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# Short Note
# Light induced seabird mortality on vessels operating in the Southern Ocean: incidents and mitigation measures

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## Introduction

It is recognized that birds become disorientated at night in the presence of artificial light (Bruderer *et al*. 1999). Bird strikes on vessels operating in the southern oceans have long been known (Ryan 1991), but few data have been published concerning these events. In the Southern Ocean the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) stipulates that, during fishing operations, deck lighting should be kept to a minimum and be directed inboard and downward (CCAMLR 2003, measures 25-02 and 25-03). However, these measures are designed to keep birds away from fishing gear rather than prevent bird strikes. The problem of bird strikes has been recognized by several territories within the southern oceans and policies to reduce the risk of them occurring are included in several management plans (Ryan & Glass 2001, policy 5.14 and Meere 2002, section 28:1f–1g). These do not, however, address the issue of ice-lights (powerful searchlights used to discern floating ice that might go undetected by radar), which are regarded as essential navigational aids.

This note describes a significant bird strike event on a vessel operating in South Georgian waters and suggests measures to limit bird strikes on vessels.

## The incident

Between 6 January and 10 February 2004, MV *Dorada* (a 75 m trawler) was present within the South Georgia Maritime Zone conducting a Fisheries Biomass Survey on behalf of the Government of South Georgia and the South Sandwich Islands (GSGSSI). On the night of 30/31 January, the vessel was moving over continental shelf waters to the west of South Georgia, passing within 15 nautical miles (nm) of Annenkov Island (between positions 54°50.3'S 36°46.1'W and 54°30.5'S 37°36.7'W), at speeds ranging between four and seven knots. The weather was calm with sea states of 0 to 1. Throughout the night, visibility was poor (< 1 nm) with fog and persistent rain. Ice-lights were on throughout the night with minimal other deck lighting in use.

Throughout the hours of darkness (22:00 to 04:00 ship's time), a large number of birds collided with the ship. At dawn the deck was littered with dead and dying birds. Of the almost 900 birds collected 215 were dead (Table I). Death was thought to be either directly due to collisions with the ship or to a combination of hypothermia and drowning, following prolonged immersion in water-filled cavities on deck. Virtually all of those still alive were in a waterlogged state and were collected in cardboard fish boxes to dry and recondition their feathers. Boxes were stored in a dry yet unheated area of the factory deck, and once in captivity very few birds died. Over the following hours, 684 birds were released alive (Table I). Nine species were recorded during this bird strike; blue petrel *Halobaena caerulea* (Gmelin), Antarctic prion *Pachyptila desolata* (Gmelin), fairy prion *P. turtur* (Kuhl), soft-plumaged petrel *Pterodroma mollis* (Gould), Wilson's storm-petrel *Oceanites oceanicus* (Kuhl), black-bellied storm-petrel *Fregetta tropica* (Gould), grey-backed storm-petrel *Garrodia nereis* (Gould), common diving-petrel *Pelecanoides urinatrix* (Gmelin) and Georgian diving-petrel *P. georgicus* (Murphy and Harper).

Dead birds were weighed, measured, sexed and stomach samples were taken for diet analysis, the results of which will be presented elsewhere.

## Discussion

Bird strikes on vessels operating in the southern oceans is an almost nightly occurrence (personal observation) but the level of mortality is generally low. However, occasionally large events concerning hundreds of birds take place. One such incident occurred in January 1992, on the MV *Aurora*

**Table I.** Summary of the number of birds found dead and released alive after the *Dorada* birdstrike.

| Species | Dead | Released | Total | % dead |
|---|---|---|---|---|
| Antarctic prion | 27 | 240 | 267 | 10.1 |
| Blue petrel | 57 | 208 | 265 | 21.5 |
| Common diving-petrel | 82 | 129 | 211 | 38.9 |
| Georgian diving-petrel | 30 | 52 | 82 | 36.6 |
| Wilson's storm-petrel | 16 | 40 | 56 | 28.6 |
| Black-bellied storm-petrel | 2 | 11 | 13 | 15.4 |
| Grey-backed storm-petrel | 1 | 1 | 2 | 50.0 |
| Fairy prion | 0 | 1 | 1 | 0 |
| Soft-plumaged petrel | 0 | 2 | 2 | 0 |
| Total | 215 | 684 | 899 | 23.9 |

*Australis* whilst anchored in Atlas Cove, Heard Island. The night was calm and foggy, deck operations necessitated the use of deck lighting. By morning over 200 birds were dead as a result of collisions with the vessel and a combination of hypothermia and drowning on deck; many more were released alive (exact numbers unavailable). The dead birds consisted of Antarctic prion, fulmar prion *Pachyptila crassirostris* (Mathews), Kerguelen petrel *Aphrodroma brevirostris* (Lesson), Wilson's storm-petrel, common diving petrel and Georgian diving-petrel (T.A. Reid personal communication 2004). As a consequence of this event shipping operations at Heard and Macquarie islands have changed with deck operations no longer being conducted during the hours of darkness. The ship operators also minimize light escape from cabin windows (E.J. Woehler personal communication 2004).

On a smaller scale, an event occurred on 11 March 2002 at South Georgia. MV *Sigma* was moored at King Edward Point jetty with all deck lights on. The following morning, 62 petrels were collected from the deck including; 15 Antarctic prion, 6 Wilson's storm-petrel, 23 black-bellied storm-petrel, 11 Georgian and seven common diving-petrels. Two birds were dead; the remainder were held in boxes to recover and released the following evening (D. Edwards personal communication 2002).

The species involved in all these incidents are consistently small burrow nesting petrels. The scales of the Heard Island and *Dorada* bird strikes were similar, both events occurred in conditions of reduced visibility and in the vicinity of major burrowing petrel breeding sites. The *Sigma* event is of a smaller scale but this is consistent with the lower number of burrowing petrels breeding in the immediate vicinity. The use of ice-lights or other deck lighting is a key factor in all three incidents.

Of interest are those species that breed on South Georgia in considerable numbers that were not involved in this incident; particularly albatrosses, giant petrels *Macronectes* species and white-chinned petrel *Procellaria aequinoctialis* (Linn.) (Prince & Croxall 1996). The presence of white-chinned petrels principal prey species near the surface at night infers that this species, at least, is active at night (Croxall *et al.* 1995).

Following this event the Captain of MV *Dorada* changed the standing night orders, instructing the officer of the watch to inform the Captain of future bird strikes. Efforts will be made to limit the amount of lighting in use and alter the ship's activities, if appropriate, to minimise the number of birds colliding with the ship (L. Featherstone, personal communication 2004). However, ice-lights are regarded as essential for the safe operation of vessels in waters where icebergs are prevalent.

In response to this event the GSGSSI is investigating the use of image enhancing technology to enable a lookout to be kept with limited use of ice-lights (G. Liddle personal communication 2004).

## Recommendations for minimising light-induced seabird mortality

Seabird mortality due to artificial lights can be minimized by employing some simple mitigation measures:

- alerting vessels to the risk associated with the use of ice-lights and other deck lighting, particularly on nights when visibility is poor and in the vicinity of seabird islands,
- black-out blinds should be mandatory on all portholes and windows with external lighting kept to the minimum required for safe navigation and operation of vessels;
- keeping deck lights to a minimum when at anchor or close inshore overnight;
- providing information on how to treat and release birds found on deck;
- recording birds found on deck ( species, position and weather conditions) and ideally dead birds should be frozen for further investigation ashore.

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