Mass mortality of Cape Cormorants, caused by fish oil, in the Walvis Bay region of South West Africa

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1 INTRODUCTION

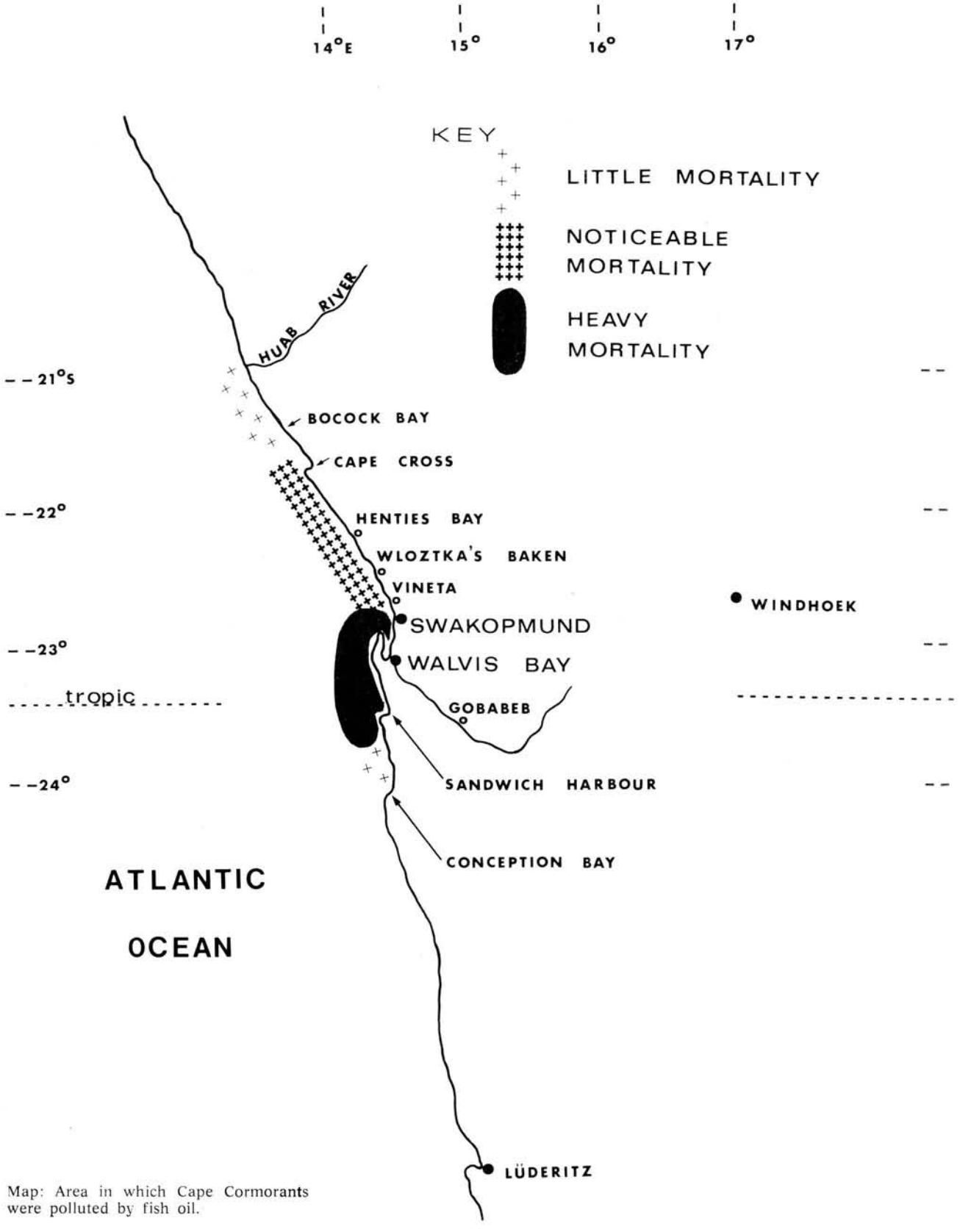
The consequences of a mineral oil spill at sea on marine bird life are well known. On the South African coast the effect of oil pollution on Jackass Penguins has been described by Westphal and Rowan (1970). Until the present time no large scale mortality of sea birds due to fish oil pollution is known to have taken place on the South West African coast. Earlier in 1974 the Percy FitzPatrick Institute of African Ornithology reported heavy mortality of sea birds by fish oil at Lamberts Bay, 240 km north of Cape Town (Anon 1974). During June 1974 fish oil in the sea at Walvis Bay again demonstrated that this type of pollution is in most respects as lethal to birds as its mineral counterpart. The species most affected was the Cape Cormorant *Phalacrocorax capensis* Sparrman.

2 SEQUENCE OF EVENTS

The first report to reach the Nature Conservation Division was from the public at Walvis Bay on Saturday 22 June. Hundreds of *P. capensis* were observed coming ashore in the harbour area of the town. They were unable to fly and preened themselves continuously. During the following day it became apparent that this phenomenon was occurring along a large section of the coast and that thousands of cormorants were affected. A report appearing in the "Namib Times" (No. 1052) of Tuesday 25 June stated that "thousands upon thousands of cormorants and other sea birds face a slow and painful death by starvation following the large diesoliné *(sic)* oil slick which has washed up along the coast here over the past few days". "Die Suidwester" carried a similar article on 27 June and published photographs of cormorants massed along the railway line running close to the beach between Walvis Bay and Swakopmund. Eyewitnesses at the scene told of hundreds of oiled birds, weakened by hunger and cold, being struck by trains and road traffic on the highway between the two towns. Further reports of dead and dying cormorants found at Sandwich Harbour, south of Walvis Bay, to Cape Cross in the north (see map), indicated that a mass mortality was occurring.

The Division's light aircraft (Piper Super Cub) was placed at my disposal and on Thursday 27 June I began a survey of the extent of the pollution between Bocock Bay and Swakopmund. The next day the aerial survey was continued from Swakopmund to a point between Sandwich Harbour and Conception Bay. On 29 June the beach between Bocock Bay and the Huab River was surveyed. From a height of 20 metres it was possible to record the number of dead and dying cormorants and plot the locations where the greatest mortality was occurring (Table I and Map).

An investigation was done by vehicle along the beach on 28 June to coincide with the aerial survey. A sample of 100 dying *P. capensis* was taken be-



Map: Area in which Cape Cormorants were polluted by fish oil.

tween Swakopmund and Walvis Bay and aged according to Berry (1975), see Table II. Six dying *P. capensis* were detroyed and autopsied. In addition an oiled White-breasted Cormorant *P. lucidus* (Lichtenstein) was shot and examined (Table III).

3 RESULTS AND DISCUSSION

Table I. Distribution of oiled *P. capensis* on the West Coast.

Area and distance (km)	No. of dead or dying birds	Total
Huab River to Bocock Bay (15)	130	
Bocock Bay to Henties Bay (140)	612	
Henties Bay to Swakopmund (70)	855	
Swakopmund to Walvis Bay (30)	1 007	4 572
Walvis Bay to Namib Desert Park (30)	707	
Namib Desert Park to Sandwich Harbour (30)	828	
south of Sandwich Harbour (15)	433	

The highest mortality was found between Walvis Bay and Swakopmund. This was due to flightless birds colliding with trains and road traffic. Towards the Huab River and south of Sandwich Harbour relatively few oiled birds were found.

Affected birds sought shelter from the wind by clustering on the leeward side of sandy humps near the beach or behind old fuel drums washed ashore. At areas of human habitation they congregated behind buildings and walls to avoid the wind. The birds shivered continuously due to lack of insulation. They all walked along the beach towards the north. It resulted in mortality occurring far north of the original site of pollution. This direction of movement may have been a result of attempts to escape the prevailing south-westerly wind. They also moved inland into the dune area of the Namib Desert and one oiled *P. capensis* was reported at the Research Station at Gobabeb, a straight line distance of 55 km from the sea.

Table II. Age Classes of a sample of 100 oiled *P. capensis*.

Age Class	No. of birds
Juvenile	79
Adult	21

All post-fledging age classes were affected by the oil. Only 5% of the sample consisted of young juveniles (2-4 months) as the 1974 breeding season for the species ended in March, three months prior to the oil pollution. Older juveniles (4-8 months) formed the greatest portion of the sample, their predominance being due to a successful breeding peak in December 1973/January 1974. The adult birds were sexually inactive, the breeding period of *P. capensis* in this area being September to March.

The autopsied *P. capensis* were in an emaciated condition. Average body mass of the species is approximately 1 230g (Berry 1975) which indicates that the oiled birds had lost 24-45% of their normal mass. When dead pilchards *Sardinops ocellata* were thrown to oiled birds they fought over the fish. Stomachs showed oil traces, probably ingested by preening. Plumage was oiled and adhered to the body areas which made most contact with the water surface while the birds swam, namely the neck, breast and wing coverts (Plate 1). Its odour was similar to raw linseed oil.

Observation showed that oiled birds did not immediately become flightless. The oil film at sea was probably very dispersed, resulting in gradual accumulation on the plumage.

A separate veterinary post mortem was carried out on an adult *P. capensis*. It noted that "the feathers were matted with an oily substance which smelled of fish oil or linseed oil" (von Ludwiger *in litt.*). Nothing else unusual was found in the post mortem. Samples of oiled feathers taken from *P. capensis* were submitted for analysis to the Fishing Industry Research Institute, University of Cape Town. The results indicate that the oil involved was non-mineral and probably of marine origin (Nachenius *in litt.*). This correlates with a run of anchovy *Engraulis japonicus* to the south of Walvis Bay from 17-29 June, at a time of year when the fish are high in oil content (Schulein pers. comm.). It follows that the compaction of tons of anchovies into the purse nets or the holds of fishing trawlers could result in a release of considerable quantities of oil. This in turn would be further dispersed into the sea by pumping from the holds. Flushing of trawler holds and bilges is standard procedure at sea. Fish oil contamination also occurred in Walvis Bay harbour at this time during wet off-loading operations at the factories (see Plate 2 and refer P.F.I.A.O. report of 1974). Seen in the light of these circumstances it is highly probable that the contaminant on the plumage of *P. capensis* was anchovy oil (Shannon *in litt.*).

Death was due to secondary effects of the oil, especially flightlessness which resulted in starvation. Lack of insulation by the oiled feathers resulted in exposure to cold and was a supplementary cause of death.

The oil pollution diminished after 29 June, a week after it had started, with a corresponding decrease in mortality among *P. capensis*. After a further week there was no more significant mortality. Heavily oiled birds succumbed but those lightly

Table III. Autopsy carried out on destroyed *P. capensis* and *P. lucidus* at Walvis Bay on 28 June 1974.

Species	Measurements			Primary moult	Sex and activity	Estimated Age Class*	Stomach	Fat Index**	Macroscopic internal examination	Condition of Plumage
	Body mass (g)	Wing (mm)	Tail (mm)							
P. capensis	670	243	109	both wings (1) tail left (4)	female ovary/oviduct infantile	6-8 months class 3+	empty, traces of oil	1	no parasites, organs appear normal	oiled, very worn, breast and scapulars moulting
"	760	246	112	both wings (5) tail left (1) tail right (5)	female ovary/oviduct infantile	6-8 months class 3+	empty, 1 small stone present, traces of oil	3	nematode attached in proventriculus, organs appear normal.	oiled, worn, breast and scapulars moulting
"	930	264	103	both wings (1,7) tail no moult	male testes/spermaducts infantile	4-6 months class 3—	1 crustacean remnant, traces of oil	3	no parasites, organs appear normal	oiled, worn on breast
"	700	252	108	left wing (3,7,10) right wing (1,8) tail left (4) tail right (2,5)	female ovary/oviduct immature	1-2 years class 4+	empty, traces of oil	2	no parasites, organs appear normal	oiled, breast slightly worn
"	810	271	103	left wing (4) right wing (5) tail left (4) tail right (2,6)	male testes/spermaducts not vascular	8-12 months class 4—	empty, traces of oil	2	no parasites, organs appear normal	oiled, breast slightly worn
P. lucidus	1 520	339	150	left wing (3,6) right wing (5) tail right (6)	male testes/spermaducts infantile	1st year	empty	2	no parasites, organs appear normal	oiled, otherwise good

*Age Class: 3—) juvenile
3+)
4—) adult
4+)

**Fat Index: 1 = fat deposits virtually absent
2 = small deposits of fat
3 = noticeable deposits of fat

oiled appeared to regain their flying ability within this period.

Only *P. capensis* suffered from the oil pollution. Two other species *P. lucidus* and the Cape Gannet *Sula bassana* were slightly involved but only a few individuals showed signs of oiling and no mortality was noted. This is probably due to the difference in fishing habits of the species. *P. lucidus* frequents the lagoons and rocky shoreline and does not venture out to the trawling area. *S. bassana* dives for its fish from the air, unlike *P. capensis* which dives from a swimming position on the surface.

Plate 1. A juvenile Cape Cormorant typically polluted by fish oil which caused adhesion of the plumage.

4 CONCLUSIONS

Counts made 5-7 days after the start of the pollution indicate that at least 4 500 *P. capensis* had died or were dying. The total number was probably much higher due to continuing mortality and the fact that many birds had wandered inland and were missed during the counts.

If the total *P. capensis* population on South West Africa's coast is taken at approximately one million (900 000-plus estimated by Rand (1963) and 1 053 000 estimated by Berry in 1975) then the percentage birds known to have died from the effects of fish oil is less than 1 %.

The small percentage of the population killed by fish oil in no way detracts from the danger inherent in such a situation. Fish oil in large quantities, such as from a tanker spill, will be lethal to many more bird species. Prevention of such situations is the logical approach. Once fish oil is released into the sea through human error, the nature of the South West African coastline makes attempts at correcting the damage done to bird life physically and economically unfeasible.

Plate 2. Aerial photograph of fishing trawlers at berth in Walvis Bay on 28 June 1974, showing discolouration of surrounding sea water, due to pollution.

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