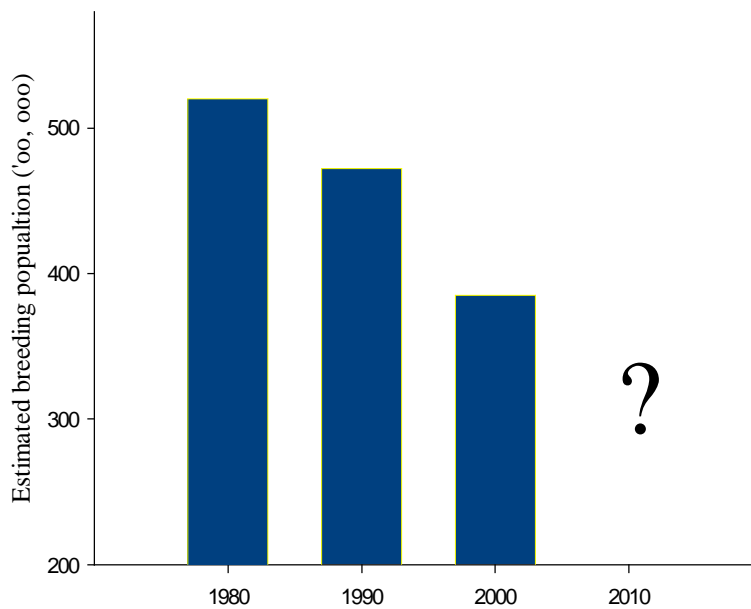




## FALKLAND ISLANDS PLAN OF ACTION FOR REDUCING INCIDENTAL CATCH OF SEABIRDS IN TRAWL FISHERIES

Falkland Islands' black-browed albatross population



March 2004

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## Structure

This document is broadly based on guidelines provided in FAO International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries to produce a Plan of Action for Reducing Incidental Catch of Seabirds in Trawl Fisheries. The document is divided into two sections:

**Part I** Review of Trawl Fisheries Incidental Seabird Mortality in the Falkland Islands

**Part II** Falkland Islands Plan of Action for Reducing Incidental Catch of Seabirds in Trawl Fisheries

*Cover: Black-browed albatross population estimates extrapolated by Huin (2001), from Prince (1981), Thompson and Rothery (1991) and various unpubl. reports.*

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## 1.0 INTRODUCTION

The intent of the International Plan of Action-Seabirds (IPOA-S) is based upon framework of the Code of Conduct for Responsible Fisheries to reduce the incidental catch of seabirds in longline fisheries, where this occurs. In the absence of similar policies addressing trawling, the Falkland Islands Plan of Action for Reducing incidental Catch of Seabirds in Trawl Fisheries (FI POA-Trawling) has been written as a document that can either be considered in concert with the Falkland Islands National Plan of Action-Seabirds (FI NPOA-S) or as a stand-alone document. Given that trawling currently causes significantly more mortality than longlining in Falkland Island waters, the drafting of FI POA-Trawling was considered essential to meeting the overall conservation objectives of IPOA-S.

### 1.1 Scope and Structure

Incidental mortality of seabirds by a range of stern trawl fisheries is documented around the Southern Hemisphere (Bartle 1991, Williams and Capdeville 1996, Schiavini *et al.* 1998, Weimerskirch *et al.* 2000, SC-CCAMLR 2001, 2002 Sullivan and Reid 2002). However, the extent of the problem in many regions remains unknown.

In response to international pressure, in 1997 the Committee of Fisheries (COFI) of the United Nations Food and Agricultural Organisation (FAO) established a technical working group to draft guidelines on reducing incidental mortality and prepare a draft Plan of Action to implement the mitigation guidelines. In 1999, the resulting International Plan of Action-Seabirds (IPOA-S, FAO 1999a) was produced. IPOA-S is a hortatory document that provides the framework for the development of National Plans of Action –Seabirds (NPOA-S) to reduce the incidental catch of seabirds in longline fisheries, where this occurs. IPOA-S is voluntary and relates to States in the waters of which longline fisheries are being conducted by their own or foreign vessels and to States that conduct longline fisheries on the high seas and in the Exclusive Economic Zones (EEZ) of other States (hereafter, countries).

The clearly stated objective of IPOA-S is to provide international guidance to reduce seabird bycatch in longline fisheries. IPOA-S was developed within the framework of the Code of Conduct for Responsible Fisheries, particularly Articles 7.6.9 and 8.5 (see Appendix I) which state that fisheries should take appropriate measures and use fishing gear and methods that minimise catch of non-target species both fish and non-fish species, and negative impacts on associated or dependent species.

This document is divided into two parts:

#### Part I - Review of Trawling Related Incidental Seabird Mortality

Part I serves as both a review of the scale and management of trawler related seabird bycatch (with an emphasis on the Southern Hemisphere) and an assessment and justification of the need for a FI POA-Trawling. As outlined in the technical notes of IPOA-S an assessment should be conducted to ‘determine the extent and nature of a country’s incidental catch of seabirds in longline fisheries where it occurs.’ The purpose of the review is to form the basis of the decision-making process and the resulting FI POA-Trawling.

#### Part II - Falkland Islands Plan of Action-Trawling

The FI POA-Trawling details a comprehensive strategy to reduce seabird bycatch associated with trawlers operating in Falkland Islands waters and Falkland Island flagged vessels

operating outside local waters to levels that will have no deleterious impact on the long-term sustainability of seabird populations, regardless of their provenance. The plan also outlines the steps necessary to enlist the support of industry and other stakeholders to monitor and implement the mitigation measures necessary to maintain seabird bycatch at these low levels in the long-term.

## **1.2 Definitions**

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

*Bycatch and incidental mortality:* refer to the unintentional mortality of seabirds as a result of trawling, the cause of which varies considerably between trawl fisheries (see Section 3.0).

*Discards:* includes all discarded fish species

*Discharge:* includes factory discharge including discards and offal

*Falkland Island waters:* refers to those parts of the southern Atlantic Ocean under governance of the Falkland Islands Government. These include the Falklands Interim Conservation and Management Zone, which covers a 150nm radius around the islands (FICZ, declared by the United Kingdom in 1986) and the Falklands Outer Conservation Zone (FOCZ, declared by the United Kingdom in 1990), which extends the fishery conservation zone to 200nm in the north, east and south of the islands (Figure 1).

*Offal:* includes all discharge resulting from fish processing e.g. visceral matter, fish heads etc.

*Seabirds:* refers to bird species that habitually obtain their food from the sea beyond the low water mark.

*Trawling:* refers specifically to stern trawling

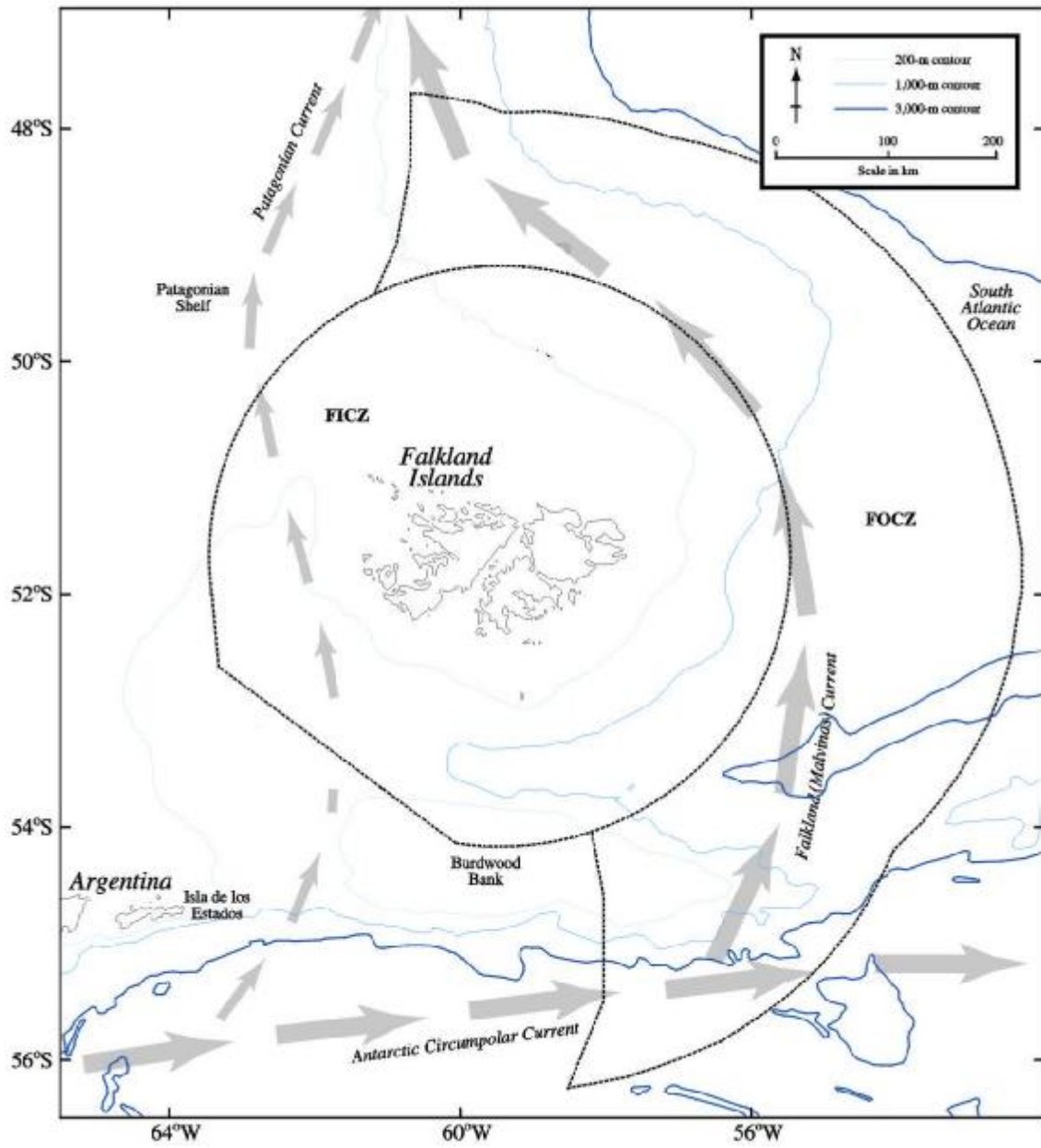


Figure 1 Falkland Islands Interim and Outer Conservation Zones and Regional Currents

## **PART I**

# **REVIEW OF INCIDENTAL SEABIRD MORTALITY ASSOCIATED WITH TRAWLING IN THE FALKLAND ISLANDS**

## **2.0 LEGISLATIVE/POLICY FRAMEWORK**

### **2.1 Falkland Island Legislation**

The Falkland Islands Government in conjunction with the Falkland Islands Fisheries Department (FIFD), industry and other interested parties is currently reviewing fisheries policy, which will result in the drafting of new ordinance in 2004.

Currently, the primary ordinance relating to the management of commercial fisheries in Falkland Island waters is the *Fisheries (Conservation and Management) Ordinance 1986*. In its present form, this Act makes no mention of the conservation or management of non-fish taxa, including seabirds and marine mammals, which are susceptible to both direct and indirect mortality associated with trawl fishing. However, current ordinances and licensing provisions, gives the Director of Fisheries power to impose conditions on vessels fishing in Falkland Island waters and those on the high seas in relation to vessel reporting, carriage of observers, and conservation and mitigation measures to reduce incidental mortality. The *Marine Mammal Ordinance 1992* makes it unlawful for any person to take, wound or kill any marine mammals on land or in the internal waters, territorial sea and fishery waters of the Falkland Islands.

The *High Sea Fishing Ordinance 1995* is the relevant legislation for Falkland Island registered vessels operating on the 'high seas'. This Act also contains no mention of measures or practices for the conservation of non-fish taxa. However, the Director of Fisheries has powers to impose licensing conditions, as detailed above.

In addition, the *Fishing (CCAMLR) Ordinance 1999* makes provisions for the implementation of conservation and other measures cognisant with the objectives of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR).

### **2.2 United Kingdom Overseas Territory**

The Falkland Islands is a United Kingdom Overseas Territory. As defined in the 1999 White Paper: Partnership for Progress and Prosperity, the United Kingdom encourages Overseas Territories to have the greatest possible control over their own affairs, but retains international responsibility for the territories, including obligation to ensure that international law is respected. However, locally elected councillors (which compose three of five members of an Executive Council) are responsible for the conduct of internal affairs.

Pursuant with the United Kingdoms compliance with the intent of the Food and Agricultural Organisation's IPOA-Seabirds and as a country with locally registered trawlers operating in Falkland Island waters, on the high seas, and in the EEZ of other countries, the drafting of FI-IPOA-Trawling helps to meet the international commitments of the United Kingdom and the responsibilities of the Falkland Islands under the Code of Conduct for Responsible Fisheries.

## 2.3 Primary International Policy Framework

### *Code of Conduct for Responsible Fisheries*

Largely to address continuing concern regarding unregulated fishing on the high seas, in some cases involving straddling and highly migratory fish species, which occur within and outside EEZs, in 1991 FAO-COFI called for the development of new concepts, which would lead to responsible, sustained fisheries. Subsequently, the International Conference on Responsible Fishing, held in 1992 in Cancun (Mexico) 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 Twenty-seventh 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 which would 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).

IPOA-S was elaborated within the framework of the Code of Conduct for Responsible Fisheries as envisaged by Article 2 (d) the objective of which is to ‘provide guidance which may be used where appropriate in the formulation and implementation of international agreements and other legal instruments, both binding and voluntary (FAO 1995). The Code of Conduct for Responsible Fisheries contains several references to the protection of the marine environment, non-target and dependent species. In addition to those contained in Article 7.6.9 and 8.5 references made in General Principles (Article 6), the Precautionary Approach (Article 7.5) and Management Objectives (Article 7.2.2) (see Appendix I) relate directly to a holistic approach to marine ecosystem management.

### *Drafting of the International Plan of Action-Seabirds*

The issue of the incidental mortality of seabirds in longline fisheries first received official international recognition with the passing of a draft Conservation Measure in 1990, which was converted into a legally binding measure for signatory CCAMLR countries in 1991. In 1996, the World Conservation Union (IUCN) World Conservation Congress passed a resolution that called for concerted action to reduce seabird mortality. This was followed in 1997 by COFI establishing a Seabird Technical Working Group (TWG) to draft guidelines on reducing incidental mortality and prepare a draft Plan of Action to implement the mitigation guidelines. The TWG met in Tokyo in 1998 and considered three technical papers (which were combined and published, Brothers *et al.* 1999a) as background information on longline fishing, incidental mortality and measures to reduce such mortality. This meeting and subsequent meetings of COFI in 1998 resulted in the production of IPOA-S (FAO 1999a).

### *FAO IPOA-Illegal, Unreported and Unregulated Fishing*

As previously stated, the FAO Code of Conduct for Responsible Fisheries (adopted in 1995) provides the general framework, which underpins IPOA-S. The voluntary code “sets out principles and international standards of behaviour for responsible practices with a view to ensuring the effective conservation, management and development of living aquatic resources, with due respect for the ecosystem and biodiversity”. Subsequent to the adoption of IPOA-S in 1999, in 2001 FAO adopted the IPOA-IUU (Illegal, Unreported and Unregulated Fishing). The objective of IPOA-IUU is “to prevent, deter and eliminate IUU fishing by

providing all States with comprehensive, transparent measure by which to act, including through appropriate regional fisheries management organisations established in accordance with international law” IPOA-IUU encourages countries to develop legislation and to join regional agreements to control IUU fishing and to develop National Plans of Action. By reducing IUU effort, the development and implementation of such NPOAs should help reduce pressure on fish stocks and also significantly reduce incidental mortality.

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

The United Nations Convention on the Law of the Sea (UNCLOS 1982) entered into force in 1994. The UK ratified UNCLOS in January 1998 on behalf of UK Overseas Territories, including the Falkland Islands. UNCLOS provided a new framework for the better management of marine resources and a new legal regime that afforded ocean and coastal States rights and responsibilities for the management and use of fishery resources within their EEZs, which embrace some 90 percent 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 taxa, as it requires coastal States and States fishing on the high seas to consider the effects of fishing 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’.

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

In 1983, the United Nations Environment Programme (UNEP) Convention on the Conservation of Migratory Species of Wild Animals (CMS) agreement came into force to 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 into international waters. In this context, all seabird species susceptible to longline mortality in Falkland Island waters are considered migratory.

Parties to CMS provide strict protection for endangered migratory species listed in Appendix I, and Appendix II lists migratory species that require or would benefit significantly from international co-operative agreements. Since April 1997 (the fifth meeting of the Conference of Parties to the Convention), all Southern Hemisphere albatross species have been listed in either Appendix I or II.

At the sixth meeting of the Conference of Parties to the Convention the threats posed by fisheries bycatch in general to a wide range of species, and in particular to 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 2001). This resulted in the drafting of the Agreement on the Conservation of Albatross and Petrels (ACAP) with the stated objective to achieve and maintain a favourable conservation status for Southern Hemisphere albatrosses and petrels. A major component of ACAP will be the requirement of signatory countries to produce an Action Plan that address all threats to relevant albatrosses and petrels, not just the threat posed by longline fishing. One of ACAP’s general conservation measures that relates directly to longline fishing 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).

Unlike IPOA-S, ACAP is a binding agreement that came into force on February 1 2004 after being ratified by five-States (countries). ACAP has been ratified by Australia (Depositary State for the Agreement), New Zealand, Ecuador, Spain and South Africa. In September 2002, the Falkland Islands Government Executive Council formally supported the UK ratification of the agreement. ACAP schedules currently have 21 species of albatross and

seven species of petrel listed as protected. Three of these species (the White-chinned petrel *Procellaria aequinoctialis*, Southern giant petrel *Macronectes giganteus* and Black-browed albatross, (*Thalassarche melanophris*) are identified as breeding in the Falkland Islands.

### **3.0 TRAWLER RELATED SEABIRD MORTALITY**

This is not intended as a comprehensive literature review of trawler related seabird mortality, but a chronology of events from the identification of a bycatch problem in trawl fisheries in the Southern Hemisphere. The review specifically focuses on the nature and multiple causes of bycatch in trawl fisheries and subsequent attempts to quantify its scale and the development of mitigation measures.

#### **3.1 Identifying and Quantifying Trawler Bycatch**

In Falkland Island waters, demersal stern trawling accounts for the vast majority of licensed trawling. However, a small amount of pelagic and semi-pelagic trawling occurs in the surimi trawl fishery. The cause of incidental mortality in trawl fisheries varies considerably, depending on the nature of the fishery (pelagic or demersal), the seasonality of seabird assemblages present and the level and duration of offal and discards discharged.

Discharge produced by trawl fisheries around the world provides important food resources for a wide range of seabird populations (e.g. Abrams 1983, Furness *et al.* 1988, Thompson 1992, Tasker and Furness 1996, Garthe and Damm 1997, Ryan and Moloney 1998, Reeves and Furness 2002). It is estimated that the Patagonian squid (*Loligo gahi*) and finfish trawler waste in Falkland Island waters provides around 5.4% of the annual black-browed albatross breeding population energy requirements (Thompson and Riddy 1995). However, because the fisheries are greater predators of fish stocks than albatrosses, their long-term impact may be detrimental to these birds (Thompson 1992, Thompson and Riddy 1995). Such negative impacts on Falkland Island seabird populations from this type of competition have not yet been identified (Putz *et al.* 2001).

There are several causes of mortality in trawl fisheries; however, they can be categorised into two groups:

- cable related mortality, which includes collisions with netsonde cables, warp cables and paravanes
- net related mortality, which includes all deaths caused by net entanglement

##### *3.1.1 Cable Related Mortality*

Historically, seabird mortality records associated with trawl fisheries in the Southern Hemisphere have been predominantly caused by birds colliding with the netsonde cable, which extends from the top of the aft gantry to 20m behind the vessel (Bartle 1991, Williams and Capdeville 1996). In the New Zealand squid trawl fishery around the Snares and Auckland Islands an estimated 2,300 White-capped albatross (*Thalassarche cauta stearnsi*) and small numbers of six other seabird species were killed in 1990 (Bartle 1991). It is estimated that up to 90% of these deaths were caused by collisions with the netsonde cable. Comparable mortality levels have also been recorded in Kerguelen waters. Based on the recovery of banded birds from a trawler operating with a netsonde cable, it is estimated that in 1984 as many as 200 Black-browed albatross may have been killed by a single vessel, and up to 1,000 by the entire trawling fleet (Weimerskirch *et al.* 2000).

Since mid 2001, SAST have recorded mortality caused by seabirds feeding on offal discharge at the stern of the ship being struck by the warp cable, dragged under water and drowned (Sullivan and Reid 2002). This situation appears to be exacerbated by newer cables, which are coated with sticky grease to which feathers adhere (*pers. obs.*). The estimated mortality level caused by cable collisions by the finfish fleet in Falkland Island waters in 2002/03 is >1, 500 birds (Sullivan and Reid 2003). Lower levels of bycatch have also been caused by birds becoming caught on warp splices during hauling operations (*in* Goni 1998, *in* Kock 2001). In addition, incidental mortality is caused by birds becoming entangled around the electronic cable and rope that joins the paravane arm to the paravane (which contains transducers to monitor net position and aperture), and drowning after being dragged down the cable and becoming wrapped around the paravane (SAST and FIFD *unpubl. data*).

### 3.1.2 Net Related Mortality

In pelagic trawl fisheries, incidental mortality is also caused by birds diving into the net and becoming entangled, particularly in the wings of the net where the mesh size is typically larger (Williams and Capdeville 1996, Weimerskirch *et al.* 2000, SC-CCAMLR 2001, 2002). In the 2001 mackerel icefish (*Champscephalus gunnari*) trawl fishery at South Georgia (CCAMLR Subarea 48.3), a total of 125 entanglements was reported, of which at least 73 were fatal. Seabird mortality recorded in the trawl fishery for 2001 and 2002 was around 3 times the estimated mortality caused by licensed longliners in the same area for the same period (SC-CCAMLR 2001, 2002).

## 3.2 Reducing Mortality (Mitigation Measures)

The varied causes of trawler mortality require specifically developed and targeted mitigation measures.

### 3.2.1 Cable Related Mortality

Since the prohibition of netsonde cables in many trawling fisheries around the world (e.g. Weimerskirch *et al.* 2000, Kock 2001) the most critical mitigation measure aimed at reducing incidental mortality caused by warp cables is the effective management of offal discharge (e.g. Wienecke and Robertson 2000).

To reduce the attractiveness of the two Patagonian toothfish trawlers operating around Macquarie Island and Heard and MacDonal Islands, licensing conditions prohibit offal discharge, and require all offal and bycatch to be processed onboard as fishmeal. Other mitigation measures required under licence conditions include neat splicing of warp cables, and the dimming of lights at night to minimise the attractiveness of vessels to birds. With this combination of mitigation measures seabird and seal mortality recorded from 883 shots and 1,043 hauls from 1997-2000 consisted of only 9 birds and 2 seals and seven serious seabird injuries (Wienecke and Robertson 2000).

A second option for reducing cable related mortality is the development of bird-scaring devices. One such device developed in New Zealand is the 'Brady Baffler', which was designed to prevent birds that are scavenging for factory discharge from congregating at the stern of trawlers in the region where the warp cables enter the water. The device is a semi-permanent fixture that consists of two towers placed in the stern quarters of the ship. Both towers have two steel arms that are lowered, one astern and one outboard, each arm has ropes with plastic 'cones' (filled with water) hanging at the seaward end. As the vessel pitches and rolls the ropes and 'cones' swing and scare the birds from the area adjacent to the warp cable (Southern Seabirds Solutions 2002).

A collaborative project between SAST and FIFD has also resulted in significant steps toward developing a bird-scaring device to prevent contacts between birds and warp cables at the

stern of the vessel. This device requires further development but it is hoped that an operationally effective version will be completed in 2003/04.

### 3.2.2 Net Related Mortality

Due to the nature of pelagic trawl fisheries (the size of mesh used and the time the net spends on and near the water's surface), net related mortality is a more difficult cause of mortality to mitigate. Probably the most critical variable to manage to reduce net related mortality caused by birds diving into the net and becoming entangled is the time the net spends on or near the surface of the water during shooting and hauling. The best way to reduce this time is for vessels to operate with powerful and mechanically reliable winches and to maintain the highest vessel speed feasible during setting and hauling. Other options that have been trialed with some success include: adding chain to the net to maximise the time the net is submerged, reducing shooting and hauling during daylight hours, and thoroughly cleaning the net prior to shooting to remove all 'stickers', which attract diving seabirds.

## 4.0 OVERVIEW OF FALKLAND ISLAND TRAWLING

Since the mid 1970's multinational squid and finfish fisheries developed in the southwest Atlantic, including extensive fishing in waters around the Falkland Islands. In 1986, the UK declared a 150 nm radius around the islands - Falklands Interim Conservation and Management Zone (FICZ; Figure 1). In 1990, a further zone called the Falklands Outer Conservation Zone (FOCZ) extended the fishery conservation zone out to 200 nm to the north, east and south of the islands (Figure 1). Within FICZ and FOCZ fishing effort is regulated by limiting the number of vessels licensed (e.g. effort limitation) to fish for each target species.

### Trawling Licences

Most finfish licences are allocated in units of one month whereas squid (*Loligo gahi*) licences are allocated for the relevant season. Season duration may be adjusted for conservation reasons, for example for stock conservation reasons the first *Loligo* season for 2003 was reduced by 50% (2.5 months). Restricted finfish and Surimi licences limit vessels to targeting southern blue whiting (*Micromesistius australis*) and hoki (*Macruronus magellanicus*), together with a small permissible bycatch. Whilst most finfish fisheries could theoretically operate all year around, some fisheries (e.g. Surimi and Skate) have a seasonal aspect with fishing effort concentrated within a few months of the year.

Table 1 Typical breakdown of trawling licences (Falkland Islands Fisheries Department)

Licence type	Period	Typical Licence Numbers
Unrestricted Finfish	All year	6
Restricted Finfish	All year	15
Skates and Rays	All year	8
Surimi	All year	2
Loligo squid	1 Feb - 31 May	16
	1 Aug - 31 Oct	16

### *Management Regime*

Fishing in the Falkland Islands is controlled through effort limitation; the number of vessels, their fishing power and the length of period for which they operate. The reason for adopting this system was that about 75% of all catches consist of two species of squid, both of which live for approximately 1 year. Therefore, biomass of squid fluctuates greatly from year to year and it would be difficult to operate a quota system. Effort control is also fairly straightforward to operate, and as such is suitable for the Falklands where resources, including people, are limited. Quotas could be used for finfish, but for management and operational efficiency and simplicity, effort limitation has been used throughout the trawling fleet.

### *Flag State/Nationality*

The majority of vessels in the Finfish and Restricted Finfish fisheries are either Falkland Island or Spanish registered. The former have usually transferred from the Spanish register. The main applicants for Skate or Ray licences are Korean companies and vessels. Surimi licences usually involve Japanese and one Chilean flagged vessel. Falkland registered vessels are usually owned by joint ventures; typically 51% owned by Falklands interests and 49% by Spanish interests, although the Falkland shareholding can be higher in some cases, or as low as 25.1%. In some cases, Spanish or other vessels in the finfish fisheries may be chartered to Falkland companies or to joint ventures with a Falkland Islands component. Other business arrangements may also apply in some cases. The profits of a joint venture company are taxable in the Falkland Islands.

### *Fishing Area*

Most trawling takes place in water depths of less than 300m, with the majority in 200m or less. Water depths increase rapidly to the east and south of the Falkland Islands, whereas to the west and north/northwest the Patagonian shelf gently slopes away to reach depths of greater than 400m. Consequently, most trawling takes place within 40 miles of coast to the east and south, but extends to the extent of FICZ (150 - 200 nautical miles) to the west and northwest. Most finfish fisheries overlap although the skate and ray fishery sometimes takes place in deeper water. The *Loligo* fishery is restricted to a specific area (*Loligo* box) on the eastern and southern coast of East Falkland, from which all other trawling effort is prohibited, with the exception of surimi vessels fishing for southern blue whiting.

### *Vessel Characteristics*

All trawlers in the fishery are oceangoing freezer factory vessels. They range in size from 50 - 100m LOA, although the larger vessels tend to be involved in the *Loligo* squid fishery. Vessels in finfish fisheries are predominantly in the 50 - 75m range with 25 - 40 crew. Catches vary from a few tonnes per day to 30 - 40 tonnes per day.

### *Observer coverage (FIFD, SAST)*

Typically, FIFD has six observers that are rotated around commercial trawlers and *Illex argentinus* jiggers to collect fisheries stock assessment data. Additional observers are sometimes recruited for specific projects.

SAST currently has three full time seabird observers, two of which are dedicated to investigating and quantifying seabird interactions and mortality associated with trawlers in Falkland Island waters.

## 5.0 SQUID AND FINFISH TRAWLING

The surimi vessels that operate in Falkland Island waters process discards and offal onboard and do not discharge during trawling operations or produce a limited amount of finely macerated discharge. Current evidence suggests that discharge produced by these vessels pose a negligible risk to seabirds, and are not discussed in detail in this document. SAST plan to conduct a trip in 2003 onboard the vessel that produces macerated discharge to verify this assumption. In the future, should surimi vessels alter their discharge management regime, or a seabird mortality problem be identified for the fleet, a section should be added to this document to address the issue. For the remainder of this document, trawling within Falkland Island waters is divided into two broad categories; *Loligo* and finfish (including skate and ray).

As previously discussed (see Section 3.2.1), mortality caused by netsonde cables has been a major cause of seabird mortality in several Southern Hemisphere trawling fisheries. In early 2003 a FIFD observer reported the use of a netsonde cable on a surimi vessel operating in Falkland Island waters. A 'great albatross' mortality (thought most likely to be a Southern royal Albatross, *Diomedea epomophora*) was recorded after a collision with the cable (A. Stocks *pers. comm.*). Netsonde cables have been prohibited in New Zealand (Bartle 1991), and in CCAMLR trawl fisheries since 1994/95 (CCAMLR 1998). It is recommended that the FIFD consider a similar regulation for trawlers in Falkland Island waters.

### 5.1 Squid (*Loligo*) Trawling Fleet

The *Loligo gahi* trawler fleet is typically the second most important commercial fishery in the Falkland Islands, the *Illex argentinus* jigging fleet is the largest both in terms of number of vessels and licence revenue generated. *Loligo* vessels target two cohorts (autumn - 1 February to 31 May 2002 and spring - 1 August to 31 October) in their feeding grounds on the east coast of the islands (at depths of 120-250m depths). The *Loligo* fishery is restricted to a specific area (*Loligo* box) from which all other trawling effort is prohibited, with the exception of surimi vessels fishing for southern blue whiting. Typically, 16 full vessel equivalents are licensed to fish in both *Loligo* seasons. The total fishing effort for each fishing year has remained relatively constant over the last ten years, with minimum effort in 1995 and a peak in 1998-2000 (Figure 2). However, the flag nation of vessels operating in the fleet has shifted significantly from being dominated by Spanish registered vessels to Falkland Island registered vessels.

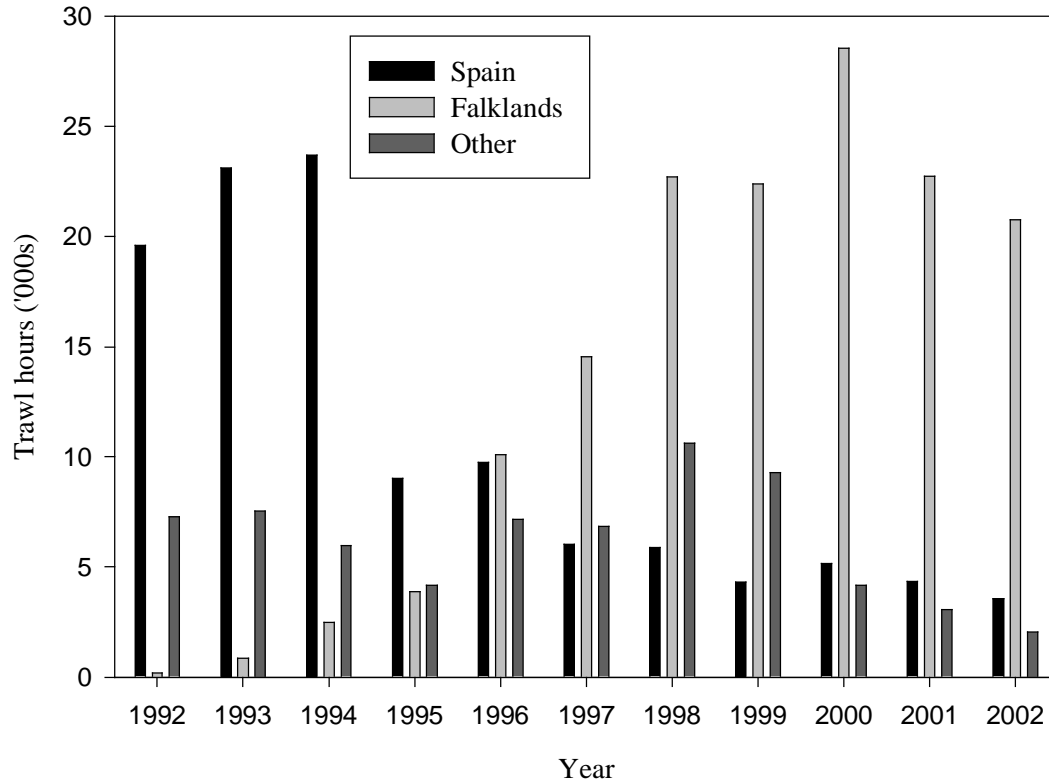


Figure 2 *Loligo* trawling effort by nation (1992-2002) (As defined by trawling effort within the *Loligo* box).

## 5.2 Finfish Trawling Fleet

The Falkland Islands support a diverse fleet of finfish trawlers that operate throughout the year targeting predominantly southern blue whiting, hoki, hake (*Merluccius hubbsi* and *M. australis*), kingclip (*Genypterus blacodes*) and red cod (*Salilota australis*). The majority of finfish trawling effort is concentrated in the west of FICZ (see Figure 1) at water depths up to 400m, but typically between 100-200m. Finfish licences are divided into two seasons, 1 January-30 June and 1 July to 31 December of each year. In 2000/2001 this represented 264 months fishing effort, and the effort in the second season of 2001 was 109 months. Peak catches usually occur in March-April and August-October (various Falkland Island Fisheries Department FIFD reports). There is also a small fleet of Korean trawlers targeting *Rajidae*, the most commonly caught skate and ray being *Bathyrāja griseocauda*, *B. albomaculata*, *B. brachyrops* and *Raja flavirostris*.

Over the last ten years the finfish (including ray and skate) trawling effort has fluctuated with peaks in 1995 and 1999 with minimum effort occurring in 1997 and 2002 (Figure 3).

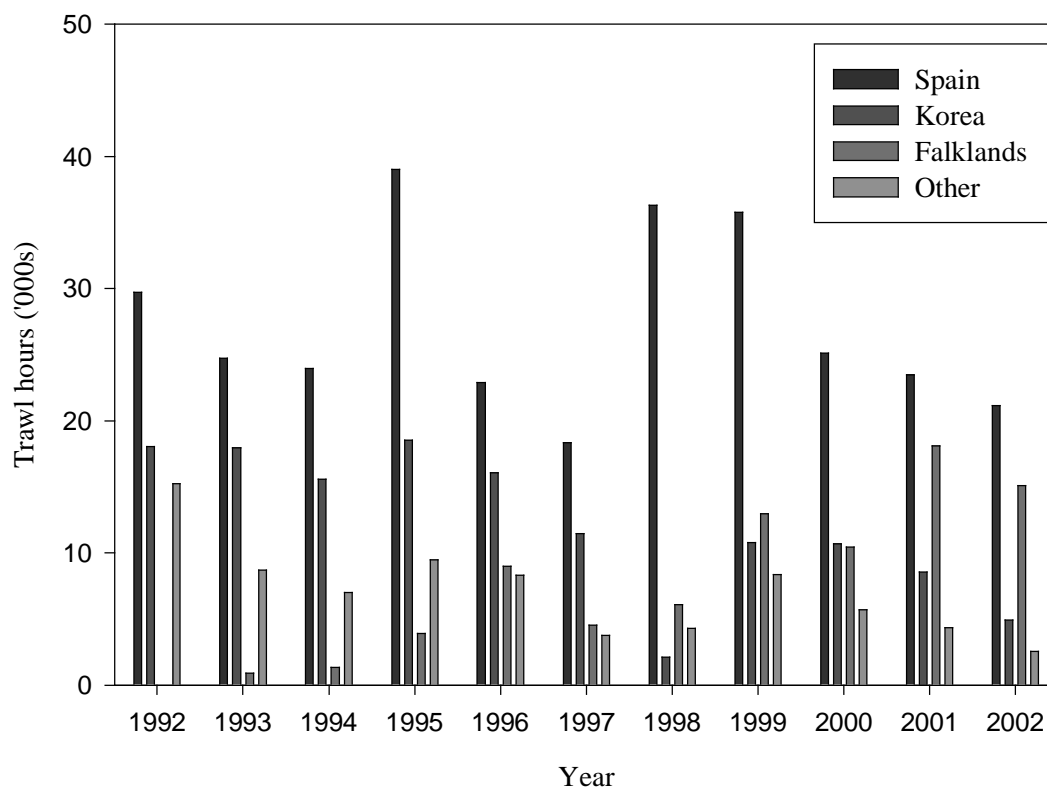


Figure 3 Finfish and skate/ray trawling effort by nation (1992-2002). (As defined by trawling effort outside the *Loligo* box).

The relatively large proportion of effort by Korean flagged vessels in the early to mid 1990s represents vessels operating on finfish and ray/skate licences, however, since 1998 Korean effort largely represent ray/skate licences.

### 5.3 Mitigation Measures to Reduce Incidental Mortality

There are currently no mitigation measures required to prevent incidental mortality under Falkland Island fishing ordinances. Current ordinances and licensing provisions give the Director of Fisheries power to impose conditions on vessels fishing in Falkland Island waters and those on the high seas in relation to vessel reporting, carriage of observers, conservation, and mitigation measures to reduce the incidental mortality of seabirds.

A collaborative research programme between FC and FIFD has made significant steps toward the development of a mitigation measure to reduce potentially fatal contacts between seabirds and the warp cable during trawling operations.

## 6.0 TRAWLING MORTALITY IN THE FALKLAND ISLANDS

With the exception of the two-three surimi vessels that operate seasonally in Falkland Island waters, all trawling fisheries in Falkland Islands waters are bottom (demersal) fisheries and the discharge of offal and fish bycatch is standard practice throughout the course of factory processing. This means that on some occasions discharge occurs during hauling. Although black-browed albatross mortality has been recorded during hauling (*in Kock 2001*), during hauling operations observed in 2001/02, SAST recorded no contacts between birds and splices.

### 6.1 *Loligo* Trawling Fleet

From 2001-2003, SAST seabird observers conducted three trips on *Loligo* trawlers. During these trips no seabird mortalities were recorded<sup>1</sup>. Due to a combination of factors, the *Loligo* fishery produces significantly fewer discards than the finfish fishery. Firstly, *Loligo* are packed whole for freezing and consequently there is relatively little discharge produced, whereas in the finfish fishery, fish are processed by either filleting or 'heading and gutting'. Secondly, *Loligo* catches are relatively homogenous (target specific) and therefore produce only small quantities of discards or discharge from processed finfish, which greatly reduces the potential for collisions between seabirds and warp cables.

### 6.2 Finfish Trawling Fleet

Between June 1 2002 and May 31 2003 there were 3,257 finfish trawling days in Falkland Islands waters (FIFD *unpubl. data*). SAST observers conducted nine cruises aboard seven different vessels during the year, representing 157 fishing days, or 4.7 % of fishing effort. While onboard, 420 trawls and 421 hauls were conducted, of which 404 (96.2 %) and 419 (99.5 %), were observed, respectively. During this time 73 dead birds were hauled aboard vessels fishing within Falkland Island waters.

The estimated number of seabirds killed and the variance of this were calculated using SAST mortality and FIFD fishing effort data, and methods detailed by Klaer and Polacheck (1995), which follow methods in Cochran (1977) for multi-stage sampling with unequal size primary and secondary sampling. In total, 1,529 birds (co-efficient of variance CV = 0.15) were estimated to be killed in Falkland Island waters in the 12-month period. This includes, 1,411 (CV = 0.13) black-browed albatrosses, 98 (CV = 0.87) southern giant petrels, 12 (CV = 1.37) southern royal albatrosses and nine (CV = 0.04) white-chinned petrels.

Due to unusually good *Loligo* catches on the outer Patagonian shelf, approximately 100 km to the north of the FOCZ (between 46°S and approximately 47° 30'S) from mid-September to late October 2002 most trawlers licensed to fish in Falkland Island waters operated in international waters. From 21 September – 13 October observations were made in this region by SAST on three trips aboard two trawlers. During this period 54 bird mortalities, predominantly black-browed albatross, were recorded in 18 observed fishing days. These data provide the first records of significant trawler mortality on the Patagonian Shelf, outside Falkland Island waters, and suggest that the problem is not restricted to local waters.

In total, of the 127 mortalities recorded on finfish trawlers in 2002/03, 122 (95%) were caused by birds feeding on offal discharge at the stern of the vessel being hit by the warp cable,

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<sup>1</sup> Three mortalities were recorded by a FIFD observer onboard a *Loligo* vessel in February/March 2003 (A. Stocks *pers. comm.*), which highlights the need for further monitoring of the fleet.

dragged underwater and drowned. Once the bird is under water the forward motion of the ship and the downward force of the cable as the vessel pitches, forces the bird down the cable, often until it reaches a splice, where it becomes impaled. This situation appears to be exacerbated by new cables, which are coated with sticky grease to which feathers adhere. In addition, some birds become wrapped around the warp cable underwater after diving for discharge. An unknown proportion of birds caught in both manners then become impaled on a warp splice and are subsequently hauled onboard. In the vast majority of cases birds that make heavy contact with the cable get pushed under water and quickly surface, apparently unharmed. The vast majority of contacts that cause birds to get wrapped around the cable and dragged under water occur when the cable strikes birds near the scapular when they have their wings outstretched.

It is likely that the level of mortality reported for the Falkland Island finfish fleet (see Table 2) is actually higher than that based on the number of birds hauled onboard. In other trawl fisheries around the world it is accepted that due to birds becoming dislodged from the netsonde cable the actual level of mortality is considerably higher than that recorded by onboard observers (Bartle 1991, Weimerskirch *et al.* 2000).

In addition to birds being dragged underwater by the warp cable, SAST have also recorded three cases of birds being drowned after becoming entangled in the paravane cable when feeding on discards adjacent to the discharge scupper.

Incidental mortality has also been recorded when birds become entangled with the net. The vast majority of recent mortality recorded in the pelagic icefish trawl fishery in South Georgia has been caused by birds, particularly white-chinned petrels, becoming caught in the net after diving into the mesh around the wings and opening of the net. SAST has recorded only four similar events, and available data suggests this form of mortality will remain relatively minor in comparison to that caused by collisions with the warp cable, as the average mesh size near the mouth of nets used in Falkland Islands waters is around 120-140mm (J. Clarke *pers. comm.*), compared with the mesh size of around 400mm in the pelagic icefish fishery in South Georgia (SC-CCAMLR 2001).

Since 1995, seven species of seabirds that breed in the Falkland Islands have been recorded to be killed by trawlers in Falkland Island waters. Black-browed albatross comprise the vast majority of mortalities (Table 2).

Table 2 Incidental mortality recorded by observers on trawlers (\*taken from Table 5 in Barton 2002, ^ SAST *unpubl.data*)

Common Name	Scientific name	1995-2000*	2002-2003^	Total
King penguin	<i>Aptenodytes patagonicus</i>	1		1
Gentoo penguin	<i>Pygoscelis papua</i>	4		4
Magellanic penguin	<i>Spheniscus magellanicus</i>	6		6
Albatross (unident)		1		1
Southern royal albatross	<i>Diomedea epomophora</i>		1	1
Black-browed albatross	<i>Thalassarche melanophris</i>	24	118	142
Southern giant petrel	<i>Macronectes giganteus</i>		5	5
White-chinned petrel	<i>Procellaria aequinoctialis</i>		3	3
Cape petrel	<i>Daption capense</i>	2		2
Imperial shag	<i>Phalacrocorax atriceps</i>	2		2

Given the relatively low numbers of mortalities recorded for all species, except black-browed albatross and southern giant petrels, and the estimated local and global population of these species (Table 3) it is unlikely that incidental mortality caused by trawling in the Falkland Island waters has a significant effect on those populations. However, in addition to the estimated high level of black-browed albatross mortality in 2002/03 (1,411 birds), the estimated level of southern giant petrel mortality (98 birds) comprises a significant proportion of their local breeding population (Table 3 - 7,300 pairs).

Cape petrels and southern royal albatross are the only seabird species that do not breed in Falkland Island waters which have been recorded killed on trawlers in local waters.

Many species that were recorded around trawlers in 2001/02 do not interact closely with trawl gear, either because they do not scavenge for discards as actively as other species, or because they are out-competed by larger more aggressive species (e.g. black-browed albatross). These species are therefore considered not to be at high risk of mortality from trawling in Falkland Island waters.

Table 3 Estimated population seabirds that breed in the Falkland Islands and have been recorded to be killed by trawlers

Common name	Scientific name	Estimated Falkland Island breeding population	Estimated global population
King penguin	<i>Aptenodytes patagonicus</i>	200-300 <sup>1</sup>	1 250 000 <sup>2</sup>
Gentoo penguin	<i>Pygoscelis papua</i>	113 000 <sup>2</sup>	260 000 <sup>4</sup>
Magellanic penguin	<i>Spheniscus magellanicus</i>	100 000 <sup>2</sup>	
Black-browed albatross	<i>Thalassarche melanophris</i>	380 000 <sup>3</sup>	530 000 <sup>5</sup>
Southern giant petrel	<i>Macronectes giganteus</i>	7 300 <sup>2</sup>	36 000 <sup>6</sup>
White-chinned petrel	<i>Procellaria aequinoctialis</i>	1 000 - 5 000 <sup>2</sup>	5 000 000 <sup>7</sup>
Imperial Shag	<i>Phalacrocorax atriceps</i>	65 000 <sup>2</sup>	

<sup>1</sup> Clausen (2001)<sup>2</sup> Woods and Woods 1997<sup>3</sup> Huin (2001)<sup>4</sup> Marchant and Higgins 1990<sup>5</sup> Submission to IUCN for reclassification of black-browed albatross<sup>6</sup> www.oceanwanderers.com<sup>7</sup> Birdlife International (2000)

## 7.0 REGIONAL TRAWLER MORTALITY

Seabird populations of the Falkland Islands are of international importance (Croxall *et al.* 1984, Woods and Woods 1997), particularly as the region contains around 85% of the world's breeding population of black-browed albatross (Gales 1998), and breeding grounds and foraging waters for a range of seabirds vulnerable to fisheries related mortality. However, subsequent census results identified a dramatic decline in the number of breeding pairs compared to a census of Beauchêne Island conducted in 1980 and various censuses conducted on different islands throughout the last 20 years. Based on extrapolated population estimates for 1995, the 2000/01 census identified an estimated reduction of 87 500 breeding pairs over a five year period, which reduces the Falkland Island population to around 71% of the global population (Huin 2001). This includes serious declines at the three largest colonies (Steeple Jason -47 300, Grand Jason -10 100 and Beauchêne -27 500) (Huin 2001). This decline was largely responsible for the recent IUCN reclassifications of the species from Near Threatened to Vulnerable in 2002, and subsequently to Endangered in 2003.

Satellite tracking of breeding black-browed albatross from the Falkland Islands has shown that they forage in different regions of the Patagonian Shelf throughout the year, depending on the stage of their breeding cycle. During the incubation period, birds forage predominantly in the northern reaches of the Patagonian Shelf (on the shelf break east of Peninsula Valdez and north to Rio de la Plata), and during chick rearing both males and females forage locally in areas adjacent to breeding sites (Grémillet *et al.* 2000, Huin 2002).

As discussed in FI NPOA-S, longlining over the extent of the Patagonian Shelf and into the waters of northern Argentina, Uruguay and Brazil is directly relevant to the conservation of black-browed albatross from the Falkland Islands. However, there are currently few data on the level of factory trawler related mortality on the Patagonian Shelf and other areas of South

America. Data collected by SAST on the 'high seas' north of Falkland Island waters is the first evidence of significant trawler mortality on the Patagonian Shelf, outside Falkland Island waters. However, these data were collected opportunistically when vessels licensed to fish in Falkland Island waters travelled north to target unusually dense concentrations of *Loligo*, so the direct impact of trawling in the region on seabird populations is unknown. Given the extensive foraging range of black-browed albatross on the shelf waters of eastern South America (Huin 2002), and their high level of interaction with factory trawling fleets in the region, it is important that investigations are conducted to determine if these fisheries have a bycatch problem which requires mitigation.

## **8.0 SEABIRD PROVENANCE**

Seabird bycatch is a global conservation issue and because of the vast distances covered by many of the species affected (*e.g.* Procellariiformes) it is an issue that must be managed on a relevant scale. However, the extent of trawling incidental mortality across the world is largely unknown but given the extensive coverage of trawling fleets in the world's oceans it is critical to develop a more detailed understanding of the cause(s) and scale of mortality. In the context of the conservation of the Falkland Island's seabirds and given the high levels of mortality recently identified and the decline on the regions black-browed albatross population, FI POA-Trawling is focused largely on reducing and/or maintaining low levels of mortality of black browed albatross. However, it is vital that as well as conserving seabirds that breed in Falkland Island waters that the plan aims to reduce and/or maintain low levels of mortality of all seabirds regardless of their provenance. Given the migratory nature of seabird species vulnerable to incidental mortality all fisheries should be considered as open and dynamic systems. For example, in the non-breeding season South Georgia seabirds migrate to the Indian Ocean and the waters of South American coastal nations, and some species circumnavigate the world. Six species of albatross from New Zealand migrate to the coastal waters of Peru, Chile, Argentina and Uruguay, where they interact with a range of longline fisheries (Robertson *et al.* 2002). This includes the southern royal albatross, 12 of which were estimated to be killed by finfish trawlers in Falkland Island waters in 2002/03. The diversity of seabirds that utilise Falkland Island waters is best emphasised by three years of comprehensive at-sea survey conducted between 1998-2000, in which more than 60 species were recorded, and 21 of these were recorded on more than 1000 occasions (White *et al.* 2002).

## **9.0 ASSESSMENT OF THE FALKLAND ISLANDS TRAWLING BYCATCH PROBLEM**

The intent of IPOA-S is (based upon framework of the Code of Conduct for Responsible Fisheries, see Appendix 1) to reduce the incidental catch of seabirds by the drafting and implementation of a National Plan of Action for longline fisheries, where this occurs. In the absence of similar policies addressing trawling, FI POA-Trawling has been written to address the high levels of mortality associated with the Falkland Island finfish trawling fleet. Given the declining status of the local black-browed albatross breeding population (see Section 7.0) the drafting of FI POA-Trawling was considered essential to meeting the overall conservation goals of IPOA-S.

## 9.1 Assessment Criteria

In 2002/03, the estimate of seabird mortality in Falkland Island waters is 1,529 birds (coefficient of variance  $CV = 0.15$ ), 1,411 ( $CV = 0.13$ ) of which were black-browed albatross. Mortality occurs throughout the year with a peak in the months of spring. While there is a limited time series of data to determine the impact of trawling in Falkland Island waters on seabird populations, current mortality estimates raise considerable concerns given the declining status of black-browed albatross in particular.

Article 7.6.9 of the FAO Code of Conduct for Responsible Fisheries states that 'countries should take appropriate measures to minimise waste, discards, catch by lost or abandoned gear, catch of non-target species, both fish and non-fish species, and negative impacts on associated or dependent species, in particular endangered species'. Given the recent decline in the local black-browed albatross breeding population and the subsequent IUCN reclassification of the species from Vulnerable to Endangered it is deemed necessary for a FI POA-Trawling to be drafted.

## **PART II**

# **FALKLAND ISLANDS PLAN OF ACTION FOR REDUCING INCIDENTAL CATCH OF SEABIRDS IN TRAWL FISHERIES**

### **10.0 Scope and Purpose**

The FI POA-Trawling is the first Plan of Action for trawl fisheries to be written for a United Kingdom Overseas Territory, and as such, is important not only for the Falkland Islands but also for the international conservation commitments of the UK. The plan has been drafted at a time when a rapid decline in the Falkland Island's black-browed albatross breeding population has been identified, and many albatross and petrel populations in the Southern Hemisphere are also in decline, the cause of which is frequently linked to longline mortality.

In August 2002, the Falkland Islands Government supported the UK ratification of the Agreement on the Conservation of Albatrosses and Petrels (ACAP). ACAP is a binding agreement developed in the framework of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) where parties are encouraged to reach agreement for the conservation of wild animals, which periodically cross national jurisdictional boundaries. The overall objective of ACAP is to achieve and maintain a favourable conservation status for Southern Hemisphere albatrosses and petrels, while acknowledging the important role of FAO IPOA-S in the conservation of albatrosses and petrels. FI POA-Trawling will act as an important step toward exhibiting the Falkland Islands commitment to reducing trawler seabird mortality and will form a significant part of an ACAP Plan of Action that may be required in the future. (ACAP came into force on February 1 2004).

FI POA-Trawling relates to trawl fishing in Falkland Islands waters and that conducted by Falkland Island registered vessels in other territorial waters and on the high seas. The primary objective of FI POA-Trawling is to reduce incidental seabird mortality to a level that will have no deleterious impact on the long-term sustainability of seabird populations. This will be achieved by setting indicative bycatch objectives to reduce seabird mortality to a specific level over the next five years and providing detailed Seabird Interaction Management Strategies to facilitate the process.

While the crew of fishing vessels undoubtedly play a critical role in reducing incidental seabird mortality the level of importance placed on the issue by government ordinances and policy and the management of fishing companies will largely determine the level of compliance and attitude toward the implementation of mitigation measures at-sea. In relation to this principle, the document (Parts I and II) is focused on providing fishing companies with the background knowledge, and strategies necessary to achieve significant steps toward reducing seabird mortality to negligible levels within the next four years. When fully implemented FI POA-Trawling will enable the local fishing industry to demonstrate commitment to sustainable and environmentally appropriate management of Falkland Island fisheries and thereby ensure that their market share is maintained or increased as requirements on vessels and fisheries to demonstrate best-practice standards increase.

As such, for FI POA-Trawling to achieve the objectives stated herein, it is critical that this document is disseminated not only to local fishing companies, but also to senior

representatives of their foreign joint partners and all companies involved with trawling in Falkland Islands waters.

It is intended that the plan be reviewed four years after implementation, at which time the bycatch objectives should be revised and the scope and content of the plan reassessed.

## **11.0 OBJECTIVES**

### **General Objective**

By the end of 2003/04 have a statistically robust estimate of the level of bycatch across the trawling fleet, and where appropriate, mitigation measures in place that enable the implementation of seabird bycatch objectives

### **Specific Objectives**

The implementation of strategies and recommendations contained in the FI POA-Trawling should facilitate the achievement of the following objectives:

Maintain a suitable level of observer coverage to calculate an annual estimate of seabird mortality in all trawl fisheries;

Identify the relative importance of the specific causes of mortality across the trawling fleet;

Continue to investigate the development of cost effective and practical mitigation measures to reduce trawler related incidental seabird mortality;

Consider with a view to implement the findings and recommendations produced by the Discharge Management Officer (Finfish);

Once mitigation measures are in place, achieve an annual reduction in trawler related incidental mortality;

Recognising the experience and knowledge of fishermen, encourage their involvement in the modification and development of mitigation measures;

Increase international awareness of trawling related seabird mortality in the fishing industry and community at large;

Ensure the dissemination of information and training opportunities for crew and other stakeholders to work towards practical implementation of the FI POA-Trawling and the development of a seabird conservation culture in fishing companies operating in the Falkland Islands;

Facilitate the synergy of FI POA-Trawling with the upcoming Falkland Islands Conservation Strategy and Biodiversity Action Plan;

Place high priority on establishing collaborative projects between the Falkland Islands and South American countries, and/or encouraging them to investigate the scale of seabird mortality caused by their factory trawler fleets.

## 12.0 GENERAL INTRODUCTION

In 200/03, the estimated mortality level for the Falkland Island finfish trawling fleet was 1,529 birds (co-efficient of variance  $CV = 0.15$ ), which indicates that trawler related seabird mortality in Falkland Island waters is currently significantly higher than that caused by longliners. With this in mind, and in the absence of mitigation measures to reduce incidental mortality the precautionary principle should be applied, and the highest priority should be placed on the research and development of effective short-term and long-term mitigation methods to reduce trawler related seabird mortality.

## 13.0 BYCATCH OBJECTIVES

The current level of mortality for the finfish trawling includes an estimated 1, 411 black-browed albatross, a species that in 2002 was reclassified by the IUCN, from Near Threatened to Vulnerable, and in 2003, from Vulnerable to Endangered. While it appears that the *Loligo* fleet only causes negligible mortality, this situation requires continuous monitoring. There are currently no recommended mitigation measures in place in the Falkland Islands to reduce mortality caused by warp cable strikes and it is therefore not feasible to set bycatch objectives. (See Seabird Interaction Management Strategies, Sections 18.0-20.0, that outline both the development of mitigation measures and facilitate future development of bycatch objectives for each trawl fishery).

When there are mitigation measures in place to enable bycatch objectives to be set, they should apply to all seabird species, regardless of their conservation status. Reducing the bycatch potential of a vessel/fleet to catch seabirds can only accrue benefit to scheduled species. Due to the effort related management of all trawl fisheries and the format of data reported daily to FIFD, bycatch objectives should be expressed as a number of incidental seabird mortalities recorded per fishing day.

### 13.1 Stratification of Bycatch Data

Future bycatch estimates should be based on similar stratification principles to those detailed in FI NPOA-S and modified for the finfish fishery (*sensu* Sullivan and Reid 2003). The temporal and spatial components of which were modified to capture variation in both fishing effort and the various stages of the breeding cycle of black-browed albatross. The season and area of fishing have been identified as critical factors influencing seabird bycatch in many longline fisheries (e.g. Klaer and Polacheck 1998, Brothers et al. 1999b), including the Falkland Islands (Sullivan and Reid 2002) and the highly seasonal nature of existing bycatch data in the finfish fleet suggests that similar strata are appropriate (Sullivan and Reid 2003).

### 13.1.1 Temporal

As black-browed albatross comprise greater than 95% of recorded bycatch in the finfish trawler fleet and the stages of their breeding cycle largely determine their abundance and foraging behaviour in Falkland Islands waters, in 2002/03 the temporal component of bycatch extrapolations was based on a combination of their breeding cycle and the seasonality of fishing effort (Table 4).

### 13.1.2 Spatial

At this stage it is unclear whether there is an important spatial component that influences mortality within trawling fisheries. However, the mortality estimate for 2002/03 was based on dividing the Falkland Island waters into four approximately equal latitudinal and longitudinal zones (Table 4). However, this stratum should be flexible and it is recommended that annual extrapolations for each fishery reflect fishing effort, seabird abundance and mortality levels.

Table 4 Spatial and temporal stratification of trawling effort

Fishing Zones*		Breeding Cycle	
Central-east	>48°S, <51°S, <60°W	Prospecting	August 21-September 30
South-east	>51°S, <54°S <60°W	Laying	October
South-west	>51°S, <54°S >60°W	Eggs	November-December
Central-west	>48°S, <51°S >60°W	Young Chicks	January-February
		Old Chicks	March-April

\*The east/west edge of fishing zones is delimited by the outer edges of FICZ and FOCZ

## 14.0 REPORTING

It is recommended that an annual review of FI POA-Trawling becomes the mandate of the Fisheries Advisory Committee (FAC), with relevant invited guests. This will ensure that locally elected industry members and relevant government officials continue to have significant input into the monitoring and evolution of the plans.

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 bycatch 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 bycatch
- recommendations for the development and/or changes to mitigation measures

## **15.0 EDUCATION, TRAINING AND PUBLICITY**

As outlined in Section 10.0, the importance placed on reducing seabird mortality by crew-members will depend largely on the emphasis placed on the issue by government ordinances and regulations and subsequently by fishing company management. As such, the primary responsibility for the provision of education material and programmes to crew-members should be the responsibility of the management of fishing companies. In addition, information on bycatch 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.

However, currently there is no popular literature available on reducing trawler related seabird mortality. It is recommended that SAST and FIFD work together to develop an information sheet highlighting the various causes of mortality and mitigation options available to reduce mortality to an acceptable level. This document should be translated in Spanish, and multiple copies should be distributed to all vessels as part of their licensing package. In addition, the captains of all vessels should be provided with detailed information on local policies and ordinances that relate to the management of seabird bycatch.

## **16.0 DATA COLLECTION (AT-SEA OBSERVER PROGRAMMES)**

Currently there are two at-sea observer programmes operating on trawlers in the Falkland Islands, one employs seabird observers and the other is related specifically to fisheries stock assessment.

### *Falklands Conservation Seabirds at Sea Team (SAST)*

SAST employ three specifically tasked seabird observers, two of which work full time on seabird bycatch issues and a third who conducts at-sea surveys around South Georgia and spends a minor proportion of his time investigating seabird mortality onboard trawlers.

In 2001/02 SAST, observers worked on both longliners and trawlers, and in 2002-2004 they are tasked to investigate, quantify, and where necessary and feasible, develop mitigation measures to reduce seabird mortality caused by trawlers in Falkland Island waters.

### *Falkland Island Fisheries Department (FIFD) Fisheries Observers*

The FIFD also employ up to six fisheries observers that are rotated around the main commercial trawling and *Illex* jigging fleet. These observers are tasked with collecting biological fisheries data to meet stock assessment and general fisheries management objectives. As their core duties involve working in the ship's factory, seabird interaction and mortality data collected by Fisheries Observers have traditionally been of limited use in assessing the level of fisheries induced seabird mortality.

## **17.0 Seabird Interaction Management Strategies**

The five components of Seabird Interaction Management Strategies provide detailed recommendations to reduce the frequency of potentially fatal interactions between seabirds and fishing vessels, in this case specifically trawlers. Seabird Interaction Management Strategies also establish a cyclical framework of data collection and research to quantify and reduce seabird bycatch to specified annual bycatch objectives (Figure 4). The broad principles of these five stages are similar to those outlined in FI NPOA-S.

The following section details the five elements of Seabird Interaction Management Strategies and outlines the common objectives of each element for each of the three trawl fisheries:

### **17.1 Data Collection (Observer Coverage)**

#### *17.1.1 Objective*

At-sea observer programmes are regarded as the most effective means of gathering representative and independent data (FAO 1999b). As such, it is important that FI POA-Trawling facilitates the establishment, continuation or expansion of an appropriate observer programme(s) to investigate the nature of seabird interactions within the trawling fisheries. If incidental mortality is recorded, determine the spatial and temporal scale and cause(s) of the problem, initiate appropriate mitigation measures and develop a long-term monitoring programme.

### **17.2 Mitigation Measures**

#### *17.2.1 Objective*

Recommend a suite of mitigation measures that should be implemented to reduce incidental mortality to negligible levels. These may include mandatory (i.e. pursuant with licensing) and voluntary measures and recommended actions to attain best practice management.

### **17.3 Bycatch Objectives**

#### *17.3.1 Objective*

Based on Stages 1 and 2 and a thorough knowledge of the operational constraints of the fishery develop annual indicative seabird bycatch objectives.

### **17.4 Research and Development**

#### *17.4.1 Objective*

*Mitigation Measures* – investigate the development of mitigation measures and evaluate the effectiveness of new mitigation measures under a range of environmental and operational conditions.

*Other* – identify and prioritise knowledge gaps in seabird ecology that are intrinsically linked with seabird bycatch and would enhance future efforts to quantify and manage its impacts.

### **17.5 Education**

#### *17.5.1 Objective*

Ensure appropriate educational material on managing incidental mortality is available to management, office staff and crew-members of fishing companies.

## 18.0 FINFISH TRAWL FISHERY

### 18.1 Seabird Interaction Management Strategy

Given that the allocation of finfish trawling effort has been relatively consistent in the last five years (Part I, Figure 3) and trawling equipment and operational methods used are relatively uniform across the fleet, recommendations for the implementation of a specific suite of mitigation measures is both feasible and appropriate<sup>2</sup>.

The intention of Seabird Interaction Management Strategy-Finfish is to concurrently quantify the current level of bycatch associated with the fleet, and research and develop mitigation measures that will facilitate the future development of bycatch objectives that reduce mortality to negligible levels.

### 18.2 Data Collection (Observer Coverage)

#### 18.2.1 Strategy

The current level of seabird observer coverage is not determined by statistical parameters because there is insufficient data to calculate the level of coverage to achieve a bycatch estimate within a prescribed level of precision.

- |         |  |
|---------|--|
| 2003/04 | Maintain current level of specifically tasked seabird observers to continue to develop and trial appropriate mitigation measures under a range of environmental and operational conditions   |
| 2004/06 | The level of specifically tasked seabird observer coverage should be determined by the need to assess the effectiveness of prescribed mitigation measures and monitor subsequent bycatch levels.   |
| 2004/06 | FIFD fishery observers could have their duties changed to include observation of hauling operations to record seabird mortality. These data would greatly improve the precision of bycatch estimates and enable a more representative portion of the fleet to be assessed. |

### 18.3 Mitigation Measures

#### 18.3.1 Strategy

Under current fishing ordinances there are no mitigation measures imposed on the finfish trawl fleet to reduce seabird bycatch. Data collected by SAST observers in 2001-2004 suggests that birds being dragged underwater by the warp cables as they scavenge discards at the stern of the vessel cause >95% of finfish trawler mortality. Reducing contacts between the warp cable and seabirds to negligible levels during trawling operations would therefore reduce mortality. There are two primary techniques applicable to reduce such contacts, one short-term and one long-term.

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<sup>2</sup> In the event that pelagic trawling commences in Falkland Island waters (above the current level represented by surimi vessels, that do not produce significant levels of factory discharge, see Section 5.0), every effort should be made to place a seabird observer onboard at the first opportunity and the FAC should appoint an appropriately qualified person to add a section to this document to address the issue in detail.



*Bird scarer (Short-term option )*

A collaborative project between SAST and FIFD has resulted in significant steps toward developing a bird-scaring device to prevent contacts between birds and warp cables at the stern of the vessel. Once an operationally safe and effective bird-scarer is identified it is intended to make the deployment of the device mandatory under licensing conditions for all finfish trawlers. Such a device will act as an interim measure until a longer-term solution is implemented. The development of effective bird scaring devices has the advantage of being easily and cost effectively transferred to other fisheries that may have a similar bycatch problem.

One such device developed in New Zealand is the 'Brady Baffler', which was designed to prevent birds that are scavenging for factory discharge from congregating at the stern of trawlers in the region where the warp cables enter the water. (see Section 3.2.1 for description).

SAST recently secured funds to conduct comparative trials to test the effectiveness of a range of emerging bird scaring devices in Falkland Island waters. These trials were conducted from August-November 2003, which is the time of year when bird densities, discharge levels and mortality levels are highest. Further trials are planned for February-May 2004.

If, and when mitigation measures to reduce seabird mortality are promulgated in fishing licensing agreements the issue of monitoring compliance needs to be addressed.

*Long-term solution (Discharge management)*

To reduce finfish trawler related bycatch for the long-term, it is essential to manage the discharge of factory waste (e.g. visceral matter, fish parts) and discard species. To determine the most cost effective and efficient manner in which to achieve this, Falklands Conservation and FIFD have secured funds to employ a Discharge Management Officer (Finfish). This position will be undertaken from September-May 2004 and the final recommendations will be instrumental in providing guidance for the future onboard discharge management for the finfish fleet, and subsequent reduction of seabird mortality to a negligible level.

In general, the investigation and implementation of mitigation measures should be considered as a two-staged process. Initially, FI POA (Trawling) aims to instigate the steps required to investigate the effectiveness of a range of emerging bird-scaring technologies, identify the most effective and appropriate for the Falkland Island fleet, and then monitor their effectiveness over a minimum of a 12-month period. The subsequent mortality estimate for this 12-month period should then be included in an annual report and presented to the FAC, and consideration given to implementing the findings of the Discharge Management Officer, either in combination, or isolation, of the recommended bird-scaring device.

## 18.4 Bycatch Objectives

### 18.4.1 Strategy

In the absence of mitigation measures it is currently not possible to set bycatch objectives. In 2003/04, SAST will concentrate on developing and testing a range of bird-scaring mitigation measures, in order to have recommendations in place for the second season of 2004.

By the end of 2004/05 an estimate of annual mortality, with bird-scaring mitigation measures in place, should enable specific bycatch objectives to be incorporated into Seabird Interaction Management Strategy-Finfish for 2005/06.

## 18.5 Research and development

### 18.5.1 Strategy

#### *Mitigation Measures*

To reduce contacts between warp cables and seabirds whilst scavenging discards at the stern of the vessel, the following steps should be taken:

- By mid 2004 the Discharge Management Officer (Finfish) will have produced a comprehensive report that recommends the most effective means for the onboard management of discards, including the feasibility (economic and operational) of necessary structural/technical alterations.
- If after a review of annual mortality with bird-scaring mitigation measures in place, discharge management measures are recommended, vessel management authorities should be given a realistic but stringent time frame to make any structural and or operational alterations necessary to comply with any subsequent discharge management regulations imposed by FIFD.
- SAST secured funds to conduct experimental trials in the spring of 2003 to test the comparative effectiveness of the locally developed bird-scarer and the 'Brady Baffler' under Falkland Island conditions (e.g. albatross density, sea conditions, discharge level). A report on these trials will be circulated in March 2004.

#### *Other*

- Based on the level of southern giant petrel (*Macronectes giganteus*) mortality recorded in the finfish fishery in 2002/03 (SAST *unpubl. data*), funds should be acquired for a comprehensive census of their breeding populations in the Falkland Islands to be conducted by the end 2004/05.

## 18.6 Education

### 18.6.1 Strategy

- Convert the FI POA-Trawling into a practical set of procedures for use aboard trawlers.
- SAST and FIFD should collaborate to produce an information sheet (in English and Spanish) on reducing trawler related seabird mortality.
- The profile of trawler related seabird bycatch should be raised in both the fishing industry and community in general.

## 19.0 LOLIGO TRAWL FISHERY

Current evidence suggests that due to the limited discharge provide by *Loligo* vessels (compared to finfish trawlers) the fleet does not have a serious seabird mortality problem. Although recent mortalities recorded by a FIFD observer emphasise the need for continued monitoring<sup>3</sup>.

### 19.1 Seabird Interaction Management Strategy

The intention of Seabird Interaction Management Strategy-*Loligo* is to concurrently quantify the current level of bycatch associated with the fleet, and if required, research and develop mitigation measures and set bycatch objectives that reduce mortality to negligible levels.

### 19.2 Data Collection (Observer Coverage)

#### 19.2.1 Strategy

- Continue current level of specifically tasked observer coverage (one trip per year) to allow both the detection and estimation of seabird bycatch, if it occurs.
- FIFD fishery observers could have their duties changed to include observation of hauling operations to record seabird mortality. These data would greatly improve the precision of bycatch estimates and enable a more representative portion of the fleet to be assessed.
- If seabird mortality for the fleet within either season is estimated to be greater than 20 birds, the level of observer coverage should be increased to an appropriate level to calculate an estimate of seabird mortality.

### 19.3 Mitigation Measures

#### 19.3.1 Strategy

Currently, no mitigation measures are prescribed. However, further data is required to ensure the fleet does not cause significant bycatch.

### 19.4 Bycatch Objectives

#### 19.4.1 Strategy

Further data is required to ensure the fishery does not pose a significant threat to the long-term sustainability of seabird populations. Until these data are available the situation will be monitored by specifically tasked seabird observers. If significant bycatch is recorded specific bycatch objectives should be incorporated into the Seabird Interaction Management Strategy-*Loligo*.

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<sup>3</sup> Three mortalities were recorded by a FIFD observer onboard a *Loligo* vessel in February/March 2003 (A. Stocks *pers. comm.*).

## **19.5 Research and development**

### *19.5.1 Strategy*

- To further reduce the potential for seabird mortality consider the feasibility of implementing recommendations that arise from the Discharge Management Officer (Finfish).

## **19.6 Education**

### *19.6.1 Strategy*

- Convert the FI POA-Trawling into a practical set of procedures for use aboard trawlers.
- SAST and FIFD should collaborate to produce an information sheet (in English and Spanish) on reducing trawler related seabird mortality.

## **20.0 RAY AND SKATE TRAWL FISHERY**

There are currently no data available to determine if the ray and skate fleet causes significant seabird mortality.

### **20.1 Seabird Interaction Management Strategy**

The intention of Seabird Interaction Management Strategy-Ray and Skate is to achieve a level of observer coverage that will enable investigations into bycatch associated with the fleet, and as a precautionary measure, mitigation measures adopted by the finfish fleet should also be applied to the ray and skate fleet.

### **20.2 Data Collection (Observer Coverage)**

#### *20.2.1 Strategy*

- 2003/04            Specifically tasked seabird observers should conduct a minimum of one cruise to investigate seabird interactions.
- 2004/06            The level of specifically tasked seabird observer coverage should be determined by the need to assess the effectiveness of prescribed mitigation measures and monitor subsequent bycatch levels.
- 2004/06            FIFD fishery observers could have their duties changed to include observation of hauling operations to record seabird mortality. These data would greatly improve the precision of bycatch estimates and enable a more representative portion of the fleet to be assessed.

### **20.3 Mitigation Measures**

#### *20.3.1 Strategy*

Given that significant levels of factory discharge is produced by ray and skate trawlers (FIFD observer reports), as a precautionary measure any bird-scaring and/or discharge management mitigation measures implemented for the finfish fleet should also be considered for the ray/skate fleet.

## **20.4 Bycatch Objectives**

### *20.4.1 Strategy*

In the absence of mitigation measures it is currently not possible to set bycatch objectives. In 2003/04, SAST will concentrate on developing and testing a range of bird-scaring mitigation measures, in order to have recommendations in place for the second season of 2004.

By the end of 2004/05 an estimate of annual mortality, with bird-scaring mitigation measures in place, should enable specific bycatch objectives to be incorporated into Seabird Interaction Management Strategy-Ray and Skate for 2005/06.

## **20.5 Research and development**

### *20.5.1 Strategy*

- To further reduce the potential for seabird mortality investigate the feasibility of implementing recommendations that arise from the Discharge Management Officer (Finfish).

## **20.6 Education**

### *20.6.1 Strategy*

- Convert the FI POA-Trawling into a practical set of procedures for use aboard trawlers.
- SAST and FIFD should collaborate to produce an information sheet (in English and Spanish) on reducing trawler related seabird mortality.
- The profile of trawler related seabird bycatch should be raised in both the fishing industry and community in general.

## **21.0 INTERNATIONAL FISHING**

As fishing operations vary greatly depending on the nature of the target species and the vessel, the most appropriate and effective mitigation measures to reduce seabird mortality also vary. It is therefore not possible to recommend a uniform suite of mitigation measures for Falkland Islands registered trawlers operating outside of Falkland Islands.

### **21.1 Recommendations**

Falkland Island registered trawlers operating in waters where an international treaty is in place to which the Falkland Islands is a signatory should observe all ordinances and regulations therein.

Falkland Island finfish trawlers operating outside Falkland Islands waters where no management guidelines are in place to reduce seabird mortality, or where guidelines are less stringent than those utilised in Falkland Islands waters should utilise all technical mitigation measures outlined in FI POA-Trawling.

Falkland registered trawlers operating outside Falkland Islands waters should adopt fishery specific best practice methods to reduce seabird mortality, and where possible, adopt mitigation measures outlined in the FI POA-Trawling.

## **22.0 REVIEW PROCESS**

The Fisheries Advisory Committee (FAC) should monitor the success of the plan in regard to the implementation of recommendations and the success in reducing seabird bycatch to meet the bycatch reduction goals. Detail of the annual review process is contained in Section 14.0.

In addition, as required by IPOA-S, FI POA-trawling should be reviewed at four-yearly intervals after its implementation. The FAC should commission an appropriate person(s) to conduct the four-yearly review, which should include, but not be limited to, a review of:

- the scope of the plan
- the purpose of the plan
- the legislative framework
- status of ACAP and other international obligations and their relationship with FI POA-Trawling
- an audit of annual seabird bycatch objectives and an assessment of appropriate new objectives
- a review the conservation status of seabird species potentially impacted by Falkland Island trawler

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## APPENDIX I

### (Abstracts from) FAO Code of Conduct for Responsible Fisheries (FAO 1995)

#### Article 6 General Principles

6.5 States and subregional and regional fisheries management organizations should apply a precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment, taking account of the best scientific evidence available. The absence of adequate scientific information should not be used as a reason for postponing or failing to take measures to conserve target species, associated or dependent species and non-target species and their environment.

6.6 Selective and environmentally safe fishing gear and practices should be further developed and applied, to the extent practicable, in order to maintain biodiversity and to conserve the population structure and aquatic ecosystems and protect fish quality. Where proper selective and environmentally safe fishing gear and practices exist, they should be recognized and accorded a priority in establishing conservation and management measures for fisheries. States and users of aquatic ecosystems should minimize waste, catch of non-target species, both fish and non-fish species, and impacts on associated or dependent species.

#### Article 7 Fisheries Management

##### *7.2 Management Objectives*

7.2.3 States should assess the impacts of environmental factors on target stocks and species belonging to the same ecosystem or associated with or dependent upon the target stocks, and assess the relationship among the populations in the ecosystem.

##### *7.5 Precautionary approach*

7.5.1 States should apply the precautionary approach widely to conservation, management and exploitation of living aquatic resources in order to protect them and preserve the aquatic environment. The absence of adequate scientific information should not be used as a reason for postponing or failing to take conservation and management measures.

##### *7.6 Management Measures*

7.6.9 States should take appropriate measures to minimize waste, discards, catch by lost or abandoned gear, catch of non-target species, both fish and non-fish species, and negative impacts on associated or dependent species, in particular endangered species. Where appropriate, such measures may include technical measures related to fish size, mesh size or gear, discards, closed seasons and areas and zones reserved for selected fisheries, particularly artisanal fisheries. Such measures should be applied, where appropriate, to protect juveniles and spawners. States and subregional or regional fisheries management organizations and arrangements should promote, to the extent practicable, the development and use of selective, environmentally safe and cost effective gear and techniques.

## **Article 8 Fishing Operations**

### *8.5 Fishing gear selectivity*

8.5.1 States should require that fishing gear, methods and practices, to the extent practicable, are sufficiently selective so as to minimize waste, discards, catch of non-target species, both fish and non-fish species, and impacts on associated or dependent species and that the intent of related regulations is not circumvented by technical devices. In this regard, fishers should cooperate in the development of selective fishing gear and methods. States should ensure that information on new developments and requirements is made available to all fishers.