasted from 0600 to 1800 hrs the first and second day, and from 0600 to 1600 hrs the third day. Weighing and recording of the catches were done at the Kalimbeza Fishing Camp. Dr. Clinton Hay, Ministry of Fisheries and Marine Resources, was the weigh master and responsible for identifying species. The organisers of the competition did not restrict the allowed fishing area inside Namibia. Thus, the Namibian side of a 148 km long section of the river was available to the participants.

The rules for fishing competitions in this area have changed over the years. Presently, there is a bag limit per species or group of species (**table 1, annex 2**). Within each species there is a minimum size of fish that may be entered in the competition, and the anglers are encouraged to release all fish below the weight limits. The rules and regulations of the competition were communicated to the team captains at the "Captains' Meeting" on the evening before the start of the event.

The competition rules encourage catching few and large fish, with points given according to the size of individual fish. However, the fishing activity may wound and kill more fish than recorded in the competition, and, hence, the number of fish caught exceed the bag limit. During this year's event, we recorded and sampled this additional catch. In addition, boat captains recorded the species and approximate weights of all fish caught, including those released back into the river. This facilitates a fairly reliable estimate of the total outtake of fish during the competition.

3.2 Pre-competition communication with fishermen

Through close contact with the organisers prior to the event, we were able to provide information to the participants at the Captains' Meeting. In addition to some general information on the fisheries investigations of MFMR in the Zambezi River, we informed more specifically about the objectives of the investigation on the fishing competition. All captains were handed a notebook to record their total catch. On each fish they were asked to record species,

Table 1. Minimum weight of fish allowed to be recorded in the competition and maximum number of fish to be recorded per day of the relevant species or species groups in the Nwanyi Millennium Open Fishing Competition in 2000.

Species		Min. weight	No. of fish allowed
Threespot tilapia	<i>Oreochromis andersonii</i>	1.0 kg	A total of 10 bream, irrespective of fish species
Nembwe	<i>Serranochromis robustus</i>	1.5 kg	
Humpback largemouth	<i>Serranochromis altus</i>	1.0 kg	
Thinface largemouth	<i>Serranochromis angusticeps</i>	0.5 kg	
Green happy	<i>Sargochromis codringtonii</i>	0.5 kg	
Pink happy	<i>Sargochromis giardi</i>	0.5 kg	
Greenhead tilapia	<i>Oreochromis macrochir</i>	0.5 kg	
Redbreast tilapia	<i>Tilapia rendalli</i>	0.5 kg	
Catfish ("Barbel")*	<i>Clarias gariepinus</i> or <i>ngamensis</i>	3.0 kg	3 fish
Squeaker *	<i>Synodontis</i> spp.	0.15 kg	3 fish
Tigerfish	<i>Hydrocynus vittatus</i>	2.5 kg	4 fish

* The competition rules did not distinguish between the two large catfish species nor the seven species of squeakers.

approximate weight, whether the fish was caught while trolling or lying stationary, and if the fish was kept (i.e. killed) or released.

The captains were also requested to provide information on the home addresses of their team members, the number of participants on their teams, the number of accompanying persons, their type of accommodation during the competition, and their length of stay in the area. This information facilitated an estimate of the economic investment by competitors to participate in the event in terms of travelling, accommodation costs, and the amount of money spent in the local area.

3.3 Sampling programme

The river was patrolled during all three days of the competition in order to record the section of the river utilised by the competing anglers. The position of each boat was recorded with GPS. The number of fishermen aboard, the number of rods in use, and their method of fishing (trolling or stationary) were noted. The fish caught in the competition were weight and length measured, sexed and the maturity stage determined every evening after the competitors had returned to the base. The catches were recorded through 1) the captains' reports, 2) the recording of fish for the competition, and 3) by measuring, weighing and sampling all surplus fish that were brought to land, but not entered in the competition.

3.4 MFMR fish survey and importance of species

Ministry of Fisheries and Marine Resources has been surveying the fish populations in the Namibian part of the Zambezi River at high and low water annually since 1997. One of the goals of these studies has been to describe the fish populations and fish resources in the river. Survey gillnets of different mesh sizes and numerous other gears such as seines, dip nets, traps and rotenone, have been used to sample the fish populations. In this survey, all together 75 fish species have been found in the area of the fishing competition.

To evaluate the effects of different forms of exploitation, for example subsistence or recreation fisheries, it is important to know which part of the fish population that is exploited, and the proportions of mature individuals caught. An "index of relative importance", IRI, (equation 1) (Pinkas *et al.* 1971, Caddy & Sharp 1986, Kolding 1989, 1999) may be used to find the most important species in the catches from different sampling localities. This index is a measure of relative abundance or commonness of the different species in the catch, and is calculated as:

$$\% \text{ IRI} = ((\% N_j + \% W_j) * \% F_j / (\% N_j + \% W_j) * \% F_j) * 100 \quad (1)$$

where $j = 1 - S$, $\% N_j$ and $\% W_j$ is percentage number and weight, respectively, of each species in the total catch, $\% F_j$ is percentage frequency of occurrence of each species in the total number of settings, and S is the total number of species.

4 Results

4.1 Anglers

With a few exceptions, all the 40 participants fished all days and most of the allowed fishing time (**annex 3**). Most of the participants (85%) lived in Namibia, mainly in Katima Mulilo, Windhoek, and Rundu, while some participants were from Zambia and Zimbabwe (Victoria Falls) (**table 2**). All the anglers in three four-person teams were residents of Katima Mulilo, whereas two teams were from Windhoek and one from Rundu. Two teams had mixed crews, originating in Katima Mulilo and Windhoek, and Katima Mulilo and Victoria Falls, respectively. The remaining two teams were mixed crews from Zambia/Zimbabwe, and from Windhoek and the Namibian coast (Swakopmund and Henties Bay). Of the non-resident participants, 67% stayed at camping sites, and 17% at local lodges, and 17% with friends and relatives in the area. Persons not participating in the competition accompanied some of the non-resident anglers. According to our information, there were five accompanying persons (i.e., approximately 0.2 accompanying persons per non-resident angler). This number, however, might have been larger. The accompanying persons were mainly spouse and children of the anglers and helping hands. The length of stay for non-resident anglers varied from 4 to 14 days, with a mean of 6.8 days.

4.2 Equipment and river section used

The 19 boats used were small (15 - 20 feet) open boats with outboard engines. The engine size varied between 25 and 85 hp, while one boat had 2 x 60 hp engines. The majority of engines (12 of 19 boats) were 60 - 85 hp. The reason for the relatively large engines on the small boats is the large distances often travelled by fishermen on the rivers. However, larger boats would also be ill suited to the shallow stretches in many sections of the river during low water.

Table 2. Place of origin of participants in the angling competition 14 - 16 September 2000 in the Zambezi River.

Place of origin	No. of participants	Percent
Katima Mulilo	16	40
Windhoek	12	30
Rundu	4	10
The Namibian coast	2	5
Zimbabwe	4	10
Zambia	2	5
Total	40	100

The number of persons per boat during the competition was usually 2, although one boat had 4 persons fishing. Normally, each person fished with one rod. Mainly three methods of fishing were seen: 1) trolling with slow-moving boat and two (occasionally three) lures trailing the boat; 2) spinning with lures from a stationary boat or from land; and 3) baiting with worms from a stationary boat or from land.

According to the GPS recorded positions of boats during the competition, the participants used the same 84 km long river stretch the first two days (**figure 2**). The river stretch used the third day was much smaller, only 24 km. The third day, however, the participants travelled 30 km downstream to reach this fishing area.

Based on the fishing reports filled in by the boat captains (totally 40 day-reports) 70% of the teams caught fish both during trolling and stationary fishing, while 20% only caught fish while trolling and 10% only during stationary fishing.

4.3 Weight and number of fish caught

All together, 13 species or species groups were caught during the competition (**table 3**). Nine of these were cichlids (breams). Sharptooth catfish and tigerfish were also important species. A number of species of squeakers were caught, but only the spotted squeaker (*Synodontis nigromaculatus*) was identified to species level. The other species in this genus were pooled.

A total of 538 fish were brought ashore during the three-day competition (**table 3**). The species, numbers and approximate weight of released fish were reported by 9 of the 10 teams in the competition. According to these reports, a minimum of 293 fish were caught and released by the participants (**table 3**).

Catches in numbers were similar the first two days (202 and 201 fish), whereas the shorter third day yielded a lower catch (135 fish). This was also true if the catches are adjusted for the actual number of fishing hours, as the total catch per unit effort (CPUE) were 16.8, 16.7 and 13.5 fish per hour during the three days, respectively. The dominant species in terms of number of fish were nembwe (179 fish, 33 % of total catch), sharptooth catfish (barbel) (99 fish, 18 %) and spotted squeaker (71 fish, 13 %) (**table 3**). The cichlids green happy, thinface and brownspot largemouth were only caught in low numbers (1-5 fish). The relative proportions of fish species in the catches were the same if we include released fish.

The fishermen use different methods and tackles to catch different fish species. Nembwe and tigerfish were mainly caught trolling with spoons and solid tackle, while the rest of the cichlids were caught both trolling with spinners and lying still using light tackle with spinners or worms. Catfish

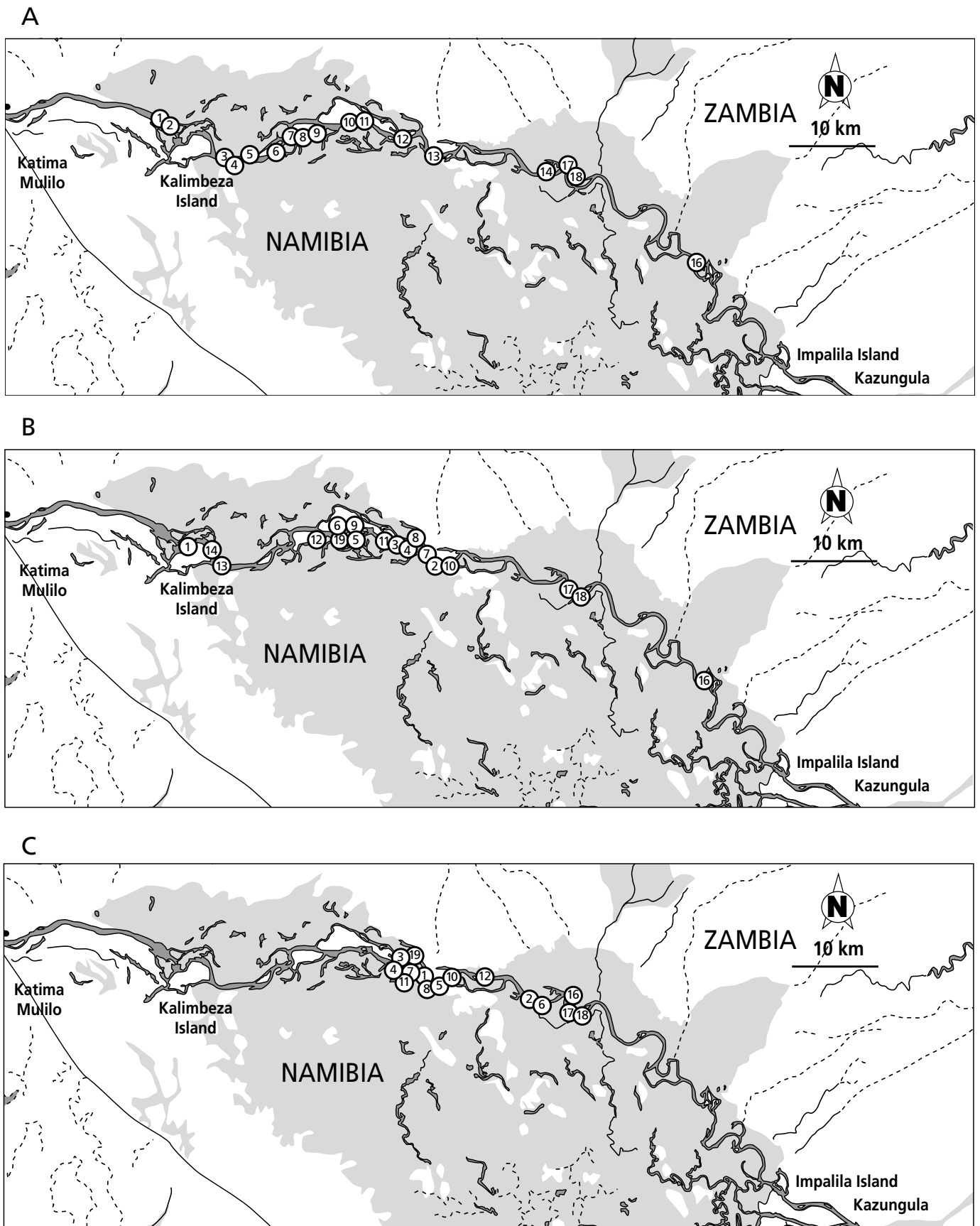


Figure 2. The sections of the Zambezi River used by the anglers during day one (A), day two (B) and day three (C) of the fishing competition 14 - 16 September 2000. The different boats were positioned with GPS the first time registered the actual day. Each boat has been given a separate number.

Table 3. Total number of fish caught and weighted in the competition (Tot. comp.), 14 - 16 September 2000, and the minimum number of fish caught and released during the competition (Released).

Species	Date	14.	15.	16.	Number of fish	
					Tot. comp.	Released
Sharptooth catfish*	<i>Clarias gariepinus</i>	40	40	19	99	13
Tigerfish	<i>Hydrocynus vittatus</i>	14	8	7	29	33
Nembwe	<i>Serranochromis robustus</i>	67	64	48	179	77
Threespot tilapia	<i>Oreochromis andersonii</i>	16	10	8	34	6
Redbreast tilapia	<i>Tilapia rendalli</i>	15	9	7	31	1
Humpback largemouth	<i>Serranochromis altus</i>	5	4	11	20	1
Pink happy	<i>Sargochromis giardi</i>	2	11	6	19	2
Greenhead tilapia	<i>Oreochromis macrochir</i>	7	4	2	13	2
Green happy	<i>Sargochromis codringtonii</i>	2	2	1	5	
Thinface largemouth	<i>Serranochromis angusticeps</i>	2	1	0	3	3
Brownsport largemouth	<i>Serranochromis thumbergi</i>	1	0	0	1	
Spotted squeaker	<i>Synodontis nigromaculatus</i>	19	32	20	71	155
Squeakers	<i>Synodontis spp</i>	12	16	6	34	
Total		202	201	135	538	293

* All catfish caught were identified as sharptooth.

Table 4. Recorded weight of catches (kg) during the competition (Tot. comp.), 14 - 16 September 2000, and the estimated weight of released fish (Released).

Species	Date	14.	15.	16.	Weight (kg)	
					Tot. comp.	Released
Sharptooth catfish	<i>Clarias gariepinus</i>	175.9	173.1	114.2	463.2	32.6
Tigerfish	<i>Hydrocynus vittatus</i>	61.1	20.6	16.8	98.5	25.6
Nembwe	<i>Serranochromis robustus</i>	114.3	113.5	84.4	312.2	85.0
Threespot tilapia	<i>Oreochromis andersonii</i>	16.1	14.6	8.6	39.2	4.6
Humpback largemouth	<i>Serranochromis altus</i>	6.3	6.3	15.8	28.3	0.8
Redbreast tilapia	<i>Tilapia rendalli</i>	14.3	6.3	3.8	24.4	0.4
Pink happy	<i>Sargochromis giardi</i>	2.0	11.7	6.7	20.3	1.1
Greenhead tilapia	<i>Oreochromis macrochir</i>	3.6	2.8	1.0	7.4	0.8
Green happy	<i>Sargochromis codringtonii</i>	1.3	1.3	0.1	3.7	
Thinface largemouth	<i>Serranochromis angusticeps</i>	2.2	1.2	0.0	3.4	2.9
Brownsport largemouth	<i>Serranochromis thumbergi</i>	1.0	0.0	0.0	1.0	
Spotted squeaker	<i>Synodontis nigromaculatus</i>	3.0	5.2	3.5	11.8	17.7
Squeakers	<i>Synodontis spp</i>	1.7	1.9	0.9	4.6	
Total		402.8	358.5	255.8	1018.0	171.5

were caught both lying stationary and trolling with solid tackle, while squeakers were caught lying stationary fishing with worms or other forms of bait.

In terms of weight, 1018 kg of fish was recorded in the competition (table 4). Catch per day decreased from 403 kg the first day, to 359 kg the second day and 256 kg the last day. Dominating species by weight were sharptooth catfish (463 kg), and nembwe (312 kg), constituting more

than 46 % and 31 % of the total catch, respectively. Tigerfish constituted 10 %, while none of the other species represented more than 5 %.

The weight of the total catch, including both killed and released fish, was estimated to minimum 1190 kg of fish, or a mean of 30 kg per participant. Each participant caught an average of 0.88 kg fish per hour of allowed fishing time.

The size of fish brought ashore reflects that the participants would only bring ashore point-giving fish. The highest mean weight was recorded for sharptooth catfish at 4.7 kg, whereas tigerfish entered in the competition had a mean size of 3.4 kg (**table 5**). The cichlids with the largest mean weight were nembwe (1.7 kg) and humpback largemouth (1.4 kg).

The individual catches and results from the fishing competition varied largely between the participants (**annex 3**). No participants managed to fill their daily competition quota for

any species or species group, with the exception of 13 day-catches of catfish and 5 day-catches of squeaker.

Only one person did not catch any fish during the three days of fishing. The maximum average score was 54 points during the three days. Maximum attained day score was 66 points. Most people (28 %) got an average score of 0 – 10 points, and more than 50 % of the participants got between 0 and 20 points (**figure 3**). The mean score per person declined from the 0 – 10 point group (13 persons) to the 50 – 60 points group (1 person).

Table 5. Mean weight (kg) of the various species in recorded catches during each day of the competition, 14 - 16 September 2000, and in the total catch. Released fish are not included. Only species represented by more than ten individuals have been included (see **table 3**).

Species	Date	Mean weight (kg)			Total
		14.	15.	16.	
Sharptooth catfish	<i>Clarias gariepinus</i>	4.40	4.33	6.01	4.68
Tigerfish	<i>Hydrocynus vittatus</i>	4.36	2.58	2.40	3.40
Threespot tilapia	<i>Oreochromis andersonii</i>	1.01	1.46	1.08	1.15
Greenhead tilapia	<i>Oreochromis macrochir</i>	0.51	0.70	0.50	0.57
Pink happy	<i>Sargochromis giardi</i>	1.00	1.06	1.12	1.07
Humpback largemouth	<i>Serranochromis altus</i>	1.26	1.58	1.44	1.42
Nembwe	<i>Serranochromis robustus</i>	1.71	1.77	1.76	1.74
Redbreast tilapia	<i>Tilapia rendalli</i>	0.95	0.70	0.54	0.79
Spotted squeaker	<i>Synodontis nigromaculatus</i>	0.16	0.16	0.18	0.17
Squeakers	<i>Synodontis spp.</i>	0.14	0.12	0.15	0.14

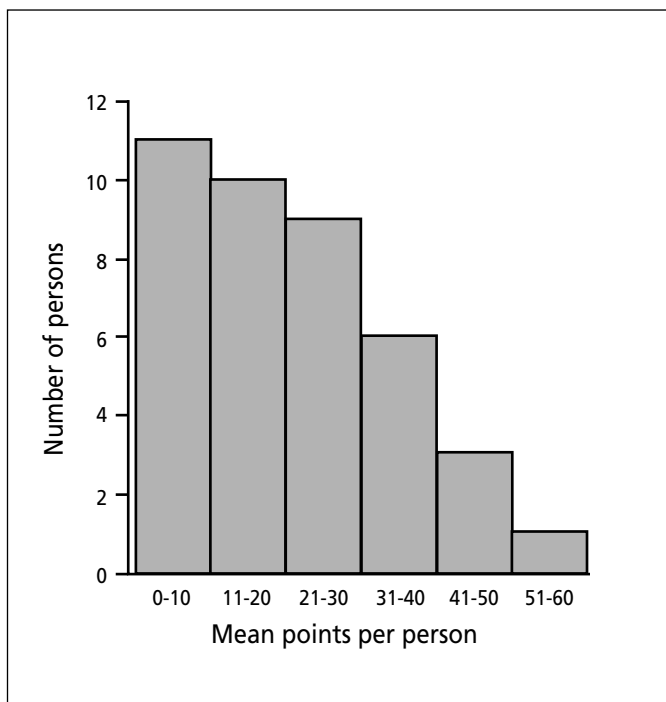


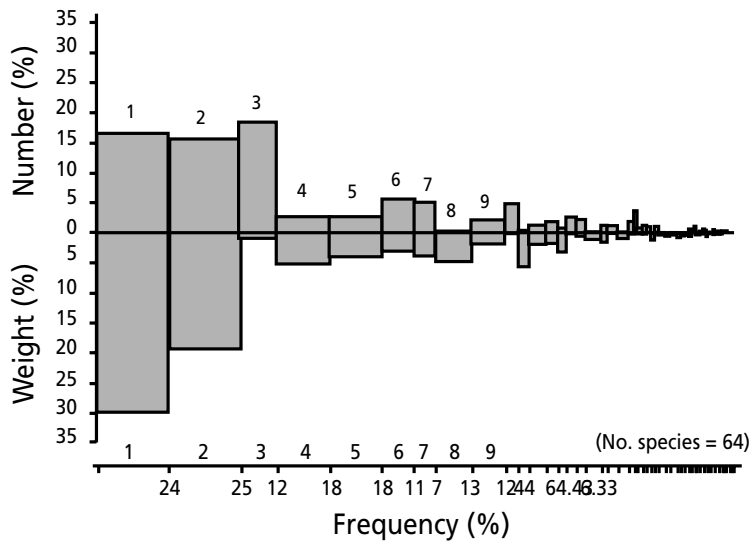
Figure 3. Mean number of points scored per day by the participants in the fishing competition 14 - 16 September 2000 in the Zambezi River.

4.4 Relative importance of species

As an expression of the selectivity of the sport fishery or which part of the fishing populations they exploited, we can compare the species composition (IRI) in the catches from the competition (September) with the fish populations in the river at low water (September – November) (**figure 4** and **table 6**).

The relative importance (IRI) of fish species caught in the competition was very different from the distribution of fish species found in the fish survey. Most strikingly, four out of the 13 species or species groups caught during the competition were not at all registered in the fishing survey in the same area. These were redbreast tilapia, pink happy, green happy and brownspot largemouth (**table 6**). Most important of the fish species caught in the competition, according to the index of relative importance (IRI %), were nembwe (42 %), catfish (20 %), and tigerfish (17 %), representing 79 out of 100 %. While important species/species groups in both fisheries, were *Synodontis* spp. (IRI: ranked 2 and 9) and tigerfish (IRI: ranked 3 and 3). In the fish survey, the small striped robber (*Brycinus lateralis*) was most important

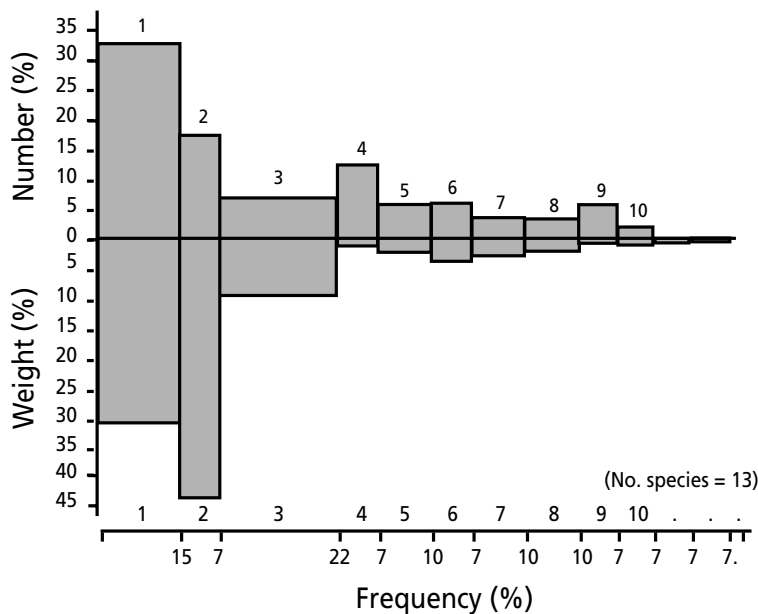
A



Gillnets and other gears

- 1 *Brycinus lateralis*
- 2 *Synodontis* spp.
- 3 *Hydrocynus vittatus*
- 4 *Barbus poechii*
- 5 *Pharyngochromis acuticeps*
- 6 *Marcusenius macrolepidotus*
- 7 *Tilapia sparrmanii*
- 8 *Barbus radiatus*
- 9 *Schlbe intermedius*
- 10 *Hepsetus odoe*
- 11 *Micralestes acutidens*

B



Fishing competition

- 1 *Serranochromis robustus*
- 2 *Clarias gariepinus*
- 3 *Hydrocynus vittatus*
- 4 *Synodontis nigromaculatus*
- 5 *Tilapia rendalli*
- 6 *Oreochromis andersonii*
- 7 *Serranochromis altus*
- 8 *Sargochromis giardi*
- 9 *Synodontis* spp.
- 10 *Oreochromis macrochir*

Figure 4. Index of relative importance (IRI, see equation 1) as a measure of the most important species in **A**) MFMR surveys at Katima Mulilo and Kalambeza Island, Zambezi, at low water in the years 1997 – 2000, and **B**) in the fishing competition 14 – 19 September, 2000. Frequency (%) = frequency of occurrence, Weight (%) = weight percent of total catch, Number (%) = numeric percent of total catch.

Table 6. The IRI rank, number (No.), weight (W), frequency (F) and IRI (see equation 1) of fish species or species groups caught in the competition (No. species = 13), 14 - 16 September 2000, and in the MFMR fish survey in the main river and backwaters at Katima Mulilo and Kalimbeza Island at low water (No. species = 64) from 1997 to 2000. N = Not caught in the fish survey.

Species	Fishing competition					Fish survey				
	Rank	No. %	W %	F %	IRI %	Rank	No. %	W %	F %	IRI %
Nembwe	1	33.3	31.3	14.6	42.3	27	0.1	1.0	1.1	0.0
Barbel	2	17.6	44.5	7.3	20.4	22	0.0	3.5	0.9	0.1
Tigerfish	3	7.1	9.8	22.0	16.6	3	1.1	18.2	12.4	8.2
Spotted squeaker	4	12.6	1.1	7.3	4.5	23	0.1	0.7	2.1	0.1
Redbreast tilapia	5	5.7	2.4	9.8	3.5	N	N	N	N	N
Threespot tilapia	6	6.0	3.8	7.3	3.2	47	0.0	0.2	0.5	0.0
Humpback largemouth	7	3.7	2.9	9.8	2.9	50	0.0	0.1	0.5	0.0
Pink happy	8	3.7	2.1	9.8	2.6	N	N	N	N	N
Squeakers	9	6.0	0.4	7.3	2.1	2	19.4	15.8	24.9	29.7
Greenhead tilapia	10	2.3	0.7	7.3	1.0	24	0.2	1.2	1.2	0.1
Thinface largemouth	11	0.7	0.5	7.3	0.4	40	0.0	0.4	0.7	0.0
Green happy	12	0.9	0.3	7.3	0.4	N	N	N	N	N
Brownspot largemouth	13	0.2	0.1	2.4	0.0	N	N	N	N	N

species (IRI: 39 %). Both the tigerfish and the squeakers accounted for a higher percentage weight in the fish survey than in the fishing competition.

The weight and length distributions of the ten most numerous species or species groups in the recorded catches during the angling competition and in the MFMR fish survey in the Zambezi River are shown in **figure 5** and **figure 6**, respectively. In general, the fish caught in the fishing competition were larger than the fish caught in the fish survey. For all species, some or several specimens caught during the competition were larger than the largest specimens caught during the MFMR survey, with the exception of the *Synodontis* species.

The size of fish within the different species caught in the competition varied largely. Sharptooth catfish and tigerfish weighted from 2.3 to 9.7 kg and from 1.0 to 7.5 kg, respec-

tively (**figure 6**). The cichlids also varied in size, and specimens of more than 2.0 kg were caught for nembwe, humpback thinface and threespot tilapia. Maximum sizes recorded for these three species during the competition were 3.0 kg, 2.6 kg and 2.5 kg, respectively. The largest redbreast tilapia was 1.8 kg, whereas the largest pink happy and greenhead tilapia were 1.9 kg and 0.9 kg, respectively. Among the less common green happy a specimen of 0.6 kg was the largest. The largest recorded spotted squeaker was 0.36 kg, whereas the largest specimen among the other *Synodontis*-species was 0.32 kg.

4.5 Sexual maturation of fish species

Most of the fish caught during the competition were sexually mature (**table 7**). A possible exception was catfish. We were not able to classify the maturity stage of this species,

Table 7. Number of males and females sexed, percent sexually mature fish (%), and minimum lengths of sexually mature individuals in the catch from the fishing competition 14 – 16 September 2000. This analysis only contain fish we were able to sex. In addition, several unclassified fish were taken away for trophies. We were not able to classify the maturity stage of catfish.

SPECIES	Males	Females	Min. length males	Min. length females
Catfish	31 (?)	26 (?)		
Tigerfish	6 (83 %)	12 (100 %)	37 cm	49 cm
Threespot tilapia	7 (100 %)	3 (100 %)	33 cm	31 cm
Greenhead tilapia	8 (88 %)	4 (100 %)	26 cm	27 cm
Nembwe	19 (100 %)	33 (100 %)	41 cm	33 cm
Redbreast tilapia	18 (94 %)	1 (100 %)	26 cm	28 cm
Pink happy	4 (75 %)	5 (100 %)	33 cm	31 cm
Green happy	1 (100 %)	3 (100 %)	30 cm	28 cm
Spotted squeaker	14 (100 %)	56 (100 %)	16 cm	17 cm

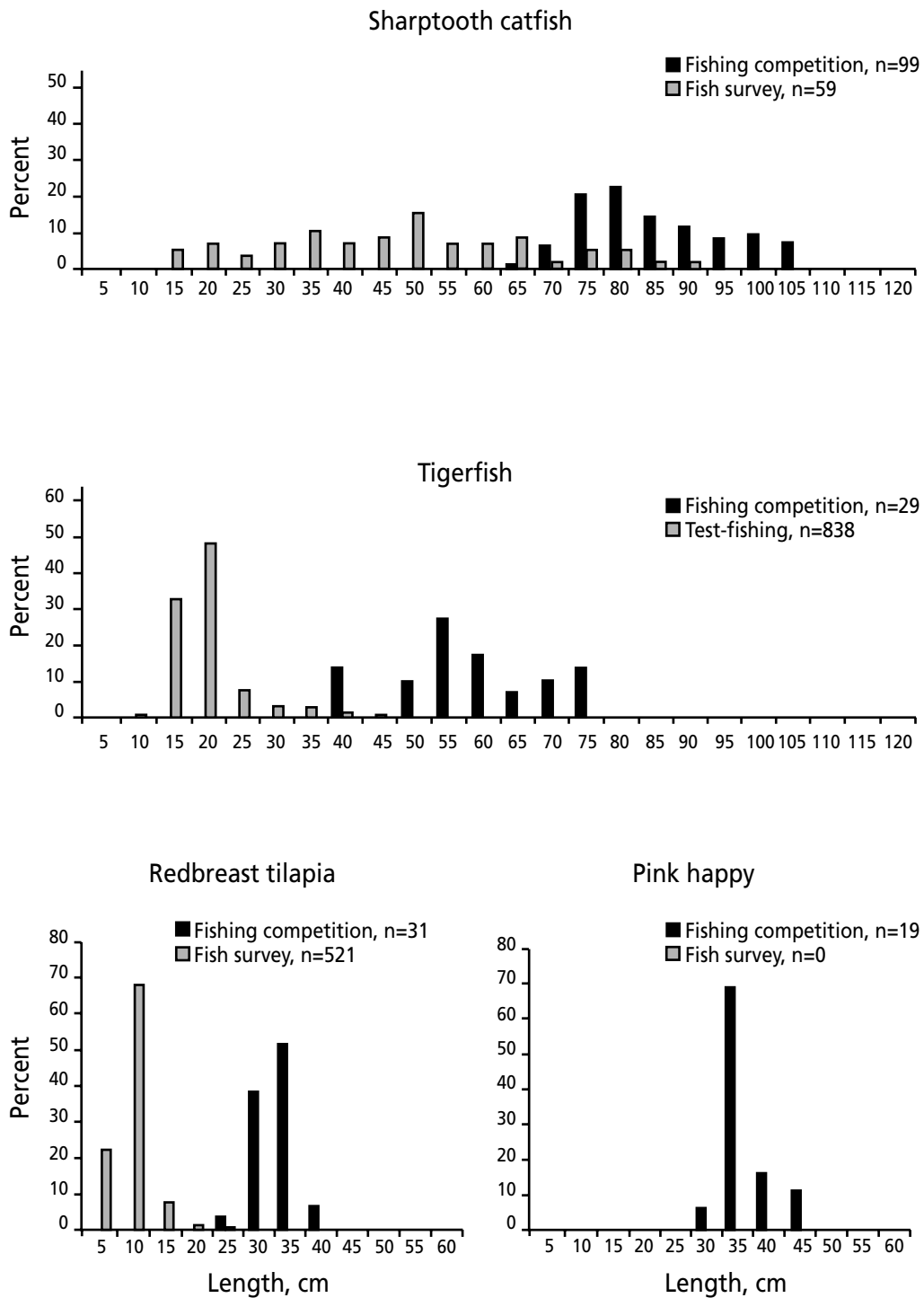


Figure 5. The length distributions of the ten most numerous species or species groups in the recorded catches during the angling competition, 14 –16 September 2000, and in the MFMR fish survey in the main river and backwaters at Katima Mulilo and Kalimbeza Island at low water during 1997 - 2000.

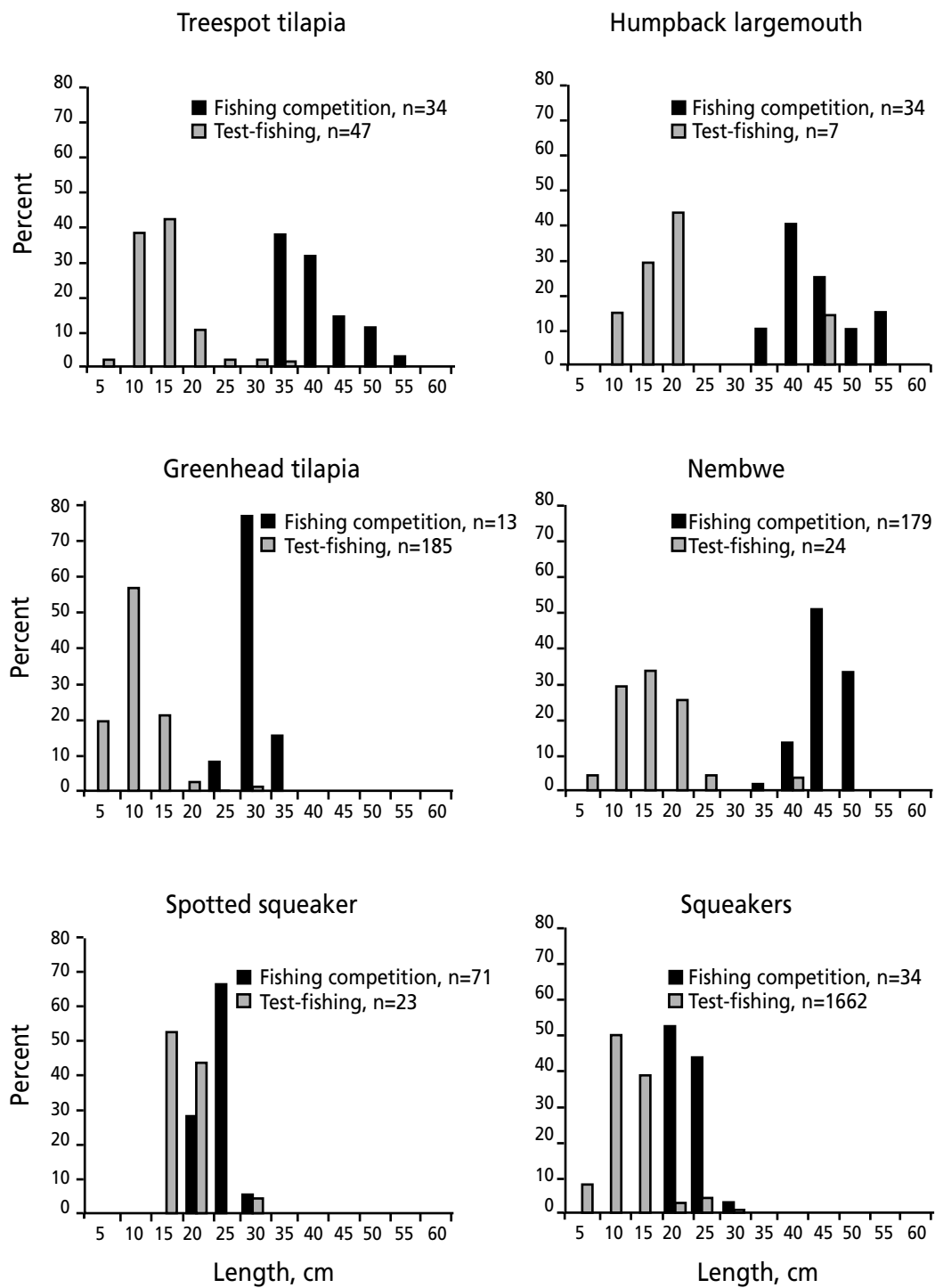


Figure 5. Continued

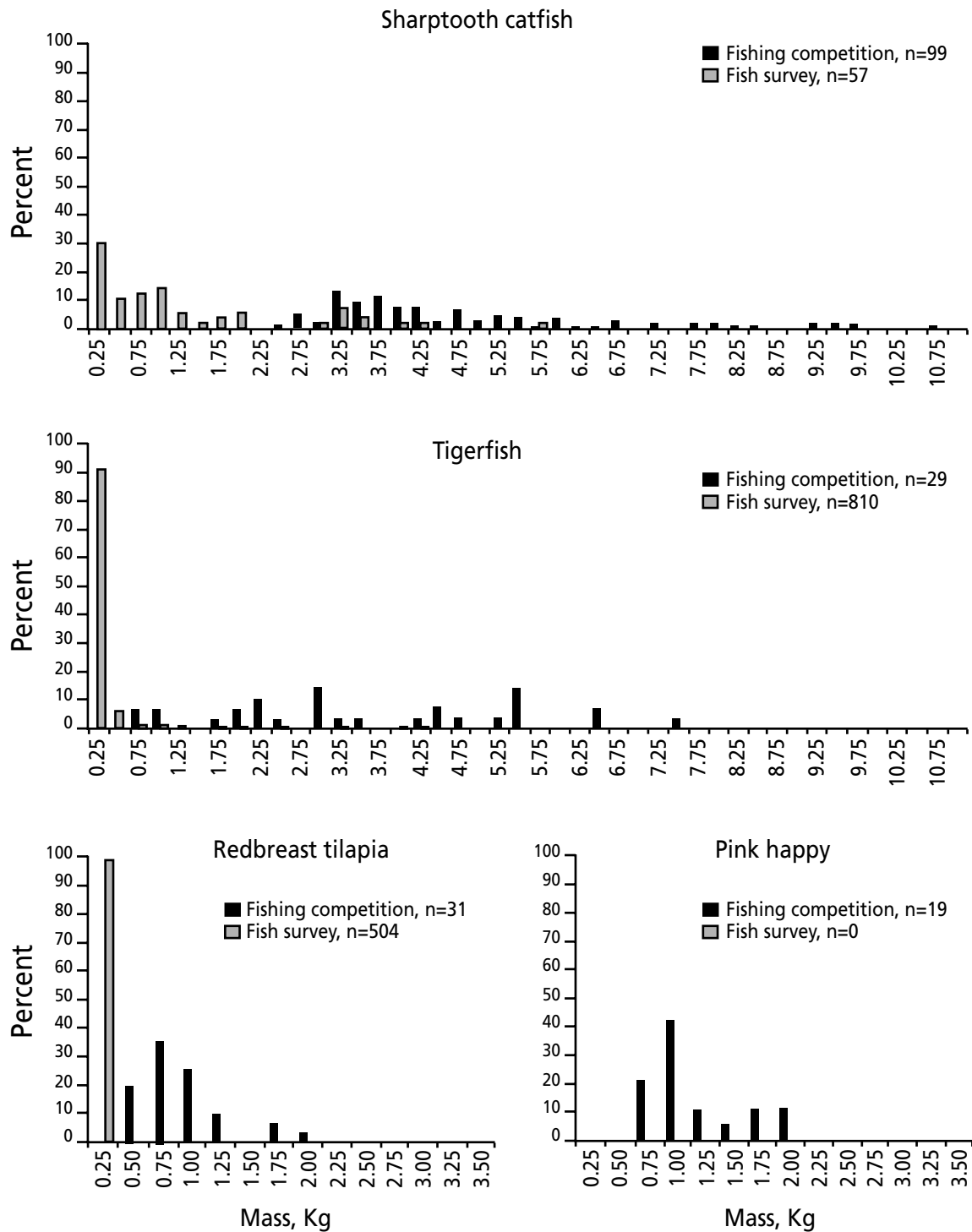


Figure 6. The weight distributions of the ten most numerous species or species groups in the recorded catches during the angling competition, 14 –16 September 2000, and in the MFMR fish survey in the main river and backwaters at Katima Mulilo and Kalimbeza Island at low water during 1997 - 2000.

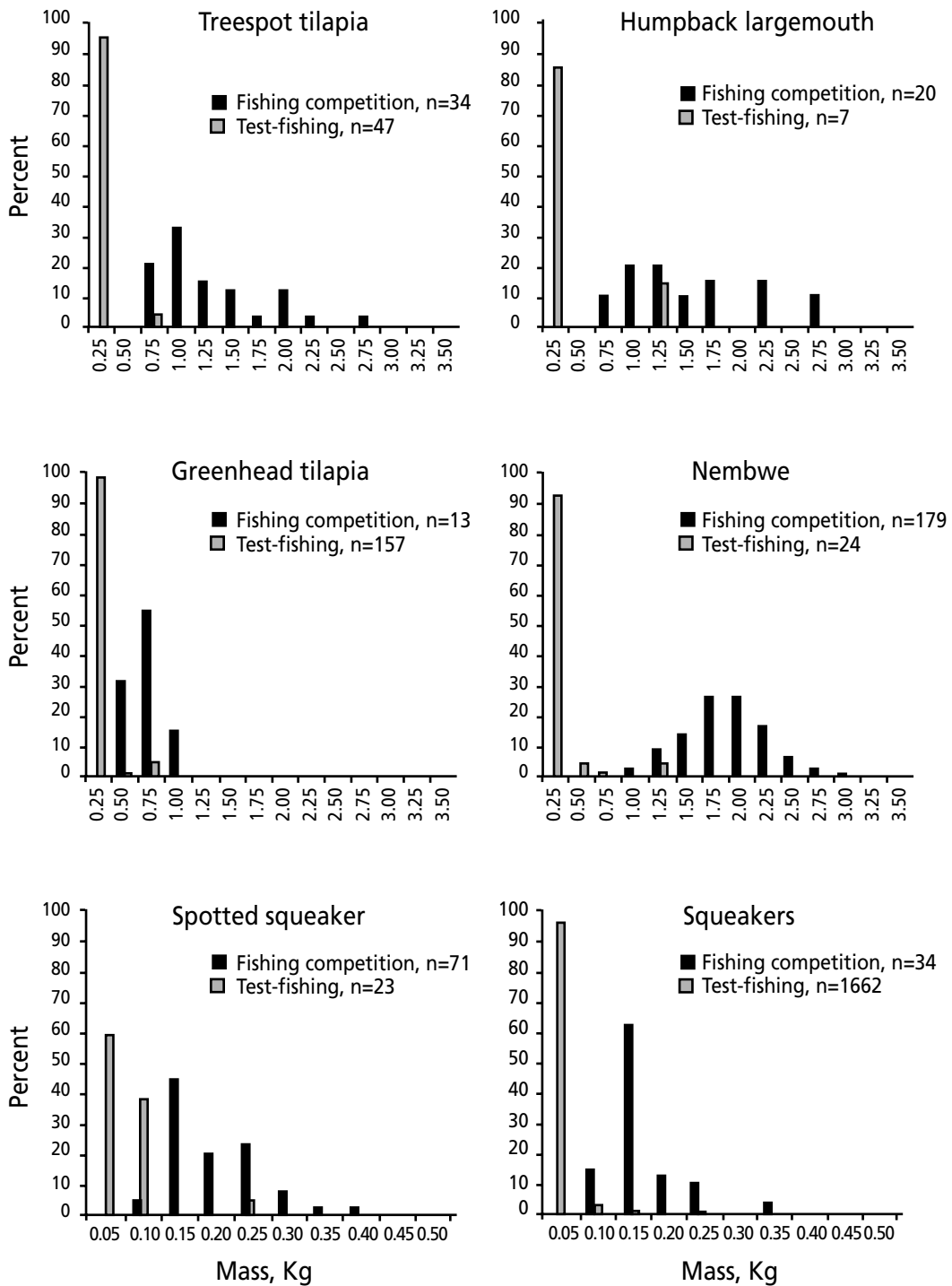


Figure 6. Continue.

which was sexed according to external sexual characteristics. With the exception of tigerfish and nembwe, the minimum size of mature fish was similar for male and females. Among tigerfish the minimum size of mature males were smallest, while among nembwe the minimum size of mature females were smallest. For several species there were a difference in the proportion of the two sexes caught in the competition. Among tigerfish, nembwe, and spotted squeaker more females were caught, while more males were caught of redbreast tilapia.

4.7 Economic aspects of the competition

The expenses for the participants to be able to take part in the competition are of at least four types. These are the competition entry fee, the travel expenses (fuel, food, and accommodation), the running costs of boat and equipment, and the cost of food and accommodation while in the area. The investment costs in cars, boats, and other equipment were disregarded.

The entry fee for participants in this competition was N\$ 300 (US\$ 39) per individual or N\$ 1,000 (US\$ 129) per team. Thus, total entry fees were approximately N\$ 11,000 (US\$ 1,419). The fish which were not kept by the anglers were sold at the fish market in Katima Mulilo, and the money donated to a local private school bringing an estimated value of N\$ 4,000 (US\$ 516). The prizes were donated by various private businesses. The top prize was N\$ 5,000 (US\$ 645), the second prize was a hi-fi stereo set, and the third prize was a deep freezer. A large number of smaller prizes consisted mainly of fishing and camping equipment. The total value of the prizes was estimated to N\$ 50,000 (US\$ 6,452).

Long distances were travelled by some of the participants to take part in the competition. The distance from Windhoek to Katima Mulilo by car is approximately 1,200 km. The fuel price in Namibia in September 2000 was approximately N\$ 3.70 (US\$ 0.5) per litre. Most cars used were four wheels drives, and they pulled trailers with boats. Thus we may assume that the driven distance per litre of fuel was 7 km. The estimated fuel cost per kilometre would then be N\$ 0.53 (US\$ 0.07), and fuel cost for the round trip Windhoek

Table 8. Estimated cost for participants at the fishing competition 14 – 16 September 2000 in the Zambezi River. The travel expenses are calculated as explained in the text. Travel expenses for local anglers travelling between Katima Mulilo and Kalimbeza have been excluded. Figures in Namibian dollars (N\$) or US dollars (US\$).

Angler group	No.	Entry fee	Travel	Food and accommodation	Boat fuel etc.	Total per participant		Total	
		N\$	N\$	N\$	N\$	N\$	US\$	N\$	US\$
Local	16	300	-	-	375	675	87	10800	1394
Rundu	4	300	177	2050	375	2902	374	11608	1498
Windhoek	12	300	424	1148	375	2247	290	26964	3479
Coast	2	300	600	738	375	2013	260	4026	519
Zim./Zambia	6	300	124	738	375	1537	198	9222	1190
Total								62620	8080

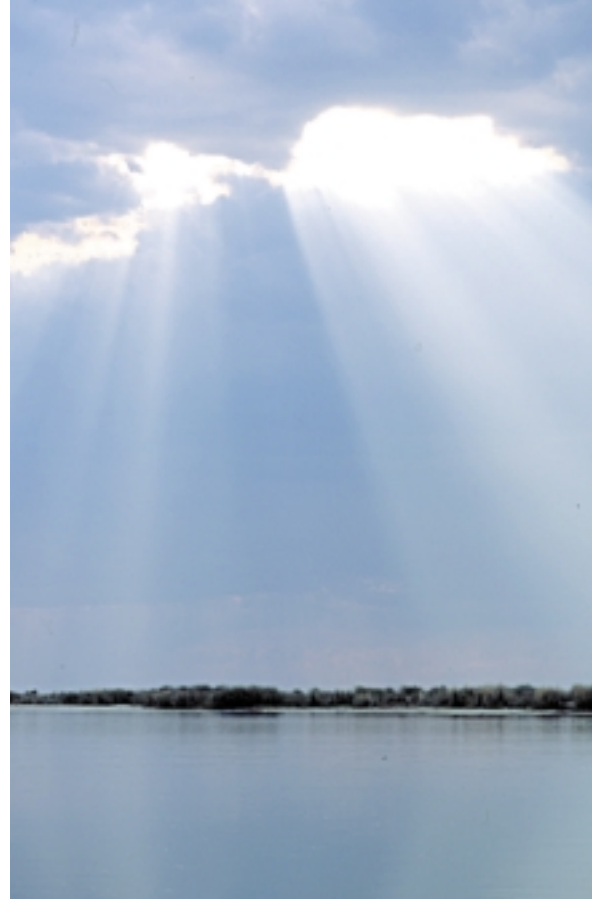
Table 9. Amount of money spent by the anglers in local shops and tourist facilities. Figures are in Namibian dollars (N\$) and US dollars (US\$).

Angler group	No.	Food and accommodation	Boat fuel etc.	Total	
		N\$	N\$	N\$	US\$
Local	16	-	375	6000	774
Rundu	4	2050	375	9700	1252
Windhoek	12	1148	375	18276	2358
Coast	2	738	375	2226	287
Zim./Zambia	6	738	375	6678	862
Total				42880	5533

– Katima Mulilo (approximately 2,400 km) is N\$ 1,272 (US\$ 164). Assuming three participants per vehicle, the minimum travel cost per participant from Windhoek would be N\$ 424 (US\$ 55). The round trip distance from Rundu to Katima Mulilo is approximately 1,000 km. A similar estimate of transport cost for participants from Rundu yields N\$ 177 (US\$ 23) per participant. For participants living in Zambia (Livingstone) and Zimbabwe (Victoria Falls), a similar calculation of travel costs based on a round trip distance of approximately 700 km is N\$ 124 (US\$ 16) per participant. The return airfare between Windhoek and Katima Mulilo is N\$ 2,046 (US\$ 264).

On average, each non-resident participant was accompanied by 0.2 non-participants. All visitors stayed in the area on average 6.8 days. Each non-resident participant and his/her company therefore stays 8.2 guest days (1.2 x 6.8 days = 8.2 days) in the area (see paragraph 4.1 above). Staying at a camping site costs approximately N\$ 20 (US\$ 2.60) per person per day. We assume that the cost of food when camping is similar to the per diem rate paid by the Namibian government for field work based on camping, which is N\$ 70 per person per day. The cost of staying at a lodge is approximately N\$ 250 (US\$ 32) per day, including food. The cost of petrol for the boats was estimated to N\$ 250 (US\$ 32) per boat per day, or N\$ 125 (US\$ 16) per participant per day. Based on these figures, the total amount spent by the participants on this event was N\$ 62,620 (US\$ 8,080), or an average of N\$ 1,566 (US\$ 202) per participant. These are minimum figures. For instance, some participants hired a boat costing approximately N\$ 600 - 800 (US\$ 77 - 103) per day, which is significantly more than the cost of boat fuel.

Out of these expenses, the cost of food and accommodation and boat fuel may be spent in local businesses (**table 9**). The total amount spent by the anglers on these services was estimated to N\$ 1,072 (US\$ 138) per participant, and in total N\$ 42,880 (US\$ 5,533).



Photos: **Upper left and right:** The great Zambezi River. **Middle:** Greenhead tilapia. **Lower left:** Stationary fishing for cichlids. **Lower right:** Weighing in a nice tiger fish. Photographs: Finn Økland and Tor F. Næsje.

5 Discussion

Background

The 1995 White Paper “Responsible Management of the Inland Fisheries of Namibia” and the draft bill on inland fisheries have the objectives of ensuring a sustainable and optimal utilisation of the freshwater resources. The stated policy takes into consideration the large differences among water systems in Namibia and proposes adoption of separate management regimes for the various river systems.

The Zambezi River is one of the most important of the perennial rivers in Namibia, and freshwater fish are a very important food source for local inhabitants. The exploitation of fish resources in the river is of three types: subsistence fisheries, commercial fisheries and recreational fisheries. Fishing competitions are an important part of the recreational fisheries. This report shows that although the catch of fish can be considerable during a fishing competition, the socio-economic returns to the local society may also be significant, and far beyond the value of the fish caught. This is mostly related to the participants’ use of local shops and tourism businesses during the competition.

Fishing competition

Forty participants (10 teams) took part in the competition. The total number of participants was approximately half of what was expected from previous years, mainly due to the recent hostile activities in the area. The competition rules have been changed through the years and were this year focused on catching more species as one additional point was given for each species caught. However, the rules had minimum weights for all species and the points given increased with the size of the fish. The daily bag limit of the different species or species groups was not filled by any competitors, with the exception of catfish and a few catches of squeakers. This means that the competitors could target their favourite fish species using their favourite methods, and were only to a minor extent restricted by the bag limit. This is also in accordance with the fishermen’s reports showing that 70 % of the anglers caught fish both during trolling and stationary fishing, while 20 % and 10 % caught fish only during trolling or stationary fishing, respectively.

Socio-economics

The socio-economic aspects of the competition are important both for the local communities and for the organisers. Local communities benefit from the money spent by participants and their companions in shops, markets, and in local tourist businesses. The organisers evaluate their expenses and their income from participants’ fees and from sponsors. The participants, however, do not evaluate the event in a strict economic sense, but rather consider the competition a special experience and as a social event combined with a

holiday, spending money locally on for example food, housing, petrol, and firewood.

The fishing competition reported here was probably relatively small in terms of number of participants, as the organisers had expected about twice as many anglers. This demonstrates the vulnerability of such events to political or social unrest. Without the restrictions imposed by the events in Western Caprivi, more participants would probably have come from Windhoek, and possibly also from South Africa. There were only three women among the participants, reflecting that angling is generally a male dominated activity.

In spite of the relatively low number of participants, it illustrates some of the potentials and distribution of the economy related to this type of nature-based tourism. The total economy for the event amounted to N\$ 138,000 (US\$ 17,806), or N\$ 3,450 (US\$ 445) per angler. The sponsors have supported the competition with prizes valued at approximately N\$ 50,000 (US\$ 6,452), or N\$ 1,250 (US\$ 161) per angler. In the past, the prizes have been even more expensive, such as a boat with an outboard engine and a trailer. This indicates that companies sponsoring these events consider the anglers as an interesting customer group.

The economic consumption of the participants demonstrates that the willingness to spend money to take part in this type of event is quite high. On average, the competition cost each angler N\$ 1,825 (US\$ 235), which probably higher or within the same order of magnitude as a day’s gross salary for the social group represented by the participants. This may be compared with the total average expenses paid by anglers fishing for salmon in one of the best Norwegian salmon rivers, which may be considered a relative exclusive fishery. In 1989, this figure was calculated at NOK 789 (N\$ 658; US\$ 85) per day, which was less than half of the estimated daily income for the relatively wealthy group of anglers fishing in this river (Aas 1991). The Nwanyi fishing competition totalled N\$ 108,000 (US\$ 13,935), and a total of 831 fish were caught. Thus, according to these figures, each fish caught in the angling competition generates approximately N\$ 130 (US\$ 17). Although the figures are approximate, this indicates that recreational fishing in the Zambezi River is an attractive activity with a significant economic potential.

The segment of the total economy of the event that was spent in the local community was approximately N\$ 43,000 (US\$ 5,533), or N\$ 1,075 (US\$ 139) per angler. A significant part of this was for gasoline and other products that are imported to the region, but it still means support to the local shops and tourist businesses. Calculated as value generated for local business per fish caught, it becomes approximately N\$ 52 (US\$ 6.70), excluding the market value of the fish. At the fish marked in Katima Mulilo small fish were usually sold

for approximately N\$ 10 (US\$ 1.30), while larger fish were sold for approximately N\$ 20 (US\$ 2.60). However, bream were more popular than catfish and tigerfish. Squeakers are seldomly sold at the market. The local market value of the total catch from the competition, 831 fish including 260 squeakers (total 1,190 kg) would be less than N\$ 15,000 (US\$ 1,935). Thus, in strict monetary terms, the angling competition seems to create significantly more economic activity than the market price of the fish.

Despite a significant amount of revenues to the local economy from the fishing competition, there are strong indications, both from the economic data in this study and from general tourism literature, that there is a large potential for an increase in the value for the local community along the Zambezi River. Actions that can increase their length of stay in the area and increased use of local businesses compared to businesses outside the area is two important elements in such a strategy. Future studies should be conducted to gather more information on what types of services and goods that competitors prefer.

Catches

Ministry of Fisheries and marine Resources has been studying the fish resources in the actual part of the Zambezi River where the fishing competition was held. In this survey a total of 46,030 individual fish representing 75 fish species were sampled. Based on the previous fish surveys in the Zambezi River the total weight of the catches in the fishing competition was high as 1018 kg (538 fish) were caught during the three days competition. The dominating species in weight were sharptooth catfish (463 kg) and cichlid nembwe (312 kg). In addition, the fishermen released minimum 293 fish, being in numbers more than half of the catch brought ashore.

Only 13 species were caught in the fishing competition, and four of these species (redbreast tilapia, pink happy, green happy, and brownspot largemouth) were species not caught in the survey in the same area at low water. The reason for this is probably that these species live in habitats not easily sampled with the survey gears. To a large extent the anglers fish in the main current of the river and/or very close to the vegetation. In these habitats gill nets and other survey gears cannot easily be used. The lack of juveniles of these four species in the survey catches may be because the juveniles live inside the dense vegetation a habitat difficult to access with the survey gears. In addition, the sampling gears were different. In the fishing competition one uses "attractive" gear (rod and line), with a bait or lure to attract the fish to the gear. The goal of the anglers was to catch the largest specimens of the target species. The fisheries survey on the other hand, used both "passive" gears (e.g. gill nets) and "active" gears (e.g. dip nets and seines) to obtain a catch which best possible reflects the species and size com-

position of the fish population present. These differences may also explain some of the large differences in size and species caught during the competition and in the fish survey. The tigerfish differs from the other fish species in that it was prominent in both the anglers catches and in the survey catches. In relative importance (according to % IRI) the tigerfish was number three in both catches. This may be because tigerfish utilises all open water habitats, both shallow and deep water, and consequently is vulnerable to a variety of fishing gears.

The difference between survey catches and the anglers' catches shows that the anglers' catches are selective, including only the largest individuals of the various species. The anglers also catch mainly sexually mature fish, and it may be assumed that the recruitment to the various species stocks is not much influenced by the anglers' catches. Unfortunately, we have no data on the species and size composition of the subsistence and commercial catches. We may expect, however, that the anglers' catches on average contain larger fish than both these types of fishing if the subsistence and commercial fisheries is based on gillnetting.

The results and the amount of fish caught during the competition may give a good indication of the potential exploitation of the fish resources by recreational fisheries in the Zambezi River. Although all competitors fished to obtain maximum points, their ability as anglers varied greatly. With the exception of catfish, few participants scored the maximum number of points within the different groups or species of fish. Hence, there were a relatively large number of anglers with a low or moderate catch. Approximately 50 % of the anglers scored 0 – 20 points as a daily average, less than 1/3 of the best angler. This may indicate that the average angler only catches a few fish during a day fishing on the river. A few persons, however, are expert fishermen and may land a considerable catch.

In conclusion, the following points may be highlighted:

1. The anglers caught only a few species compared to what was present in the fish community of the river. Even so, the anglers caught a few cichlid species that were not found in the survey catches.
2. The anglers caught the largest individuals of the target species.
3. Angling was excellent in this part of the Zambezi River, as the average catch per hour of fishing was at least 0.88 kg.
4. There were large differences in effectiveness among the anglers. Most anglers caught only a few fish, whereas a few anglers were experts and caught many and large fish.
5. Many of the participants in the competition travelled long distances to participate.

6. The mean investment by anglers to be able to participate was approximately N\$ 1,566, of which approximately N\$ 1,072 was spent in the local area.
7. Based on the total economy of this competition (approximately N\$ 108,000), each fish caught generates approximately N\$ 130. The amount spent in local businesses was approximately N\$ 43,000, which means that each fish caught generates N\$ 52 for the local economy.

6 References

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Nwanyi Millennium Open Competition

(14 16 September 2000)

Rules and Regulations

1. Only two rods per person to be used at any one time
2. Maximum two hooks per rod or one artificial lure
3. No ground baiting allowed
4. No tampering with fish in anyway besides marking
5. No buying of fish from nets for bait or otherwise
6. Fishing from: 6 a.m. to 6 p.m. - Day 1 & 2
 6 a.m. to 6 p.m. – Day 3
7. No fishing before or after official times
8. All captains to report to official start ppoint before and after day's fishing
9. Weighmasters decision is final
10. All participants to obey international border. (Middle of the river in the deepest stream)
11. Fish limits as per weigh sheet

Annex 3. Results of the fishing competition held 14 – 16 September 2000 in the Zambezi River. The teams and persons are numbered. S = senior, J = junior (<16 years). Open space for the results means that the person did not participate that day.

Team	Participant	Sex	Class	Day 1	Day 2	Day 3	Mean Points	Team sum
Team 1	P1	Male	S	12.98	0.00	0.00	4.33	92.04
	P2	Male	S	6.82	0.00	0.00	2.27	
	P3	Male	S	22.33	0.00	0.00	7.44	
	P4	Male	S	14.48	28.60	6.88	16.65	
Team 2	P5	Male	S	33.56	Stranded		33.56	76.50
	P6	Male	S	43.24	Stranded		43.24	
	P7	Male	S	0.00	Stranded		0.00	
	P8	Male	S	0.00	Stranded		0.00	
Team 3	P9	Male	S	40.54	43.74	47.66	43.98	432.28
	P10	Male	S	18.64	39.22	41.08	32.98	
	P11	Male	S	53.02	41.48	29.40	41.30	
	P12	Male	S	32.50	30.56	15.00	26.02	
Team 4	P13	Male	S	6.50	14.84	13.76	11.70	125.03
	P14	Male	S	9.26	0.00	7.28	5.51	
	P15	Male	S	10.50	12.38	32.91	18.60	
	P16	Female	S	13.60	4.00		8.80	
Team 5	P17	Male	S	14.30	0.00	17.52	10.61	201.54
	P18	Male	S	22.80	4.30	35.54	20.88	
	P19	Male	S	9.64	28.38	11.42	16.48	
	P20	Male	S	0.00	28.82	28.82	19.21	
Team 6	P21	Male	S	30.44	65.85	20.40	38.90	459.69
	P22	Male	S	16.86	47.52	34.08	32.82	
	P23	Male	S	50.50	57.50	54.88	54.29	
	P24	Male	S	29.20	46.00	6.46	27.22	
Team 7	P25	Male	S	6.68	23.80	18.36	16.28	227.82
	P26	Male	S	7.00	27.38	12.28	15.55	
	P27	Male	S	8.54	45.22	7.98	20.58	
	P28	Male	S	31.94	24.48	14.16	23.53	
Team 8	P29	Male	S	21.08	22.50		21.79	139.26
	P30	Male	S	20.44	0.00		10.22	
	P31	Male	S	20.70	27.10	7.18	18.33	
	P32	Male	J		20.26		20.26	
Team 9	P33	Male	S	0.00	0.00	13.22	4.41	122.02
	P34	Male	S	41.96	17.58	35.68	31.74	
	P35	Male	S	0.00	0.00	0.00	0.00	
	P36	Female	S	4.72	0.00	8.86	4.53	
Team 10	P37	Male	J	35.32	26.06	20.44	27.27	285.80
	P38	Male	J	21.68	63.14	23.34	36.05	
	P39	Female	S	24.82	23.56	18.04	22.14	
	P40	Male	J	12.50	16.90	0.00	9.80	