UNUSUAL MASS STRANDING EVENT OF WHITE-CHINNED PETRELS *PROCELLARIA AEQUINOCTIALIS* IN SANTA CATARINA STATE, SOUTHERN BRAZIL

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ABSTRACT

KOLESNIKOVAS, C.K.M., FERREIRA, E.C., ASSUMPÇÃO, C.C.A. & SERAFINI, P.P. 2021. Unusual mass stranding event of White-chinned Petrels *Procellaria aequinoctialis* in Santa Catarina State, southern Brazil. *Marine Ornithology* 49: 183–187.

Bycatch is a significant threat for albatrosses and petrels in general but especially within Brazilian waters. As part of a monitoring program, Projeto de Monitoramento de Praias da Bacia de Santos (PMP-BS), an unusually high number of White-chinned Petrels *Procellaria aequinoctialis* was recorded at Santa Catarina Island: 72 birds from August 2015 to July 2016 (60 dead and 12 alive) and 31 birds from 29 December 2015 to 05 January 2016 (28 dead and 3 alive). Evaluation of the carcasses showed that 12 birds had external evidence of anthropogenic interaction, and necropsy demonstrated that at least two had perforation of internal organs due to hook attachment. Hooks were identified as the type used by the Itaipava fleet. This fleet targets dolphinfish *Coryphaena hippurus*; tunas *Thunnus obesus*, *T. alalonga*, and *T. albacares*; and swordfish *Xiphias gladius*, and it typically operates in waters off southeastern Brazil. Although Brazil has strict laws to prevent albatross and petrel bycatch, enforcing bycatch mitigation measures has been a challenge. It is crucial to understand the dynamics of threats and their effects on populations, especially in terms of mass mortalities. For now, beach surveys can at least document the incidence of this problem.

Key words: *Procellaria aequinoctialis*, mortality, bycatch, South Atlantic

INTRODUCTION

A mass stranding event is defined as two or more animals stranding close to each other in time and space; the event may occur over several hours or days, and in one location or across many kilometers (Simeone & Moore 2018). Mass strandings of marine and coastal waterbirds are frequently reported worldwide, although the causes are often undetermined (e.g., Buehler *et al.* 2010). Examples of mass strandings include shearwaters *Puffinus* spp. and *Ardenna* spp. (Ayala *et al.* 2013, Haman *et al.* 2013); prions *Pachyptila* spp. and Blue Petrels *Halobaena caerulea* (Kinsky 1968, Ryan *et al.* 1989, Martuscelli *et al.* 1997); gadfly petrels *Pterodroma* spp. (Ryan *et al.* 1989, Bugoni *et al.* 2007); loons *Gavia* spp., grebes *Aechmophorus* spp., and Northern Fulmars *Fulmarus glacialis* (Jessup *et al.* 2009); penguins *Spheniscus* spp. (Gandini *et al.* 1994, Mäder *et al.* 2010); shags *Phalacrocorax* spp. (Coulson *et al.* 1968); Common Eiders *Somateria mollissima* (Camphuysen *et al.* 2002); Common Murres *Uria aalge* (Bailey & Davenport 1972); and shorebirds *Calidris* spp. (Buehler *et al.* 2010). Massive die-offs are attributed to a range of causes, including oil pollution (Gandini *et al.* 1994, Furness & Camphuysen 1997), algal blooms (Coulson *et al.* 1968), storms (Kinsky 1968, Bugoni *et al.* 2007), food shortages (related to El Niño (Ryan *et al.* 1989, Ayala *et al.* 2013) or due to unknown circumstances (Camphuysen *et al.* 2002, Haman *et al.* 2013)), and bycatch in fisheries (Hamel *et al.* 2009). Small-scale or artisanal fisheries have been included as causes of seabird bycatch, among them the Itaipava fleet off Brazil (Bugoni *et al.* 2008).

The White-chinned Petrel *Procellaria aequinoctialis* (hereafter WCP) is frequently observed in fisheries bycatch, internationally and within Brazilian waters (Phillips *et al.* 2016). This seabird has a wide distribution, breeding on the French, New Zealand, and South African subantarctic islands, as well as on South Georgia (Islas Georgias del Sur) and the Falklands (Islas Malvinas; Onley & Scofield 2007, Howell 2012). In the Pacific, they breed on the Auckland, Antipodes, and Campbell island groups, but very little is known about these WCP populations or their at-sea movements, as is true for many breeding populations of this species.

Here we describe a mass stranding event of WCP and discuss the possible sources of mortality. It is the second mass stranding in southern Brazil within a five-year period, with 52 individuals reported for Rio Grande do Sul in 2014 (Faria *et al.* 2014). Mass mortalities, especially of adults and subadults, are particularly deleterious when they affect threatened species that have small population sizes. It is crucial to understand the dynamics of threats and how populations are being affected, and this report shows that beach surveys in a continuous monitoring program can be effective in identifying causes of death in mass strandings.

METHODS

Study area

Located in southern Brazil, Santa Catarina Island (27°22′S, 048°21′W) is a typical island along the coast in South Atlantic waters (Horn Filho 2006; Fig. 1). Its perimeter is 147 km long and is composed of sandy beaches, dunes, salt marshes, ponds, cliffs, and mangroves. The island has 117 sandy beaches totaling 88 km or 50.5% of the total perimeter (Diehl & Horn Filho 1996).

Stranding data

Systematic beach surveys were conducted from August 2015 to July 2016 to record turtles, seabirds, and marine mammals as part of the Santos Basin Beach Monitoring Program (Projeto de Monitoramento de Praias da Bacia de Santos, PMP-BS). This program is one of several required by Brazil's federal environmental agency (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis) as part of the licensing process for oil production and transport by Petrobras in the pre-salt province (25°05′S, 042°35′W to 25°55′S, 043°34′W), between the 2100 m and 2300 m isobaths (licence ABIO Nº 640/2015). The beach survey covers ~42.35 km daily (297.68 km weekly) on foot or on a motorized quadricycle, not exceeding the speed of 20 km/h. Carcasses are identified referencing well-known texts, e.g., Onley & Scofield (2007) and Howell (2012).

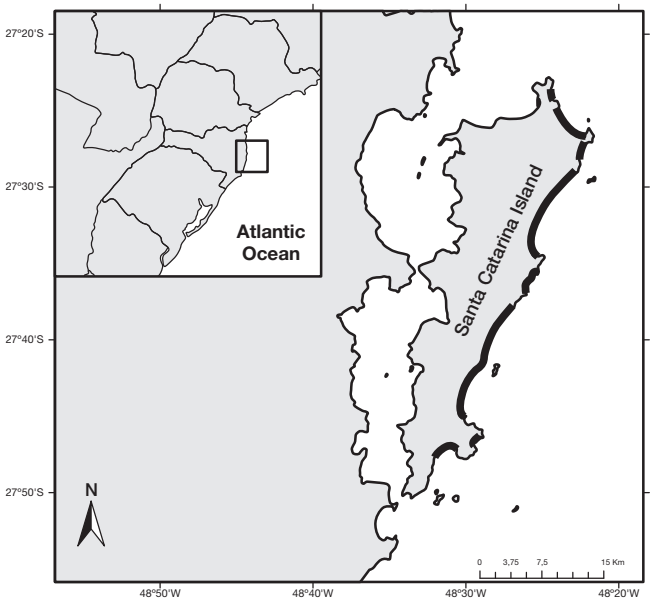

Fig. 1. Study area in southern Brazil. Thick black lines show monitored areas.

Anatomopathological examination

Animals found dead or debilitated were evaluated by veterinarians for lesions, external markings, fishing gear, nylon, and oil. Every animal found was given an identification number. Fishing gear was identified according to Mituhasi & Hall (2011).

RESULTS

From August 2015 to July 2016, 72 WCPs were found beached during daily beach monitoring. Among those, 60 were dead (D) and 12 were alive (A). From 29 December 2015 to 07 January 2016, a mass stranding event was observed on Santa Catarina Island, during which an unusual high number of WCPs was recorded: 31 animals (28 D/03 A), representing 42.5% of the total number of WCPs recorded in one year of monitoring (Fig. 2).

Gross evaluation of the carcasses in this latter period showed that 12 of the 31 birds (38.7%) had external evidence of anthropogenic interaction, including seven that had fishing gear attached to the carcasses: two had hooks in the mouth (Fig. 3A) and five had line or ropes attached to the body (Fig. 3B). Twenty-six animals were classified as adults, five as juveniles, and one could not be classified because of poor carcass condition. Body condition was assessed in only three birds: one was in poor condition and two were in good condition.

Because of poor carcass preservation, necropsy was possible for only two dead individuals. One had no external evidence of fishery interaction, but necropsy indicated both perforation of the cervical musculature of the esophagus and the presence of a hook and line in the esophagus that was associated with hemorrhage. The other had fresh fish in its stomach and a line attached to a hook in the esophagus; perforation was evident in the lung and esophagus. All three birds that were rescued alive died during rehabilitation and were submitted for necropsy. One had no evidence of fishery interaction, such as fresh fish in the stomach or lung congestion; one showed granulomatous pneumonia that was unrelated to fishery interaction; and last one had its lung perforated, likely by a hook that was not present.

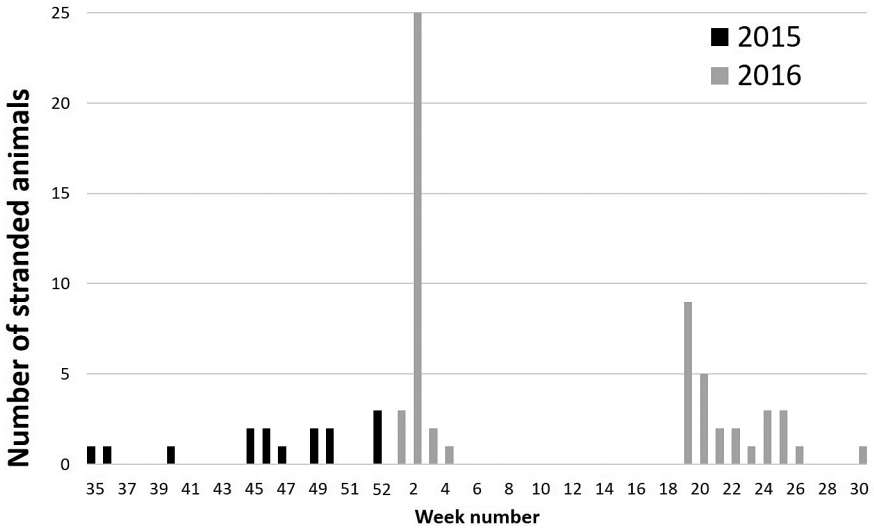

Fig. 2. Number of stranded animals by week number from August 2015 to July 2016.

The hooks found were of the J type and were around 5.6 cm in length (Fig. 3C). This type of hook is used by the Itaipava long-line fleet targeting dolphinfish *Coryphaena hippurus*; tunas *Thunnus obesus*, *T. alalunga*, and *T. albacares*; and swordfish *Xiphias gladius*.

DISCUSSION

In monitoring WCP deaths for one year, the occurrence of 42.5% of the deaths in just eight days is unusual and qualifies as a mass stranding event. No unusual weather event occurred during the period (INMET 2019). Direct evidence of anthropogenic interaction was identified in 12 of 31 birds, and other carcasses would likely have had similar indications except for their advanced decomposition.

Poor body condition can also be correlated to lack of prey and mass stranding (García-Borboroglu *et al.* 2010). As body condition could not be determined in most of the birds, starvation as contributing factor to this mass stranding cannot be excluded. Only one animal showed evidence of infection associated with water aspiration (drowning) and secondary bacterial infection. The others showed evidence of trauma caused by fishing gear interaction. Considering that WCPs are common bycatch in many areas (Laich & Favero 2007), it is highly feasible that bycatch played a role in the event reported here.

The amount and reliability of bycatch information is still severely limited for many areas, particularly for artisanal and small-scale fisheries, owing to difficulties regarding on-board observer programs or even electronic monitoring (Anderson *et al.* 2011, Žydelis *et al.* 2013, Richard *et al*. 2011). Studies show negative relationships between fishing effort and adult survival or population trends of seabirds (Véran *et al.* 2007, Rolland *et al.* 2009, Tuck *et al.* 2011). Assessing the conservation implications of bycatch requires estimation of the capture rate or risk for each species in different fisheries, based on the spatiotemporal overlap between fishing effort and bird distributions, as well as data on size and trends of affected populations (Tuck 2011, Žydelis *et al.* 2013). The WCP population is relatively abundant (*ca*. one million breeding pairs), but limited trend data indicate a steep decline in some areas, such as South Georgia from the 1980s to the late 1990s, because of bycatch in fisheries (Phillips *et al.* 2006).

A typical vessel of the Itaipava fleet is wooden-hulled, *ca*. 14 m long, and used for a mix of diverse fishing strategies to target different species. Each vessel can capture and store up to around seven tonnes of fish per trip and targets mainly dolphinfish. This fleet originates from the port of Itaipava in Espírito Santo State and migrates to the port of Itajaí in Santa Catarina State during the summer months. This type of fishery interacts closely with seabirds, including some threatened albatrosses and petrels (Bugoni *et al.* 2008). According to the National Plan of Action for the Conservation of Albatrosses and Petrels of Brazil (PLANACAP), this fishery is complex due to the large number of boats, high mobility, and frequent interaction with threatened species (ICMBio 2006).

PLANACAP recognizes the mortality caused by incidental bycatch as the most important threat for these seabirds in Brazilian waters, especially in regard to longline fisheries. Mitigation measures in Brazil have been applied to fishing vessels operating with surface longlines south of 20°S by Interministerial Ordinance MMA/MPA no. 7 since 30 October 2014. The mitigation measures for the reduction of seabird bycatch are mandatory and include rigging torilines (lines with streamers to scare birds), setting lines at night, and weighting fishing lines to reduce bird exposure to hooks. However, the Itaipava fleet is not covered by this law, since the fleet involves small vessels and is considered artisanal. In this case, PLANACAP enforcement of bycatch obligations has been problematic. Although bycatch is now recognized as the most important threat for albatrosses and petrels within Brazilian waters (ICMBio 2006, Phillips *et al.* 2016), it has been difficult to keep on-board observers in Brazilian fisheries, especially for small-scale and artisanal fleets. On-board monitoring is very limited or non-existent, which brings us to the importance of indirect measures of bycatch offered by beach monitoring.

The PMP-BS project has a hotline for dead or live animal rescue and absolutely no calls for dead WCPs were received during the event period (29 December 2015 to 07 January 2016). Our group has been working with seabirds since 2000, and our experience shows that the local human population does not call to report dead birds. Thus, without beach monitoring, this important information would be lost. Constant beach monitoring is an essential tool to recognize not only unusual events caused by anthropogenic interaction but also those caused by natural etiology.

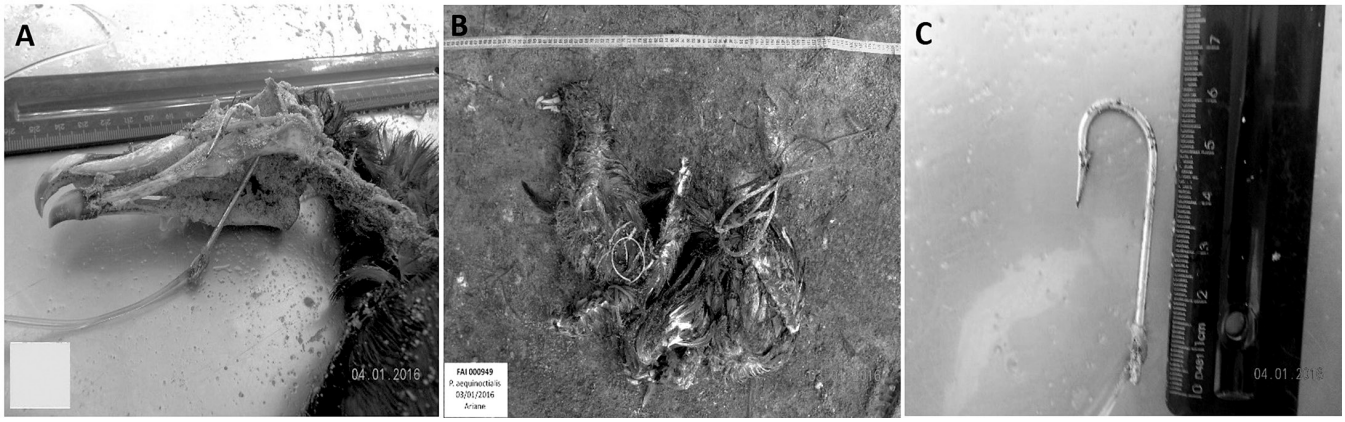

Fig. 3 (A) Specimen R3A000901, with hook attached to the mouth cavity; (B) specimen R3A000949, with wings tangled by fishing line; (C) J-type hook found in specimen R3A000901.

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