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Note

Assessing the impact of major oil spills on seabird populations

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Inputs of oil to the sea from tanker incidents have been much reduced in the last 20 years, but are still a regular occurrence (Clark, 2001). Recent major shipping disasters were the sinking of the *Erika* off Brittany (France) in 1999 and of the *Prestige* off NW Spain in 2002. The damage done by tanker incidents and other oil spills has varied with the type and volume of oil, weather conditions and the area and time of year where the incidents took place, but there are always economical, political and environmental consequences. As with other shipping, many accidents involving tankers happen every year and some areas (notably those near major shipping lanes) are more likely to experience large spills than others. Yet on a regional scale, major oil incidents are still so rare that few countries can claim to be fully prepared to cope with the resultant chaos. The manner in which both the *Erika* and the *Prestige* incidents were treated by the French and Spanish authorities, respectively, highlighted this lack of preparedness. One of the most visible environmental effects of oil spills, not to be confused with necessarily the most profound impact on the (marine) environment, is seabird mortality.

The authors have been involved in assessing the impact of oil spills on seabirds in Europe and in North America over the past 25 years. With few exceptions, the need to properly assess the impact of these spills on seabirds has not been fully appreciated during incidents, despite pressure from the media and other interested parties for accurate and up to date information on the damage done. Consequently, the number of seabird casualties involved in many major spills has only been estimated approximately, while impacts at the population level have been difficult to determine. Most seabird species are highly mobile and are capable of travelling

great distances, either outside the breeding season or simply in search for food. In the absence of accurate figures and with no knowledge of age structures and the possible origin of the birds involved, it is very difficult to predict or interpret post-spill population trends.

There are two inter-linked aspects to dealing with oiled seabirds during major spills. The first involves birds found alive, and the humanitarian efforts made to clean, rehabilitate, and successfully release them into the wild. This can be a relatively expensive and logistically complicated process. The second involves assessing the likely impact of the spill on the populations of those species affected.

The successful rehabilitation of oiled seabirds requires high quality facilities and expert skills (including veterinary). Few oil spills occur where both are readily available, but in recent years there have been some relatively successful attempts to clean, rehabilitate, and release birds with the help of expert teams brought in from abroad. The need to establish properly equipped rescue centres is usually appreciated very rapidly, particularly when images of heavily oiled seabirds are brought to the attention of the public through the (international) media.

Oil spill impact assessment (OSIA) requires more than this, particularly since most seabird casualties in oil spills do not reach the coast alive. Therefore, in the very early stages of a spill, systematic collection, recording and scientific examination of dead seabirds has to be established. The main interface between this process and rehabilitation efforts is integrating data on seabirds received at rehabilitation centres (and their fate) into an overall database of seabird casualties. The principal aim of the OSIA is to properly assess the damage done by the spill, in terms of recording the number of casualties

and predicting possible effects at the population level. To detect population effects requires data on the species involved, their geographic breeding origin, and the age and sex structure of the mortality. This would allow seabird biologists involved in post-spill monitoring to know what to look for, and where and when to look. The age composition of the mortality is important to determine since most seabird population monitoring involves counts of breeding birds at colonies, and most species have several years of immaturity before attaining age of first breeding. If the majority of victims were adults, an effect might be detected the following breeding season, whereas if most were immatures any effect might be delayed for several years.

There are four fundamental steps in a proper OSIA, the first being a systematic beach search effort which should be sustained for the duration of the spill (Camphuysen and Heubeck, 2001). Such a search effort should not rely on casual visits to shorelines by members of the public, but should be carried out by dedicated volunteers backed-up by a core of people experienced in oil spill response and the efficient organisation of beached bird surveys, some of whom may need to be imported from out with the country/region polluted. Beach clean-up teams also should be instructed to collect any oiled birds they encounter during their work, put them aside, and have them labelled and collected at regular intervals. An efficient collection and transportation system needs to be organised for both the live and dead birds found.

Second, a facility to examine dead birds needs to be identified and established as soon as possible, manned by a sufficient number of trained personnel, including experienced ornithologists, some of whom will almost certainly need to come from out with the country/region. Scientific oversight should be established rapidly, to identify and source relevant expertise, to decide the level of examination that is practicable given the resources available, and to determine the fate of the biological material collected. In the case of the *Prestige* spill, it was fortunate that a university laboratory was made available where students volunteered to be trained in post-mortem techniques, but this will not always be the case. [Here, it is appropriate to acknowledge the efforts of the students of the University of A Coruña, who have sustained this work on a voluntary basis for 10 weeks, with no end in sight at the time of writing.] Facilities should be available seven days per week, with at least one person dedicated to logistic tasks and another compiling a central database. Dependant on relevant national legislation, authority should be given rapidly to the scientific team for examination of corpses and their transfer to other institutions, if appropriate, while an effective, legal system of disposal of dead, oiled birds must also be identified.

Third, preliminary analyses of results should be reported regularly during the spill (ideally on a dedicated

website), so that an overview of the potential impact on seabird populations can be accessed by all involved and interested in the event: government agencies, NGOs, journalists, scientists, seabird rescue workers, clean-up teams and others. Such a website should also advertise what material is available for purposes such as museum curation or DNA analysis.

Fourth, meteorological conditions allowing, permission should be obtained rapidly from authorities for experienced ornithologists to have access to aircraft and boats involved in the spill response plan for the purpose of conducting surveys of seabirds at sea. Drift experiments, using tagged corpses or wood blocks released from these planes or boats, should also be conducted to assess the trajectory of corpses, the rate of loss at sea, and the recovery rate on beaches.

The basic steps involved in post-mortem examination are logging the date and place of finding, identification to species and checking for rings and other markers such as satellite transmitters (not always easy in the case of heavily oiled birds), detailing the oiling status of each bird (% oiled), external ageing and sexing where possible, external biometrics (to help determine the age and breeding population of origin), and internal examination to determine sex and age. In most situations, up to 100–150 birds could be processed per day in a well organised facility. In the event of more birds being found, some procedures may have to be curtailed or arrangements may have to be made for freezer storage once the initial logging, specific identification and checking for rings has been completed. Both the beach search effort and the scientific examination of dead birds described above should be generic to any major oil spill. These procedures are essential to understanding the impact of that spill on seabird populations and should not be considered as academic research.

There will be costs involved, which should be met by those responsible for the pollution. These costs include (1) staff time and expenditure for the organisation coordinating the response, (2) travel, accommodation and subsistence for any expertise requested to assist, (3) accommodation, subsistence, vehicle hire and fuel for beach teams, (4) any costs involved in arranging laboratory or similar facilities and the disposal of dead oiled birds, (5) basics such as protective clothing, disposable laboratory equipment, and cleaning materials, and (6) analysis of the data and publication of the results. The organising body should work in close conjunction with the local/national government and the relevant insurers in agreeing and tracking this expenditure, providing interim payments where necessary, and eventually processing a claim to the International Oil Pollution Compensation Fund (or whichever body is responsible for compensation). However, it is essential that in future rapid contact is made between those planning to spend money on assessing the impact of a major spill on

seabird populations, and those on the scene who are both advising on, and responsible for refunding costs.

Pre-planning is essential for an effective response, and all countries or regions vulnerable to oil spill events (and some spills may impact more than one country) should identify which organisation should be prepared to take the lead role in co-ordinating the systematic beach search effort, identifying facilities where dead birds can be examined, and sourcing the expertise to conduct post-mortems. A rapid response should not be constrained by the fear of expenditure, which might be considerable in terms of the assets of that organisation, but will be minimal in terms of the overall costs of response and cleanup. It is worth noting that our recommendations above were largely endorsed by the published reports on the environmental impacts of the 1993 *Braer* oil spill in Shetland, Scotland (Ritchie and O'Sullivan, 1994) and the 1996 *Sea Empress* oil spill in

south-west Wales (SEEEC, 1998). Governments, conservation organisations and seabird biologists need to learn the lessons of the past, and not re-invent the wheel each time they are forced to cope with a major oil spill.

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