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An assessment of visitor statistics and linefishing along the Sandwich shoreline, Namib-Naukluft Park, Namibia

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ABSTRACT

Visitor numbers to Sandwich were at a maximum from December 1989 through March 1990 and appeared to be directly linked to the availability of edible fish species (kob, steenbras, galjoen, blacktail) which are seasonally abundant. Nearly 90 metric tonnes of these fish were removed during the survey period of 15 weeks, of which almost 75 tonnes were caught after the school holiday season. Anglers comprised 81% of the visitors during the school holidays (December-January); this figure increased to 97% after the holidays (February-March). The area is the only marine nature reserve on Namibia's coast and commercial fishing is a violation of the Nature Conservation Ordinance. However, the majority of fish caught apparently were sold for commercial gain. Side effects of visitor pressure were vehicle tracks on sensitive substrata and litter. To improve management of the area, daily fish bag limits on fish numbers and size should be imposed, catch statistics collected, and vehicles confined to specified routes. Furthermore, non-consumptive tourist use such as bird-watching and photography should be encouraged.

INTRODUCTION

The aim of this survey was to establish the origin of visitors and the reason for their visit, and to assess seasonality and total numbers of fish caught by shore-based anglers in the Sandwich section of the Namib-Naukluft Park, with comments on angler characteristics.

STUDY AREA

Sandwich (formerly Sandwich Harbour) lies astride the Tropic of Capricorn on the dune sea coast of Namibia in southwestern Africa (Fig. 1). Sandwich is open to the public throughout the year, from 06:00 to 20:00, upon purchase of a permit (currently five rand per vehicle plus five rand per person) which lists the conditions of entry in terms of the Nature Conservation Ordinance (No. 4 of 1975). Regulation 28 of this Ordinance imposes specific restrictions on anglers, namely the prohibition of fishing for commercial purposes, a ban on bait collecting, observance of minimum permissible sizes of fish removed*, and the restriction of angling to a 20 kilometre section of coast north of the lagoon.

* Minimum permissible sizes of fish :

"true" kob <i>Argyrosomus hololepidotus</i>	= 40 cm
west coast steenbras <i>Lithognathus aureti</i>	= 30 cm
galjoen <i>Coracinus capensis</i>	= 20 cm
blacktail ("dassie") <i>Diplodus sargus</i>	= 15 cm

Sandwich lagoon is an internationally important wetland, supporting up to 113 species of birds (Berry & Berry 1975). Moreover, it and the surrounding bay may serve as important fish nurseries, recruitment and foraging sites. Because of these considerations, the Sandwich coastline, up to a distance of 1,609 km from the low tide mark into the Atlantic Ocean, was included in the Namib-Naukluft Park (area 50 000 km²) in 1979. This was proclaimed in Official Gazette No. 4003 on 1 August 1979, effectively giving Sandwich the status of a marine reserve from its northern boundary fence, which adjoins the enclave of Walvis Bay, extending southwards for a distance of approximately 45 km, to a point opposite the end of the tidal mud flats south of Sandwich lagoon (Fig. 1). It is the only marine reserve on the Namibian coastline. The remaining formal conservation area, namely the Skeleton Coast Park, was proclaimed inland

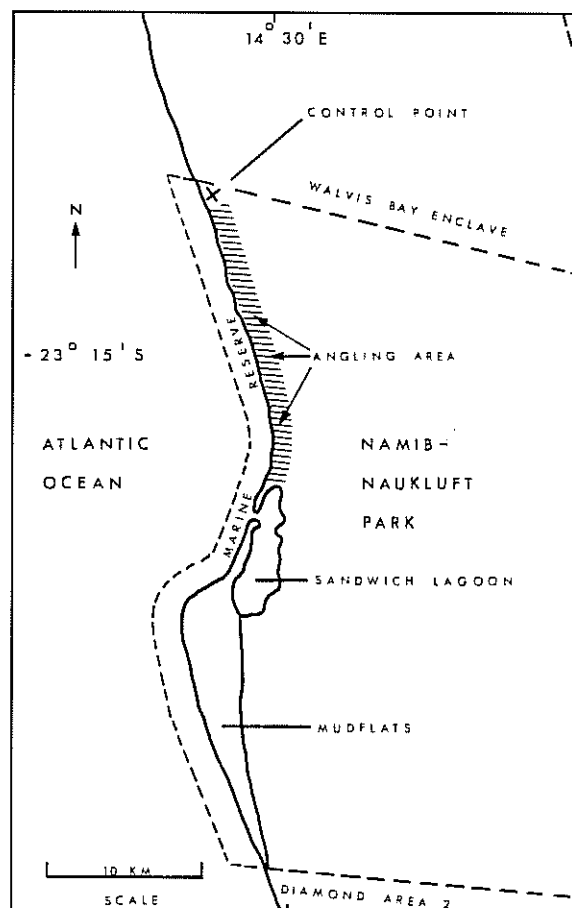


FIGURE 1: Map of Sandwich Harbour

from the low tide mark, by Official Gazette No. 3214 on 20 September 1971.

Descriptions of Sandwich Harbour and its biota are given in Prozesky (1963), Hellwig (1968), Gebhardt (1973), Berry and Berry (1975), Stuart (1975a, b), Kensley (1978), Kensley and Penrith (1977), Buzer and Sym (1983), Wilkinson, Blaha and Noli (1989), Ward and Seely (1990).

METHODS

Because previous informal surveys by staff of the Ministry of Wildlife, Conservation and Tourism indicated different

utilisation patterns by visitors to Sandwich within identifiable periods, a survey to define usage was completed during the period 12 December 1989 to 28 March 1990. The Namibian and South African school holidays, which affected utilisation of Sandwich, occurred 7 December 1989 to 21 January 1990, whilst the post-holiday period monitored was 22 January to 28 March 1990.

To ensure maximum control during the survey, visitor access to Sandwich was restricted to a single entrance on the beach at the northern boundary fence. Staff of the Directorate of Wildlife, Conservation and Research monitored vehicle and visitor numbers past this control point for a total of 90 out of 107 days. The 17 days during which no monitoring was done were spread over the entire period. An entry checklist was used to record:

Vehicle registration (grouped as Namibia, Walvis Bay, and Republic of South Africa (RSA))

Driver's name

Number of anglers and non-anglers

Visitors' country of origin

Exiting anglers were asked to make a voluntary declaration of the number of edible fish species they had in their possession. The edible fish comprised four species: kob *Argyrosomus hololepidonus*, steenbras *Lithognathus aureti*, blacktail *Diplodus sargus*, and galjoen *Coracinus capensis*. No inspection of fish caught was carried out. Because an earlier survey at Terrace Bay in the Skeleton Coast Park showed other teleost species comprised less than 1% of total catches, and the only other fish taken in significant numbers (sea catfish *Tachysurus feliceps*) was often discarded by anglers (Penrith & Loutit 1982), they were not recorded during this survey. A number of exiting anglers (6.6% during the school holidays and 8.6% during the post-holiday period) drove past the control point without declaring their catches. Consequently, these percentages were applied as correction factors to the declared catches to obtain an estimate of total catches. Since it is likely that the anglers who avoided declaration of catches had excessive numbers of fish in their possession, our estimates may be considered conservative. Likewise, correction factors of 1.24 (school holiday period) and 1.16 (post-holiday period), were applied to declared catches to represent the days when the control point was not staffed.

To obtain estimates of the average body mass of each fish species, data collected by Wildlife, Conservation and Research staff at Sandwich in the corresponding period of 1988/89 were used. Random samples of whole, uncleaned fish landed by anglers were weighed. The monetary value of the fish was based on the average price paid to anglers by local fish retailers during the investigation (R4.00 per kg).

Before and after this survey, two clean-up operations of Sandwich (April 1989 and April 1990) were conducted by the Namib Centre of the Wildlife Society of Namibia. These attempted to quantify the amount and nature of litter accumulated on the beach area of the reserve accessible to visitors. In addition, the beach area south of the lagoon, which is closed to the public, was checked for litter.

Although the impact of vehicle tracks on the area was not identified as an aim of our survey, we took note of the effects of large numbers of vehicles entering the reserve.

RESULTS

Since permits sold for Sandwich are valid for the entire Namib-Naukluft Park, it was not possible to plot the monthly visitor

utilisation of Sandwich. Nevertheless, there are three distinct peaks of visitor activity at Sandwich during the year. In the school summer holidays the majority of vehicles came from Namibia (51%), with 40% originating from Walvis Bay and 9% from the RSA (Fig. 2). A total of 682 vehicles were counted at the control point, an average of 21 vehicles per day. During the post-holiday period of this survey, vehicles from the RSA increased significantly (totalling 46%), with vehicles from Walvis Bay and Namibia declining to 30% and 24% respectively (Fig. 2). The total number of vehicles counted during the post-holiday time increased sharply to 2 449, an average of 42 per day. Thereafter the number of vehicles entering Sandwich declined significantly: for the eight-month period from April through November 1990, a total of 405 vehicles was estimated to have entered Sandwich (permit sales of the Directorate). This is an average of two vehicles per day.

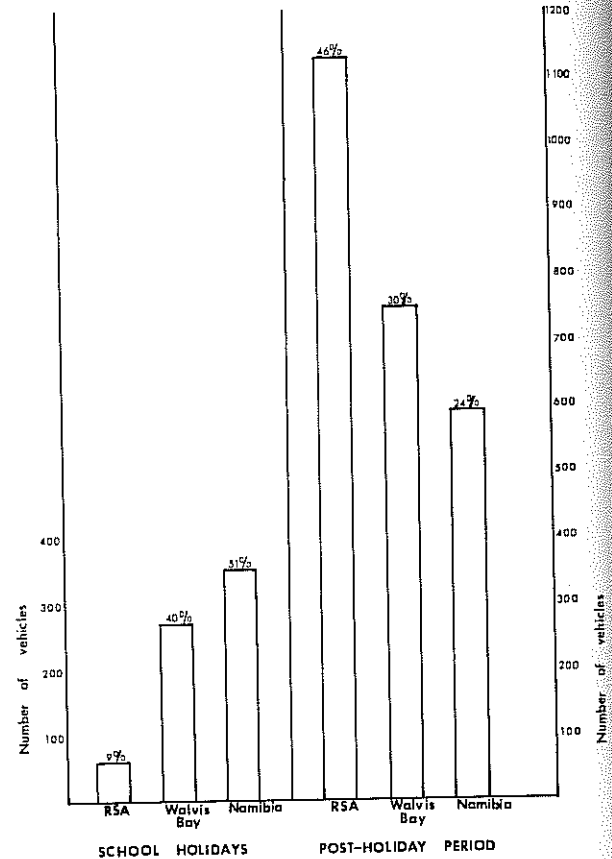


FIGURE 2: Origin of vehicles passing the control point during the school holiday survey (12 December 1989 to 21 January 1990) compared to the post-holiday survey (22 January to 28 March 1990)

In the school holiday period totalling 41 days, 2 349 visitors were recorded at the control point (Table 1). Of these, 81% were anglers. During the post-holiday survey totalling 66 days, 8 561 visitors passed the control point and the percentage of anglers increased to 97 (Table 1). Numerically, the total of anglers increased from 1 901 in the holidays to 8 300 during the post-holiday period. Angling success also increased during the post-holiday survey (through 28 March) with a declared bag of 24 763 fish, compared to 3 944 fish taken during the school holidays (Table 2). If the estimated number of fish caught during the holiday period (5 213) is related to the estimated number of anglers (2 357), as shown in Table 3, then angling success was 2.2 fish per angler day. In comparison, angling success during the post-holiday survey was 3.2 fish per angler day. Similarly the estimated body mass of fish caught during the holiday period was 6.4 kg per angler day compared to 7.8 kg per angler day during the post-holiday survey (Tables 3 and 5). During the rest of the year angling success at Sandwich was poor, and this is reflected by a concomitant decrease in vehicle numbers.

TABLE 1: Comparison between the number of anglers and non-anglers recorded visiting Sandwich during the school holidays and post-holiday period of 1989/90.

Period	Anglers	Non-anglers	Totals
School holidays (12 Dec to 21 Jan)	No. 1901 %81	448 19	2349 100
Post Holiday (22 Jan to 28 March)	No. 8300 %97	261 3	8561 100

TABLE 2: Numbers of the four major species of edible fish declared by anglers at Sandwich during the school holidays and post-holiday period of 1989/90.

Period	Species of fish				Totals
	Kob	Steenbras	Blacktail	Galjoen	
School holidays	3 277	435	104	128	3 944
Post-holiday	12 642	10 963	788	370	24 763

TABLE 3: Estimated number of fish caught by anglers at Sandwich during the school holidays and post-holiday period of 1989/90. Correction factors were applied to allow for anglers who did not declare catches, as well as for days when the control point was not staffed, as detailed in the methods section.

Period	No. of Anglers	Species of fish				Totals
		Kob	Steenbras	Blacktail	Galjoen	
School holidays	2 357	4 331	575	138	169	5 213
Post-holiday	9 628	15 926	13 811	993	466	31 196
Totals	11 985	20 257	14 386	1 131	635	36 409

Using the estimates of total fish catches (Table 3) and the average body mass of a species (Table 4), it was possible to project that slightly more than 15 tonnes of edible fish were taken from Sandwich in the holiday season compared to almost 75 tonnes during the post-holiday survey (Table 5).

TABLE 4: Estimates of the average body mass, in kilograms, of each fish species derived from data obtained at Sandwich during the corresponding period in 1988/89. All fish weighed were whole and uncleaned.

Species (kg)	Sample size	Total mass (kg)	Average Mass
Kob	498	1 599	3,2
Steenbras	433	699	1,6
Blacktail	47	47	1,0
Galjoen	2	3	1,5

TABLE 5: Projected mass, in kilograms, of fish caught at Sandwich during 1989/90, using data from a survey in 1988/89.

Period	Species of fish				Totals
	Kob	Steenbras	Blacktail	Galjoen	
School holidays	13 859	920	138	254	15 171
Post-holiday	50 963	22 098	993	699	74 753
Totals	64 822	23 018	1 131	953	89 924

Moreover, the record of vehicle registration numbers shows that certain anglers entered the area regularly during the post-holiday survey, bringing with them varying numbers of additional fishermen (Table 6). This was substantiated by observing the activities of these groups.

TABLE 6: Analysis of three angling groups who made repeated visits to Sandwich during 1989/90.

Group	Dates of visits	Total no. of visits	No. of visits on which fish were declared	No. of anglers (range)	No. of fish declared	Average daily catch
1	22/12/89 to 20/3/90	50	42	6 (3-11)	1 589	38
2	2/1/90 to 24/2/90	54	25	3 (1-5)	1 445	58
3	2/2/90 to 19/2/90	15	14	5 (2-9)	301	22

The amount of litter recorded during the beach clean-up in April 1989 totalled 260 kg along the 20 kilometre area of coastline open to anglers. In April 1990 an additional 518 kg of accumulated litter was removed, including 16 000 metres of discarded fishing line.

A total of 3 131 vehicles, mostly four-wheel drive, were recorded passing the control point from 12 December 1989 to 28 March 1990.

DISCUSSION

The results reflect that during the post-holiday survey the proportion of anglers to visitors as well as angling success increased considerably. This may be due to an increase in abundance of fish along the Namibian coast at this time, or it may be that the anglers who visited Sandwich during this period were more proficient and professional. In addition, the majority of these anglers were groups from Walvis Bay and the RSA. It seems unlikely that the amount of fish caught by some anglers (Table 3) could have been utilised exclusively for domestic purposes. In particular, the three angling groups surveyed in Table 6 made repeated visits to Sandwich during the post-holiday survey declaring 3 335 fish with an estimated total mass of 7 990 kg. Evidence was subsequently collected which proved large amounts of fish caught at Sandwich during the post-holiday survey were sold, mostly in Walvis Bay, with some also in Swakopmund. At the existing price then of R4 per kilogram, the value of catches made by anglers from Walvis Bay and the RSA (56 656 kg) totalled R226 624.

Furthermore, vehicle impact in the area was commensurate with the passage of 3 131 four-wheel drive vehicles during our monitoring, each making at least two passes, because vehicles often drove back and forth along the beach in search of better angling. Sensitive habitats which appeared to be adversely affected were the intertidal and littoral zones where vehicle tracks may have injured or destroyed beach-dwelling organisms. Furthermore, salt pans adjoining the beach developed deep ruts from tyre tracks which detracted from the aesthetic beauty of these pristine areas, whilst dune hummocks showed varying degrees of damage caused by vehicles driving over them. Dune hummocks are important places of anchorage for the halophytic, woody shrub *Salsola nollothensis* which may aid in stabilising

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mobile sand. No quantitative data on vehicle impact were collected and further investigation into this aspect at Sandwich is necessary.

Moreover, litter left by visitors has increased markedly as evidenced by the two beach clean-ups. Litter on the beach area south of Sandwich lagoon, which is closed to visitors, was found to be so insignificant that it did not warrant a clean-up operation. This litter appeared to have originated from passing ships.

CONCLUSIONS

Although Sandwich Harbour is part of a proclaimed wildlife and conservation park which includes the only marine reserve in Namibia, this status is ignored by many anglers who apparently violate the Nature Conservation Ordinance through large-scale catches of edible fish for commercial gain. At present, prosecution of persons contravening the Ordinance is not possible because most commercial sale of fish caught at Sandwich takes place in the Walvis Bay enclave which is not under the jurisdiction of Namibia. Commercialisation of the fish resources, vehicle track impacts and wanton littering greatly detract from an area which is recognised internationally for its importance to migrant and regional birds. The abuse of these natural resources is of sufficient concern for us to recommend positive management action. At the same time, it should be recognised that Sandwich has an inherent potential to provide food and recreation. The following suggestions to manage the resources for optimal benefit adhere to guidelines provided by the World Conservation Strategy (IUCN, 1980) to which Namibia's Ministry of Wildlife, Conservation and Tourism subscribes:

- 1) Enforce daily bag limits in respect of numbers and size of fish caught to discourage commercial exploitation.
- 2) Collect better catch statistics to document trends.
- 3) Confine vehicles to specific routes.
- 4) Enlist public support of and pride in the reserve.
- 5) Encourage other forms of non-consumptive tourist use such as bird-watching and photography.

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