

**FALKLAND ISLANDS NATIONAL PLAN OF ACTION  
for Reducing Incidental Catch of SEABIRDS  
in Trawl Fisheries, 2014 (FI-NPOA-S-T-2014)**



**Falkland Islands**  
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### **Acknowledgements**

Based on the two previous FI-NPOA-S-Ts which are referred to:  
- 2004 by Ben Sullivan (Seabirds at Sea Team, Falklands Conservation);  
- 2009 by Esther Sancho (Albatross and Petrel Program, Falklands Conservation).

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## Overview

The 2014 Falkland Islands National Plan of Action Seabirds-Trawling (FI-NPOA-S-T-2014) outlines a four year strategy that strives to further reduce seabird mortalities due to interactions with trawlers, specifically by understanding and trialling discard management for the future and long-term implementation on vessels.

Following FAO guidelines, a Seabird Interaction Management Strategy is described making recommendations based on five interconnected components: 1. observer coverage, 2. mitigation measures, 3. by-catch objectives, 4. research and 5. development and education. Each sector of the trawl fleet is considered separately when recommendations diverge.

The Seabird By-catch Committee (SBC), composed of representatives from the FIFD and other sectors of government (Environmental Planning Department or EPD), the fishing industry (through their umbrella organisation FIFCA), the JNCC ACAP coordinator and one NGO (Falklands Conservation or FC) is recommended to work more actively. The duty of the SBC is to conduct regular evaluations of the progress of this plan and act as an advisory body for and report to the Fisheries Committee and the Environmental Committee.

In adopting and implementing the FI-NPOA-S-T-2014, the Falkland Islands will ensure compliance with domestic and international policies and conventions and build on its international reputation for responsible and sustainable management of its fishery.

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# 1. Introduction

## 1.1. Definitions

For the purpose of this document the following definitions are applicable:

*By-catch and incidental mortality:* refer to the unintentional mortality of non-target species (including fish, marine mammals and seabirds) within a specific fishery. Unless otherwise stated, by-catch in this document refers to seabird incidental mortality. By-catch in relation to fish species is taken to mean the capture of non-commercial species, undersized fish or damaged fish that are not processed to a commercial product.

*Discards and waste:* includes all discarded by-catch fish species and offal resulting from the onboard processing of the catch.

*Falkland Islands waters:* refers to those parts of the southwest Atlantic Ocean under governance of the Falkland Islands, i.e. the FICZ and FOCZ.

*Seabirds:* refers to bird species that have adapted to life within the marine environment

*Trawling:* refers specifically to stern trawling and might be further sub-divided into demersal trawl fishing at the seabed and semi-pelagic/pelagic trawling, fishing in the water column.

*Sustainable (seabird by-catch) target:* Seabird by-catch level by a fishery, which will have no deleterious impact on the long-term sustainability of seabird populations.

## 1.2. Glossary of Acronyms

ACAP	Agreement on the Conservation of Albatrosses and Petrels
APP	Albatross and Petrel Programme
BSL	Bird Scaring Lines
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
EEZ	Exclusive Economic Zones
FC	Falklands Conservation
FICZ	Falklands Interim Conservation and Management Zone
FOCZ	Falklands Outer Conservation Zone
ITQ	Individual Transferable Quota
FAO	Food and Agriculture Organisation
FI	Falkland Islands
FIFD	Falkland Islands Fisheries Department
FI-NPOA-S-T	Falkland Islands National Plan of Action for Reducing Incidental Catch of Seabirds in Trawl Fisheries
FI NPOA-S	Falkland Islands National Plan of Action -Seabirds
GRT	Gross Registered Tonnage
IPOA-S	FAO International Plan of Action-Seabirds
LOA	Length Overall
SAST	Seabirds at-Sea Team
SBC	Seabird by-catch Committee
TAC	Total Allowed Catch
TAE	Total Allowed Effort
VU	Vessel Units

### 1.3. Background

#### **NPOA**

In response to the concern related to the incidental seabird mortality in fisheries, the United Nations Food and Agricultural Organization (FAO) Committee of Fisheries (COFI) developed an International Plan of Action-Seabirds (IPOA-S) (FAO 1999). The IPOA-S focused initially on longline fisheries, and required that countries with responsibility for managing longline fisheries in their own waters, or a fleet that fishes elsewhere, should carry out an assessment of these fisheries to determine if a by-catch problem exists, and if so to ascertain the extent and nature of the problem, and adopt a National Plan of Action – Seabirds (NPOA-S). Subsequently, the best practice technical guidelines for IPOA/NPOA-S were extended in scope to also include trawl fisheries (FAO 2008). Concurrently, the Agreement on the Conservation of Albatrosses and Petrels (ACAP) also came into force in 2004 as a result of international concern over the high level of incidental seabird mortality associated with fisheries. The UK ratified this agreement, and the Falkland Islands was included as one of the UK's overseas territories (Cooper et al. 2006).

The Falkland Islands National Plan of Action for Reducing incidental Catch of Seabirds in Trawl Fisheries (FI NPOA-Trawling) (Sullivan 2004), adopted by the FIFD in 2004, was among the first NPOAs and one of the first to cover trawl fisheries. The NPOA-Trawling came about as a consequence of work conducted by the Seabird at Sea Team (SAST), which besides estimating mortality highlighted that trawl fisheries were causing significantly more seabird mortalities than longline fishing activities in Falkland Island waters (Sullivan & Reid 2003). The draft of the FI NPOA-Trawling was considered essential to meeting the overall conservation objectives of the IPOA-S.

This document forms the revised version of the first Falkland Islands National Plan of Action Seabirds-Trawlers 2004 (Sullivan 2004) and 2009 (Sancho 2009a). As with the previous versions, it has been written either as a document that can be considered in context with the Falkland Islands National Plan of Action-Seabirds (FI NPOA-S) or as a stand-alone document.

#### **Fishing areas and seabirds: fishing grounds valued by birds and man**

The waters around the Falkland Islands form part of a productive ecosystem which is largely the result of nutrient rich upwellings brought about by the northerly flowing Falkland Current, carrying nutrient rich water from the Antarctic (Figure 1). The environment supports an important commercial fishery and an abundance of marine life, including significant populations of seabirds (Agnew 2001).

More than 63 species of seabirds have been recorded in the Falklands waters with 22 known to breed in the islands (White et al. 2000; Woods & Woods 2006). For several species, including the Black-browed albatross and Southern giant petrel, the Falkland Islands population represents significant proportions of the global populations: circa 70% of the Black-browed albatross (Wolfaardt 2012) and circa 40% of the Southern giant petrel, respectively (Reid & Huin 2008).

The offshore harvesting of fish resources can threaten seabird populations, either by direct competition for the resource or by incidental mortality due to fishing activity (Abraham et al. 2008; Croxall 2008; González-Zevallos et al. 2007; Moore & Žydelis 2008; Petersen et al. 2008; Soykan et al. 2008; Sullivan et al. 2006a; Watkins et al. 2008; Zador et al. 2008).

Limited studies suggest no detections of negative impact on seabird populations resulting from the direct competition for marine resources (i.e. prey items) in the Falkland Islands waters (Pütz 2001). However, because the fisheries have a greater impact on fish stocks than seabirds, their long-term impact may well be detrimental to these birds (Thompson 1992; Thompson & Riddy 1995). On the other hand, discards may contribute significantly to seabird diet and variation of discard levels could alter their feeding habits and their population dynamics (Garthe & Scherp 2003; Granadeiro et al. 2011; Granadeiro et al. 2013; Votier et al. 2004)

Incidental seabird by-catch by trawling fleets has been extensively documented throughout the Southern Hemisphere (Abraham et al. 2008; Bartle 1991; Barton 2002; González-Zevallos & Yorio 2011; Maree et al. 2014; Sullivan & Reid 2002; Watkins et al. 2008; Zador et al. 2008). The level of seabird by-catch is significant in several fishing sectors worldwide and its long-term impact remains of serious global concern (ACAP 2014).

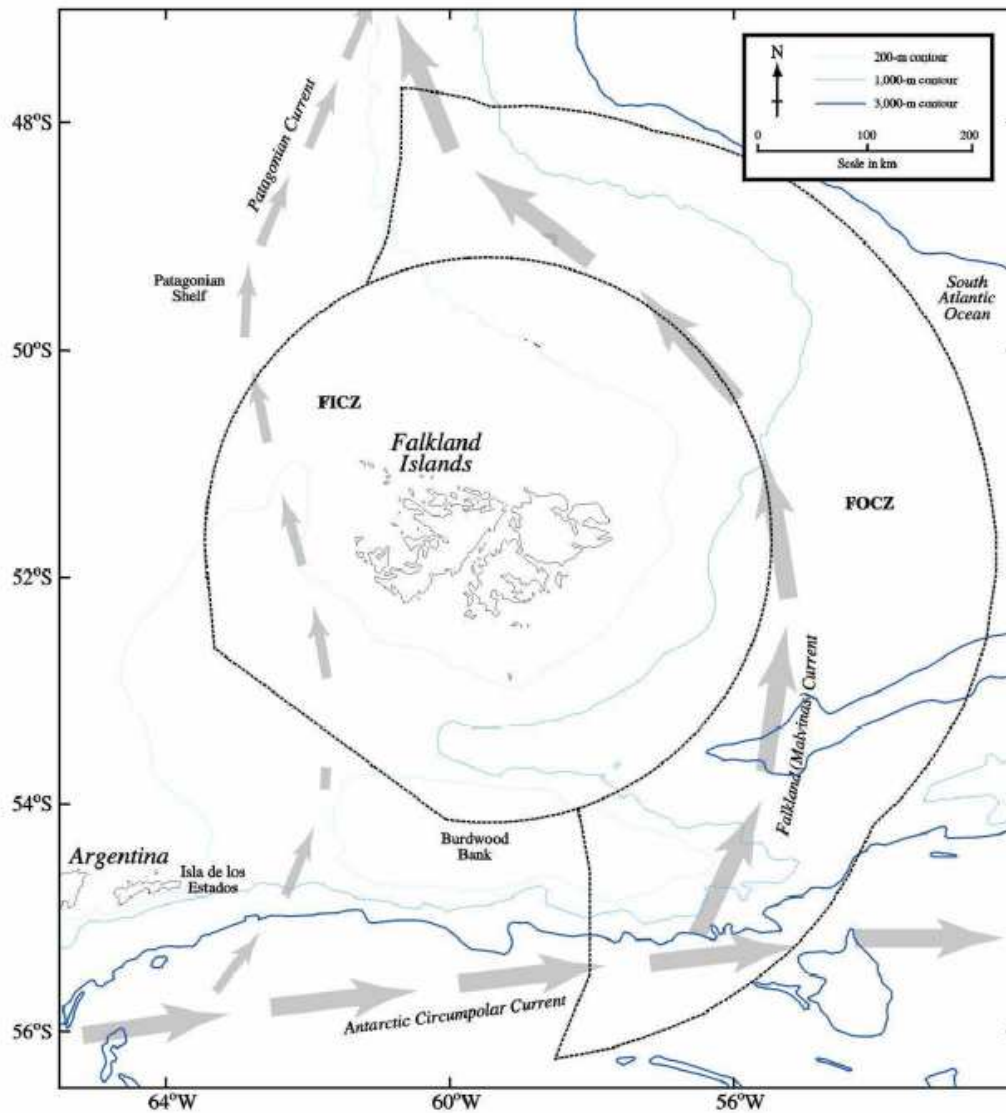
Background on the issues of seabird mortalities associated with the trawl fishery in the Falkland Islands is available in the two previous versions of the FI-NPOA Trawling (Sancho 2009a; Sullivan 2004), whereas more recent studies and trials have been written up separately (e.g. Parker 2013c; Parker et al. 2013)

#### 1.4. Overview of relevant fisheries

The Falkland Islands Conservation Zones extend to the internationally recognized 200 nautical miles (nm) limit. This area is separated into the FICZ, a radius of 150 nm from a central point except for a line of equidistance between Isla de los Estados and the Falkland Islands, and declared in 1986, and the FOCZ, which extends from coastal baselines and controlling points to 200 nm to the north, south and east, and was declared in 1990 (Figure 1).

The marine resources found within the Falkland Islands Conservation Zones support demersal and pelagic fisheries. The demersal trawl fleet targets skates, finfish and Falkland calamari (*Doryteuthis gahi*) squid; while the pelagic trawlers target a smaller stock of blue whiting and hoki. The longline and jigging fleet are not considered in this document.

Fisheries conducted in these waters are vital for the economy of the Falkland Islands, being the main income source for the Government. The revenue in 2013 from fisheries licenses raised £21.5 million (£11m from the trawling fleet, £10.5m from the jigging fleet), making up around 20% of Gross Domestic Product (www.falklands.gov.fk 2015).

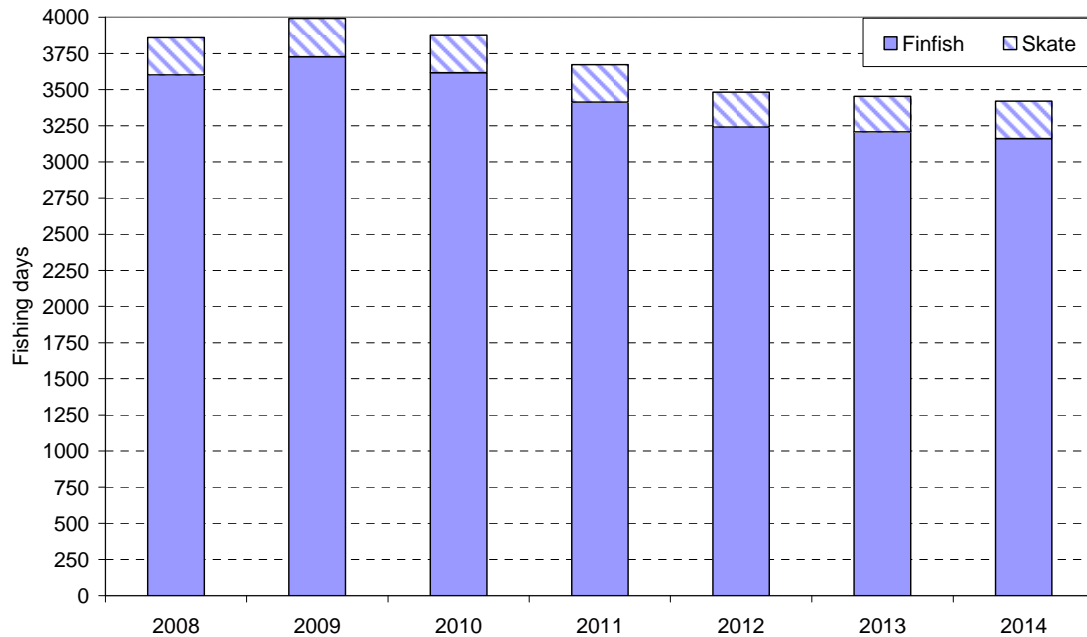


**Figure 1:** Map showing the Falkland Islands Conservation zones (150 nautical miles FICZ, 200 nautical miles FOCZ), depth contours and main currents.

### Finfish Trawl Fishery

The finfish fleet includes trawlers fishing under the unrestricted finfish (A), restricted finfish (W) and combined licences (G), which also includes the targeting of *Illex* squid. The finfish fleet in the Falklands operates throughout the year targeting southern blue whiting (*Micromesistius australis*), hoki (*Macruronus magellanicus*), hake (*Merluccius hubbsi* and *M. australis*), kingclip (*Genypterus blacodes*), red cod (*Salilota australis*) and since 2005, rock cod (*Patagonotothen ramsayi*). The majority of the finfish effort is concentrated in the west and north of the FICZ at water depths down to 400m, but typically between 140-200m. It is worth noting that since 2008 there has been approximately a 10% decrease in fishing days in the finfish fisheries (see Figure 2).





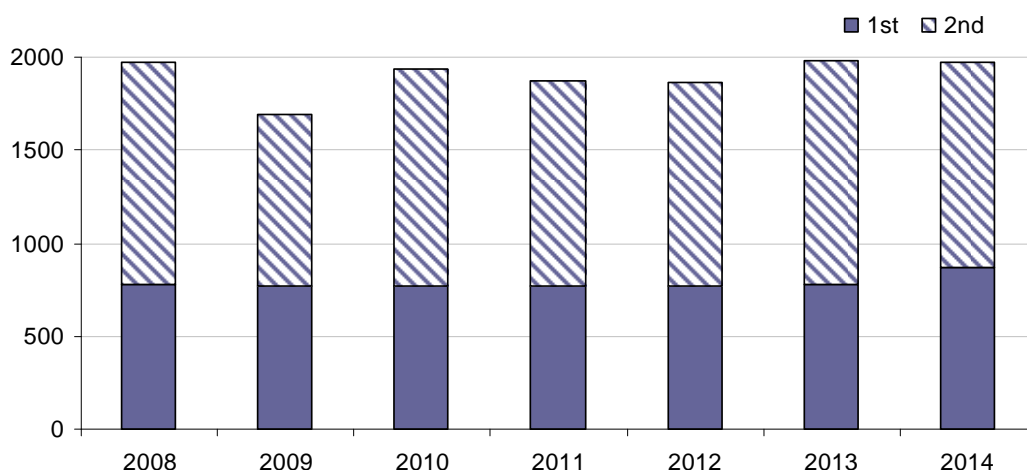
**Figure 2:** Finfish and skate trawler fleet effort defined as number of fishing days per year.

### Skate Trawl Fishery

There is a small trawl fleet of Korean and, more recently, Spanish trawlers using an F licence to target skates (Rajidae). The most commonly caught skate species are *Bathyraja brachyurops*, *B. albomaculata*, *B. griseocauda* and *Zearaja chilensis*. For the purpose of this document the skate fleet will be included under the finfish fleet.

### Falklands calamari Trawl Fishery

The calamari (*Doryteuthis gahi*) trawler fleet is the second most important commercial fishery in the Falkland Islands after the *Illex argentinus* jigging fleet. The fleet targets two cohorts in their feeding grounds off the east coast of the islands at depths of generally between 120 and 250m. The calamari fishery is restricted to a specific area from which other trawling effort is prohibited, with the exception of pelagic vessels fishing for southern blue whiting outside the calamari licence period. Typically, 16 vessels are licensed to fish over two seasons (February-April & July-September). The fishing effort generally remains stable, although small variations in the 2nd season (late winter-spring) due to early closures for stock conservation reasons (Figure 3) may occur.



**Figure 3:** Falklands calamari trawler fleet effort defined as number of vessel fishing days per year. The bottom part of the bars represent the first season while the top is the second.

### Pelagic Trawl Fishery

The restricted finfish-pelagic fleet is the smallest fleet operating in the Falkland waters with 1 to 3 vessels targeting hoki and blue whiting. Fishing activity takes place mostly in the east and south of the islands from October through December at depths between 200 and 400m. From the 1<sup>st</sup> of July until 15<sup>th</sup> of October since 2010, the blue whiting spawning grounds to the south off the islands are closed to all fisheries. Due to a collapse of the southern blue whiting stock, the TAC for this fishery has been steadily decreased from 18,000t in 2009 to 2000t in 2014. Fishing days during the last 7 years have also steadily decreased (Table 1).

**Table 1:** Pelagic trawler fleet effort defined as number of fishing days per year.

Year	2008	2009	2010	2011	2012	2013	2014
Effort	158	119	85	52	5	3	15

### 1.5. Seabird by-catch in Falkland Islands trawl fisheries

Records from 1995 to 2014 indicate that at least 15 seabird species have died as a result of encounters with trawl fishing gear in Falklands waters. The Black-browed albatross being by far the most affected (Table 2).

**Table 2:** Incidental mortalities of seabirds reported by observers on trawlers, 1995-2014 (<sup>1</sup>FIFD unpubl. data, <sup>2</sup>SAST unpubl. data, <sup>3</sup>APP unpubl. data).

Common name	Scientific name	1995-2008 <sup>1</sup>	2002-2003 <sup>2</sup>	2004-2008 <sup>3</sup>	2009-2014 <sup>1</sup>	Total
King penguin	<i>Aptenodytes patagonicus</i>	1			1	2
Gentoo penguin	<i>Pygoscelis papua</i>	6			1	7
Magellanic penguin	<i>Spheniscus magellanicus</i>	8				8
Albatross (unidentified)		1		1	1	3
Wandering albatross	<i>Diomedea exulans</i>	2				2
Southern royal albatross	<i>Diomedea epomophora</i>	2	1			3
Black-browed albatross	<i>Thalassarche melanophris</i>	198	118	105	139	517
Giant petrel	<i>Macronectes spp.</i>	7		1	8	16

Southern giant petrel	<i>Macronectes giganteus</i>	5	5	1	1	<b>12</b>
Northern giant petrel	<i>Macronectes halli</i>			1		<b>1</b>
White-chinned petrel	<i>Procellaria aequinoctialis</i>	6	3			<b>9</b>
Cape petrel	<i>Daption capense</i>	13		1	3	<b>17</b>
Southern fulmar	<i>Fulmarus glacialis</i>	1				<b>1</b>
Sooty shearwater	<i>Ardenna grisea</i>				10	<b>10</b>
Thin-billed prion	<i>Pachyptila belcheri</i>				1	<b>1</b>
Imperial shag	<i>Phalacrocorax atriceps</i>	2				<b>2</b>
Rock shag	<i>Phalacrocorax magellanicus</i>	1				<b>1</b>

Given the relatively low mortalities of penguins and shags, it is unlikely that by-catch by trawlers in the Falklands has had a significant effect on those populations. On the other hand, mortalities of albatrosses and petrels have been higher. Particularly Black-browed albatrosses and Giant petrels with 517 and 29 mortalities recorded respectively, represent 84% and 5% of all the mortalities recorded by observers onboard trawlers since 1995.

*Albatrosses and petrels species conservation profiles are provided in Appendix C.*

The first incidental seabird mortality assessment in the demersal trawl fisheries within the Falkland Islands Conservation Zones was carried out in 2002 and 2003 estimating a minimum of 1,529 seabirds, predominantly Black-browed albatrosses, being killed at a daily rate of 0.47 by warp cable strikes (Sullivan et al. 2006a). This high level of estimated mortality coincided with a 20% decline of Black-browed albatrosses at breeding colonies in the Falklands over a five year period 1995 – 2001 (Huin 2001). However, understanding relationships of by-catch rates on population levels is also complicated by other unknown factors. Due to high seabird mortality estimates, bird scaring lines (BSLs, commonly known as tori-lines) were trialled, and became mandatory in the finfish fishery in 2004 and the calamari fishery in 2006. Following the introduction of BSLs in the finfish trawl fleet, observations showed that between July 2004 and June 2005 there was a 90% reduction in incidental mortality due to warp strikes (Reid & Edwards 2005) with an estimated mortality rate of 0.07 birds per vessel day for the entire Falkland fishing zone (Table 3).

Table 3: Seabird mortality estimates from the Falkland Islands Finfish trawl fishery, 2002-2014 (each year comprise data from the 1<sup>st</sup> of July to the 30<sup>th</sup> of June) (Black 2011; Lopez Gutierrez 2013; Parker 2012a; Parker 2013a; Quintin 2014a; Sancho 2009a).

Year	Obs. days	% fishing days obs.	Agency	Recorded mortality	Estimated daily mortality	Estimated annual mortality
2002-2003	157		SAST	73	0.47	1529
2004-2005	88		APP	16	0.07	169
2005-2007			no data collected			
2007-2008	86		APP & FIFD	10	0.14	510
2008-2009	99		APP & FIFD	25	0.15	590
2009-2010	91	2.3	FIFD	9	0.03	326
2010-2011	103	3	FIFD	43	0.42	1447
2011-2012	139	4.3	FIFD	29	0.21	679
2012-2013	102	3.2	FIFD	32	0.31	999
2013-2014	60	1.9	FIFD	2	0.03	103

Further work from a collaborative project between the FIFD and FC, investigating seabird by-catch over a two year period from 2007-2009 in all Falklands trawl fisheries showed an increase in by-catch rate since 2005 (Sancho 2009b), to 0.14 and 0.15 per vessel day. Whilst this was twice the value of 0.07 per vessel day as reported by Reid and Edwards (2005) the two reports were unfortunately not directly comparable, since Sancho (2009b) included mortalities caused by paravane cables and net entanglements, whereas Sullivan et al. (2006b) and Reid and Edwards (2005) only included warp strikes. The 2009-2010 seabird mortality estimates were calculated from data gathered solely by the FIFD (Black 2011), using the same criteria as Sancho (2009b), so again not directly comparable to Sullivan et al. (2006b). Black (2011) estimated a low rate of 0.03 birds per vessel day in the finfish trawl fishery. These results were in stark contrast to the 2010-2011 estimation of a by-catch rate of 0.42 birds per day, predominantly Black-browed albatrosses (Parker 2012a). The estimated incidental seabird mortality in the finfish trawl fleet in 2010-2011 was 1,447 birds, similar to the 2002-2003 estimates prior to BSLs being introduced. In the last three seasons (2011-12, 2012-13., and 2013-14), mortalities and mortality rates have fluctuated, with an all-time low in the 2013-14 season.

As before, there are limitations to the current data sets that hamper accurate and realistic assessments of by-catch. The low level of observer coverage and the difficulties in ascertaining seabird mortality are the main factors affecting the robustness of the estimates and may explain the low mortality rates estimated in 2013-14. A precautionary approach to estimating mortality rates should always be taken. Studies indicate that mortality estimates are likely to be underestimations through undetected mortality (e.g. Parker et al. 2013). The available information nonetheless still forms a valuable tool to monitor the performance of the trawling fleet, and to be able to assess the further reduction of seabird mortality and any introduction of further mitigation measures.

## **2. Current Mitigation of Incidental Catch of Seabirds**

### **2.1. Finfish, Skate and Falkland calamari trawl fisheries**

The most frequent cause of incidental catch of seabirds in those fleets are the cable-related mortalities. Bird Scaring Lines (BSL) were introduced in 2004 and 2006 to prevent seabirds from interacting with the warp cables. Modifications were implemented in July 2009 and in 2011 to improve performances and reduce entanglement. Since 2011, trawlers are not allowed to discharge offal or discards while fishing gear is in the water unless the BSLs are in place.

*The specifications of the BSL design currently in place are provided in Appendix B.*

### **2.2. Pelagic trawl fishery**

In addition to BSL deployment, pelagic trawlers are subject to a set of mitigation measures targeting the net in order to avoid net-related mortalities. The net has to be thoroughly cleaned before each deployment and special net bindings limit the net time and area at the surface during shooting.

*The specifications of the net-related mitigation measures are provided in Appendix B.*

### **2.3. Seabird observer coverage**

The Albatross and Petrel Programme (APP) was established in 2004 to achieve compliance with the Agreement on the Conservation of Albatrosses and Petrels (ACAP) ratified by the UK. The programme replaced the Seabirds at Sea Team

(SAST), where the primary aims between 2001-2004 were to investigate and quantify the incidence of seabird by-catch and interactions in the long-line and trawling fisheries in Falkland waters. From 2004 to 2008 APP employed dedicated seabird observers, who spent 100% of their duties assessing seabird interactions specifically in the trawler fleets. In addition observers monitored the performance of mitigation measures to assess and improve performance where possible.

Since 2006, the FIFD has incorporated seabird monitoring duties into the scientific fisheries observer protocols. In the past these protocols had only addressed collecting information for stock assessment purposes and biological studies of the exploited species. To date, FIFD fishery observers are required to observe setting, trawling and hauling operations on every fourth day of fishing activity to detect seabird mortality associated with fishing gear and to monitor the performance of the tori lines. Subsequently, since 2009, more focussed seabird observations were incorporated into the general observer protocols, and in 2010 a dedicated seabird observer post was created to investigate tori line performance and identify where improvements could be achieved, as well as increase the number of seabird interaction monitoring days.

### **3. Legislation and Policy**

There are currently a range of policies and legislation related to seabird conservation matters in the Falkland Islands, which are linked to domestic, British and international policies, laws and conventions (*see Appendix A for further details*). The most relevant are the Fisheries (Conservation and Management) Ordinance 2005, the Conservation of Wildlife and Nature Ordinance 1999 and the ACAP agreement ([www.acap.aq](http://www.acap.aq) 2012). In response to the obligations related to these policies, laws and conventions, mitigation measures have been included in the licence conditions by the Director of Fisheries (*see Appendix B*).

The fishery protection vessel, *Protegat*, is chartered by FIG at a cost of £2.8m per annum. Fisheries officers aboard the patrol vessel patrol the zone to deter illegal fishing. They also conduct inspections of fishing vessels to determine whether the licence requirements are respected. Non-compliant vessels may be apprehended for further investigation, but in practice infringements, in particular in relation to BSL configuration and deployments, are generally considered relatively minor and are addressed immediately through corrective measures. Persistent infringements or gross infringements would result in more severe action.

## **4. Seabird Interaction Management Strategy**

### **4.1. Scope**

The FI-NPOA-S-T-2014 applies to trawl fishing in Falkland Islands waters and that conducted by Falkland-flagged trawlers on the High Seas.

It is intended that the plan be reassessed four years after implementation, at which time the by-catch objectives should be revised and the scope and contents of the plan re-evaluated. The SBC should conduct annual review of the FI-NPOA-S-T to monitor the success of the actions and recommendations.

## 4.2. Objectives

### **General objective**

The primary objective of the FI-NPOA-S-T-2014 is to strive towards elimination of incidental seabird mortality due to interaction with trawlers. Ultimately, through discard management it is hoped this target may be achieved. Seabird Interaction Management Strategies will facilitate this process.

### **Specific objectives**

- Maintain a suitable level of observer coverage that enables the calculation of a robust annual estimate of seabird mortality in all trawl fisheries;
- Further evaluate the use of a robust mortality proxy such as “heavy contacts” and their application in the estimation of seabird mortality and assessment of mitigation measures performances;
- Continue to investigate the development of alternative, safe, cost-effective and practical mitigation measures to reduce trawler related incidental seabird mortality;
- Further investigation and trial of discard management measures appropriate for the existing and upcoming fleet;
- Evaluate and adopt a process whereby realistic annual indicative by-catch targets are set, based on robust mortality indices and thereafter achieve an annual reduction in trawler related mortalities to meet these targets;
- Recognizing the experience and knowledge of fishermen, encourage their involvement in the modification and development of mitigation measures including discard management implementation;
- Continue international awareness of mitigation of trawling related mortality in the fishing industry and community at large;
- Ensure the dissemination of information and training opportunities for fishers and other stakeholders to work towards practical implementation of the FI-NPOA-S-T-2014 and the further development of a seabird conservation culture in fishing companies operating in the Falkland Islands;
- Aim to establish collaborative projects between the Falkland Islands and nations where Falkland Island breeding seabirds migrate to, and/or encourage these nations to investigate the scale of seabird mortality caused by their factory trawler fleets. The absence of a Regional Fisheries Management Organization (RFMO) for the Southwest Atlantic hinders furthering strategies that maintain or improve the status of regional seabird populations

## 4.3. Data collection

Since 2009, the collection of at-sea data has been solely conducted by FIFD observers (every fourth day for the six fishery observers and full-time by the seabird

observer). Observer deployment should be organized in order to achieve >3% of observer coverage in each sector of the trawl fishery, which equates to at least 120 days of seabird monitoring in the finfish/skate (A/G/W-licence) fisheries, and haul monitoring in the Falkland calamari fleet on one day in three (change from one day in four).

Observer coverage level should be maintained in pursuit of consistency to review the FI-NPOA-S-T-2014. If further mitigation measures are implemented, FIFD fishery observer protocols should be adapted for the collection of relevant data for assessing effectiveness.

#### 4.4. Prescription of mitigation measures

##### Bird Scaring Lines

Under current fishing licences, the use of BSLs is required by all trawlers in Falkland Islands waters. Whilst BSLs have been shown to significantly reduce the level of seabird mortalities, this measure on its own is unlikely to reduce seabird mortality to a level that will have no deleterious impact on the long-term sustainability of seabird populations in the finfish trawl fishery.

##### Discard Management

Ten years of data collected by APP/FIFD observers (2004-2014) suggest that discards are ultimately responsible for warp related interactions, which account for 95% of finfish trawler mortality. In the absence of discards, interactions with warp cables became rare and observed mortality non-existent. To reduce finfish trawler related by-catch in the long-term it is essential to lessen the attractiveness of vessels to the seabirds by managing the discharge of discards.

The reduction of discards during fishing operations, especially during periods when the warp cables are in motion (hauling, shooting and turning) and in some cases unprotected, has already been implemented and reduces mortality without any change to current vessel design. However, long-term solutions will have to involve vessels modification (Munro 2005), whether it is to retain discards or to ensure discards are away from the danger area where the cables enter the water.

Elsewhere, trials with discard management or waste retention have been conducted, arriving at the same conclusion, i.e. no discard=no mortality (Abraham et al. 2008; Pierre et al. 2010; Pierre et al. 2012a; Pierre et al. 2012b)

#### 4.5. Research and development

To reduce contacts between seabirds and warp cables the following steps should be taken:

- A re-evaluation of the actual Waste Discard Management Discussion Document (Munro 2005) should be conducted by the end of 2015. On top of the feasibility (economic and operational) of necessary structural/technical alterations, the fact that several by-catch species (including invertebrates, skates and some fish species) may survive being caught and released should be considered.

#### Provisional Discard Management trial schedule

2015	<ul style="list-style-type: none"> <li>• Trials on Santa Mariña (batch discarding only)</li> <li>• Invitation to tender for trial: batch discard + macerating</li> <li>• Investigate modification requirements fleet wide</li> </ul>
2016	<ul style="list-style-type: none"> <li>• Trial on second vessel (batch discarding + macerating)</li> <li>• Write up results, make recommendations</li> </ul>
2017	<ul style="list-style-type: none"> <li>• First vessels with waste management systems start returning.</li> <li>• All new entries into the trawl fisheries should have approved waste management systems onboard</li> </ul>
2018	<ul style="list-style-type: none"> <li>• Second year of the introduction of waste management systems</li> </ul>
2019	<ul style="list-style-type: none"> <li>• Third year since introduction of waste management. By end of 2019 all vessels should have an approved waste management system</li> </ul>

- By mid 2016 an evaluation of the operational performance of the modified BSL implemented in June 2009 will be available. Based on the findings for the various demersal fleet components (finfish, Falklands calamari and skate fleet), introduction of complementary mitigation measures in the form of waste management should be evaluated.
- The study into quantifying the level of undetected (or cryptic) mortality as conducted in 2012 (Parker et al. 2013) should be repeated with a further study period as soon as can be practically arranged.

#### 4.6. Education, training and publicity

In line with previous educational literature on reducing trawler related seabird mortality produced by SAST, FIFD and APP, further education material should be produced by FIFD summarizing the results from the previous FI-NPOA-S-T and planned developments relating to seabird mortality mitigation and goals. These materials should be translated to the appropriate languages (i.e. Spanish and Korean) and distributed to all vessels as part of their licence. Fisheries officers and fishing companies should also be provided with this material.

In addition, information on by-catch levels and relevant management strategies (e.g. observer programmes, development and prescription of mitigation measures) should be disseminated, as appropriate, to local and international media.

#### 4.7. Reporting

In line with the terms of reference of the SBC, it is recommended that an annual review of the implementation of the F-NPOA-S-T-2014 is undertaken by the SBC, in consultation with relevant stakeholders. This will ensure that fishing industry members, relevant government officials, and FC continue to have significant input into by-catch monitoring and mitigation efforts.

It is proposed that at this meeting a brief annual summary is also presented that contains, but is not limited to:



- an estimate of seabird mortality within the trawl fisheries
- an assessment of the level and utility of observer coverage
- an audit of performance against indicative by-catch objectives contained in Seabird Interaction Management Strategies
- a summary of the effectiveness of Seabird Interaction Management Strategies and any recommended changes to further reduce seabird by-catch
- recommendations for the development and/or changes to mitigation measures

## 4.8. Conclusion

It is the authors' opinion that while research and efforts to provide more accurate seabird mortality estimates would be academically valuable, the limited resources currently available to work in this field may be better spent. The level of seabird by-catch currently occurring within Falkland Islands waters, and more specifically its decrease, is the results of a decade of mitigation. The Falkland Islands did take a lead in seabird by-catch mitigation on trawlers closely followed by the South African trawl fisheries where they have been implemented since mid-2006 in (Maree et al. 2014). In the Argentine trawl fisheries various designs of BSLs as well as offset-towing devices (Tamini Tabla) have been trialled, with 2014-2015 year the improved BSLs are being trialled on a number of commercial trawlers ([www.rspb.org.uk](http://www.rspb.org.uk) blog) before BSLs may become mandatory.

However, the level of seabird by-catch it is still of concern. Some further ecological research would be necessary to establish whether the by-catch rate or level is "sustainable" or not for the populations (mainly Black-browed albatrosses and Giant petrels), but this is outside the remit of the seabird observer or fisheries scientists. Either way, killed birds is not an outcome wished by any stakeholders.

The ultimate objective is to have a fishery which has no or negligible incidental mortalities of seabirds. The measures adopted so far have improved the situation. Achieving the goal of negligible impact is likely to be best achieved through effective discard management. That solution will be investigated and if successful could lead to the elimination of seabird mortalities due to direct impact with fishing vessels. If that result can be achieved the Falkland Islands would have a seabird-safe fishery.

## 4.9. Acknowledgements

Sarah Crofts from FC for helpful comments and suggestions, as well as Andy Pollard from FIFCA for the same, but also including a industry's perspective. All FIFD fisheries observers and scientists are thanked for contributing in many ways over the last decade in developing or trialling and modifying mitigation measures, collecting seabird interaction data, analysing data and writing reports. These observers and scientists have also been at the front line interacting with fishermen, a crucial component of the successful deliverance of the mitigation process. FIFD fisheries officers are thanked for their ongoing efforts ensuring mitigation requirements are adhered to. The Director of Natural Resources John Barton is thanked for continuing to support this work through the employment of staff as well as providing PV time (for trials), and the Senior Fisheries Scientist Dr. Alexander Arkhipkin for his involvement with staff and scrutiny of the work. Lastly the current SBC members, including the ACAP coordinator for feedback, advice and support.

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## 6. Appendices

### Appendix A: Legislative framework

#### International

##### *International Union for the Conservation of Nature*

The International Union for the Conservation of Nature (IUCN) through the Species Survival Commission (SSC) has for more than 30 years been assessing the conservation status of species on a global scale in order to highlight taxa threatened with extinction, and therefore to promote their conservation.

Assessments are conducted according to strict scientific criteria and assessed by a committee at the IUCN congress. Assessment criteria include the population size, the geographical range and the reduction in population size in relation to the generation length of the assessed species. For those species where adequate data exist, seven levels of threat are identified; Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW) and Extinct (EX).

Approximately 36 species that occur in the Falkland Islands are red listed, including the seabirds species black-browed albatross (NT), southern giant petrel (LC) and white-chinned petrel (VU) ([www.iucnredlist.org](http://www.iucnredlist.org) 2014).

##### *Convention of the Conservation of Migratory Species of Wild Animals*

This convention came into force in 1983 under the United Nations Environmental Program (UNEP). The fundamental objective of CMS is to protect and conserve terrestrial, marine and avian migratory species throughout their range. Migratory species are defined by the convention as those that regularly cross international boundaries, including international waters.

Six albatross and petrel species that breed on the islands or are common visitors are listed under Appendix II of the convention, including black-browed albatross, southern giant petrel and white-chinned petrel. This appendix covers those species that have an unfavourable conservation status and require concerted and collaborative international efforts to achieve and maintain a favourable conservation status ([www.cms.int](http://www.cms.int) 2012).

##### *Agreement on the Conservation of Albatross & Petrels*

The Agreement on the Conservation of Albatross & Petrels (ACAP) is a daughter agreement of CMS. At the sixth meeting of the Conference of Parties to the CMS, the threat posed by fisheries by-catch to a wide range of species in general, but particularly albatrosses and petrels, was noted, and it was requested that relevant parties develop an agreement under the convention for the conservation of Southern Hemisphere albatrosses and petrels. ACAP came into force in February 2004 with the ratification by the required five states. The agreement was ratified by the UK in April 2004 and extended to the UK Overseas Territories in the South Atlantic Ocean. A total of 13 countries have joined the ACAP agreement, including Chile (2005), Argentina (2006), Brazil (2008) and Uruguay (2009). This expansion on the Parties of the ACAP constitutes a great development since jurisdictional waters of these countries are extensively used by Falkland Island breeding and migratory seabirds.

ACAP is a binding agreement that requires signatory countries to commit to a range of actions that address all threats relevant to albatrosses and petrels, not just the

threat posed by fisheries. One of ACAP's general conservation measures that relates directly to fisheries is to 'develop and implement measures to prevent, remove, minimize or mitigate the adverse effects of activities that may influence the conservation status of albatrosses and petrels' (Article III 1c).

The agreement currently includes 31 species, 22 albatrosses and 8 petrels. Three of these species, the white-chinned petrel, southern giant petrel and black-browed albatross breed in the Falkland Islands. An additional four ACAP listed species, the wandering albatross, southern royal albatross, grey-headed albatross and northern giant petrel, regularly forage within Falkland Island waters.

A workshop was held in the Falkland Islands in March 2006 to identify conservation priorities to achieve the ACAP objectives in the UK Overseas Territories of the Falkland Islands, South Georgia, British Antarctic Territory and Tristan da Cunha. The meetings proceedings (Baker et al. 2006) effectively form a Falklands Species Action Plan for black-browed albatross, southern giant petrels and white-chinned petrels. This document was later converted into a Falklands plan, being review and revised in 2007. The next version is currently under review.

#### *United Nations Convention on Law of the Sea*

The United Nations Convention on Law of the Sea (UNCLOS) 1982 entered into force in the Falkland Islands in 1994. UNCLOS provides a framework for the better management of marine resources and a new legal regime that affords ocean and coastal states rights and responsibilities for the management and use of fishery resources within their EEZs, which embrace 90% of the world's marine fisheries.

Article 61 of the agreement is related to the impact of the incidental mortality of seabirds and other non-target species and requires coastal states and states fishing on the high seas to consider the effects on species associated with or dependent upon harvested species, with a view to maintaining or restoring populations of such associated or dependent species above levels at which reproduction may become seriously threatened. The convention also introduces the concept of precautionary management.

#### *Convention on the Conservation of Antarctic Marine Living Resources*

Although the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) is strictly aimed at protecting the marine ecosystem in the convention area (<http://www.ccamlr.org/pu/E/conv/maplge.htm>). However, the Falkland Islands fishery did adopt some CCAMLR mitigation measures, and as such the Convention has some relevance to conservation measures and resource management in Falkland Islands waters.

#### *Food and Agriculture Organisation- Code of Conduct for Responsible Fisheries*

These guidelines were designed to address continuing concern regarding unregulated fishing on the high seas, particularly of migratory fish species and of stocks of fish that straddle the waters of various nations. In 1991, the Food and Agriculture Organisation Committee of Fisheries (FAO-COFI) called for the development of new concepts, which would lead to responsible, sustainable fisheries. Subsequently, the International Conference on Responsible Fishing, held in 1992, further requested FAO to prepare an international Code of Conduct to address these concerns. In November 1993, the 'Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas' was adopted at the 27<sup>th</sup> Session of the FAO Conference.



In response to these developments, the FAO Governing Bodies recommended the formulation of a global 'Code of Conduct for Responsible Fisheries' to be consistent with these instruments and, in a non-mandatory manner, establish principles and standards applicable to the conservation, management and development of all fisheries. The Code, which was unanimously adopted in October 1995 by the FAO Conference, provides a necessary framework for national and international efforts to ensure sustainable exploitation of aquatic living resources in harmony with the environment (FAO 1995).

Within the framework of the 'Code of Conduct for Responsible Fisheries', the 'International Plan of Action-Seabirds (IPOA-S)' was developed. The issue of the incidental mortality of seabirds in longline fisheries first received official international recognition with the passing of a resolution at the IUCN World Conservation Congress in 1996 that called for concerted action to reduce seabird mortality.

This was followed in 1997 by the FAO-COFI establishing a Seabird Technical Working Group to draft guidelines on reducing incidental mortality and prepare a draft Plan of Action to implement the mitigation guidelines, which resulted in the production of the IPOA-S (FAO 1999).

## **National**

*Conservation of Wildlife and Nature Ordinance 1999 (with corrections in 1999, 2003, 2004 & 2007, and currently under review)*

All seabird species are protected in the Falkland Islands under this Ordinance, adopted in 1999 to replace the previous Wild Animals and Birds Protection Ordinance. The ordinance contains provisions for the protection of wild birds, wild animals and wild plants, introductions of new species and for the designation of National Nature Reserves.

### *The Fisheries (Conservation and Management) Ordinance 2005*

This ordinance was introduced in September 2005 and gives legislative effect to a review and modernisation of fisheries policy including the introduction of property rights in the Falkland Islands fishery.

Under the Fisheries (Conservation and Management) Ordinance 2005, sustainability means maintaining the potential of fisheries resources to meet the reasonable foreseeable needs of future generations; avoiding, remedying, or mitigating adverse effects of fishing on the marine environment so far as it is reasonably practicable to do so.

The waters covered by the ordinance include both waters within the territorial baselines as well as the FICZ and FOCZ. This ordinance also extends the Conservation of Wildlife and Nature Ordinance 1999 to the fishing waters beyond the territorial sea.

### *National Plan of Action*

The Falkland Islands Government and Fisheries industry adopted in 2004 a National Plan of Action (NPOA)-Seabirds (Trawling) for the period 2004-2008 and a National Plan of Action-Seabirds (Longlining) for the same period, 2004-2008. The process of plan preparation and adoption was led by FC and the RSPB. Both plans have been updated in 2009 for the NPOA-Trawling (Sancho 2009a) and 2011 for NPOA-Longlining (Janzen et al. 2011). The plans set out the adoption of fishing licence

conditions, which include aspects to protect seabirds, and for the NPOA-Trawling to adopt and monitor new seabird by-catch mitigation measures. Targets for by-catch rates were set for the NPOA-Longlining, but not for the NPOA-Trawling.

## Appendix B: Licence requirement, Mitigation of Seabird Mortalities

### **Bird Scaring Lines (compulsory for all trawlers)**

C1. In order to minimise seabird interactions with trawl warps:

a) **Discards from the ship of unwanted whole fish, offal and waste must cease when trawl warps are in the water and the Bird Scaring Lines are not deployed** (i.e. net hauling, door and net retrieval, net and door deployments, and paying out of warp cable).

b) In order to reduce incidental seabird mortalities through warp strikes, all trawlers **must deploy two Bird Scaring Lines**. One Bird Scaring Line must be deployed on each side of the ship outboard of the trawl warps.

c) Bird Scaring Lines must be deployed as soon as the trawl doors are submerged, throughout the trawl, until hauling operations commence. **If the Bird Scaring Lines are not deployed during shooting or hauling then factory processing and discarding must cease.**

d) Bird Scaring Lines must be fixed at stern of the vessel from attachment points higher than the trawl blocks and **no more than 2 metres horizontally** from the trawl blocks. Extension pieces may need to be fabricated to allow correct positioning of the Bird Scaring Lines. Fisheries Officers may advise of correct fixing points during inspections.

e) The first Bird Scaring Lines streamer must be positioned at 1 metre distance from the stern of the vessel, **as measured at the waterline**.

f) A third spare Bird Scaring Lines must be available for immediate deployment in the event of a mishap with either of the two Bird Scaring Lines in use.

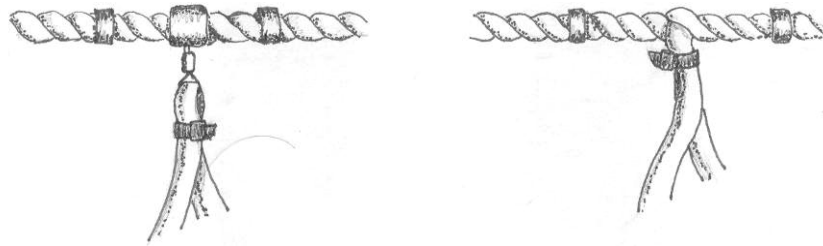
C2. All vessels must conform to the following design of Bird Scaring Lines as shown in figures 1a and 1b. This design has been tested and shown to significantly reduce the number of seabirds hitting the trawl warps whilst foraging astern of fishing vessels, reducing bird entanglements and improving durability.

a) The lines must be made from **8-10 millimetre floating line**, either laid or pleated. The recommended total length of the line astern the vessel is **30 metres**. Depending on the distance between the stern of the vessel and the warp/water interface, the total Bird Scaring Line length **may vary between 27 metres and 33 metres**. This variation in length can only be adjusted for between the last streamer and the buoy.

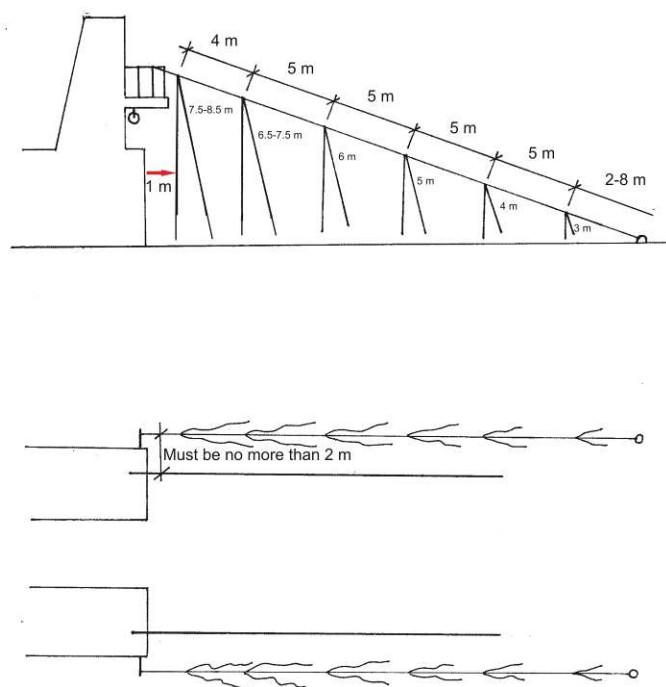
b) Six double streamers are to be attached at intervals indicated in Fig 1. Attachment may be by light weight swivels (less than 50 grams) with stoppers or directly into the lay of the rope (Fig 1a). Streamer lengths range from 2 × 8 metre streamers closest to the stern to 2 × 3 metre streamers nearest the buoy. The length of the first set of streamers (2 x 8 metre and 2 x 7 metre) may be adjusted to optimise mobility and reduce drag (Fig 1b). The length of these two sets may vary between 2 x 7.5 - 8.5 metres and 2 x 6.5 - 7.5 metres for the first and second respectively (Fig 1a).

c) It is required that the streamers be made from semi-flexible tubing of high visibility (red, orange or yellow). The recommended tubing is **Red Mazzerpur 10 millimetre** polyurethane tubing. Polythene and materials such as fire hose; old waterproofs, nylon covered rope, and dark coloured tubing are NOT ACCEPTABLE.

d) The drag buoy is a net covered 300 millimetre diameter HDP moulded fishing float attached by a swivel. Any other buoys are NOT ACCEPTABLE.



**Figure 4:** Attachment of approved BSL



## **Implementation of mitigation measures to reduce seabird mortalities associated with pelagic trawling within the Falkland Islands Conservation Zone**

In response to seabird mortalities associated with pelagic fishing operations, the Falkland Island Fisheries Department has implemented mitigation measures based on CCAMLR conservation measures (25-03) for reducing the incidental mortality of seabirds and marine mammals.

- Use of strops during shooting (biodegradable material such as sisal string).
- No discards from the factory during shooting and hauling.
- Minimise the time that the net is stationary on the surface of the water during shooting and hauling.
- Cleaning of the net prior to shooting.

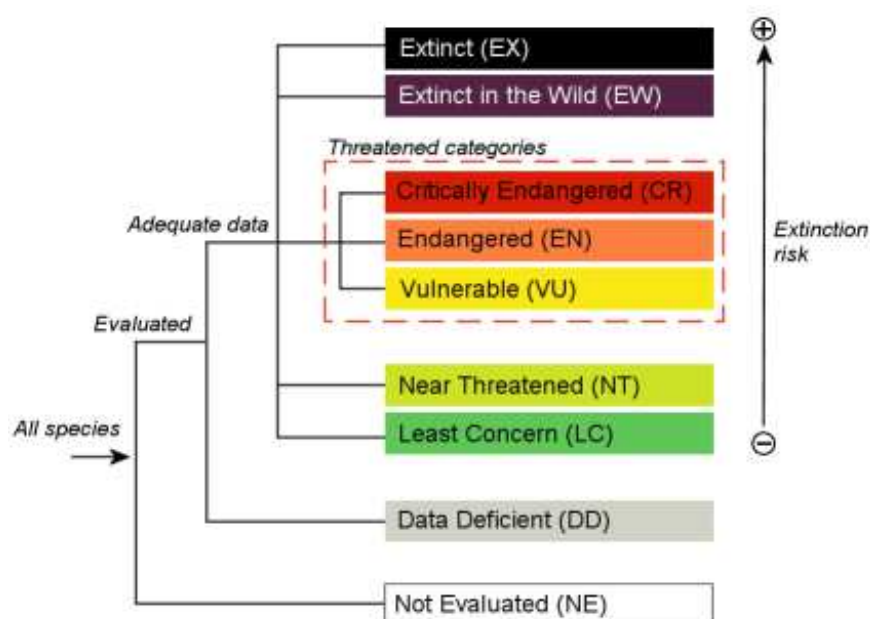
The most suitable string for use as strops is 3 ply sisal string with a breaking strain of 110kg, to ensure the net has sunk below the surface before the bindings break.

### Implementation of mitigation measures

- Strops should be attached at approx. 3 m intervals with the string passing between 2 meshes to avoid the binds slipping down the net.
- The binding should also be tied to the net so they are not lost at sea once they have broken.
- Strops should be attached along sections of the net where the mesh size is sufficiently large for seabirds to become entangled.
- No discards from the factory 30 minutes prior to shooting and hauling.
- Prior to shooting, by-catch (such as squid) and fish should be removed from the sections of the net where mesh size is sufficiently large for seabirds to become entangled.
- Hauling and shooting procedures that minimise the time the net is stationary on the surface should be adopted

### Appendix C: ACAP-listed species of seabirds reported FI waters

13 of the 30 ACAP-listed species of albatross and petrels have been recorded in FI waters. Tables that summarize the conservation status are available below. An asterisk after the species name indicates the species has been reported killed in the trawl fisheries since 1995 (see Table 2).



**Figure 6:** IUCN statuses classification and abbreviations.

**Table 4:** ACAP-listed species breeding on the Falkland Islands, estimated size of the world and FI breeding population, recent (2014) IUCN status and population trends. Table adapted from (Wolfaardt et al. 2010).

Species	Breeding pairs (above: world; below: FI)	IUCN status	Recent trend
Black-browed Albatross *	700,000 bp	NT	↘
<i>Thalassarche melanophris</i>	500,000 bp		
Southern Giant Petrel *	46,800 bp	LC	↗
<i>Macronectes giganteus</i>	19,500 bp		
White-chinned Petrel *	1,200,000 bp	VU	↘
<i>Procellaria Aequinoctialis</i>	> 50 bp		

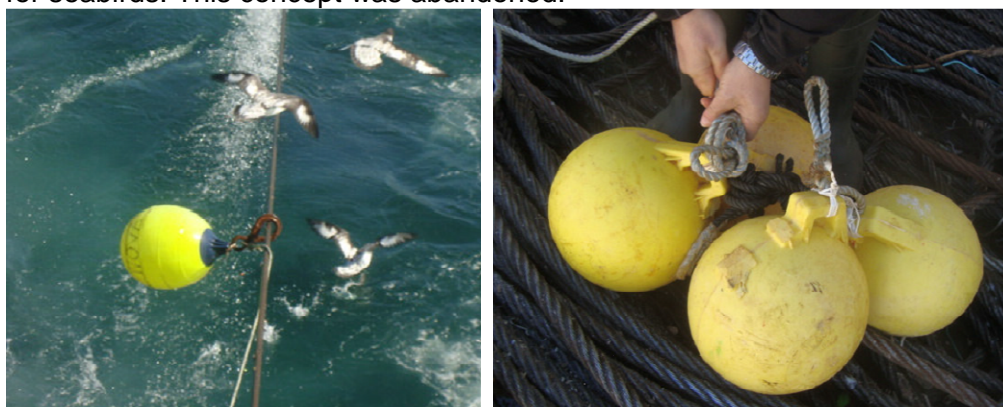
**Table 5:** Non-breeding ACAP-listed species that have been recorded as visitors to the territorial waters of Falkland Islands. Table adapted from (Wolfaardt et al. 2010), information in (White et al. 2002) and FC *unpublished data*.

Species	Visitor status	IUCN status	Recent trend
Wandering Albatross * <i>Diomedea exulans</i>	Year-round; peak numbers from January to April	VU	↘
Northern Royal Albatross <i>Diomedea sanfordi</i>	Year-round; peak numbers from March to July	EN	↘
Southern Royal Albatross * <i>Diomedea epomophora</i>	Year-round; peak numbers from March to June	VU	stable
Light-mantled Sooty Albatross <i>Phoebastria palpebrata</i>	Most records from August to November	NT	↘
Shy/White-capped Albatross <i>Thalassarche steadi</i>	Scarce; mostly immatures from January to May	NT	↘
Grey-headed Albatross <i>Thalassarche chrysostoma</i>	Year-round; peak numbers from May to September	EN	↘
Atlantic Yellow-nosed Albatross <i>Thalassarche chlororhynchos</i>	One record (May 2003)	EN	↘
Buller's Albatross <i>Thalassarche bulleri</i>	One record (July 2007)	NT	stable
Northern Giant Petrel * <i>Macronectes halli</i>	Year-round; higher numbers in austral winter	LC	↗
Grey Petrel <i>Procellaria cinerea</i>	Unfrequent; February to June	NT	↘

## Appendix D: Trials conducted since 2009

### Buoy on warp

In October 2012, brief trials were conducted at the initiative of the first mate of the Spanish trawler, Manuel Angel Nores. His idea was to lower a float along the warp in hope that it would remain at the warp/water interface area and prevent birds from being snagged under. Unfortunately, the devices trialled (1 light float and 4 heavy float rigged together) did not remain at the waterline as the vessel pitched. Moreover, the lazy line necessary to deploy and retrieve the buoys created an additional hazard for seabirds. This concept was abandoned.



**Figure 7:** Devices trialled to deter birds from approaching the distal end of the warp. Figures copied from FIFD Observer report 939 (Parker 2012b).

### Cryptic mortality

In October 2012, a research trip was conducted by a team of 4 scientists (FC, JNCC and FIFD) in order to investigate the level of cryptic mortality detectable by observers on the patrol vessel following the wake of a fishing vessel. Results from a week long

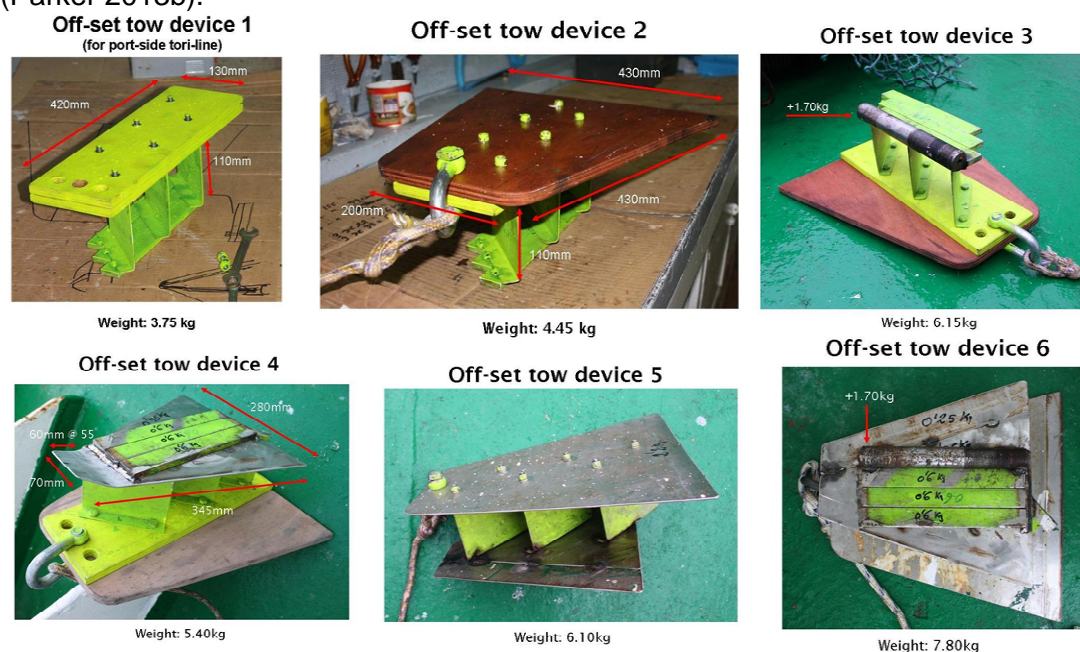


trip revealed that cryptic mortality is taking place in the Falkland Islands. At least 23% of the total mortalities (and severe injuries, which were judged ultimately to be fatal) recorded, were not observed from the trawler (Parker et al. 2013). These early results highlighted that data obtained by observers located on trawlers underestimated seabird mortality rates. This preliminary study provides a platform for further work to develop a correction factor to account for un-detected (cryptic) mortality of seabirds in Falkland Islands' trawl fisheries.

Repetitions of this research have yet to be conducted, funding permitting.

### Off-set tow devices

In January 2013, off-set tow devices were trialled in order to prevent the BSL from deviating away from the warp in cross winds. The devices trialled functioned well but did not reduce deviation compared with the standard net-covered 300 mm float (Parker 2013b).



**Figure 8:** Off-set tow devices built and trialled on the *Jose Antonio Nores*.

### Aerial fixed array

Scaring birds away from entering areas they can get killed in is still the cheapest and easiest method. As tori-lines can be problematic to fishers and have reduced effectiveness in a range of conditions, during July 2012 a very simplistic prototype of an aerially mounted tori-line that won't deviate in cross-winds was trialled on stern trawler the *Argos Vigo*. The trial was limited by the materials onboard the vessel. Nevertheless the trial provided encouraging results in excluding birds from the warp area. Since this initial trial, Argos Ltd. contracted an engineering company and constructed a refined prototype, and mounted this on the *Argos Vigo*. Trials were conducted in early 2013 with mixed results (Parker 2013c). Trials were repeated again in early 2014 (Quintin 2014d) with the addition of streamers on the paravane arms. The results were encouraging, as no heavy contact occurred during the 21 days period of the trial.

Repetition of observations of the fixed array performance was conducted during one week in October 2014 when the vessel targeted finfish again. Despite this system being effective, during this period heavy strikes with the warp were still being recorded

**Snap-hooks, V twin BSL and raffia BSL clamped on warp**

Various design have been trialled in 2014, all have been abandoned due to inadequacy of either deployment/retrieval (clamped BSL), safety to the crew (snap hooks) and safety hazard to the seabirds (float of the twin BSL). Details of those trials are provided in the FIFD observer reports (Quintin 2014b; Quintin 2014c).