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11. MORTALITY OF AQUATIC BIRDS IN THE GULF OF GDAŃSK AS A RESULT OF OIL POLLUTION

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Abstract

Poland is one of the few countries around the Baltic Sea where the mortality of aquatic birds due to oil pollution has been monitored since the 1960s. The most comprehensive data has been gathered in the Gulf of Gdańsk region. During the sixties and seventies Polish coastal waters were permanently contaminated by numerous though relatively small leaks from port installations, ships and fishing cutters. The density of dead, oiled birds was then high and ranged from 3-5 individuals per km. The 1980s witnessed a rapid decline in the number of oiled birds, owing probably to the tightening of punitive measures against the perpetrators of marine pollution, and to the recession, which also affected the maritime economy. Furthermore, the source of contamination had moved, a fact endorsed by the species composition of the dead birds recovered. At present, far fewer petroleum-based contaminants enter the open sea; the major sources of such pollution are now to be found on the coast.

11.1. INTRODUCTION

Birds are a very important biological indicator of water polluted by crude oil and its derivatives: no other type of pollution causes such rapidly apparent effects in them. Regular coastal surveys including counts of dead, oiled birds have become a widespread means of monitoring oil pollution of the sea (Camphnysen and van Francker 1992). Poland is one of the few countries where monitoring of this kind has been carried on since the early 1960s; the fullest information has been gathered for the Gulf of Gdańsk (Meissner 1992). The European centre co-ordinating research into avian mortality through oil pollution is housed at the Institute for Marine Research in the Netherlands.

Birds are extremely sensitive to oil pollution: even a small, quantity of oil will soil the plumage. The feathers stick together, become soaked and lose their insulating properties, so that the bird rapidly loses heat. While attempting to preen itself, the bird ingests highly toxic petroleum compounds, which leads to disorders of the stomach and intestines, systemic poisoning, and finally death.

No large-scale disasters of the kind where thousands of tons of oil enter the sea have occurred along the Polish coast. However, for many years now, continual contamination of the sea has been taking place as a result of leaky port installations, small spills from ships and fishing cutters, and tankers washing out their tanks at sea (Górski *et al.* 1976, 1977, 1979a, 1979b, 1980)

11.2. METHOD

Material was collected on walking surveys. The western part of the Gulf of Gdańsk was surveyed once a month from September to April. Aquatic birds found were identified and classified into one of the following groups:

- birds with soiled plumage
- birds with clean plumage
- birds drowned in fishing nets
- remains (not classified in any of the first three groups).

These birds are removed from the beach so that they are not counted again during the next survey.

The results of counts done in the 1960s and 1970s have been published in a series of articles (Szczepski 1976, Górski *et al.* 1976, 1977, 1979a, 1979b, 1980) and have served as comparative material for this paper.

11.3. RESULTS

In the 1960s and 1970s the mortality of aquatic birds due to oil pollution was high, the rate being as high, and in some years higher, than that in western Europe (Górski *et al.* 1979b). At that time from 1500 to 5500 birds were estimated to be perishing on the Polish coast every year. It should be realised that all such figures will have been underestimated, because some of these dying birds conceal themselves on sand dunes, while the bodies of birds that have perished at sea are not always washed ashore.

In the eighties both on the central coast (Górski and Antczak 1990) and in the Gulf of Gdańsk (Meissner 1992) the numbers of oiled birds fell very considerably (Fig. 11.1). It is worth noting that the density of non-oiled, dead birds has remained practically unchanged. Any slight fluctuations are probably

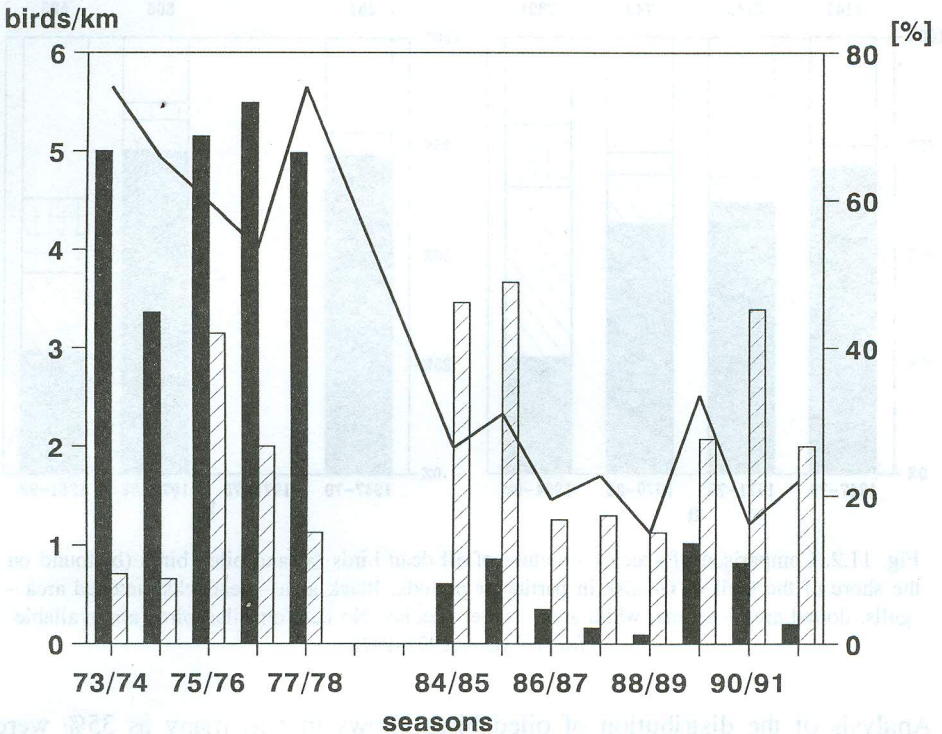


Fig. 11.1. Average density of dead birds found on the shore of the Gulf of Gdańsk in successive seasons. Black columns – oiled birds; hatched columns – non-oiled birds. The line indicates the percentage of seaducks among the dead birds. Detailed data for the years 1979-1983 are not available.

the result of annual, natural factors affecting the mortality of wintering and migrating populations.

In the sixties and seventies the most frequent victims of oil pollution were seaducks: Long-tailed Duck (*Clangula hyemalis*), Common Scoter (*Melanitta nigra*), Velvet Scoter (*Melanitta fusca*) and Eider (*Somateria mollissima*). These are all open-sea species, and their numbers among dead birds decreased distinctly in the 1980s. In comparison with the earlier period, it is now swans and gulls, inshore species, that are increasingly falling victim to pollution (Fig. 11.2). Interestingly enough, one hardly ever comes across oiled Mallard (*Anas platyrhynchos*) or Tufted Duck (*Aythya fuligula*), even though both species spend the winter in the inshore zone in very large numbers (Brewka 1993, Michno *et al.* 1993). On the other hand, a substantial proportion of the wintering swans and gulls congregate on the municipal beaches, where they are fed by humans (Meissner 1993, Meissner and Nitecki 1993).

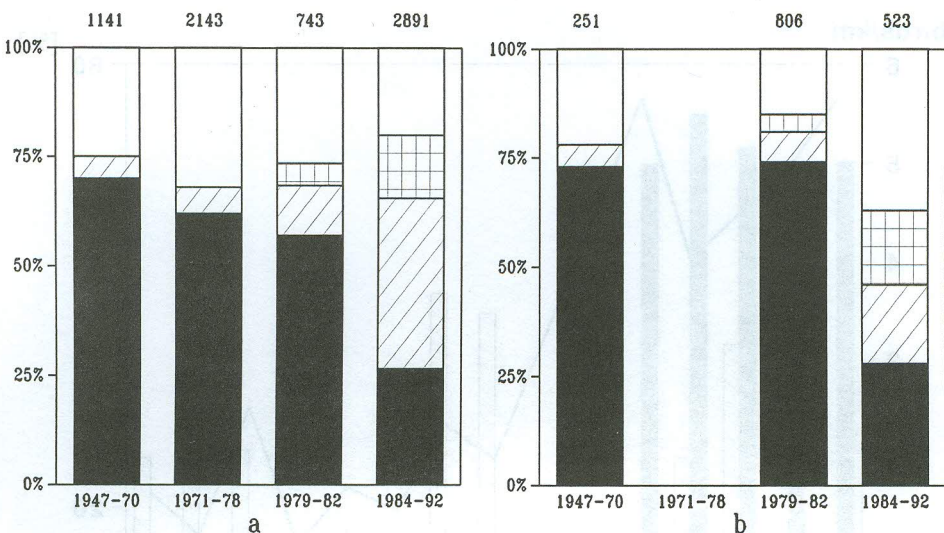


Fig. 11.2. Comparison of species structure of all dead birds (a) and oiled birds (b) found on the shore of the Gulf of Gdańsk in particular periods. Black area – seaducks, hatched area – gulls, dotted area – swans, white area – other species. No data on oiled birds are available for the years 1971-1978.

Analysis of the distribution of oiled birds shows that as many as 35% were found on municipal beaches, on average 1 bird per kilometre. Only in port areas was the density higher – ca 1.8 birds per km.

The results of counts along the entire Polish coast have confirmed the fall in numbers of oiled birds (unpublished data from the International Beach Birds Survey). In 1993 only 10 birds were found with soiled plumage. The chief human cause of aquatic bird mortality is drowning in fishing nets, not oil pollution of the sea (Fig. 11.3).

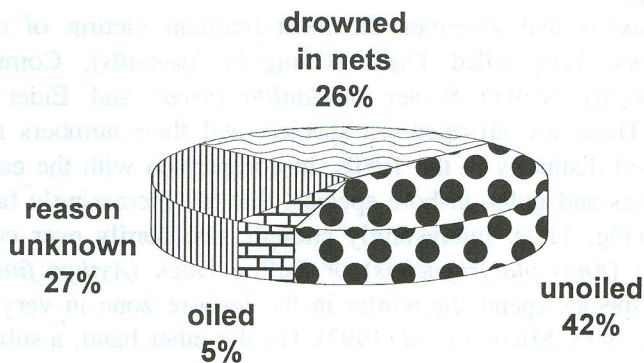


Fig. 11.3. Causes of mortality among aquatic birds on the whole Polish coast in February 1993

The largest numbers of dead birds, including oiled birds, are found in early winter and in spring (Fig. 11.4). This finding is in agreement with the results obtained in the sixties and seventies (Górski et al. 1979b).

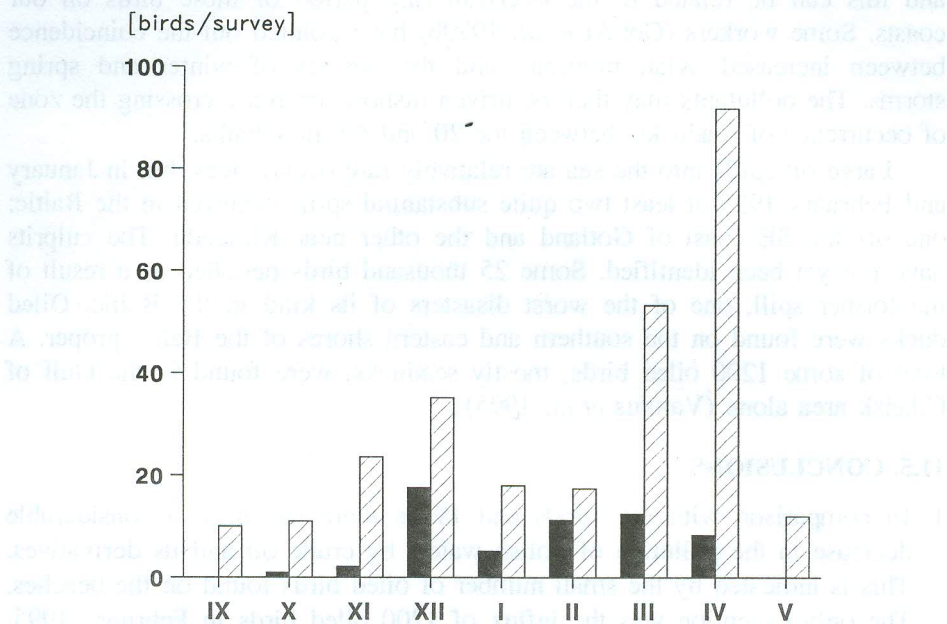


Fig. 11.4. Average density of dead aquatic birds found on the shores of the Gulf of Gdańsk in successive months. Black columns – oiled birds, hatched columns – non-oiled birds. Data for 1984-1992.

11.4. DISCUSSION

The species composition of oiled birds can give some indication of the pollution source. If there are seaducks, divers and auks, i.e. open-sea birds, among the victims, they will have come into contact with an oil slick out at sea, and the oil will very probably have originated from a tanker or drilling rig. If inshore birds such as gulls, coots, swans and dabbling ducks are affected, the oil will have entered the sea in the inshore zone. Usually in such cases the source of pollution is a port or an industrial plant discharging effluent straight into the sea. The increasing proportions of swans and gulls among the oiled birds and the relatively high percentage and density of oiled birds found on municipal beaches indicate that more and more oil derivatives are getting into the sea from the area of the Tri-city's beaches. Some of them have certainly come from the ports of Gdańsk and Gdynia, the North Port, and the shipyards, situated at either end of the Tri-city beach. Another piece of evidence

suggesting that the ports have become the main source of oil pollution is the fact that the highest density of oiled birds is to be found in their vicinity (Fryderyk 1993).

The highest numbers of dead, oiled birds are found in winter and spring, and this can be related to the overwintering period of these birds on our coasts. Some workers (Górski *et al.* 1979b) have pointed out the coincidence between increased avian mortality and the periods of winter and spring storms. The pollutants may then be driven inshore, en route crossing the zone of occurrence of seaducks, between the 20 and 40 m isobaths.

Large oil spills into the sea are relatively rare occurrences, but in January and February 1995 at least two quite substantial spills occurred in the Baltic: one off the SE coast of Gotland and the other near Klajpeda. The culprits have not yet been identified. Some 25 thousand birds perished as a result of the former spill, one of the worst disasters of its kind in the Baltic. Oiled ducks were found on the southern and eastern shores of the Baltic proper. A total of some 1200 oiled birds, mostly seaducks, were found in the Gulf of Gdańsk area alone (Vaitkus *et al.* 1995).

11.5. CONCLUSIONS

1. In comparison with the 1960s and 1970s there has been a considerable decrease in the pollution of Polish waters by crude oil and its derivatives. This is indicated by the small number of oiled birds found on the beaches. The only exception was the influx of 1200 oiled birds in February 1995, but almost all of them had been oiled in the other Baltic regions.
2. The species composition of the oiled birds indicates that the source of oil slicks is not the same as it used to be. Nowadays the chief source of such pollution are ports, shipyards and effluent outfalls. Far fewer oil derivatives enter the sea from ships at sea.

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