

CCSBT-ERS/0909/SBT Fisheries - South Africa

South Africa's Annual Report to the Ecologically Related Species Working Group of the Commission for the Conservation of Southern Bluefin Tuna

August 2009

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1. Introduction

Southern bluefin tuna is only caught in South Africa by means of swordfish and tuna longline vessels. The swordfish longline vessels are domestic vessels that mainly target swordfish, yellowfin and bigeye within South Africa's EEZ and catch southern bluefin tuna as by-catch. These vessels set after dusk, using shallow sets, squid bait and light sticks. The longline system used is based on the American system, i.e. monofilament mainline used. The tuna longline vessels target yellowfin, bigeye and southern bluefin tuna. South Africa is currently in the process of developing this sector of its fishery and notes that no suitable domestic vessels exist for this fishery. Furthermore, South Africans are not suitably skilled to target tuna using longline. Consequently, there is a large reliance on chartering of foreign vessels to source suitable vessels for reflagging and for skills transfer to South Africans. The tuna vessels used in the fishery in 2008 have been chartered from Japan, Korea and Philippines. All vessels set lines after midnight using mainly fish bait. No light sticks are used and a braided multifilament mainline is used. These vessels also regularly use bait casting machines and line setters. The tuna longliners usually catch southern bluefin as by-catch to targeting yellowfin and bigeye within South Africa's EEZ. However, these vessels are more efficient at targeting southern bluefin along the southern edge of South Africa's EEZ and further south (Statistical Areas 9 and 14). When the vessels are operating in the south it is noted that catch rates of ERS decrease due to the fishery operating at the edge of their geographical distributions. Catches of southern bluefin is generally made in the winter months (May – September).

2. Review of SBT Fisheries

South Africa has had a brief history in targeting southern bluefin tuna in the early 1960s along the west coast of South Africa where southern bluefin was one of the most common species caught on longline. This fishery ceased by mid-1960s in favour of developing other more lucrative fisheries. Interest in longline fishing only resurfaced in the mid-1990s when joint operations with a Japanese vessel showed that tuna could be profitably exploited within South Africa's EEZ. Subsequently, 30 experimental longline permits were issued in 1997. The experimental fishery was finally closed in 2005 when 50 long-term fishing rights were made available for allocation. The 50 rights were further split between 20 swordfish-directed rights and 30 tuna-directed rights. In the allocation only 44 rights (18 swordfish vessel and 26 tuna vessels) were allocated to South African

companies. Activation of the entire fleet remains a challenge due to low catch rates, increasing fuel costs and lack of suitable vessels and skilled crew. In 2008 only 25 vessels were active (12 South African, 11 Japanese, 1 Korean and 1 Philippine vessel). The majority of the vessels fish out of Cape Town harbour and fish the area between Saldanha Bay on the west coast to Port Elizabeth on the South East coast of South Africa. A few vessels operate out of Richards Bay along the east coast of South Africa.

Trends in catch rates are difficult to identify for southern bluefin tuna as much of the catch of southern bluefin tuna is caught while targeting swordfish, yellowfin and bigeye due to the limited size of the southern bluefin quota. However, catches have been more consistent since 2007, with the South African quota being caught in 2007 and 2008 and is likely to be caught in 2009 as well. Due to the small quota the South African southern bluefin fishery was closed mid-way through 2007 and 2008 and is likely to occur in 2009 as well. In 2005, 2006 and 2007 the majority of the southern bluefin catch was taken within the EEZ of South Africa. In contrast, the majority of the catch was taken south of the EEZ in 2008.

3. Fisheries Monitoring for Each Fleet

South Africa has established an on board observer programme for the longline fishery since 1998. Observer coverage for foreign vessels under charter agreement is 100% whereas the observer coverage for domestic swordfish longline vessels was 14% for 2008. The observers are required to collect independent data on each set made and retrieved. Data includes effort, the area fished, environmental conditions, number of seabirds, turtles killed, compliance issues, species composition, length frequencies, mauling, release and discard data. The observers have also been instructed to collect biological samples from time to time.

4. Seabird

Seabird interaction is high in the waters along the south coast of South Africa. An alarming number of seabirds (albatross and petrels) have been caught in the fishery which has resulted in very stringent bird mitigation measures to be implemented in the fishery in accordance with South Africa's NPOA-Seabirds. See attached draft manuscript to be submitted for publication which explains the interaction and current mitigation measures.

5. Other non-target fish

Although shark catches account for more than 30% of the catch by number South Africa has implemented very stringent permit conditions since 2005 which only allows vessels to have shark catches not exceeding 10% of the target species. This has resulted in a number of vessels releasing sharks alive at sea. It should also be noted that the use of wire tracers is also not permitted in the fishery.

6. Marine mammal and marine reptiles

Although killer whales and pilot whales have been observed on several occasions mauling fish caught on the longline no South African records exist for any of

these species to be caught on a longline. Turtle catches are rare and are more often caught by the swordfish vessels which set lines within 50m of the surface and use squid bait. The most common turtle species caught are loggerhead and leatherback turtles.

7. Mitigation Measures to minimize seabird and other species by-catch

All mitigation measures have been included in permit conditions which fishers have to adhere to. All the details of mitigation measures are contained in the attached permit conditions.

A summary of seabird mitigation measures are as follows:

Tuna longline vessels may only set at night and would have to use the specified tori line for each set;

Swordfish vessels have to use a tori line for each set and must use weighted lines;

Fishers are also required to discard used bait on the opposite side of hauling;

Vessel to have the necessary bird dehooking device on board;

Bait is to be thawed prior to being used, and;

Deck lighting is to be kept to a minimum.

Compliance with the mitigation measures have increased in recent years due to the 25 and 50 bird cap imposed per vessel since 2008.

A summary of shark mitigation measures are as follows:

Vessels are prohibited from using stainless steel hooks and wire leaders;

All fins and shark trunks must be landed to ensure no finning is allowed;

Thresher sharks are not permitted to be landed, and;

Shark by-catch is not to exceed 10% of the targeted species.

Compliance to these measures is close to 100%.

The following additional information should be noted:

All discharges/ transshipments are monitored;

Transshipping is only allowed in port;

All vessels must have a functional VMS on board;

Observer coverage is aimed at 20% for domestic vessels and 100% for foreign vessels.

Marine and Coastal Management (MCM) is the lead agency in South Africa undertaking research on large pelagics and is working closely with Birdlife SA and WWF in terms of investigating mitigation measures. Currently MCM is working closely with researchers from Washington Sea Grant to improve seabird mitigation measures, particularly tori line design and line weighting.

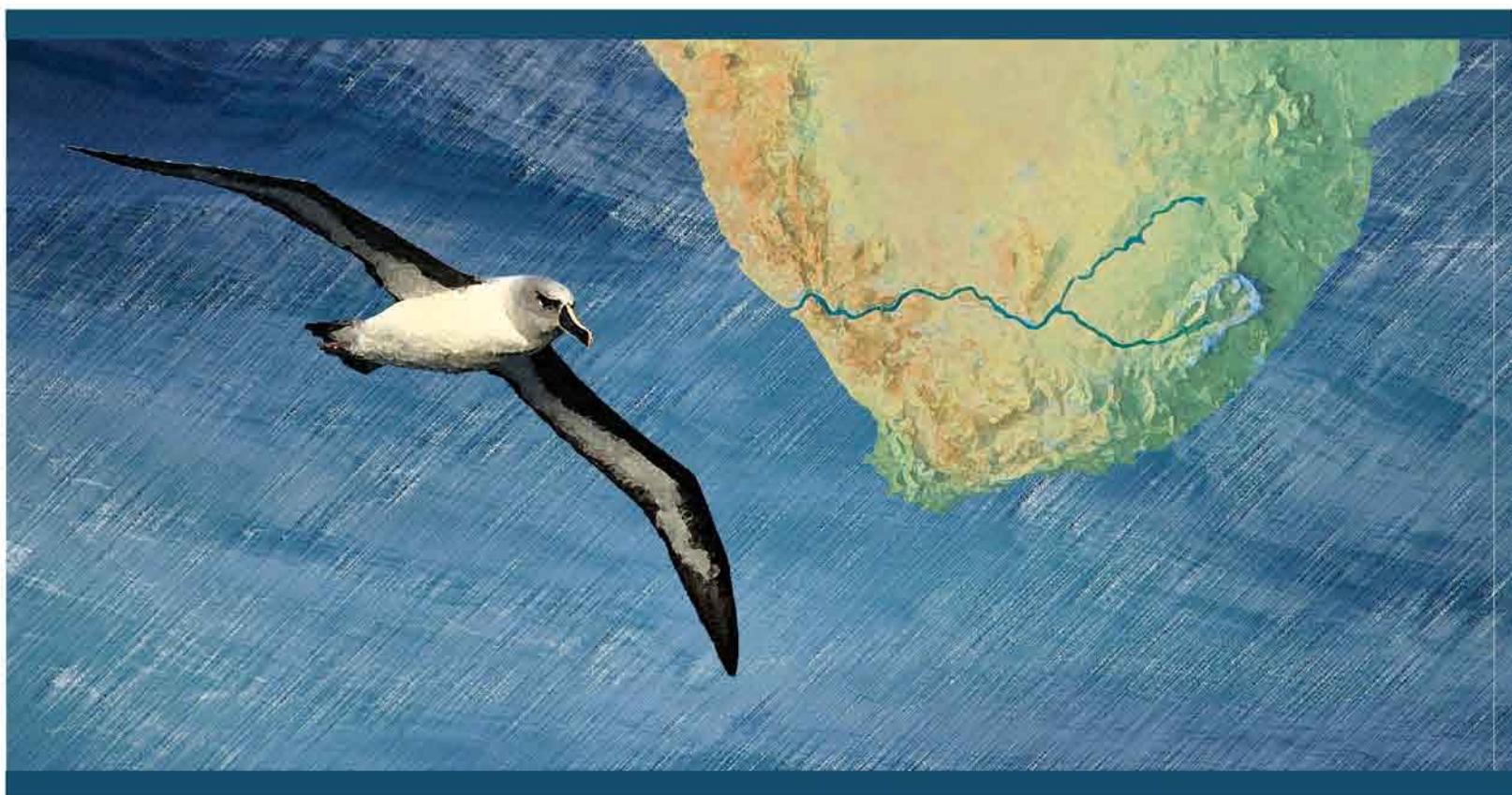
8. Public Relations and Education Activities

MCM is working closely with WWF on the development of responsible fishing courses per fishing sector. These courses were started in 2008 and it is MCM's vision that all officers should undergo the training.

11. Implementation of the IPOA-Seabirds

South Africa launched its NPOA-seabirds in 2008. Thus far great progress has been made in reducing seabird mortality in its large pelagic longline fleet (See attached for a copy of South Africa's NPOA-seabirds). MCM is currently in process of finalizing its NPOA-sharks and should complete the process by the end of 2009. Despite not having the NPOA –sharks completed South Africa has non the less taken appropriate steps to address shark issues as can be seen by the current permit conditions. Furthermore, South Africa will be terminating its directed pelagic shark fishery in 2009.

National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries



August 2008
South Africa



environment
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Environmental Affairs and Tourism
REPUBLIC OF SOUTH AFRICA

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NATIONAL PLAN OF ACTION for Reducing the Incidental Catch of SEABIRDS in Longline Fisheries



Foreword



South Africa is committed to the Code of Conduct for Responsible Fisheries voluntarily agreed to by the Members of the United Nations Food and Agriculture Organisation (FAO). On the basis of the code of conduct, four International Plans of Action (IPOA) were developed. The IPOA is aimed at reducing the incidental catch of Seabirds in Longline Fisheries. FAO Members were encouraged to adopt and implement National Plans of Action (NPOA).

South Africa realises the many challenges facing seabirds, in a rapidly changing environment. In general a reduction in seabird populations has been observed. As part of our commitment to address this challenge, South Africa has commenced implementation of an Ecosystem Approach as such we are increasingly taking into consideration other elements of the ecosystem over and above fish species. Our country further introduced strict permit conditions in efforts to reduce the catch of seabirds by fishers. This National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries also known as the NPOA-Seabirds, further attests to our commitment to managing seabirds and fisheries responsibly.

A handwritten signature in black ink, appearing to read 'Nosipho Ngcaba'.

Ms Nosipho Ngcaba

Director-General

Department of Environmental Affairs and Tourism

SOUTH AFRICA

August 2008



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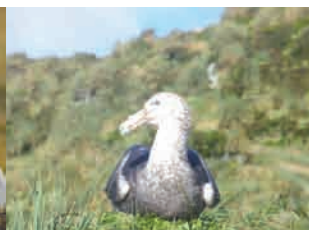
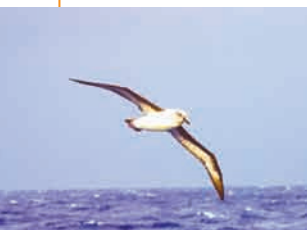
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I. Glossary of Acronymns

ACAP	Agreement for the Conservation of Albatrosses and Petrels
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CMS	Convention for Migratory Species
DEAT	Department of Environmental Affairs and Tourism
FAO	Food and Agriculture Organisation of the United Nations
ICCAT	International Commission for the Conservation of Atlantic Tunas
IOTC	Indian Ocean Tuna Commission
SEAFO	South East Atlantic Fisheries Organisation
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Fish Stocks Agreement
WSSD	World Summit on Sustainable Development



2. Introduction



Background

Since the 1990s there has been global concern about the bycatch of seabirds in fishing operations, in particular longline and trawl fisheries (Brothers 1991, Bergin 1997, Croxall & Gales 1998, Nel et al. 2002, Sullivan et al. 2006, BirdLife International 2007). The incidental mortality of these species has been widely held responsible for the declining populations and threatened conservation status of several species (BirdLife International 2007). Seabirds have an economic value in terms of non-consumptive eco-tourism activities (Yorio et al. 2001, Garrod & Wilson 2003, Topelko & Dearden 2005). Because they breed on land and their populations can therefore be accurately monitored, seabirds are also indicators of the health of the ecosystem (Cherel & Weimerskirch 1995, Best et al. 1997).

The Benguela Upwelling System is one of the world's most productive systems, attracting millions of top predators such as seabirds (Shannon & Field 1985, Best 1997). Many of

these species travel thousands of kilometres, sometimes across oceans, to feed in its nutrient rich waters (Weimerskirch et al. 1999, Baker et al. 2007, Fretey et al. 2007). Not surprisingly, the Benguela Upwelling System also supports several large commercial fisheries operating within countries' Exclusive Economic Zones (EEZ) as well as on the high seas (Sauer et al. 2003). The spatial overlap of large numbers of top predators and large commercial fisheries in a confined area has the potential to lead to high and unsustainable catches of threatened species.

Table 1: List of species recorded by observers as being caught by longliners and trawlers.

Common Name	Scientific Name	IUCN Status
Shy/White-capped Albatross	<i>Thalassarche cauta/steadii</i>	Near Threatened
Black browed Albatross	<i>Thalassarche melanophrys</i>	Endangered
Indian Yellow-nosed Albatross	<i>Thalassarche carteri</i>	Endangered
Atlantic Yellow-nosed Albatross	<i>Thalassarche chlororhynchos</i>	Endangered
Grey-headed Albatross	<i>Thalassarche chrysostoma</i>	Vulnerable
Southern Royal Albatross	<i>Diomedea epomophora</i>	Vulnerable
Northern Royal Albatross	<i>Diomedea sanfordi</i>	Endangered
Tristan Albatross	<i>Diomedea dabbenena</i>	Endangered
Wandering Albatross	<i>Diomedea exulans</i>	Vulnerable
Sooty Albatross	<i>Phoebastria fusca</i>	Endangered
Northern Giant Petrel	<i>Macronectes halli</i>	Near Threatened
Southern Giant Petrel	<i>Macronectes giganteus</i>	Vulnerable
White-chinned Petrel	<i>Procellaria aequinoctialis</i>	Vulnerable
Spectacled Petrel	<i>Procellaria conspicillata</i>	Critically Endangered
Cape/Pintado Petrel	<i>Daption capense</i>	Near Threatened
Great-winged Petrel	<i>Pterodroma macroptera</i>	Least Concern
Great Shearwater	<i>Puffinus gravis</i>	Least Concern
Flesh-footed Shearwater	<i>Puffinus carneipes</i>	Least Concern
Sooty Shearwater	<i>Puffinus griseus</i>	Near Threatened
Antarctic Prion	<i>Pachyptila desolata</i>	Least Concern
Wilson's Storm-petrel	<i>Oceanites oceanicus</i>	Least Concern
European Storm-petrel	<i>Hydrobates pelagicus</i>	Least Concern
Cape Gannet	<i>Morus capensis</i>	Vulnerable
Sub-Antarctic Skua	<i>Catharacta antarctica</i>	Least Concern
Kelp Gull	<i>Larus dominicanus</i>	Least Concern
Sabine's Gull	<i>Larus sabini</i>	Not listed



South African waters are of global importance for conserving seabirds. The coastal waters are a rich foraging area for albatross and petrel species, mainly as a result of fishing operations (Nel & Taylor 2002, BirdLife International 2007). A total 26 species has been recorded caught by South African fisheries, 13 of which are threatened with extinction (Table 1). Ryan et al. (2002) estimated that between 19 000 and 30 000 seabirds were killed per year by the South African pelagic longline fishery during 1998–2000. Barnes et al. (1997) evaluated seabird bycatch in the South African demersal longline fishery and estimated that approximately 8 000 White-chinned Petrels were killed in 1995. In general, these studies were based on limited sample sizes (108 and 12 sets, respectively) collected over short periods of time (Barnes et al. 1997, Ryan et al. 2002). More recently analysis of observer data from 1998–2005 revealed that approximately 2 900 (1 100–5 600) and 225 (range 220–245) birds are killed each year (2000–2005) (Petersen et al. 2008). Seabird bycatch in the Patagonian toothfish longline fishery decreased from 911 in 1996 to only three in 2002. Seabird bycatch was evaluated in the demersal trawl fishery (2004 and 2005) and a total of 18 000 (8 000–31 000) birds are estimated to be killed per year (Watkins et al. 2008), although there has been a significant reduction in hake trawl mortalities since the introduction of tori lines in August 2006 (Watkins, pers comm.).

Globally there is strong resolve to reduce the incidental mortality of seabirds both in terms of species conservation (CMS, ACAP) and fisheries management (WSSD, UNCLOS, UNFSA, FAO, ICCAT, IOTC and SEAFO). This sets the scene for national implementation. For seabirds, effective and relatively inexpensive methods of reducing the number of animals killed in these fishing operations have been developed (Alexander et al. 1997, FAO 1999, Melvin & Robertson 2000, Melvin et al. 2004). South Africa's commitment to address these issues is largely reflected in fisheries policy and permit conditions. However, implementation of these measures could be much improved. Efforts should be focused on raising awareness, compliance and bringing interested and affected parties together to identify solutions in a participatory manner.

This 2008 version of the National Plan of Action for Seabirds (NPOA-Seabirds) is an abridged and updated version of the draft NPOA-Seabirds of 2004, which is available on the FAO website at <ftp://ftp.fao.org>.

Overview of relevant fisheries

South Africa supports demersal and large pelagic fisheries within its continental EEZ: a demersal longline and trawl fishery targeting Cape hakes *Merluccius* spp. and pelagic longline fisheries targeting tuna *Thunnus* spp, Swordfish *Xiphias gladius* and sharks. South Africa also has a Patagonian toothfish, *Dissostichus eleginoides*, fishery operating in the vicinity of the Prince Edward Islands.

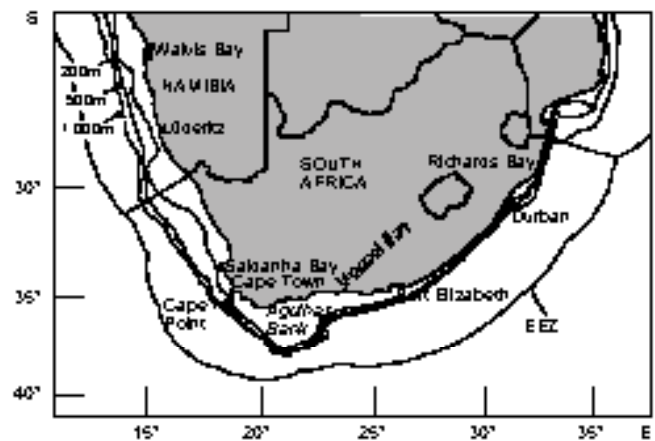


Figure 1: Map of South Africa's and southern Namibia's Exclusive Economic Zones, in relation to the 200 m, 500 m and 1 000 m isobaths.

PELAGIC LONGLINE FISHERY

The earliest record of a South African domestic pelagic longline fishery dates back to the early 1960s (Cooper & Ryan 2003). This fishery predominantly targeted Albacore *Thunnus alalunga*, Southern Bluefin *T. maccoyii* and Bigeye *T. obesus* Tunas (Cooper & Ryan 2003). Effort in the domestic fishery waned in the mid 1960s. Thereafter, pelagic fishing effort was largely conducted by Japanese and Taiwanese vessels under bilateral agreements with South Africa. These Asian vessels set their gear relatively deeply, frequently during the day, seldom used lightsticks and primarily targeted tuna species. Their fishing effort accounted for 96% of the approximately 12 million hooks set annually within the South African EEZ during 1998–2000 (Ryan & Boix-Hinzen 1998, Ryan et al. 2002). In 1995, a permit was issued to conduct a joint venture operation between a South African



and Japanese vessel. This joint venture showed that tunas and Swordfish *Xiphias gladius* could be exploited profitably in South African waters and consequently 30 experimental permits were issued in 1997 to South African flagged vessels. Vessels targeting Swordfish typically use the American longline system, set their gear relatively shallow, use lightsticks and set their lines primarily at night.

A policy decision was made in 2004 to expand and “South Africanise” the South African large pelagic longline fishery (DEAT 2004, 2005, 2007). This process commenced in 2002 when all foreign licences to target tunas and Swordfish in South African waters were withdrawn (DEAT 2004). This resulted in a smaller domestic fishery operating in South Africa’s EEZ. The domestic fishery was developed in 2004 when 50 (20 swordfish directed and 30 tuna directed) commercial fishing rights were made available for allocation (DEAT 2004, 2005, 2007). The rationale for this expansion was to improve South Africa’s catch history and thereby motivate for larger country allocations at Regional Fisheries Management Organisations (RFMOs), such as the International Convention for the Conservation of Atlantic Tunas (ICCAT) (South Africa is a member) and Indian Ocean Tuna Commission (IOTC) (South Africa is not a member, but a co-operating party) (Department of Environmental Affairs and Tourism (DEAT) 2004, 2005, 2007).

Since South Africa is not traditionally a tuna fishing nation, foreign flagged vessels were once again allowed into the fishery in 2005 on the following basis: a) South Africanisation and transformation would occur through a step-wise increase in employment of local crew; b) skills would be transferred to South African fishers; and c) all foreign flagged vessels would re-flag to South Africa in a period of one year (DEAT 2004, 2005, 2007). The element of re-flagging is being reviewed by the Department of Environmental Affairs and Tourism.

This fishery currently operates out of Cape Town, Durban and Richards Bay (Sauer et al. 2003, Fig 1). South African vessels typically undertake trips of 15 days’ and Asian vessels of 45 days’ duration. Fishing takes place predominantly on the continental shelf along the west coast and on the Agulhas Bank, although some fishing activity takes place off the east coast, especially in summer. Average annual fishing effort in 2005 was approximately 4 million hooks.

HAKE LONGLINE FISHERY

An experimental demersal longline fishery targeting Kingklip *Genypterus capensis* in the continental shelf waters around South Africa was initiated in 1983 (Japp 1993). Due to concern over the sustainability of the Kingklip resource the fishery was closed in 1990. In 1994, a five-year experimental longline fishery directed at Cape hakes *Merluccius capensis* (mainly inshore) and *M. paradoxus* (mainly offshore) was started. During this period the number of active vessels varied between 32 and 71 (Japp 1993, Japp & Wissema 1999). This fishery operates out of Cape Town, Mossel Bay and Port Elizabeth (Fig. 1) and typically undertakes trips of approximately six days in duration. In 1998, this fishery became commercial and has remained so until the present. Fishing typically takes place along the continental shelf along the western and southern coasts in depths of 100–600 m (Japp 1993, Japp & Wissema 1999). In 2007, the Total Allowable Catch (TAC) for hakes was 135 000 mt, divided between the trawl (90%), longline (6.6%) and handline (3.4%) sectors (Brandao et al. 2002, Butterworth & Rademeyer 2005, DEAT 2005b).

PATAGONIAN TOOTHFISH LONGLINE FISHERY

Experimental longline fishing by five South African-flagged vessels for Patagonian toothfish commenced within the Prince Edward Islands’ EEZ in October 1996 after observations and reports of considerable illegal fishing. It has been estimated that Illegal, Unreported and Unregulated (IUU) fishing vessels removed over 26 000 tonnes of toothfish from the Prince Edward Islands EEZ in the five-year period from July 1996 to June 2001, with as many as 13 IUU vessels operating at one time. In 1996, a quota of 1200 tonnes was divided equally among five licensed vessels and 1663 tonnes were caught. A quota of 2500 tonnes, or 500 tonnes a vessel, was set for the 1996/97 CCAMLR (Commission for the Conservation of Antarctic Marine Living Resources) fishing season. The vessel quota was thereafter reduced in stages to 450 tonnes for the whole EEZ for the 2000/01 season. During the short history of this fishery the total catch and catch per unit effort have both dropped dramatically and fish size caught has been reduced, as has the licensed catch quota.



Fishing takes place within the 200-nautical mile Exclusive Economic Zone surrounding the Prince Edward Islands (falling within FAO Fishing Area 51, Subareas 58.6 and 58.7 and Division 58.4.4). Longlining is concentrated on sea mounts with depths generally not exceeding 1500 m. At times, South African flagged vessels have fished outside the EEZ in FAO Subarea 58.6 and Area 51. Most vessels used the single-line system with autobaiters. One vessel used the Spanish (double-line) hand-baited system.

DEMERSAL TRAWL FISHERY

The demersal trawl fishery for hake is the most valuable fishery in South Africa (FAO 2001) and comprises two sectors: an offshore, deep-sea sector and an inshore sector (Payne 1989). Seabird bycatch is considered to be negligible in the inshore sector. The offshore trawl fishery started in the 1890s, mainly targeting Agulhas *Austroglossus pectoralis* and West Coast *A. microlepis* sole (Payne 1989). In the mid 1940s, annual catches were 1 000 t, which increased to 50 000 t by 1950 and had reached 115 000 t by 1955 (Sauer et al. 2003).

During the 1960s, foreign vessels entered the fishery and catches escalated to a million tonnes per year. The International Commission for the Southeast Atlantic Fisheries (ICSEAF) was established in 1972, to investigate and control the international fisheries for hake off South Africa and Namibia (Sauer et al. 2003). Most hake caught were juvenile fish and in 1975 the minimum mesh size was increased from 102 to 110 mm.

Between 1977 and 1992 the stocks collapsed. South Africa declared its 200 nautical mile (nm) EEZ in 1977 which reduced the number of foreign trawlers operating in South African waters by 25% (Sauer et al. 2003). Individual quotas were first granted in 1979, the bulk being allocated to the two major companies. In 1985 a policy was introduced to broaden access to the fishery, resulting in the number of participants increasing from seven in 1986 to 21 in 1992.

Post 1992 saw major changes in quota allocations and the entry of new participants from previously disadvantaged communities (Sauer et al. 2003). The number of participants in the deep-water sector increased to 56 in 2000. In 2005 there were 79 vessels in the fleet which undertook approximately 60 000 trawls. The CPUE decreased fourfold from 1955 to

1997 (Sauer et al. 2003). Vessels operate mostly out of Cape Town and Saldanha Bay (near Cape Columbine) and typically undertake 6 day trips.

Seabird bycatch in South African Fisheries

PELAGIC LONGLINE FISHERY

Twelve species of seabird have been confirmed incidentally caught by this fishery, nine of which are considered threatened. Data from 1998-2005 show that birds were caught at an average rate of 0.44/1000 hooks, resulting in an average of 2 900 birds killed per year decreasing from approximately 5 900 in 1998 to 1 800 in 2005 (Petersen et al. 2008). Three techniques for extrapolating total seabird mortality were investigated and little difference between estimates found. White-chinned Petrels *Procellaria aequinoctialis* were caught most commonly (68.9%) at a rate of 0.30/1000 hooks (1 650 killed each year).

Albatrosses made up 30.3% of the bycatch or 0.14/1000 hooks. Three species were recorded in significant numbers: shy-type (mostly White-capped *Thalassarche steadi*) (0.09/1000 hooks, 600 per year), Black-browed *T. melanophrys* (0.02/1000 hooks, 125 per year) and Indian Yellow-nosed Albatrosses *T. carteri* (0.01/1000 hooks, 85 per year) (Petersen et al. 2008). Generalised linear models were used to explain bycatch patterns and revealed that individual vessel is the most important explanatory variable, followed by vessel flag, moon phase, season, sea state, the use of a tori line, time of set, area and bathymetry (Petersen et al. 2008). Most birds (88%) were caught by Asian flagged tuna directed vessels (72% of albatrosses and 97% of petrels). Asian tuna directed vessels caught seabirds at a rate of 0.51/1000 hooks (0.58/1000 hooks in winter and 0.14/1000 hooks in summer) compared to South African swordfish directed vessels which caught seabirds at a rate of 0.23/1000 hooks (0.22/1000 hooks in winter and 0.24/1000 hooks in summer) (Petersen et al. 2008).

More birds were caught during full moon (1.07/1000 hooks) compared to new moon (0.09/1000 hooks). Albatrosses were mainly caught on the Agulhas Bank and along the continental



shelf, especially in the Atlantic Ocean. Petrels, especially White-chinned Petrels, were caught on the Agulhas Bank, but had a higher catch rate along the east coast of South Africa (Petersen et al. 2008). Although there were subtle differences between species, all species were more likely to be caught in the austral winter and spring (June to October). Estimates of the numbers of birds killed per year are lower than previous studies. The improvement was most likely linked to the termination of the foreign bilateral agreements, as well as improved awareness among fishers linked to ongoing education campaigns. Some of the apparent decrease in catch rate could reflect reduced numbers of birds at sea, as a result of ongoing population decreases in several key species (Petersen et al. 2008).

HAKE LONGLINE FISHERY

Based on observer data from 1998 to 2005, seabirds were caught at a rate of 0.008/1000 hooks and seabirds were killed at a rate of 0.003/1000 hooks (Petersen et al. 2008). Generalised linear modelling revealed a significant decrease in catch rate from 0.033/1000 hooks in 2000 to 0.001/1000 hooks in 2006 (Petersen et al. 2008). The White-chinned Petrel *Procellaria aequinoctialis* was the most commonly caught species (36%) at a rate of 0.003/1000 hooks. Albatrosses comprised 5% of the total catch and were caught at a rate of 0.0004/1000 hooks (Petersen et al. 2008). Only yellow-nosed albatrosses *Thalassarche chlororhynchus/carteri* were identified. Shearwaters were caught at a rate of 0.001/1000 hooks and comprised 17% of the catch. Cape Gannets *Morus capensis* were caught at a rate of 0.001/1000 hooks and comprised 17% of the catch (Petersen et al. 2008). An estimated total of 225 (range 220–245) birds are killed per year by this fishery. 'Vessel', area and light conditions were all significant predictors of seabird bycatch (Petersen et al. 2008). Counts of seabirds associated with fishing vessels revealed White-chinned Petrels to be the most common species, followed by Great Shearwaters *Puffinus gravis* and Pintado Petrels *Daption capense* (Petersen et al. 2008).

PATAGONIAN TOOTHFISH LONGLINE FISHERY

During the six-year period 1996/97 to 2001/02, estimated annual catch rate in the sanctioned fishery decreased from 0.29/1000 hooks to 0.001/1000 hooks, and the numbers of

birds killed declined from 911 in the first year to only three in the last (and zero in South Africa's EEZ in 2006-2008), despite an increase in fishing effort in the early years. The marked improvement in mortality rates is thought due to a gain in fishing experience, improved compliance with mitigation measures, especially night-setting, and the fact that increased fishing effort in the more recent years took place at greater distances from the islands, where catch rates have been lower. Fifty-five percent of sets were made during the day in the first year of the fishery, decreasing to 1% in 2001/02. Mortality rates were significantly higher on day sets for albatrosses and giant petrels but not for White-chinned Petrels.

Overall, observers reported that 1 840 birds of 12 species were killed from 23 million hooks set, at an average rate of 0.08/1000 hooks. Most (80%) birds killed were White-chinned Petrels *Procellaria aequinoctialis*. Most other species were killed in the first year of the fishery, notably 126 Grey-headed Albatrosses *Thalassarche chrysostoma*. Most birds were killed during their summer breeding seasons, although Grey Petrels *Procellaria cinerea* were killed during winter months, when they breed. Most birds killed were breeding adults, assumed to have come from the Prince Edward Islands (as supported by a number of band returns). The only immature birds were giant petrels *Macronectes* spp. Albatrosses were caught closer to the islands than were White-chinned Petrels *Procellaria aequinoctialis*. Most petrels were foul-hooked, whereas albatrosses tended to be caught by the bill.

DEMERSAL TRAWL FISHERY

At least 30 birds were killed in 190 hours of dedicated observations of demersal trawl warps in the hake fishery during 2004 and 2005 (Watkins et al. 2008). Most were killed when their wings were entangled around the trawl warp and they were dragged under by the force of the water passing over the warp. Albatrosses were killed most frequently: shy-type albatrosses *Thalassarche cauta/steady* (43% of all birds killed) and Black-browed Albatrosses *T. melanophrys* (37%), with smaller numbers of White-chinned Petrels *Procellaria aequinoctialis* (10%), Cape Gannets *Morus capensis* (7%) and Sooty Shearwaters *Puffinus griseus* (3%) (Watkins et al. 2008). Mortalities occurred mainly during dumping of fishery wastes, and were more frequent in winter, when more birds attended fishing vessels. Average mortality rates were 0.56



(95% CI 0.32-0.82) birds killed per hour during dumping in winter; 0.21 (0.07-0.38) during dumping in summer, and 0.09 (0.02-0.19) when not dumping in winter (Watkins et al. 2008). No birds were killed in the absence of dumping in summer. Albatrosses suffered a disproportionately high mortality rate, with 15% of birds dragged under drowning, compared to 4% of all other species. Deaths resulting from entanglement in fishing nets mainly affected Cape Gannets *Morus capensis*, and

occurred at an average rate of 3.0 (0.9-5.4) birds per 100 trawls (n=331 trawls) (Watkins et al. 2008). Serious warp incidents were independent of age among albatrosses, but there was a tendency for immature gannets to have a higher interaction rate than adults. Crude extrapolation suggests that total mortality is some 18 000 (8 000-31 000) birds per year, of which 85% are killed on warps and 15% entangled in nets (Watkins et al. 2008).



3. Current mitigation of incidental Seabird mortality



Longline fisheries

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.

“TORI” OR BIRD-SCARING LINE

A tori or bird-scaring line 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. The streamers are designed to cover the point where the bait enters the water and distract 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. It is therefore important to ensure that longline gear sinks to below at least 10 m while under the protection of the tori line. The system works well for surface feeding birds, however, diving birds can still dive down to the bait outside

of the effective area of the streamers. Still, 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.

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) (Fig.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.

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

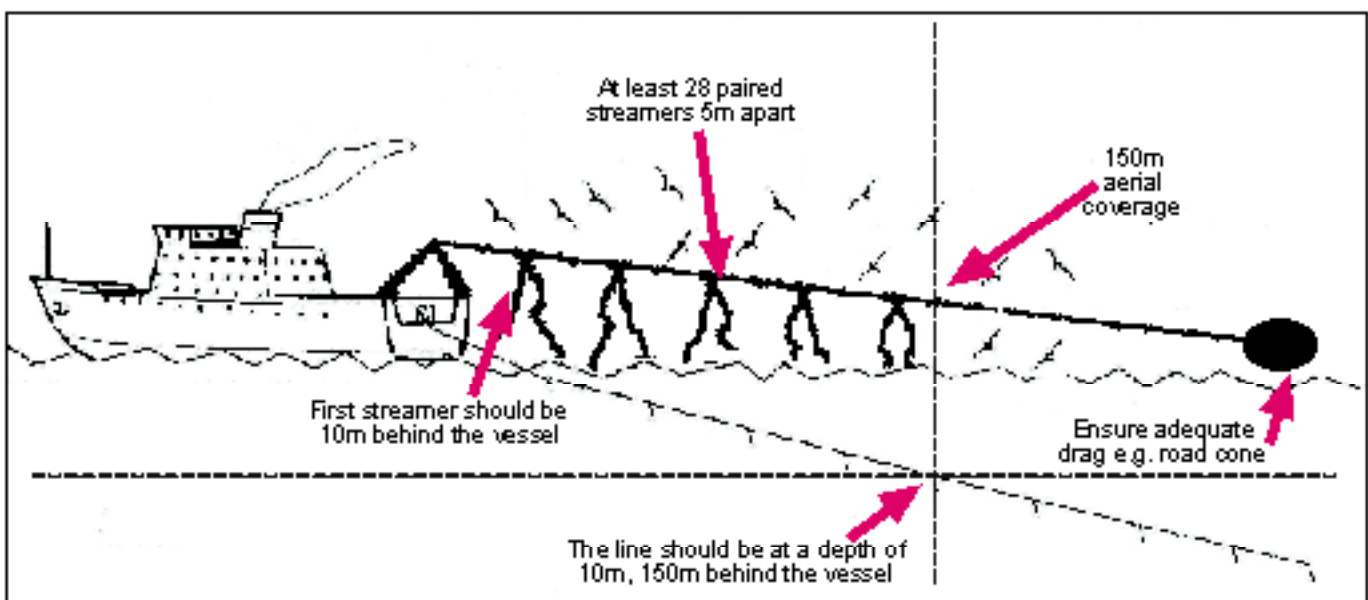


Figure 2: Bird-scaring line and longline sink rate specifications



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. Streamers shall be placed at least 5 m intervals along the entire aerial section of the line. The erratic movement of the streamers increases their efficacy. Attaching light sticks to streamers may increase the efficacy of the bird-scaring line when setting at night.

Vessels operating in the CCAMLR Convention area are to fly the bird-scaring line specified below:

1. The aerial extent of the streamer line, which is the part of the line supporting the streamers, is the effective seabird deterrent component of a streamer line. Vessels are encouraged to optimise the aerial extent and ensure that it protects the hookline as far astern of the vessel as possible, even in crosswinds.

2. The streamer line shall be attached to the vessel such that it is suspended from a point a minimum of 7 m above the water at the stern on the windward side of the point where the hookline enters the water.
3. The streamer line shall be a minimum of 150 m in length and include an object towed at the seaward end to create tension to maximise aerial coverage. The object towed should be maintained directly behind the attachment point to the vessel such that in crosswinds the aerial extent of the streamer line is over the hookline.
4. Branched streamers, each comprising two strands of a minimum of 3 mm diameter brightly coloured plastic tubing or cord, shall be attached no more than 5 m apart commencing 5 m from the point of attachment of the streamer line to the vessel and thereafter along the aerial extent of the line. Streamer length shall range between minimums of 6.5 m from the stern to 1 m for the seaward end. When a streamer line is fully deployed, the branched streamers should reach the sea surface in the absence of wind and swell. Swivels or a similar device should be

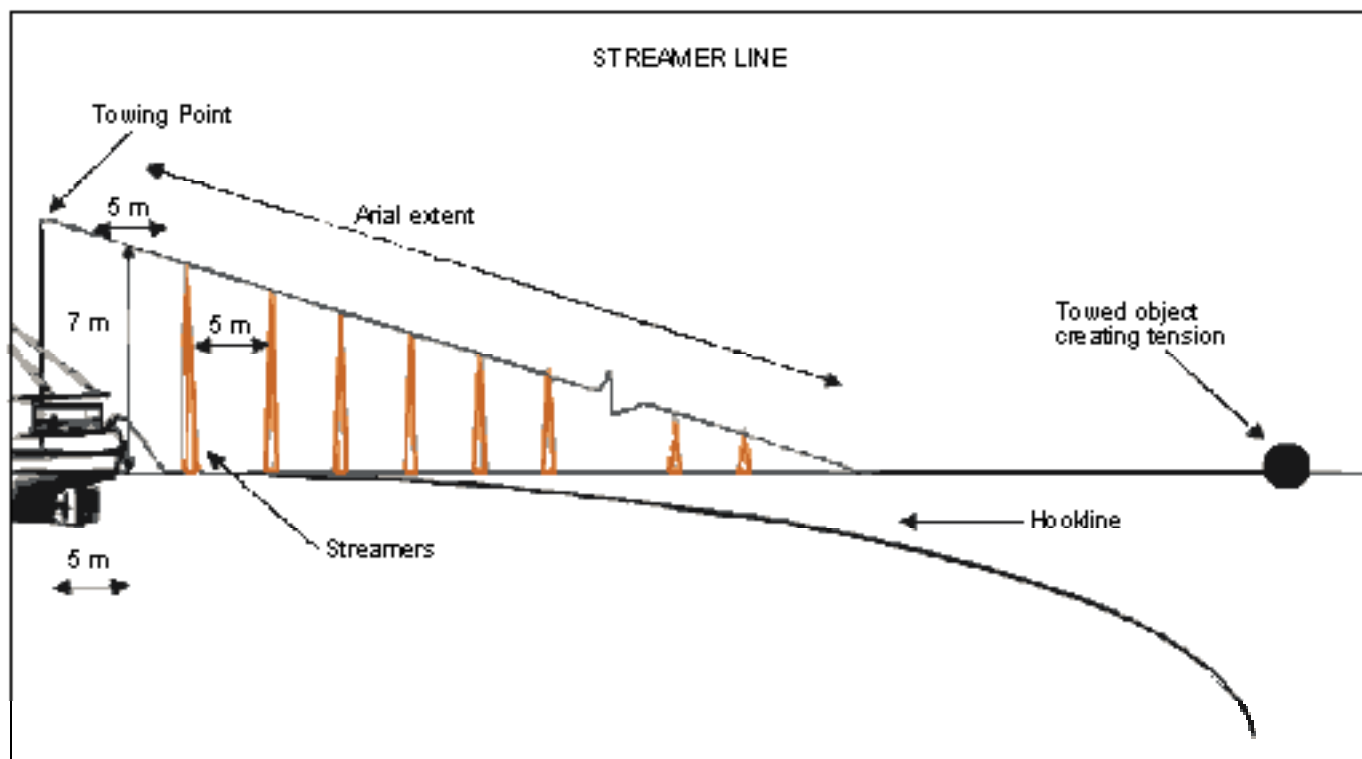


Figure 3: CCAMLR specified tori line



placed in the streamer line in such a way as to prevent streamers being twisted around the streamer line. Each branched streamer may also have a swivel or other device at its attachment point to the streamer line to prevent fouling of individual streamers.

5. Vessels are encouraged to deploy a second streamer line such that streamer lines are towed from the point of attachment each side of the hookline. The leeward streamer line should be of similar specifications (in order to avoid entanglement the leeward streamer line may need to be shorter) and deployed from the leeward side of the hookline.
6. Plastic tubing should be of a type that is manufactured to be protected from ultraviolet radiation.

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, one 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 demersal and pelagic longlining (Brothers et al. 2001, Anderson and Mcardle 2002, Robertson et al. 2003, Moreno et al. 2006, Honig and Petersen 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).

Pelagic longlining: Optimal line sink rates of $0.3 \text{ m}\cdot\text{s}^{-1}$ are a requirement of the South African longline fishery, yet gear configurations to achieve this sink rate have not been established. Five gear configurations were investigated (Petersen et al. 2008): the American longline system using no weighted swivel, 60 g and 120 g weighted swivels, the use of a wire trace and the Asian pelagic longline system. None of these weighting regimes achieved $0.3 \text{ m}\cdot\text{s}^{-1}$ consistently. The fastest line sink rates were achieved by the addition of a 120 g

weighted swivel (average $0.35 \text{ m}\cdot\text{s}^{-1}$). However, the relative improvement from 60 g (average $0.24 \text{ m}\cdot\text{s}^{-1}$) to 120 g may not warrant the additional cost and may further compromise crew safety (Petersen et al. 2008).

Similar studies have been conducted in pelagic longline fisheries operating off New Zealand (Anderson and Mcardle 2002) and Australia (Brothers et al. 2001). These studies found that during normal line setting using unweighted branchlines a considerable proportion of hooks were within the known diving range of a number of seabirds frequenting these vessels (Brothers et al. 2001, Anderson and Mcardle 2002). The addition of a 60 g swivel weight within 1-2 m of the hook attained a line sink rate of $0.45 \text{ m}\cdot\text{s}^{-1}$. This results in the hook being out of the reach of most seabirds, excluding Sooty Shearwaters, after 30 seconds (it was estimated that the bird-scaring or tori line provided protection for 29.3 sec) (Anderson and Mcardle 2002). Brothers et al. (2001) found that the heavier the weight, and the closer it is to the hook, the more rapidly it will sink. In this study, sink rates of $0.26 \text{ m}\cdot\text{s}^{-1}$ to $0.30 \text{ m}\cdot\text{s}^{-1}$ were attained using either an 80 g weight within 3 m of the hook, or a 40 g weight at the hook. However, for such line weighting regimes to be effective in reducing seabird bycatch, they need to be deployed in conjunction with an effective bird scaring or tori line.

Demersal longlining for hake – Various weighting regimes (4, 6, 8 kg weights spaced at 40, 50 and 60 fathoms) have been investigated locally for this fishery which uses the Spanish double longline system (Petersen et al. 2008). No significant difference was found in the sink rate to 2 m, 5 m, 10 m and 15 m for dropper lines between weighting regimes. However, there was a significant difference in the sink rate for the portion of the line near the weight. 4 kg weights sank significantly slower than the 6 kg weights which in turn sank slower than the 8 kg weight (Petersen et al. 2008). There was no significant difference in the catch rate of hake *Merluccius* spp. between the dropper (84.73/1000 hooks) and the weight (100.53/1000 hooks), but there was a significant increase in the catch rate of Kingklip, the three most commonly caught demersal sharks (Short-spine Spiny Dogfish *Squalus mitsukurii*, Yellow-spotted Catshark *Scyliorhinus capensis* and Izak Catshark *Holohalaelurus regani*) and the most commonly caught skate (Biscuit Skate *Raja straeleni*) near weights compared to near droppers (Petersen et al. 2008). Thus while hake catches are unlikely to



be reduced by increased weighting, other vulnerable species of fish, shark and skate may be affected. Given that relatively few birds are caught in this fishery off South Africa, the increased impact on non-target fish species may outweigh the potential benefits of increased weighting on reduced seabird bycatch (Petersen et al. 2008).

Demersal longlining for Patagonian toothfish – Demersal longline vessels fishing for Patagonian toothfish are required by the CCAMLR regulations to achieve a line sink rate of at least 0.3 m.s⁻¹. This is done by attaching 8.5 kg weights every 40 m or 6 kg weights every 20 m on the line. Autoliners are recommended to attach a 5 kg weight every 50-60 m and vessels using an internally weighted line must achieve a sink rate of 0.2 m.s⁻¹. CCAMLR fisheries conservation measure 24-02 (CCAMLR 2005) requires vessels to demonstrate a sink rate of 0.3 m.s⁻¹ prior to commencing fishing on each fishing trip in non territorial waters using either time-depth recorders or the “bottle test”. Details of these tests may be found on the CCAMLR website (www.ccamlr.org). Each vessel has to demonstrate that its line sinks at the prescribed rate before it may commence fishing.

FROZEN VERSUS THAWED BAIT

Thawed baits sink more rapidly than frozen baits. In experiments conducted on Japanese pelagic longliners, Brothers et al (1998) 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 sufficient to 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 Hawaiiin 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 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 seabird 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. 2008) (Fig 4).

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 for mitigating seabird mortality in the fishery.

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



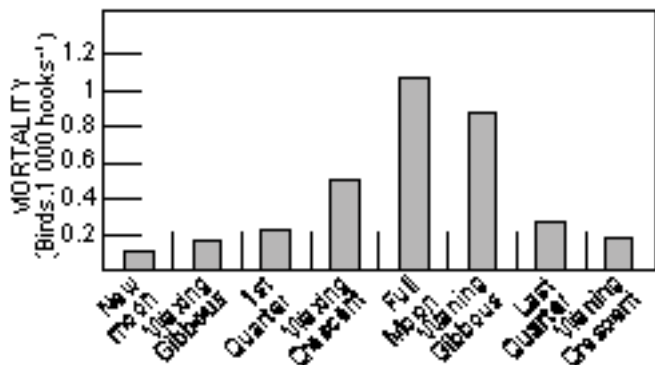


Figure 4: The effect of moon phase on seabird mortality, 1998–2005.

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 of birds.

CONCLUSION

There is no single solution, but rather a suite of measures that should be used in combination to mitigate seabird bycatch. The choice may differ from fishery to fishery depending on gear configuration, preferred operation and species complexes involved. Fisheries regulations in South Africa address seabird bycatch; however two issues remain unresolved. Firstly, line sink rate trials need to be completed in order to advise on appropriate measures in this regard. Secondly, implementation of these regulations has been poor and requires improved enforcement.

Trawl fisheries

MODIFIED, PAIRED BIRD-SCARING OR TORI LINE

Bird-scaring or tori lines towed alongside warps deter birds from entering the area where most collisions occur. In the Falklands, it has been shown that paired tori lines reduce seabird mortality by up to 80%. Initial trials conducted in South Africa suggest that a pair of bird-scaring lines set over the warps greatly reduce the numbers of birds entering the danger zone where the warps enter the water.

Bird-scaring lines are cheap and easy to use. They should be deployed outside of both warp cables and attached to the stern at the maximum practical height above the water line. Each line should consist of 30-50 m of rope with a buoy or road cone attached at the seaward end for tension, and should be deployed such that the seaward end enters the water at least 10 m behind the point at which the trawl warp enters the water (Fig 5). Each bird-scaring line should have at least six streamers (preferably of 10-17 mm diameter garden hose to prevent possible entanglement with warps) attached at intervals of no more than 2.5 m, commencing 5 m from the stern. Each streamer should reach the water's surface in calm sea conditions. The bird-scaring lines should be deployed after shooting and retrieved prior to hauling to minimize entanglement, but must be flown during trawling. Discarding of offal should not occur during setting.

OFFAL MANAGEMENT

Albatrosses and petrels are opportunistic scavengers and fishing vessels processing at sea and discarding offal provide a feeding opportunity for these birds. To reduce numbers of birds following fishing vessels, discarding any item of an edible nature, even cardboard packaging should be avoided during setting. Managing fishery discards is an important way to reduce seabird mortalities. By reducing fishery discards the incentive for seabirds to forage behind fishing vessels is reduced. Albatrosses, which are particularly vulnerable to trawl warp collisions, prefer whole fish. The following options could be considered to manage discards:

- a) Freeze discards into blocks
 - Pro: No discharge or discharge in a form unpalatable to seabirds
 - Con: Storage, freezing capacity reduced, trip length reduced
- b) Fishmeal
 - Pro: Definitive solution
 - Con: Expensive, vessel refitting, additional storage for meal and anti-oxidant
- c) Interim waste storage
 - Pro: Discharge when no gear deployed
 - Discharge at night or trawl by trawl
 - No significant modification to vessel stability
 - Con: Storage requirements, design may be limiting
 - Complications of fish held over from previous haul
 - Sacrifice storage



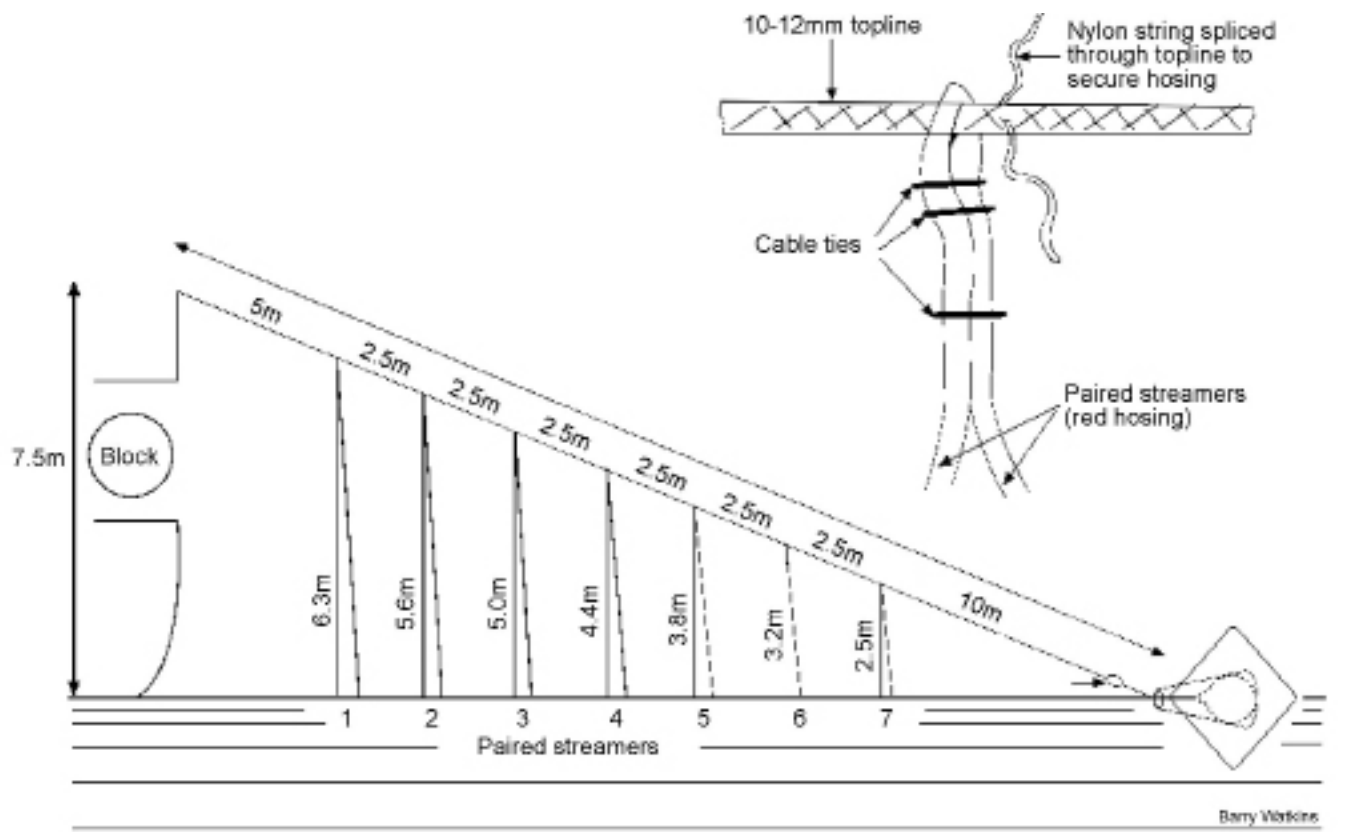


Figure 5: Trawl bird-scaring line specifications

- d) Mincing of fish to a small particle size
 - Pro: Reduces intensity of foraging behaviour
 - Waste in a form that increases dispersal of waste
 - Minimal space and factory design change
 - No storage or change to vessel stability
 - Con: Discharge attracts seabirds to danger area of warps
 - Seabirds may adapt foraging cues
 - Tolerance of mincer to hard objects (rocks etc.)
- e) Discharge minced offal under pressure from the side of the vessel
 - Pro: Water jet to 5m from side of vessel
 - Discharge through pipe mounted on a boom
 - Con: Discharge in front of warps – interactions may occur
 - Strong winds may limit water jet
- f) Discharge minced offal underwater
 - Pro: Discharge in front of propeller
- g) Discharge minced offal via floating hose astern
 - Pro: Minced discharge out of danger zone
 - Low pump pressure required
 - Pipe blockage accessible
 - One of cheapest options
 - Con: Possible prop entanglement
 - Retrieve prior to hauling
- h) Permanent storage on board (in 'liquid' form)
 - Utilizing empty fuel tanks and "pickling" of minced offal by adding food acids and salt
 - Pro: No discharge: no attraction to seabirds
- Prop wash discharge astern of warps
- Discharge by pipe fitted to vessel side
- Con: Hauling vessel stationary or moving backwards: discard in net area
- Prop wash may upwell in danger zone
- Pipe blockage to be fixed in port
- Expensive



- Stability, fuel and storage capacity not effected
 - Con: Potential contamination of fuel tanks
 - Storage of hazardous chemicals on board
 - Logistics balancing fuel consumption to waste production
- i) Discharge in a form unattractive to seabirds
- Offal minced and cooked at 70°C: stock water and bones piped overboard
 - Pro: Unpalatable to seabirds
 - Batch processing less storage
 - Con: Expensive
 - Two tanks: one for filling and one for “cooking”

CONCLUSION

Since seabird bycatch in trawl fisheries has been identified relatively recently, it is likely that refinement and development of mitigation measures will take place in coming years.

Fisheries monitoring programme

Fisheries scientific observers collect valuable information on the seabird bycatch which allows a detailed analysis of both the number of seabirds killed as well as how, where and when they were killed. It is imperative that observers are adequately trained to ensure correct species identification. This has been highlighted as a short-coming in the past (Petersen et al. 2008) and should be addressed in future initiatives. Observers can also play a role in educating fishers and demonstrating

mitigation measures at sea. Furthermore, observers can play a key role in monitoring compliance. For example, observers in South African fisheries report that tori lines were only used on 51% of sets in the pelagic longline fishery and 9% in the demersal longline fishery (Petersen et al. 2008). This has the implication that tori lines are less likely to be used when observers are not present. Compliance improved to 73% of sets in 2005 when improved observer coverage was the result of a condition placed on joint-venture vessels operating in the fleet. Similar improvements in compliance with improved observer coverage have been reported elsewhere (Gales et al. 1998). Even though observers are not onboard to bring about compliance, their mere presence is likely to have an effect. Increasing observer coverage is therefore likely to be important to increase compliance.

For South African flagged vessels, permit holders are to ensure that a minimum of 20% of all fishing days per quarter are monitored by an on board observer. Foreign flagged vessels operating under joint venture agreements are required to carry an on board observer on all fishing days (i.e. 100% observer coverage). The toothfish fishery currently also operates at 100% observer coverage under CCAMLR regulations. Failure to comply with this regulation shall result in the initiation of proceedings under section 28 of the Marine Living Resource Act of 1998 (Act No 18 of 1998) (MLRA). The observer shall be responsible to collect seabird bycatch data at sea and to return whole specimens of all seabirds killed during fishing operations. The observer shall also monitor all fishing operations, record any transgressions of the MLRA, and from time to time conduct mitigation trials.





4. Legislation and Policy

International

The concept of an ecosystem approach to fisheries (EAF) has been widely accepted as a preferred manner of managing fisheries and is entrenched in various international legal instruments and policy statements. This is perhaps most aptly illustrated in the 2002 World Summit on Sustainable Development (held in Johannesburg, South Africa) and the Johannesburg Plan of Implementation, which urged states to apply an Ecosystem Approach to Fisheries by 2010 (UN 2002).

The 1982 United Nations Convention on the Law of the Sea (UNCLOS) is the principle 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 populations of such associated or dependent species above levels at which reproduction may become seriously threatened” (Article 61, paragraph 4). South Africa ratified UNCLOS in 1997.

The more recent UN Fish Stocks Agreement¹ (UNFSA) of 1995, developed under the auspices of UNCLOS, is more explicit in its endorsement of an EAF. It requires member States to “...minimize...catch of non-target species, both fish and non-fish species ... and impacts on associated or dependent species, in particular endangered species, through measures including, to the extent practicable, the development and use of selective, environmentally safe and cost-effective fishing gear and techniques” (Article 5).

South Africa has ratified the UNFSA. This Agreement is important because several species targeted by means of longlines within South Africa’s EEZ’s are in fact straddling and/or highly migratory species (tunas, swordfish

and sharks). The UNFSA asserts that coastal States and States fishing for straddling stocks and highly migratory species in the adjacent areas have a “duty to co-operate for the purpose of achieving compatible measures in respect of such stocks.” (Article 7, paragraph 2).

In 1995 the Food and Agriculture Organisation of the United Nations (FAO) adopted a Code of Conduct for Responsible Fisheries (<http://www.fao.org/fi>). This code explicitly endorses an ecosystem approach to fisheries management and considers the integrity of the entire ecosystem and promotes the development of gear and techniques which maintain biodiversity and conserve vulnerable populations. Moreover, it advocates minimising waste, catch of non-target species and impacts on associated or dependent species. The code, although not legally binding, provides internationally accepted guidelines for the development and implementation of national fisheries policies, including the use of species selective gear. South Africa is a signatory to this Code of Conduct.

The FAO has further endorsed the need to reduce bycatch of vulnerable species through the development of International Plans of Action (IPOA’s) for both seabirds and sharks. Under this process individual countries are required to develop National Plans of Action (NPOA’s) that demonstrate the measures that individual countries will take to reduce impacts to these vulnerable suites of species. The NPOA-seabirds is an undertaking aimed at reducing mortalities of seabirds in longline fishing to insignificant levels and the NPOA sharks was developed as a result of the increasing commercial and bycatch takes of pelagic shark species, and the awareness of the vulnerability of these apex predators to fishing.

The Convention for Migratory Species (CMS) has recognised that migratory species are particularly vulnerable to bycatch in fisheries and require cohesive international efforts to curb these impacts. In this regard, the CMS has been instrumental in developing international Agreements and Memoranda of Understanding (MOU’s) that specifically address the issue of bycatch of seabirds and sea turtles. These include the 2002 Agreement on the Conservation of Albatrosses and Petrels (ACAP). South Africa was instrumental in the development of this Agreement and was a founder signatory.

¹ Full name: Agreement for the implementation of the provisions of the UN Law of the Sea Convention relating to the conservation and management of straddling fish stocks and highly migratory fish stocks. Also referred to as the Fish Stocks Agreement.



Regional

Regional fisheries management organisations (RFMOs) of relevance to South Africa include: the International Convention for the Conservation of Atlantic Tunas (ICCAT) (South Africa is a member), the Indian Ocean Tuna Commission (IOTC) (South Africa is a co-operating non-member), the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) (South Africa is a co-operating non-member), the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) (South Africa is a member) and the South East Atlantic Fisheries Organisation (SEAFO) (South Africa is a member).

ICCAT and IOTC which entered into force in 1969 and 1996, are responsible for the management of tuna and billfish fisheries throughout the Atlantic and Indian Oceans respectively. Their mandate covers tuna and tuna-like species. Recent resolutions addressing seabird bycatch have been adopted. In the case of ICCAT, resolutions on seabirds were adopted in 2002 (Resolution 02-14) after initial proposals in 2001 and 2002. The resolution encourages members to collect data on seabird interactions, urges members to implement NPOA-seabirds, and resolves that the Scientific Committee will report to the Commission on the impact of incidental mortality on seabirds 'when feasible and appropriate'. The Scientific Committee has encouraged members to include experts on seabirds at its meetings (ICCAT 2003b, 2004b), and in 2003 and 2004 the Scientific Committee made a recommendation to the Commission that ICCAT hire a bycatch coordinator (ICCAT 2004b, ICCAT 2004a). ICCAT also has a bycatch sub-committee which addresses bycatch issues. The IOTC has established a Working Party on Data Collection and Statistics, which considered bycatch issues in December 2001 at its Third Session (most notably of sharks) and recommended that an observer scheme be adopted. In 2002 the IOTC resolved to establish a Working Group on Ecosystems and Bycatch (WGEB). A resolution concerning seabirds (06/04) and a recommendation on incidental mortality of seabirds (05/09) caught in association with fisheries managed by IOTC have been adopted.

CCSBT which entered into force in 1994 applies to Southern Bluefin Tuna *Thunnus maccoyii* and has the objective of ensuring

the conservation and optimum utilization of the species through appropriate management. The Convention recognizes ecologically related species as living marine species, including seabirds that are associated with Southern Bluefin Tuna. The Commission of the CCSBT established an Ecologically Related Species Working Group (WG-ERS) in 1995, with terms of reference, inter alia, that it "... provide advice on measures to minimize fishery effects on ecologically related species, including but not limited to gear and operational modifications". At the first meeting of the WG-ERS use of bird-scaring lines was promoted (with the Working Group adopting guidelines for their design and deployment), as was the avoidance of dumping offal during both setting and hauling. Collection of data on mortality of seabirds from longlining for Southern Bluefin Tuna was to commence in 1995. At its Third Annual Meeting, in February 1997 the Commission recommended that Parties to the CCSBT adopt a suite of mitigation measures to reduce seabird mortality by longliners fishing for Southern Bluefin Tuna. At its Fourth Meeting in September 1997, the Commission adopted the proposal of the WG-ERS that use of bird-scaring lines (described as "Tori poles") be mandatory for vessels of Parties south of 30° South, and requested their use north of this.

CCAMLR came into force in 1982 following signature in 1980. The Convention, and its Commission, aims to take an ecosystem approach to conserving marine living resources in the Southern Ocean that will maintain ecological relationships and prevent or minimize risks of changes not potentially reversible within two to three decades. In 1989 the Commission first noted the problem of seabird mortality in longline fisheries in the Southern Ocean and urged its Members to introduce mitigation measures as soon as possible. In 1991 it adopted its first mitigation measure: the requirement to use bird-scaring "streamer" lines. CCAMLR's *ad hoc* Working Group on Incidental Mortality Arising from Longline Fishing (WG-IMALF, now WG-IMAF) was established in 1993. It annually reviews information on seabird mortality from longline fishing within the CCAMLR Area and estimates the total numbers of birds killed each year by both sanctioned and IUU fishing for toothfish *Dissostichus* spp. It recommends conservation measures to reduce such mortality to the Commission via the Scientific Committee (Conservation measure 25-02). In 1994 its proposals to restrict line setting to night-time and not to dispose of offal during line setting were adopted by



the Commission. From 1997, the Commission postponed the opening of the longline fishing season in international waters, including in the vicinity of the Prince Edward Islands, successively from 1 March to 1 May in 2002, with it closing on 31 August. In the Prince Edward Islands EEZ, fishing is year round: the idea for this is that licensed vessels act as a deterrent to illegal, unregulated and unreported fishing. CCAMLR adopted its catch documentation scheme (CDS) in 1999, and it became binding on CCAMLR Members in May 2000. The CDS aims to monitor and certify international trade in toothfish in an effort to reduce IUU fishing, which is expected in turn to lead to a reduction in seabird mortality.

SEAFO which came into force in 2003 is responsible for managing fisheries operating on the high seas in the Southeast Atlantic (FAO Statistical Area 47). The application of an ecosystem approach is a cornerstone of the guiding principles (Article 3 c, d, e and f) of this modern convention, which includes a plan for a regional observer programme (with seabird bycatch data included in data collection protocols) as well as a regional enforcement system that will include both port and at-sea inspections (SEAFO 2001). SEAFO will manage non-tuna fish stocks, such as alfonso, orange roughy, armourhead, wreck fish, deepwater hake and red crab. At present longline fisheries managed under this agreement are negligible.

Recently South Africa, Angola and Namibia signed an agreement formally to establish the Benguela Current Commission (BCC), allowing for greater harmonisation of management of marine resources between the national jurisdictions of the three countries within the Large Marine Ecosystem (LME). The institutional structures of the BCC include an Ecosystem Advisory Committee that will advise the Commission on the “ecological sustainable use” of the Benguela Current LME. The Benguela Current Commission is the culmination of over 10 years of shared efforts by scientists from Angola, Namibia and South Africa.

National

In South Africa, the principle Act guiding the utilization of living marine resources is the Marine Living Resources Act 1998 (Act No. 18 of 1998). This Act explicitly endorses the concept of

“ecological sustainable development” and recognizes the need to “protect the ecosystem as a whole, including species which are not targeted for exploitation...”, (Sections 2a and e) as its guiding principles. Furthermore, in the General Policy on the Allocation and Management of Long Term Commercial Fishing Rights (2005), the South African government commits itself to “implementing an Ecosystem Approach to Fisheries Management by 2010”.

All seabirds affected by South African longline and trawl fisheries are protected in terms of the Sea Birds and Seals Protection Act 1973 (Act No. 46 of 1973). This Act prohibits the killing, capture or willful disturbance of seabirds unless sanctioned in terms of a permit issued by the Minister of Environmental Affairs & Tourism or a delegated representative. Furthermore, the South African Policy on the Management of Seals, Seabirds and Shorebirds (2007) commits the government to adopt “plans of action to reduce the incidental mortality of seabirds, seals and shorebirds caused by fishing operations”.

Various measures to mitigate seabird bycatch have been included in South African fisheries regulations through permit conditions. These permit conditions are reviewed on an annual basis.

PELAGIC LONGLINE PERMIT CONDITIONS

1. The vessel must have onboard an approved tori line, which must be flown during the setting of each longline. A tori line must achieve at least 150 m aerial coverage. It must be attached to the vessel at least 7 m above sea level, be at least 150 m long and have at least 28 paired streamers spaced 5m apart (commencing 10 m astern the vessel). There must be sufficient drag (e.g. buoy, road cone or sea-anchor). Streamers (minimum requirement) for all vessels other than those operating in CCAMLR Convention Area: 6 pairs of 4 m; 6 pairs of 3 m; 8 pairs of 2 m; 8 pairs of 1 m (i.e. a total of 28 pairs of streamers).
2. Both the main line and branch lines (snood) must be properly weighted to ensure optimal sinking rates (approximately 0.3 m.s⁻¹ or to reach a depth of 10 m, 150 m behind the vessel).
3. Offal dumping must take place on the opposite side of the vessel from that on which the lines are hauled. No dumping of offal may take place during setting.



4. Deck lighting should be kept to a minimum, without safety being compromised. All deck lights should be shaded in such a way that the beam is directed down towards the deck.
5. All bait must be properly thawed, and where necessary, the swim bladder punctured to ensure the rapid sinking of bait.
6. All birds caught must first be brought on board and thereafter any live birds should be released.
7. The start and completion of line setting shall be conducted at night only; defined by the period between nautical dusk and nautical dawn (compulsory for tuna permit holders, voluntary for swordfish permit holders)
8. The Permit Holder is restricted to a seabird mortality limit of 25 birds per year irrespective of vessel replacements. Once this limit is reached the Permit Holder is required to stop fishing for the remainder of the year, unless the Permit Holder can show that it complied with permit conditions 3 and 6 for very set made. Compliance to these measures shall be determined by the seabird mitigation checklist which is completed by both the skipper and the observer on a daily basis when an observer is on board. In addition, the onus is on the Permit Holder to: 1) Have the vessel inspected by a Fishery Control Officer prior to each departure to ensure that an approved tori line and bird de-hooking device are on board; and 2) Ensure that the skipper(s) and officers undergo a one day training course from Birdlife South Africa, before 1 July 2008, on how to effectively reduce seabird mortality.
9. Permit Holders which have reached their seabird mortality limit of 25 birds and have complied with all the necessary mitigation measures as stated above (point 8) may continue fishing subject to authorisation from the Department. This authorisation is only valid for a further 25 seabirds and on condition that the Permit Holder complies with the following additional seabird mitigation measures: 1) setting shall only be conducted at night as defined between nautical dusk and nautical dawn; and (2) Either no setting shall be conducted one day before and one day after full moon (i.e 3 days around full moon) or the Permit Holder would have to demonstrate line sink rates in excess of 0.3m/sec. Failure to comply with permit conditions in point 8 and the additional mitigation measures will result in the termination of fishing for the remainder of the year. No further exemptions will be

granted once the additional 25 seabird limit has been reached.

HAKE LONGLINE PERMIT CONDITIONS

1. Longlines shall be set at night only (i.e. during the hours of darkness between the times of nautical twilight).
2. During longline fishing at night, only the minimum ship's lights necessary for safety shall be used. All deck lights should be shaded in such a way that the beam is directed down towards the deck.
3. Dumping of offal must be minimised and must take place only on the opposite side of the vessel from that on which lines are hauled. No dumping of offal may take place during setting.
4. Fishing operations shall be conducted in such a way that hooklines (defined as the groundline or mainline to which the baited hooks are attached by snoods) sink beyond the reach of seabirds as soon as possible after they are put in the water. The Department is undertaking tests to determine the optimal line weighting regime for local conditions and full specifications will be published once the tests have been completed. The following specifications from CCAMLR serves as a guideline in the interim: Vessels using autoline systems should add weights to the hookline or use integrated weight hooklines while deploying longlines. Integrated
 5. weight (IW) longlines of a minimum of 50 g/m or attachment to non-IW longlines of 5 kg weights at 50 to 60 m intervals are recommended. Vessels using the Spanish method of longline fishing (double line) should release weights before line tension occurs. Weights of at least 8.5 kg mass, spaced at intervals of no more than 40 m, or weights of at least 6 kg mass spaced at intervals of no more than 20 m are recommended.
 6. The Permit Holder must ensure that the vessel has a streamer line (tori line) onboard. The streamer line/s shall be deployed during longline setting to deter birds from approaching the hookline. The streamer line shall be a minimum of 150 m in length and include an object (buoy, road cone or sea-anchor) towed at the seaward end to create tension to maximise aerial coverage. The object towed should be maintained directly behind the attachment point to the vessel such that in crosswinds



the aerial extent of the streamer line is over the hookline. Streamer length shall range between minimums of 6.5 m from the stern to 1 m for the seaward end. When a streamer line is fully deployed, the branched streamers should reach the sea surface in the absence of wind and swell. Swivels or a similar device should be placed in the streamer line in such a way as to prevent streamers being twisted around the streamer line. Each branched streamer may also have a swivel or other device at its attachment point to the streamer line to prevent fouling of individual streamers. Vessels are encouraged to deploy a second streamer line such that streamer lines are towed from the point of attachment each side of the hookline

7. Every effort should be made to ensure that birds captured alive during longlining are released alive and that wherever possible hooks are removed without jeopardising the life of the bird concerned.
8. All banded birds killed must be retained whole (frozen or on ice) and returned to port. Other birds killed must be retained, either whole (preferable) or heads and feet (the heads and feet from each bird to be tied together) and returned to port. On landing the birds must be handed over to the Fishery Control Officer.
9. No fishing hooks, fishing line or plastics may be discarded.

PATAGONIAN TOOTHFISH PERMIT CONDITIONS

CCAMLR Conservation Measure 25-02 (2002) is a permit condition for all licensed South African vessels irrespective of the area they are operating within. The regulations may be summarized as:

1. A bird-scaring line to CCAMLR specifications shall be used during the setting of longline gear
2. Line setting to be only undertaken at night (defined by between nautical dusk to dawn)
3. No offal to be discarded during line-setting
4. Fish hooks to be removed from offal and fish heads prior to discharge
5. Offal to be jettisoned on the opposite side of the ship from the hauling station

6. Appropriate line weighting (6 kg weights at no more than 20 m intervals, or 8.5 kg weights at no more than 40 m intervals for the Spanish system). Otherwise, solid steel weights of at least 5 kg mass should be used, spaced at intervals of no more
7. Vessels using autoline systems should add weights to the hookline, or use integrated weight (IW) hooklines while deploying longlines. IW longlines of a minimum of 50g.m⁻¹ or attachment to non-IW longlines of 5 kg weights at 50-60 intervals are recommended.
8. A device designed to discourage birds from accessing baits during the haul of longlines shall be deployed (This does not apply to all CCAMLR areas but it does apply to our EEZ).

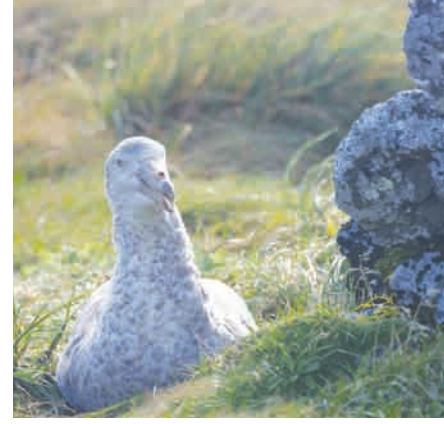
From 1997, fishing has not been allowed within five nautical miles of the Prince Edward Islands, increased to eight nautical miles and finally to 12 nautical miles (and not between the two islands in the group).

HAKE TRAWL PERMIT CONDITIONS

1. A tori line should be outside of both warp cables. The tori lines should be attached to the stern at the maximum practical height above the water line
2. Each tori line should consist of 30-50 m of rope with a buoy or road cone attached at the seaward end for tension, and should be used such that the seaward end enters the water at least 10m behind the point at which the trawl warp enters the water.
3. Each tori line should have at least six paired streamers (preferably of 10-17 mm diameter garden hose to prevent possible tangling with warps) attached at intervals of no more than 2.5 m, commencing 5 m from the stern. Each streamer should reach the water surface in calm sea conditions.
4. The tori lines may be used after shooting and brought in prior to hauling to minimise entanglement, but must be flown during trawling.
5. Discarding of offal should not occur during the shooting of the trawl gear. Offal discards attract seabirds and during shooting tori lines cannot be used.



5. Actions



Prescription of mitigation measures

The over-riding principle of this NPOA is that each South African longline and trawl fishery has in place a set of prescribed mitigation measures aimed at reducing seabird mortality to less than the interim target of 0.05 birds/1000 hooks or 0.05 birds/trawl day per vessel. These measures will be reviewed at regular intervals, both in terms of their efficacy and of research and developments in mitigation methods on a global scale.

Mitigation methods included in permit conditions should describe the method clearly and concisely. In general, fisheries regulations should be defined by gear configuration and fishing operation rather than by the desired outcome. This facilitates both accurate implementation and enforcement. For example, foreign flagged vessels which do not add weights to their lines are often in breach of the regulation to achieve a line sink rate of $0.3 \text{ m}\cdot\text{s}^{-1}$. A compliance officer cannot enforce this regulation without the use of a time depth recorder to calculate the line sink rate.

To facilitate enforcement, this permit condition should rather be defined by the gear configuration tested to achieve a desired line sink rate, for example 60–120 g weight placed 2 m from the hook (Brothers et al. 2001, Petersen et al. 2008). At present this is not the case for the South African pelagic longline fishery and this requires addressing. Alternatively, vessels could be required to demonstrate that they meet the desired line sink rate prior to entering the fishery. A precedent for this exists in CCAMLR fisheries conservation measure 24-02 (CCAMLR 2007) which requires vessels to demonstrate a sink rate of $0.3 \text{ m}\cdot\text{s}^{-1}$ prior to commencing fishing.

Research and development

Following the FAO's IPOA-Seabirds, South Africa should undertake research and development on the issue of seabird mortality in longline and trawl fisheries to:

- (i) develop practical and effective deterrent devices,

- (ii) improve technologies and practices to reduce incidental capture of seabirds, and
- (iii) evaluate the effectiveness of mitigation measures.

Research of relevant aspects of the biology and conservation management of the affected species of seabirds should also continue.

Education, training and publicity

Low compliance is frequently the result of a lack of understanding of the life history characteristics of seabird populations (Bergin 1997, Robertson 1998, Gilman 2001). Fishers, who are accustomed to catching less vulnerable species, perceive the relatively low catch rates of seabirds as insignificant (Robertson 1998). Seabirds are opportunistic scavengers attracted to fishing vessels as they discard fisheries waste (Brothers et al. 1991, 1999a,b, Bergin 1997), often in large numbers, creating the impression to fishers that seabirds are plentiful. For effective implementation of mitigation measures it is essential to educate fishers (Bergin 1997) about the fact that seabird populations are indeed declining at unsustainable rates due to their K-selected life history traits (Warham 1996, Croxall & Gales 1998, Gales 1998). Compliance with the use of tori lines improved dramatically from virtually non-existent to approximately 50% in the longline fishery partly as a result of an education programme launched in South Africa in 2004.

Awareness materials should include both the conservation aspects of the problem and the economic benefits of reducing bait loss to birds (in the case of longline). To date, relatively little activity has taken place within South Africa in this regard with fishers, or with other groups, and activities undertaken to date have almost exclusively been by BirdLife and the WWF Responsible Fisheries Programme. The Department of Environmental Affairs and Tourism, through its branch Marine and Coastal Management, recently supported and encouraged bycatch awareness campaigns and is working collaboratively with WWF-South Africa's Responsible Fisheries Programme and BirdLife to this end.



The following activities should be undertaken at regular intervals:

- (i) training of fisheries observers in seabird identification and the use of mitigation measures,
- (ii) training of fishers on an Ecosystem Approach to Fisheries management and in particular the use of mitigation measures required in fishing permits,
- (iii) training of compliance staff in seabird identification, mitigation measures and enforcement,
- (iv) distribution of seabird identification and mitigation booklets to observers, skippers and compliance staff,
- (v) production of a set of seabird posters by the BirdLife International Seabird Conservation Programme, sponsored by Irvin & Johnson, Ltd, and
- (vi) writing articles on an ad hoc basis for commercial fishing and environmental magazines, giving of media interviews to radio, TV and press, and filming of TV programmes.

Data collection

In order to assess regularly the levels of seabird mortality and to ascertain the levels of compliance with prescribed mitigation measures, it is necessary to run an onboard observer scheme in longline and trawl fisheries known to cause seabird mortality. Such observers are to be properly trained. Although trawl fisheries carry fisheries observers on 20% of fishing trips, they spend their time collecting data in the factory and would therefore not capture seabird bycatch data in their current activities. It is essential that observer protocols for trawl fisheries be adapted to include warp observations to capture seabird interactions. Suggested activities are described below, for which the design and usage of standardised procedures and recording forms are required.

COLLECTION OF DATA ON SEABIRD MORTALITY

The following requirements are to be met:

- (i) observer schemes for longline and trawl fisheries will continue to operate at the 20% minimum and 100% for toothfish and foreign flagged vessels, the cost of these schemes to be borne by the respective fisheries,
- (ii) observers must aim to observe a minimum of 75% of

hooks on each set (but preferably higher) and in the case of trawlers, one trawl per day for the duration of the trip preferably when discarding is taking place. The remainder of the time the observer is in the factory collecting fisheries data and out of sight of seabird mortality.

- (iii) A data collection protocol should be developed for trawlers. Since seabirds are seldom hauled onboard warp observations would need to be conducted from a position on the trawl deck which would allow the observer to observe the area where the warp enters the water. The warps need to be observed during setting and when offal is being discarded during trawling. Interactions should be recorded for warp interactions (collision and drownings) and net entanglements. Information relating to fishing operation (setting, trawling or hauling) and the level of discarding (whole fish, macerated fish, no discarding etc) when mortality occurred should be recorded.
- (iv) all seabird corpses brought aboard all fishing vessels (not only those with observers aboard) must be kept for examination ashore after suitable packaging and deep-freezing, along with information on vessel name, observer name, species' identification, presence of markings such as metal or colour bands, how it was hooked (e.g. swallowed hook or foul-hooked) (longline) or warp/net (trawl), position and date. If storage space is limiting, then as a minimum, the head, legs + feet and any bands present must be retained from each corpse,
- (v) information on birds killed including species, age class should be collected,
- (vi) information on mitigation measures used and their efficacy should be collected,
- (vii) information on birds caught alive must be kept including species, age class and sex ideally by photographic record, presence of markings such as metal and colour bands, how it was hooked or entangled, condition on release (healthy, sick-looking, injured, etc.), position, date, and
- (viii) on a voluntary basis information on species and numbers occurring during setting and hauling may be kept, along with information on attack rates of bait, foraging methods and interactions between species.
- (ix) a system is to be put in place to allow for the handing over of seabird corpses on docking for examination.



COLLECTION OF FISHING DATA

The following is to be collected, *inter alia*, in order to allow for an estimation of seabird catch rates in relation to mitigation measures in place:

- (i) In the case of trawling, the numbers of trawls per day should be recorded. In the case of longlining the number of sets and numbers of hooks per set, hook spacing, line length and baiting percentage,
- (ii) fishing positions (coordinates at the beginning and end of fishing), depths, course settings, wind directions during setting (for trawling, wind direction not restricted to setting), sea and meteorological conditions, and dates,
- (iii) start and finish times and vessel speeds during setting and hauling (longline) and during setting, trawling and hauling (trawl),
- (iv) descriptions and usage of prescribed and any other mitigation measures, including descriptions of streamer lines in use (single or paired, overall length, height of deployment, number and lengths of streamers etc.), weighting regimes (mass and interval of weights), offal discharge (timing in relation to setting and hauling, position on the vessel), deck-lighting regimes (usage, brightness, direction), and
- (v) assessments by a sampling regime of the numbers of hooks and entangled lines discarded attached to fish heads, etc.

Addressing poor compliance

Adhering to regulations is a combination of enforcement and voluntary compliance (Brothers et al. 1999a). The latter is essential because not all vessels can be inspected at all times.

INCENTIVES

To encourage voluntary compliance, skippers should be made aware of the conservation status of these animals. They also need to be included in the decision making processes to ensure that mitigation and management measures implemented are practical and cost-effective and have the support of the fishing industry from the start. Incentives for compliance should include increased access to rights and quota allocations

for those fishing responsibly. Eco-labels such as the Marine Stewardship Council and the Sustainable Seafood Initiative can also encourage voluntary compliance (May 2003, Jacquet & Pauly 2007). As consumers become more aware of the threats to the world's oceans, so they begin to use their discretion when making the choice of which products to purchase (May 2003, Jacquet & Pauly 2007). Fishing industries which act responsibly are more likely to secure a market advantage than those who do not. The South African hake trawl fishery has Marine Stewardship Council certification. Addressing bycatch was a condition placed on this certification. Tori lines and offal management requirements were implemented in the trawl fishery in 2006 and compliance was estimated to be 80% during the day within the first two years (B. Watkins pers. comm.). This is a substantial improvement from the situation in the longline fishery where virtually no compliance for the first ten years was observed, and is largely attributable to the Marine Stewardship Council certification highlighting the role eco-labels and market driven forces can play in implementing solutions.

ENFORCEMENT

It is important that the cost of non-compliance and risk of being caught be sufficiently high to outweigh the benefit. This is frequently not the case in South African fisheries where penalties implemented for breaking bycatch related regulations are insignificant and fall short of acting as an incentive to comply. Penalties need to be brought in line with the commercial interests of the fishery to act as a disincentive. This alone is likely greatly to facilitate implementation of mitigation measures.

A further option is the setting of upper precautionary catch limits, beyond which fishing may cease. Such limits should ideally be placed per vessel rather than across a fleet. In all cases 'vessel' was the best predictor of mortality (Petersen et al 2008). Bycatch is not evenly distributed throughout the fleet, with a handful of vessels responsible for killing the majority of seabirds (Petersen et al. 2008), a finding consistent with Klaer and Polacheck (1998). Setting upper precautionary catch limits can therefore act to eliminate problem vessels or force compliance with mitigation measures. It can also act as an incentive for skippers to comply, because a vessel complying with regulations is unlikely to reach an appropriately set upper precautionary catch limit and thus likely to continue fishing



unhindered by the limit. A 25 bird per vessel limit has been placed on the South Africa Large Pelagic Longline sector since January 2008.

Conclusion

The single biggest challenge facing conservationists and fisheries managers to overcome and reduce bycatch in longline and trawl fisheries in South African waters is addressing the low voluntary compliance to mitigation measures. The harsh reality

is that although win-win situations should be sought, they occur infrequently. Even for seabirds, where there are cost-effective, practical solutions that operate in the economic interest of the fishery, seabirds continue to be killed and their populations continue to decrease (BirdLife International 2007). Every effort should be made to understand the problem, find cost-effective, practical solutions, educate fishers, include them in decision making processes and ensure incentives. Experience has shown that these will only take compliance so far, after which effective enforcement is necessary.



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7. Selected references

- BARNES, K.N., RYAN, P.G. and C. BOIX-HINZEN. 1997. The impact of the hake *Merluccius* spp. longline fishery off South Africa on procellariiform seabirds. *Biological Conservation* 82: 227-234.
- BIRDLIFE INTERNATIONAL. 2007. IUCN Red List of Threatened Species. www.iucnredlist.org. BRANDAO, A., BUTTERWORTH D.S., WATKINS, B.P. and D.G.M. MILLER. 2002. A first attempt at an assessment of the Patagonian toothfish (*Dissostichus eleginoides*) resource in the Prince Edward Islands EEZ. *CCAMLR Science* 9: 11-32.
- BROTHERS, N.P. 1991. Albatross mortality and associated bait loss in the Japanese longline fishery in the Southern Ocean. *Biological Conservation*. 55: 255-268.
- BROTHERS, N.P., COOPER, J. and S. LØKKEBORG. 1999a. The incidental catch of seabirds by longline fisheries: worldwide review and technical guidelines for mitigation. Preliminary version. FAO Fisheries Circular No. 937. Food and Agriculture Organization of the United Nations, Rome. 99pp.
- BROTHERS, N.P., GALES, R. and T. REID. 1999b. The influence of environmental variables and mitigation measures on seabird catch rates in the Japanese tuna longline fishery within the Australian Fishing Zone 1991-1995. *Biological Conservation* 88: 85-101.
- BROTHERS, N.P., GALES, R. and T. REID. 2001. The effect of line weighting on the sink rate of pelagic tuna longline hooks, and its potential for minimising seabird mortalities. Nature Conservation Branch, Department of Primary Industries, Water and Environment, Tasmania. Unpublished report.
- CROXALL, J.P. and R. GALES. 1998. An assessment of the conservation albatrosses. In: *Albatrosses biology and conservation*. Robertson G and R Gales (eds). Surrey Beatty & Sons, Chipping Norton. pp 46-65.
- DEAT 2004. Government Gazette. Republic of South Africa. Vol 465. No. 26176. Invitation to apply for commercial rights to undertake commercial fishing of large pelagics (tuna and swordfish) using a longline in terms of section 18 of the Marine Living Resource Act, 1998.
- DEAT 2005. Government Gazette. Republic of South Africa. Vol 477. No. 27359. Policy for the allocation of commercial fishing rights: Large Pelagic longline Sector.
- DEAT 2007. Government Gazette. Republic of South Africa. Vol 510. No. 30535. Draft policy and application forms concerning the allocation and management of the longterm fishing rights in the large pelagic (tuna and swordfish) sector.
- FAO. 2003. Fisheries management 2. The ecosystem approach to fisheries. FAO technical guidelines for responsible fisheries 4, supplement 2. Food and Agriculture Organization of the United Nations, Rome. 112pp.
- GALES, R. 1998. Albatross populations: status and trends. In: *Albatross biology and conservation*. Robertson, G. and R. Gales (eds). Surrey Beatty & Sons, Chipping Norton. pp 20-45.
- KLAER, N. and T. POLACHECK. 1998. The influence of environmental factors and mitigation measures on by-catch rates of seabirds by Japanese longline fishing vessels in the Australian region. *Emu* 98: 305-316.
- MELVIN, E.F. and G. ROBERTSON. 2000. Seabird mitigation research in longline fisheries: status and priorities for future research and actions. In: *Albatross and Petrel Mortality from Longline Fishing*. Cooper, J (ed). International Workshop, Honolulu, Hawaii, USA, 11-12 May 2000. Report and presented papers. *Marine Ornithology* 28: 179-182.
- MELVIN, E.F., SULLIVAN, B., ROBERTSON, G. and BWIENECKE. 2004. A review of the effectiveness of streamer lines as a seabird bycatch mitigation technique in longline fisheries and CCAMLR streamer line requirements. *CCAMLR Science* 11: 1-13.
- NEL, D.C., RYAN, P.G. and B.P. WATKINS. 2002. Seabird mortality in the Patagonian toothfish longline fishery around the Prince Edward Islands, 1996-2000. *Antarctic Science* 14: 151-161.
- ROBERTSON, G. 1998. The culture and practice of longline tuna fishing: implications for seabird by-catch mitigation. *Bird Conservation International* 8: 211-221.
- RYAN, P.G. and C.L. MOLONEY. 1988. Effect of trawling on bird and seal distributions in the southern Benguela region. *Marine Ecological Progress Series* 45: 1-11.
- RYAN, P.G. and C. BOIX-HINZEN. 1998. Tuna longline fisheries off southern Africa: the need to limit seabird bycatch. *South African Journal of Science* 94: 179-182.
- RYAN, P.G., KEITH, D.G. and M. KROESE. 2002. Seabird bycatch by tuna longline fisheries off southern Africa, 1998-2000. *South African Journal of Marine Science* 24: 103-110.
- PETERSEN, S.L. and M.B. HONIG. 2005. A practical guide



to understanding and reducing vulnerable bycatch. BirdLife and WWF Responsible Fisheries Programme, Stellenbosch. 103pp.

PETERSEN, S.L. 2008. Understanding and Mitigating Vulnerable Bycatch in southern African Trawl and Longline Fisheries. Submitted phd thesis. University of Cape Town.

WATKINS, B.P., PETERSEN, S.L. and P.G. RYAN. In press. Interactions between seabirds and deepwater hake (*Merluccius* spp) trawl gear: an assessment of impacts in South African waters in 2004-2005. Animal Conservation.





8. Additional reading

Mitigation measures still under refinement: longline

UNDERWATER SETTING CHUTE

Baited hooks may be set below the surface using a funnel fitted to the stern of the vessel, which guides the line directly from the vessel to below the water surface (Ryan and Watkins 2002). The system still requires refinement and is not widely used. A South African toothfish vessel used this system in 1998-2000 with some success, indicating its potential use (Ryan & Watkins 2002). At present funnels are designed mainly for a single line system however; investigations are underway to modify the system to accommodate the double line system. Gilman et al. (2005) demonstrated a 100% reduction in seabird bycatch levels in the Hawaiian pelagic longline fishery although later demonstrated less success. There have been serious problems with its effectiveness reported especially when entanglements occur and cause the line to lie on the surface for extended periods of time (Gilman et al. 2002), resulting in higher than normal mortalities of seabirds. A study conducted in Australia reported 0% reduction (AFMA unpublished data)

UNDERWATER SETTING CAPSULE

This method is similar to the underwater setting chute. In this case, baited hooks are deployed in a capsule attached to a cable, which is designed to open at a depth of 5-10 m and release the baited hook (Brothers et al. 2000). As with the underwater setting chute, line entanglements have been reported to occur. Further testing and modification is underway (G Robertson pers. comm.).

SIDE SETTING

This method requires the line to be set from the side of the vessel resulting in hooks sinking by the time they reach the stern of the vessel. This method was tested in combination with 60 g weights and a "bird curtain" (pole out the side with streamers) in the Hawaiian pelagic longline fishery and found

to reduce the incidental mortality of Laysan and Black-footed Albatrosses up to 100% (Gilman et al. 2003). This method is currently employed in the Hawaiian and Australian pelagic longline fleet (Gilman et al. 2003). It needs wider testing in a number of localities with other species complexes (e.g. deeper diving species).

FISH OIL

This method won the WWF "Smart Gear" award in 2005 for the most innovative idea to reduce seabird mortality. It has been tested in the Spanish and New Zealand demersal longline and some success has been demonstrated. Fish oil is released on the surface of the water during setting and has been shown to reduce seabird activity in the vicinity of the vessel (www.wwf.org).

DYED BAITS

Dying baits blue so that they are less visible to seabirds was investigated as a measure to reduce seabird deaths. A number of studies were conducted and reported mixed successes (Gliman et al. 2003, 2005). Gliman et al. (2003) found a 95% reduction in mortality of Laysan and Black-Footed Albatrosses in Hawaii, but in a later study they found it less successful (63% reduction) than side-setting. This method is more successful using squid rather than fish bait. At this stage this method is not practically feasible as there is no commercially available dye and it is a rather messy job (Gilman et al. 2005).

BAIT CASTING MACHINE

This measure has the potential to reduce bird bycatch because a) bait can be cast outside turbulent area caused by the propeller theoretically resulting in an increased line sink rate, b) bait can be cast into area protected by a tori line and c) bait can be cast in varying positions to avoid concentrations of seabirds. Where direction and distance can be altered, Brothers (1993), in a study conducted in the South East Indian Ocean, showed a reduction in the level of seabird bycatch by 50% when the bait caster was used in combination with a tori line and thawed bait. Since this study conflicting results have been reported (e.g. Brothers 1999).



Mitigation measures tested and found ineffective: longline

LIVE BAIT

The concept of using live versus dead bait was investigated. It was thought that live fish would actively swim down from the surface. Observations suggest that fish may also swim to surface and thus be ineffective as a mitigation method. Brothers et al. (1999b) compared catch rates of live versus dead bait and found little evidence of a reduction in seabird catch rates

WATER CANNON

This method involves the use of a high-pressure fire hose that produces directed high-pressure water above baited hooks and thus deters seabirds from baited hooks. This method was tested by the Japan Tuna Fisheries Co-operative Associations in 1997, although its effectiveness against seabird bycatch was not quantified. The distance reached was considered inadequate and insufficient to avoid incidental capture of seabirds on its own (Kiyota et al. 2001). According to the observer the cannon was switched off due to cold water affecting crew (Brothers, Cooper & Lokkerborg 1999)

Future possibilities: longline

HOOK DESIGN

It has been suggested that hook designs (J-hooks, circle-hooks) have differing influences on seabird bycatch rate (Borneo workshop report 2005). However, little or no work to investigate this has been conducted to date.

Mitigation measures still under refinement: trawl

DEVICE AROUND WARP ENTRY POINT

When albatrosses are competing for food, they typically sit on the ocean with their wings open. This behaviour increases their risk of entanglement with the warp cable. By placing a ring or a buoy at the point where the warp enters the water, seabirds could be kept away from this high risk area and thus reduce seabird mortality. Trials are being conducted attaching a PVC tube of 100mm diameter around the warp. Limitations include the height of the swell.

FALKLAND ISLAND WARP SCARER

This measure consists of a series of karabiner-style devices joined by a length of square netting. A brightly coloured hose (streamer) hangs from each karabiner into the sea to scare birds from the warp. Each streamer should reach the surface of the water in calm conditions. The Warp Scarer is deployed after shooting and retrieved prior to hauling, and while trawling it is in operation it is held in position by two ropes ('lazy lines') tied-off to the stern of the vessel. This measure was developed and tested in the Falkland Islands where it was found to be effective at reducing contacts between seabirds and the warp cable.

OTHER IDEAS

Several plastic or light metal buoys (bright red or yellow) are joined together and attached to the warp by means of a karabiner. This device is attached prior to setting operations and removed once the doors have docked. Once attached, the device slides freely down the cable to where the cable meets the water which is where the majority of fatal collisions occur. The device moves freely up and down the cable with wave surges.



Individual vessel limits greatly reduce seabird mortality on pelagic long-lines

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Running head: Reducing seabird bycatch in a pelagic fishery

Abstract

Accidental mortality on long-lines is one of the main threats facing seabirds. Pelagic long-lines that set their lines in mid-water are especially problematic to mitigate because it is difficult to ensure that lines sink quickly beyond the diving depth of affected seabirds. We report a remarkable success in reducing seabird bycatch in the pelagic fishery operating off South Africa. Foreign-flagged vessels all carried fishing observers. In 2007 these vessels killed at least 1052 seabirds on 3.31 million hooks (0.32 birds per 1000 hooks), all but three of which were listed as globally threatened or near-threatened. A previous study of this fishery suggested that inter-vessel differences accounted for most of the variance in seabird bycatch. Accordingly, a cap of 25 birds per vessel was imposed on the fishery in 2008. Placing the onus on individual vessels to avoid catching birds improved compliance with mitigation measures and reduced seabird bycatch rate more than six fold. The average catch rate in 2008 was only 0.048 birds per 1000 hooks (153 birds killed on 3.17 million hooks), and the vessel with the worst catch rate in 2007 managed to reduce its bycatch rate from 0.82 to 0.04 birds per 1000 hooks in 2008. The use of two well-designed bird-scaring lines, coupled with education of fishers, was largely responsible for reducing seabird bycatch, although fishers may have avoided areas with large numbers of birds. Our study suggests that fishers have the ability to reduce seabird bycatch even on pelagic long-lines provided there is sufficient incentive to do so.

Keywords: bycatch, long-lines, mitigation, enforcement, compliance, albatrosses, petrels, gannets

Introduction

Seabirds have a disproportionately large number of threatened species, and their conservation status has worsened more rapidly than any other group of birds (BirdLife International 2004). The major threat facing many seabirds, including most albatrosses and large petrels, is accidental mortality in long-line fisheries (BirdLife International 2004). Ever since this problem was first reported in the Southern Ocean off Australia (Brothers 1991) considerable effort has been devoted to devising effective mitigation strategies to reduce seabird bycatch on long-lines (e.g. Brothers et al. 1999). Several measures have been identified that reduce bycatch, including the use of an effective bird-scaring line, setting lines at night with minimal deck lighting, thawing bait prior to use and weighting lines to ensure rapid sink rates beyond the depth accessible to most affected seabirds (Løkkeborg 2008). Fishers should embrace these developments because catching birds reduces the efficiency of fishing gear (Brothers 1991), but conservatism among some fishing communities has hampered effective implementation of mitigation measures (Robertson 1998; Cox et al. 2007).

In general, demersal long-line fisheries are more easily adapted to catch few birds because line weighting can be manipulated to ensure rapid sink rates. However, pelagic long-lines that are designed to fish in mid-water are more problematic. South Africa has three main long-line fisheries, all of which killed significant numbers of birds (Barnes et al. 1997; Nel et al. 2002; Ryan et al. 2002). Thanks to the introduction of appropriate permit conditions and ongoing education of fishers by NGOs, both demersal fisheries have reduced their catch rates to less than 0.05 birds per 1000 hooks (Ryan et al. 2006),

the interim target level set for South African fisheries (DEAT 2008). However, efforts to reduce bycatch in the pelagic fishery has been less successful. Bycatch for the period up to 2005 was estimated to be 0.44 birds per 1000 hooks (Petersen et al. 2008, in press). Statistical models of bycatch patterns found that the individual vessel explained most variance in seabird catches (Petersen et al. 2008, in press), so in 2008, the permit conditions were amended to place an individual vessel limit on the numbers of birds killed each year (DEAT 2008). If a vessel killed 25 birds in a year it had to stop fishing and return to port for inspection. It was allowed to continue fishing only if it had adhered to key mitigation measures (night setting and used an approved bird-scaring line) on all sets. Should the vessel then kill a further 25 birds it would lose its permit (see Methods for full details).

Enforcement of this measure required complete observer coverage in the fishery. This was only achieved for foreign-flagged vessels fishing under joint-venture agreements. However, such vessels were responsible for 74% of fishing effort during 2007 and 2008 (8.8 million hooks). We show how the revised regulations improved compliance with mitigation measures and greatly reduced the mortality rates of seabirds, especially on vessels with high catch rates.

Methods

Independent fishery observers were placed aboard all foreign-flagged vessels (from Japan, South Korea and the Philippines) operating under license in the South African pelagic long-line fishery during 2007 and 2008. Administration of this fishery runs from

1 January to 31 December each year. In addition to recording information on effort and fish catches, observers recorded compliance with permit conditions, including mitigation measures adopted to reduce seabird bycatch. In 2007 these were:

1. The start and completion of line setting should be conducted at night only (defined by nautical dusk/dawn);
2. Both the main line and branch lines (snood) must be properly weighted to ensure optimal sinking rates (approximately 0.3 m.s^{-1} or to reach a depth of 10 m, 150 m behind the vessel);
3. The vessel should have onboard an approved bird-scaring line (tori line), which must be flown during setting of each long-line;
4. Offal dumping shall take place on the opposite side of the vessel from that on which lines are hauled. No dumping of offal may take place during setting;
5. Deck lighting should be kept to a minimum, without compromising safety. All deck lights should be shaded so that the beam is directed down towards the deck;
6. All bait must be appropriately thawed, and where necessary, the swim bladder punctured to ensure rapid sinking of bait;
7. All birds and turtles caught alive on the haul should be released.

An approved bird-scaring line has at least 28 paired streamers spaced 5 m apart (starting 10 m astern the vessel), ranging from 4 m long immediately astern the vessel and decreasing to 1 m long. It must be mounted 7 m above the water and have sufficient drag to ensure at least 100 m aerial coverage. The same permit conditions applied in 2008, but with the addition of the following measures:

8. The Permit holder is restricted to a seabird mortality limit of 25 birds per year

irrespective of vessel replacements. Once this limit is reached the Permit Holder shall be required to stop fishing for the remainder of the year unless the Permit Holder can demonstrate that it complied with permit conditions 1 and 3 for every set made.

Compliance to these measures shall be determined by the seabird mitigation checklist which is to be completed by the observer on a daily basis. In addition, the onus is on the Permit Holder to: a) Have its vessel inspected by a Fishery Control Officer prior to each departure to ensure that an approved tori line and bird dehooking device are on board; and b) Ensure that the skipper(s) and officers undergo a one day training course from Birdlife South Africa on how to effectively reduce seabird mortality.

9. Permit Holders which have reached their seabird mortality limit of 25 birds and have complied with all the necessary mitigation measures as stated in permit condition 8 may continue fishing subject to authorization from the Department. This authorization is only valid for a further 25 birds and on condition that the Permit Holder complies with the following additional seabird mitigation measures: Either no setting shall be conducted one day before and one day after full moon (i.e. 3 days around full moon) or the Permit Holder would have to demonstrate line sink rates in excess of $0.3 \text{ m}\cdot\text{s}^{-1}$. Failure to comply with permit conditions 8 and the additional mitigation measures shall result in the termination of fishing for the remainder of the year. No further exemptions shall be granted once the additional 25 seabird limit has been reached.

Data on compliance to permit conditions were summarised from observer reports. Birds killed on lines were labelled by observers and returned to port for identification. In some cases only heads and feet were retained because of the large numbers of birds killed.

Tasmanian and New Zealand populations of Shy Albatrosses *Thalassarche cauta* (*sensu*

lato) are sometimes treated as separate species, with *T. cauta* confined to Tasmania and White-capped Albatrosses *T. steadi* from New Zealand's sub-Antarctic islands. However, they can only be separated reliably by genetic markers, and so were lumped in this study. Both forms reach southern Africa, with the majority being from the New Zealand population (Abbott et al. 2006; Baker et al. 2007).

Seabird bycatch was expressed per 1000 hooks set. As well as for the whole fishery, data were analysed for the International Commission for the Conservation of Atlantic Tuna (ICCAT) and the Indian Ocean Tuna Commission (IOTC) areas (west and east of 20°E, respectively), and inside and outside of the 200 nautical mile South African Exclusive Economic Zone (EEZ). Because individual vessel was the best predictor of seabird bycatch rates in this fishery (Petersen et al. 2008, in press), we compared catch rates by the same vessel between years provided it had set at least 200,000 hooks in each year.

Results

Fishery observers were deployed on 20 foreign-flagged vessels, of which nine vessels fished in both years (accounting for 80% of hooks set). Fishing effort was constant in each year (Table 1), and the areas fished were similar, with most sets along the edge of the continental shelf (Fig. 1). Overall, 84% of hooks were set within the South African EEZ, with the proportion increasing from 2007 to 2008 (Table 1). Effort was concentrated in the IOTC region, where almost all sets were within the EEZ (Table 1). By comparison, most sets in the ICCAT area were made outside the EEZ, with the proportion in the EEZ decreasing from 2007 to 2008 (Table 1). Seasonality of effort

differed between the two years, with most fishing in winter during 2007, and a more even distribution year round in 2008 (Fig. 2).

Fourteen species of seabirds were killed on observed long-line sets during 2007 and 2008 (Table 2). As in previous studies of this fishery (Ryan et al. 2002; Petersen et al. in press), White-chinned Petrels *Procellaria aequinoctialis* were the species killed most frequently (Table 2), but they were outnumbered by Shy Albatrosses in the ICCAT area. There was no change in the ratio of albatrosses to petrels killed between the two years ($\chi^2=1.32$, $P>0.2$). Two species not previously confirmed killed by this fishery were killed during the study, Cape Gannet *Morus capensis* and King Penguin *Aptenodytes patagonicus*. Surprisingly large numbers of gannets were killed, both off the west and south coasts of South Africa. Gannets currently are decreasing off South Africa, apparently as a result of decreased availability of their favoured prey, sardines *Sardinops sagax* and anchovies *Engraulis capensis*, mainly off the west coast of South Africa (Pichegru et al. 2007). They are increasingly resorting to scavenging fishery wastes, and this may account for their sudden appearance on long-lines. Gannets were only killed in coastal waters, mainly off the west coast (0.11 birds per 1000 hooks, vs 0.001 off the south coast). The King Penguin was surprising because it had apparently swallowed the baited hook. Penguins seldom scavenge dead prey, and the few penguins caught on long-lines are usually foul-hooked (e.g. Nel et al. 2002).

The overall bycatch rate was 0.19 birds per 1000 hooks set, but this decreased more than six fold from 2007 (0.32) to 2008 (0.05; Table 2). Most birds were killed in the South

African EEZ (96%), where the bycatch rate (0.21 per 1000 hooks overall; 0.37 in 2007 and 0.05 in 2008) was greater than outside the EEZ (0.04, 0.06 and 0.02, respectively). In 2007, the bycatch rate was greater in the ICCAT area off the west coast (0.41) than in the IOTC area off the east coast (0.30), but there was little difference between the two regions in 2008 (0.04 and 0.05, respectively). However, this was biased by changes in the proportion of hooks set inside the EEZ in the ICCAT area. The highest bycatch rates were recorded inside the EEZ in the ICCAT area (1.00 and 0.14 birds per 1000 hooks in 2007 and 2008, respectively), which were roughly triple those recorded in the EEZ in the IOTC area (0.31 and 0.05, respectively).

Restricting comparisons to vessels that set more than 200,000 hooks in each year showed the same marked decrease between years (Table 3). All six vessels reduced their catch rates from 2007 to 2008 with the vessels with the highest catch rates in 2007 decreasing 10-20 fold (Table 3). Two vessels (2 and 5 in Table 3) exceeded the 25 bird quota during 2008 and had to return to port for inspection. Both were allowed to resume fishing, but neither reached the 50-bird threshold that would have led to their exclusion from the fishery. By comparison, had the same permit conditions applied in 2007, 5 of 13 vessels would have been excluded from the fishery.

Despite being permit conditions in both years, mitigation measures were not implemented in all sets (Table 4). Compliance was greater inside the EEZ in both years, apparently as a result of many permit holders failing to appreciate that mitigation measures applied equally to international waters. The decreases in seabird catch rates from 2007 to 2008

were accompanied by improved compliance with mitigation measures (Table 4). There was a slight increase in the proportion of sets that took place at night ($\chi^2=4.38$, $P>0.05$), and a more marked increase in the proportions of sets with bird-scaring lines ($\chi^2=128.8$, $P>0.001$). In addition, most sets were made with two bird-scaring lines in 2008 (78%), compared with only 5% in 2007. This was a voluntary amendment to fishing operations that was encouraged by Albatross Task Force members visiting vessels prior to sailing. The design of bird-scaring lines also improved. Only one of six vessels examined in 2007 had a bird scaring line that met the recommended specifications, compared with two thirds of vessels in 2008. The vessel with the highest bird catch rate in 2007 achieved the second lowest catch rate in 2008 (Table 3), despite no significant change in the proportion of night sets (88%; $\chi^2=0.91$, $P>0.3$) or sets with bird-scaring lines (99%; $\chi^2=0.60$, $P>0.4$). The improvement in bycatch rates was linked to a switch from one, non-standard bird-scaring line in 2007 to two approved bird-scaring lines in 2008.

Discussion

Almost all of the birds killed on pelagic long-lines off South Africa are globally threatened or near-threatened. Black-browed Albatrosses *Thalassarche melanophris*, Atlantic *T. chlororhynchos* and Indian Yellow-nosed Albatrosses *T. carteri*, and Sooty Albatrosses *Phoebastria fusca* are listed as Endangered, White-chinned Petrels and Cape Gannets as Vulnerable and Shy Albatrosses, Grey Petrels *Procellaria cinerea* and Southern *Macronectes giganteus* and Northern Giant Petrels *M. halli* as near-threatened (BirdLife International 2008). Only Great Shearwaters *Puffinus gravis* and King Penguins (<1% of total bycatch) are listed as least concern. As a result, it is important

that every effort is made to limit seabird bycatch in this fishery. The numbers of birds reported killed are a minimum estimate of the actual impact of the fishery because not all birds killed are hauled aboard (Brothers 1991).

Several effective mitigation measures have been developed over the last two decades to reduce seabird bycatch on long-lines (Cox et al. 2007; Løkkeborg 2008). Although there is no single solution, and best practice varies between regions and fisheries, a combination of measures usually is able to reduce bycatch rates significantly. Managing bycatch in pelagic fisheries is more problematic than in demersal fisheries, because sink rates are less easily manipulated to carry baited hooks below the depth where they are accessible to scavenging seabirds. The pelagic long-line fishery off South Africa has long been recognised as a significant cause of seabird mortality (Ryan & Boix-Hinzen 1998; Ryan et al. 2002). Since the early 2000s, permit conditions have been introduced to reduce seabird bycatch and education programmes established by conservation NGOs have targeted fishers, compliance officers and fishery observers. These measures have helped to decrease bycatch rates from the 1990s to the 2000s (Petersen et al. 2008, in press), but up to and including 2007, bycatch rates remained much higher than the target level set in South Africa's National Plan of Action for Reducing the Incidental Catch of Seabirds in Long-line Fisheries (DEAT 2008).

A major factor in the failure of the pelagic fishery to reduce bycatch rates below the interim target of 0.05 birds per 1000 hooks (DEAT 2008) has been incomplete compliance with permit conditions. It was only once vessels were faced with disruption

to their fishing schedule and the threat of being excluded from the fishery that bycatch rates dropped markedly. The obvious conclusion is that many of the operators of the joint-venture vessels in this study paid little heed to seabird mitigation measures until there was a serious threat to their continued access to the fishery. However, regular visits to vessels by members of BirdLife's Albatross Task Force prior to sailing probably aided the effective implementation of mitigation measures. Task Force members advised fishers on best practices to reduce seabird bycatch, including checking that bird-scaring lines met the approved specifications, and promoting the routine use of two bird-scaring lines.

The compliance data suggest that the use of two well-designed bird-scaring lines was largely responsible for reducing seabird bycatch. However, it is also possible that vessels shifted their effort away from high-risk areas. Effort in the EEZ in the ICCAT area decreased by more than 70% in 2008. This area experienced the highest bycatch rates in 2007, presumably linked to the greater numbers of birds associated with commercial trawling at the shelf-edge between Cape Agulhas and Cape Town (Ryan & Moloney 1988). Even in 2008, when effective mitigation was in place, the seabird bycatch rate in this area (0.14 birds per 1000 hooks) remained above the target level of 0.05 birds per 1000 hooks. If fishing continues in this region, additional mitigation measures may be required. By comparison, the relatively low bycatch rates outside the EEZ suggest that strict adherence to night setting is less critical in these waters where smaller numbers of birds attend vessels, provided two well-designed bird-scaring lines are used.

A recent expert review identified six factors that have helped to reduce seabird mortality in fisheries: incentives, innovation, leadership, science, conservation goals and collaboration (FAO 2008). Incentives were broadly interpreted to include both positive and negative economic incentives, as well as operational and political incentives. Our study strongly suggests that the threat of economic penalties (negative incentives) was necessary to change fishing practices. This strategy is not without its risks, however, as it may cause resentment among fishers. It would be counterproductive if fishers that were annoyed by the threat of punitive measures failed to employ any mitigation measures once out of the scrutiny of fishery observers. In an ideal world, fishers should implement mitigation measures because they are convinced of the importance of the need to conserve seabirds. Our study emphasises the importance of a combination of legislation, enforcement and education in ensuring compliance with mitigation measures, and thus reducing seabird bycatch on long-lines.

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Literature cited

- Abbott, C. L., M. C. Double, G. B. Baker, R. Gales, A. Lashko, C. J. R. Robertson, and P. G. Ryan. 2006. Molecular provenance analysis for Shy and White-capped Albatrosses killed by fisheries interactions in Australia, New Zealand and South Africa. *Conservation Genetics* **7**: 531-542.
- Baker, G. B., M. C. Double, R. Gales, G. N. Tuck, C. L. Abbott, P. G. Ryan, S. L. Petersen, C. J. R. Robertson, and R. Alderman. 2007. A global assessment of the impact of fisheries-related mortality on Shy and White-capped albatrosses: conservation implications. *Biological Conservation* **137**: 319-333.
- Barnes, K. N., P. G. Ryan, and C. Boix-Hinzen. 1997. The impact of the hake *Merluccius* spp. longline fishery off South Africa on procellariiform seabirds. *Biological Conservation* **82**: 227-234.
- BirdLife International. 2004. *Threatened Birds of the World*. BirdLife International, Cambridge, UK.
- BirdLife International. 2008. www.birdlife.org
- Brothers, N. 1991. Albatross mortality and associated bait loss in the Japanese longline fishery in the Southern Ocean. *Biological Conservation* **55**: 255-268.
- Brothers, N. P., J. Cooper, and S. Løkkeborg. 1999. The incidental catch of seabirds by longline fisheries: worldwide review and technical guidelines for mitigation. *FAO Fisheries Circular 937* (100 pp), FAO, Rome.
- Cox, T. M., R. I. Lewison, R. Žydelis, L. B. Crowder, C. Safina, and A. J. Read. 2007. Comparing effectiveness of experimental and implemented bycatch reduction measures: the ideal and the real. *Conservation Biology* **21**: 1155-1164.

Department of Environmental Affairs & Tourism (DEAT) 2008. South African National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries. Marine and Coastal Management, Department of Environmental Affairs and Tourism, South Africa. www.environment.gov.za. 31 pp.

Food and Agriculture Organisation (FAO) 2008. Report of the Expert Consultation on Best Practice Technical Guidelines for IPOA/NPOA-Seabirds. FAO Fisheries and Aquaculture Report 880 (37 pp), FAO, Rome.

Løkkeborg, S. 2008. Review and assessment of mitigation measures to reduce incidental catch of seabirds in longline, trawl and gillnet fisheries. FAO Fisheries and Aquaculture Circular 1040 (24 pp), FAO, Rome.

Nel, D. C., P. G. Ryan, and B. P. Watkins. 2002. Seabird mortality in the Patagonian toothfish longline fishery around the Prince Edward Islands, 1996-2000. *Antarctic Science* **14**: 151-161.

Petersen, S. L., D. Nel, P. G. Ryan, and L. G. Underhill. 2008. Understanding and mitigating vulnerable bycatch in southern African trawl and longline fisheries. WWF South Africa Report Series - 2008/Marine/002. 225 pp.

Petersen, S. L., M. B. Honig, P. G. Ryan, and L. G. Underhill. Seabird bycatch in the pelagic longline fishery off southern Africa. *African Journal of Marine Science*: in press.

Pichegru, L., P. G. Ryan, C. D. van der Lingen, J. Coetzee, Y. Ropert-Coudert, and D. Grémillet. 2007. Foraging behaviour and energetics of Cape Gannets *Morus capensis* feeding on live prey and fishery waste in the Benguela upwelling system. *Marine Ecology Progress Series* **350**: 127-136.

- Robertson, G. 1998. The culture and practice of longline tuna fishing: implications for seabird by-catch mitigation. *Bird Conservation International* **8**: 211-221.
- Ryan, P. G. and C. Boix-Hinzen. 1998. Tuna longline fisheries off southern Africa: the need to limit seabird bycatch. *South African Journal of Science* **94**: 179-182.
- Ryan, P. G. and C. L. Moloney. 1988. The effect of trawling on bird and seal distributions in the southern Benguela region. *Marine Ecology Progress Series* **45**: 1-11.
- Ryan, P. G., D. G. Keith, and M. Kroese. 2002. Seabird bycatch by tuna longline fisheries off southern Africa. *South African Journal of Marine Science* **24**: 103-110.
- Ryan, P. G., D. C. Nel, and J. Cooper. 2006. Reducing longline mortality of seabirds: a South African perspective. *Acta Zoologica Sinica* **52S**: 645-648.

Table 1. Fishing effort by foreign-flagged vessels operating under license in the South African pelagic long-line fishery during 2007 and 2008.

	2007	2008	Total
Number of vessels	13	16	20
Number of sets	1,329	1,147	2,476
Total effort (thousands of hooks)	3,305	3,174	6,479
% in Exclusive Economic Zone (EEZ)	82%	87%	84%
Effort in ICCAT ^a area (% in EEZ)	636 (41%)	327 (22%)	963 (35%)
Effort in IOTC ^b area (% in EEZ)	2,670 (92%)	2,846 (94%)	5,516 (93%)

^aICCAT = International Commission for the Conservation of Atlantic Tuna

^bIOTC = Indian Ocean Tuna Commission

Table 2. Numbers of seabirds killed by foreign-flagged vessels in the South African pelagic long-line fishery during 2007 and 2008.

	Numbers of birds killed			Catch per 1000 hooks	
	2007	2008	Total	2007	2008
<i>Procellaria aequinoctialis</i>	608	100	708	0.184	0.032
<i>Macronectes giganteus</i>	3	0	3	0.001	0.000
<i>Macronectes halli</i>	1	0	1	<0.001	0.000
<i>Puffinus gravis</i>	2	0	2	0.001	0.000
<i>Procellaria cinerea</i>	0	1	1	0.000	<0.001
all petrels	614	101	715	0.186	0.032
<i>Thalassarche cauta (sensu lato)</i>	246	44	290	0.074	0.014
<i>Thalassarche melanophris</i>	70	5	75	0.021	0.002
<i>Thalassarche carteri</i>	60	2	62	0.018	0.001
<i>Thalassarche chlororhynchos</i>	15	0	15	0.005	0.000
<i>Diomedea exulans</i>	4	0	4	0.001	0.000
<i>Diomedea epomophora</i>	1	0	1	<0.001	0.000
<i>Phoebetria fusca</i>	1	0	1	<0.001	0.000
all albatrosses	396	51	447	0.120	0.016
<i>Morus capensis</i>	42	0	42	0.013	0.000
<i>Aptenodytes patagonicus</i>	0	1	1	0.000	<0.001
other birds	42	1	43	0.012	<0.001
All birds	1052	153	1205	0.318	0.048

Table 3. Fishing effort (thousands of hooks), numbers of seabirds killed and bycatch rates for six vessels that fished in the South African pelagic long-line fishery during both 2007 and 2008 (minimum effort 200,000 hooks in each year). The total number of birds killed is followed in parentheses by the numbers of petrels, albatrosses and other birds.

	2007		2008		Catch per 1000 hooks	
	effort	birds killed	effort	birds killed	2007	2008
Vessel 1	245	245 (44/156/0)	452	17 (3/14/0)	0.816	0.038
Vessel 2	354	241 (168/78/35)	490	41 (17/24/0)	0.794	0.084
Vessel 3	424	136 (34/126/1)	255	14 (7/6/1)	0.380	0.055
Vessel 4	319	96 (45/69/0)	432	9 (0/9/0)	0.357	0.021
Vessel 5	265	36 (16/26/0)	467	31 (9/22/0)	0.158	0.066
Vessel 6	209	19 (8/14/0)	221	18 (6/12/0)	0.105	0.081

Table 4. The proportion of sets that complied with key mitigation measures in the South African pelagic long-line fishery in 2007 to 2008 (inside and outside the South African Exclusive Economic Zone, EEZ), linked to the threat of exclusion from the fishery if vessels exceeded a specific level of mortality during 2008.

Mitigation measure	2007 (n=1,329)			2008 (n=1,147)		
	In EEZ	Out EEZ	overall	In EEZ	Out EEZ	overall
% with a bird scaring line	84%	70%	82%	97%	93%	96%
% completed at night	84%	29%	76%	88%	14%	79%
% extending into dawn/dusk	15%	38%	19%	12%	78%	20%
% extending into day	1%	33%	5%	0%	8%	1%

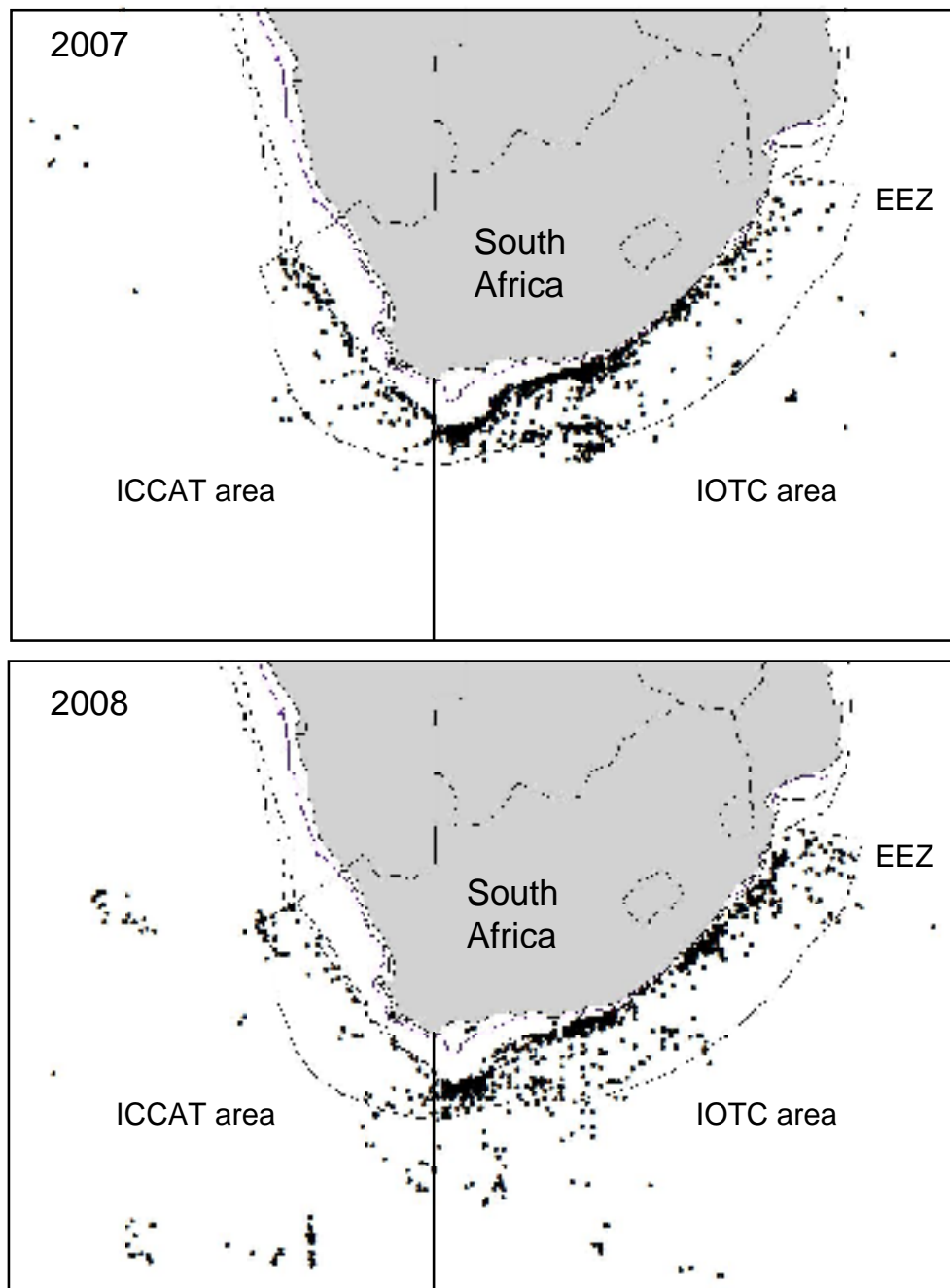


Fig. 1. The distribution of sets by joint-venture vessels in the South African large pelagic long-line fishery during 2007 and 2008. A few sets occurred outside the mapped area in 2007 and 2008.

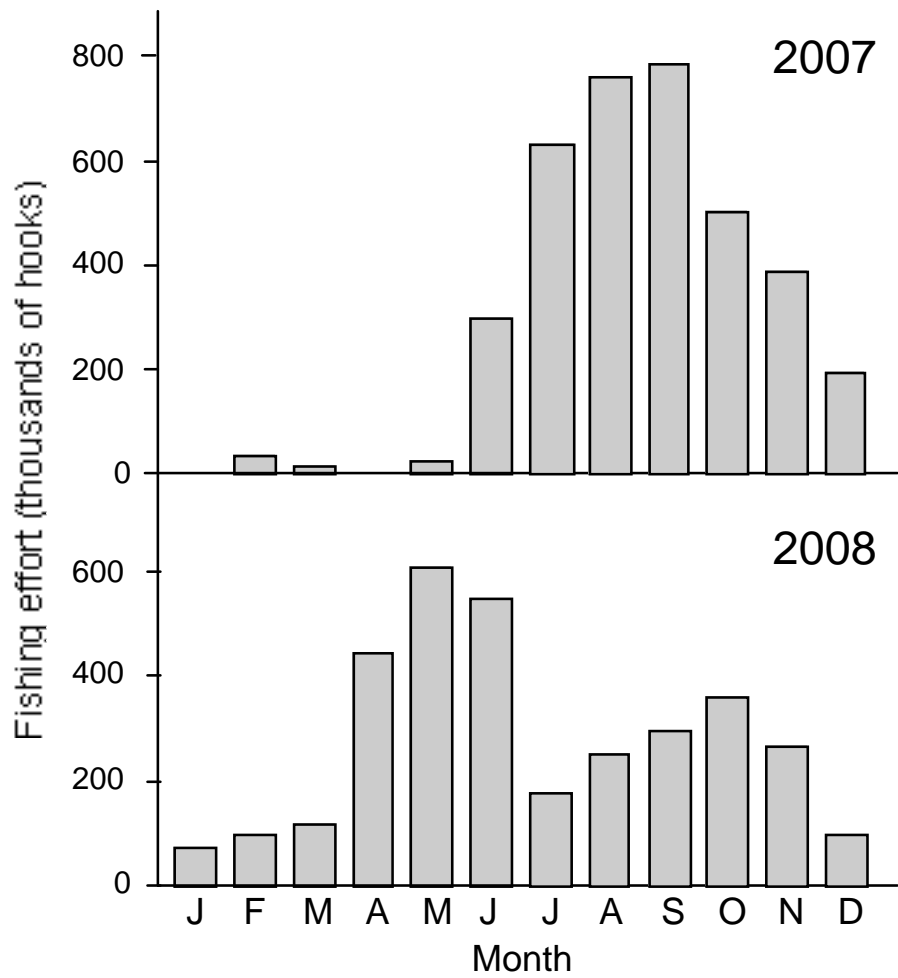


Fig. 2. Seasonality of long-line sets by joint-venture vessels in the South African large pelagic long-line fishery during 2007 and 2008.

SECTION B**PERMIT CONDITIONS: TUNA LONGLINE FISHERY: 2009****1. GENERAL**

- 1.1 This permit is issued subject to the provisions and regulations of the following laws:
- (a) The Marine Living Resources Act, 1998 (Act No. 18 of 1998) ("the MLRA"), and in particular, the regulations that designate marine protected areas;
 - (b) The National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), and in particular, the regulations that control vehicle use in the coastal zone (as amended);
 - (c) The National Biodiversity Act, 2004 (Act No. 10 of 2004);
 - (d) The National Environment Management Protected Areas Act, 2003 (Act No. 57 of 2003);
 - (e) The Sea Birds and Seals Protection Act, 1973 (Act No. 46 of 1973); and
 - (f) Marine Pollution (prevention of pollution from ships) Act 1986. (Act No. 2 of 1986).
- 1.2 This permit shall be issued subject to the further provisions of the –
- (a) General Policy on the Allocation of Long-Term Commercial Fishing Rights and the Management of Commercial Fisheries;
 - (b) New Large Pelagics Tuna / Swordfish Longline Fisheries Policy (to be gazetted in 2009).
- 1.3 The Director: Offshore & High Seas Fisheries Management shall be entitled to amend these permit conditions.
- 1.4 Any reference to the Permit Holder in these permit conditions includes the entity or person in whose name the commercial fishing right is allocated ("the Right Holder"), its employees (whether permanent, full-time or part-time), its agents and the skipper of the vessel.
- 1.5 A breach of the provisions of the MLRA or these permit conditions by the Permit Holder will result in the initiation of proceedings under section 28 of the MLRA. A breach includes:

- (a) furnishing information to which the Department of Environmental Affairs and Tourism ("the Department") is entitled to, which is not true, complete or submitted by the required scheduled deadline;
 - (b) contravening or failing to comply with a permit condition imposed or with the provisions of the MLRA;
 - (c) being convicted of an offence in terms of the MLRA; or
 - (d) failing to effectively utilise the permit.
- 1.6 The Department may refuse to re-issue a subsequent permit should the conditions stipulated in this permit not be adhered to.
- 1.7 The Permit Holder shall not land, sell, receive or process any fish taken by any means in contravention of the MLRA.
- 1.8 The Permit Holder shall hold at its registered place of business the original permit issued for the current fishing season. The Permit Holder shall at all times over the duration of the right have available a true certified copy (co-signed by the Local Fishery Control Officer) of this permit on board the nominated vessel utilised to harvest large pelagics.
- 1.9 The Permit Holder shall safely store all inorganic waste material, garbage and pollutants on board the vessel. Should the Permit Holder discard any inorganic waste material, garbage or pollutants into the sea, this permit will be suspended for a period determined by the Department and the Permit Holder shall take those steps considered necessary in terms of NEMA to remedy any pollution caused.
- 1.10 No transshipment at sea shall be permitted. Transshipment in port shall be permitted subject to the issuing of a transshipment permit. Should the Permit Holder transship any catches without the necessary authorisation from the Department, the Permit Holder may be subjected to proceedings under section 28 of the MLRA.
- 1.11 The Permit Holder may only harvest the amount of fish allocated to it in terms of the total allowable catch ("TAC") and/or total applied effort ("TAE") allocated to it under Section A. Fishing over these limits will result in the initiation of legal proceedings.
- 1.12 The permit is not transferable.

2. CONSULTATION AND COMMUNICATION

- 2.1 The Permit Holder may contact the Department in one of the following ways (all correspondence must be clearly marked as to subject matter:

<u>By mail</u>	<u>By Hand</u>	<u>By Email</u> csmith@deat.gov.za idegoede@deat.gov.za pmullins@deat.gov.za
Subject: Customer Services Centre, Private Bag X2, Roggebaai, 8012 Attn: Craig Smith/ Johan De Goede/ Pheobius Mullins	Subject: Customer Services Centre, Ground Floor, Foretrust Building, Martin Hammerschlag Way, Foreshore, Cape Town Attn: Craig Smith/ Johan De Goede/ Pheobius Mullins	<u>By Fax</u> 021 402 3622 021 402 3618
		<u>By telephone</u> 021 402 3048 (074 1972450) 021 402 3683 (083 461 4522) 021 402 3633 (084 3322292)

- 2.2 The Department will prefer to consult and communicate with the Recognised Industrial Body (Bodies) representative of Right Holders in this fishery.
- 2.3 The Department (Attention Craig Smith) shall be informed prior to the termination of fishing on this permit. In so doing the original permit and licences shall be returned to the Department.

3. SUBMISSION OF INFORMATION

- 3.1 The Permit Holder must submit to the Department:
- (a) notification (clearly marked *Right Holder Information*) of any change of contact details (including postal address and contact telephone numbers) on the prescribed form available at the Customer Service Centre within 30 days of such change;
 - (b) notification of intended change of company details (including change of ownership/ shareholding or name) on the prescribed forms available at the Customer Service Centre for approval by the Department;
 - (c) catch statistics and landing declarations as stipulated in paragraph 4, and;
 - (e) levy declarations as stipulated in paragraph 12.
- 3.2 The Permit Holder must provide any other economic, socio-economic or financial information in the format as and when requested by the Department.
- 3.3 Should the Permit Holder fail to timeously submit the above information or submit false or incorrect information, the Department may-
- (a) refuse to re-issue a permit under section 13 of the MLRA for the following year until such time as the required information has been received; or
 - (b) proceed under section 28 of the MLRA.

4. CATCH STATISTICS

- 4.1 Catch returns, completed on a daily basis, shall be presented to the Fishery Control Officer before any fish are authorised by the Fishery Control Officer to be discharged or transshipped. The signed original catch return form and landing declaration must be submitted to the Customer Service Centre (Ground Floor Foretrust Building, Martin Hammerschlag Rd, Attention: Dylan Clark, Large Pelagics Research Section c/o Linefish Section) within two weeks of the discharge/transshipment. If a vessel has not been fishing for a particular month then a "NIL" catch return form shall be posted by registered mail to the Department of Environmental Affairs and Tourism, Branch: Marine and Coastal Management, Private Bag X2, Roggebaai, 8012. (Attention: Dylan Clark, Large Pelagics Research Section c/o Linefish Section) to reach the Department before the 15th of the following month.
- 4.2 Any errors in recording information in the catch return book shall only be rectified using a pen to strike out the incorrect information. (No typex shall be used).
- 4.3 The duplicate copies of the catch returns shall be retained by the Permit Holder for a period of 36 months.
- 4.4 The Permit Holder shall e-mail regular trip summaries on an Excel spreadsheet summarising the total landed weight (kg) by species per vessel within two weeks after the vessel has discharged. The e-mail shall be sent to Craig Smith (csmith@deat.gov.za), with large pelagic catch summary as the subject. In addition, the spreadsheet must indicate the Permit Holders name, vessel name, the start and end dates for the trip, and the trip number for the year (see Annexure 1 as an example).
- 4.5 The Permit Holder shall provide to the Department (Attention: Craig Smith, Pelagics and High Seas Fisheries Management) a yearly summary of the total landed weight (kg) by species (incl. target and by-catch species) by vessel for the period 1 January – 15 December 2009 when making application for the 2010 fishing season permit. The Department will not issue the 2010 catch permit to the Permit Holder if the information required is not provided or is incomplete.

5. FISHING AREAS

- 5.1 Setting and retrieving of longlines can be conducted in South Africa's Exclusive Economic Zone (EEZ), except in the following areas: 1) within a 12 nautical mile area along the entire South African coastline, excluding KwaZulu-Natal where the closed area will be extended to 20 nautical miles; 2) in the rectangle bounded by the latitudes 34° 00' S and 35° 00' S, and longitudes 17° 20' E and 18° 30' E, and; 3) in any Marine Protected Area.

- 5.2 This permit may be used on the High Seas in conjunction with a High Seas vessel licence.
- 5.3 Fishing will not be permitted in the Atlantic and Indian Ocean during the same fishing trip (West and East of 20° East longitude), unless accompanied by a Scientific Observer.

6. VESSEL MONITORING SYSTEM (VMS)

- 6.1 The Permit Holder shall ensure that the fishing vessel is fitted with a functioning vessel monitoring system ("VMS"), which is approved by the Department.
- 6.2 It is the responsibility of the Permit Holder/ Rights Holder/ Vessel Owner/ Skipper to ensure that the VMS is fully operational and that the VMS continues to transmit to the Department's Operations Room prior to sailing and throughout whilst at sea.
- 6.3 The Permit Holder shall establish that the VMS unit is functional by contacting the Operations Room on telephone numbers 021 - 402 3076 or 021 - 402 3077, prior to sailing. Should the power supply be interrupted or the equipment become non-functional (for whatever reason), and the problem persists, the vessel shall return to port within two hours of being informed of the problem.
- 6.4 Vessels fitted with Inmarsat C VMS units, wishing to switch their units off whilst alongside in port, shall only do so a minimum of six hours after berthing, and the units shall be switched on a minimum of six hours prior to their estimated time of departure from port. Should the power supply be interrupted or the equipment become non-functional (for whatever reason), and the problem persists, the vessel shall return to port within twenty-four hours of being informed of the problem, unless special arrangements have been made with the Department's Operations Room to allow the vessel to continue fishing. Such special arrangements shall include:
 - (a) 3- hourly reporting of the vessel's positions faxed to 021 -4256497;
 - (b) Notice of estimated time of arrival;
 - (c) Notice of port arrival;
 - (d) Inspection of the catch by a Fishery Control Officer/Monitor; and
 - (e) A copy of the vessel track for the voyage for verification purpose.

The Department will keep a record of the frequency of VMS breakdowns in order to discourage repeated use/abuse of this special arrangements dispensation.

- 6.5 In cases of emergency, the Permit Holder must obtain written authorisation before the fishing vessel enters or intends to enter into a Marine Protected Area or any other area closed for fishing. The request must clearly set out the nature of the emergency and motivate why the request should be granted. Such request shall be sent via e-mail to: mcmops@deat.gov.za or faxed to: 021 425 6497.

- 6.6 In cases where VMS units are non-functional due to “technical” problems, and such Permit Holders/ Rights Holders’, Vessel Owners/ Skippers wish to proceed to sea without a VMS unit onboard, an “Application for an exemption to undertake fishing without a VMS” form must be completed.

This form, together with a letter from the Company undertaking the repairs (which must include the fishing vessel’s name, area number and estimated time that it will take to repair and re-install the unit), must be faxed to the Department’s Customer Care Services, fax number 021-402 336.

Only once written permission has been received from the Department (i.e. an exemption has been granted), may the vessel proceed to sea. The VMS exemption must be kept onboard the vessel for the duration of each trip undertaken within the period of validity of the exemption.

For each fishing trip undertaken during the exemption validity period, the Permit Holders/ Rights Holders, Vessel Owner/ Skipper of such vessels shall notify the Department’s Operations Room on telephone numbers 021 – 402 3076 or 021 – 402 3077 that they are proceeding to sea, and upon arrival back in port or launching site for the duration of the exemption.

- 6.7 Should the Permit Holder not adhere to the provisions of the above paragraphs, the Department will detain the vessel once in port and may implement legal proceedings.

7. VESSEL SPECIFICATIONS

- 7.1 The letters (TL) must be displayed on the vessel next to the area code.
- 7.2 The registration letters and numbers assigned to the vessel by the Director-General (the area code), must be painted in white on a black background or in black on a white background on both bows in characters not less than 15 cm in height, 10 cm in breadth (figure “1” expected) and 2 cm in thickness (width of stroke). The space between adjacent letters and figures shall be between 2 cm and 5 cm.
- 7.3 Radio call signs must be clearly visible and displayed as stipulated in terms of regulation 78 of the Regulations promulgated under the MLRA.

8. GEAR RESTRICTIONS

- 8.1 Only pelagic longlines may be used. Other fishing gear, such as nets, may not be carried on board the vessel, unless the Permit Holder has been issued with an exploratory live bait permit. In this case the vessel may have a net onboard as specified by the permit conditions of the exploratory live bait permit.
- 8.2 The use of stainless steel hooks and wire leaders is prohibited.

9. CATCH LIMITATIONS AND CONTROLS

- 9.1 This permit shall only be used for targeted longline fishing on tuna species of the genus *Thunnus*.
- a) *Chondrichthians* (sharks, skates and rays) and billfishes of the genera *Makaira*, *Tetrapturus*, *Istiophorus* and *Xiphias* are designated by-catch species.
 - b) For *Chondrichthians* and billfishes (excluding swordfish) the total catch shall not exceed 10% (by dressed weight) of the total dressed weight of the targeted species per annum (to be reviewed by 30 September).
 - c) All thresher sharks belonging to the genus *Alopias* shall not be landed.
 - d) The Permit Holder shall encourage the crew to release live shark and marlins.
 - e) Fins may be removed only from sharks that are retained onboard and both the fins and trunks must be landed together. The maximum weight of fins landed or retained onboard shall not exceed 8 % of the total weight of shark trunks retained onboard or landed.
 - f) For the foreign-flagged tuna vessels operating under joint venture the total swordfish by-catch in the Atlantic Ocean (EEZ and High Seas) and the Indian Ocean (EEZ) shall not exceed 15% by number of the total catch of the targeted species per trip.
 - g) South African-flagged tuna vessels shall have unrestricted access to swordfish in the south Atlantic Ocean until 600 t of swordfish has been landed by the large pelagic fishery. Thereafter, the total swordfish by-catch in the Atlantic Ocean (EEZ and High Seas) and the Indian Ocean (EEZ) shall not exceed 15% by number of the total catch of the targeted species per trip.
 - h) If the vessel is only fishing on the high seas in the Indian Ocean then no swordfish by-catch limit will apply. If fishing in both the SA EEZ and high seas then the swordfish by-catch limit will apply to the entire trip.
 - i) No hake (*Merluccius* spp.) kingklip (*Genypterus capensis*), wreckfish (*Polyprion* spp.) or Patagonian toothfish (*Dissostichus* spp.) shall be caught or retained on board.
 - j) No discarding of dead designated by-catch species at sea shall be permitted and only live fish may be returned to sea, except in the cases where certain species are prohibited from being landed or retained on board (e.g. 9.1.c, 9.1.i and 9.3.d). The Fisheries Control Officer must be notified of excess by-catch 24 hrs prior to the vessel berthing. Excess by-catch must be handed over to the Fisheries Control Officer upon return of vessel to port.

- 9.2 The following principle regulatory measures will apply to the harvesting of swordfish: the tuna longline fishery will be allowed to catch swordfish as prescribed in 9.1.f and 9.1.g on an Olympic system until 80% of the South African Atlantic swordfish quota is reached. Thereafter the Permit Holders together with the Department will jointly manage the remaining allocation. No catch limit for swordfish in the Indian Ocean currently exists.
- 9.3 The following principle regulatory measures will apply to the harvesting of southern bluefin tuna: the tuna longline fishery will be allocated 75% of the South African southern bluefin quota (30 t).
- a) This quota shall be equally divided between all tuna Right Holders (1(one) ton per tuna Right Holder).
 - b) Quotas may be transferable subject to approval from the Department.
 - c) Quotas of non-active Right Holders by 30 June 2009 shall be equally divided among active tuna longline Right Holders (i.e. those Right Holders who have been issued a valid permit) for the remainder of the season.
 - d) Once the South African quota is reached no further landing of southern bluefin tuna under South African flag will be permitted, and if any subsequent southern bluefin tuna are caught the Permit Holder shall be required to release/ discard the fish.
- 9.4 The catching of southern bluefin tuna (*Thunnus maccoyii*), Bigeye tuna (*Thunnus obesus*) and Yellowfin tuna (*Thunnus albacares*) with a mass of less than 6.4 kg, 3.2 kg and 3.2 kg respectively, and Swordfish (*Xiphias gladius*) with a Lower Jaw Fork Length (LJFL) of less than 119 cm and a weight of less than 18 kg dressed weight (i.e. headed, gutted and finned), and marlins less than 210 cm LJFL is prohibited. Any fish that does not comply with the size and weight restrictions and is not alive when retrieving the longline must be handed over to the Fisheries Control Officer upon return of the vessel to port. The Fisheries Control Officer must be notified of the number of undersize fish 24 (twenty four) hours prior to the vessel berthing. If the undersized fish is alive when retrieving the longline the fish should be returned to the sea alive.
- 9.5 All catches on board when any pelagic longline gear is on board will be deemed to have been made with such longline gear. None of the prohibited species shall be on board at any time that a pelagic longline gear is on board, irrespective of what other fishing permits are held.
- 9.6 Permit Holders will be required to participate in tagging programmes. This implies that Permit Holders shall allow Marine and Coastal Management officers and Observers on board to tag and release undersize swordfish (< 119 cm LJFL) and tuna smaller than 70 cm PFL, which are in suitable condition. In addition, no more than 5 larger tuna and swordfish specimens in total, may be tagged per fishing trip. Permit Holders are also encouraged to allow for the tag and release of as many sharks and other billfish, which are in suitable condition.

- 9.7 Any tags retrieved, emanating from national or international tagging programmes, must be retained on board together with data on the vessel name, catch position, date of capture, length and weight of individual tagged animals and name of person reporting the recapture. The tags and information shall be forwarded to the Department (Attention Craig Smith) upon discharging. Such returns may be eligible for reward.

10. LANDING OF FISH

- 10.1 The Permit Holder must inform the local Fishery Control Officer in writing by fax (Attention: The Station Manager, Cape Town at fax no. **021- 402 3113**, Port Elizabeth at fax **041-585 0385** and Hout Bay fax **021-790 2808**, Durban & Richard's Bay contact Mr Benedict Nene on **082 559 2860** and Saldanha Bay at fax **022-714 3997**) at least 24 hours prior to the intended time of landing of the estimated time of arrival ("ETA") and the port of arrival.
- 10.2 At least 2 (two) hours prior to berthing the Permit Holder shall confirm berthing details to Marine and Coastal Management as per the contact details in 10.1.
- 10.3 Discharging shall only take place in the week between 08:00-16:00 in the presence of a Fishery Control Officer or Fisheries Monitor. Discharging after hours or on weekends and public holidays is subject to the availability of Fishery Control Officers or Fisheries Monitors and shall be the responsibility of the Permit Holder to co-ordinate with the relevant offices (see 10.1).
- 10.4 Any discharge of fish, caught in terms of this permit, outside South Africa shall be monitored by a South African Fisheries Control Officer. The travel and subsistence cost of the Fisheries Control Officer to attend such discharges shall be recovered from the Right's Holder.
- 10.5 The relevant catch statistical documents must be completed for all bigeye tuna, swordfish and southern bluefin tuna exported/transshipped. In addition, an export permit is also required. These provisions includes catches made by foreign joint venture vessels. Bigeye tuna and swordfish to be exported shall be accompanied by an International Commission for the Conservation of Atlantic Tunas (ICCAT) or Indian Ocean Tuna Commission (IOTC) catch statistical document, depending on where the catches were made. All southern bluefin tuna to be exported shall be accompanied by a Commission for the Conservation of Southern Bluefin Tuna (CCSBT) catch statistical document. The catch documents are invalid, unless authorised by a duly appointed MCM official (contact Craig Smith/ Johan De Goede/ Pheobius Mullins for further information). Catches exported without these documents shall be detained and/or seized.
- 10.6 No transshipment of fish is permitted at sea. Transshipments of fish may be allowed in port subject to authorisation and complete

monitoring of transshipment by Fisheries Control Officers. All fish are required to be transshipped in such a manner that accurate weights per species are obtainable by the Fishery Control Officer.

11. ECOSYSTEM EFFECTS OF FISHING

Plastic Pollution Interaction With Cape Fur Seals

- 11.1 The Permit Holder must take cognisance of sustainable fishing practices and impacts of tuna longline operations on the ecosystem. A specific concern is the impact of lost "strops" (cords used to hang fish during freezing) during discharge procedures. Cape fur seals subsequently become entangled in these strops resulting in mutilation of these mammals and in many cases a slow agonising death. In order to solve this problem the Permit Holder is to ensure that "strops" used during freezing and discharge are to be constructed according to the specifications as per paragraph 11.2 below.
- 11.2 A double strand of polypropylene cord (or better still any biodegradable material) rather than being made into one large circle is to be restricted to a maximum size of circle by knotting the rope to limit the hole size to a maximum of 80 mm between knots. (See Figure 1 for clarity). The minimum stretched length between knots may not exceed the stipulated 80 mm. This design allows the application of the strops as originally used but will ensure that seals cannot become entangled in the loops.

By-Catch Mitigation Measures and Release Procedures

- 11.3 The start and completion of line setting shall be conducted at night only; defined by the period between nautical dusk and nautical dawn (Annexure 2). Vessels fishing outside the area indicated in Annexure 2 (i.e. north of 20°S, west of 5°E, east of 45°E and south of 40°S) shall ensure that the start and completion of line setting is conducted between sunset and sunrise.)
- 11.4 Both the main line and branch lines (snood) must be properly weighted to ensure optimal sinking rates (approximately 0.3 m/sec or to reach a depth of 10m, 150m behind the vessel).
- 11.5 The vessel shall have onboard an approved bird-scaring line (tori line), which must be flown during setting of each longline. See Annexure 3 for details.
- 11.6 Dumping of used bait shall take place on the opposite side of the vessel from that on which lines are hauled. No dumping of used bait may take place during setting.
- 11.7 Deck lighting should be kept to a minimum, without compromising safety. All deck lights should be shaded in such a way that the beam is directed down towards the deck.

- 11.8 All bait must be appropriately thawed, and where necessary, the swim bladder punctured to ensure rapid sinking of bait.
- 11.9 All birds caught must first be brought on board and thereafter any live birds should be released according to release instructions in Annexure 4. Any live turtles caught should also be released according to release instructions in Annexure 4.
- 11.10 It is the responsibility of the Permit Holder to ensure that the seabird mitigation checklist (Annexure 5) is signed off by a Fishery Control Officer prior to departure. The checklist must also be signed off on a daily basis by the Skipper and an on board Observer (if an observer is present). The check list must be retained by the Permit Holder for the entire year.
- 11.11 The Permit holder is restricted to an initial seabird mortality limit of 25 birds per year irrespective of vessel replacements. No further setting shall be permitted once this limit is reached. The Permit Holder is required to immediately contact the Department (Attention: Craig Smith, cell 074 1972450, work telephone (021) 4023048, e-mail csmith@deat.gov.za). The Department will review the Permit Holder's compliance with permit conditions 11.3 and 11.5 using the seabird mitigation checklist (Annexure 5). If in the Department's view there has been satisfactory compliance with permit conditions 11.3 and 11.5 then the vessel will be authorized to continue fishing once the Permit Holder nominates which of the following additional mitigation measures the vessel will deploy, i.e. either no setting shall be conducted 3 days around full moon (e.g. if full moon is on the 27 January then no setting of gear shall be allowed on the 26-28 January) or the Permit Holder would have to demonstrate line sink rates in excess of 0.3 m/sec.
- 11.12 Permit Holders which have reached a mortality of 50 seabirds shall immediately stop fishing (i.e. no further sets may be made). The Permit Holder is required to immediately contact the Department (Attention: Craig Smith, cell 074 1972450, work telephone (021) 4023048, e-mail csmith@deat.gov.za). The Department will review the Permit Holder's compliance with permit conditions 11.3, 11.5 and the additional mitigation measure (paragraph 11.11) deployed using the seabird mitigation checklist (Annexure 5). If the Permit Holder has not complied 100% with the permit conditions then the vessel shall be ordered to return to port and no further fishing shall be permitted for the Permit Holder for the remainder of the year irrespective of vessel changes. However, if in the Department's view there has been 100% compliance with these permit conditions then the vessel will be authorized to continue fishing, but shall be required on the next fishing trip to take on board a trained observer/ researcher to investigate the nature of the high seabird mortality rate and to immediately address the issues as raised by the observer/ researcher. All mitigation measures adopted at the 25 bird limit shall be complied with 100% of the time otherwise the vessel shall be ordered to immediately return to port and no further fishing shall be permitted for the Permit Holder for the remainder of the year irrespective of vessel changes.

- 11.13 Provisions in paragraphs 11.11 and 11.12 shall be reviewed.
- 11.14 The onus is on the Permit Holder to strongly encourage skipper(s) and/or officers to undergo a training course from WWF/Birdlife South Africa, before the end of 2009, on how to effectively reduce seabird mortality. It is envisaged that this requirement will become mandatory from 2010.
- 11.15 The Department strongly encourages Permit Holders to conduct independent research to improve seabird mitigation measures.

12. LEVIES

- 12.1 The Permit Holder must pay the prescribed levies for the fish landed for prescribed species as stipulated in the Government Gazette.
- 12.2 All levies and fees must be paid monthly in arrears and by the last day of the month.
- 12.3 The Department may refuse to issue fishing permits to Right Holders who have any levies or fees outstanding for a period in excess of 60 days, or may cancel the Right Holder's fishing permit until all outstanding levies have been paid to the Department.
- 12.4 The Permit Holder must submit together with all levy payments:
(a) A levy declaration form; and
(b) A copy of the landing declaration for each landing included in that month's levy payment. The landing declaration must clearly indicate the vessel name and docking date for each landing.
- 12.5 A "NIL" return must be submitted for every month where no fish has been landed.
- 12.6 The information specified in paragraphs 12.4 and 13.2 must be submitted when paying levies to the cashier at the Marine and Coastal Management Customer Service Centre, Ground Floor, Foretrust Building, Martin Hammerschlag Way Foreshore, Cape Town, Tel – **(086 112 3626)**.
- 12.7 Failure to comply with paragraphs 12.1 – 12.5 may result in proceedings in terms of Section 28 of the MLRA.

13. OBSERVER PROGRAMME

- 13.1 The Department, at its own cost, shall nominate local vessels to carry an on board Observer so as to ensure that 20% of all fishing days per quarter are monitored. Failure to comply with this request shall result in the vessel being ordered to immediately return to port and may result in

the initiation of proceedings under section 28 of the MLRA. All foreign vessels fishing under joint venture shall have an observer on board for 100% of all fishing days and the cost shall be at the expense of the Permit Holder.

- 13.2 The Permit Holder, when accommodating an Observer, shall ensure that accommodation and food of officer's standard is provided.
- 13.3 The Observer shall be responsible to verify fisheries data or as otherwise directed by the Chief Director: Marine Resource Management. The Observer shall monitor all fishing operations and shall record any transgressions of the MLRA.
- 13.4 The Permit Holder shall, when requested, allow for land-based sampling of catches for scientific purposes by persons authorized by the Department.
- 13.5 Observers on board shall bring back whole specimens of all seabirds killed during longline fishing operations.

14. COMPLIANCE

- 14.1 The Permit Holder is obliged in terms of the MLRA to report to the Minister any contravention of the MLRA or permit conditions by any other person. Any such contravention must be reported to the Department in writing and should be faxed to (021) 425-7324, Attention: The Chief Director: Monitoring, Control and Surveillance.
- 14.2 At any time during the course of the fishing trip or discharging, a Fishery Control Officer can request the skipper of the vessel to provide the cargo manifest or any other documents relating to fishing operations. The skipper must comply with this request.

15. VALIDITY OF PERMIT

- 15.1 This permit shall be valid from the date of issue until the **31st December 2009**.
- 15.2 This permit shall automatically expire and be invalid should the right allocated by the Minister or his delegate be cancelled or revoked in terms of section 28 of the MLRA.

SECTION C

MANAGEMENT MEASURES

TUNA LONGLINE FISHERY: 2009

1. GENERAL

This permit is issued subject to the further provisions of the following once finalised and/or promulgated (See also Paragraph 2.2 of Section B):

- The new large pelagics swordfish / tuna longline allocation policy (to be gazetted in 2009);
- Large Pelagics Fisheries Management Plan (to be developed); and
- National Plans of Action for the Conservation and Management of Sharks (NPOA-sharks) and Seabirds (NPOA-seabirds).

2. OBSERVERS

The Department will maintain its current Observer coverage in this fishery.

3. ECOSYSTEM CONSIDERATIONS

- 3.1 The Department will, in consultation with Right Holders, implement measures to minimise the impact of destructive fishing practices on ecosystems.
- 3.2 Turtle, seabird and shark by-catch may be a problem but the extent of this problem and the solutions thereof can only be determined through an Observer programme. Hence, a dedicated Observer programme is essential for the tuna longline fishery.
- 3.3 The Permit Holder must take cognisance of sustainable fishing practices and impacts of tuna longline operations on the ecosystem. A specific concern is the impact of lost "strops" (cords used to hang fish during freezing) during discharge procedures. Cape fur seals subsequently become entangled in these strops resulting in mutilation of these mammals and in many cases a slow agonising death. In order to solve this problem the permit holder is to ensure that "strops" used during freezing and discharge are to be constructed according to the following specifications (see paragraph 13.1 above):

A double strand of polypropylene cord (or better still any biodegradable material) rather than being made into one large circle is to be restricted

to a maximum size of circle by knotting the rope to limit the hole size to a maximum of 80 mm between knots. (See Figure 1 for clarity). The minimum stretched length between knots may not exceed the stipulated 80 mm. This design allows the application of the strops as originally used but will ensure that seals cannot become entangled in the loops.

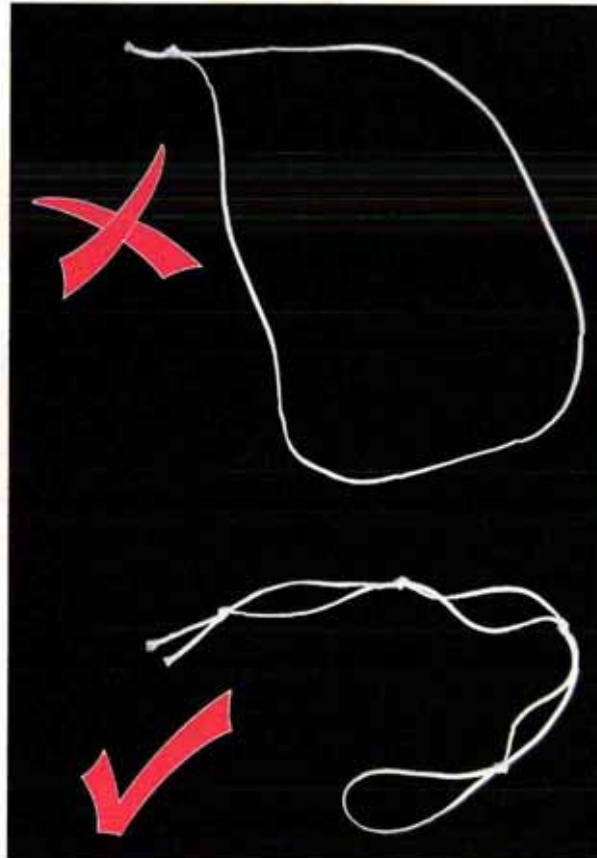


Figure 1: An example of correct "strops" to use to avoid seal entanglement

Annexure 1
Example of Large Pelagic Catch Summary

Permit Holder Name	Vessel Name	Trip No	Trip start date	Trip end date	Albacore in kg	Bigeye in kg	Yellowfin in kg	Bluefin in kg	Swordfish in kg	Billf in t
Lucky Trading	Swift	1	1/5/2009	13/5/2009	100	1560	3000	0	4500	3
Lucky Trading	Swift	2	29/5/2009	10/6/2009	200	3030	1210	75	3500	1
Lucky Trading	Delta	3	1/8/2009	14/8/2009	900	1900	900	350	4110	2

* Catch Summaries to be submitted after every trip on the same spreadsheet.

ANNEXURE 2

Monthly charts indicating averaged nautical dawn (upper time) and nautical dusk (lower time) for the various geographic co-ordinates. Times are indicated as GMT+2.



	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E	
20 S	6h47 20h07	6h27 19h47	May						4h47 18h07	4h27 17h47
25 S	6h52 20h02	6h32 19h42					6h12 19h22			5h12 18h22
30 S	6h56 19h58	6h36 19h38	6h16 19h218	6h00 18h54	5h37 18h36	5h16 18h18	4h56 17h58	4h36 17h38		
35 S	7h01 19h53	6h41 19h33	6h21 19h13	6h01 18h53	5h41 18h33	5h21 18h13	5h01 17h53	4h41 17h33		
40 S										

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E	
20 S	6h57 19h59	6h37 19h39	June						4h57 17h59	4h37 17h39
25 S	7h05 19h51	6h45 19h31					6h25 19h11			5h25 18h11
30 S	7h12 19h43	6h52 19h23	6h32 19h03	6h19 18h37	5h54 18h20	5h32 18h03	5h12 17h43	4h52 17h23		
35 S	7h20 19h35	7h00 19h15	6h40 18h55	6h20 18h35	6h00 18h15	5h40 17h55	5h20 17h35	5h00 17h15		
40 S										

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E	
20 S	7h00 20h13	6h40 19h53	July						5h00 18h13	4h40 17h53
25 S	7h06 20h07	6h46 19h47					6h26 19h27			5h26 18h27
30 S	7h12 19h01	6h52 19h41	6h32 19h21	6h16 18h57	5h53 18h39	5h32 18h21	5h12 18h01	4h52 17h41		
35 S	7h18 19h55	6h58 19h35	6h38 19h15	6h18 18h55	5h58 18h35	5h38 18h15	5h18 17h55	4h58 17h35		
40 S										

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E	
20 S	6h41 20h19	6h21 19h59	August						4h41 18h19	4h21 17h59
25 S	6h43 20h18	6h23 19h58					6h03 19h38			5h03 18h38
30 S	6h44 20h17	6h24 19h57	6h04 19h37	5h45 19h16	5h24 18h56	5h04 18h37	4h44 18h17	4h24 17h57		
35 S	6h45 20h16	6h25 19h56	6h05 19h36	5h45 19h16	5h25 18h56	5h05 18h36	4h45 18h16	4h25 17h56		
40 S										

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E	
20 S	6h11 20h29	5h51 20h09	September				4h11 18h29	3h51 18h09		
25 S	6h07 20h33	5h47 20h13	5h27 19h53				4h27 18h53	4h07 18h33	3h47 18h13	
30 S	6h02 20h38	5h42 20h18	5h22 19h58	4h57 19h43	4h42 19h18	4h22 18h58	4h02 18h38	3h42 18h18		
35 S	5h56 20h44	5h36 20h24	5h16 20h04	4h56 19h44	4h36 19h24	4h16 19h04	3h56 18h44	3h36 18h24		
40 S										

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E
20 S	5h40 20h47	5h20 20h27	October				3h40 18h47	3h20 18h27	
25 S	5h31 20h57	5h11 20h37	4h51 20h17				3h51 19h17	3h31 18h57	3h11 18h37
30 S	5h19 21h09	4h59 20h49	4h39 20h29	4h08 20h20	3h59 19h49	3h39 19h29	3h19 19h09	2h59 18h49	
35 S	5h05 21h23	4h45 21h03	4h25 20h43	4h05 20h23	3h45 20h03	3h25 19h43	3h05 19h23	2h45 19h03	
40 S									

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E
20 S	5h26 21h12	5h06 20h52	November				3h26 19h12	3h06 18h52	
25 S	5h12 21h28	4h52 21h08	4h32 21h48				3h32 19h46	3h12 19h26	2h52 19h06
30 S	4h55 21h44	4h35 21h24	4h15 21h04	3h38 21h00	3h35 20h24	3h15 20h04	2h55 19h44	2h35 19h24	
35 S	4h34 22h05	4h14 21h45	3h54 21h25	3h34 21h05	3h14 20h45	2h54 20h25	2h34 20h05	2h14 19h45	
40 S									

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E
20 S	5h32 21h27	5h12 21h07	December				3h31 19h27	3h12 19h07	
25 S	5h16 21h43	4h56 21h23	4h36 21h03				3h36 20h03	3h16 19h43	2h56 19h23
30 S	4h58 22h01	4h38 21h41	4h18 21h21	3h39 21h19	3h38 20h41	3h18 20h21	2h57 20h01	2h37 19h41	
35 S	4h34 22h25	4h14 22h05	3h54 21h45	3h34 21h25	3h14 21h05	2h54 20h45	2h34 20h25	2h14 20h05	
40 S									

Annexure 3:

BIRD-SCARING LINE

Specifications:

A bird-scaring line must achieve at least 150 m aerial coverage. It must therefore 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).

Streamers (minimum requirement):

6 pairs of 4m

6 pairs of 3m

8 pairs of 2m

8 pairs of 1m

i.e. a total of 28 pairs of streamers

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.

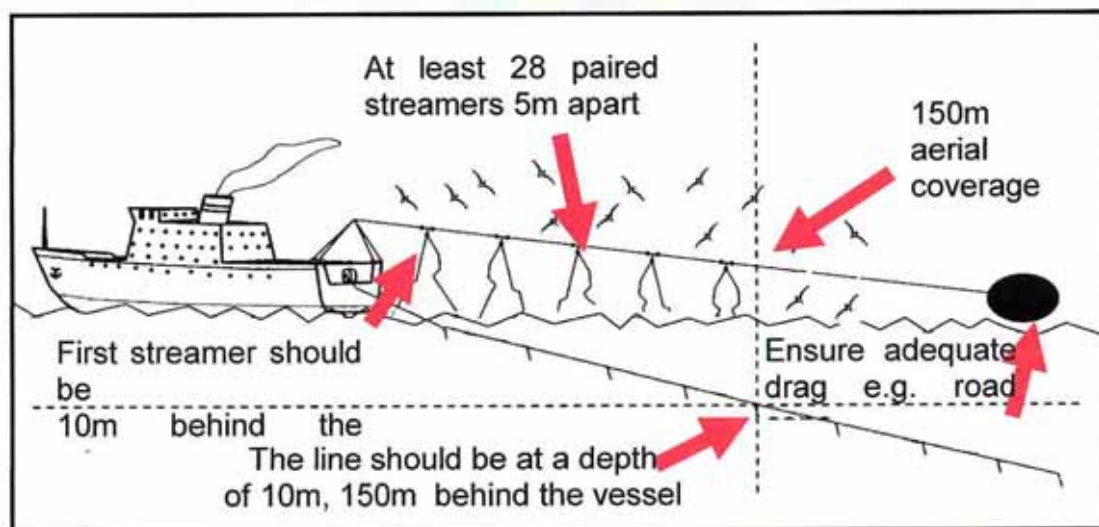


Figure 1: Bird-scaring line and longline sink rate specifications

What makes an effective bird-scaring line?

There are several things which improve the effectiveness of a bird-scaring line:

Maximising aerial coverage: 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. 7 m above sea level should be considered a minimum. On small vessels where a high attachment point is not accessible, an outrigger pole can be mounted to provide this height. 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.

The importance of streamers: Streamers can be made from plastic strapping or pvc tubing. They should be a bright colour, preferably red. Streamers should be placed every 5 m along the entire aerial section of the line. The erratic movement of the streamers increases its efficacy. Attaching light sticks to streamers may increase the efficacy of the bird-scaring line when setting at night.

Adjusting the bird-scaring line: Once a bird-scaring line is operating at its full height a "lazy line" attached and tied off at a convenient point on the stern allows the bird-scaring line to be quickly retrieved. This is particularly important if the line gets snagged as it can be quickly pulled down, unclipped and clipped onto the backbone, allowing the vessel to continue setting. The bird-scaring line can then be retrieved during hauling. The lazy line also allows the bird-scaring line to be adjusted according to wind conditions. To be effective a bird-scaring line should be over the point where gear enters the water. By tying the "lazy line" on the windward side of the vessel, it can be effectively used to adjust the bird-scaring line so that it is positioned directly over the gear.

Ease of use: It is important that the bird-scaring line is easy to use. To save space it can be stored in a plastic hose reel or in a fish bin. It is important that the line does not foul the gear being set. To prevent this from happening floats and mid-buoys should be thrown downwind so that they do not float back onto the bird-scaring line. Altering the course slightly when radio buoys are thrown into the water may also prevent them from becoming snagged.

Annexure 4:**RELEASE PROCEDURES****Seabirds**

Birds released from longline hooks have a good chance of survival if they are treated correctly.

Carefully lift the bird aboard, preferably using a net, or by holding the bill, wing tips and body – never pull the bird up with the line. Once aboard, keep hold of the bill and carefully fold the wings into the body.

Hold the bird securely, without squeezing.

Hooks can then be extracted easily from wings, legs or bill tips using bolt cutters to remove the barb.

If an albatross has swallowed a hook, and its position can be found, the following procedure is recommended, but must only be attempted by trained people with access to the correct equipment:

Reach down the bird's throat, grasp the hook and gently push it so it bulges under the skin. Make a small cut to allow the hook to pass through. Cut the barb off the hook and remove it. Never try to remove the hook with the barb. If you cannot remove the hook, cut the line as short as possible and let the bird go.

When releasing a bird, allow it to move away from the vessel before proceeding with fishing operations.

Turtles

All turtles alive on the line should be treated correctly to improve their chances of post release survival.

If the turtle is too large to bring on board, manoeuvre the boat as close to the turtle as possible, avoiding putting too much strain on the line. If the turtle is hooked and the barb visible, use a long handled de-hooker to remove the hook. Otherwise, cut the line as close to the turtle as possible and remove any entangling line. Let the turtle swim away from the vessel before continuing fishing operations.

If the turtle is small enough to be safely handled, use a net to bring it on board. Avoid pulling on the line. A tyre is useful to demobilise the turtle once on board. If the hook has been swallowed, or is in the mouth, place a gag in its mouth so it cannot bite.

If the turtle is hooked in its mouth use bolt cutters, or a de-hooker to remove the hook.

If the turtle is hooked in its throat and the barb is visible, use a de-hooker.

If the turtle is deeply hooked and the barb is not visible, remove as much of the line as possible, without pulling on it.

Keep the turtle on board in a cool location to recover. Gently release the animal headfirst, ensuring the water is clear of fishing gear and the boat is stationary.

How to use a de-hooker:


Thread the line through the eye of the de-hooker.

Keeping the line taught, push the de-hooker down the turtle's throat until it reaches the hook.

A sharp downward movement will dislodge the hook.

Turn the handle 45° and slowly remove the de-hooker.

De-hookers and instructions can be obtained from www.dehooker4arc.com.



DIRECTOR: OFFSHORE & HIGH SEAS FISHERIES MANAGEMENT

DATE: 23 December 2008

ANNEXURE 5 Seabird Mitigation Checklist for Tuna Vessels

Section A (Prior Departure Inspection by Fishery Control Officer)

Date	Tori line length (150m)	Attachment point for tori line (>7 m high)	Bird dehooker device	FCO's Name	FCO's signature

Section B (Observer Report On Compulsory Measures)

Date	Tori line deployed?	Night setting?	Comments	Skipper Signature	Observer Name & Signature

Section C (Observer Report On Additional Measures)

Date	Bait Management (11.6 & 11.8)?	No fishing over full moon	line sink rate	Skipper Signature	Observer Name & Signature

Instructions: mark boxes with TICK if Permit Holder complies or with a CROSS if Permit Holder does not comply

SECTION B

PERMIT CONDITIONS: SWORDFISH LONGLINE FISHERY: 2009

1. GENERAL

- 1.1 This permit is issued subject to the provisions and regulations of the following laws:
- (a) The Marine Living Resources Act, 1998 (Act No. 18 of 1998) ("the MLRA"), and in particular, the regulations that designate marine protected areas;
 - (b) The National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), and in particular, the regulations that control vehicle use in the coastal zone (as amended);
 - (c) The National Biodiversity Act, 2004 (Act No. 10 of 2004);
 - (d) The National Environment Management Protected Areas Act, 2003 (Act No. 57 of 2003);
 - (e) The Sea Birds and Seals Protection Act, 1973 (Act No. 46 of 1973); and
 - (f) Marine Pollution (prevention of pollution from ships) Act 1986. (Act No. 2 of 1986).
- 1.2 This permit shall be issued subject to the further provisions of the –
- (a) General Policy on the Allocation of Long-Term Commercial Fishing Rights and the Management of Commercial Fisheries;
 - (b) New Large Pelagics Tuna / Swordfish Longline Fisheries Policy (to be gazetted in 2009).
- 1.3 The Director: Offshore & High Seas Fisheries Management shall be entitled to amend these permit conditions.
- 1.4 Any reference to the Permit Holder in these permit conditions includes the entity or person in whose name the commercial fishing right is allocated ("the Right Holder"), its employees (whether permanent, full-time or part-time), its agents and the skipper of the vessel.
- 1.5 A breach of the provisions of the MLRA or these permit conditions by the Permit Holder will result in the initiation of proceedings under section 28 of the MLRA. A breach includes:

- (a) furnishing information to which the Department of Environmental Affairs and Tourism (“the Department”) is entitled to, which is not true, complete or submitted by the required scheduled deadline;
 - (b) contravening or failing to comply with a permit condition imposed or with the provisions of the MLRA;
 - (c) being convicted of an offence in terms of the MLRA; or
 - (d) failing to effectively utilise the permit.
- 1.6 The Department may refuse to re-issue a subsequent permit should the conditions stipulated in this permit not be adhered to.
- 1.7 The Permit Holder shall not land, sell, receive or process any fish taken by any means in contravention of the MLRA.
- 1.8 The Permit Holder shall hold at its registered place of business the original permit issued for the current fishing season. The Permit Holder shall at all times over the duration of the right have available a true certified copy (co-signed by the Local Fishery Control Officer) of this permit on board the nominated vessel utilised to harvest large pelagics.
- 1.9 The Permit Holder shall safely store all inorganic waste material, garbage and pollutants on board the vessel. Should the Permit Holder discard any inorganic waste material, garbage or pollutants into the sea, this permit will be suspended for a period determined by the Department and the Permit Holder shall take those steps considered necessary in terms of NEMA to remedy any pollution caused.
- 1.10 No transshipment at sea shall be permitted. Transshipment in port shall be permitted subject to the issuing of a transshipment permit. Should the Permit Holder transship any catches without the necessary authorisation from the Department, the Permit Holder may be subjected to proceedings under section 28 of the MLRA.
- 1.11 The Permit Holder may only harvest the amount of fish allocated to it in terms of the total allowable catch (“TAC”) and/or total applied effort (“TAE”) allocated to it under Section A. Fishing over these limits will result in the initiation of legal proceedings.
- 1.12 The permit is not transferable.

2. CONSULTATION AND COMMUNICATION

- 2.1 The Permit Holder may contact the Department in one of the following ways (all correspondence must be clearly marked as to subject matter:

<u>By mail</u>	<u>By Hand</u>	<u>By Email</u> csmith@deat.gov.za jdegoede@deat.gov.za pmullins@deat.gov.za
Subject: Customer Services Centre, Private Bag X2, Roggebaai, 8012 Attn: Craig Smith/ Johan De Goede/ Pheobius Mullins	Subject: Customer Services Centre, Ground Floor, Foretrust Building, Martin Hammerschlag Way, Foreshore, Cape Town Attn: Craig Smith/ Johan De Goede/ Pheobius Mullins	<u>By Fax</u> 021 402 3622 021 402 3618
		<u>By telephone</u> 021 402 3048 (074 1972450) 021 402 3683 (083 461 4522) 021 402 3633 (084 3322292)

- 2.2 The Department will prefer to consult and communicate with the Recognised Industrial Body (Bodies) representative of Right Holders in this fishery.
- 2.3 The Department (Attention Craig Smith) shall be informed prior to the termination of fishing on this permit. In so doing the original permit and licences shall be returned to the Department.

3. SUBMISSION OF INFORMATION

- 3.1 The Permit Holder must submit to the Department:
- (a) notification (clearly marked *Right Holder Information*) of any change of contact details (including postal address and contact telephone numbers) on the prescribed form available at the Customer Service Centre within 30 days of such change;
 - (b) notification of intended change of company details (including change of ownership/ shareholding or name) on the prescribed forms available at the Customer Service Centre for approval by the Department;
 - (c) catch statistics and landing declarations as stipulated in paragraph 4, and;
 - (d) levy declarations as stipulated in paragraph 12.
- 3.2 The Permit Holder must provide any other economic, socio-economic or financial information in the format as and when requested by the Department.
- 3.3 Should the Permit Holder fail to timeously submit the above information or submit false or incorrect information, the Department may-
- (a) refuse to re-issue a permit under section 13 of the MLRA for the following year until such time as the required information has been receipted; or
 - (b) proceed under section 28 of the MLRA.

4. CATCH STATISTICS

- 4.1 Catch returns, completed on a daily basis, shall be presented to the Fishery Control Officer before any fish are authorised by the Fishery Control Officer to be discharged or transshipped. The signed original catch return form and landing declaration must be submitted to the Customer Service Centre (Ground Floor Foretrust Building, Martin Hammerschlag Rd, Attention: Dylan Clark, Large Pelagics Research Section c/o Linefish Section) within two weeks of the discharge/transshipment. If a vessel has not been fishing for a particular month then a "NIL" catch return form shall be posted by registered mail to the Department of Environmental Affairs and Tourism, Branch: Marine and Coastal Management, Private Bag X2, Roggebaai, 8012. (Attention: Dylan Clark, Large Pelagics Research Section c/o Linefish Section) to reach the Department before the 15th of the following month.
- 4.2 Any errors in recording information in the catch return book shall only be rectified using a pen to strike out the incorrect information. (No typex shall be used).
- 4.3 The duplicate copies of the catch returns shall be retained by the Permit Holder for a period of 36 months.
- 4.4 The Permit Holder shall e-mail regular trip summaries on an Excel spreadsheet summarising the total landed weight (kg) by species per vessel within two weeks after the vessel has discharged. The e-mail shall be sent to Craig Smith (csmith@deat.gov.za), with large pelagic catch summary as the subject. In addition, the spreadsheet must indicate the Permit Holders name, vessel name, the start and end dates for the trip, and the trip number for the year (see Annexure 1 as an example).
- 4.5 The Permit Holder shall provide to the Department (Attention: Craig Smith, Pelagics and High Seas Fisheries Management) a yearly summary of the total landed weight (kg) by species (incl. target and by-catch species) by vessel for the period 1 January – 15 December 2009 when making application for the 2010 fishing season permit. The Department will not issue the 2010 catch permit to the Permit Holder if the information required is not provided or is incomplete.

5. FISHING AREAS

- 5.1 Setting and retrieving of longlines can be conducted in South Africa's Exclusive Economic Zone (EEZ), except in the following areas: 1) within a 12 nautical mile area along the entire South African coastline, excluding KwaZulu-Natal where the closed area will be extended to 20 nautical miles; 2) in the rectangle bounded by the latitudes 34° 00' S and 35° 00' S, and longitudes 17° 20' E and 18° 30' E, and; 3) in any Marine Protected Area.

- 5.2 This permit may be used on the High Seas in conjunction with a High Seas vessel licence.
- 5.3 Fishing will not be permitted in the Atlantic and Indian Ocean during the same fishing trip (West and East of 20° East longitude), unless accompanied by a Scientific Observer.

6. VESSEL MONITORING SYSTEM (VMS)

- 6.1 The Permit Holder shall ensure that the fishing vessel is fitted with a functioning vessel monitoring system ("VMS"), which is approved by the Department.
- 6.2 It is the responsibility of the Permit Holder/ Rights Holder/ Vessel Owner/ Skipper to ensure that the VMS is fully operational and that the VMS continues to transmit to the Department's Operations Room prior to sailing and throughout whilst at sea.
- 6.3 The Permit Holder shall establish that the VMS unit is functional by contacting the Operations Room on telephone numbers 021 - 402 3076 or 021 - 402 3077, prior to sailing. Should the power supply be interrupted or the equipment become non-functional (for whatever reason), and the problem persists, the vessel shall return to port within two hours of being informed of the problem.
- 6.4 Vessels fitted with Inmarsat C VMS units, wishing to switch their units off whilst alongside in port, shall only do so a minimum of six hours after berthing, and the units shall be switched on a minimum of six hours prior to their estimated time of departure from port. Should the power supply be interrupted or the equipment become non-functional (for whatever reason), and the problem persists, the vessel shall return to port within twenty-four hours of being informed of the problem, unless special arrangements have been made with the Department's Operations Room to allow the vessel to continue fishing. Such special arrangements shall include:
 - (a) 3- hourly reporting of the vessel's positions faxed to 021 -4256497;
 - (b) Notice of estimated time of arrival;
 - (c) Notice of port arrival;
 - (d) Inspection of the catch by a Fishery Control Officer/Monitor; and
 - (e) A copy of the vessel track for the voyage for verification purpose.

The Department will keep a record of the frequency of VMS breakdowns in order to discourage repeated use/abuse of this special arrangements dispensation.

- 6.5 In cases of emergency, the Permit Holder must obtain written authorisation before the fishing vessel enters or intends to enter into a Marine Protected Area or any other area closed for fishing. The request must clearly set out the nature of the emergency and motivate why the

request should be granted. Such request shall be sent via e-mail to: mcmops@deat.gov.za or faxed to: 021 425 6497.

- 6.6 In cases where VMS units are non-functional due to "technical" problems, and such Permit Holders'/ Rights Holders', Vessel Owners/ Skippers wish to proceed to sea without a VMS unit onboard, an "Application for an exemption to undertake fishing without a VMS" form must be completed.

This form, together with a letter from the Company undertaking the repairs (which must include the fishing vessel's name, area number and estimated time that it will take to repair and re-install the unit), must be faxed to the Department's Customer Care Services, fax number 021-402 336.

Only once written permission has been received from the Department (i.e. an exemption has been granted), may the vessel proceed to sea. The VMS exemption must be kept onboard the vessel for the duration of each trip undertaken within the period of validity of the exemption.

For each fishing trip undertaken during the exemption validity period, the Permit Holders/ Rights Holders, Vessel Owner/ Skipper of such vessels shall notify the Department's Operations Room on telephone numbers 021 – 402 3076 or 021 – 402 3077 that they are proceeding to sea, and upon arrival back in port or launching site for the duration of the exemption.

- 6.7 Should the Permit Holder not adhere to the provisions of the above paragraphs, the Department may detain the vessel once in port and may implement legal proceedings.

7. VESSEL SPECIFICATIONS

- 7.1 The letters (SL) must be displayed on the vessel next to the area code.
- 7.2 The registration letters and numbers assigned to the vessel by the Director-General (the area code), must be painted in white on a black background or in black on a white background on both bows in characters not less than 15 cm in height, 10 cm in breadth (figure "1" expected) and 2 cm in thickness (width of stroke). The space between adjacent letters and figures shall be between 2 cm and 5 cm.
- 7.3 Radio call signs must be clearly visible and displayed as stipulated in terms of regulation 78 of the Regulations promulgated under the MLRA.

8. GEAR RESTRICTIONS

- 8.1 Only pelagic longlines may be used. Other fishing gear, such as nets, may not be carried on board the vessel, unless the Permit Holder has been issued with an exploratory live bait permit. In this case the vessel may have a net onboard as specified by the permit conditions of the exploratory live bait permit.

- 8.2 The use of stainless steel hooks and wire leaders is prohibited.

9. CATCH LIMITATIONS AND CONTROLS

- 9.1 This permit shall only be used for targeted longline fishing on swordfish and tuna species of the genus *Thunnus*.
- a) *Chondrichthians* (sharks, skates and rays) and billfishes of the genera *Makaira*, *Tetrapturus* and *Istiophorus* are designated by-catch species.
 - b) For *Chondrichthians* and billfishes (excluding swordfish) the total catch shall not exceed 10% (by dressed weight) of the total dressed weight of the targeted (i.e. swordfish and tuna) species per annum (to be reviewed by 30 September).
 - c) All thresher sharks belonging to the genus *Alopias* shall not be landed.
 - d) The Permit Holder shall encourage the crew to release live shark and marlins.
 - e) Fins may be removed only from sharks that are retained onboard and both the fins and trunks must be landed together. The maximum weight of fins landed or retained onboard shall not exceed 8 % of the total weight of shark trunks retained onboard or landed.
 - f) No hake (*Merluccius* spp.) kingklip (*Genypterus capensis*), wreckfish (*Polyprion* spp.) or Patagonian toothfish (*Dissostichus* spp.) shall be caught or retained on board.
 - g) No discarding of dead designated by-catch species at sea shall be permitted and only live fish may be returned to sea, except in the cases where certain species are prohibited from being landed or retained on board (e.g. 9.1.c, 9.1.f and 9.3.b). The Fisheries Control Officer must be notified of excess by-catch 24 hours prior to the vessel berthing. Excess by-catch must be handed over to the Fisheries Control Officer upon return of vessel to port.
- 9.2 The following principle regulatory measures will apply to the harvesting of swordfish: the swordfish longline fishery will be allowed to catch swordfish on an Olympic system until 80% of the South African Atlantic swordfish quota is reached. Thereafter the Permit Holders together with the Department will jointly manage the remaining allocation. No catch limit for swordfish in the Indian Ocean currently exists.
- 9.3 The following principle regulatory measures will apply to the harvesting of southern bluefin tuna: the swordfish longline fishery will be allocated 25% of the South African southern bluefin quota (10 t).
- a) This quota shall be fished on an Olympic system.
 - b) Once this quota is reached no further landing of southern bluefin tuna under South African flag will be permitted, and if any subsequent southern bluefin tuna are caught the Permit Holder shall be required to release/ discard the fish.

- 9.4 The catching of southern bluefin tuna (*Thunnus maccoyii*), Bigeye tuna (*Thunnus obesus*) and Yellowfin tuna (*Thunnus albacares*) with a mass of less than 6.4 kg, 3.2 kg and 3.2 kg respectively, and Swordfish (*Xiphias gladius*) with a Lower Jaw Fork Length (LJFL) of less than 119 cm and a weight of less than 18 kg dressed weight (i.e. headed, gutted and finned), and marlins less than 210 cm LJFL is prohibited. Any fish that does not comply with the size and weight restrictions and is not alive when retrieving the longline must be handed over to the Fisheries Control Officer upon return of the vessel to port. The Fisheries Control Officer must be notified of the number of undersize fish 24 (twenty four) hours prior to the vessel berthing. If the undersized fish is alive when retrieving the longline the fish should be returned to the sea alive.
- 9.5 All catches on board when any pelagic longline gear is on board will be deemed to have been made with such longline gear. None of the prohibited species shall be on board at any time that a pelagic longline gear is on board, irrespective of what other fishing permits are held.
- 9.6 Permit Holders will be required to participate in tagging programmes. This implies that Permit Holders shall allow Marine and Coastal Management officers and Observers on board to tag and release undersize swordfish (< 119 cm LJFL) and tuna smaller than 70 cm PFL, which are in suitable condition. In addition, no more than 5 larger tuna and swordfish specimens in total, may be tagged per fishing trip. Permit Holders are also encouraged to allow for the tag and release of as many sharks and other billfish, which are in suitable condition.
- 9.7 Any tags retrieved, emanating from national or international tagging programmes, must be retained on board together with data on the vessel name, catch position, date of capture, length and weight of individual tagged animals and name of person reporting the recapture. The tags and information shall be forwarded to the Department (Attention Craig Smith) upon discharging. Such returns may be eligible for reward.

10. LANDING OF FISH

- 10.1 The Permit Holder must inform the local Fishery Control Officer in writing by fax (Attention: The Station Manager, Cape Town at fax no. **021- 402 3113**, Port Elizabeth at fax **041-585 0385** and Hout Bay fax **021-790 2808**, Durban & Richard's Bay contact Mr Benedict Nene on **082 559 2860** and Saldanha Bay at fax **022-714 3997**) at least 24 hours prior to the intended time of landing of the estimated time of arrival ("ETA") and the port of arrival.
- 10.2 At least 2 (two) hours prior to berthing the Permit Holder shall confirm berthing details to Marine and Coastal Management as per the contact details in 10.1.
- 10.3 Discharging shall only take place in the week between 08:00-16:00 in the presence of a Fishery Control Officer or Fisheries Monitor.

Discharging after hours or on weekends and public holidays is subject to the availability of Fishery Control Officers or Fisheries Monitors and shall be the responsibility of the Permit Holder to co-ordinate with the relevant offices (see 10.1).

- 10.4 Any discharge of fish, caught in terms of this permit, outside South Africa shall be monitored by a South African Fisheries Control Officer. The travel and subsistence cost of the Fisheries Control Officer to attend such discharges shall be recovered from the Right's Holder.
- 10.5 The relevant catch statistical documents must be completed for all bigeye tuna, swordfish and southern bluefin tuna exported/transshipped. In addition, an export permit is also required. Bigeye tuna and swordfish to be exported shall be accompanied by an International Commission for the Conservation of Atlantic Tunas (ICCAT) or Indian Ocean Tuna Commission (IOTC) catch statistical document, depending on where the catches were made. All southern bluefin tuna to be exported shall be accompanied by a Commission for the Conservation of Southern Bluefin Tuna (CCSBT) catch statistical document. The catch documents are invalid, unless authorised by a duly appointed MCM official (contact Craig Smith/ Johan De Goede/ Pheobius Mullins for further information). Catches exported without these documents shall be detained and/or seized.
- 10.6 No transshipment of fish is permitted at sea. Transshipments of fish may be allowed in port subject to authorisation and complete monitoring of transshipment by Fisheries Control Officers. All fish are required to be transshipped in such a manner that accurate weights per species are obtainable by the Fishery Control Officer.

11. ECOSYSTEM EFFECTS OF FISHING

Plastic Pollution Interaction With Cape Fur Seals

- 11.1 The Permit Holder must take cognisance of sustainable fishing practices and impacts of tuna longline operations on the ecosystem. A specific concern is the impact of lost "strops" (cords used to hang fish during freezing) during discharge procedures. Cape fur seals subsequently become entangled in these strops resulting in mutilation of these mammals and in many cases a slow agonising death. In order to solve this problem the Permit Holder is to ensure that "strops" used during freezing and discharge are to be constructed according to the specifications as per paragraph 11.2 below.
- 11.2 A double strand of polypropylene cord (or better still any biodegradable material) rather than being made into one large circle is to be restricted to a maximum size of circle by knotting the rope to limit the hole size to a maximum of 80 mm between knots. (See Figure 1 for clarity). The minimum stretched length between knots may not exceed the stipulated 80 mm. This design allows the application of the strops as originally used but will ensure that seals cannot become entangled in the loops.

Alternatively, the strops should be cut, so that they do not form a continuous loop.

By-Catch Mitigation Measures and Release Procedures

- 11.3 Both the main line and branch lines (snood) must be properly weighted to ensure optimal sinking rates (approximately 0.3 m/sec or to reach a depth of 10m, 150m behind the vessel).
- 11.4 The vessel shall have onboard an approved bird-scaring line (tori line), which must be flown during setting of each longline. See Annexure 2 for details.
- 11.5 Dumping of used bait shall take place on the opposite side of the vessel from that on which lines are hauled. No dumping of used bait may take place during setting.
- 11.6 Deck lighting should be kept to a minimum, without compromising safety. All deck lights should be shaded in such a way that the beam is directed down towards the deck.
- 11.7 All bait must be appropriately thawed, and where necessary, the swim bladder punctured to ensure rapid sinking of bait.
- 11.8 All birds caught must first be brought on board and thereafter any live birds should be released according to release instructions in Annexure 3. Any live turtles caught should also be released according to release instructions in Annexure 3.
- 11.9 It is the responsibility of the Permit Holder to ensure that the seabird mitigation checklist (Annexure 4) is signed off by a Fishery Control Officer prior to departure. The checklist must also be signed off on a daily basis by the Skipper and an on board Observer (if an observer is present). The check list must be retained by the Permit Holder for the entire year.
- 11.10 The Permit holder is restricted to an initial seabird mortality limit of 25 birds per year irrespective of vessel replacements. No further setting shall be permitted once this limit is reached. The Permit Holder is required to immediately contact the Department (Attention: Craig Smith, cell 074 1972450, work telephone (021) 4023048, e-mail csmith@deat.gov.za). The Department will review the Permit Holder's compliance with permit conditions 11.4, 11.5 and 11.7 using the seabird mitigation checklist (Annexure 4). If in the Department's view there has been satisfactory compliance with permit conditions 11.4, 11.5 and 11.7 then the vessel will be authorized to continue fishing once the Permit Holder nominates which of the following additional mitigation measures the vessel will deploy, i.e. either no setting shall be conducted 3 days around full moon (e.g. if full moon is on the 27 January then no setting of gear shall be allowed on the 26-28 January) or the Permit Holder

would have to set gear at night as defined by the time between nautical dusk and nautical dawn (Annexure 5).

- 11.11 Permit Holders which have reached a mortality of 50 seabirds shall immediately stop fishing (i.e. no further sets may be made). The Permit Holder is required to immediately contact the Department (Attention: Craig Smith, cell 074 1972450, work telephone (021) 4023048, e-mail csmith@deat.gov.za). The Department will review the Permit Holder's compliance with permit conditions 11.4, 11.5, 11.7 and the additional mitigation measures (paragraph 11.10) deployed using the seabird mitigation checklist (Annexure 4). If the Permit Holder has not complied 100% with the permit conditions then the vessel shall be ordered to return to port and no further fishing shall be permitted for the Permit Holder for the remainder of the year irrespective of vessel changes. However, if in the Department's view there has been 100% compliance with these permit conditions then the vessel will be authorized to continue fishing, but shall be required on the next fishing trip to take on board a trained observer/ researcher to investigate the nature of the high seabird mortality rate and to immediately address the issues as raised by the observer/ researcher. All mitigation measures adopted at the 25 bird limit shall be complied with 100% of the time otherwise the vessel shall be ordered to immediately return to port and no further fishing shall be permitted for the Permit Holder for the remainder of the year irrespective of vessel changes.
- 11.12 Provisions in paragraphs 11.10 and 11.11 shall be reviewed.
- 11.13 The onus is on the Permit Holder to strongly encourage skipper(s) and/ or officers to undergo a training course from WWF/Birdlife South Africa, before the end of 2009, on how to effectively reduce seabird mortality. It is envisaged that this requirement will become mandatory from 2010.
- 11.14 The Department strongly encourages Permit Holders to conduct independent research to improve seabird mitigation measures.

12. LEVIES

- 12.1 The Permit Holder must pay the prescribed levies for the fish landed for prescribed species as stipulated in the Government Gazette.
- 12.2 All levies and fees must be paid monthly in arrears and by the last day of the month.
- 12.3 The Department may refuse to issue fishing permits to Right Holders who have any levies or fees outstanding for a period in excess of 60 days, or may cancel the Right Holder's fishing permit until all outstanding levies have been paid to the Department.
- 12.4 The Permit Holder must submit together with all levy payments:

- (a) A levy declaration form; and
 - (b) A copy of the landing declaration for each landing included in that month's levy payment. The landing declaration must clearly indicate the vessel name and docking date for each landing.
- 12.5 A "NIL" return must be submitted for every month where no fish has been landed.
- 12.6 The information specified in paragraphs 12.4 and 12.5 must be submitted when paying levies to the cashier at the Marine and Coastal Management Customer Service Centre, Ground Floor, Foretrust Building, Martin Hammerschlag Way Foreshore, Cape Town, Tel – (086 112 3626).
- 12.7 Failure to comply with paragraphs 12.1 – 12.5 may result in proceedings in terms of Section 28 of the MLRA.

13. OBSERVER PROGRAMME

- 13.1 The Department, at its own cost, shall nominate local vessels to carry an on board Observer so as to ensure that 20% of all fishing days per quarter are monitored. Failure to comply with this request shall result in the vessel being ordered to immediately return to port and may result in the initiation of proceedings under section 28 of the MLRA.
- 13.2 The Permit Holder, when accommodating an Observer, shall ensure that accommodation and food of officer's standard is provided.
- 13.3 The Observer shall be responsible to verify fisheries data or as otherwise directed by the Chief Director: Marine Resource Management. The Observer shall monitor all fishing operations and shall record any transgressions of the MLRA.
- 13.4 The Permit Holder shall, when requested, allow for land-based sampling of catches for scientific purposes by persons authorized by the Department.
- 13.5 Observers on board shall bring back whole specimens of all seabirds killed during longline fishing operations.

14. COMPLIANCE

- 14.1 The Permit Holder is obliged in terms of the MLRA to report to the Minister any contravention of the MLRA or permit conditions by any other person. Any such contravention must be reported to the Department in writing and should be faxed to (021) 425-7324, Attention: The Chief Director: Monitoring, Control and Surveillance.

- 14.2 At any time during the course of the fishing trip or discharging, a Fishery Control Officer can request the skipper of the vessel to provide the cargo manifest or any other documents relating to fishing operations. The skipper must comply with this request.

15. VALIDITY OF PERMIT

- 15.1 This permit shall be valid from the date of issue until the **31st December 2009**.
- 15.2 This permit shall automatically expire and be invalid should the right allocated by the Minister or his delegate be cancelled or revoked in terms of section 28 of the MLRA.

SECTION C

MANAGEMENT MEASURES

SWORDFISH LONGLINE FISHERY: 2009

1. GENERAL

This permit is issued subject to the further provisions of the following once finalised and/or promulgated (See also Paragraph 2.2 of Section B):

- The new large pelagics swordfish / tuna longline allocation policy (to be gazetted in 2009);
- Large Pelagics Fisheries Management Plan (to be developed); and
- National Plans of Action for the Conservation and Management of Sharks (NPOA-sharks) and Seabirds (NPOA-seabirds).

2. OBSERVERS

The Department will maintain its current Observer coverage in this fishery.

3. ECOSYSTEM CONSIDERATIONS

- 3.1 The Department will, in consultation with Right Holders, implement measures to minimise the impact of destructive fishing practices on ecosystems.
- 3.2 Turtle, seabird and shark by-catch may be a problem but the extent of this problem and the solutions thereof can only be determined through an Observer programme. Hence, a dedicated Observer programme is essential for the swordfish longline fishery.
- 3.3 The Permit Holder must take cognisance of sustainable fishing practices and impacts of tuna longline operations on the ecosystem. A specific concern is the impact of lost "strops" (cords used to hang fish during freezing) during discharge procedures. Cape fur seals subsequently become entangled in these strops resulting in mutilation of these mammals and in many cases a slow agonising death. In order to solve this problem the permit holder is to ensure that "strops" used during freezing and discharge are to be constructed according to the following specifications (see paragraph 12.1 above):

A double strand of polypropylene cord (or better still any biodegradable material) rather than being made into one large circle is to be restricted to a maximum size of circle by knotting the rope to limit the hole size to

a maximum of 80 mm between knots. (See Figure 1 for clarity). The minimum stretched length between knots may not exceed the stipulated 80 mm. This design allows the application of the strops as originally used but will ensure that seals cannot become entangled in the loops.

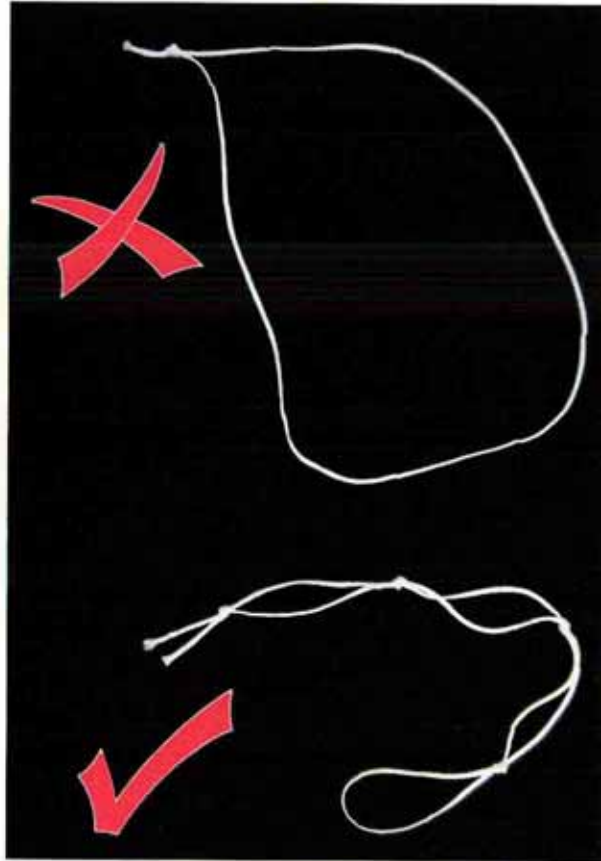


Figure 1: An example of correct "strops" to use to avoid seal entanglement

Annexure 1
Example of Large Pelagic Catch Summary

Permit Holder Name	Vessel Name	Trip No	Trip start date	Trip end date	Albacore in kg	Bigeye in kg	Yellowfin in kg	Bluefin in kg	Swordfish in kg	Bill in
Lucky Trading	Swift	1	1/5/2009	13/5/2009	100	1560	3000	0	4500	
Lucky Trading	Swift	2	29/5/2009	10/6/2009	200	3030	1210	75	3500	
Lucky Trading	Delta	3	1/8/2009	14/8/2009	900	1900	900	350	4110	

* Catch Summaries to be submitted after every trip on the same spreadsheet.

Annexure 2:

BIRD-SCARING LINE

Specifications:

A bird-scaring line must achieve at least 150 m aerial coverage. It must therefore 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).

Streamers (minimum requirement):

6 pairs of 4m

6 pairs of 3m

8 pairs of 2m

8 pairs of 1m

i.e. a total of 28 pairs of streamers

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.

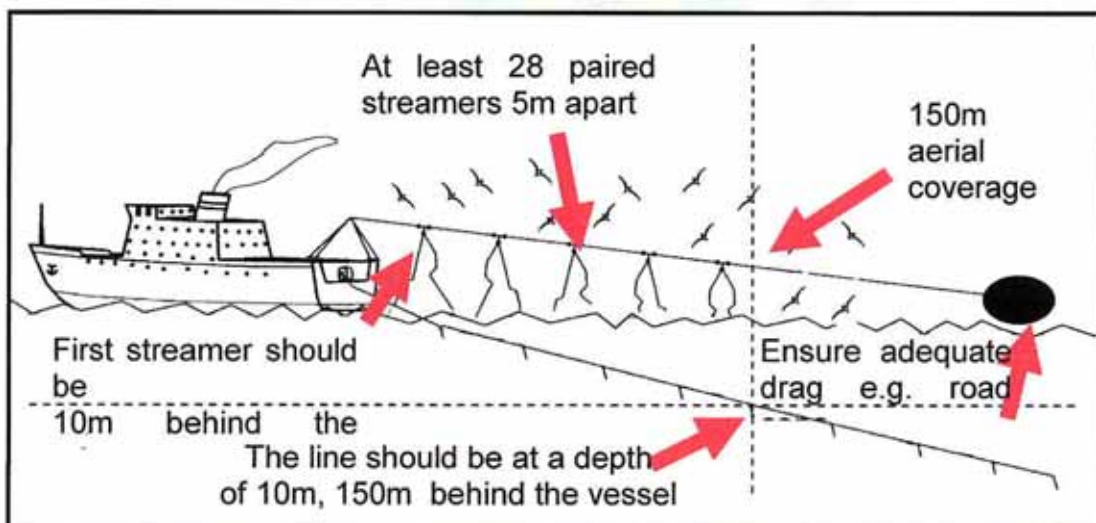


Figure 1: Bird-scaring line and longline sink rate specifications

What makes an effective bird-scaring line?

There are several things which improve the effectiveness of a bird-scaring line:

Maximising aerial coverage: 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. 7 m above sea level should be considered a minimum. On small vessels where a high attachment point is not accessible, an outrigger pole can be mounted to provide this height. 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.

The importance of streamers: Streamers can be made from plastic strapping or pvc tubing. They should be a bright colour, preferably red. Streamers should be placed every 5 m along the entire aerial section of the line. The erratic movement of the streamers increases its efficacy. Attaching light sticks to streamers may increase the efficacy of the bird-scaring line when setting at night.

Adjusting the bird-scaring line: Once a bird-scaring line is operating at its full height a "lazy line" attached and tied off at a convenient point on the stern allows the bird-scaring line to be quickly retrieved. This is particularly important if the line gets snagged as it can be quickly pulled down, unclipped and clipped onto the backbone, allowing the vessel to continue setting. The bird-scaring line can then be retrieved during hauling. The lazy line also allows the bird-scaring line to be adjusted according to wind conditions. To be effective a bird-scaring line should be over the point where gear enters the water. By tying the "lazy line" on the windward side of the vessel, it can be effectively used to adjust the bird-scaring line so that it is positioned directly over the gear.

Ease of use: It is important that the bird-scaring line is easy to use. To save space it can be stored in a plastic hose reel or in a fish bin. It is important that the line does not foul the gear being set. To prevent this from happening floats and mid-buoys should be thrown downwind so that they do not float back onto the bird-scaring line. Altering the course slightly when radio buoys are thrown into the water may also prevent them from becoming snagged.

Annexure 3:**RELEASE PROCEDURES****Seabirds**

Birds released from longline hooks have a good chance of survival if they are treated correctly.

Carefully lift the bird aboard, preferably using a net, or by holding the bill, wing tips and body – never pull the bird up with the line. Once aboard, keep hold of the bill and carefully fold the wings into the body.

Hold the bird securely, without squeezing.

Hooks can then be extracted easily from wings, legs or bill tips using bolt cutters to remove the barb.

If an albatross has swallowed a hook, and its position can be found, the following procedure is recommended, but must only be attempted by trained people with access to the correct equipment:

Reach down the bird's throat, grasp the hook and gently push it so it bulges under the skin. Make a small cut to allow the hook to pass through. Cut the barb off the hook and remove it. Never try to remove the hook with the barb. If you cannot remove the hook, cut the line as short as possible and let the bird go.

When releasing a bird, allow it to move away from the vessel before proceeding with fishing operations.

Turtles

All turtles alive on the line should be treated correctly to improve their chances of post release survival.

If the turtle is too large to bring on board, manoeuvre the boat as close to the turtle as possible, avoiding putting too much strain on the line. If the turtle is hooked and the barb visible, use a long handled de-hooker to remove the hook. Otherwise, cut the line as close to the turtle as possible and remove any entangling line. Let the turtle swim away from the vessel before continuing fishing operations.

If the turtle is small enough to be safely handled, use a net to bring it on board. Avoid pulling on the line. A tyre is useful to demobilise the turtle once on board. If the hook has been swallowed, or is in the mouth, place a gag in its mouth so it cannot bite.

If the turtle is hooked in its mouth use bolt cutters, or a de-hooker to remove the hook.

If the turtle is hooked in its throat and the barb is visible, use a de-hooker.

If the turtle is deeply hooked and the barb is not visible, remove as much of the line as possible, without pulling on it.

Keep the turtle on board in a cool location to recover. Gently release the animal headfirst, ensuring the water is clear of fishing gear and the boat is stationary.

How to use a de-hooker:

Thread the line through the eye of the de-hooker.

Keeping the line taught, push the de-hooker down the turtle's throat until it reaches the hook.

A sharp downward movement will dislodge the hook.

Turn the handle 45° and slowly remove the de-hooker.

De-hookers and instructions can be obtained from www.dehooker4arc.com.

**ANNEXURE 4
Seabird Mitigation Checklist for Swordfish Vessels**

Section A (Prior Departure Inspection by Fishery Control Officer)

Date	Tori line length (150m)	Attachment point for tori line (>7 m high)	Bird dehooker device	FCO's Name	FCO's signature

Section B (Observer Report On Compulsory Measures)

Date	Tori line deployed?	Bait management? (11.5 & 11.7)	Comments	Skipper Signature	Observer Name & Signature

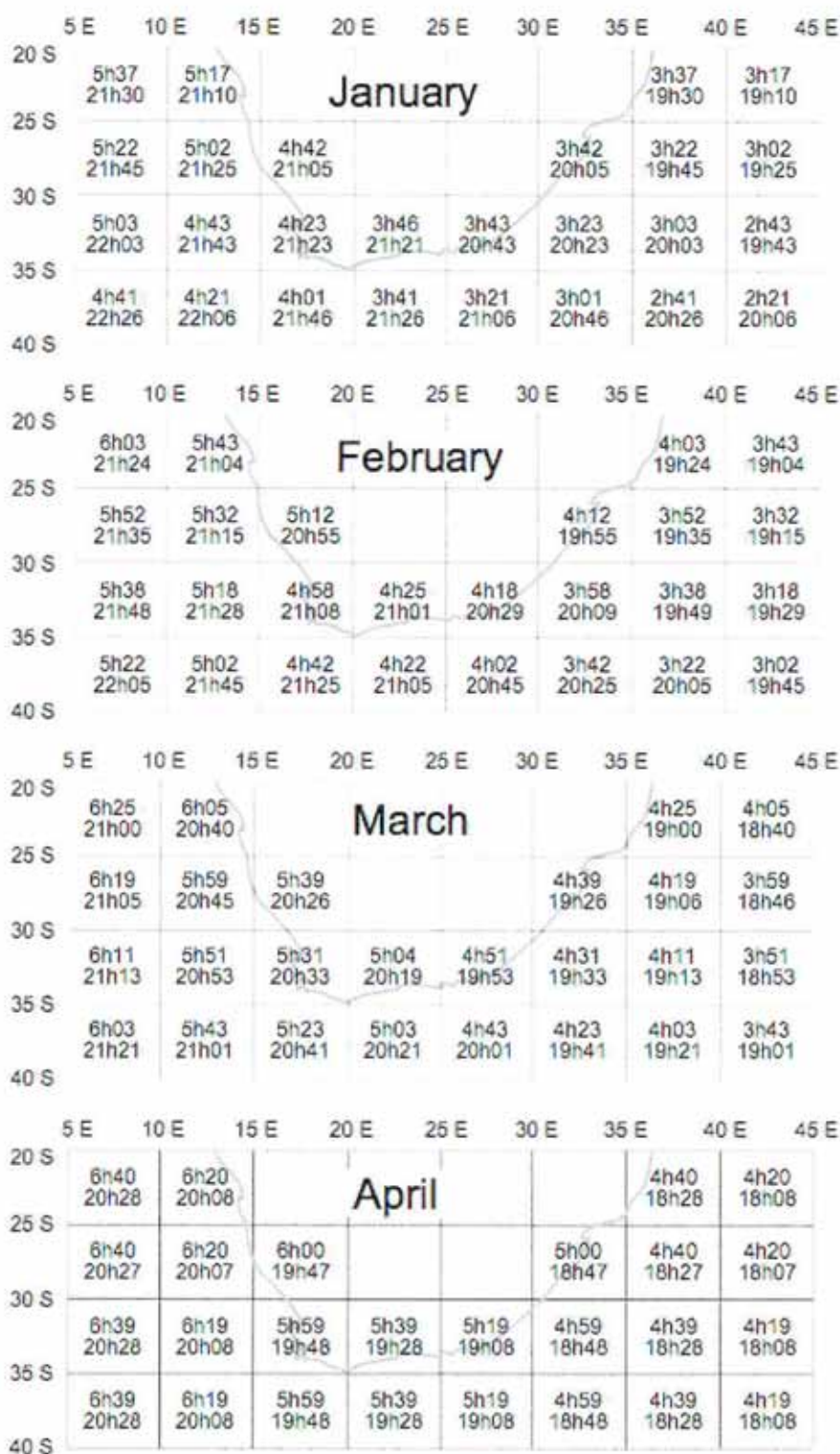
Section C (Observer Report On Additional Measures)

Date	Night Setting?	No fishing over full moon	Comments	Skipper Signature	Observer Name & Signature

Instructions: mark boxes with TICK if Permit Holder complies or with a CROSS if Permit Holder does not comply

ANNEXURE 5

Monthly charts indicating averaged nautical dawn (upper time) and nautical dusk (lower time) for the various geographic co-ordinates. Times are indicated as GMT+2.



	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E	
20 S	6h47 20h07	6h27 19h47	May					4h47 18h07	4h27 17h47	
25 S	6h52 20h02	6h32 19h42	6h12 19h22				5h12 18h22	4h52 18h02	4h32 17h42	
30 S	6h56 19h58	6h36 19h38	6h16 19h218	6h00 18h54	5h37 18h36	5h16 18h18	4h56 17h58	4h36 17h38		
35 S	7h01 19h53	6h41 19h33	6h21 19h13	6h01 18h53	5h41 18h33	5h21 18h13	5h01 17h53	4h41 17h33		
40 S										

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E	
20 S	6h57 19h59	6h37 19h39	June					4h57 17h59	4h37 17h39	
25 S	7h05 19h51	6h45 19h31	6h25 19h11				5h25 18h11	5h05 17h51	4h45 17h31	
30 S	7h12 19h43	6h52 19h23	6h32 19h03	6h19 18h37	5h54 18h20	5h32 18h03	5h12 17h43	4h52 17h23		
35 S	7h20 19h35	7h00 19h15	6h40 18h55	6h20 18h35	6h00 18h15	5h40 17h55	5h20 17h35	5h00 17h15		
40 S										

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E	
20 S	7h00 20h13	6h40 19h53	July					5h00 18h13	4h40 17h53	
25 S	7h06 20h07	6h46 19h47	6h26 19h27				5h26 18h27	5h06 18h07	4h46 17h47	
30 S	7h12 19h01	6h52 19h41	6h32 19h21	6h16 18h57	5h53 18h39	5h32 18h21	5h12 18h01	4h52 17h41		
35 S	7h18 19h55	6h58 19h35	6h38 19h15	6h18 18h55	5h58 18h35	5h38 18h15	5h18 17h55	4h58 17h35		
40 S										

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E	
20 S	6h41 20h19	6h21 19h59	August					4h41 18h19	4h21 17h59	
25 S	6h43 20h18	6h23 19h58	6h03 19h38				5h03 18h38	4h43 18h18	4h23 17h58	
30 S	6h44 20h17	6h24 19h57	6h04 19h37	5h45 19h16	5h24 18h56	5h04 18h37	4h44 18h17	4h24 17h57		
35 S	6h45 20h16	6h25 19h56	6h05 19h36	5h45 19h16	5h25 18h56	5h05 18h36	4h45 18h16	4h25 17h56		
40 S										

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E	
20 S	6h11 20h29	5h51 20h09	September				4h11 18h29	3h51 18h09		
25 S	6h07 20h33	5h47 20h13	5h27 19h53				4h27 18h53	4h07 18h33	3h47 18h13	
30 S	6h02 20h38	5h42 20h18	5h22 19h58	4h57 19h43	4h42 19h18	4h22 18h58	4h02 18h38	3h42 18h18		
35 S	5h56 20h44	5h36 20h24	5h16 20h04	4h56 19h44	4h36 19h24	4h16 19h04	3h56 18h44	3h36 18h24		
40 S										

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E	
20 S	5h40 20h47	5h20 20h27	October				3h40 18h47	3h20 18h27		
25 S	5h31 20h57	5h11 20h37	4h51 20h17				3h51 19h17	3h31 18h57	3h11 18h37	
30 S	5h19 21h09	4h59 20h49	4h39 20h29	4h08 20h20	3h59 19h49	3h39 19h29	3h19 19h09	2h59 18h49		
35 S	5h05 21h23	4h45 21h03	4h25 20h43	4h05 20h23	3h45 20h03	3h25 19h43	3h05 19h23	2h45 19h03		
40 S										

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E	
20 S	5h26 21h12	5h06 20h52	November				3h26 19h12	3h06 18h52		
25 S	5h12 21h26	4h52 21h06	4h32 21h46				3h32 19h46	3h12 19h26	2h52 19h06	
30 S	4h55 21h44	4h35 21h24	4h15 21h04	3h38 21h00	3h35 20h24	3h15 20h04	2h55 19h44	2h35 19h24		
35 S	4h34 22h05	4h14 21h45	3h54 21h25	3h34 21h05	3h14 20h45	2h54 20h25	2h34 20h05	2h14 19h45		
40 S										

	5 E	10 E	15 E	20 E	25 E	30 E	35 E	40 E	45 E	
20 S	5h32 21h27	5h12 21h07	December				3h31 19h27	3h12 19h07		
25 S	5h16 21h43	4h56 21h23	4h36 21h03				3h36 20h03	3h16 19h43	2h56 19h23	
30 S	4h58 22h01	4h38 21h41	4h18 21h21	3h39 21h19	3h38 20h41	3h18 20h21	2h57 20h01	2h37 19h41		
35 S	4h34 22h25	4h14 22h05	3h54 21h45	3h34 21h25	3h14 21h05	2h54 20h45	2h34 20h25	2h14 20h05		
40 S										



DIRECTOR: OFFSHORE & HIGH SEAS FISHERIES MANAGEMENT
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