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Executive Summary
The National Plan of Action for seabirds provides methods and actions that should prevent and reduce the capture of seabirds in Angolan fisheries. The Benguela Upwelling System is one of the world’s most productive systems, attracting millions of top predators such as seabirds. Of the migrant pelagic seabird species occurring in the Benguela region, five that are most susceptible to the impacts of fishing operations are the Black-browed albatross (*Thalassarche melanophris*), Shy albatross (*T. cauta*), Atlantic Yellow-nosed albatross (*T. chlororhynchus*) and Indian yellow-nosed albatross (*T. carteri*) and the White-chinned petrel (*Procellaria aequinoctialis*). Southern Angolan waters are also a key area for wintering Cape gannet (*Morus capensis*), particularly for young birds. It is estimated that approximately 250 birds may be killed per year by the pelagic longline fishery operating in Angola. As currently no mandatory mitigation measures to reduce the incidental bycatch of seabirds in the Angolan longline and trawl fisheries have been implemented, it is crucial that Angola join the global conservation effort to reduce the incidental bycatch of seabirds in fisheries operating in its’ national waters.

To this end, this NPOA recommends the introduction of precautionary mitigation measures as a matter of urgency:
1. The mandatory use of tori lines by trawl and pelagic longline fishing vessels
2. Line-weighting to increase the sinking time of baited hooks (pelagic longline)
3. Night setting (demersal longline)

This document has also identified the urgent need for the assessment of seabird bycatch in the pelagic longline and trawl fisheries, as well as research to test the efficiency of mitigation measures. In addition, key implementation challenges are identified. These include *inter alia*: i) ...

The document further provides some key recommendations:
1. The assessment of seabird bycatch in the pelagic longline and trawl fisheries;
2. Research to test the efficiency of mitigation measures;
3. To implement an independent observer programme;
4. For Angola to become a member of ACAP - Agreement for the Conservation of Albatrosses and Petrels.
### Glossary of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACAP</td>
<td>Agreement for the Conservation of Albatrosses and Petrels</td>
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<tr>
<td>CBD</td>
<td>Convention on Biological Diversity</td>
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<tr>
<td>CCAMLR</td>
<td>Commission for the Conservation of Marine Living Resources</td>
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<tr>
<td>CCSBT</td>
<td>Commission for the Conservation of Southern Bluefin Tuna</td>
</tr>
<tr>
<td>CMS</td>
<td>Convention for Migratory Species</td>
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<td>COFI</td>
<td>Committee on Fisheries</td>
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<td>FAO</td>
<td>Food and Agriculture Organisation</td>
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<tr>
<td>ICCAT</td>
<td>International Commission for the Conservation of Atlantic Tunas</td>
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<tr>
<td>SADC</td>
<td>Southern African Development Community</td>
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<td>SEAFO</td>
<td>South East Atlantic Fisheries Organisation</td>
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1. Introduction

Seabird bycatch in fisheries became a conservation issue some two decades ago (Favero and Seco Pon, 2014). Incidental mortality in longliners and trawlers was first reported in studies by Bartle (1991) and Brothers (1991) (as cited by Favero and Seco Pon, 2014). Although conservation efforts have primarily focused on longline fisheries, the incidence and scale of seabird bycatch in trawl fisheries has also become a major concern. In recent years, various countries around the world have adopted measures to combat the incidental capture of seabirds in longline fisheries where they occur. These efforts have sprung from a growing international concern over both the economic and ecological effects of the incidental capture of seabirds in both longline and trawl fisheries conducted in many areas of the globe.

It is generally considered that, in addition to the threat of diminished biodiversity, the incidental catch of seabirds may negatively impact on fishing efficiency and profitability for the fishing industry. It is also noted that the use of irresponsible fishing techniques may jeopardize the long-term sustainability of fisheries. In view of growing international pressure and aversion to controversial fishing practices some longline fisheries continue to operate under threat of loss of markets and accreditation, with some facing severe penalties, including closure, because of the incidental catch of endangered seabird species.

Several countries and international fisheries organizations have over the past decade responded to the need to adopt mitigation measures in order to reduce the incidental catch of seabirds in commercial longline fisheries. The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) adopted mitigation measures in 1992 for its 23 member states to reduce the incidental catch of seabirds. Australia, Japan and New Zealand were the first countries to have studied and embarked upon seabird bycatch reduction programs since 1994. These countries spearheaded an initiative under the auspices of the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) that led to the adoption in 1995 of a recommendation that outlines, amongst others, a policy for mitigating the incidental mortality of seabirds by longline fishing. All member states have since made bird scaring lines mandatory in their fisheries. Several other countries have followed suit and the United States of America has also adopted regulatory measures for its groundfish longline fishery and halibut fishery in 1997 and 1998 respectively.

Against the background of an international awareness of the potential negative impacts that the incidental capture of seabirds may have on seabird populations, the 22nd Session of the Committee on Fisheries (COFI) of the Food and Agriculture Organization of the United Nations (FAO) in March 1997 considered a proposal to develop Guidelines leading to a Plan of Action aiming at the reduction of incidental catch of seabirds. The International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA-Seabirds) has been developed under the auspices of the FAO through a series of meetings of notably COFI and the Seabird Technical Working Group in 1998. The IPOA-Seabirds was endorsed by the 23rd Session of COFI (February 1999), commended by an FAO Fisheries Ministerial (March 1999) and endorsed first by the FAO Council (June 1999) and then by the FAO Conference (November 1999).

The IPOA-Seabirds is meant to provide broad guidelines to states for the preparation of their National Plan of Action for reducing the incidental catch of seabirds in longline fisheries (NPOA-Seabirds) that is defined as “a plan that a State designs, implements and monitors to reduce the incidental catch of seabirds in longline fisheries”. States are encouraged to assess voluntarily the extent of seabird bycatch in their
fisheries and to develop national plans of action to reduce seabird bycatch in fisheries where a bycatch problem has been identified.

The IPOA-Seabirds, a voluntary measure, applies both to states in whose waters commercial fisheries are being conducted, by their own or foreign vessels, and to those that conduct commercial fisheries on the high seas and in the exclusive economic zones (EEZs) of other States.

At the 27th Session of the FAO Committee on Fisheries in 2007, considerable attention was focused on the IPOA-Seabirds in relation to the ecosystem approach to fisheries. Specifically, COFI;

- Reported that, best practice technical guidelines to support the elaboration of NPOA’s for seabirds should be developed through continuing joint work between FAO and relevant bodies and organizations or an expert consultation.
- Agreed that FAO should, in cooperation with relevant bodies, develop best practice guidelines to assist countries and RFMOs in implementation of the IPOA-Seabirds; and
- Agreed that the guidelines should be extended to other relevant fishing gears.

In response to the directions and recommendations from COFI, FAO held an Expert Consultation in September 2008, (Bergen, Norway) to develop guidelines to; (1) assist countries in preparing and implementing more effective NPOA-S, (2) provide Regional Fisheries Management Organisations (RFMOs) with guidance on implementing IPOA-Seabirds within a regional framework and (3) to address the incidental catch of seabirds in other relevant gears (e.g. trawl and gillnet). Following on from the 28th Session of COFI in 2009, FAO published the guidelines in the FAO Technical Guidelines for Responsible Fisheries (FAO, 2009).

2. Purpose
The FAO International Plan of Action for Reducing Incidental Catch of Seabirds (FAO, 1999) encourages countries to produce their own National Plans of Action (NPOA-Seabirds), which at the national level have the mandate to recommend the adoption of mitigation measures (Hagen and Wanless, 2014). The Benguela system (South Africa, Namibia and Angola) has been identified as one of the major regions where seabirds and fisheries converge, and priority attention to conservation efforts is needed (Lewison et al., 2014 in Favero and Seco Pon, 2014). The purpose of the Angolan NPOA-Seabirds is to provide a national framework and action plan for the reduction of seabird bycatch in longline and trawl fisheries leading to a reduction of negative impacts of longline and trawl operations on seabird populations to a biologically insignificant level. Hence, this NPOA – elaborated upon within the context of the FAO’s IPOA-Seabirds, has been prepared to reflect the recently adopted FAO Best Practice Technical Guidelines (BPTG) to reduce incidental catch of seabirds in capture fisheries – and as such sets out procedures and practices to be followed in implementing the following key elements:
- A reduction in seabird bycatch in longline and trawl fisheries (BPTG 2);
- Assessment of seabird bycatch (BPTG 3);
- Prescription and evaluation of mitigation measures (BPTG 4);
Angola’s National Plan of Action for Reducing Incidental Catch of Seabirds in Longline and Trawl Fisheries

- Research, demonstration and development of mitigation measures (BPTG 5);
- Education, training and dissemination of information to interested and affected parties (BPTG 6);
- Observer coverage and the role of Fisheries Observer Agency (BPTG 7);
- Catch reduction objectives (BPTG 8);
- Ongoing monitoring and evaluation of seabird mortalities (BPTG 9);
- Reporting on the implementation of NPOA-Seabirds (BPTG 10);

The numbers in parentheses cross-references the relevant element of the Best Practice Technical Guidelines. See Figure 1 for a schematic outline of the decision-making process and framework for IPOA-Seabirds.

Figure 1: Framework for IPOA/NPOA – Seabirds and regional plans
3. Background

3.1. International obligations and responsibilities

The management objectives and priorities of Angola are influenced by a number of international policy obligations. Numerous memberships, agreements and policies which Angola are party to, are relevant to the seabird bycatch issue.

The International Convention for The Conservation Of Atlantic Tunas (ICCAT), ratified by Angola 29 July 1976, manages tuna and billfish fisheries in the Atlantic and Mediterranean. In 2002, ICCAT adopted a resolution on reducing incidental mortality of seabirds, which encourages ICCAT Members to collect data on seabird interactions and urges members to implement FAO’s IPOA–Seabirds. ICCAT also encourages Members to establish onboard observer programmes. Data collection on seabird bycatch is voluntary and not standardized, however, the ICCAT Sub-Committee on Ecosystems called for a review of ICCAT’s data collection guidelines with respect to incidentally caught species, including seabirds. In 2012, a Bycatch Coordinator was hired to harmonise and analyse fishery datasets related to bycatch species of tuna fisheries in the ICCAT area. The Bycatch Coordinator is also in charge of updating and maintaining the ICCAT bycatch meta-database.

The 1982 United Nations Convention on The Law of The Sea (UNCLOS) was ratified by Angola on 5 December 1990. UNCLOS is the principal global legal instrument governing the management of our oceans. With 150 ratifications (www.un.org) this agreement has been widely accepted as customary international law. Although UNCLOS does not explicitly refer to an ecosystem approach to fisheries in its text, it does require states to consider the effect of fishing activities on “species associated with or dependent upon harvested species” with a view to maintaining or restoring population of such associated or dependent species above levels at which reproduction may become seriously threatened” (Article 61, paragraph 4).

The Convention on Biological Diversity (CBD), ratified by Angola on 1 April 1998, was developed by the Ad Hoc Working Group of Experts on Biological Diversity (convened by the United Nations Environment Programme-UNEP) in response to the threat to species and ecosystems by human activities. The text of the Convention was adopted on 22 May 1992 at the Nairobi Conference for the Adoption of the Agreed Text of the Convention on Biological Diversity. Article 6 of the Convention on Biological Diversity, signed on 5 June 1992 in the city of Rio de Janeiro-Brazil, establishes that the signatory countries of the Convention shall develop National Biodiversity Strategies and Action Plans (NBSAPs) for the conservation and sustainable use of biodiversity. NBSAPs are the principal instruments for implementing the Convention at the national level and the Convention requires countries to ensure that this strategy is mainstreamed into the planning and activities of all those sectors whose activities can have an impact (positive and negative) on biodiversity. Although not specifically mentioning seabirds, it does specify obligations by contracting parties regarding the creation of protected areas and maintaining legislation to protect threatened species. In addition, conducting studies on the impact (incidental bycatch of seabirds) of fishing activities practiced in the coastal waters of Angola, and the identification of new sustainable fishing practices in order to avoid incidental catches, formed part of Angolas’ National Strategy and Plan of Action for Biodiversity (2007-2012). In their First National Report to the Convention of the Conference on Biological Diversity, Angola identified a number of seabirds at risk and requiring conservation efforts.
The Protocol on Fisheries to The Treaty Of The Southern African Development Community (SADC) was Ratified by Angola on 1 April 2003. This Protocol emphasizes the responsibilities of Member States, international relations as well as the effective management of shared resources. In signing this Protocol, the Member States agree to amongst other things, take adequate measures to protect the aquatic environment, endangered living aquatic species and their habitats. This includes compiling a list of endangered species; introducing measures to progressively replace fishing gear and other technologies which are hazardous to the species; and to promote broad awareness by all stakeholders of the need for protection of the species and their habitats.

The Convention on The Conservation and Management of Fishery Resources In The South East Atlantic Ocean (SEAFO) was ratified by Angola on 7 March 2006. The objective of the Convention is to ensure the long-term conservation and sustainable use of the fishery resources in the Convention Area (the Southeast Atlantic high seas area) through the effective implementation of the Convention. In 2006, SEAFO adopted the legally-binding Conservation Measure 05/06 on Reducing Incidental Bycatch of Seabirds in the SEAFO Convention Area. This Conservation Measure has been repealed and replaced with Conservation Measure 15/09 (2009), which states that “Contracting Parties shall collect and provide all available information to the Secretariat on interactions with seabirds, including incidental catches by fishing vessels, fishing for species covered by the SEAFO Convention, flagged to these Contracting Parties. 2. Each Contracting Party shall seek to achieve reductions in levels of seabird by-catch across all fishing areas, seasons, and fisheries through the use of effective mitigation measures.” This convention makes mandatory the use of birdsScaring lines by all longline vessels fishing south of the parallel of latitude 30 degrees South, and vessels using trawl gear.

The Convention on The Conservation of Migratory Species of Wild Animals (CMS) was entered into force in Angola on 1 Dec 2006. The aim of this treaty is to conserve migratory species throughout their range. A number of resolutions on bycatch have been adopted (e.g. Resolution 9.18 adopted in 2008 calls on Parties to compile information to assess the impact of bycatch on migratory species and take action regarding fishing activities within their control; and Resolution 8.14 which calls on Parties to implement the FAO IPOA–Seabird). The Agreement on the Conservation of Albatrosses and Petrels is a daughter Agreement to CMS and provides a framework to conserve Southern Hemisphere albatrosses and petrels. Angola has signed this agreement but it has not yet been ratified. In the Report of the Eight Meeting of the Advisory Committee 2014, it was noted that ACAP has identified Angola as one of the priority countries regarding domestic fisheries and seabird bycatch.

The Revised African Convention on The Conservation of Nature and Natural Resources was ratified by Angola on 28 March 2014. Article X of the Convention compels parties to identify and eliminate factors that are causing the depletion of species that are threatened or may become so. More specifically: “1. The Parties undertake to identify the factors that are causing the depletion of animal and plant species which are threatened or which may become so, with a view to their elimination, and to accord a special protection to such species, whether terrestrial, freshwater or marine, ... and 2. The Parties shall adopt legislation on the protection of species referred to in paragraph 1 above, taking into particular account the need to develop or maintain throughout the African continent concerted protection measures for such species...”.

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9
Angola’s membership of the United Nations Food and Agriculture Organization makes it party to the FAO Code of Conduct for Responsible Fisheries, adopted by the 28th Session of the FAO Conference in October 1995. The Code, accepted on a voluntary basis, sets forth principles and standards of behavior for responsible management practices within the resource environment. Particularly relevant to the issue of seabirds is the general principle outlined in Article 6.6 stating that fishing gear should be developed and applied “... in order to maintain biodiversity and to conserve the population structure and aquatic ecosystems...”. In the same article it is further expounded that “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”. These principles contained in the FAO Code is in line with Angolan resource management and conservation objectives and forms the basis of our endeavour to manage our marine resources in an efficient and responsible way.

3.2. Institutional and legal framework

Institutional framework

The Angolan Ministry of Fisheries was established in March 2010, and comprises of:

- The National Directorates: National Directorate of Fisheries and Protection of Fishing Resources (DPRP) and Aquaculture (DNA) and National Directorate of Infrastructure and Fisheries Industry (DNIIP);
- Public Fisheries Institutes: Institute for Fisheries Research, Institute for Development of Artisanal Fisheries, and Institute for the Support of Fisheries Industry;
- The Inspection and Surveillance Service.
- Fisheries Development Fund

Legal framework

The legal basis of the Angolan fisheries is given by the Law of Aquatic Biological Resources (New Law of Fisheries) N.6-A/04 of 8 October 2004. Although no specific reference is made to the incidental catch of seabirds, this Law aims to ensure the use of selective fishing methods and gears to reduce incidental catches, ensure the conservation of threatened/endangered species and cooperate with other states in monitoring of shared resources and migratory species. This Law also provides for fisheries management based on:

- TAC/quotas
- Access control (nationality)
- Limited entry regulation (licensing/effort allocation)
- Vessel type and size
- Gear regulations: type, dimensions, mesh size
- Closed seasons
- Area restrictions

To keep them effective, these management measures are revised periodically based on stock assessment results and estimates of the economic performance of the fleet. Monitoring is aided by (1) the mandatory carrying of a GPS by all vessels, including artisanal fishing vessels, (2) all industrial and semi-Industrial vessels >15m, irrespective of their fishing gear, must install on-board Vessel Monitoring Systems (VMS), and (3) all fishing vessels shall have on board Observers, in accordance with the terms defined.
3.3. The Bycatch Problem

Longline fishing presents a threat to seabirds during both setting and hauling operations, when numerous baited hooks are within reach of seabirds, either above or a few meters below the surface. Seabirds will seize baited hooks and can then become hooked and dragged into deeper water as the lines sink, drowning (setting); or injured or killed while lines are being brought in (hauling). Prior to intervention measures, significant seabird mortalities were observed in the South African pelagic longline and South African and Namibian demersal longline fisheries. Seabirds most commonly caught included petrels (White-chinned Petrels) and albatrosses (Shy-type, Black-browed and Indian Yellow-nosed albatrosses) (Peterson et al., 2008a). Gannets and White-chinned Petrels are also killed (illegally) for consumption by artisanal longline fisheries in southern Angola (Omardien, 2016). These fishers set floating lines with approximately 5-7 hooks, specifically targeting seabirds (Petersen et al. 2008b).

Trawl operations also present a significant threat to seabirds. During observations of South African demersal hake trawl operations, it was noted that seabirds were killed after becoming entangled in trawl nets, with these birds being drowned either during setting, when they were enmeshed in the trawl wings, or during hauling, when diving or swimming into the net entrance or trapped while standing on the net as the mesh diameter closes (Petersen et al. 2008a). Collisions with trawl warps were also observed in this study, the most serious of which saw seabirds being dragged underwater when their wings became entangled after collision with the warps, being pulled under by the force of the water passing over the warp (Petersen et al. 2008a). Seabirds reported to have been killed during trawl operations included Cape gannets, White-chinned Petrels and Shy and Black-browed albatrosses (Petersen et al., 2008a).

Although very little information on seabird bycatch related to purse-seine fishing exists, there is evidence to suggest that the incidental catch of seabirds during such fishery operations is a potential issue. For example: large numbers of flesh-footed shearwaters have been caught in a Western Australia purse seine fishery targeting pilchards (see Baker and Hamilton, 2016). These authors report that Flesh-footed shearwater bycatch occurs in a particular area during a period of the year when fishing effort is in close proximity to breeding grounds and when birds are provisioning chicks, indicating that in certain situations and time periods, seabirds will interact freely with purse-seine gear.

Gillnet bycatch is a substantial threat to seabird populations worldwide, with a recent literature review by Žydelis et al. (2013) suggesting that at least 400,000 birds die in gillnets each year. No published information on gillnet bycatch rates in the Southeast Atlantic was available, except for some seabird mortalities recorded in South Africa (Hagen and Wanless, 2014). Seabirds most at risk from gillnets are those with the ability to make deep dives from the sea surface (“pursuit divers”), such as penguins, shearwaters and cormorants (Hagen and Wanless, 2014). Žydelis et al. (2013) noted that the Benguela Current is home to several locally abundant diving seabird populations, including African penguin (Spheniscus demersus), Cape gannet (Morus capensis), shearwaters and petrels, and there is a strong likelihood that diving seabirds are captured in gillnets throughout the Benguela region.

Of the migrant pelagic seabird species occurring in the Benguela region, five that are most susceptible to the impacts of fishing operations are the Black-browed albatross (Thalassarche melanophris), Shy albatross (T. cauta), Atlantic Yellow-nosed albatross (T. chlororhynchos) and Indian yellow-nosed albatross (T. carteri) and the White-chinned petrel (Procellaria aequinoctialis) (Petersen et al. 2008b). These birds’
often have enormous ranges, traveling vast distances to forage, putting them at risk from a wide range of fisheries (David et al., 2003). With the Benguela Upwelling System being one of the world’s most productive systems, it attracts millions of top predators such as seabirds, which come to feed in its nutrient rich waters (see Petersen et al., 2008a). Effective control and implementation of mitigation measures is therefore a global rather than a local problem (David et al., 2003); and it is crucial that Angola (together with Namibia and South Africa), join the global conservation effort to reduce the incidental bycatch of seabirds in fisheries operating in its national waters.

Of the Benguela endemics, the Cape gannet (*Morus capensis*) is the most susceptible to fisheries impacts (Petersen et al., 2008b). Fishery discards make up an important component of the Cape Gannet’s diet (especially in winter), making this species vulnerable to incidental mortality by fisheries (Berruti et al., 1993 in Peterson et al., 2008a). Surveys carried out in southern Angolan waters have shown that this region is a key area for wintering gannets and is particularly important for young birds (Dyer, 2005). Given the importance of southern Angola to young gannets, it is imperative that Angola work together with Namibia and South Africa in a joint conservation effort to reduce the targeted and incidental catch of this species. The conservation status of these and other seabirds species in the Benguela ecosystem is given in Annex 3.

### 3.3.1. Angolan longline fisheries

**Fishery characteristics**

There are three longline fisheries in Angola where seabird mortality is likely to occur. These are the coastal artisanal subsistence fishery targeting line fish such as grouper, a semi-industrial fishery also targeting linefish, and the industrial and semi-industrial longline fishery targeting tuna, swordfish and pelagic sharks. The longline tuna fishery fleet is comprised of midwater longliners with up to 40 crew operating drifting longlines. Wetfish vessels (ice boats) remain at sea for up to 7 days, and freezers vessels up to 3 months. In 2015, it was recommended that no more than 7 vessels operated demersal longlines and 100 vessels be licensed in the pelagic tuna fishery, although it is not clear the number of these vessels operating longlines versus purse-seines or poles and lines.

**Bycatch levels**

The accidental capture and mortality of seabirds during longline fishing operations are not recorded in these fisheries, neither by fishers or observers. However, if seabird catch rates are similar to those in Namibia (0.07 birds per 1000 hooks) then it is estimated that approximately 250 birds may be killed per year (Petersen et al., 2008b) by the pelagic longline fishery operating in Angola.

### 3.3.2. Angolan trawl fisheries

**Fishery characteristics**

Trawl gear is used in two major industrial fisheries in Angola targeting shrimp and demersal fish species. The shrimp industry is export-oriented and represents an important source of foreign exchange for Angola. The shrimp trawl fishery (beam trawlers) targets striped red shrimp, deep-water rose shrimp, Caramote prawn and Northern pink shrimp. In 2015, it was recommended that 25 vessels with a maximum output of 1200 HP be licensed. Demersal trawlers generally catch sea breams, groupers, snappers, croakers, hakes and horse mackerel (as bycatch). In 2015 it was recommended that no more than 40 vessels, with a maximum engine power of 1,500 HP, be licensed. Gear used is either bottom otter trawls
or bottom (stern) trawl with otter boards (vessels 20-90 m length, 80 mm cod end) with up to 60 crew onboard. Freezer vessels can remain at sea for over 40 days. The minimum mesh sizes allowed are: a) 50 mm for deep-water shrimp; b) 80 mm for demersal fish except the Cabo hake and c) 110mm for Cape hake. Mid-water trawling, targeting horse-mackerel, has been banned since 2004.

3.3.3. Angolan purse-seine fishery
Along with trawling, purse-seining is one of the most common methods used by the industrial fishing sector, and is used to target small pelagic shoaling fish: Round sardinella, Flat Sardinella, Sardine, Cunene horse mackerel, Cape horse mackerel and European anchovy. The fleet is made up of purpose-built industrial vessels carrying a crew of up to 60 men, undertaking daily trips or remaining at sea for over 40 days (freezer vessels). The minimum mesh size allowed is 25-30 mm (2015). In 2015, the licensing of 90 vessels was recommended: 84 vessels with a Gross Tonnage (GRT) of ≤250 tonnes and with a holding capacity ≤120 m$^3$; and six vessels with a GRT >250 tonnes with a holding capacity of 120 m$^3$.

3.3.4. Angolan subsistence and artisanal fisheries
Subsistence fishers in Angola are classified as those who fish for non-commercial purposes, including for family consumption, whilst artisanal fishers are classified as those who fish for commercial purposes and whose boats are 14 metres or less in length (Du Preez, 2009). Artisanal fishing vessels can be propelled by sails, paddles or engines, and fishers can use equipment ranging from hand lines to gill nets and entangling nets (Du Preez, 2009). There is a large marine artisanal fishing fleet in Angola. According to the FAO Country Profile for Angola, there were some 3000-5500 boats (most with engines) operating in this fishing sector in 2010, and total catches exceeded 102 000 tonnes. Subsistence and artisanal fishers use boat seines, handlines, gillnets, lift nets and entangling nets to target a number of species such as drums, croakers, groupers and pelagic shoaling fish (sardines). Floating lines are used to catch White-chinned petrels and Cape gannets for consumption. Fishers go out for 1-7 days, with up to 10 crew per vessel.

3.4. Mitigation measures
Currently no mandatory mitigation measures to reduce the incidental bycatch of seabirds in the Angolan longline, trawl, purse-seine or subsistence/artisanal fisheries have been implemented. Targeting of seabirds for consumption however is illegal.

3.4.1. Longline
Mitigation measures work by either keeping birds away from baited hooks (e.g. tori lines), reducing the time the hook is available to the birds (e.g. line weighting or line setting chutes), avoiding peak periods of bird foraging (e.g. night setting) or making vessels or bait less attractive to the birds. It is vital that these measures are simple, easy to implement and cost effective. A combination of weighted branch lines, bird scaring lines and night setting remains the best practice approach to mitigate seabird bycatch in longline fisheries (Klaer & Polacheck 1998; Brothers et al. 1999a, 2001; Sakai et al. 2001; Anderson and McArdle 2002; Baker & Wise 2005; Gilman et al. 2005; Hu et al. 2005; Melvin et al. 2013; 2014; Jiménez et al. 2009).

The white-chinned petrel (Procellaria aequinoctialis) is the seabird species most commonly killed by Southern Hemisphere longline fisheries. Recent research has provided insight into the diving ability of this species important for mitigating longline bycatch. This research revealed a maximum dive depth (16 m) was slightly deeper than the previous estimate (13 m), but varied considerably among individuals (range 2-16 m). Males dived deeper than females and birds feeding chicks dived deeper than incubating birds, but dive rate did not differ between the sexes. Time of day had no significant effect on dive depth or rate.
These findings will help to improve the design and performance of mitigation measures aimed at reducing seabird bycatch in longline fisheries, such as the calculation of minimum line sink rates and optimum aerial coverage of bird-scaring lines (Rollinson et al. 2014).

**Night setting**

Setting longlines at night is highly effective at reducing incidental mortality of seabirds because the majority of vulnerable seabirds are inactive at night. “Night” is defined as the time between the end of nautical twilight and before nautical dawn as set out in the Nautical Almanac tables for relevant latitude. However, night setting is not as effective for nocturnal foragers such white-chinned petrels which are very common in South African waters. Consequently, night setting should be used in combination with weighted branch lines and bird scaring lines (Klaer & Polacheck 1998; Brothers et al. 1999a; McNamara et al. 1999; Gilman et al. 2005; Baker & Wise 2005; Jiménez et al. 2009; Melvin et al. 2013; 2014). The effectiveness of night setting is reduced during bright moonlight and when using intense deck lights.

“A tori” or bird-scaring line

A tori or bird-scaring line (BSL) consists of a line with a number of streamers attached to it. This line is towed from the stern of the vessel while the baited fishing lines are being set. It runs from a high point at the stern to a device or mechanism that creates drag at its terminus. The streamers are designed to cover the point where the bait enters the water and distracts foraging birds from taking the baited hooks. If longline gear is not sufficiently weighted and remains on or close to the surface beyond the area protected by the tori line it will have a limited effect on reducing seabird mortality. Bird Scaring Lines should therefore be used in combination with weighted branch lines and night-setting (Uozumi & Takeuchi 1998; CCAMLR 2002; Minami & Kiyota 2004; Melvin 2003). This method has been demonstrated to reduce bycatch rates by up to 96% (Brothers et al. 1999a). However, the success depends on design and setting conditions as well as crew willingness and input.

BSLs should be made from the lightest practical strong fine line. Lines should be attached to the vessel with a barrel swivel to minimise rotation of the line from torque created as it is dragged behind the vessel. Long streamers should be attached with a swivel to prevent them from rolling up onto the BSL. Towed objects should be attached at the terminus of the BSL to increase drag. BSLs are at risk of tangling with float lines leading to lost BSLs, interruptions in vessel operations and in some cases lost fishing gear. Adding short streamers to the in-water portion of the line, can enhance drag while minimising tangles with float lines. Weak links (breakaways) should be incorporated into the in-water portion of the line for safety reasons and to minimize operational problems associated with lines becoming tangled.

Given operational differences in pelagic longline fisheries due to vessel size and gear type, specifications of BSLs have been divided into two vessel-size categories: those greater than 35 meters and those less than 35 meters in length.

**Bird Scaring Lines for vessels >35 m total length**

Simultaneous use of two BSLs, one on each side of the sinking longline, provides maximum protection from bird attacks under different wind conditions (Melvin et al. 2004; 2013; 2014; Sato et al. 2013). The setup for BSLs should be as follows:
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- BSLs should be deployed to maximise the aerial extent, which is a function of vessel speed, height of the attachment point to the vessel, drag, and weight of bird scaring line materials.
- To achieve a minimum recommended aerial extent of 100 m, BSLs should be attached to the vessel such that they are suspended from a point a minimum of 8 m above the water at the stern.
- BSLs should contain a mix of brightly coloured long and short streamers placed at intervals of no more than 5 m. Long streamers should be attached to the line with swivels to prevent streamers from wrapping around the line. All long streamers should reach the sea-surface in calm conditions.
- Baited hooks should be deployed within the area bounded by the two BSLs. If using bait-casting machines, they should be adjusted so as to land baited hooks within the area bounded by the BSLs.

If large vessels use only one BSL, it should be deployed windward of the sinking baits. If baited hooks are set outboard of the wake, the BSL attachment point to the vessel should be positioned several meters outboard of the side of the vessel that baits are deployed.

Bird Scaring Lines for vessels <35 m total length
Two designs have been shown to be effective:

1. A design with a mix of long and short streamers, that includes long streamers placed at 5 m intervals over the first 55 m of the BSL
2. A design that does not include long streamers. In this case, short streamers (no less than 1 m in length) should be placed at 1 m intervals along the length of the aerial extent.

In both cases, streamers should be brightly coloured. To achieve a minimum recommended aerial extent of 75 m, BSLs should be attached to the vessel such that they are suspended from a point a minimum of 7 m above the water at the stern.

A number of trials were conducted in South African waters and produced the following specifications as a guideline for a best-design. These specifications have been included in South African fishing permit regulations. A bird-scaring line should achieve 150 m aerial coverage. To achieve this it should be attached to the vessel at least 7 m above sea level, be at least 150 m long, have at least 28 paired streamers spaced 5 m apart (starting 10 m astern the vessel) and have sufficient drag (e.g. buoy, road cone or sea-anchor) (Figure 2). The bird-scaring line must be deployed on the windward side of the main line, unless two streamers are used, in which case they must be deployed on either side of the main line.
Figure 2: Bird-scaring line and longline sink rate specifications

The key to an effective bird-scaring line is maximising the portion of the line which is in the air. The best way to achieve this is to make the point of attachment on the vessel as high as possible. An outrigger pole, sometimes referred to as a tori pole, can be mounted to provide this height. Ideally an outrigger pole should be extended from the side of the vessel to keep the tori line away from fishing gear thereby reducing the chance of entanglement. The aerial coverage is also improved by attaching an item, e.g. a buoy, which creates drag to lift the line out of the water. Streamers can be made from plastic strapping or PVC tubing. They should be a bright colour, preferably red. The erratic movement of the streamers increases it efficacy. Attaching light sticks to streamers may increase the efficacy of the bird-scaring line when setting at night.

**Line weighting (and reducing setting speeds)**

Albatrosses are relatively shallow divers, 0.3-12.4 m (Prince et al. 1994) although some petrels can dive considerably deeper than this depth e.g. Sooty Shearwater *Puffinus griseus* can dive to a maximum depth of 67 m (Weimerskirch and Sagar 1996). By maximising the rate at which the longline sinks, you will minimise the time the hook is within the reach of the birds, and thus reduce the chance of birds being drowned.

Various “line weighting” regimes have been investigated and proposed for pelagic longlining (Brothers et al. 2001, Anderson and Mcardle 2002, Robertson et al. 2003, Moreno et al. 2006). Although the gear will be configured according to the particular fishery, a line sink rate of 0.3 s⁻¹ is recommended. This sink rate will allow the hooks to reach a depth of at least 10 m while under the aerial coverage of a well-constructed bird-scaring line (150 m).

Branch lines should be weighted to sink the baited hooks rapidly out of the diving range of feeding seabirds. Studies have demonstrated that branch line weighting where there is more mass closer to the hooks, sink most rapidly and consistently (Gianuca et al. 2013; Robertson et al. 2010; 2013), reduces seabird attacks on baits (Gianuca et al. 2013; Ochi et al. 2013) and seabird mortalities (Jiménez et al. 2013). Studies of a range of weighting regimes, including placing weights at the hook, have shown no negative effect on target catch rates (Jiménez et al. 2013; Robertson et al. 2013; Gianuca et al. 2013). Increased
weighting will shorten but not eliminate the distance behind the vessel in which birds can be caught. Line weighting has been shown to improve the effectiveness of other mitigation methods such as night setting and bird scaring lines, in reducing seabird bycatch (Brothers, 1991; Boggs, 2001; Sakai et al., 2001; Anderson & McArdle, 2002; Gilman et al., 2003, Hu et al., 2005; Melvin et al., 2013; 2014). Line weighting is integral to the fishing gear and, compared to bird scaring lines and night setting, has the advantage of being more consistently implemented, hence facilitating compliance and port monitoring.

Current recommended minimum standards for branch line weighting are as follows (ACAP, 2016a):
(a) 40 g or greater attached within 0.5 m of the hook; or
(b) 60 g or greater attached within 1 m of the hook; or
(c) 80 g or greater attached within 2 m of the hook.

**Lumo leads**
Lumo Leads provide a line-weighting technique for seabird bycatch mitigation that works without compromising fish catch, fishing operations efficiency or crew safety. Unlike conventional weighted swivels, Lumo Leads are attached to monofilament lines in such a way that they can slide up and down the line and simply slip off the line during a bite-off. Studies of lumo leads revealed no significant reduction in target fish catch for bluefin tunas, did not compromise crew safety, and did not seriously affect fishing operations. Lumo leads appear to be an effective seabird bycatch mitigation measure (Rollinson et al. 2016). Further trials conducted in 2015 in the Brazilian pelagic longline fishery to compare catch rates of seabirds, target fish species and sink rates using two different configurations of sliding weights (60 g Lumo Lead 1 m from the hook and 60 g Lumo Lead 3.5 m from the hook) and the traditional weighting system (60 g weighted swivel 3.5 m from the hook). All fishing took place at night, without bird-scaring lines. There was no difference in catch rates of target species among the three treatments. The sink rate of the 60 g Lumo Lead placed 1 m from the hook was faster than the other two treatments, and resulted in significantly lower seabird bycatch rates (0.11 birds/1000 hooks, as opposed to 0.33 and 0.85 birds/1000 hooks treatments with Lumo Leads 3.5 m from the hook, and weighted swivels 3.5 m from the hook, respectively) (ACAP 2016). The recommendation is 60 g lumo leads (or any other kind of sliding lead) be used one metre form the hook.

Preliminary research findings in the Uruguayan swordfish fishery demonstrated that a reduction in leader length from 4.5 m (75 g) to 1 m (65 g) reduced seabird mortality by about 50 per cent in the absence of other mitigation (night setting, bird-scaring lines). The authors noted that the faster sink rates of the proposed weighting regime safeguard against any non-compliance in the use of bird-scaring lines or night setting (ACAP, 2016a).

**Frozen versus thawed bait**
Thawed baits sink more rapidly than frozen baits. In experiments conducted on Japanese pelagic longliners, Brothers et al. (1999b) found that on average 1.1 birds per 1000 hooks were caught using frozen bait, compared to 0.6 birds per 1000 hooks using partly thawed and 0.3 birds per 1000 hooks using thawed bait demonstrating the effectiveness of this measure.

**Setting lines at night**
Albatrosses generally feed during the day, but lower numbers may forage at night. Therefore, by setting lines between dusk and dawn, the danger of catching these birds is greatly reduced (Harper, 1987).
However, the smaller petrels e.g. White-chinned Petrel, may feed at night and are therefore less protected (Harper, 1987). Although this measure is effective in reducing seabird bycatch especially the capture of albatrosses, in isolation it is unlikely to sufficiently reduce seabird bycatch. Seabirds will be especially vulnerable on clear, bright nights such as those during full moon periods.

*Gilman et al.,* (2005) showed a 97-100% reduction in the capture of Laysan *Phoebastria immutabilis* and Black-footed *Phoebastria nigripes* Albatrosses in the Hawaiian longline fishery and Klaer and Polacheck (1998) a 91% reduction in the capture of all seabird species in the Japanese pelagic longline fishery when setting took place at night as opposed to during the day. In a study conducted in South African waters, it was found that the pelagic longline fishery, which sets a high proportion of their sets during daylight, catch approximately 0.2 birds per 1000 hooks while the demersal longline fishery which sets their lines primarily at night only catch 0.04 birds per 1000 hooks. This difference can in part be accounted for by the difference in setting time (Petersen et al., 2006). There is further evidence from a pilot study conducted in Namibia which revealed higher catches of 0.3 birds per 1000 hooks between full and half moon compared to no birds caught during between quarter and new moon periods (Goren, 2007). Analysis of fisheries observer data and the use of generalised linear models indicate that the time of setting and moon phase were important indicators of sea bird mortality in South Africa and therefore by limiting fishing to night setting and/or outside of full moon periods seabird mortality could be substantially reduced (Petersen et al. 2008a) (Figure 3).

The tuna directed fishery is required to set their lines at night, but not the swordfish directed sector. This decision is based on the premise that Swordfish *Xiphias gladius* catches are highest at dusk. Evaluation of observer data (1998–2005) confirms that Swordfish catch rates are the highest when setting takes place at dusk (6.56/1000 hooks). There was no effect on catch rates of Swordfish or tuna over full moon. Limiting fishing effort during full moon could therefore be considered as an additional management option without a disproportionate effect on the fishery.

Figure 3: The effect of moon phase on seabird mortality, 1998–2005.

**Offal management**

Albatrosses and petrels are opportunistic scavengers and fishing vessels processing at sea and discarding offal provide a feeding opportunity for these birds (Ryan and Moloney, 1988). Therefore, by minimising
or eliminating discards seabirds will not be attracted to fishing vessels. Seabirds are most at risk of being caught during setting (Brothers et al. 1999a) therefore discarding should not take place during this time. If discarding is necessary during hauling, crew should be instructed to do so on the opposite side thereby reducing the risk of capture to the birds.

**Hook shielding devices**
Hook-shielding devices encase the point and barb of baited hooks to prevent seabird attacks during line setting until a prescribed depth is reached (a minimum of 10 m), or until after a minimum period of immersion has occurred (a minimum of 10 minutes) that ensures that baited hooks are released beyond the foraging depth of most seabirds.

1. ‘Hook Pod’ – 68 g minimum weight that is positioned at the hook, encapsulating the barb and point of the hook during setting, and remains attached until it reaches 10 m in depth, when the hook is released.
2. ‘Smart Tuna Hook’ – 40 g minimum weight that is positioned at the hook, encapsulating the barb and point of the hook during setting, and remains attached for a minimum period of 10 minutes after setting, when the hook is released.

**Smart hook**
This method uses a modified tuna longline hook which accepts a specially designed shield that disarms the hook once it has been baited, preventing ingestion and making it impossible for any seabird to be hooked. The shield is released within 15 minutes after the hook has been immersed in salt water, allowing fish to be caught after the baited hook has passed beyond the normal diving and feeding depths of most seabirds. After release from the hook the shield sinks to the seafloor where it corrodes within 12 months, leaving no pollution or toxic residue. The byproduct is iron oxide and carbon.

Experimental work was conducted on pelagic longline vessels targeting tuna and swordfish out of Cape Town, South Africa during the spring of 2014. Seabird bycatch was high and a total of 13 birds were caught across the three trips. Eleven of these birds were caught on the control treatments and 2 birds on the STH treatments. The use of the Smart Tuna Hook led to a reduction in the bycatch of seabirds of between 81.8% – 91.4%. Importantly, there was no detectable difference between setting methods in the catch rates of commercially valuable species, indicating no detectable detrimental effect on fish catch for any species. Given this fishery has a high seabird bycatch rate and a regulation in place where the capture of more than 25 birds by a vessel each season leads to a suspension of fishing activity for that vessel, the Smart Tuna Hook provides a significant deterrent to seabirds attacking baits, and offers a feasible option for pelagic fishers to significantly reduce the level of interactions with seabirds and hence remain active in the fishery.

Some initial concerns raised by stakeholders includes the issue of space to store the caps (which are not reusable) and the time needed to attach the cap to the hook. Therefore, this solution is likely to only work for some fisheries. No operational issues were however experienced when using the smart hooks in the South African fishery during this study. This is partly because the South African vessels set hooks every 12-15 seconds and use bins to house the branchlines, instead of coils and so can easily attached the cap to the hook before setting. They also only setting c. 1500 hooks per set and undertake trips of 2-3 weeks means that they have sufficient storage to take caps onboard. A further consideration would be to only...
use the caps when fishing in high seabird abundance/bycatch areas and/or the few days either side of full moon when high bycatch rates are observed.

Conclusion
There is no one magic solution, but rather a suite of measures that should be used in combination to mitigate seabird bycatch in pelagic longline fisheries. The choice may differ from fishery to fishery depending on gear configuration, preferred operation and species complexes involved.

Mitigation measures that are not recommended
ACAP considers that the following measures lack scientific substantiation as technologies or procedures for reducing the impact of pelagic longlines on seabirds:

- Line shooters: No experimental evidence of effectiveness in pelagic longline fisheries.
- Olfactory deterrents: No evidence of effectiveness in pelagic longline fisheries.
- Hook size and design: Changes to hook size and design may reduce the chance of seabird mortality in longline fisheries, but have not been adequately studied.
- Blue dyed bait: No experimental evidence of effectiveness in pelagic longline fisheries. Insufficiently researched.
- Bait thaw status: No evidence that the thaw status of baits has any effect on the sink rate of baited hooks set on weighted lines.

3.4.2. Demersal Trawl
The FAO Best Practice Guidelines for IPOA/NPOA-Seabirds have been amended to include trawl fisheries in addition to longline fisheries. ACAP has reviewed the scientific literature dealing with seabird bycatch mitigation in trawl fisheries (ACAP, 2016b). The mitigation measures presented below are taken directly from these recommendations, which address both cable-related mortality (including collisions with net-monitoring cables, warp cables and paravanes) and net-related mortality (which includes deaths caused by net entanglements) in trawl fisheries.

Offal and discards
In all cases, the presence of offal and discards is the most important factor attracting seabirds to the stern of trawl vessels, where they are at risk of cable and net interactions. Managing offal discharge and discards while fishing gear is deployed has been shown to reduce seabird attendance. The following management measures are recommended:

1. Avoid any discharge during shooting and hauling.
2. Where practicable, convert offal into fish meal and retain all waste material with any discharge restricted to liquid discharge / sump water to reduce the number of birds attracted to a minimum; and
3. Where meal production from offal and full retention are impracticable, batching waste (preferably for two hours or longer) has been shown to reduce seabird attendance at the stern of the vessel. Mincing of waste has also been shown to reduce the attendance of large albatross species.

Cable strikes
**Warp cables**

1. Deploy bird scaring lines while fishing to deter birds away from warp cables. BSL are recommended even when appropriate offal discharge and fish discard management practices are in place. It is recommended that for every meter of block height, 5 m of backbone be deployed and 1.2 kg of terminal object drag weight be used.

**Net monitoring cables**

Net monitoring cables should not be used. Where this is impracticable:

4. Deploy bird scaring lines specifically positioned to deter birds away from net monitoring cables while fishing; and

5. Install a snatch block at the stern of a vessel to draw the net monitoring cable close to the water to reduce its aerial extent.

**Net entanglement**

6. Clean nets after every shot to remove entangled fish (“stickers”) and benthic material to discourage bird attendance during gear shooting; and

7. Minimise the time the net is on the water surface during hauling through proper maintenance of winches and good deck practices. Net weighting on or near the cod end increases the angle of ascent of the net during hauling operations, and thus reduces the time the net is on the water's surface during both shooting and hauling operations.

Further measures include avoiding peak areas and periods of seabird foraging activity. It is important to note that there is no single solution to reduce or avoid incidental mortality of seabirds in trawl fisheries, and that the most effective approach is to use the measures listed above in combination. Net entanglements during the haul remain the most difficult interactions to mitigate.

Measure not recommended include:

1. Net jackets: Free-floating panels of net attached to the most dangerous mesh sizes.

4. **NPOA assessment**

The Angolan Ministry of Fisheries and the appropriate National Directorates and Public Fisheries Institutes, and in collaboration with a suitably qualified organisation if available capacity is lacking, will conduct national assessments of incidental seabird mortalities in longline and trawl fisheries within two years of the adoption of the NPOA-Seabirds. The purpose of these assessments is to determine the nature and extent of seabird interactions with longline fishing operations within each longline fishery and seabird interactions with trawl fishing operations within each trawl fishery.

The scientific assessment will address the following:

- Estimated total annual, species-specific seabird catch and catch-per-unit effort (i.e. number/1 000 hooks set/species/fishery, incidents/mortalities/hrs trawled/species);
- Fishing effort data (seasons, species, catch, number of sets, number of hooks/year/fishery);
- Fishing areas (by season and geographic location);
- Longline fishing fleet and fishing techniques data;
- Trawl fishing fleet and fishing techniques data;
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- Status of seabird populations in the fishing areas;
- Measures used that might mitigate or exacerbate seabird bycatch rates.

A seabird bycatch assessment per fishery must be conducted within one year of the adoption of the NPOA-Seabirds. If this assessment determines that a seabird bycatch problem exists within a particular fishery; a mitigation program will be developed within one year of the assessment, with subsequent full implementation within two years. If an assessment determines that a seabird bycatch problem does not exist, and in cases where changes (expansion or reduction) to existing longline and/or trawl fisheries occur or in the event of the development of a new fishery, periodic assessments will be conducted. In the case of a new fishery a seabird bycatch assessment will be conducted covering the first year of operation.

5. ANGOLA’S NPOA-SEABIRDS ACTIONS

5.1. Development and implementation

Angola’s fisheries management system recognizes the importance of implementing seabird bycatch mitigation measures in fisheries where incidental seabird catch occurs, with the purpose of both the global and regional conservation of seabird species vulnerable to threats from fisheries. Angola therefore strives to cooperate through the FAO with regional and sub-regional fisheries organizations to identify, develop and adopt appropriate mitigation measures to reduce the incidental catch of seabirds in longline and trawl fisheries.

The implementation process of the Angola NPOA-Seabirds will commence at the date of adoption of this document. Further assessments of seabird bycatch in all relevant fisheries will be completed within a period of two years by the Angolan Ministry of Fisheries and the appropriate National Directorates and Public Fisheries Institutes or in collaboration with a suitable organisation. Upon completion and depending on the results of the assessment period, this measure will either become a condition of the fishery or be abolished. Furthermore, should the assessment show significant bycatch levels, a seabird bycatch reduction program including the adoption of further mitigation measures (such as deployment of mitigation devices, adequate line weighting, night setting, offal management etc.) will be developed within one year of the assessment and implemented within two years. Should an initial assessment indicate a severe bycatch problem in a particular fishery, the Minister, through the provisions of the Law of Aquatic Biological Resources (2004) may impose emergency operational mitigation measures to reduce incidental capture. These measures would become specific permit conditions and compliance would be enforced by the National Inspectorate Service of Ministry of Fisheries. In all relevant fisheries where an assessment indicates that no seabird bycatch problem exists, a re-assessment will be made after three years.

5.2. Role of the DNPPRP National Directorate for Fisheries and Protection of Fishing Resources (Fisheries Observer Agency)

The Law of Aquatic Biological Resources (New Fisheries Law) outlines the vested powers, duties, obligations and role of fisheries observers on Angolan semi-industrial and industrial fishing vessels. The Fishery Observer Programme performs the function of monitoring, recording and reporting catch and
other relevant data. Angola also has a Community Observer Programme, with Community observers being members of coastal communities tasked with monitoring of fishing and related activities in areas reserved for artisanal fishing and subsistence fishing. These programmes provide a potentially powerful tool in conducting seabird bycatch estimates and promoting compliance with any seabird bycatch mitigation regulations that might be promulgated. A proper assessment of the impact of longline, trawl and artisanal fishing will require reliable and verifiable information. The activities of fisheries observers exclude the monitoring of seabird bycatch, due to a lack of specialized training, practical tools such as data collection protocols and data sheets, human resources and the absence of appropriate regulations and directives. The FOA should be approached to collaborate on seabird bycatch assessments. This collaboration will require that the agency provides sufficient observers for training in seabird bycatch observation protocols and the identification of seabirds at sea, thus, facilitating the collection of more detailed and reliable data onboard longline and trawl vessels. Frequent observer training courses will be run in consultation with the national fisheries observer agencies. Training of people in key positions to be able to teach these courses (the train-the-trainers principle) will also be critical to ensure maximum outreach and long-term sustainability. The fisheries observer agency will further coordinate the placement of all additional scientific observers on board fishing vessels on a permanent basis and facilitate the dissemination of data collected to the Ecosystem and Bycatch Working Group or relevant scientists. This will allow for more informed management decisions.

5.3. Establishment and role of Ecosystem and Bycatch Working Group

This NPOA calls for the establishment of a technical Ecosystem and Bycatch Working Group (EBWG), comprised of staff from the Angolan Ministry of Fisheries and the appropriate National Directorates and Public Fisheries Institutes (a seabird expert, an ecosystem analyst, and demersal and pelagic fishery scientists, a policy analyst, a senior fisheries inspector), as well as the coordinator of the Fisheries and Community Observer Programs and other interested and affected parties such as an industry representative and NGO participation. The sole function of the EBWG will be the coordination and implementation of Angola’s NPOA’s on bycatch species.

The responsibilities of the EBWG towards the NPOA - Seabirds may include, but is not limited to, the following:

- Promoting and coordinating the implementation of the NPOA-Seabirds nationally, as well as in regional and international fisheries organizations.
- Facilitating effective training of at-sea data collectors to monitor and gather scientific data on seabird bycatch onboard fishing vessels.
- Advising the relevant biologist(s) on conducting seabird assessments for all longline and trawl fisheries.
- Assisting the development and implementation of seabird data collection for FOA observers.
- Assisting in the development of national seabird bycatch reduction programs and reviewing of regional and international mitigation measures for possible adaptation and adoption.
- Facilitating the participation of interested and affected parties (public and industry) in the implementation of the NPOA-Seabirds.
Collaborating with regional and international fisheries organizations (including the FAO) in research, training and the production of information and promotional material, with the objective to reduce the incidental catch of seabirds in longline fisheries.

Assisting in the drafting of the NPOA-Seabirds Implementation Report, which will form part of the biennial report to FAO on Code of Conduct for Responsible Fisheries.

Assisting in the review and assessment of the effectiveness of seabird bycatch reduction programs.

Formulating appropriate mitigation measures and advising management via annual reports to the Fisheries Advisory Council on seabird bycatch monitoring and assessment.

Developing an appropriate compliance monitoring programme in collaboration with relevant stakeholders.

5.4. Prescription of mitigation measures

In order to reduce seabird mortality to acceptable levels, the Ministry of Fisheries will adopt an approach whereby each relevant fishery (which has been assessed and found to have a seabird bycatch problem) is regulated by a set of fishery-specific prescribed mitigation measures. Currently, no mitigation measures are prescribed for any fishery for want of an assessment of whether, and to what extent, seabird mortalities occur.

Precautionary mitigation measures (box 1) should be introduced as a matter of urgency and remain in force until a full assessment has been conducted. If an initial assessment (prior to completion of formal assessment) determines that a severe seabird bycatch problem exists in any particular fishery, the Minister reserves the right to impose interim seabird bycatch mitigation measures, as he/she deems appropriate and practicable. These mitigation measures may include those listed in the FAO technical note on suggested measures (Annex 1) or any other specifically designed measure. At a minimum, ICCAT recommendations for mitigation in pelagic longline fisheries should be implemented (Annex 2), as per Angola’s obligations stemming from the ICCAT agreement; with the implementation of ACAP measures (presented under “Mitigation Measures”) for pelagic longline and trawl fisheries being preferable. Further to this, it is recommended that Angola become a member of ACAP.

1. All seabird bycatch reduction and management measures should be incorporated into Fishery Management Plans, regulatory amendments and permit conditions.

2. In the interim, it is strongly advised that longline fishing vessels (pelagic and demersal) start including the use of bird-scaring (or tori) lines. This should be implemented in association with a line-weighting regime that sinks baited hooks (at a desired rate of 0.3 m/s\(^2\)) to below 10m within the target 100m aerial extent of the bird-scaring line.

3. Bird-scaring (or tori) lines should be used to prevent warp strikes in the trawl fisheries

4. Demersal longline vessels complete all line setting activities by at least one hour prior to sunrise, and no setting to take place before one hour after sunset.

Box 1: Some suggested preliminary precautionary mitigation measures
The Ministry of Fisheries, in its prescription of mitigation measures or devices, will be guided by criteria of efficiency (i.e. whether the prescribed methods significantly contribute to a reduction in seabird mortalities) and cost-effectiveness of measures to be implemented by the fishing industry.

5.5. Compliance

If a fishery has been found to have a biologically significant level of seabird bycatch a suite of appropriate regulations to manage this bycatch must be developed under the auspices of the seabird EBWG and promulgated by the minister. Compliance monitoring of these regulations rests with the Inspectorate National Service of Ministry of Fisheries. While FOA and EU observers are not compliance officers they do have a reporting function and must be able to collect information on the use, or lack of use of mitigation measures and to understand the effectiveness of measures in achieving set targets for seabird bycatch reduction. Collecting this data will, by necessity, involve reporting on the use of mandatory mitigation measures. The Ministry of Fisheries will establish mechanisms to receive and process FOA data quickly and address any non-compliance matters arising. A compliance report showing non-compliance must be processed within two weeks of the report being submitted to the Ministry of Fisheries. Feedback must be given to the FOA on any action taken by the Ministry of Fisheries on the report once the incident has been finalized.

Punitive measures for non-compliance will be stipulated in the regulations pertaining to bycatch issues. These measures will, but not only, include cash fines, mandatory deployment of additional mitigation measures, suspension and/or withdrawal of fishing licences and setting of precautionary bycatch limits which may, if exceeded, result in the vessel being recalled to port for a full investigation and may lead to mandatory deployment of additional mitigation measures or in extreme cases a suspension or cancellation of the fishing licence. Punitive measures must be reviewed every second year and adjusted to realistically reflect activities and trends in the industry.

5.6. Research and development

Following guidance by the FAO’s IPOA-Seabirds, the ministry will work in consultation with the fishing industry and in close cooperation with relevant regional and international organizations (particularly the ATF) to conduct research and to develop fishery-specific seabird mitigation measures. Specifically, the Ministry undertakes to:

- Conduct research on and assess seabird bycatch,
- Develop practical and effective seabird deterrent devices and evaluate the effectiveness of mitigation measures, taking due cognizance of best practice and lessons learned from other countries with similar fisheries and seabird assemblages
- Evaluate and improve technologies and practices that reduce incidental capture of seabirds.

Given the high costs of research into the development of technologies and at-sea trials, it may be much more expedient to cooperate closely with other countries and organizations involved in the development of mitigation measures. Angola may need to source funding for these projects from donor organizations. Research in respect to seabird bycatch reduction should not only be aimed at developing and improving
technical and operational mitigation measures, but should also deal with relevant aspects of biology and conservation of affected seabird populations.

5.7. Catch reduction objectives
There are two primary methods for establishing incidental mortality goals:
1) An incidental catch rate expressed, for example, as seabirds killed per 1,000 hooks or other unit of effort; and
2) Number of seabirds caught, either at a species specific or generic seabird level.

Typically, seabird incidental catch is reported as the number of birds killed per unit effort. While this may be appropriate as a measure of fishery performance, as it relates seabird mortality to fishing effort in a manner that is both transparent and meaningful to fisheries management authorities, effort-based bycatch objectives can be flawed if they do not account for incidental catch levels in relation to fishing effort (FAO, 2009). Thus, it is important also to assess total seabird bycatch numbers per fishery, and to set targets to reduce the overall numbers of birds killed as well as to reduce the bycatch rate.

Through the cyclical review process established under the formation of the Ecosystem and Bycatch Working Group once mitigation measures have been identified and adopted the EBWG will establish bycatch reduction objectives with a clearly stated timeframe that will lead to on-going reductions in seabird mortality. The monitoring of the success of these targets will become part of the annual review process outlined in Table 1.

5.8. Education, training and publicity
The level of awareness among fishers and the general public regarding the problem of seabird mortality is extremely low, specifically regarding the conservation aspects of the bycatch problem and the economic benefits related to increased fishing efficiency. The Ministry recognises that engaging the fishing industry in seeking solutions to this problem increases ownership and voluntary implementation. Therefore, the Ministry will develop appropriate programs to raise awareness among fishermen, fishing industry representatives and the general public concerning the need to reduce the incidental capture of seabirds in longline fisheries. Such programs will include consultative workshops and multi-stakeholder fora that will seek to find compromises that are acceptable to all interest groups. The FAO’s IPOA-Seabirds provides a set of measures that could be adopted by states to raise awareness among stakeholders (fishermen, general public etc) on the problem of seabird bycatch in longline fisheries (Annex 1).

The Ministry will give priority to the following (non-exhaustive) activities in respect of training, publicity and education of target groups:
1) Facilitating a series of workshops with the fishing industry, where the NPOA-Seabirds, IPOA-Seabirds and information on seabird bycatch could be disseminated and discussed. Guidelines, information and training will be provided through presentations, videos, posters, brochures etc. and will focus on conservation aspects of seabird mortality as well as the economic benefits to the industry of reduction of bait loss to seabirds
2) Training of fishery observers and fishers in seabird identification, aspects of the biology and conservation of affected seabird species, the use of various mitigation measures and the collection of reliable data on seabird bycatch during fishing operations; and
3) Producing multimedia material (videos, brochures, posters, visual guides) for dissemination of information on seabird conservation status, bycatch mitigation measures and monitoring activities etc. to industry, general public and other stakeholders.

5.9. Data collection

A programme will be designed to collect statistically reliable and comprehensive data that can be used to assess the level of seabird mortality in longline and trawl fisheries and to evaluate the effectiveness of prescribed mitigation measures. Angola will make use of its fisheries observers (although not limited to) to obtain the required information and it is thus critical that these observers are properly trained and equipped with the necessary skills and material to carry out their job.

Observations made and data collected on seabird mortality must be sufficient to allow for statistically valid estimates of overall catch rates. In addition to the collection of such specific information of birds caught (alive or dead) e.g. species, age class, sex and condition, the collection of fishing data such as numbers of sets and numbers of hooks per set deployed, setting and hauling time and speeds, fishing positions, etc is also needed. Recording the use of prescribed and other mitigation measures in place is also useful in assessing the usefulness and impact of mitigation measures on seabird catch rates.

5.10. Reporting

The Ecosystem and Bycatch Working Group (EBWG), to be established in response to this NPOA, will prepare an annual report on the status of seabird mortality for each relevant fishery, including criteria used in assessment, research efforts and recommendations on mitigation measures (if necessary). This report will be presented to the senior management of the Ministry of Fisheries, for consideration and action. Finally, the annual bycatch reports will be compiled into an NPOA-Seabirds Implementation Report and drafted into the country’s biennial status report to the FAO on its implementation of the Code of Conduct for Responsible Fisheries.
### Table 1: Table of Organizational Roles for NPOA-Seabirds Activities

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Activity</th>
<th>Implementation Time-line</th>
<th>Responsible entity</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Data collection</strong></td>
<td>Collect reliable and comprehensive data through:</td>
<td></td>
<td></td>
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<td></td>
<td>Training onboard observers in:</td>
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<tr>
<td></td>
<td>- Seabird identification (which includes the biology &amp; conservation status of affected spp.)</td>
<td></td>
<td>1.</td>
<td>High</td>
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<tr>
<td></td>
<td>- Mechanics and practical use of mitigation measures</td>
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<td>3.</td>
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<td></td>
<td></td>
<td></td>
<td>4. Appropriate partner organisation</td>
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<td></td>
<td></td>
<td></td>
<td>High</td>
<td></td>
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<tr>
<td></td>
<td>Upgrading existing logsheets to include seabird species caught as bycatch</td>
<td>Within 1 year of acceptance of NPOA-Seabirds</td>
<td>1.</td>
<td>High</td>
</tr>
<tr>
<td><strong>2 Research</strong></td>
<td>Ensure that bycatch of seabirds in fisheries is reduced through:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Annual assessment of seabird bycatch onboard longliners and trawlers</td>
<td>Immediately</td>
<td>1.</td>
<td>High</td>
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<tr>
<td></td>
<td>Identify a suite of best practice mitigation measures for longline and trawl fisheries</td>
<td>Within 1 year of acceptance of NPOA-Seabirds</td>
<td>1.</td>
<td>High</td>
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<td>2.</td>
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<td>3. Appropriate partner organisation</td>
<td></td>
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<tr>
<td>Management measures</td>
<td>3 Management measures</td>
<td>4 Reporting</td>
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<tr>
<td><strong>Ensure that bycatch of seabirds in fisheries is reduced through:</strong></td>
<td>Identify the sink rate of longline gear to complement prescription of mitigation measures (by means of Time Depth Recorders – TDRs)</td>
<td>Results of mitigation trials to be openly discussed with all affected stakeholders in a workshop setting</td>
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<td></td>
<td>Within 1 year of acceptance of NPOA-Seabirds</td>
<td>During annual review</td>
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<td></td>
<td>1. 2. 3. Appropriate partner organisation</td>
<td>1. 2. 3. 4. 5. Appropriate partner organisation</td>
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<tr>
<td></td>
<td>High</td>
<td>High</td>
<td></td>
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<tr>
<td></td>
<td>Ensure that bycatch of seabirds in fisheries is reduced through:</td>
<td>Compile annual national implementation report on seabird bycatch</td>
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<tr>
<td></td>
<td>Incorporate the use of bird-scaring lines in permit conditions as a short-term measure</td>
<td>Annually</td>
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<tr>
<td></td>
<td>Incorporate the use of a suite of best practice mitigation measures in permit conditions</td>
<td>1. 2. 3. Appropriate partner organisation</td>
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<td></td>
<td>Immediately</td>
<td>Medium</td>
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<tr>
<td></td>
<td>Within 2 years of acceptance of NPOA-Seabirds</td>
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<tr>
<td>Monitor compliance to bycatch reduction measures</td>
<td>Ongoing (annual review)</td>
<td>1. 2. 3.</td>
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<td></td>
<td>High</td>
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<tr>
<td></td>
<td>Compile annual national implementation report on seabird bycatch</td>
<td>1. 2. 3. Appropriate partner organisation</td>
<td></td>
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<tr>
<td></td>
<td>Annually</td>
<td>Medium</td>
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</tbody>
</table>
## 5 Capacity building

<table>
<thead>
<tr>
<th>Action</th>
<th>Timeframe</th>
<th>Milestones</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiate the establishment of an Ecosystem and Bycatch Working Group</td>
<td>Working group established by June 2010</td>
<td>1. 2. 3. 4. Appropriate partner organisation</td>
<td>High</td>
</tr>
<tr>
<td>Train people in key positions to teach these courses on mitigation measures and the general scale of the problem (the train–the-trainers principle) to ensure maximum outreach and long term sustainability of this initiative</td>
<td>Immediately</td>
<td>1. 2. 3. 4. Appropriate partner organisation</td>
<td>Medium</td>
</tr>
<tr>
<td>Divulge summary information to all stakeholders of all fisheries in the adoption of the Angolan NPOA for seabirds</td>
<td>Within 1 year of acceptance of NPOA-Seabirds</td>
<td>1. 2. 3. 4. Appropriate partner organisation</td>
<td>High</td>
</tr>
</tbody>
</table>
6. Bibliography


Angola’s National Plan of Action for Reducing Incidental Catch of Seabirds in Longline and Trawl Fisheries


Annex 1: FAO’s International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries

Introduction

1. Seabirds are being incidentally caught in various commercial longline fisheries in the world, and concerns are arising about the impacts of this incidental catch. Incidental catch of seabirds may also have an adverse impact on fishing productivity and profitability. Governments, non-governmental organizations, and commercial fishery associations are petitioning for measures to reduce the mortality of seabirds in longline fisheries in which seabirds are incidentally taken.

2. Key longline fisheries in which incidental catch of seabirds are known to occur are: tuna, swordfish and billfish in some particular parts of oceans; Patagonian toothfish in the Southern Ocean, and halibut, black cod, Pacific cod, Greenland halibut, cod, haddock, tusk and ling in the northern oceans (Pacific and Atlantic). The species of seabirds most frequently taken are albatrosses and petrels in the Southern Ocean, northern fulmars in the North Atlantic and albatrosses, gulls and fulmars in the North Pacific fisheries.

3. Responding to the need to reduce the incidental catch of seabirds in commercial fisheries in the Southern Ocean, the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) adopted mitigation measures in 1992 for its 23 member countries to reduce incidental catch of seabirds.

4. Under the auspices of the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), Australia, Japan and New Zealand have studied and taken seabird mitigation measures in their southern bluefin tuna longline fishery since 1994, and in 1995 CCSBT adopted a recommendation relating to ecologically related species, including the incidental mortality of seabirds by longline fishing. The recommendation stipulates a policy on data and information collection, mitigation measures, as well as education and information dissemination. All member nations of CCSBT have made the use of bird scaring lines (tori poles) mandatory in their fisheries.

5. The United States of America also adopted, by regulation, measures for reducing incidental catch of seabirds for its groundfish longline fisheries in the Bering Sea/Aleutian Islands and Gulf of Alaska in 1997, and for its halibut fishery in 1998. The United States is currently developing measures to mitigate the incidental catch of seabirds in the Hawaiian pelagic longline fisheries. Several other countries with longline fisheries have likewise adopted similar mitigation measures.

Origin

6. Noting an increased awareness about the incidental catch of seabirds in longline fisheries and its potential negative impacts on seabird populations, a proposal was made at the Twenty-second Session of the Committee on Fisheries (COFI) in March 1997 that FAO organize
an expert consultation, using extra-budgetary funds, to develop Guidelines leading to a Plan of Action to be submitted at the next Session of COFI aiming at a reduction in such incidental catch.

7. The International Plan of Action for reducing incidental catch of seabirds in longline fisheries (IPOA-Seabirds) has been developed through the meeting of a Technical Working Group in Tokyo 25-27 March 1998† and the Consultation on the Management of Fishing Capacity, Shark Fisheries and Incidental Catch of Seabirds in Longline Fisheries held 26-30 October 1998 and its preparatory meeting held in Rome 22-24 July 1998‡.

Nature and Scope

8. IPOA-Seabirds is voluntary. It has been elaborated within the framework of the Code of Conduct for Responsible Fisheries as envisaged by Article 2 (d). The provisions of Article 3 of the Code of Conduct apply to the interpretation and application of this document and its relationship with other international instruments. All concerned States§ are encouraged to implement it.

9. The IPOA-Seabirds applies 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.

Objective

10. Taking into account in particular the objectives of articles 7.6.9 and 8.5 of the Code of Conduct, the objective of the IPOA-Seabirds is to reduce the incidental catch of seabirds in longline fisheries where this occurs.

Implementation

11. In implementing the IPOA-Seabirds States should carry out a set of activities. This should be done as appropriate in conjunction with relevant international organizations. The exact configuration of this set of activities will be based on an assessment of the incidental catch of seabirds in longline fisheries.

12. States with longline fisheries should conduct an assessment of these fisheries to determine if a problem exists with respect to incidental catch of seabirds. If a problem exists, States should adopt a National Plan of Action for reducing the incidental catch of seabirds in longline fisheries (NPOA-Seabirds). (See the attached "Technical note on developing a National Plan of Action for reducing the incidental catch of seabirds in longline fisheries"). When developing the NPOA-Seabirds experience acquired in regional management organizations should be taken into account as appropriate. FAO should provide a list of experts and a mechanism of technical assistance to countries for use in connection with development of NPOA-Seabirds.
13. States which determine that an NPOA-Seabirds is not necessary should review that decision on a regular basis, particularly taking into account changes in their fisheries, such as the expansion of existing fisheries and/or the development of new longline fisheries. If, based on a subsequent assessment, States determine that a problem exists, they should follow the procedures outlined in paragraph 12, and implement an NPOA-Seabirds within two years.

14. The assessment should be included as a part of each relevant State’s NPOA-Seabirds.

15. Each State is responsible for the design, implementation and monitoring of its NPOA-Seabirds.

16. States recognize that each longline fishery is unique and the identification of appropriate mitigation measures can only be achieved through on-the-spot assessment of the concerned fisheries. Technical and operational mitigation measures are presently in use or under development in some longline fisheries where incidental catch of seabirds occurs. Measures developed by different States are listed in a Technical Note attached to this document. This list does not prejudice the right of States to decide to use any of these or other suitable measures that may be developed. A more comprehensive description and discussion of the mitigation measures currently used or under development can be found in FAO Fisheries Circular No. 937.

17. States should start the implementation of the NPOA-Seabirds no later than the COFI Session in 2001.

18. In implementing their NPOA-Seabirds States should regularly, at least every four years, assess their implementation for the purpose of identifying cost-effective strategies for increasing the effectiveness of the NPOA-Seabirds.

19. States, within the framework of their respective competencies and consistent with international law, should strive to cooperate through regional and subregional fisheries organizations or arrangements, and other forms of cooperation, to reduce the incidental catch of seabirds in longline fisheries.

20. In implementing the IPOA-Seabirds States recognize that cooperation among States, which have important longline fisheries, is essential to reduce the incidental catch of seabirds given the global nature of the issue. States should strive to collaborate through FAO and through bilateral and multilateral arrangements in research, training and the production of information and promotional material.

21. States should report on the progress of the assessment, development and implementation of their NPOA-Seabirds as part of their biennial reporting to FAO on the Code of Conduct for Responsible Fisheries.
Role of FAO

22. FAO will, as and to the extent directed by its Conference, and as part of its Regular Programme activities support States in the implementation of the IPOA-Seabirds.

23. FAO will, as and to the extent directed by its Conference, support development and implementation of NPOA-Seabirds through specific, in-country technical assistance projects with Regular Programme funds and by use of extra-budgetary funds made available to the Organization for this purpose.

24. FAO will, through COFI, report biennially on the state of progress in the implementation of the IPOA-Seabirds.

Technical note on developing a National Plan of Action for reducing the incidental catch of seabirds in longline fisheries (NPOA-Seabirds)

This is not an exclusive or necessarily all-encompassing list but provides guidance for preparation of the NPOA-Seabirds.

The NPOA-Seabirds is a plan that a State designs, implements and monitors to reduce the incidental catch of seabirds in longline fisheries.

I. Assessment

1. The purpose of the assessment is to determine the extent and nature of a State’s incidental catch of seabirds in longline fisheries where it occurs.

2. The assessment may include, but is not limited to, the collection and analysis of the

   • Criteria used to evaluate the need for an NPOA-Seabirds.
   • Fishing fleet data (numbers of vessels by size).
   • Fishing techniques data (demersal, pelagic, methods).
   • Fishing areas.
   • Fishing effort by longline fishery (seasons, species, catch, number of hooks/year/fishery).
   • Status of seabird populations in the fishing areas, if known.
   • Total annual catch of seabirds (numbers per 1000 hooks set/species/longline fishery).
   • Existing mitigation measures in use and their effectiveness in reducing incidental catch of seabirds.
   • Incidental catch of seabirds monitoring (observer program, etc.).
   • Statement of conclusions and decision to develop and implement an NPOA-SEABIRDS.

The NPOA-Seabirds may contain the following elements:

1. Prescription of mitigation measures

   • The NPOA-Seabirds should prescribe appropriate mitigation methods. These should have a proven efficiency, and be cost-effective for the fishing industry. If effectiveness
of mitigation measures can be improved by combining different mitigation measures or devices, it is likely that each State will find it advantageous to implement a number of different measures that reflect the need and particular circumstances of their specific longline fishery.

2. **Research and development**

- The NPOA-Seabirds should contain plans for research and development, including those aiming: (i) to develop the most practical and effective seabird deterrent device; (ii) to improve other technologies and practices which reduce the incidental capture of seabirds; and (iii) undertake specific research to evaluate the effectiveness of mitigation measures used in the longline fisheries, where this problem occurs.

3. **Education, training and publicity**

- The NPOA-Seabirds should prescribe means to raise awareness among fishers, fishing associations and other relevant groups about the need to reduce the incidental catch of seabirds in longline fisheries where this occurs; National and International Plans of Action and other information on the incidental catch of seabirds in longline fisheries; and to promote the implementation of the NPOA-Seabirds among national industry, research and its own administration.

- Provide information about technical or financial assistance for reducing the incidental catch of seabirds.

- Preferably design and implementation of outreach programmes for fishers, fisheries managers, gear technologists, maritime architects, shipbuilders, and conservationists and other interested members of the public should be described in the plan. These programmes should aim at improving the understanding of the problem resulting from incidental catch of seabirds and the use of mitigation measures. The outreach programme may include educational curricula, and guidelines disseminated through videos, handbooks, brochures and posters. The programme should focus on both the conservation aspects of this issue and on the economic benefits of expected increased fishing efficiency *inter alia* by eliminating bait loss to seabirds.

4. **Data Collection**

- Data collection programmes should collect reliable data to determine the incidental catch of seabirds in longline fisheries and the effectiveness of mitigation measures. Such programmes may make use of onboard observers.

**Technical note on some optional technical and operational measures for reducing the incidental catch of seabirds**

I. **Introduction**

To reduce the incidental catch of seabirds, it is essential to reduce the number of encounters between seabirds and baited hooks. It should be noted that, if used in combination, the options could improve mitigation effectiveness.
For each of the measures, the effectiveness and the cost involved for fishers are briefly presented. In this presentation, "effectiveness" is defined as to what extent the measures reduce incidental catch of seabirds; "cost" is defined as the initial cost or investment and any ongoing operational costs.

Other technical options are currently under development and fishers and researchers in the field may develop new mitigation measures, so the list of measures is likely to increase over time.

If effectiveness of mitigation measures can be improved by combining different mitigation measures or devices, each State may find it advantageous to implement different measures that are more suitable for their conditions and reflect the needs of their specific longline fisheries.

The list below should not be considered mandatory or exhaustive and FAO shall maintain a data base of measures that are in use or under development.

II. Technical measures

1. Increase the sink rate of baits
   
   a. Weighting the longline gear

   **Concept:** Increase the sinking speed of baited hooks and reduce their exposure time to seabirds.  
   **Effectiveness:** Studies have shown that appropriate line-weighting can be highly effective in avoiding bait loss to birds.  
   **Cost:** The cost is the initial purchase of the weighting material (either heavier gear or weights) and any ongoing replacement of weights lost during fishing.

   b. Thawing bait

   **Concept:** Overcome buoyancy problems in bait by thawing and/or puncturing swim bladders.  
   **Effectiveness:** Rate of incidental catch of seabirds is reduced when thawed baits are used. It has also been shown that bait fish with deflated swim bladders sink more quickly than those with inflated swim bladders did.  
   **Cost:** Possible costs include bait thawing rack, or extra weight to compensate flotation resulting from the air bladder.

   c. Line-setting machine

   **Concept:** Increase line sinking rate by removing line tension during gear deployment.  
   **Effectiveness:** Although no quantitative assessments have been done, this practice would result in the line sinking more rapidly thereby reducing availability of baited hooks to seabirds.  
   **Cost:** For some fisheries, initial costs may include purchase of a line-setting device.
2. **Below-the-water setting chute, capsule, or funnel**

*Concept:* Prevent access by seabirds to baited hooks by setting line under water.
*Effectiveness:* Underwater setting devices are still under development but could have high effectiveness.
*Cost:* Initial cost would include purchase of the underwater setting device.

3. **Bird-scaring line positioned over or in the area where baited hooks enter the water**

*Concept:* Prevent seabirds access to baited hooks where they enter the water. The bird scaring line is designed to discourage birds from taking baited hooks by preventing their access to baited hooks. Design specifications may vary by vessel, fishing operation, and location and are critical to its effectiveness. Streamer lines and towing buoys are examples of these techniques.
*Effectiveness:* A number of studies and anecdotal observations have demonstrated significant effectiveness of these devices when properly designed and used.
*Cost:* Low initial cost for the purchase and installation of bird scaring line.

4. **Bait casting machine**

*Concept:* Places bait in area protected by a bird scaring line and outside the turbulence caused by the propeller and the ships wake.
*Effectiveness:* Deployment of bait under the protection zone of the bird-scaring line reduces the availability of baited hooks to seabirds. The extent to which bait loss is reduced by the use of bait casting machines, used either without a bird-scaring line or in such a manner that baits are not protected by a bird-scaring line, is yet to be determined.
*Cost:* High, initial costs may include purchase of a bait-casting device.

5. **Bird scaring curtain**

*Concept:* To deter seabirds from taking baited hooks during the haul by using a bird scaring curtain.
*Effectiveness:* Anecdotal evidence indicates that the bird-scaring curtain can effectively discourage birds from seizing baits in the hauling area.
*Cost:* Low, cost for materials.

6. **Artificial baits or lures**

*Concept:* Reduce palatability or availability of baits.
*Effectiveness:* New baits are still under development and effectiveness has yet to be resolved.
*Cost:* Currently unknown

7. **Hook modification**

*Concept:* Utilize hook types that reduce the probability of birds getting caught when they attack a baited hook.
Effectiveness: Hook size might affect the species composition of incidentally caught seabirds. The effect of modification of hooks is, however, poorly understood.
Cost: Unknown.

8. **Acoustic deterrent**

*Concept:* Deterring birds from the longline using acoustic signals, such as high frequency, high volume, distress call, etc.
*Effectiveness:* Low probability of being effective as background noises are loud and habituation to noises is common among seabirds.
*Cost:* Unknown

9. **Water cannon**

*Concept:* Concealing baited hooks by using high pressure water.
*Effectiveness:* There is no definite conclusion about the effectiveness of this method.
*Cost:* Unknown.

10. **Magnetic deterrent**

*Concept:* Perturbing the magnetic receptors of the birds by creating magnetic fields.
*Effectiveness:* No indication of effect in practical experiments.
*Cost:* Unknown.

III. **Operational Measures**

1. **Reduce visibility of bait (Night setting)**

*Concept:* Set during hours of darkness and reduce illumination of baited hooks in the water.
*Effectiveness:* This method is generally recognized as being highly effective. However, effectiveness can vary between fishing grounds and also seasonally according to the seabird species. Effectiveness of this measure may be reduced around the full moon.
*Cost:* A restriction of line setting to the hours of darkness may affect fishing capacity, especially for smaller longliners. Small costs may be incurred to make vessel lighting appropriate. Such restriction can also entail investing in costly technology for maximizing fishing efficiency in a shorter period of time.

2. **Reduce the attractiveness of the vessels to seabirds**

*Concept:* Reducing the attractiveness of vessels to seabirds will reduce the potential for seabirds being incidentally caught. Materials (e.g. fish discards, garbage) discharged from vessels should be at a time or in a way that makes them least available to birds or least likely to cause them harm. This includes avoidance of the dumping of discarded fish, offal, fish heads, etc. with embedded hooks. If dumping offal is unavoidable, it should be done on the opposite side of the vessel to where lines are being set or in such a manner that birds are not attracted to the vessel (e.g. at night).
Effectiveness: The issue of offal discharge is a complex one, and there have been conflicting results regarding effects of various procedures in the studies done to date. 
Cost: Low; in some situations costs may be associated with providing for offal containment or reconfiguration of offal discharge systems on the vessel.

3. Area and seasonal closures

Concept: Reduce incidental catch of seabirds when concentrations of breeding or foraging seabirds can be avoided.
Effectiveness: Area and seasonal closures could be effective (such as in high density foraging areas or during the period of chick care when parental duties limit the distances adults can fly from breeding sites) although displacement of fishing fleet to other seabird areas needs to be considered.
Cost: Unknown, but a restriction on fishing by area or season may affect fishing capacity.

4. Give preferential licensing to vessels that use mitigation measures that do not require compliance monitoring

Concept: Incentive provided for effective use of mitigation measures that do not require compliance monitoring.
Effectiveness: May be highly effective in stimulating the use of mitigation measures and development of fishing systems that reduce incidental catch of seabirds.
Cost: Unknown.

5. Release live birds

Concept: If despite the precautions, seabirds are incidentally caught, every reasonable effort should be made to ensure that birds brought onboard alive are released alive and that when possible hooks should be removed without jeopardizing the life of the birds.
Effectiveness: Depends on the number of birds brought onboard alive and this is considered small by comparison to the numbers killed in line setting.
Cost: Unknown.


3 In this document the term "State" includes Members and non-members of FAO and applies mutatis mutandis also to "fishing entities" other than States.

THE INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS (ICCAT) RECOMMENDS THAT:

1. The Commission shall develop mechanisms to enable Contracting Parties and Cooperating non-Contracting Parties, Entities, or Fishing Entities (hereinafter referred to as “CPCs”) to record data on seabird interactions, including regular reporting to the Commission, and seek agreement to implement such mechanisms as soon as possible thereafter.

2. CPCs shall collect and provide all available information to the Secretariat on interactions with seabirds, including incidental catches by their fishing vessels.

3. CPCs shall seek to achieve reductions in levels of seabird by-catch across all fishing areas, seasons and fisheries, through the use of effective mitigation measures.

4. All vessels fishing south of 20°S shall carry and use bird-scaring lines (tori poles):
   – Tori poles shall be used in consideration of the suggested tori pole design and deployment guidelines;
   – Tori lines are to be deployed prior to longlines entering the water at all times south of 20°S;
   – Where practical, vessels are encouraged to use a second tori pole and bird-scaring line at times of high bird abundance or activity;
   – Back-up tori lines shall be carried by all vessels and be ready for immediate use.

5. Longline vessels targeting swordfish using monofilament longline gear may be exempted from the requirements of paragraph 4 of this Recommendation, on condition that these vessels set their longlines during the night, with night being defined as the period between nautical dusk/dawn as referenced in the nautical dusk/dawn almanac for the geographical position fished. In addition, these vessels are required to use a minimum swivel weight of 60g placed not more than 3m from the hook to achieve optimum sink rates. CPCs applying this derogation shall inform the SCRS of their scientific findings resulting from their observer coverage of these vessels.

6. The Commission shall, upon receipt of information from the SCRS, consider, and if necessary, refine, the area of application of the mitigation measures specified in paragraph 4.

7. This measure is a provisional measure which will be subject to review and adjustment in the light of future available scientific advice.

8. The Commission shall consider adopting additional measures for the mitigation of any incidental catch of seabirds at its annual meeting in 2008 based on the results of the ICCAT seabird assessment which is currently underway.
Suggested Guidelines for Design and Deployment of Tori Lines

Preamble: These guidelines are designed to assist in preparation and implementation of tori line regulations for longline vessels. While these guidelines are relatively explicit, improvement in tori line effectiveness through experimentation is encouraged. The guidelines take into account environmental and operational variables such as weather conditions, setting speed and ship size, all of which influence tori line performance and design in protecting baits from birds. Tori line design and use may change to take account of these variables provided that line performance is not compromised. On-going improvement in tori line design is envisaged and consequently review of these guidelines should be undertaken in the future.

Tori line design

1. It is recommended that a tori line 150 m in length be used. The diameter of the section of the line in the water may be greater than that of the line above water. This increases drag and hence reduces the need for greater line length and takes account of setting speeds and length of time taken for baits to sink. The section above water should be a strong fine line (e.g. about 3 mm diameter) of a conspicuous colour such as red or orange.
2. The above water section of the line should be sufficiently light that its movement is unpredictable to avoid habituation by birds and sufficiently heavy to avoid deflection of the line by wind.
3. The line is best attached to the vessel with a robust barrel swivel to reduce tangling of the line.
4. The streamers should be made of material that is conspicuous and produces an unpredictable lively action (e.g. strong fine line sheathed in red polyurethane tubing) suspended from a robust three-way swivel (that again reduces tangles) attached to the tori line, and should hang just clear of the water.
5. There should be a maximum of 5-7 m between each streamer. Ideally each streamer should be paired.
6. Each streamer pair should be detachable by means of a clip so that line stowage is more efficient.
7. The number of streamers should be adjusted for the setting speed of the vessel, with more streamers necessary at slower setting speeds. Three pairs are appropriate for a setting speed of 10 knots.

Deployment of tori lines

1. The line should be suspended from a pole affixed to the vessel. The tori pole should be set as high as possible so that the line protects bait a good distance astern of the vessel and will not tangle with fishing gear. Greater pole height provides greater bait protection. For example, a height of around 6 m above the water line can give about 100 m of bait protection.
2. The tori line should be set so that streamers pass over baited hooks in the water.
3. Deployment of multiple tori lines is encouraged to provide even greater protection of baits from birds.

4. Because there is the potential for line breakage and tangling, spare tori lines should be carried onboard to replace damaged lines and to ensure fishing operations can continue uninterrupted.

5. When fishers use a bait casting machine (BCM), they must ensure coordination of tori line and machine by:
   i. ensuring the BCM throws directly under the tori line protection, and
   ii. when using a BCM that allows throwing to port and starboard, ensure that two tori lines are used.

6. Fishers are encouraged to install manual, electric or hydraulic winches to improve ease of deployment and retrieval of tori lines.
Annex 3: Conservation status of seabird species most affected by mortality from longline fisheries within the Benguela ecosystem.

<table>
<thead>
<tr>
<th>Seabird Species</th>
<th>IUCN Conservation Status (2004)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cape Gannet Morus Capensis</td>
<td>Vulnerable</td>
</tr>
<tr>
<td>White-chinned Petrel Procellaria aequinoctialis</td>
<td>Vulnerable</td>
</tr>
<tr>
<td>Spectacled Petrel Procellaria conspicillata</td>
<td>Vulnerable</td>
</tr>
<tr>
<td>Northern Giant Petrel Macronectes halli</td>
<td>Near Threatened</td>
</tr>
<tr>
<td>Southern Giant Petrel Macronectes giganteus</td>
<td>Near Threatened</td>
</tr>
<tr>
<td>Wandering Albatross Diomedea exulans</td>
<td>Vulnerable</td>
</tr>
<tr>
<td>Tristan Albatross Diomedea dabbenena</td>
<td>Endangered</td>
</tr>
<tr>
<td>Shy Type Albatross Thalassarche steadi/cauta</td>
<td>Near Threatened</td>
</tr>
<tr>
<td>Atlantic Yellow-nosed Albatross T. chlororhynchos</td>
<td>Endangered</td>
</tr>
<tr>
<td>Black-browed Albatross T. melanophrys</td>
<td>Endangered</td>
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</tbody>
</table>