

National Plan of Action

for the Conservation and Management of Sharks
(NPOA-Sharks)

Foreword

South Africa's Exclusive Economic Zone is endowed with a rich variety of marine living resources. The sustainable management of these resources for the benefit of all South Africans, present and future, remains a firm commitment of the South African Government. South Africa is signatory to the Code of Conduct for Responsible Fisheries - voluntarily agreed to by members of the United Nations Food and Agriculture Organisation (FAO) - and, as such, is committed to the development and implementation of National Plans of Action (NPOAs) as adopted by the twenty-third session of the FAO Committee on Fisheries in February 1999 and endorsed by the FAO Council in June 1999.

NPOAs describe strategies through which commercial fishing nations can achieve economically and ecologically sustainable fisheries. South Africa published the NPOA-Seabirds – aimed at reducing incidental catch and promoting the conservation of seabirds in longline fisheries - in August 2008. South Africa has adopted an Ecosystem Approach to Fisheries and now regularly conducts Ecological Risk Assessments for all the commercial fishing sectors, widely consulting with all stakeholders regarding best management practices.

Acknowledging the importance of maintaining a healthy marine ecosystem and the possibility of major detrimental effects due to the disappearance of large predators, South Africa was the first country to offer full protection to the great white shark, removing it from the list of harvestable species. In accordance with international recommendations, South Africa subsequently banned the landing of a number of susceptible shark species, including oceanic whitetip, silky, thresher and hammerhead sharks.

South Africa implemented a ban on shark finning practices in 2004 and continually improves monitoring efforts for foreign vessels discharging shark products in its ports. To ensure long-term sustainability of valuable, but biologically limited, shark resources South Africa has already drastically reduced fishing effort in the demersal shark longline fishery and has terminated the pelagic shark longline fishery in favour of developing a more sustainable tuna and swordfish longline fishery.

The NPOA-Sharks presented here formalises and streamlines ongoing efforts to improve conservation and management of sharks caught in South African waters. The Fisheries Branch of the Department of Agriculture, Forestry and Fisheries has invested significantly in the area of shark research and capacity development including, but not limited to, the establishment of a dedicated shark research section at the Chief Directorate: Fisheries Research and Development, the formation of a Large Pelagic and Sharks Scientific Working Group and the commencement of research efforts dedicated to investigating the biology, ecology and stock status of commercially harvested shark species.

Situated at the boundary of the Atlantic and the Indian Ocean and two Large Marine Ecosystems (LMEs), the Agulhas and the Benguela LMEs, South Africa is destined to play a key role in ensuring the responsible harvesting of marine living resources associated with these systems, many of which are shared between many fishing nations, from Africa and beyond. The development of the NPOA-sharks is further testimony to the dedication of its Government to constantly improve mechanisms to ensure responsible management and long-term sustainable utilization of these resources for the benefit of all.

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Executive summary

The global increase of shark catches raises concern about the sustainability of these resources. Sharks share life-history characteristics that make them susceptible to overexploitation. Not only are sharks often caught as by-catch in fisheries that are managed for species that can sustain a higher fishing pressure, sharks also form a large part of the unwanted by-catch that is discarded at sea, much of which is unrecorded and unregulated, which complicates the management of these resources. Taking cognisance of these concerns, the FAO committee on Fisheries held a number of expert meetings in 1998 and developed an International Plan of Action for Conservation and Management of Sharks (IPOA-Sharks). The guideline is to promote the conservation and management of sharks and their long term sustainable use, and is based on principles of the Code of Conduct for Responsible Fisheries, to which South Africa is a signatory. To achieve this goal the IPOA-Sharks recommended that member states of the FAO should develop a voluntary National Plan of Action for the Conservation and Management of Sharks (NPOA-Sharks). South Africa has one of the most diverse shark faunas in the world and many species are caught in appreciable quantities in directed and non-directed shark fisheries. South Africa has well developed fisheries management systems for most of its fisheries and many challenges with regard to the sustainable management and conservation of sharks have already been identified and addressed in individual fisheries policies and management measures. The South African National Plan of Action for sharks (NPOA-Sharks) provides information on the status of chondrichthyans in South Africa and examines structure, mechanisms and regulatory framework related to research, management, monitoring, and enforcement associated with shark fishing and trade of shark product in the South African context. This information is then used to identify, group and prioritize issues particular to the South African chondrichthyan resources that require intervention in the form of specific actions with associated responsibilities and time frames. Once adopted, this voluntary guideline will provide a mechanism for identifying and resolving the outstanding issues around management and conservation of sharks to ensure their optimal, long-term, sustainable use for the benefit of all South Africans.



Acronymns

CCAMLR:	Commission for the Conservation of Antarctic Marine Living Resources
CCSBT:	Commission for the Conservation of Southern Bluefin Tuna
COFI:	FAO Committee on Fisheries
DAFF:	Department of Agriculture, Forestry and Fisheries
EAf WG:	Ecosystem Approach to Fisheries Working Group
EEZ:	Exclusive Economic Zone
FAO:	Food and Agriculture Organisation
FRD:	Fisheries Research and Development
ICCAT:	International Commission for the Conservation of Atlantic Tunas
IOTC:	Indian Ocean Tuna Commission
IPOA-Sharks:	International Plan of Action for the Conservation and Management of Sharks
IUU Fishing:	Illegal, Unregulated and Unreported Fishing
MCS:	Monitoring, Compliance and Surveillance
MLRA:	Marine Living Resources Act
MLRF:	Marine Living Resources Fund
MRM:	Marine Resources Management
MSC:	Marine Stewardship Council
NPOA-Sharks:	National Plan of Action for Sharks
PEI:	Prince Edward Islands
RR:	Resources Research
SABS:	South African Bureau of Standards
SAR:	Shark Assessment Report
TAC:	Total Allowable Catch
TAE:	Total Allowable Effort
VMS:	Vessel Monitoring System
OMP:	Operational management Plan
ASPM:	Age Structured Production Model
SANBI:	South African National Biodiversity Institute
SAIAB:	South African Institute for Aquatic Biodiversity
MPA:	Marine Protected Area
PUCL:	Precautionary Upper Catch Limit
RFMO:	Regional Fisheries Management Organisation
KZNSB:	KwaZulu Natal Sharks Board
SASSI:	Southern African Sustainable Seafood Initiative



Glossary

ABUNDANCE: Degree of plentifulness for example the total number of fish in a population or a stock.

BIODIVERSITY: the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. [Convention on Biological Diversity].

BIOMASS: or standing stock. The total weight of a group or stock of living organisms, or of some defined fraction of it, in an area at a particular time.

BY-CATCH: Part of a catch of a fishing unit taken incidentally in addition to the target species towards which fishing effort is directed. Catch may be retained or returned to the ocean as discards, usually dead or dying.

CATCH: The total number (or weight) of fish caught by fishing operations. Catch should include all fish killed by the act of fishing, not just those landed.

COLLAPSE: Reduction of a stock abundance by fishing and / or other causes to levels at which the production is negligible compared to historical levels.

CONSERVATION: Of natural resources. The act of maintaining, protecting or enhancing natural resources and ecosystems.

DEMERSAL: Living in close relation with the bottom and depending on it. Example: Cods, Groupers and lobsters are demersal resources. The term “demersal fish” usually refers to the living mode of the adult.

DIRECTED FISHERY: Fishing that is directed at a certain species or group of species. This applies to both sport fishing and commercial fishing.

DISCARD: To release or return fish to the sea, dead or alive, whether or not such fish are brought fully on board a fishing vessel.

ECOTOURISM: Travel undertaken to witness the unique natural or ecological quality of particular

sites or regions, including the provision of services to facilitate such travel.

FINNING: The practice of removing fins and discarding the carcass, usually pertaining to sharks.

FISHING EFFORT: Measure of the amount of fishing.

HABITAT: means any area which contains suitable living conditions for a species.

HIGHLY MIGRATORY SPECIES OR STOCKS: Marine organisms whose life cycle includes large scale systematic movement patterns, usually through the EEZ of two or more countries as well as into international waters.

JOINT PRODUCT: Term used to describe the utilisation of by-catch species.

LONGLINE: A fishing gear in which short lines carrying hooks are attached to a longer main line at regular intervals. Longlines are either laid on the bottom or suspended horizontally at a predetermined depth with the help of surface floats.

MANAGEMENT: The art of taking measures affecting a resource and its exploitation with a view to achieving certain objectives, such as the maximization of the production of that resource. Management includes, for example, fishery regulations such as catch quotas or closed seasons.

MIGRATION: Systematic (as opposed to random) movement of individuals of a stock from one place to another, often related to season. A knowledge of the migration patterns helps in targeting high concentrations of fish and managing shared stocks.

MIGRATORY SPECIES: Organisms that move over national boundaries, and hence require international cooperation to enable their management.

NON-CONSUMPTIVE USE: Refers to cases where one person’s enjoyment does not prevent others from enjoying the same resource. For example, the viewing of marine mammals or other wildlife does not prevent another from enjoying the same resources.



OPTIMAL: Most favourable or desirable.

PELAGIC: Sharks that frequents surface waters or occur in the water column, not associated with the bottom but may make diurnal migrations between the surface and the ocean floor.

PRECAUTIONARY APPROACH: Is the ability to exercise prudent foresight to avoid unacceptable or undesirable situations, taking into account that changes in fisheries systems are only slowly reversible, difficult to control, not well understood, and subject to change in the environment and human values. The precautionary principle therefore promotes that measures be implemented to prevent degradation of the ecosystem where there are threats of serious or irreversible damage even in the absence of full scientific certainty.

RATIONAL USE: Decisions on resource utilization are derived from conclusions in a consistent way given the available information.

REQUIEM SHARKS: Any shark of the family

Carcharhinidae, predominantly grey in appearance, live-bearing and migratory.

SHARKS: For the purpose of this document the term “sharks” is used to describe all chondrichthyans (sharks, skates, chimeras and rays).

STAKEHOLDER: An entity (individuals or organizations) having a stake or interest in a physical resource, ecosystem service, institution, or social system, or someone who is or may be affected by a public policy.

STOCK: Fish stocks are subpopulations of a particular species of fish, for which intrinsic parameters (growth, recruitment, mortality and fishing mortality) are the only significant factors in determining population dynamics, while extrinsic factors (immigration and emigration) are considered to be insignificant.

SUSTAINABLE USE: Actions that maintain the long-term production of a renewable resource.



Introduction

There is international concern over the global increase of shark catches against a backdrop of scientifically monitored marked reductions in many shark populations. Sharks are particularly vulnerable to overexploitation due to closed stock-recruitment relationships, low biological productivity, and complex spatial structures. Sharks are often caught as by-catch in fisheries that are managed for species that can sustain a higher fishing pressure and sharks form part of the unwanted by-catch that is discarded at sea, much of which is unrecorded and unregulated. Fishing is therefore regarded as the single largest threat to many shark populations. Noting these concerns, the FAO Committee on Fisheries (COFI) developed in 1998 an International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks) within the framework of the Code of Conduct for Responsible Fisheries to which South Africa is a signatory. The IPOA-sharks is a voluntary instrument which encourages states to conduct a Shark Assessment Report (SAR) and adopt a National Plan of Action for Sharks (NPOA-sharks) if their vessels conduct shark-directed fishing or if their vessels regularly catch sharks in non-directed fisheries. For the purpose of this document the term “sharks” is used to describe all chondrichthyans (sharks, skates, chimeras and rays). The objective of the IPOA-Sharks is to ensure the conservation and management of sharks and their long-term sustainable use, with the following specific aims:

- i. Ensure that shark catches from directed and non-directed fisheries are sustainable;
- ii. Assess threats to shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use;
- iii. Identify and provide special attention, in particular to vulnerable or threatened shark stocks;
- iv. Improve and develop frameworks for establishing and coordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States;
- v. Minimize unutilized by-catch of sharks;
- vi. Contribute to the protection of biodiversity and ecosystem structure and function;

- vii. Minimize waste and discards from shark catches in accordance with article 7.2.2.(g) of the Code of Conduct for Responsible Fisheries (for example, requiring the retention of sharks from which fins are removed);
- viii. Encourage full use of dead sharks;
- ix. Facilitate improved species-specific catch and landings data and monitoring of shark catches;
- x. Facilitate the identification and reporting of species-specific biological and trade data.

The IPOA-Sharks requires each state to develop, implement and monitor its NPOA-Sharks. These plans were required to be submitted to COFI in 2001 and a progress report on implementation is required every two years.

South Africa has a responsibility to develop a SAR and to adopt a NPOA-Sharks as good practice and consistent with its role as a signatory to the FAO Code of Conduct for Responsible Fisheries, it is Member Party of the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), a Co-operating Non-Contracting Party of the Indian Ocean Tuna Commission (IOTC) and the Commission for the Conservation of Southern Bluefin Tunas (CCSBT). Moreover, South Africa has one of the most diverse faunas of cartilaginous fishes (Class Chondrichthyes) in the world, accounting for 181 species (15% of the world’s shark species) (Appendix 1, Species Summary) of which 27.1% are endemic to Southern Africa (Appendix 1, Species Summary). Most species are poorly understood and constitute stocks of relatively low biomass (Appendix 1, Species Summary) However, a number of species are caught in appreciable quantities in directed and non-directed shark fisheries. Directed fisheries for sharks include the demersal shark longline, St Joseph (Elephantfish) net fishery, the traditional linefish fishery, recreational linefishery, and the Kwazulu Natal Bather Protection Program (Table 1, section 7). Important non-directed fisheries for retained shark include the tuna/swordfish longline fishery, and inshore/ offshore trawl.



The South African National Plan of Action for sharks (NPOA-Sharks) provides information on the status of chondrichthyans in South Africa as well as on structure, mechanisms and regulatory framework related to research, management, monitoring, and enforcement associated with shark fishing and trade of shark product in the South African context (The NPOA-sharks does not address issues pertaining to the non-consumptive utilization of sharks, such as shark diving and filming, which is currently being addressed in the Department of Environmental Affairs.). This information is contained

in section 7 and provides the baseline for South Africa as required by the IPOA-Sharks in terms of a Shark Assessment Report.

This information is then used to identify, group and prioritize issues particular to the South African chondrichthyan resources that require intervention in the form of specific actions with associated responsibilities and time frames in order to attain the goals set out in the vision statement:



Vision

“The effective conservation and management of sharks that occur in the South African EEZ to ensure their optimal, long-term, sustainable use for the benefit of all South Africans, including both present and future generations.”

The NPOA-Sharks recognizes the need to determine and implement harvesting strategies consistent with the principles of biological sustainability, attained through scientifically based management, and consistent with a Precautionary Approach. Furthermore, it strives to identify and direct attention, in particular, to vulnerable or threatened shark stocks, minimize by-catch capture of sharks and contribute to the protection of biodiversity and ecosystem structure and function.

The NPOA-Sharks recognizes the potential of non-

consumptive use of sharks through ecotourism activities. These aspects of utilization need to be explored so as to find an optimum balance between consumptive and non-consumptive use, maximizing their benefits with low impact on the marine ecosystem.

Although the NPOA further recognizes that pollution, coastal development and climate change might negatively impact on sharks, the focus of the first NPOA-Sharks is fisheries related, including fisheries where sharks are caught as by-catch but not retained. The Plan is intended to have an initial implementation period of four years (2012-2015) with an annual review scheduled to determine progress. The final consultative review in year four would be used to provide the basis for a revision of the NPOA-Sharks, taking into account any new changes in fisheries.



Baseline information

Species information

The South African EEZ straddles two oceans and, if one considers the sub Antarctic Prince Edward Islands, includes all marine bio-zones, from tropical to polar. Consequently, South Africa has one of the most diverse faunas of cartilaginous fishes (Class Chondrichthyes) in the world. South African chondrichthyo-fauna include representatives from all 10 orders of cartilaginous fishes, 44 of the 60 families (73%), 100 out of 189 genera (53%), over 181 of the 1171 world species (15%) and 34 endemic species to southern Africa (27%) (Appendix 1) (Compagno 2000). This high level of diversity and endemism engenders South African responsibility in conserving and managing sharks that occur in South African waters and protecting those that enter South African waters periodically.

Management agencies and legislation

The Branch Fisheries Management, of the Department of Agriculture, Forestry and Fisheries is the lead governmental agency responsible for the management of sharks caught in South African fisheries. Fisheries Management is legally mandated to manage sharks in terms of the Marine Living Resources Act (MLRA), 1998 (Act No 18 of 1998) and the Regulations promulgated thereunder. Other additional acts that have relevance to the conservation of sharks include the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004), the National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003), Dumping at Sea Control Act, 1980 (Act No 73 of 1980), and the KwaZulu-Natal Sharks Board Act, 2008 (Act 5 of 2008). Fisheries Management, in managing sharks, is supported by a number of agencies/ institutions, namely Oceans and Coast (Department of Environmental Affairs), South African National Biodiversity Institute (SANBI), KwaZulu-Natal Sharks Board, Ezemvelo KZN Wildlife, Oceanographic Research Institute, South African National Parks, Cape Nature, Bayworld, Iziko Museum of Natural History and the South African Institute for Aquatic Biodiversity (SAIAB).

Current management tools

Fisheries Management uses various management tools which have contributed to the conservation and sustainable fishing of many shark species. Some species due to their compromised conservation status have been afforded special protection status under the Regulations of the MLRA, e.g. the great white shark and the sawfish (Pristidae). In addition, spotted gully and raggedtooth sharks have been commercially delisted in terms of the Regulations of the MLRA (Appendix 2). Entry into any commercial fishery is limited by a rights allocation process, which is managed by Fisheries Management. The allocation takes into account scientific recommendations in limiting the number of vessels, crew and Total Allowable Catch (TAC) or Total Allowable Effort (TAE) for target species as well as precautionary catch limits for by-catch species. A number of coastal Marine Protected Areas (MPAs) have also been promulgated along the South African coastline with the aim of conserving biodiversity hot spots and providing harvest refuges for highly resident fishes. In so doing partial protection is afforded to some coastal shark species such as ragged tooth sharks, cow sharks, smooth hounds, cat sharks and juvenile requiem sharks. The impact of fisheries on some shark species has been reduced through permit conditions in certain fisheries e.g. tuna pole, which prohibit the landing of shark. Recreational bag limits have been reduced to one shark per fisher per day.



Hammer shark



Harvesting of sharks in south africa

The total South African shark catch is estimated at 6 562 t per annum (Appendix 3) and is derived from fisheries that can be divided into two principal components, that of directed and by-catch fisheries (Table 1). The

first component represents fishing activities that target sharks –the demersal shark longline-, traditional line-, and St. Joseph shark net-fishery as well as the bather protection program and shark fishing for the aquarium trade. Sharks are also caught as both by-catch and as a targeted species in the large pelagic longline fishery and the recreational linefishery. For the purpose of this

Table 1. South African fisheries that have a shark component.

Fishery	Area	Main Shark Species	Target / By-catch
Demersal Shark Longline	West and South Coast	Smoothhound spp and soupfin sharks	Target
Large Pelagic Longline	Offshore to beyond EEZ	Blue and mako sharks	Target and By-catch
Bather Protection Program	East Coast	Large Carcharhinids species	Target
Traditional Linefish	Inshore to 200 m depth	Smoothhound spp and soupfin sharks	Target
St Joseph net	West Coast	St Joseph sharks	Target
Recreational Linefishery	Inshore to 200m depth	Large Carcharhinids	Target
Tuna Pole	Offshore to beyond EEZ	Blue and Mako sharks	By-catch
Hake Longline	West and South Coast to 500 m depth	Common smoothhound and soupfin sharks	By-catch
Inshore Trawl	South and East Coast to 200 m depth	Squalidae, Scyliorhinidae, smoothhounds spp, soupfin sharks, St Joseph and Rajids .	By-catch
Offshore Trawl	West Coast, Agulhas Bank to shelf edge (600 m depth)	Squaliform, Scyliorhinidae, soupfin sharks, Rajids and Chimeara.	By-catch
Prawn Trawl	KwaZulu-Natal East Coast to 600 m depth	Carcharhinid, Sphyrnid, Squalidae, Dasyatidae and Rajidae species	By-catch
Midwater trawl	South and East Coast	Pelagic sharks	By-catch
Gill net / Beach Seine (legal and illegal)	West, South & East Coast	Smoothhound spp, soupfin, St. Joseph sharks, and Rajidae.	Target and by-catch
Patagonian Tooth fishery	Prince Edward Islands	Deep water scyliorhinids, six gills, Rajidae	By-catch
Rocklobster trap		Scyliorhinid spp	By-catch
Aquarium trade		Small Carcharhinids and Scyliorhinidae	Target



document, the large pelagic longline and the recreational linefishery are also regarded as targeting sharks due to the relatively high shark catch that are retained in these fisheries. The second component is represented by fisheries that catch sharks as a component of their by-catch, e.g. hake longline, inshore trawl, offshore trawl, mid-water trawl/ purse seine fishery, and the beach seine ('treknet') fishery. Appreciable shark by-catches are also made in the tuna pole, prawn trawl, patagonian toothfish and in the rock lobster trap fisheries, but the animals are not necessarily retained. In the interest of clarity, profiles of fisheries that target sharks and those with appreciable by-catch are discussed separately.

DIRECTED SHARK FISHERY PROFILES

Demersal shark longline

In the 1990s, over 30 permits were issued to target shark (pelagic and demersal species combined). Many of the permits were not utilized as permit holders generally held permits in other more lucrative fisheries. The initial incentive to obtain these permits was to exploit loopholes in the regulations to catch hake by longline, banned in 1990 (Crawford et al., 1993). Due to poor performance the number of permits was decreased to 11 in 2004 and finally to six permits in 2005. Due to the steep learning curve in catching and marketing demersal sharks catches of soupfin (*Galeorhinus galeus*) and common smoothhound sharks (*Mustelus mustelus*) only increased in this fishery in 2006. In 2010 catches of sharks were as follows: soupfin (106 t), common smoothhound (110 t), bronze whaler sharks (*Carcharhinus brachyurus*) (32 t) and skates (Rajidae.) (33 t).

The current demersal shark longline is restricted to coastal waters and uses weighted longline with hooks to target soupfin, smoothhound spp, dusky (*C. obscurus*) and bronze whaler sharks. The fishery is currently restricted to a Total Applied Effort (TAE) of 6 vessels. As a precautionary measure the fishery is prohibited from fishing North of East London, where biodiversity increases and the continental shelf narrows up the East Coast of South Africa. Vessels are tracked by a Vessel Monitoring System (VMS) that directly links to the Fisheries Management base station. All landings are independently monitored and skippers are required to complete logbooks per longline set. There is generic reporting of skates and carcharhinid species. There is an overlap of species caught in this fishery with the traditional linefish fishery and the recreational fishery.



Smoothhound sharks (*M. mustelus*) caught during National research demersal shark longline surveys aboard the research vessel *RV Ellen Khuzwayo* (Photo: Rob Tarr)



Large pelagic longline fishery

The large pelagic longline fishery was established in 1997 as an experimental fishery. This fishery uses pelagic longline to target swordfish (*Xiphias gladius*), yellowfin tuna (*Thunnus albacores*) and bigeye tuna (*Thunnus obesus*) along the entire coastline of South Africa. Sharks accounted for 30-40% of the catch. Blue shark (*Prionace glauca*) is the most common shark species caught followed by shortfin mako sharks (*Isurus oxyrinchus*). Other sharks caught include silky shark (*Carcharhinus falciformis*), thresher shark (*Alopias vulpinus*, *A. pelagicus* and *A. superciliosus*), oceanic whitetip (*Carcharhinus longimanus*), scalloped hammerhead (*Sphyrna lewini*), and other Carcharhinid species. The large pelagic fishery was formalized into a commercial fishery in 2005 with the allocation of 18 swordfish and 26 tuna-directed long-term fishing rights. One of the goals of the allocation was also

to terminate the directed pelagic shark fishery by issuing large pelagic rights to the shark fishers. Due to an administrative oversight the amalgamation of the fisheries never occurred and seven shark fishers were granted exemptions until March 2011 to target pelagic sharks (mainly targeting blue and shortfin mako sharks). For the period 2005 to March 2011 there were two fisheries which caught pelagic shark species. During this period the large pelagic fishery was restricted to a 10% by-catch limit of sharks (i.e. sharks landings could not exceed 10% of the weight of the targeted swordfish and tuna species) and wire traces were banned. In 2010 the pelagic shark fishery landed 515 t of shortfin mako, 198 t of blue sharks, 25 t of bronze whalers and 9 t of skates. In the same year the large pelagic longline fishery landed 66 t shortfin mako and 100 t of blue sharks. In April 2011 the directed pelagic shark fishery was terminated when six shark fishers were allocated large pelagic rights.



Shortfin mako sharks *I. oxyrinchus* being prepared for market aboard a tuna longline vessel
(Photo: Craig Smith)



In the current large pelagic fishery, sharks are managed under a Precautionary Upper Catch Limit (PUCL) of 2 000t per annum, based on shark catch ratios during the experimental fishery when no shark by-catch restrictions applied and extrapolating for the development of the tuna/swordfish fleet. In addition foreign charter vessels are restricted to a 10%

shark by-catch limit and these vessels have 100% observer coverage. Observer coverage was targeted at 20% for domestic vessels, but due to the expiry of the observer contract with the service providers no observer coverage could be obtained for domestic vessels during 2011. Observers typically record species composition, length frequencies, live releases,



Silky sharks (*C. falciformis*) are caught occasionally by tuna longline vessels but are released according to permit conditions (Photo: Charlene da Silva)



Crocodile sharks (*Pseudocarcharias kamoharai*) are caught occasionally by tuna longline vessels and are usually released (Photo: Charlene da Silva)



Blue shark (*P. glauca*) one of the most commonly caught shark in the large pelagic fishery being tagged with a satellite tag during National research surveys aboard the *RV Ellen Khuzwayo* (Photo: Charlene da Silva)





Blue shark (*P. glauca*) released with a satellite tag fitted during a National large pelagic research survey aboard the *RV Ellen Khuzwayo* (Photo: Charlene da Silva)

and discards. All vessels in this fishery are monitored by VMS. All landings are weighed and independently monitored. Logbooks are required to be completed on set-by-set basis. All fisheries data pertaining to pelagic sharks are submitted to ICCAT and IOTC on an annual basis but South Africa's capacity to send experts to RFMO scientific meetings is still a concern. Shark finning is banned in terms of permit conditions. Landings of certain shark species are banned due to concern over their conservation status namely, silky sharks, oceanic whitetip, all thresher sharks, and all hammerhead sharks. The correct identification of some shark species by fishers and MCS personnel remains a challenge.

Kwazulu-natal bather protection program

The KwaZulu-Natal Sharks Board (KZNSB) operates a bather protection program that uses shark nets and drumlines from Richards Bay to Port Edward. The primary objective of the program is to protect bathers and other resource users from shark attack – principally, from those sharks that are regarded as potentially dangerous. This is achieved by reducing the local populations of the target species at designated bathing beaches. The species targeted include large carcharhiids and lamnids, but other shark species, turtles, rays and dolphins are also caught. Between 1999 and 2004 the number of nets at most beaches



was reduced in order to reduce catches of marine animals. Between 2005 and 2007, 79 drumlines were introduced in place of some remaining nets as a measure to reduce by-catch but without compromising bather protection. The total catch of sharks and rays in 2010, excluding animals released alive, was 35 t. All mortalities are biologically sampled and have contributed substantially to life-history studies. One of the problems with this program is that the target reference level is set to minimise attacks on bathers. This target reference level may be below the biologically sustainable level. In terms of the provincial KwaZulu-Natal Sharks Board Act, 2008 (Act 5 of 2008), the KZNSB is required to endeavour to introduce schemes that will reduce negative impact on all biodiversity. In addressing biodiversity issues the KZNSB has already reduced the number of nets, introduced drumlines, and has removed shark fishing gear during the annual winter sardine run.

Traditional linefishery

The linefishery is considered the oldest fishery to have historically targeted sharks, predominantly soupfin in the 1940's as a source for vitamin A. Post World War II sharks were targeted as a cheap source of protein for African countries. More recent catches have been driven by market demand and the seasonal availability of target teleost species. The linefish fishery was an open-access fishery until 1984. In 1985 the fishery was capped at around 3200 vessels. Focused research on linefish species in the ensuing decade had identified that many of the target teleost species were compromised. Subsequently effort levels were reduced in the fishery to the current level of 450 vessels (and a maximum crew of 3 450), all of whom which retain access to sharks. Vessel size is typically less than 10m and consists of small motorized vessels. Species targeted include soupfin, common smoothhound,



Soupfin sharks (*Galeorhinus galeus*) caught by the commercial linefishery in Western Cape fishing villages in the 1940's (DAFF Archival picture)



hardnose smoothhound (*M. mosis*) and whitespotted smoothhound (*M. palumbes*), Carcharhinid spp. smooth hammerhead (*S. zygaena*) and Rajidae. Shark catches in the linefishery in 2010 were reported as soupfin (89 t), houndsharks (25 t), Carcharhinid sharks (64 t), blue sharks (13 t) and skates (59 t).

The traditional linefishery operates along the entire length of the South African coastline. Vessels are monitored by VMS. Landings are not monitored, but land-based observers have been placed at primary harbours/ slipways to determine species composition, biological samples, and length frequencies. Daily catches are recorded in logbooks and are submitted on a monthly basis. Logbook data are not verified and are considered to under-estimate the total shark catch. Furthermore, catches are not reported on species level. Shark species caught in this fishery are the same as those targeted by the demersal longline fishery and the recreational linefishery.

St Joseph fishery

A directed shark fishery for Ploughnose chimeras, locally referred to as St. Joseph sharks (*Callorhynchus capensis*), operates on the west Coast of South Africa and is managed on a TAE of 162 rights holders. Landing of other sharks is not allowed due to a history of illegal fishing in this sector. The St Joseph shark net fishery employs 178 mm stretched mesh, monofilament, bottom-set gill nets. The nets have a fall of 3m and are no longer than 150m. The fishery is an effort based fishery confined to the west coast. The fishery is intrinsically associated with the "haarder (cape mullet) fishery. Only 80 of the 177 gillnet permits available in 2002 allowed the use of Joseph nets, all within the St Helena Bay fishing Area. The permit entitles the holder to have in their possession two St Joseph and two mullet-directed (haarder: *Liza* spp.) gill nets at any-one time. Those individuals that have permits that are restricted to "haarder" may only be in possession of two "haarder" gill nets. They are however entitled to retain any St Joseph by-catch. Originally catches were in the order of 650 tons of St Joseph per annum. The reduced St Joseph catches by the gillnet fishery may

be linked to increased trawl catches, but could also be due to the gillnet fishery targeting breeding aggregations. The time series of abundance indices from west coast surveys shows a decline in St Joseph from 1997 to 2004 followed by an increase in the last few years so that the overall trend is slightly negative however the slope is not significantly different from zero.



St. Joseph sharks (*Callorhynchus capensis*) caught by the netfishery in the 1970s (DAFF Archival picture)



Recreational linefishery

The recreational linefishery includes shore anglers, boat-based fishers and estuarine fishers (all of which use rod and reel), as well as spearfishers. An estimated 850 000 people participate in the shore-based recreational fishery alone. Boat-based fishing is conducted from ski-boats which are generally less than 10 m in length. Recreational fishing in South Africa is regulated by output control in terms of bag-, size and area limits and requires the purchase of a permit. Catches of most sharks are restricted by a bag limit of one shark per day and the sale of the catch is not permitted. Illegal sale of shark catches are of concern together with the exceeding of bag limits. Recreational fishers are not required to report any catches to Fisheries Management. Another challenge is posed by recreational tournament fishing, which remains unregulated. The catch and release of sharks, although promoted, may also pose a problem as there is little information on post-release survival.

BY-CATCH SHARK FISHERY PROFILES

Tuna pole

The commercial tuna pole fishery started in 1979 with the initial targeting of yellowfin tuna in the first year. Thereafter albacore has been the primary target species of this fishery. The fishery operates from September to May along the west coast of South Africa. In 2006, 191 long-term fishing rights were allocated to use 198 vessels and a crew of 2950 to target albacore and yellowfin tuna. The fishery does not have a history in catching shark, but the use of rod and reel gear since 2003 to target yellowfin tuna has resulted in increased encounters with pelagic sharks. The landing of sharks is currently banned in terms of permit conditions and hence all sharks are required to be released at sea. There is no on board observer coverage for this fishery and hence it is unknown whether proper release procedures are implemented to ensure the



Recreational fishers competing in an angling completion in the Langebaan Lagoon
(Photo: Robert Tarr)



post-release survival of sharks. The tuna pole fishery is monitored by VMS and skippers are required to record catches in a daily logbook, which is submitted to Fisheries Management on a monthly basis. A pilot monitoring program has been conducted in 2012 for 100% monitoring of discharges in this fishery.

Hake longline

The demersal hake long-line fishery was initiated in 1994, and has since attained commercial status with the first 50 rights being allocated in 1998. The fishery comprises two zones: the West Coast fishery that targets the deep water hake *Merluccius paradoxus*, and the South Coast fishery that targets the shallow water hake *Merluccius capensis*. An observer by-catch program is operational in this fishery. Unfortunately, the shark by-catch component is recorded at a group level – species identification is not undertaken. Nevertheless, the shark by-catch usually comprises less than 0.5% of the total catch. A kingklip (*Genypterus capensis*) directed fishery was initiated in 1983, however a subsequent stock collapse curtailed operations, and the fishery had to be closed in 1990. Nevertheless, while in operation, there was an appreciable shark by-catch component to this fishery (D.Japp, per. comm.). A total of 4 tons of unidentified “sharks, skates and rays” was reported in 2010.

Trawl

There are several trawl fisheries in South Africa the largest of which is the south and west coast demersal component targeting the Cape hakes *Merluccius capensis* and *M. paradoxus* and other lucrative benthic species; the demersal prawn trawl fishery situated on the east coast along Kwa-Zulu Natal and a midwater trawl fishery targeting horse mackerel along the south coast. The trawl fishery for Cape hakes can be separated into two distinct fishery sectors, namely the offshore and inshore trawl components. Trawl fisheries targeting hake provide over half of the value of all fisheries in South Africa and account for more than 50% of the total value of the combined South African fisheries. The development of trawling in SA commenced in 1890 and

remains centered on the South African hake resource which comprises two species, the shallow-water Cape hake and the deep-water Cape hake. Prior to the declaration of the 200 nautical mile South African EEZ in 1977, the Cape hakes were subjected to increasing levels of exploitation after the First World War, with the incursion of foreign fleets during the 1960s culminating in a peak catch of close to 300 000 t in the early 1970s. Subsequent to 1977 and the declaration of the EEZ, South Africa implemented a relatively conservative management strategy by imposing Total Allowable Catches (TACs) set at levels aimed to rebuild the hake stocks, and annual catches have subsequently remained relatively stable in the 120 000 – 150 000 t range. The hake TAC is determined annually by the application of an Operational Management Plan (OMP). In 2004 the South African demersal trawl fishery obtained Marine Stewardship Council (MSC) certification and this eco-labeling has resulted in additional focus on the management of by-catch species.

Inshore trawl

The inshore fishery targets primarily both hake species and East-coast sole (*Austroglossus pectoralis*) and is restricted to the area between Cape Agulhas (20° E) in the west and the Great Kei River in the east. The vessels operating in the inshore fishery are wetfish trawlers which are smaller than those active in the offshore fishery. These vessels may not be larger than 30 m. Although there are ecosystem-based management measures being developed for this fishery, there are significant by-catch issues. Chondrichthyan by-catch in this fishery is common, and includes considerable quantities of a large number of species, including *Squalus* spp, Scyliorhinids, soupfin sharks, smoothhound, rays and skates being caught (Attwood et al 2011).

In the past decade the number of vessels in this sector has dropped from a historic level of around 32 vessels to 24 vessels operating currently. All vessels in this sector are monitored by VMS and all the landed catch is monitored. A proportion of the operations at sea is



subjected to monitoring via the Scientific Observer Program which has attained a maximum coverage of 4.4% of trawls (Attwood et al., 2011). All discharges from the inshore demersal trawl fleet are subject to discharge monitoring but generic categorization of products remains challenging.

Offshore trawl

The offshore hake trawl industry in South Africa is one of the largest sectors of the marine fishery. Offshore vessels are restricted from operating deeper than 110m on the south coast. There is no restriction on the west coast, but they do not operate shallower than 200m. Therefore, the vessels used in this fishery are mostly large, powerful, ocean-going stern trawlers. A comprehensive Scientific Observer Program has collected information on target and non-target species, the results of which have been used in management advice. Furthermore, measures to reduce impacts on benthic habitat have been introduced, including 'ring-fencing' existing trawling grounds to reduce the amount of habitat affected. Surveillance capacity has also increased, and the entire hake fishing fleet is now covered by a Vessel Monitoring System (VMS). Trawling is a particularly unselective fishing method, and thus produces a high level of by-catch. Species caught include deepwater sharks, skates and rays. Low value shark species are discarded only once the main catch has been sorted, potentially resulting in an increased mortality of released by-catch species. Generic reporting of species is a common occurrence. Presently the offshore trawl landings are largely not monitored during discharge and catch information is thus seldom verified.

Midwater trawl

Historically adult Cape horse mackerel (*Trachurus capensis*) have been caught as by catch within the offshore hake trawl sector. In the 1960s the bulk of the adult horse mackerel catch was taken by purse-seine on the west coast, but that resource has disappeared. A Japanese midwater trawl fishery operated off the South Coast during the 1980s and 1990s. The annual catch

limit varied from 34 000t to 54 000 t during that period. In the late 1990s the Japanese fleet was replaced with South African vessels with a catch limit of 34 000 t divided between midwater trawl and demersal trawl. In about 2010 the Precautionary Upper Catch Limit (PUCL) was raised to 44 000 t (31 500t – allocated to Right Holders for targeted midwater trawl fishing and 19 500 held in reserve to cover by-catch in the demersal trawl fishery). (The bulk of the catch is made by one vessel of 121 meters with a gross tonnage of 7628t using a midwater trawl capable of making catches of up to 100t per trawl. The horse mackerel fishery is restricted to the south coast (west of Cape Agulhas). An experimental midwater trawl fishery for round herring (*Etrumeus whiteheadi*) and anchovy (*Engraulis encrasicolus*) has been recently established on the west coast. The vessels use excluder devices to reduce the capture of marine mammals and pelagic sharks.

A number of species of pelagic shark are recorded in the by-catch all of which is discarded once the main catch has been sorted, potentially resulting in an increased mortality of released by-catch species. Permit conditions require a scientific observer to be present on all trips.

Prawn trawl

The South African prawn trawl fishery operates in shallow water (< 50 m) around the Tugela Bank (KwaZulu-Natal), and in deeper water (300-500 m) between Cape Vidal and Amanzimtoti. Catches (by mass) of the prawn fishery consist of roughly 20 percent target species, 10 percent retained by-catch and 70 percent discarded by-catch. Chondrichthyans are mainly discarded, with the exception of squalid at times. The trawl vessels employed in the fishery tend to be small (24-33m length), and use 50mm stretched cod-end mesh nets. Shallow water chondrichthyan by-catch include stingrays (Dasyatidae), hammerhead sharks (Sphyrnidae), requiem sharks (Carcharhinidae), angelsharks (*Squatina africana*) and catsharks (Scyliorhinidae). Deepwater by-catch is dominated by *Squalus* spp and rajids (Dipterus spp and *Cuiraja* spp).



The fishery is managed on a TAE basis with seasonal shallow water area restrictions designed to mitigate catches of juvenile linefish (Fennessy, 1994). Although there has been a decline in prawn trawl fishing effort in recent years there is nonetheless concern that the fishery operates in a region recognized as a shark biodiversity hotspot, particularly for regionally endemic demersal shark species. Some data have been collected by a scientific observer program during the past 10 years.

Beach seine fisheries

The beach seine fishery has operated traditionally since 1652 and operates from False Bay to Port Nolloth. In 2001, a reallocation of rights saw a reduction in fishing effort from around 200 to 28 beach seine operations. Nets range from 120m to 275m in length with net depths varying according to fishing area, but may not exceed 10m (Anon, 2010b). Nets have a stretched mesh of 48mm and minimum cod end size of 44mm. This fishery primarily targets teleosts; however considerable quantities of shark are also caught (Lamberth, 2006). With the exception of protected shark species status such as great white sharks (*Carcharhinus carcharias*), raggedtooth sharks (*Carcharias taurus*), spotted gully sharks (*Triakis megalopterus*), pyjama sharks (*Poroderma africanum*), and leopard catsharks (*Poroderma pantherinum*) no by-catch restrictions for sharks exist within this fishery. There is also a sardine and a mixed fish beach seine fishery in Kwazulu-Natal. Chondrichthyan catches are typically minimal in these fisheries with most by-catch released alive.

Patagonian toothfishery

The Patagonian Toothfish fishery started as an experimental fishery in 1996 and targeted toothfish (*Dissostichus eleginoides*) using Spanish longline around Prince Edward and Marion Islands (an extension of South Africa's EEZ). Five permit holders used two vessels to fish their experimental allocation of 3 000 t. The fishery was formalized into a commercial fishery in 2005 where five long-term rights were allocated on board two vessels. Only one vessel has

been fishing up until 2011. In 2011 a second vessel joined the fishery and the fishing method changed to trot lines. The current TAC is 320 t of Patagonian toothfish. As the fishery is not permitted to retain sharks all sharks are released at sea. The fishery is stringently managed with VMS reporting, observer coverage (one observer per vessel) and monitoring of all landings. Daily logbooks are required to be completed by set. Shark catches are considered small, but there is concern regarding the identification of shark species and the impact the fishery could have on species that are long-lived and sensitive to fishing pressure. Hence, protocols for shark release procedures are needed and require enforcement.

Rocklobster fishery

The West Coast rocklobster (*Jasus lalandii*) fishery is separated into an inshore fishery using hoopnets and an offshore component using traps. No sharks are caught in the hoopnets, however catches in the offshore component may be significant. Sharks caught in traps include Scyliorhinids which may not be sold for commercial purposes and are consequently discarded. The main concerns therefore relate to fishery mortality and handling mortality.

Aquarium trade

Limited trade of raggedtooth sharks, small Carcharhiniformes and rays exists in South Africa. Sharks are caught with rod and line and transported to the aquarium or holding facility. A small number of sharks are exported to international aquariums per year. This trade is currently managed on an *ad-hoc* basis and a formal regulatory framework might be needed.

Markets

The Marine Living Resources Act (MLRA, 1998) regulates all fisheries in South Africa, including aspects of the processing, sale and trade of most marine living resources. In terms of the MLRA, sharks may not



be landed, transported, transshipped or disposed of without the authority of a permit. The market is divided into three separate components, (1) processing and filleting demersal shark carcasses or “logs”, (2) fin drying, and (3) processing and exporting of pelagic shark steaks. Each component operates separately although fins are contributed by both demersal and pelagic sharks. In the demersal shark fillet trade processed “logs” are separated depending on the value of the flesh determined by the handling, cleaning processes and mercury content. In general, sharks between 1.5kg-12kg are considered ideal as mercury levels of sharks over 12 kg exceed permissible limits (da Silva and Bürgener, 2007). In the past decade, the export market for South African shark meat has grown considerably. The majority of processed shark is sold to Australia, where there is high consumer demand for

shark fillets. Big and/or low value animals are dried and sold as dried fish sticks. All fins are dried and exported to Asian markets. The increased fin price provides strong incentives for the targeting of large sharks regardless of fillet value. Pelagic shark carcasses are mainly exported to Europe with some species, namely shortfin mako and porbeagle, exported to Asia.

A recent analysis of trade data between South Africa and Australia indicated discrepancies in import versus export statistics. Thus, it does not currently appear feasible to use trade data as a proxy indicator for shark catches in South Africa. A detailed description of the South African shark meat harvest, including processing, handling and export information, can be found in Da Silva and Bürgener (2007).





From issues to action

Although South Africa has come a long way in the development and implementation of shark management since the conception of the IPOA in 2001, the following issues need to be addressed to achieve the goals set out in the vision of the NPOA-Sharks. The broad challenges identified here mirror those identified in the IPOA and in NPOAs of other countries. The Challenges are clustered around seven broad groups: *Data and reporting, Classification and assessment, Sustainable management, Optimum use, Capacity and infrastructure, Enforcement of compliance and Regulatory tools*. The individual issues are specific to the South African context and require particular actions by one or more stakeholder groups. Suggesting responsibilities for remedial actions will enable South Africa to effectively implement these actions within the

suggested timeframes. As many issues are interlinked and require a particular sequence of actions, the actions were prioritized to make the execution of this plan viable within its four –year life span. Priorities are given on four levels, *Immediate, High, Medium and Low* and required timeframes are indicated to facilitate progress monitoring and evaluation. As there is limited budget dedicated to the implementation of this plan, the actions are expected to be achievable within existing allocations of funds to research, management and conservation agencies. As the lack of shark-specific funding has been identified as one of the issues, the application for additional funding from international agencies should be facilitated after the formal adoption of this plan.

Table 2. An overview of issues facing particular fisheries divided into clusters with proposed action, responsibilities, priorities and timeframes.

Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame
Data and reporting	Shark species identification and reporting	In catch statistics, sharks are often lumped into generic categories.	All Fisheries excluding the KZN bather protection program	Create a identification guide	FRD	Immediate	1
				Develop permit conditions	MRM	Immediate	1
				Education and Implementation	MRM Working Groups	High	2
				Review progress	FRD and MRM	Medium	3-4



Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame
	Observer coverage	There is currently no observer coverage except for the foreign flagged pelagic tuna longline fleet.	All sectors excluding the KZN bather protection program	Re-establish, re-assess and expand observer coverage	FRD	Immediate	1
		Observer programs do not collect data that are adequate to assess impact of fishing on species that are not landed.	All sectors excluding the KZN bather protection program	Define and set sampling requirements per fishery sector	FRD	Immediate	1-2
				Initiate new sampling strategy	FRD	High	2-4
	Discharge monitoring	Discharge of fish is only monitored in selected fisheries. Catch reporting is not verified.	Offshore trawl, traditional linefish, tuna pole,	Review discharge monitoring coverage and quality of information	FRD, MCS	High	1-2
				Establish additional discharge monitoring requirements	FRD and MCS	High	2-3



Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame
	Reporting of directed catch and “joint product”	Directed catches of sharks are only reported for commercial sectors.	Recreational linefish	Develop and implement a land based monitoring program expanding coverage	FRD	High	1-2
		Landed catch is not weighed	Line, net fish and recreational linefish	Instigate monitoring of landings	FRD, MRM and MCS	Medium	2-4
		There is no mandatory reporting	Recreational fishery	Engage with recreational initiative for web-based catch recording	FRD and Recreational MRM Working Group	Medium	2-4
		There is no routine collection of length frequencies and conversion factors do not exist for most species.	All except Large Pelagic longline	Set target for observer coverage	FRD	High	1
				Develop morphometric relationships to allow for conversion factors	FRD	High	1-2
		Shared stocks	All fisheries	Identify overlaps	FRD and MRM	High	1-2
	Engage with neighbouring countries and set-up data sharing agreements			MRM	Medium	3-4	



Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame
	Estimation of discards	Unable to quantify total shark mortality associated with by-catch fisheries	All fisheries	Identify short falls	FRD	High	1
				Develop monitoring procedures and implement through observer program	FRD	High	1-3
Classification and assessment of shark species	Gaps in taxonomy	Taxonomical classification is uncertain for a number of shark species	All fisheries that catch rays, skates and deepwater shark species	Reclassification of all rays, skates and deepwater shark species using genetics and morphometrics (Barcoding of Life Programs)	FRD	Immediate	Ongoing
	Stock delineation	There are several stocks that might be genetically distinct to areas in SA, while others appear to be shared with other countries.	All fisheries	Collection of additional genetic material through national research surveys and observer program	FRD	Medium	Ongoing



Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame
	Gaps in the knowledge of life history	For many species, basic information on life history i.e. age and growth and reproductive capacity is not available or fragmented.	All fisheries	Gap analysis example South African marine status reports	FRD	Immediate	1
				Prioritise species	FRD	High	1
				Source research capacity i.e. students	FRD	High	1
				Collect and work up biological material from national research surveys and observer program	FRD	High	1-3
	Spatio-temporal behaviour	Information gaps exist around spatio-temporal behaviour i.e. identification of nursery and mating areas for live-bearing sharks.	Most fisheries	Reference gap analysis	FRD	Immediate	1
				Prioritise species	FRD	High	1
				Source research capacity i.e. students	FRD	High	1
				Collect and work up biological material from national research surveys and observer program	FRD	High	1-3



Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame
	Ecosystem changes induced by fishing	Habitat alteration through Fishing activities i.e. pupping grounds of demersal sharks.	Inshore and offshore trawl	Engage with EcoFish project that is investigating the trawl effects of the benthos	FRD	Medium	ongoing
		Cascading effects on the ecosystem by the removal of apex predators	All fisheries	Ecosystem modeling using ecosym and ecopath	FRD	Low	Ongoing
	Lack of formal assessments	Formally, for stock status only three of the 98 species have been assessed comprehensively, a further 14 species were assessed for the KZN region.	All fisheries	Prioritize species for assessment	FR	High	1-2
				Identify suitable assessment models	FRD	High	1-4
				Collect and collate relevant material	FRD	High	1-4
				Undertake assessments	FRD	High	1-4



Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame
Sustainable management	Lack of formal management protocol for target and “joint product species”	Two species were assessed in terms of a per-recruit and an ASPM, respectively, according to the available data. There is no formal protocol on assessments and recommendations in any of the fisheries.	All fisheries	Develop management protocol	FRD and MRM	High	1-2
				Implement management protocol	FRD	Medium	2-3
				Management actions (input control, output controls, Marine Protected Areas) based on protocol	MRM	Medium	2-4
	Lack of coordination of shark fishery management	Most sharks are caught by more than one fishery. Currently there is no formal mechanism for shark management across fisheries. Furthermore, no formal mechanism to consider non-extractive use i.e. tourism. Inter-sector conflict	All fisheries	Review fisheries and non-extractive impacts on sharks	MRM	High	1
				Integrate into management protocol	MRM	High	1-2
				All fisheries that involve sharks take the NPOA into account during the development and implementation of species specific management plans	MRM	High	4



Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame
	Lack of funding	Funding for shark fisheries directed research and management is therefore limited		Explore funding opportunities from International agencies.	DAFF	Medium	2-3
Optimum use	Concern around health risk of shark meat consumption	High levels of heavy metal contamination are suspected for many top predators, including most shark species, making them potentially unsafe for human consumption.	All fisheries	Collect material from national research surveys and observers for priority species	FRD	Medium	1-2
				Analyze data	FRD	High	1-2
				Minimize catch as a safety precaution	FRD and MRM		
	Lack of knowledge or mechanisms to reduce fishery mortality	Mitigation measures for unwanted species Proper release protocols for unwanted by-catch	All fisheries	Review existing mitigation measures	FRD	Medium	2-4
				Develop best practice release protocols per fishery	FRD	Medium	2-4
				Incorporate best practice release protocols into Permit conditions	MRM	Medium	2-4



Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame
	Retained sharks are not fully utilized	Finning. Dumping of carcasses, killing of unwanted by-catch, no by-catch mitigation. There is no investigation into value adding and development of products i.e. shark leather etc. Large sharks are caught for fins and fillets not utilized.	All fisheries	International review of potential shark products	FRD		
Engage Technicians and Universities to develop possible shark products, meat as well as leather and Review possible Pharmaceutical products				FRD and MRM	Medium	2-4	
Engage with relevant sections within DAFF regarding developing alternate livelihoods through full utilization of shark products ie. Leather, markets for unwanted low value species such as St. Joseph sharks				MRM	Medium	2 weeks	



Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame
	Traceability of shark products from catch to sale	Product names cannot be matched with species names i.e. generic white fish	All fisheries	Introduce standardization of product codes/names	SASSI	High	1-2
		Custom HS codes only reflect generic sharks and not the individual species.		Engage with Customs to review product codes for export/import	MRM/ Traffic	High	1-3
	Fillet identification is a problem	All Fisheries	Review of genetic coding tools.	FRD Traffic	Medium	2-3	
	Fins cannot always be identified to species level Illegal recreational sale		Fin identification guide	FRD	Medium	2-3	



Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame
Capacity and infrastructure	Lack of awareness	Lack of awareness and education to change misconceptions about sharks and shark fisheries Fishery pollution eg. discard of bait box packaging	All fisheries	Determine requirements for educational material	FRD & MRM	Medium	2-3
				Implement training and awareness program		Medium	3-4
				Ensure compliance with permit conditions	MCS and MRM	High	1-2
				Develop responsible fisheries programs pertaining to sharks	DAFF	Medium	3-4
	Lack of capacity	Lack of scientific capacity to timeously complete assessments and biological analysis		Develop departmental capacity and where necessary outsource shortfalls	DAFF	High	1-2
	Representation at shark international scientific working groups and stock assessment working groups of relevant RFMO	Large Pelagic Fishery	Shark expert from FRD attend relevant international meetings	DAFF	Immediate	Ongoing	



Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame
Compliance	Lack of enforcement	<p>Finning of pelagic sharks</p> <p>Inability to identify shark species</p> <p>Recreational sale of commercially valuable shark species</p> <p>Exceeding recreational bag limits</p> <p>Interpretation and knowledge of permit conditions pertaining to sharks</p>	All Fisheries	Development of a monitoring and enforcement strategy	DAFF: MCS with input from FRD and MRM	High	1-2



Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame
Regulatory Tools	Inadequate regulatory Reference to sharks	Shark fishing competitions are not regulated adequately Fisheries specific permit conditions pertaining to sharks are not informed by overarching regulatory frameworks Inadequate measures to control imports and exports of sharks.	All Fisheries	Review and develop regulatory tools	Legal with input from FRD and MRM	Immediate	1



Monitoring and Evaluation

The Fisheries Management Branch at DAFF has been the lead agency for drafting the NPOA-Sharks and will remain responsible for coordinating its implementation. Collectively, the Chief Directorates Marine Resource Management and Fisheries Research and Development will be responsible for assessing the overall implementation of NPOA-Sharks during its operational period. The structure of the plan, with actions prioritized by a delivery timeline, should enable the Fisheries Management Branch to

iteratively monitor progress. Progress will be evaluated annually by the EAF-working group. Upon conclusion of the four-year operational period of the plan, the overall progress of the NPOA-Sharks will be evaluated against its goals and objectives. The layout allows for an assessment of individual actions, their outputs and their outcome in terms of the overall vision. If an action is not completed, an explanation for the lack of completion should also be included.

Table 3. Assessment framework for NPOA-Sharks.

Action	Responsible agencies	Original Timeframe	Output	Outcome	Challenges/ Reasons for not completing the action



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Appendix I

SHARKS IN SOUTH AFRICA

L.J.V. Compagno

Species composition of south africa sharks

Despite its relatively short coastline, South Africa has one of the most diverse faunas of cartilaginous fishes (Class Chondrichthyes) in the world. South Africa possesses representatives from all of the 10 orders,

and most of the living families of cartilaginous fishes. Cartilaginous fishes are primarily marine, with about 5% penetrating fresh water. Most species are known from the intertidal to the epipelagic zone and the mid-slope, there are however a few deep slope (below 1500 m) and mesopelagic or bathypelagic taxa.

Classification of taxa

Cartilaginous fishes are divided into two subclasses, Elasmobranchii for sharks and rays and Holocephali for the chimaeras. The major features of the synthetic classification include the subdivision of the living

Table 1. Comparison of relative numbers of species of South African and world chondrichthyan fauna

Taxa	World		South Africa	
	N ^o . species	% total	N ^o . species	% total
Class Chondrichthyes	1171	100.0	181	100.0
Subclass Elasmobranchii	1121	95.7	172	95.6
Superorder Galeomorphii	336	28.6	66	37.1
Order Heterodontiformes	9	0.8	1	0.6
Order Lamniformes	15	1.3	12	6.6
Order Orectolobiformes	34	2.9	3	1.7
Order Carcharhiniformes	278	23.7	51	28.2
Superorder Squalomorphii	785	67.0	106	58.7
Order Hexanchiformes	6	0.5	5	2.8
Order Squaliformes	119	10.2	33	18.2
Order Squatiniformes	18	1.5	1	0.6
Order Pristiophoriformes	9	0.8	1	0.6
Order Rajiformes	633	54.1	66	36.5
Suborder Pristoidei	7	0.6	3	1.7
Suborder Rhinoidei	1	0.1	1	0.6
Suborder Rhynchobatoidei	6	0.5	1	0.6
Suborder Rhinobatoidei	47	4.0	5	2.8
Suborder Platyrrhinoidei	3	0.3	0	0.0
Suborder Zanobatoidei	4	0.3	0	0.0
Suborder Torpedinoidei	77	6.6	6	3.3
Suborder Rajoidei	286	24.4	24	13.3
Suborder Myliobatoidei	202	17.3	26	14.4
Subclass Holocephali				
Order Chimaeriformes	50	4.3	8	4.4



elasmobranch fishes or neoselachians into two superorders: the Galeomorphii and the Squalomorphii. The Galeomorphii includes four orders, the Heterodontiformes (bullhead sharks), the Lamniformes (mackerel sharks), the Orectolobiformes (carpet sharks), and the Carcharhiniformes (ground sharks). The Squalomorphii include the Hexanchiformes (cow and frilled sharks), the Squaliformes (dogfish sharks), the Squatiniformes (angel sharks), the Pristiophoriformes (sawsharks), and the Rajiformes (batoids). While living elasmobranchs were usually subdivided into two major groups, Selachii (sharks) and Batoidea (rays); phyletic studies suggest that the batoids are best included as a large and diverse order of 'flat sharks' (Rajiformes) within the Squalomorphii. The Rajiformes are the immediate sister group of the Pristiophoriformes, and with them forms the sister group of the Squatiniformes.

South African chondrichthyo fauna include representatives from all 10 orders of cartilaginous fishes, 44 of the 60 families (73%), 100 out of 189 genera (53%), and over 181 of the 1171 world species (15%) (Table 2.1). With respect to world Chondrichthyan fauna, South Africa has similar relative numbers of species of chimaeroids, but has higher numbers of squaloids, lamnoids, hexanchoids, carcharhinoids, and lower numbers of orectoloboids (which are most diverse in the Western Pacific). The batoids (Rajiformes) are the largest order of sharklike fishes, but with respect to the world fauna, are found in far fewer relative numbers off South Africa (37%). In addition, batoids outnumber other chondrichthyans by 54%. The approximately nine batoid suborders also show divergence between Southern Africa and the world, with South Africa having relatively more Pristoids and fewer Rhinobatoids, Rajoids and Myliobatoids. In addition, there is no representation of the small suborders Zanobatoidei (West Africa) and Platyrrhinoidei (North Pacific). In part, this suggests that batoid diversity, particularly of deep-water rajoids and tropical East Coast myliobatoids, may increase with further exploration of the South African chondrichthyo fauna. There are many species of cartilaginous fishes currently known from Namibia and Mozambique waters that in the future, are likely to be found in South African waters.

The Prince Edward Islands (Marion and Prince Edward Islands) are isolated South African possessions in the Southern Indian Ocean. Their sub-Antarctic chondrichthyan fauna is little known, and has only been elucidated through the activities of international long-line vessels fishing for Patagonian toothfish (*Dissostichus eleginoides*, Family Nototheniidae). So far, two of the three species recorded (*Hydrolagus* sp. and *Lamna nasus*) are also known from South Africa but the third, *Amblyraja* sp. is presently not recorded, and is of uncertain identity. It is probable that additional collections will reveal more species around the Prince Edward Islands, and include *Somniosus antarcticus*, which occurs nearby on the Crozet Plateau about 500 km NNE of Prince Edward Island. In addition, it is likely that other species of skates and possibly squaloid sharks, chimaeras, and other taxa will be discovered in the area.

Distribution patterns

The South African chondrichthyan fauna is zoogeographically complex, and includes a variety of unique species. These include wide ranging species, local endemics and regional Southern African endemics that have minimal overlap with adjacent areas. South Africa, and by extension Southern Africa, is a center of endemism for a variety of taxa, most notably members of the catsharks (Family Scyliorhinidae), finback catsharks (Proscylliidae), houndsharks (Triakidae), sawsharks (Pristiophoridae), dogfish (Squaliformes), skates (Rajoidei) and chimaeras (Chimaeriformes).

Distribution and habitat data are listed for all South African cartilaginous fishes. Distributions are based on those described by Compagno *et al.* (1989). Additional data is presented on range and depth extensions, and catch data on sharks and rays provided by the KwaZulu-Natal Sharks Board (G. Cliff and S. Dudley, *pers. comm.*). In essence, 38.7% of the species are wide-ranging, 27.1% are endemics, and 16.6% Indo-Pacific species. There are lesser contributions from other areas (Table 2).

While there may be some overlap in distribution, shelf chondrichthyans, and to some extent deep-slope



Table 2. Distribution types for South African cartilaginous fishes.

Distribution type	N ^o species	% total
Eastern Atlantic to South-Western Indian Ocean	8	4.4
Atlantic	7	3.9
Eastern Atlantic and Mediterranean	5	2.8
Atlantic coast of Africa	2	1.1
Southern African endemics	34	18.8
Subequatorial African endemics	5	2.8
South-eastern African endemics	1	0.6
South African endemics	15	8.3
Indo-Pacific	30	16.6
Western Indian Ocean	4	2.2
Wide-ranging	70	38.7
Total	181	100.0

species, can further be subdivided into cool-temperate, warm-temperate and subtropical-tropical species. Cool-temperate areas include the Northern Cape and Western Cape to Cape Point; warm temperate areas include the south coast of the Western Cape from False Bay to East London in the Eastern Cape; subtropical-tropical areas include the Transkei coast and KwaZulu-Natal. South African species are listed below by distribution off the provincial coasts (Table 3). Diversity increases from west to east, and from the Northern Cape to KwaZulu-Natal.

Habitat patterns

Cartilaginous fishes are broadly divisible by habitat into species of the *continental shelves* (the intertidal to about 200 m), the *continental slopes* (below 200 m to the ocean floor), and the *oceanic zone* (beyond the shelves and above the slopes and sea bottom). In comparison with some other areas - including the Eastern North Pacific - South Africa has a remarkably rich slope fauna. The slope fauna forms the largest habitat category (Table 4), followed by the continental

shelf fauna. A few species penetrate fresh water. Very few South African cartilaginous fishes are oceanic, and the low diversity of cartilaginous fishes found in the oceanic zone reflects this. A few large sharks including the bluntnosed sevengill and white sharks have a wide range of habitats, and occur oceanically, on the slopes, and inshore. Some shelf species favour muddy bays or sandy beaches, while others favour coral or rocky reefs.

Knowledge of the fauna

The South African chondrichthyan fauna is not well known. Compagno (2000) noted that the discovery of Southern African and South African cartilaginous fishes lagged behind those of the rest of the world, and that prior to being recorded off South Africa, wide-ranging species were usually described from other regions. There are extralimital species that include Southern African and other wide-ranging species, that may be recorded off South Africa in the future - in particular, those from the inshore tropical, deep slope, and oceanic environments. Several undescribed South African species are known, but have not been



Table 3. Distribution categories for South African cartilaginous fishes.

Distribution category	N ^o . species	% total
Eastern Cape	1	0.6
Eastern Cape to KwaZulu-Natal	15	8.3
KwaZulu-Natal	51	28.2
Northern Cape	4	2.2
Northern and Western Cape	10	5.5
Northern, Western Eastern Cape	16	8.8
Northern Cape to KwaZulu-Natal	29	16.0
Northern and Western Cape, KwaZulu-Natal	2	1.1
Western Cape	13	7.2
Western and Eastern Cape	10	5.5
Western and Eastern Cape, KwaZulu-Natal	25	13.8
Western Cape, KwaZulu-Natal	5	2.8
Total	181	100

formally described. In addition, further exploration may reveal new undescribed species. In 1998, the deep-slope ghost catshark (*Apristurus manis*) was found off Cape Town, and was identified as such in 1999. Recently a long-standing record of the North Atlantic skate *Amblyraja radiata* was found to be based on an Antarctic and Southern Indian Ocean species, *A. taaf*, which had only been described in 1987 (M. Endicott, pers. comm.). A rare megamouth shark (*Megachasma pelagios*) was stranded on a beach in the Eastern Cape in 2002, and was the first specimen collected in South Africa, southern Africa, and the African continent (Smale *et al.* 2002). In retrospect, it seems obvious that our basic knowledge of the chondrichthyan fauna has increased markedly only when active interest in the ichthyofauna, and vigorous field explorations have occurred. For example, during the period in which Andrew Smith, John Gilchrist, his colleagues, and contemporary researchers were engaged in collecting specimens and examining material in systematic collections. Conversely, there was a reduction in the rate of discoveries when there was limited or no interest in the fauna or its exploration.

Table 4. Habitat categories of South African cartilaginous fishes.

Habitat category	N ^o . species	% total
Oceanic	13	7.2
Continental shelves	59	32.6
Shelves, fresh-water	6	3.3
Shelves to oceanic	10	5.5
Shelves to slopes	17	9.4
Continental slopes	67	37.0
Slopes to oceanic	3	1.7
Shelves to semi-oceanic	4	2.2
Wide range in habitats	2	1.1
Total	181	100.0

Table 5 presents an estimate of how well the South African chondrichthyan fauna is known. A score of 0 is essentially unknown. Scores of 1 and 2 are intermediate and somewhat arbitrary. 3 is scored where extensive long-term sampling programs have been undertaken - such as Marine and Coastal Management's offshore



demersal surveys of the west and southeast coast hake zones, the KwaZulu-Natal Sharks Board's sampling that have yielded relatively few surprises in the last decade or two, and anglers in most parts of South Africa that intensively sample the inshore shelf from the intertidal to 50 m.

Table 5. Knowledge of South African cartilaginous fishes by habitats.

Habitat category	Ranking
Inshore (0 to 50 m)	1 to 3
Offshore (50 to 200 m)	1 to 3
Upper slope (200 to 600 m)	0 to 3
Mid slope (600 to 1200 m)	0 to 3
Lower slope (below 1200 m)	0 to 2
Epipelagic zone	0 to 2

Knowledge of the inshore (0 to 50 m) benthic and littoral chondrichthyan fauna is patchy, and areas like the Northern Cape coast are sketchily known. In contrast, the larger inshore elasmobranchs of KwaZulu-Natal - particularly large elasmobranchs that are caught in antishark nets and fished by anglers - are very well known. However, small species that can slip through the meshes of shark nets, and those that are of no interest to anglers or commercial fishers are sketchily known. Likewise, the reef-dwelling species in the far north that are not caught in shark nets are also relatively unknown. The offshore shelf (50-200 m) and upper slope (200-600 m) fauna on the West and Southwest coasts includes some of the best known demersal and epibenthic chondrichthyan faunas. In contrast, on the East Coast, the upper slope faunas are sketchily known. The middle slope between 600 to 1200 m is best known from the West coast and from limited parts of the South coast of South Africa. This is primarily a result of sampling by the *Africana*. The fauna in those areas that have not been sampled are sketchily or poorly known. Lower slope faunas below 1200 m are sketchily known on the West coast of South Africa - due to early collections by the RV *Pickle*, the current RV *Africana*, and commercial exploratory trawling and

deep-set long-lining - but are poorly known elsewhere. Some wide-ranging deep slope species such as the false cat shark (*Pseudotriakis microdon*), the bigeye sand tiger (*Odontaspis noronhai*), and the smallspine spookfish (*Harriotta haeckeli*) have not been collected, but are to be expected in very deep water. The deepwater skate *Cruriraja durbanensis* was collected once by the RV *Pickle* off the Northern Cape and not seen since; while *Amblyraja robertsi* was described in 1970 from a single specimen found in the Western Cape (taken by the German research trawler, *Walter Herwig*). In the 1990s, the RV *Africana* recovered a few additional specimens from the same locality.

As elsewhere, the South African oceanic elasmobranch fauna is undiverse, and is well known to poorly known in the epipelagic zone. It is poorly known in the mesopelagic and bathypelagic zones. New records are expected for certain wide-ranging species that have not currently been recorded from South Africa, or for that matter Southern Africa. These include the bigeye sand tiger (*Odontaspis noronhai*), largetooth cookiecutter shark (*Isistius plutodus*), and spined pygmy shark (*Squaliolus laticaudus*). Pelagic long-liners have found the whitetail dogfish (*Scymnodalatias albicauda*) in the Southern Ocean well Southwest and Southeast of South Africa. It may be recorded in South African waters in the future. Some dwarf oceanic species such as the taillight shark (*Euprotomicroides zantedeschia*) and the longnose pygmy shark (*Heteroscyrnoides marleyi*) are rarely found, as are the pigmy shark (*Euprotomiscrus bispinatus*), cookiecutter shark (*Isistius brasiliensis*), and the semipelagic broadband lanternshark (*Etmopterus gracilispinis*). The longfin mako (*Isurus paucus*) may occur off South Africa, however confirmation is required.

In most areas, there is little knowledge of the distribution of large common offshore oceanic sharks. These include the blue (*Prionace glauca*), silky (*Carcharhinus falciformis*), oceanic whitetip (*Carcharhinus longimanus*), bigeye and pelagic threshers (*Alopias superciliosus* and *A. pelagicus*), and shortfin mako (*Isurus oxyrinchus*). In comparison with the Northern Hemisphere, there are astonishingly few offshore



records of these large pelagic sharks, and for that matter the associated pelagic stingray (*Pteroplatytrygon violacea*). What little we know of the distribution of the shortfin mako and pelagic thresher in Southern African waters is primarily from the KwaZulu-Natal shark nets. These samples are derived from individuals that occasionally wander close inshore. Important offshore commercial species such as the silky, blue, and oceanic whitetip sharks are not caught in the shark nets, and thus records are few and far between. This is an unfortunate situation, particularly when consideration is given to the intensity of epipelagic long-line fisheries in the South Atlantic and Southern Indian Ocean that are targeting scombroids, large non-batoid sharks, and the pelagic stingray (by-catch species). In addition, there is the burgeoning trade in the fins of the large pelagic sharks. Unfortunately, there have been few pelagic long-line surveys of sharks in the epipelagic zone of Southern Africa to match demersal work that has been undertaken off the West and South coast of South Africa and Namibia. The distribution of the large oceanic batoids of the Family Mobulidae (devil rays) is poorly known off South Africa. The relatively few records that exist are derived from either strandings or catches in the KwaZulu-Natal shark nets. Devil rays are rarely caught by long-lines, but were susceptible to giant pelagic gill nets during the past few decades.

The white shark (*Carcharodon carcharias*) is well-known from coastal records off the southwest and east coasts of South Africa, where it regularly occurs close inshore, but this species is poorly known north of Saldanha Bay on the west coast of South Africa, Namibia, Angola and Mozambique. In addition, it is poorly known in the epipelagic zone, which it apparently readily penetrates, as do other members of the Family Lamnidae. Such inadequate knowledge of its distribution and movements makes protecting this threatened species problematic.

Abundance of the fauna

A simple scale of the relative abundance of South African cartilaginous fishes is presented in Table 6. *Rare* species are those with 1-10 examples collected or otherwise sampled (photographed, observed, etc.). Species that are *infrequent* are known from 10 to 100 examples; *Unabundant* species from 100 to 1000; and *Common* species from 1000 or more examples. About half (52%) of known species are rare or unabundant, while slightly more than a quarter are common (including important fisheries species). An additional category, *abundant*, might be used for those species in which more than 100 000 specimens are known, and *common* restricted to 1000 to 100000. However, the current data set is insufficient, and thus at present these categories cannot be distinguished.

Table 6. Abundance of the South African cartilaginous fishes.

Abundance Category	Nº Species	% Total
Rare	64	35.4
Infrequent	30	16.6
Unabundant	39	21.5
Common	48	26.5
Total species	181	100.0

It is important to note that despite a high level of species diversity in the South African chondrichthian fauna, stock sizes remain relatively small. This low abundance is a function of the limited but diverse habitats that effectively compress the ranges of many species. Concomitant with the low abundance is a limited potential to sustain fishing pressure, and thus, these resources are vulnerable to over exploitation.



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Appendix 2

Current fishing regulations pertaining to sharks

Table 1. Sharks currently listed in Annexures 4, 7 and 8 of the amended regulations of the Marine living Resources Act, Gazette No. 35903, 23 November 2012 – listings presented here only refer to sharks and rays.

Annexure	List	Common name	Species
4 & 7 – Regulation 21	Prohibited species list for commercial and recreational fishers	Leopard catshark	<i>Poroderma pantherinum</i>
		Ragged tooth	<i>Carcharias taurus</i>
		Spotted gully	<i>Triakis megalopterus</i>
		Striped catshark	<i>Poroderma africanum</i>
		Great white shark	<i>Carcharodon carcharias</i>
		Sawfishes	<i>Pristidae</i>
		Basking shark	<i>Cetorhinus maximus</i>
		Whale shark	<i>Rhinocodon typus</i>
8 – Regulation 22	Exploitable list	Elasmobranchs	<i>Elasmobranchii</i>
	Excluding	Great white	<i>Carcharodon carcharias</i>
		Leopard catshark	<i>Poroderma pantherinum</i>
		Ragged tooth	<i>Carcharias taurus</i>
		Spotted gully	<i>Triakis megalopterus</i>
		Striped catshark	<i>Poroderma africanum</i>



Appendix 3

Summary of Chondrichthyans targeted by south african fisheries and potential sources of fishery-dependent and fishery-independent survey data. Data reflects sharks reported by fishers or observers. Estimated catch in 2010 (t) is shown with percentages attributed to each fishery (Da silva *in prep*).

Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
Squalomorpha	unidentified	unidentified	1-10									■				
Hexanchiformes Cow and frilled sharks	Hexanchidae Cow sharks	<i>Heptranchias perlo</i> Bonnaterre, 1788 Sharpnose sevengill shark "Sixgill"	0													X
		<i>Notorynchus cepedianus</i> Péron, 1807 Spotted sevengill shark "Cowshark"	<1-10	■	△										X	X
		<i>Hexanchus griseus</i> Bonnaterre, 1788 Bluntnose sixgill shark "Sixgill shark"	<1									■				X



Order	Family	Genus/Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
	Chlamydose-lachidae Frisled sharks	<i>Chlamydo-selachus africana</i> Ebert & Compagno, 2009 Southern African Frisled shark	<1							■						X
Squali-formes Bramble, sleeper and dogfish sharks	Etmopteridae Lantern shark	<i>Centro-scyllium fabricii</i> Reinhardt 1825 Black dogfish "Dogshark"	<1							■						X
		<i>Etmopterus</i> spp Unidentified Lantern sharks "Dogshark"	<1							¢		Δ			X	X
	Centrophoridae Gulper shark	<i>Centro-phorus</i> spp Gulper shark "Dogshark"	<1							■						X



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
		<i>Deania</i> spp Gulper sharks "Dogshark"	<1							■		△			X	X
	Somniosidae Sleeper sharks	<i>Centroscymnus</i> spp Sleeper sharks "Dogshark"	<1							■						X
	Dalatiidae Kitefin sharks	<i>Isistius brasiliensis</i> Quoy and Gaimard, 1824 Cookiecutter shark	<1							?	?				X	X
	Squalidae Dogfish sharks	(<i>Squalus asper</i>)* <i>Cirrhigaleus asper</i> Merrett, 1973 Roughskin spurdog "Dogshark"	<1											■		X



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
		<i>Squalus acanthias</i> Linnaeus, 1758 Piked dogfish “Dogshark”	<1	Δ		Δ			Δ	■					X	X
		<i>Squalus megalops</i> Macleay, 1881 African shortnose spurdog “Dogshark”	11-100							Δ		■			X	X
		<i>Squalus mitsukurii</i> Jordan & Snyder, 1903 Shortspine spurdog “Dogshark”	<1							■		Δ			X	X



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
Carcharhiniformes Ground sharks	Carcharhinidae Requiem sharks	<i>Carcharhinus amboinensis</i> Müller & Henle, 1839 Pigeye or Java shark “Copper shark” or “bull shark”	<1										■			
		<i>Carcharhinus brachyurus</i> Günther, 1870 Bronze whaler or copper shark	201-300	●	△	○	○	△	△		△		△	△	X	X
		<i>Carcharhinus brevipinna</i> Müller & Henle, 1839 Spinner shark “Copper shark”	1-10			X				X				△	X	



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
		<i>Carcharhinus falciformis</i> Bibron, <i>In</i> Müller & Henle, 1839 Silky shark "Copper shark"	1-10				?	?		?				Δ	X	
		<i>Carcharhinus leucas</i> Valenciennes, <i>In</i> Müller & Henle, 1839 Bull or Zambezi shark "Copper shark"	1-10	○		○	○	○		Δ			○		X	
		<i>Carcharhinus limbatus</i> Valenciennes, <i>In</i> Müller & Henle, 1839 Blacktip shark	1-10	●		⊖	⊖	⊖				⊖	⊖	Δ	X	



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
		<i>Carcharhinus longimanus</i> Poey, 1861 Oceanic whitetip shark	1-10				●	●						Δ	X	
		<i>Carcharhinus melanopterus</i> Quoy & Gaimard, 1824 Blacktip reef shark	1-10	○		○	○	○					○	Δ	X	X
		<i>Carcharhinus plumbeus</i> Nardo, 1827 Sandbar shark	<1										■	Δ		
		<i>Carcharhinus obscurus</i> Lesueur, 1818 Dusky shark "Copper shark"	11-100	○		○	○		○			○	○	Δ	X	X



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Order	Family	Genus/Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
		<i>Galeocerdo cuvier</i> Péron & Lesueur, <i>In</i> Lesueur, 1822 Tiger shark	1-10	~											X	
		<i>Prionace glauca</i> Linnaeus, 1758 Blue shark	301-400	X	Δ	Δ	□	~			Δ	Δ			X	X
		<i>Rhizoprionodon acutus</i> Rüppell, 1837 Milk shark	<1	Δ	Δ									Δ	X	
	Triakidae Hound-sharks, smooth-hounds, topes, gully and whiskery sharks	<i>Galeorhinus galeus</i> Linnaeus, 1758 Soupfin or tope shark	401-500	●	Δ	●	Δ		Δ	●	Δ	Δ			X	X



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
		<i>Mustelus mustelus</i> Linnaeus, 1758 Smooth-hound shark	300-400	○	△	□				○	△	△			X	X
		<i>Mustelus palumbes</i> Smith, 1957 Whitespot smooth-hound shark "Smooth-hound shark"	11-100	⊙		⊙				■			⊙		X	X
		<i>Mustelus mosis</i> Hemprich & Ehrenberg, 1899 Hardnose or Arabian smooth-hound shark "Smooth-houndshark"	1-10	○	○	○				●					X	



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
		<i>Triakis megalopterus</i> Smith, 1849 Spotted gully shark "Smooth-houndshark"	1-10	~								~			X	X
	Scyliorhinidae Catsharks	<i>Apristurus saldanha</i> Barnard, 1925 Saldanha catshark	<1							■					X	
		<i>Halaelurus natalensis</i> Regan, 1904 Tiger catshark	1-10	●						●		●			X	X
		<i>Halaelurus lineatus</i> Bass, D'Aubrey & Kistnasamy, 1975 Lined catshark	<1							■						X



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Tuna and swordfish	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
		<i>Haploblepharus edwardsii</i> Voigt, In Cuvier, 1832 Puffadder shyshark	1-10	●		●				●					X	X
		<i>Haploblepharus fuscus</i> Smith, 1950 Brown shyshark "Happy eddy"	1-10	●						●					X	
		<i>Haploblepharus pictus</i> Müller & Henle, 1838 Dark shyshark	1-10	●						●					X	
		<i>Holohalaelurus regani</i> Gilchrist, 1922 Izak or halaluja catshark	1-10							●		●			X	



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
		<i>Poroderma africanum</i> Gmelin, 1789 Striped catshark or pyjama shark	1-10	~		~									X	X
		<i>Poroderma pantherinum</i> Smith, In Müller & Henle, 1838 Leopard catshark	1-10			~				~					X	X
		<i>Scyliorhinus capensis</i> Smith, In Müller & Henle, 1838 Yellow-spotted catshark	1-10	⊙		⊙				■					X	X



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
	Sphyrnidae Hammer-head, bonnethead or scoophead sharks	<i>Sphyrna lewini</i> Griffith & Smith, <i>In</i> Cuvier, 1834 Scalloped hammerhead “Hammer-head shark”	1-10	○			○	○			○	○	○	△	X	X
		<i>Sphyrna mokarran</i> Rüppell, 1837 Great hammerhead “Hammer-head shark”	1-10	○			○	○					○		X	X
		<i>Sphyrna zygaena</i> Linnaeus, 1758 Smooth Hammer-head “Hammer-head shark”	1-10	○	⊗	○	⊗	○		⊗	⊗		⊗		X	X



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
Lamni-formes Mackerel sharks	Lamnidae Mackerel sharks	<i>Carcharodon carcharias</i> Linnaeus, 1758 Great white shark	<1										■		X	X
		<i>Isurus oxyrinchus</i> Rafinesque, 1810 Shortfin mako shark	501-600				■								X	X
		<i>Lamna nasus</i> Bonnaterre, 1788 Porbeagle shark	<1					■								X
	Alopiidae Thresher sharks	<i>Alopias pelagicus</i> Nakamura, 1935 Pelagic or small tooth thresher "Thresher shark"	1-10	○			○	○		○	○		○		X	



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
		<i>Alopias superciliosus</i> Lowe, 1839 Bigeye thresher shark "Thresher shark"	1-10	○			○	○		○	○		○		X	X
		<i>Alopias vulpinus</i> Bonnaterre, 1788 Thresher shark	1-10	●			○	○	○	○	○		○		X	X
	Pseudocarchariidae Crocodile sharks	<i>Pseudocarcharias kamoharai</i> Matsubara, 1936 Crocodile shark	1-10				●	●							X	X
	Odontaspidae Sandtiger sharks	<i>Carcharias taurus</i> Rafinesque, 1810 Spotted ragged-tooth shark	1-10	○			○	○		○		○	○		X	X



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
Pristiophoriformes Saw sharks	Pristiophoridae Saw fishes and saw sharks	<i>Pliotrema warreni</i> Regan, 1906 Sixgill sawshark	1-10							■		△			X	X
Squatini-formes Angel sharks and sanddevils	Squatinae Angel sharks	<i>Squatina africana</i> Regan, 1908 African angel shark	<1										■		X	X
Torpedini-formes Electric rays	Torpedinidae Torpedo rays	<i>Torpedo fuscomaculata</i> Peters, 1855 Black-spotted torpedo "Ray" or "skate"	1-10							■		△			X	X
		<i>Tetronarce nobiliana</i> Bonaparte, 1838 Torpedo ray "Ray" or "skate"	1-10							■		△			X	X



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
		<i>Torpedo sinuspersici</i> Olfers, 1831 Variable or marbled torpedo ray "Ray" or "skate"	1-10							■					X	
	Narkidae Sleeper rays	<i>Heteronarce garmani</i> Regan, 1921 Natal electric ray "Ray" or "skate"	<1							■					X	X
		<i>Narke capensis</i> Gmelin, 1789 Onefin electric ray "Ray" or "skate"	1-10							■		△			X	X
Rajiformes Skates and rays	Arhyncho- batidae Softnose skates	<i>Bathyraja smithii</i> Müller & Henle, 1841 African softnose skate "Ray" or "skate"	11- 100							■		△			X	X



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
	Rajidae Hardnose skates	<i>Raja</i> spp "Ray" or "skate"	11-100	Δ		Δ				■		Δ			X	X
		<i>(Raja alba)*</i> <i>Rostroraja alba</i> Lacepède, 1803 White or spearnose skate "Ray" or "skate"	11-100	~		~				~		Δ			X	X
		<i>(Raja caudaspinosa)*</i> <i>Rajella caudaspinosa</i> (von Bonde & Swart, 1923) Munchkin skate "Ray" or "skate"	11-100							■		Δ			X	X



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
		<i>(Raja confundens)*</i> <i>Rajella barnardi</i> (Norman, 1935) Bigthorn skate "Ray" or "skate"	1-10							■					X	X
		<i>(Raja leopardus)*</i> <i>Rajella leopardus</i> (von Bonde & Swart, 1923) Leopard skate "Ray" or "skate"	11-100							■						
		<i>(Raja linnaeus)*</i> <i>Raja miraletus</i> (Linnaeus, 1758) Twineyed skate "Ray" or "skate"	11-100	△						■		△			X	X



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		<i>(Raja pullopunctata)* Dipturus pullopunctata</i> (Smith, 1964) Slime or graybelly skate "Ray" or "skate"	11-100							■		△			X	X
		<i>(Raja ravidula)* Rajella ravidula</i> (Hulley, 1970) Smoothback skate "Ray" or "skate"	1-10							●		●			X	X
		<i>(Raja spinacidermis)* Malacoraja spinacidermis</i> Barnard, 1923 roughskin skate "Ray" or "skate"	11-100							■						



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
		<i>(Raja springeri)* Dipturus springeri</i> Wallace, 1967 Roughbelly skate "Ray" or "skate"	10-100							■		△			X	X
		<i>Raja straeleni</i> Poll, 1951 Biscuit skate "Ray" or "skate"	201-300	△		△				■		△			X	X
		<i>(Raja wallacei)* Leucoraja wallacei</i> (Hulley, 1970) Yellow-spotted skate "Ray" or "skate"	11-100	△		△				■		△			X	X
	Anacanthobatidae Legskates	<i>Cruriraja</i> spp "Ray" or "skate"	11-100							■		△			X	X



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
	Rhinobatidae Guitarfishes	<i>(Rhinobatos annulatus)*</i> <i>Acroterio- batus annulatus</i> Smith, In Müller & Henle, 1841 Lesser sandshark or little guitarfish “Sandshark”	11- 100	X	X	X			X	☞		X			X	X
		<i>(Rhinobatos blochii)*</i> <i>Acroterio- batus blochii</i> Müller & Henle, 1841 Bluntnose guitarfish or fiddlefish	1-10												X	
		<i>Rhinobatos holcorhynchus</i> (Norman, 1922) Slender guitarfish “Sandshark”	<1							■					X	X



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		<i>(Rhinobatos leucospilus)*</i> <i>Acroterio- batus leucospilus</i> Norman, 1926 Greyspot Guitarfish "Sandshark"	1-10	~	Δ	~									X	
		<i>(Rhinobatos ocellatus)*</i> <i>Acroterio- batus ocellatus</i> Norman, 1926 Speckled guitarfish "Sandshark"	<1							■						X
	Rhyncho- batidae Wedgefishes	<i>(Rhinobatos djiddensis)*</i> <i>Rhyncho- batus djiddensis</i> (Forsskål, 1775) Giant guitarfish "Sandshark"	<1							■					X	X



Order	Family	Genus/ Species	Estimated catch 2010 (t)	Commercial linefishery	Recreational linefishery	Demersal shark longline	Pelagic shark longline	Tuna and swordfish pelagic longline	Gill and beach seine net fisheries	Offshore /inshore demersal trawl fishery	Small pelagic fishery	Hake longline fishery	Bather protection	Prawn trawl fishery	Fishery-dependent data	Fishery- independent data
Myliobatoidei Stingrays	Myliobatidae Eagle rays	<i>Aetobatus narinari</i> Euphrasen, 1790 Spotted eagleray or bonnetray	1-10	△						■				△	X	
		<i>Myliobatis aquila</i> Linnaeus, 1758 Common eagle ray or bull ray "Eagle ray" or "bull ray"	1-10	○						□		○		△	X	X
		<i>Pteromylaeus bovina</i> Geoffroy Saint-Hilaire, 1817 Duckbill ray "Eagle ray" or "bull ray"	1-10	●						●		●				X
	Mobulidae Devil rays	<i>Mobula spp</i> Devil rays	<1					●		●			●		X	
		<i>Manta spp</i> Manta rays	<1					●		●			●		X	



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	Dasyatidae Whiptail stingrays	<i>Dasyatis brevicaudatus</i> Hutton, 1875 Short-tail stingray "Ray" or "skate"	<1	■										Δ	X	X
		(<i>Dasyatis kuhlii</i>)* <i>Neotrygon kuhlii</i> (Müller & Henle, 1841) Blue-spotted stingray "Ray" or "skate"	1-10	●		●								Δ	X	
		<i>Dasyatis chrysonota</i> Smith, 1828 Blue stingray "Ray" or "skate"	1-10	○		○				○		○		Δ	X	



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		<i>(Dasyatis violacea)*</i> <i>Pteroplatytrygon violacea</i> (Bonaparte, 1834) Pelagic stingray "Ray" or "skate"	11-100				☐	○		○					X	X
		<i>Himantura cf. gerrardi</i> Gray, 1851 Sharpnose stingray "Ray" or "skate"	<1	¢										Δ	X	X
		<i>Himantura uarnak</i> Forsskål, 1775 Honeycomb stingray "Ray" or "skate"	<1	¢											X	



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		<i>Taeniura lymma</i> Forsskål, 1775 Bluespotted ribbontail stingray "Ray" or "skate"	<1	■											X	
	Gymnuridae Butterfly rays	<i>Gymnura natalensis</i> Gilchrist & Thompson, 1911 Diamond or butterfly ray "Ray" or "skate"	11-100											Δ	X	
Chimaeri-formes Chimaeras or silver sharks	Chimaeridae Shortnose chimaeras	<i>Hydrolagus</i> spp. Rabbitfish or chimaera "ratfish"	<1							■						X
	Rhinochimaeridae Longnose chimaeras	<i>Harriotta raleighana</i> Goode & Bean, 1895 Narrownose chimaera	<1							■						X



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		<i>Rhinochimaera</i> spp	<1							■						X
	Callorhinchidae Elephant fishes	<i>Callorhinchus capensis</i> Duméril, 1865 St. Joseph shark	801-900						∅	■					X	X
	%catch per species: Δ <1 X 1-10 11-25	~ 26-50 £ 51-75 φ 76-100														

*Species re-described (Ebert, unpublished information). Species identification remains an issue for these species however DAFF databases record both species separately, species names are shown as they appear in databases (in brackets) with new names if they have been re-described. Common names individual sharks, skates and rays are reported as are shown in quotation marks



Update and review of the NPOA for Sharks South Africa

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Abstract

South Africa has one of the most diverse shark faunas in the world and many species are caught in appreciable quantities in directed and non-directed shark fisheries. South Africa has well developed fisheries management systems for most of its fisheries and many challenges with regard to the sustainable management and conservation of sharks have already been identified and addressed in individual fisheries policies and management measures. The South African National Plan of Action for sharks (NPOA-Sharks) was finalised in 2013 and provided information on the status of chondrichthyans in South Africa and examined structure, mechanisms and regulatory framework related to research, management, monitoring, and enforcement associated with shark fishing and trade of shark product in the South African context. This information was used to identify, group and prioritize issues particular to South African chondrichthyan resources that require intervention in the forms of specific actions, associated responsibilities and time frames. It provides a guideline for identifying and resolving the outstanding issues around management and conservation of sharks to ensure their optimal, long term, sustainable use for the benefit of all South Africans. Integral to the NPOA for Sharks - South Africa was the list of issues to be addressed in terms of improving sources of data, addressing scientific knowledge on common and cryptic species and thereby improving the management of chondrichthyan fisheries. The NPOA for Sharks – South Africa is in the process of being updated and the progress in implementation is highlighted in this paper.

Keywords

NPOA for Sharks, South Africa, chondrichthyans, sharks, rays, chimaeras, target, bycatch.

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Introduction

The South African EEZ straddles two oceans and, if one considers the sub Antarctic Prince Edward Islands, includes all marine bio-zones, from tropical to polar. Consequently, South Africa has one of the most diverse faunas of cartilaginous fishes (Class Chondrichthyes) in the world. Southern African chondrichthyo fauna include representatives from all 13 orders of cartilaginous fishes with 49 families and 111 genera (Ebert and van Hees 2015). Approximately 204 species occur in southern Africa, representing 20% of all known chondrichthyans with 117 shark, 79 batoid and 8 chimaera species and 13% of those endemic to the region (Ebert and van Hees 2015). This high level of diversity and endemism engenders South Africa's responsibility in conserving and managing sharks that occur in South African waters and protecting those that enter South African waters periodically.

The Department of Agriculture, Forestry and Fisheries (DAFF) is the lead governmental agency responsible for the management of sharks caught in South African fisheries. Fisheries Management is legally mandated to manage sharks in terms of the Marine Living Resources Act (MLRA), 1998 (Act No 18 of 1998) and the Regulations promulgated thereunder. Although a living copy of the National Plan of Action (NPOA) for Sharks South Africa remained in draft form for 13 years the original document formed the foundation of research and management initiatives in South Africa.

A thorough overview of chondrichthyans caught as target and by-catch in South African fisheries is provided in da Silva *et al.* (2015). A total of 100 out of 204 chondrichthyan species that occur in southern Africa are impacted by diverse fisheries ranging from recreational angling to industrialised fishing such as trawl and pelagic longline. Total reported dressed catch averaged at 3000 t between 2010 and 2012 with two-thirds of reported catch caught as bycatch (da Silva *et al.*, 2015). The most recent collated reported dressed catch of chondrichthyes in South Africa was 2300 t in 2016 (DAFF, unpublished catch data). Regulations aimed at limiting chondrichthyan catches, coupled with species-specific conditions currently exist in the following fisheries: demersal shark longline, large pelagic longline, recreational line and beach-seine and gillnet fisheries. Limited management measures are currently in place for chondrichthyans captured in other fisheries.

In 2013 the NPOA for Sharks was completed with the goal to move towards effective conservation and management of sharks that occur in the South African EEZ to ensure their optimum, long-term, sustainable use for the benefit of all South Africans, including present and future generations. The NPOA-Sharks recognized the need to determine and implement harvesting strategies consistent with the principles of biological sustainability, attained through scientifically based management and consistent with a Precautionary Approach. The NPOA for Sharks, South Africa is in the process of being updated with the intention of completion by 2019. This paper aims to highlight the implementation progress as listed in the action table produced in the NPOA for Sharks, South Africa (2013).

Status of Implementation of the NPOA for Sharks South Africa

The status of implementation of the NPOA for Sharks South Africa is listed in Table 1 in terms of an action table with clear goals, responsibilities, priorities and time-frames. The action table was divided into the following issue clusters; *data and reporting*, *classification and assessment of shark species*, *sustainable management*, *optimum use*, *capacity and infrastructure*, *compliance* and *regulatory tools*. In order to quantify progress made in each issue cluster and within each issue, significant progress was scored as 1 while partial progress was scored as 0.5.

Data and reporting involved all processes relating to improving data from fisheries-dependent and –independent sources (Table 1). This included improved identification of sharks from fishers in logbooks, collection of fisheries independent data by observers, improving understanding of total catch and discards across fisheries. Progress was made in 44 % of all listed actions. The most significant improvement in this issue cluster involved a review of catch data from all fishing sectors of all chondrichthyans caught as by-catch and target in South

African fisheries. This provided a framework for management and further research needs. A number of other actions was completed including the development of an identification guide which includes all 100 sharks, rays and chimaeras impacted by fisheries. Furthermore, development of factors for converting dressed weights of commercially valuable sharks such as smoothhound sharks *Mustelus mustelus* and tope shark (locally referred to as tope shark) *Galeorhinus galeus* was completed. Although a national observer programme has not yet been re-established, some fleets, namely the foreign-flagged large pelagic tuna longline fleet and the mid-water trawl fishery targeting Cape horse mackerel *Trachurus capensis* are subjected to 100% observer coverage.

The issue cluster; *classification and assessment of shark species* listed the National research needs such as clarification of taxonomic uncertainty, investigation of stock delineation, gaps in knowledge of life history, uncertainties related to unknown movement across RFMO and national boundaries, ecosystem changes induced by fishing and lack of formal assessments for sharks, rays and chimaeras impacted by South African fisheries (Table 1). Progress was made in 84% of all listed actions. Most notable achievements in this issue cluster include the preliminary stock assessments for tope and smoothhound sharks and the implementation of an IUCN Red List support tool applied to 21 species of sharks, rays and chimaeras.

Preliminary stock assessments of smoothhound and tope sharks were completed by the Linefish Scientific Working Group Task Team in August 2017. The assessment input data included standardized abundance indices from South African demersal trawl surveys (1990-2015) and catch estimates from the demersal trawl fishery, demersal shark longline fishery and the commercial linefishery, which were disaggregated by species and scaled up from dressed to total weights. The Bayesian State-Space Surplus Production Model 'JABBA' (Just Another Bayesian Biomass Assessment; Winker et al. 2018) was applied to fit the catch and abundance time series of smoothhound and tope sharks. According to the initial reference case for smoothhound sharks, there is a 58.0% probability that current harvest rates are unsustainable. To allow rebuilding of the stock, total catches would need to be substantially reduced to prevent the stock from declining further below unsustainable levels. For tope shark, the reference case model predicted an 89.8% probability that the stock is overfished and that overfishing is occurring. To halt the decline and allow rebuilding of the stock total catches would need to be sustainably reduced from more than 300 t to under 100 t.

In addition to the assessments on smoothhound and tope, trend analyses for Chondrichthyan species off the south and west coasts of South Africa was completed as part of a workshop hosted by IUCN Shark Specialist Group. A total number of 21 species of sharks, batoids and chimaeras were assessed including the following species caught as bycatch and target in South African fisheries in excess of 10 t; smoothhound sharks, tope sharks, yellow-spot skate *Leucoraja wallacei*, slime skate *Dipturus pullopunctatus*, twin-eye skate *Raja ocellifera*, spearnose skate *Rostroraja alba*, biscuit skate *Raja straeleni* and St. Joseph shark *Callorhynchus capensis*. The target species tope shark was classified as Endangered according to IUCN Redlist criteria, which corroborates the pessimistic stock assessment results for this species. Smoothhound sharks, being the other main target species of the fishery, were classified as Least Concern, which can be largely attributed to the more resilient life history characteristics and thus short generation length and potential recovery times. Of the fairly common bycatch species twin-eye skate and yellow-spot skate were classified as Endangered and Vulnerable, respectively, while the remainder of species was Least Concern.

The issue cluster *sustainable management* related to the lack of formal management protocols across all fisheries and lack of coordination between fisheries management units (Table 1). Assessments listed above will be used in the future to address specific species such as smoothhound and tope sharks caught across multiple fisheries as listed in da Silva *et al.*, 2015. Progress was made in 50% of all listed actions. Lack of co-ordination between separate units researching species impacted by specific fisheries and their associated management unit and others remain an issue. For example a management protocol aimed at reducing catches of smoothhound and tope would require the involvement and participation of Scientific and Management Working group of three separate fisheries; the commercial linefishery, the trawl fishery and the demersal shark longline fishery.

Further improvements towards sustainable management involved the addition of a number of CITES Appendix II species to the prohibited catch lists on permit conditions of all fisheries such as thresher sharks *Alopias* spp, hammerhead sharks *Sphyrna* spp, porbeagle sharks *Lamna nasus*, silky sharks *Carcharhinus falciformis* and oceanic white tip shark *C. longimanus*. In addition, dusky sharks *C. obscurus* were added as prohibited species list due to their similarity to silky sharks.

The issue cluster *optimum use* involved research related to the concern around the health risks associated with shark meat consumption, mitigation measures for unwanted by-catch, full utilization of shark catches and traceability of shark products from catch to sale (Table 1). Progress was made in 85 % of all listed actions. Several DAFF collaborations with SA institutions resulted in a number of studies investigating the heavy metal accumulation and toxicity of several marine fishes including sharks (Bosch *et al.*, 2016a; Bosch *et al.*, 2016b). In addition a study by McKinney *et al.*, 2016 investigated the health implications of consumption of sharks from the east coast of South Africa. These studies in addition to low reported catches (<10 t on average over five years) formed the basis of removing broadnose sevengill cow sharks *Notorynchus cepedianus* as a permitted species in the demersal shark longline fishery and an introduction of a slot limit on the catch of inshore demersal sharks of between 70 and 130 cm total length. Lastly, with the aim of full utilization of sharks as noted under the NPOA for Sharks South Africa the large pelagic tuna fleet was required as of 2017 to land sharks with fins naturally attached.

The issue cluster *capacity and infrastructure* which involves lack of awareness, lack of capacity to complete frequent assessment and lack of funding to outsource scientific projects. This issue cluster remains an issue and will continue to be a priority in the NPOA for Sharks South Africa (Table 1). Progress was made in 50 % of all listed actions.

Similarly, the issue clusters *compliance* and *regulatory tools* remains outstanding issues (Table 1). However, recent collaborations between DAFF, SA CUSTOMS, TRAFFIC SA and Endangered Wildlife Trust SA (EWT) has resulted in an increased awareness of trade of chondrichthyes with increased confiscations of illegal shark product. Progress was made in 100 % of all listed actions for *compliance* and 0% for *regulatory tools*.

Conclusion

The progress made in line with the NPOA for Sharks South Africa implemented in 2013 is broadly summarised in Table 1. Progress was made in six of the seven *Issue Clusters* and within most 22 issues highlighted in the NPOA Sharks SA. Most notable progress was made within the *optimum use* (100% of listed actions completed) and *classification and assessment of species* (84% of listed actions completed) issue clusters. These achievements can be attributed to the increased research capacity within DAFF SA and an increase in research institutions conducting research on sharks caught by fisheries. Progress was mostly focused in priority species that were identified through scientific working groups due to their high capture rates across multiple fisheries or availability of data. This research will be extended to more species of chondrichthyans in the future where possible. Issues and Actions where least progress was made included *sustainability and management* (50% of listed actions completed), *capacity and infrastructure* (50% of listed actions completed), *data and reporting* (44% of listed actions completed) and *regulatory tools* (0% of listed actions completed). Limited progress within these issue clusters are related to a lack of remaining capacity in enforcement and compliance, attrition of government funding which has resulted in a limited observer programme focused on a few fisheries. Lastly, lack of progress within these clusters were also related to the attrition of skilled resource managers and coordination of management of chondrichthyans caught across multiple fisheries. Although least progress was made within the issue cluster *regulatory tools*, this was mostly related to the lack of assessments. Assessments conducted within the current previous period will be used to develop regulatory tools and operational management plans in the future. The update and implementation of the NPOA for Sharks SA has been identified as a priority within the 2018/2019 calendar year.

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Table 1. Review of the National Plan of Action for Sharks South Africa 2013 indicating responsibilities, time-frames and progress

Issue cluster	Issue	Description	Fishery sector	Action	Responsibility	Priority	Time-frame	Progress		
Data and reporting	Shark species identification and reporting	In catch statistics, sharks are often lumped into generic categories.	All Fisheries excluding the KZN bather protection program	Create identification guide for chondrichthyes	FR	Immediate	1	Identification guide for 100 sharks, batoids and chimaeras caught in SA fisheries completed and circulated		
				Develop permit conditions	MRM	Immediate	1	Permit conditions of various fisheries require species specific identification of catch		
				Education and Implementation	MRM Working Groups	High	2	As above		
				Review progress	FR and MRM	Medium	3-4	No progress		
	Observer coverage	There is currently no observer coverage except for the foreign flagged pelagic tuna longline fleet.	All sectors	Re-establish, re-assess and expand observer coverage	FR	Immediate	1	Not re-established across all fisheries, but large improvement at biggest impact fishery (Large Pelagic Longline)		
				Observer programmes do not collect data that are adequate to assess impact of fishing on species that are not landed.	All sectors	Define and set sampling requirements per fishery sector	FR	Immediate	1-2	Completed for some fisheries, but observer programme has not yet been implemented across all sectors
						Initiate new sampling strategy	FR	High	2-4	Sampling strategies and requirements drafted for future observer programme

	Discharge monitoring	Discharge of fish is only monitored in selected fisheries. Catch reporting is not verified.	Offshore trawl, traditional linefish, tuna pole,	Review discharge monitoring coverage and quality of information	FR, MCS	High	1-2	No progress
				Establish additional discharge monitoring requirements	FR and MCS	High	2-3	Completed for some fisheries, but observer programme has not yet been implemented across all sectors
	Reporting of directed catch and “joint product”	Directed catches of sharks are only reported for commercial sectors.	Recreational linefish	Develop and implement a land based monitoring program expanding coverage	FR	High	1-2	Not implemented yet
		Landed catch is not weighed	Line, net fish and recreational linefish	Instigate monitoring of landings	FR, MRM and MCS	Medium	2-4	Not implemented yet
		There is no mandatory reporting	Recreational fishery	Engage with recreational initiative for web-based catch recording	FR and Recreational MRM Working Group	Medium	2-4	Web based reporting exists for some angling competitions
		There is no routine collection of length	All except Large Pelagic longline	Set target for observer coverage	FR	High	1	Observer programme not fully re-established across all fisheries, but large improvement at biggest impact fishery (Large Pelagic Longline).

		frequencies and conversion factors do not exist for most species.		Develop morphometric relationships to allow for conversion factors	FR	High	1-2	Conversion factors completed for <i>M. mustelus</i> and <i>G. galeus</i> . International morphometric relationships used for blue sharks. Length frequency data collected from landing sites and factories sporadically and out of date
		Shared stocks	All fisheries	Identify overlaps	FR and MRM	High	1-2	Overlaps in catch between fisheries identified in da Silva <i>et al.</i> 2015 Satelite tagging studies underway for shortfin mako and blue sharks
				Engage with neighbouring countries and set-up data sharing agreements	MRM	Medium	3-4	Data sharing agreements between neighboring countries non-existent
	Estimation of discards	Unable to quantify total shark mortality associated with by-catch fisheries	All fisheries	Identify short falls	FR	High	1	Completed (da Silva <i>et al.</i> , 2015)
					Develop monitoring procedures and implement through observer programme	FR	High	1-3
Classification and assessment of shark species	Gaps in taxonomy	Taxonomical classification is uncertain for a number of shark species	All fisheries that catch rays, skates and deepwater shark species	Reclassification of all rays, skates and deepwater shark species using genetics and morphometrics (Barcoding of Life Programmes)	FR	Immediate	Ongoing	Taxonomic revision of known SA species: Currently being completed by DAFF and Pacific Shark Centre Genetics research: Substantial headway was been made with DNA barcoding/ molecular species identification of some taxonomic challenging groups e.g. catsharks and

								houndharks (Maduna <i>et al.</i> , 2017; Kuguru <i>et al.</i> , 2018) ** Priority for future would be how to address these changes in the various historical databases
	Stock delineation	There are several stocks that might be genetically distinct to areas in SA, while others are appear to be shared with other countries.	All fisheries	Collection of additional genetic material through national research surveys and observer programme	FR	Medium	Ongoing	Completed for top four commercial species (Maduna <i>et al.</i> 2016; Bitalo <i>et al.</i> , 2016; Verissimo <i>et al.</i> 2017; Bester-van der Merwe <i>et al.</i> , 2017)
	Gaps in the knowledge of life history	For many species, basic information on life history i.e. age and growth and reproductive capacity is not available or fragmented.	All fisheries	Gap analysis example South African marine status reports	FR	Immediate	1	Gap analysis completed with updated available life-history information for all 100 chondrichthyes targeted or caught as by-catch in SA Fisheries. Life-history parameters available for 15 species, mostly published in grey-literature.
Prioritise species				FR	High	1	Initial species selected included the top 4 species caught in target fisheries. ** this needs to be updated for 100 species of chondrichthyes impacted by SA fisheries.	
Source research capacity i.e. students				FR	High	1	Ongoing, currently working with UCT and Stellenbosch. Funding limitations persist.	

				Collect and work up biological material from national research surveys and observer programme	FR	High	1-3	Completed where possible.
	Spatio-temporal behaviour	Information gaps exist around spatio-temporal behaviour i.e. identification of nursery and mating areas for live-bearing sharks.	All fisheries	Reference gap analysis	FR	Immediate ** changed to ongoing depending on species selected for next period	1	<p>Geostatistical models completed for 21 species from biomass indices from SA demersal trawl surveys: (Winker <i>et al.</i>, 2018b)</p> <p>Impact of RFMO management boundaries investigated (Parker <i>et al.</i> 2017).</p> <p>CPUE standardization by area completed for pelagic shark longline fishery and demersal shark longline fishery.</p> <p>Nurseries for pelagic sharks investigated (da Silva <i>et al.</i>, 2010):</p> <p>Suspected shortfin mako nursery off Agulhas Bank shelf edge currently being investigated. Satellite tagging fieldwork completed.</p> <p>Studies in prep for smooth hammerhead <i>Sphyrna lewini</i> with initial results showing spatial and temporal variation (Kuguru <i>in prep.</i>)</p> <p>Raggedtooth <i>Carcharias taurus</i> shark project showing philopatric behavior</p>

								along the Eastern Cape/ KZN Coast (Klein <i>et al.</i> in prep.).
				Prioritize species	FR	High	1	Research focused on top chondrichthyes caught in fisheries
				Source research capacity i.e. students	FR	High	1	Ongoing. Most of the progress so far have been through student projects.
				Collect and work up biological material from national research surveys and observer programme	FR	High	1-3	Ongoing. Most of the progress so far have been through student projects.
	Ecosystem changes induced by fishing	Habitat alteration through Fishing activities i.e. pupping grounds of demersal sharks.	Inshore and offshore trawl	Engage with EcoFish project that is investigating the trawl effects of the benthos	FR ** change to DEA	Medium	ongoing	Spatial conservation plan is being developed by the Department of Environmental Affairs
		Cascading effects on the ecosystem by the removal of apex predators	All fisheries	Ecosystem modeling using ecosym and ecopath	FR	Low	Ongoing	No specific research conducted.
	Lack of formal assessments	Only two of the 98 species have been assessed, a	All fisheries	Prioritize species for assessment	FR	High	1-2	Assessments completed for 22 species of chondrichthyes. (Winker <i>et al.</i> , 2018b)

		further 14 species were assessed for the KZN region.						<p>Preliminary assessment of smoothhound shark and tope shark completed in 2017.</p> <p>Contribution to RFMO assessments such as shortfin mako sharks; (Winker <i>et al.</i>, 2017a) and blue sharks; (Winker <i>et al.</i>, 2017b)</p>
				Identify suitable assessment models	FR	High	1-4	As above.
				Collect and collate relevant material	FR	High	1-4	Ongoing
				Undertake assessments	FR	High	1-4	As above.
Sustainable management	Lack of formal management protocol for target and “joint product species”	Two species were assessed in terms of a per-recruit and an ASPM, respectively, according to the available data. There is no formal protocol on assessments and recommendations in any of the fisheries.	All fisheries	Develop management protocol	FR and MRM	High	1-2	No protocols have been formalized yet
				Implement management protocol	FR	Medium	2-3	As above.
				Management action based on protocol	MRM	Medium	2-4	<p>Management so far has been <i>ad hoc.</i>, when required, but several management actions have been implemented in several fisheries</p> <p><u>Large Pelagic Longline Fishery:</u></p> <ul style="list-style-type: none"> The following CITES Appendix II species are prohibited: <ol style="list-style-type: none"> Silky sharks <i>Carcharhinus falciformis</i> Oceanic white tips <i>C. longimanus</i>

								<p>3) Thresher sharks family Alopiidae</p> <p>4) Porbeagle sharks <i>Lamna nasus</i></p> <p>5) Mobulid rays</p> <p>6) Hammerhead sharks family Sphyrnidae</p> <ul style="list-style-type: none"> • In addition: dusky sharks <i>C. obscurus</i> are prohibited • Purse seine fishing and Fish Aggregating Devices (FADs) for tuna and tuna-like species prohibited in SA • The release of unwanted or prohibited species is encouraged as per permit conditions. • Observers are required to report capture and release of all species, including information on release conditions • Fins may not be removed from shark trunks as per permit conditions <p><u>Demersal Shark Longline Fishery:</u></p> <ul style="list-style-type: none"> • Retention of CITES Appendix II species listed above prohibited • Retention of broadnosed sevengill cow sharks prohibited • Slot limit for commercially valuable shark species (tope and smoothhound shark) of 70 – 130 cm currently in the process of being implemented • No fishing north of the Kei River due to an increase in shark biodiversity
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								<p><u>Beach-seine and gillnet fisheries:</u></p> <ul style="list-style-type: none"> No retention of sharks and rays with the exception of beach-seine fishers in False Bay <p><u>Demersal inshore trawl:</u></p> <ul style="list-style-type: none"> No by-catch restrictions but move-on rules apply to avoid high teleost and chondrichthyan catches <p><u>Recreational linefishery:</u></p> <ul style="list-style-type: none"> 1 individual of each shark species per day may be retained with the exception of the following species: <ol style="list-style-type: none"> White shark <i>Carcharodon carcharias</i> Basking shark <i>Cetorhinus maximus</i> Whale sharks <i>Rhincodon typus</i> Sawfish family Pristidae
	Lack of coordination of shark fishery management	Most sharks are caught by more than one fishery. Currently there is no formal mechanism for shark management across	All fisheries	Review fisheries and non-extractive impacts on sharks	MRM	High	1	Completed the fisheries impact (da Silva <i>et al.</i> 2015). Non extractive impacts covered by shark Biodiversity Management Plan (BMP)
				Integrate into management protocol	MRM	High	1-2	Communication improved however formal integration is still a priority

		fisheries. Furthermore, no formal mechanism to consider non-extractive use i.e. tourism. Inter-sector conflict		All fisheries that involve sharks take the NPOA into account during the development and implementation of species specific management plans	MRM	High	4	Progress restricted to select fisheries
Optimum use	Concern around health risk of shark meat consumption	High levels of heavy metal contamination are suspected for many top predators, including most shark species, making them potentially unsafe for human consumption.	All fisheries	Collect material from national research surveys and observers for priority species	FR	Medium	1-2	Research conducted by DAFF and SA institutions used in developing permit conditions (Bosch <i>et al.</i> , 2016a; Bosch <i>et al.</i> , 2016b. McKinney <i>et al.</i> , 2017) Permit conditions for the removal of broadnosed sevengill cow sharks from demersal shark longline permit conditions and the introduction of the slot limit for commercially valuable demersal shark species
				Analyze data	FR	High	1-2	As above
				Minimize catch as a safety precaution	FR and MRM			As above

	Lack of knowledge or mechanisms to reduce fishery mortality	Mitigation measures for unwanted species Proper release protocols for unwanted by-catch	All fisheries	Review existing mitigation measures	FR	Medium	2-4	Restrictions implemented in several fisheries to reduce fishing mortality
				Develop best practice release protocols per fishery	FR	Medium	2-4	Completed for Longline fisheries
				Incorporate best practice release protocols into Permit conditions	MRM	Medium	2-4	Completed for Longline fisheries
Retained sharks are not fully utilized	Finning. Dumping of carcasses, killing of unwanted by-catch, no by-catch mitigation. There is no investigation into value adding and development of products i.e. shark leather etc. Large sharks are caught for fins and fillets not utilized.	All fisheries	International review of potential shark products	FR				New permit conditions for the Large pelagic longline fishery: Fins naturally attached as of 2017/2018
			Engage Technicians and Universities to develop possible shark products, meat as well as leather and Review possible Pharmaceutical products	FR and MRM	Medium	2-4	No progress	
			Engage with relevant sections within DAFF regarding developing alternate livelihoods through full	MRM	Medium	2 weeks	No Progress	

				utilization of shark products ie. Leather, markets for unwanted low value species such as St. Joseph sharks				
Traceability of shark products from catch to sale	Product names cannot be matched with species names i.e. generic white fish	All fisheries	Introduce standardization of product codes/names	SASSI	High	1-2	South African Seafood naming standard Gazetted. Comments closed in February 2018. Builds onto existing legislation requiring mandatory generic and specific names when trading marine species	
	Custom HS codes only reflect generic sharks and not the individual species.		Engage with Customs to review product codes for export/import	MRM/Traffic	High	1-3	As above.	
	Fillet identification is a problem	All Fisheries	Review of genetic coding tools.	FR Traffic	Medium	2-3	Collaboration with Stellenbosch University genetics group to develop forensic laboratory. Proof of concept published (Kuguru <i>et al.</i> 2018) Genetic identification method tested/optimized on confiscated shark fins	

		Fins cannot always be identified to species level Illegal recreational sale		Fin identification guide	Research	Medium	2-3	As above. Training ongoing and organized by PEW foundation. Collaboration in place with WWF TRAFFIC SA to undertake extensive training
Capacity and infrastructure	Lack of awareness	Lack of awareness and education to change misconceptions about sharks and shark fisheries Fishery pollution eg. discard of bait box packaging	All fisheries	Determine requirements for educational material	Research and Management	Medium	2-3	** This should be an NGO / NPO activity
				Implement training and awareness program	Management	Medium	3-4	Attrition in government funding and posts
				Ensure compliance with permit conditions	Compliance and Management	High	1-2	Little progress due to other priority issues within SA fishery compliance
				Develop responsible fisheries programs pertaining to sharks	DAFF	Medium	3-4	Limited progress through WWF and the South African Shark Conservancy (SASC)
	Lack of capacity	Lack of scientific capacity to timeously complete assessments and biological analysis		Develop departmental capacity and where necessary outsource shortfalls	DAFF	High	1-2	Capacity issues improved through employment of new scientists in the Large Pelagics and Sharks section

		Representation at shark international scientific working groups and stock assessment working groups of relevant RFMO	Large Pelagic Fishery	Shark expert from Fisheries Research attend relevant meetings	DAFF	Immediate	Ongoing	Increased representation of DAFF researchers at International Scientific Working group meetings, notably IOTC, ICCAT and CCSBT
	Lack of funding	Funding for shark fisheries directed research and management is therefore limited		Explore funding opportunities from International agencies.	DAFF	Medium	2-3	Participation in large scale research programmes through RFMOs
Compliance	Lack of enforcement	Finning of pelagic sharks Inability to identify shark species Recreational sale of commercially valuable shark species Exceeding recreational bag limits Interpretation and knowledge of	All Fisheries	Develop of a monitoring and enforcement strategy	DAFF: compliance with input from research and management	High	1-2	Identification guides developed that includes legislation and permit conditions for each of the 100 species impacted by fisheries

		permit conditions pertaining to sharks						
Regulatory Tools	Inadequate regulatory reference to sharks	Shark fishing competitions are not regulated adequately Fisheries specific permit conditions pertaining to sharks are not informed by overarching regulatory frameworks	All Fisheries	Review and develop regulatory tools	Legal with input from Research and Management	Immediate	1	No progress due to attrition of staff within DAFF, scarcity of skilled resource managers and lack of assessments.

The background of the page features a large, semi-transparent watermark of the South African coat of arms. It depicts a central figure holding a bow and arrow, with a rising sun above and two birds on either side. The figure is set against a shield with a geometric pattern. The entire emblem is encircled by a green band with the motto '!KE E. /XARRA /XE' written in white.

SECTION B

Permit Conditions: Large Pelagic Longline Fishery

Fishing Season: 2019/2020

DATE OF APPROVAL: 14 February 2020



agriculture, forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

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1. APPLICABLE ACTS, POLICIES AND DELEGATIONS

1.1 This permit is issued subject to the provisions and regulations of the following laws but not limited to:

- (a) The Marine Living Resources Act, 1998 (Act No. 18 of 1998) ("the MLRA") and the Regulations promulgated thereunder;
- (b) The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the Regulations promulgated thereunder;
- (c) The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) and the Regulations promulgated thereunder;
- (d) The National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPA) and the Regulations promulgated thereunder;
- (e) The Sea Birds and Seals Protection Act, 1973 (Act No. 46 of 1973) (SBSPA) and the Regulations promulgated thereunder;
- (f) Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) (ICMA) and the Regulations promulgated thereunder;
- (g) The International Convention for the Prevention of Pollution from Ships Act, 1986 (Act No. 2 of 1986) (ICPPSA) and the Regulations promulgated thereunder;
- (h) The Fire Arms Control Act, 2000 (Act No. 60 of 2000) (FACA) and the Regulations promulgated thereunder;
- (i) South African Maritime Safety Authority Act, 1998 (Act No. 5 of 1998) (SAMSA) and the Regulations promulgated thereunder;

- (j) The Animals Protection Act, 1962 (Act No. 71 of 1962) (APA) and the Regulations promulgated thereunder;
- (k) The Standards Act, 2008 (Act No. 8 of 2008) (SA) and the Regulations promulgated thereunder;
- (l) The National Regulator for Compulsory Specifications Act, 2008 (Act No. 5 of 2008) (NRCSA) and the Regulations promulgated thereunder;
- (m) National Ports Authority Act, 2005 (Act No. 12 of 2005) (NPA) and the Regulations promulgated thereunder;
- (n) The Merchant shipping (Act, Act 57 of 1951) and the Regulations promulgated thereunder;
- (o) The Companies Act, 2008 (Act No. 71 of 2008) (CA) and the Regulations promulgated thereunder; and
- (p) The Conservation Measures and Resolutions **(ANNEXURE 8)** adopted by the:
 - i. Commission for the Conservation of Southern Bluefin Tuna (CCSBT);
 - ii. Indian Ocean Tuna Commission (IOTC); and
 - iii. International Commission for the Conservation of Atlantic Tunas (ICCAT).

1.2 This permit is issued subject to the further provisions of the –

- (a) General Policy on the Allocation and Management of Long-Term Commercial Fishing Rights, 2013 (currently under review);
- (b) Policy on the Allocation and Management of Commercial Fishing Rights in the Large Pelagic Longline Fishery: 2015);
- (c) Large Pelagic Longline Fisheries Management Plan (currently being developed); and
- (d) Policy for the Transfer of Commercial Fishing Rights (currently under review).

1.3 The Directors: **Inshore Fisheries Management** (D: IFM) and **Offshore and High Seas Fisheries Management** (D: OHSFM) shall be entitled to amend these permit conditions after consultation with the relevant stakeholders.

1.4 Any reference to the Permit Holder in these permit conditions includes the entity or person in whose name the right is allocated to ("the Rights Holder") by the Minister or the delegated authority.

1.5 Any reference to the Department in these permit conditions means the Department of Agriculture, Forestry and Fisheries.

2. VALIDITY OF PERMIT

2.1 This permit shall be valid for the period indicated in Section A ("the permit").

2.2 This permit shall automatically expire and be invalid if one or more of the following occur:

- (a) the right is cancelled or revoked in terms of Section 28 of the MLRA;
- (b) the quantum allocated to the Permit Holder is caught;
- (c) the fishing season is terminated or ends; and
- (d) the permit is revoked, cancelled or suspended in terms of section 28 of the MLRA.

3. FISHING AREAS

3.1 The permit is valid in South African waters (excluding tidal lagoons, tidal rivers and estuaries) and may be used on the high seas in conjunction with a high seas vessel license.

3.2 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 any Marine Protected Area.

- 3.3 Fishing will be permitted in the Atlantic and Indian Ocean during the same fishing trip (West and East of 20° East longitude), provided that prior notification of movement is sent via email to the Department's VMS Office (daffops@daff.gov.za) and lpmm@daff.gov.za, Attn: Senior Administration Officer (SAO), Assistant and Deputy Directors: Pelagic and High Seas Fisheries Management.
- 3.4 Fishing in other marine areas controlled by the South African National Parks, is subject to regulations, promulgated under the National Parks Act, 1976 (Act No. 57 of 1976) as amended.
- 3.5 No fishing is permitted in the EEZ of other countries.

4. NOTIFICATIONS

- 4.1 The Permit Holder must inform the local Fishery Control Office / Fisheries Management's Fishery Control Officers (FCOs) in KwaZulu-Natal (Table 1) in writing by fax or if available via e-mail at least 24 hours prior to the estimated time of arrival ("ETA") unless prior arrangements have been made with the relevant Fishery Control Office. The prior notification should indicate the nature of the port call, i.e. if the vessel intends to transship, discharge, bunker, repair, crew change etc, and whether the vessel has under-sized fish on board.
- 4.2 At least 2 (two) hours prior to berthing the Permit Holder shall confirm berthing details to Department as per the contact details in (Table 1).
- 4.3 Discharging shall only take place in the presence of a FCO or Monitor. Discharging after hours or on weekends and public holidays shall be communicated to the relevant offices (see 4.1) at least 24 hours prior to arrival of the vessel and during office hours if discharge is to take place on a weekend or public holiday unless prior arrangements have been made with the relevant Fishery Control Office.

Table 1: Designated landing sites for the landing of catches made by Large Pelagic Longline Right holders.

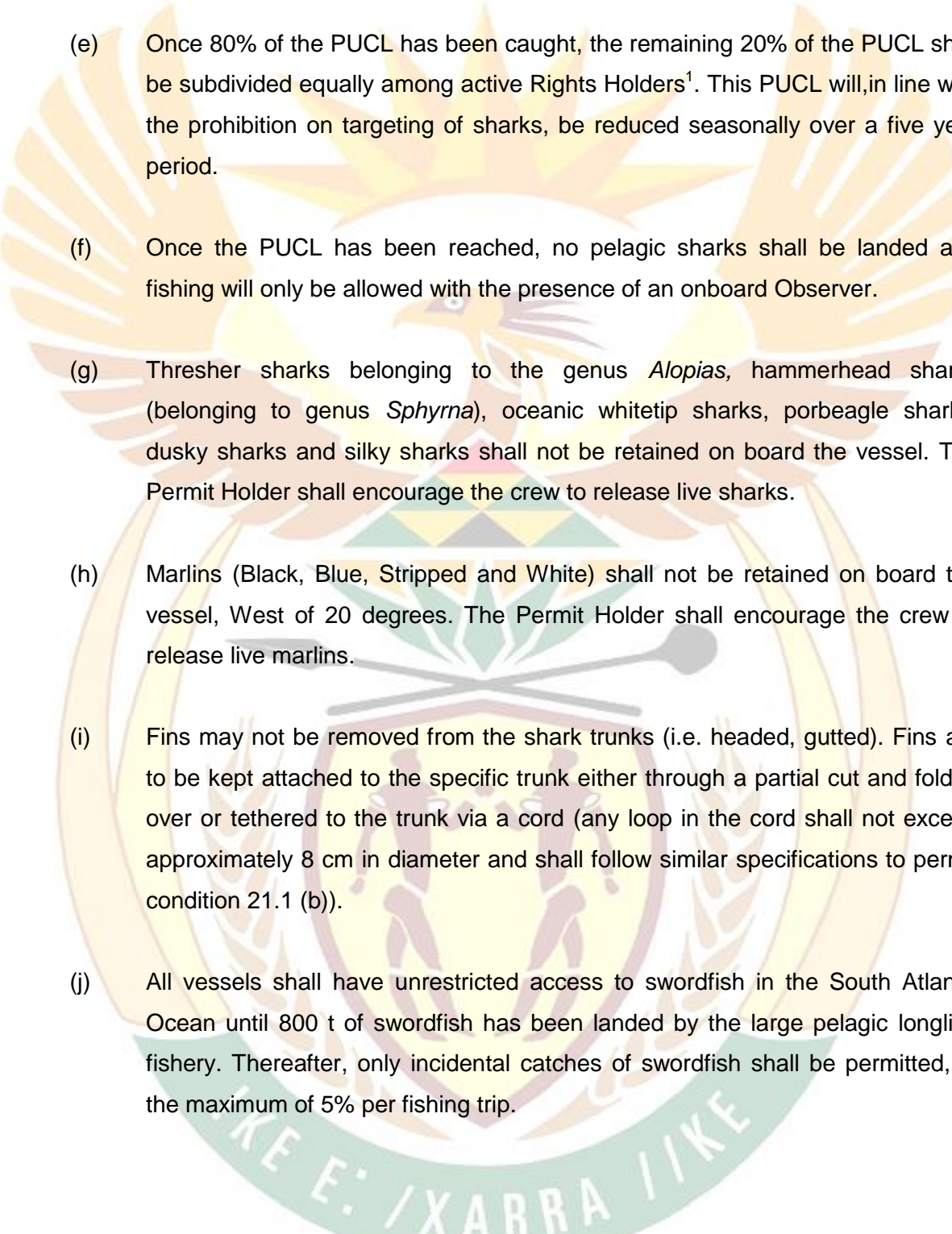
LANDING SITES: Large Pelagic Longline		
Designated Landing Sites	Addresses for FCO Offices	RESPONSIBLE OFFICER
Cape Town Harbour	Cape Town Harbour Office Foretrust Building Cape Town	Mr M Mggomo Tel: 021 402 3428/ 3361 Fax: 021 402 3113/ 3367 Cell: Email: MatsoloM@daff.gov.za
Hout Bay Harbour	Hout Bay Harbour Office Hout Bay	Mr L. Finnish Tel: 021 790 1440/ 2530 Fax: 021 790 2808 Cell: 083 443 5462 Email: LucasF@daff.gov.za
Gansbaai Harbour	Gansbaai Harbour Office	Mr. P.J Mersna Tel: 028 384 0321 Fax: 028 384 1546 Cell: 082 645 4795 Email: PetrusME@daff.gov.za
Hermanus Harbour	Hermanus Harbour Office	Mr M Grootboom Tel: 028 312 2609 Fax: 028 313 0502 Cell: 071 581 1581 Email: MzwandileGR@daff.gov.za
Mossel Bay Harbour	Aqua Plaza Mars Street Office 104 Mossel Bay	Ms T.G. Fono Tel: 044 691 2939 Fax: 044 691 2939 Cell: 083 957 7148 Email: ThisiweF@daff.gov.za
Saldanha Bay Harbour	Saldanha Bay Harbour President Street Saldanha	Mr. W. Theron Tel: 022 714 1710 Fax: 022 714 3997 Cell: 082 771 9910 Email: WadeT@daff.gov.za
Durban Harbour: Office still needs to be established. In the meantime, use Mzamba Office	Port Edward	Thanduxolo Ntshangase / Dino Govender Tel: 039 3111240/30 Cell: 0794449951 / 072 231 6070 Email: ThanduxoloN@daff.gov.za or Email: DinoG@daff.gov.za
Port Elizabeth Harbour	Port Elizabeth Harbour Office 21 Stanley Street	Mr. D. W. Mostert Tel: 041 586 4051 Fax: 041 585 0385 Cell: 082 771 8906 Email: DennisM@daff.gov.za
Port Nolloth Harbour	Port Nolloth Harbour Office Beach Road Way Port Nolloth	Ms K. Burger Tel: 022 714 1710 Fax: 027 851 8053 Cell: Email:
St Helena Bay Harbour	Eclonia Street Sandy Point Harbour St Helena Bay	Mr. Willem Basson Tel: 022 783 1118 Fax: Cell: 078 714 7422 Email: WillemB@daff.gov.za

5. EFFORT LIMITATIONS AND GEAR RESTRICTIONS

- 5.1 The Permit Holder shall utilize pelagic longline fishing gear only.
- 5.2 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.
- 5.3 The use of stainless steel hooks is prohibited.
- 5.4 The use of shocking devices is not permitted unless an onboard observer is present to verify that only targeted and secondary retained species were shocked.
- 5.5 The use of wire traces is prohibited.

6. CATCH CONTROLS AND LIMITATIONS

- 6.1 This permit shall only be used for commercial longline fishing for tuna and tuna like species with the following applicable management measures:
- (a) Billfishes of the genera Makaira, Tetrapturus, Istiophorus are designated as secondary species.
 - (b) Targeting of sharks is prohibited. Targeting is defined as landing 50% or more sharks per fishing season in terms of landed total mass.
 - (c) The Permit Holder is restricted to landings of less than 60% sharks in terms of landed total mass in any quarter. If quarterly landings exceed 60%, the Permit Holder will be required to have 100% observer coverage for the remainder of the fishing season.

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- (d) A Precautionary Upper Catch Limit (PUCL) applies to the total landed shark mass.
 - (e) Once 80% of the PUCL has been caught, the remaining 20% of the PUCL shall be subdivided equally among active Rights Holders¹. This PUCL will, in line with the prohibition on targeting of sharks, be reduced seasonally over a five year period.
 - (f) Once the PUCL has been reached, no pelagic sharks shall be landed and fishing will only be allowed with the presence of an onboard Observer.
 - (g) Thresher sharks belonging to the genus *Alopias*, hammerhead sharks (belonging to genus *Sphyrna*), oceanic whitetip sharks, porbeagle sharks, dusky sharks and silky sharks shall not be retained on board the vessel. The Permit Holder shall encourage the crew to release live sharks.
 - (h) Marlins (Black, Blue, Stripped and White) shall not be retained on board the vessel, West of 20 degrees. The Permit Holder shall encourage the crew to release live marlins.
 - (i) Fins may not be removed from the shark trunks (i.e. headed, gutted). Fins are to be kept attached to the specific trunk either through a partial cut and folded over or tethered to the trunk via a cord (any loop in the cord shall not exceed approximately 8 cm in diameter and shall follow similar specifications to permit condition 21.1 (b)).
 - (j) All vessels shall have unrestricted access to swordfish in the South Atlantic Ocean until 800 t of swordfish has been landed by the large pelagic longline fishery. Thereafter, only incidental catches of swordfish shall be permitted, to the maximum of 5% per fishing trip.

¹ Active Rights Holders are defined as Right Holders that have uplifted their 2020/21 Large Pelagic Longline Catch Permit and have submitted catch statistics reflecting at least one gear set on or before 30 June 2020.

- (k) No hake (*Merluccius* spp.), kingklip (*Genypterus capensis*), wreckfish (*Polyprion* spp.) or Patagonian toothfish (*Dissostichus* spp.) shall be caught or retained on board.
- (l) No discarding of dead tuna, swordfish or designated secondary species at sea shall be permitted and only live fish may be returned to sea, except in certain specified cases where species are prohibited from being landed or retained on board (e.g. 6.1.(f) and 6.2.(b)).
- (m) If the undersize fish or incidentally caught, unwanted or prohibited fish or shark is alive when retrieving the longline, it should be returned to the sea alive.
- (n) Discards as well as release data and details regarding the release condition must be filled in the logbooks.
- (o) The FCO must be notified of excess by-catch 24 hrs prior to the vessel berthing. Excess by-catch must be handed over to the FCO upon return of vessel to port.

6.2 The following regulatory measures will apply to the harvesting of Southern Bluefin Tuna (SBT):

- (a) SBT allocated in this sector shall be equally divided to all the Rights Holders. It should be noted that the Minister will be establishing a development plan and has identified 32 appellants which may fall within the developmental plan, accordingly and depending on the finalisation of the aforesaid, the individual Right holder catch limits shall be amended.
- (b) Any additional SBT shall not be retained on board unless prior approval has been granted for a transfer of SBT quota from another active Large Pelagic Longline Rights Holder (as defined above).
- (c) Quotas or part thereof of SBT may be transferable to other active Large Pelagic Longline Rights Holders (as defined above), subject to both parties providing

consent to the Department for approval (Attn: SAO and Deputy Director: Pelagic & High Seas Fisheries Management, lpmm@daff.gov.za).

- (d) As of the 30 June 2020, quotas of non-active Rights Holders shall be equally divided among active Large Pelagic Longline Rights Holders (as defined above).
- (e) All SBT retained on board the vessel shall be tagged with a unique numbered tag provided by Fisheries Management prior to the fish being landed (only fish tags that reference the current fishing season shall be used e.g. ZA-19 for the 2019/2020 fishing season). The tag number, Fork Length (FL in cm), weight (kg) and trip details shall be recorded on the SBT tag form prior to the vessel landing. When a SBT catch document form is applied for the tag form shall be e-mailed together with the export details (Attn: SAC, Assistant Director: Pelagic & High Seas Fisheries Management, lpmm@daff.gov.za) prior to the vessel landing.
- 6.3 The catching of SBT (*Thunnus maccoyii*), with a mass of less than 6.4 kg, and Swordfish (*Xiphias gladius*) with a Lower Jaw Fork Length (LJFL) of less than 119 cm, Pectoral Fork Length (PFL) of less than 87cm or a Cleithrum to Keel (CK) measurement of less than 63 cm, and marlins less than 120cm LJFL or less than 90 cm PFL is prohibited. Refer to **Annexure 6** below for images of length types. 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 FCO must be notified of the number of undersize fish 24 (twenty four) hours prior to the vessel berthing.
- 6.4 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 pelagic longline gear is on board, irrespective of what other fishing permits are held.
- 6.5 Permit Holders will be required to participate in tagging and biological sampling programmes. This implies that Permit Holders shall allow DAFF personnel and

Observers on board to tag and release, or sample large pelagic species, which are in suitable condition. No more than 5 tuna and swordfish specimens above the minimum size limit, where applicable, in total, may be tagged or sampled per fishing trip, unless otherwise permitted by the Permit Holder. Permit Holders are also encouraged to allow for the tag and release or sampling of as many sharks and other billfish, which are in suitable condition.

- 6.6 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: Deputy Director: Large Pelagics & High Seas Fisheries Management and Large Pelagics Scientist, Table 2) upon discharging. Such returns may be eligible for reward.
- 6.7 No vessel registered as a commercial pelagic longline vessel shall be used for recreational charters, i.e. only *bona fide* commercial South African fishers, who are in possession of valid SAMSA accredited pre-sea Personal Survival Techniques certificate, are allowed to make up the crew compliment.

7. HANDLING OF OVER/UNDER CATCHES AND PROHIBITED SPECIES

- 7.1 Failure to comply with catch limitations shall result in criminal proceedings being instituted against the Permit Holder which may be in the form of a fine being issued. Furthermore the Department may institute section 28 proceedings in terms of the MLRA against the Permit Holder for failing to comply with the permit conditions.

8. VESSEL SPECIFICATIONS

- 8.1 The letters (**TL** or **SL**) must be displayed on the vessel next to the area code.
- 8.2 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.

- 8.3 Radio call signs must be clearly visible and displayed as stipulated in terms of regulation 78 of the Regulations promulgated under the Act.

9. VESSEL MONITORING SYSTEM (VMS)

- 9.1 The Permit Holder's nominated fishing vessel shall be fitted with a functional vessel monitoring system ("VMS"), which is approved by the Chief Director: Monitoring, Control and Surveillance (CD: MCS).

- 9.2 The Permit Holder / Vessel Owner / Skipper shall ensure that the VMS is fully operational and that the VMS continues to transmit to the Department's Operations room. The Permit Holder shall notify Departmental Operations Room prior to sailing as per clause 9.4 or submit a list of vessels sailing for the forthcoming week to Operations Room by fax **021 425 6497** or email daffops@daff.gov.za by no later than the Thursday of the week prior.

- 9.3 Whilst at sea, the VMS shall report continuously and uninterruptedly to the Operations Room. Should the power supply to the VMS be interrupted or the equipment not be operational for any reason whatsoever and the problem persists, the vessel shall return to port within 24 (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 position on email daffops@daff.gov.za or faxed to **021 425 6497**, and shall include the following: date; time (UTC); latitude and longitude degrees minutes and decimal minutes e.g. 36° 32.786' S; course (true direction), and; speed (knots);
- (b) Notice of estimated time of arrival;

- (c) Notice of port of arrival;
- (d) Inspection of the catch by a Fishery Control Officer (FCO)/Monitor; and
- (e) A copy of the vessel track for the voyage for verification purposes.

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

9.4 Vessels fitted with Inmarsat C VMS units, wishing to switch off their VMS units whilst alongside in port, shall do so only after a minimum of six (6) hours after berthing, and switch on their units a minimum of 6 (six) hours prior to their estimated time of departure from port.

9.5 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 right 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 Operations Room Centre, fax number **021 425 6497** or emailed to daffops@daff.gov.za

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 right.

For each fishing trip undertaken during the right 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** or email

daffops@daff.gov.za that they are proceeding to sea, and upon arrival back in port or launching site for the duration of the right.

- 9.6 Should the Permit Holder/ Rights Holder/ Vessel Owner/ Skipper not adhere to the provisions of the above, the Department may detain the vessel once in port and implement proceedings under Section 28 of the MLRA.

10. LANDING OF FISH

- 10.1 The Permit Holder must ensure that all fish is discharged from the vessel in accordance with the reasonable instructions of the FCO.
- 10.2 All the fish caught under in terms of this permit, shall only be landed in South Africa.
- 10.3 A Landing Declaration (Annexure 7 and electronic version available upon request from Large Pelagics Marine Research Technician, Table 2) is to be completed after every discharge and certified by a FCO or a DAFF appointed Monitor. The Landing Declaration is to be submitted by the Right's Holder along with the monthly catch statistics forms (Clause 11.2).
- 10.4 All catches made by a foreign joint venture vessel shall be discharged / transhipped prior to the termination of fishing by the foreign vessel. (All catches made by a foreign joint venture vessel on the flag state's permit shall be discharged prior to fishing on this permit unless the fish can be placed in a separate hold or net, which is sealed by a FCO).
- 10.5 Any corrections made on a landing declaration form has to be countersigned by the FCO/Monitor in order for the form to be valid (No correction fluid such as Tippex shall be used to correct mistakes).
- 10.6 The relevant CCSBT, ICCAT or IOTC catch statistical documents must accompany all SBT, bigeye tuna and swordfish consignment to be exported / transhipped.

- 10.7 In addition, an export permit and an EU catch document (if product is exported to Europe) is required prior to the export of any fish products. The relevant statistical / catch documents are invalid, unless authorised by a duly appointed Fisheries Management officials (contact SAO and Assistant Director: Pelagic & High Seas Fisheries Management for further information). A Landing Declaration has to accompany all catch statistical documents during authorisation.
- 10.8 The Permit Holder shall keep a record of all fish landed and sold, and such records shall at all times be available for inspection by a FCO or authorised person.

11. **SUBMISSION OF INFORMATION**

- 11.1 The Permit Holder shall submit to the Department:
- (a) Notification (Rights Holder Information, Attention: Deputy Director: Pelagic and High Seas Fisheries Management, Customer Services Centre, Ground Floor, Foretrust Building, Martin Hammerschlag Way, Foreshore, Cape Town or Private Bag X2, Vlaeberg, 8018) notification of any change of contact details within 30 days of such change by completing the application form available at the Customer Services Centre.
 - (b) Performance statistics as stipulated in paragraph 20.
- 11.2 Catch Statistics:
- (a) A new catch statistics logbook, available at Customer Services Centre upon collection of a permit, is to be utilised every year. A second book can be obtained should the first book be fully utilized.
 - (b) The original catch statistics forms shall remain in the logbook and must be delivered to the Department by the end of each month following the month in which the fish were caught. Delivery methods include:
 - i. Scan in the original and email a copy to pllresearch@daff.gov.za.
 - ii. Hand deliver to the Customer Services Centre (Ground Floor, Foretrust Building, Martin Hammerschlag Way). Certification and receipt of delivery will be confirmed by the copy of the catch statistics in the catch statistics

book being stamped, dated and signed by an official of the Branch: Fisheries Management.

- iii. Complete an electronic version of the catch statistics form and email to pllresearch@daff.gov.za. The electronic version of the catch statistics form is available upon request from pllresearch@daff.gov.za.
- iv. Post to DAFF's Foretrust Building. Address in Clause 15.1. Attn: Large Pelagics Marine Research Technician.

Delivery methods i and iii require that the original catch statistics forms only be submitted for Attn: Marine Research Technician by the 31st January 2019, or when requesting a new log book, or when the originals are requested by the Department. Catch statistics logbook forms and notifications have to be submitted for the duration of the active permit.

- (c) Any errors in recording information in the catch statistics book shall only be rectified using a pen to strike out the incorrect information. (No correction fluid such as Tippex shall be used).
- (d) Actual weights (offload weights) of all fish landed have to be reported in the catch statistics logbook.
- (e) The Department will not issue the 2019/20 catch permit to the Permit Holder if the required catch statistics data are not provided or are incomplete.
- (f) Species identification guides for target and bycatch species are available online; contact the Large Pelagics Scientist (Table 2) for this link.

11.3 Landing catch summary

- (a) Permit Holders fishing for SBT shall e-mail regular trip summaries on an MS 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 SAC, Assistant and Deputy Directors: Pelagic & High Seas Fisheries Management, lpmm@daff.gov.za.

11.4 Socio-Economic Information

- (a) The Permit Holder shall provide, on request, any economic, socio-economic or financial information in the format as requested by the Department.

12. **RECORD KEEPING**

- 12.1 The Permit Holder shall store at its registered place of business the original permit(s) issued to it over the duration of the rights period. The Permit Holder shall at all times have available a true certified copy of this permit(s) on board the vessel utilised to harvest Large Pelagic species.
- 12.2 The Permit Holder shall keep the duplicate copies of the catch statistics logbook forms for a minimum period of sixty (60) months.

13. **LEVIES**

- 13.1 The Permit Holder shall submit a levy declaration form by the last working day of the month following the harvesting periods stated below in paragraph 13.3.
- 13.2 The Permit Holder must pay the prescribed levies for the fish landed, according to the weight declared on the Landing Declaration (clause 10.3) for species as stipulated in the Government Gazette No. 33518, published on 10 September 2010.
- 13.3 All levies and fees shall be paid monthly in arrears and by the last working day of the month following the harvesting period stated below:
- (a) 1 March 2020 to 28 February 2021.
- 13.4 Non-compliance will result in a 10% penalty being charged on the late submission of the prescribed levy declaration form.
- 13.5 The Permit Holder must submit together with all levy payments a levy declaration form.

- 13.6 The Department may refuse to issue fishing permits to Right Holders who have any levies or fees outstanding for a period in excess of 30 days, or may suspend the Right Holder's fishing permit until all outstanding levies have been paid to the Department.
- 13.7 A "NIL" return must be submitted for every month where no fish has been landed.
- 13.8 All levy declarations forms shall be submitted to the Directorate: Revenue Management by either of the following:
- (a) Facsimile – 086 613 6256;
 - (b) Electronic mail – revenue@daff.gov.za
 - (c) Postage – Private Bag x2, Vlaeberg, 8018
 - (d) By hand – Department of Agriculture, Forestry and Fisheries, Branch: Fisheries Management, Customer Service Centre, Ground Floor, Martin Hammerschlag Way, Foretrust Building, Foreshore, 8001.
 - (e) Enquiries can be directed to Assistant Director or Chief Debtors Clerk: Revenue Management via telephone on numbers +2721 402 3016/3209.
- 13.9 The information required in condition 13.5 shall be submitted when paying levies to the cashier at the Department of Agriculture, Forestry and Fisheries, Branch: Fisheries Management, Branch: Fisheries Management, Customer Service Centre, Ground Floor, Foretrust Building, Martin Hammerschlag Way, Foreshore, Cape Town. Alternatively, payment can be made via direct deposit at any First National Bank (FNB) branch or Electronic Funds Transfer (EFT) to the following banking details:
- Branch code – 204109**
- Account name – Marine Living Resources Fund**
- Account number – 62123256382**
- Deposit reference -**
- The Permit Holder must use its Customer (Party) Number as a deposit reference.**
- The Permit Holder must ensure that proof of the payment together with a levy declaration is faxed to 086 613 6256 or email to revenue@daff.gov.za.**

13.10 In light of the accession to the CCSBT and IOTC, and the increase in country allocations for southern Bluefin tuna and southern Atlantic albacore tuna, the Department will engage Rights Holders regarding a proposed increase in levies.

14. VIOLATIONS

14.1 A breach of the provisions of the MLRA or these permit conditions by the Permit Holder, or its employees (whether permanent, full-time or part-time), its contractors, agents or advisers and the skipper of the vessel, may result in the initiation of legal proceedings (which may include section 28 of the MLRA proceedings and/or criminal proceedings).

14.2 A breach referred in paragraph 14.1 includes, but is not limited to:

- (a) failure to provide information to which the Department is entitled to or to submit information which is not true or complete; or
- (b) failure to effectively utilise the permit.
- (c) landing, selling, receiving or processing of any fish taken by any means in contravention of the MLRA.

14.3 No transshipment of fish at sea is permitted. Transshipment in port shall only be permitted subject to the application and issuance of a transshipment permit by the Department and 100% complete monitoring of transshipment by the FCOs.

14.4 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”) limits allocated to it under Section A. Fishing over these limits will result in the initiation of legal proceedings in terms of section 28 of the MLRA.

14.5 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 and/or not put such waste into dedicated waste bins at the landing site, 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.

- 14.6 Any contravention of the provisions of the MLRA shall immediately be reported telephonically to the Customer Service Centre at **086 000 3474** and thereafter shall be faxed to **(021) 402 3663**, Attention: The Chief Director: Monitoring, Control and Surveillance (MCS).
- 14.7 The Department may refuse to issue a subsequent permit should the conditions stipulated in this permit not be adhered to.

15. CONSULTATION AND COMMUNICATION

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

Table 2: Contact details of Departmental Officials (Marine Resource Management; Fisheries, Research and Development; and Revenue Management)

By mail			By hand		
Subject: Customer Services Centre, Private Bag X2, Vlaeberg, 8018 Attn: Insert below contact			Subject: Customer Services Centre, Ground Floor, Foretrust Building, Martin Hammerschlag Way, Foreshore, Cape Town Attn: Insert below contact		
Section	Designation	Name	Email	Tel	Fax
Marine and Resource Management	Deputy Director: Pelagic and High Seas Fisheries Management (PHSFM)	Qayiso Mketsu	QayisoMK@daff.gov.za	021 402 3048	021 402 3622021 402 3618
	Assistant Director: PHSFM	Johan De Goede	JohannesDG@daff.gov.za	021 402 3683	086 776 7038 or
	Senior Administration Officer: PHSFM	Aphiwe Nonkeneza	AphiweN@daff.gov.za	021 402 3026	0867307335
Fisheries Research and Development	Large Pelagics Scientist	Henning Winker	HenningW@daff.gov.za	021 402 3120/3017	021 402 3034
	Chair: Large Pelagics and Sharks Scientific Working Group (LPSSWG)	Sven Kerwath	SvenK@daff.gov.za	021 402 3017	
	Large Pelagics Marine Research Technician	Melissa Meyer	MelissaG@daff.gov.za	021 402 3627	
Revenue Management	Assistant Director: Revenue Management	Siyasanga Qaziyana	SiyasangaQ@daff.gov.za	021 402 3209	086 239 8448
	Chief Debtors Clerk: Revenue Management	Sarah Baartman	SarahB@daff.gov.za	021 402 3016	

15.2 The Department will prefer to consult and communicate with the Recognised Industrial Bodies for the sector, which are currently the South African Tuna Association (SATA), the South African Tuna Longline Association (SATLA), the Shark Longline Association (SLA), the Eastern Cape Pelagic Association, the National Black Rights Holders Association and the Large Pelagic SMME Association.

15.3 Communication regarding all permits and licences shall be addressed to the Department's Customer Service Centre, Ground Floor, Foretrust Building, Martin Hammerschlag Way, Foreshore, Cape Town. The Customer Service Centre may be contacted on **086 000 3474**.

15.4 The Chief Director: Marine Resources Management will consult with Permit Holders when conducting performance reviews to determine further criteria against which Permit Holders will be measured.

15.5 The Department (Attention: SAO, Assistant and Deputy Directors: Pelagic & High Seas Fisheries Management) shall be informed prior to the termination of fishing on this permit. In so doing the original permit and licenses shall be returned to the Department.

16. OBSERVER PROGRAMME

16.1 The Department shall require each Permit Holder to carry one or more Scientific observers on board its vessel on request (72 hours), a minimum of one per quarter 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 remain in port and may result in the initiation of proceedings under section 28 of the MLRA. Annual observer coverage per vessel is required to be spatially representative of annual fishing effort and needs to fulfill RFMO specific requirements. If coverage of observed trips is not temporally and spatially representative of effort, the Department shall require vessels to carry scientific observers on board additional trips.

16.2 The Permit Holder shall bear the costs of the Scientific Observer deployment. It should however be noted that the Department is in the process of recruiting a Service Provider to render services in respect of the Observer Programme and once the Service Provider is appointed, the Department will bear the costs of deploying Observers.

16.3 Observer companies need to be accredited and provide the Observer service in line with the Departmental requirements. In order to be listed as an accredited scientific

observer company a company must employ on its register of available observers individuals who have been recognised by Regional Fisheries Management Organisations (RFMOs) and subsequently been allocated a unique RFMO observer ID number. Those observers will have received RFMO-accredited training with respect to the roles and responsibilities of scientific observers on-board commercial fishing vessels.

- 16.4 RFMO observer IDs need to be provided to the department in order for the trip to be recognised as an observed trip. Rights holders are responsible to ensure that the department receives all relevant data and information pertaining to observed trips no later than 15 days after the trip has ended.
- 16.5 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.
- 16.6 The Observer shall be fully accommodated on board the vessel and provided with food and facilities of a level accorded to officers.
- 16.7 The Observer shall be responsible to verify fisheries data or as otherwise directed by the Department. The information collected by the observer shall be standardised to the departments' requirements. The Observer shall monitor all fishing operations and shall record any transgressions of the MLRA.
- 16.8 Should the Department reasonably believe that an Observer is being prevented from carrying out his/her obligations in any way or threatened in any way while on board, the Department may implement proceedings under section 28 of the MLRA.
- 16.9 The Permit Holder shall, when requested, allow for land-based sampling of catches for scientific purposes by persons authorized by the Department.
- 16.10 Observers on board shall bring back whole specimens of all seabirds and turtles killed during longline fishing operations and communicate

17. PROCESSING AND SALE OF FISH

17.1 The Permit Holder (or vessel owning company where catch agreements) shall keep at its registered place of business records of invoices issued for all fish sold for a maximum period of 60 months. The invoice shall reflect the name of the Permit Holder (or vessel owning company where there is a catch agreement), the name and address of the buyer, the date of delivery, the quantity of fish species sold by total weight and number.

18. TRANSFER OF FISHING RIGHTS

18.1 The Permit Holder may only transfer the long-term commercial fishing right allocated to it in terms of section 21 of the MLRA read together with the Policy for the Transfer of Commercial Fishing Rights (Gazette No 32449).

18.2 Any transfer of shares or sale of shares and/or or membership interest that results in a change in control or ownership of the Permit Holder must be approved by the Department in terms of section 21.

18.3 Failing to comply with 18.1 or 18.2 may lead to the initiation of further legal proceedings including but not limited to proceedings in terms of section 28 of the MLRA.

19. TRANSPORTATION OF FISH

19.1 A Large Pelagic Longline transport permit is required from Rights Holders if fish is being transported from landing point to fish processing facility outside of the harbour.

19.2 In the event that an alternative truck to that which is referred to on the transport permit is used for the transportation of the fish, the Right holder shall note the registration details of the truck in the comments section of the landing declaration and the FCO shall verify these truck registration details.

19.3 The Fish Processing Establishment receiving the fish shall verify that the details of the truck and the details on the landing declaration are the same.

20. FISHING PERFORMANCE MEASURING

20.1 The Permit Holder shall be obliged to provide the Department with information required to carry out a performance measuring exercise, which information may include but not limited to:

- (a) Data regarding transformation levels;
- (b) Sustainable fishing practices;
- (c) Data regarding investments made in the fishery and jobs created and sustained; and
- (d) Data regarding compliance initiatives.

21. MARINE PROTECTED AREAS

22. ECOSYSTEM EFFECTS OF FISHING

22.1 Plastic Pollution Interaction With Marine Animals

- a) 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. Marine animals subsequently become entangled in these strops resulting in mutilation and potential mortality of these animals (seals, birds, sharks, turtles). In order to solve this problem the Permit Holder is to ensure that “strops” used during freezing and discharge is to be constructed according to the specifications as per paragraph 21.2 below.

- b) 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 80mm between knots. (See Figure 1 below for clarity). The minimum stretched length between knots may not exceed the stipulated 80mm. 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.

22.2 By-Catch Mitigation Measures and Release Procedures

- a) When fishing in South Africa's EEZ the start and completion of the line setting shall be conducted at night only; defined by the period between nautical dusk and nautical dawn (Annexure 2).
- b) In addition to night setting, the vessel shall choose between using a bird-scaring line or using line weighting.
- c) If a bird-scaring line is used as the second seabird bycatch mitigation measure, vessels shall have on board an approved bird-scaring line (tori line, see Annexure 3 for details, to be reviewed during the next permit conditions), which must be deployed before setting starts each night and may only be retrieved after setting ends.
- d) If line weighting is used as the second seabird bycatch mitigation measure, the branch lines (snoods) shall be properly weighted; 40 g or greater attached within 0.5 m of the hook (to minimize gear loss from shark bite-offs), or 60 g or greater attached within 1 m of the hook, or 80 g or greater attached within 2 m of the hook. The gear shall be configured with weights attached for port inspections if this measure is chosen by the vessel.
- e) Vessels may use 'hook shielding devices' (as approved by the Agreement on the Conservation of Albatross and Petrels), which in 2018 are limited to Smart Tuna Hooks® and Hookpods®. If either method is chosen, each hook set shall have the chosen device attached. If vessels choose to use the Smart Tuna

Hook shielding devices, the Department may request evidence that the Rights Holder or Vessel Operator has purchased sufficient units to be used on all sets for each trip. If vessels choose to use the Hookpod shielding device they shall keep the devices attached correctly to the gear at all times, for each trip where this system is in use. In addition, vessels shall simultaneously use one of the measures specified in permit condition 21.2 a or 21.2 c.

- f) Vessels fishing on the high seas may set during daylight hours subject to the following conditions: 1) the vessel shall have an observer on board; 2) the vessel shall deploy two tori lines following the specifications of permit condition 21.2 (b) and Annex 3, and; 3) the branch lines shall be weighted as specified in permit condition 21.2 (d). The provision granted here for day setting may be revoked at any time should the Department consider that the seabird by-catch is too high.
- g) 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 has been reached. The Permit holder is required to immediately contact the Department (Attention: Assistant and Deputy Directors: Pelagic & High Seas Fisheries Management). The Department will review the Permit Holder's compliance with permit conditions 21.2 (a & b) using the seabird mitigation checklist (Annexure 5) for vessels fishing in the EEZ and (c & d) for vessels fishing in the high seas. If in the Department's view there has been satisfactory compliance with permit conditions 21.2 (a-d) then the vessel will be authorized to continue fishing with the following additional mitigation measures: 1) for vessels fishing in the EEZ all three mitigation measures described in 21.2 a-d shall be used for all sets and 2) for vessels fishing in the high seas no further fishing will be permitted in 3 days around full moon.
- h) 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 Assistant and Deputy Directors: Pelagic & High Seas Fisheries Management). The Department will review the Permit Holder's compliance with permit conditions 21.2 (a-d) and the additional

mitigation measure 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 to make regular e-mail contact with the Department every three days and provide information on how the mitigation measures are deployed in order for the Department to assist in determining the nature of the high bird mortality rate. Once the seabird mitigation measures have been resolved the vessel will not be required to make regular contact with the Department. If deemed necessary the Department may also require that a seabird expert instead of a scientific observer be placed on board the vessel to resolve any mitigation challenges. 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.

- i) Provisions in paragraphs 21.2 (i) and (j) may be reviewed.
- j) The onus is on the Permit Holder to provide training to skipper(s)/ officers/ crew on environmentally sustainable fishing practices. The Department also encourages Permit Holders to work closely with WWF, Birdlife SA and other relevant NGOs in this regard.
- k) The Department strongly encourages Permit Holders to conduct independent research to improve by-catch mitigation measures.

22.3 Ecosystem Considerations

- a) The Department will, in consultation with Rights Holders, implement measures to minimise the impact of destructive fishing practices on ecosystems.

- b) 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.
- c) The Permit Holder must take cognisance of sustainable fishing practices and impacts of Large Pelagic Longline operations on the ecosystem. A specific concern is plastic pollution, for an example, the impact of lost “strops” (cords used to hang fish during freezing) .In order to solve this particular 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 21.1 (b) above);
- d) 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 80mm between knots. (See Figure 1 for clarity). The minimum stretched length between knots may not exceed the stipulated 80mm. This design allows the application of the strops as originally used but will ensure that seals and sharks cannot become entangled in the loops. Alternatively, the strops should be cut, so that they do not form a continuous loop.

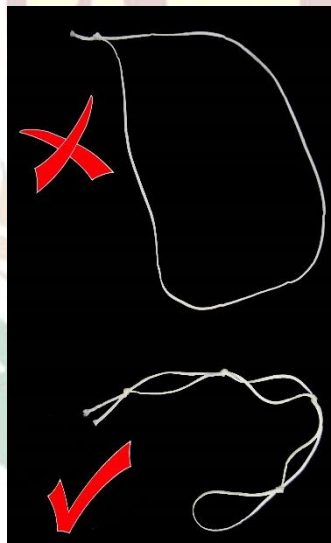


Figure 1. An example of correct “strops” to use to avoid seal entanglement.

22.4 Fisheries Management Areas

- a) The Department intends to declare fisheries management areas in the future.

DIRECTOR: OFFSHORE AND HIGH SEAS FISHERIES MANAGEMENT

DATE: 14 February 2020



Annexure 1

Example of Large Pelagic Catch Summary

Permit Holder	Vessel	Trip No	Trip start date	Trip end date	Albacore in kg	Bigeye in kg	Yellowfin in kg	Bluefin in kg	Swordfish in kg	Billfish in kg	Sharks in kg	Other in kg
Lucky Trading	Swift	1	1/5/2009	13/5/2009	100	1560	3000	0	4500	300	1000	330
Lucky Trading	Swift	2	29/5/2009	10/6/2009	200	3030	1210	75	3500	150	970	100
Lucky Trading	Delta	3	1/8/2009	14/8/2009	900	1900	900	350	4110	230	790	460

* 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	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
20 S	5h37 21h30	5h27 21h20
25 S	5h22 21h45	5h12 21h35
30 S	5h03 22h03	4h53 21h53
35 S	4h41 22h26	4h31 22h16
40 S		

	5 E	10 E
20 S	6h03 21h24	5h53 21h14
25 S	5h52 21h35	5h42 21h25
30 S	5h38 21h48	5h28 21h38
35 S	5h22 22h05	5h12 21h55
40 S		

	5 E	10 E
20 S	6h25 21h00	6h15 20h50
25 S	6h19 21h05	6h09 20h55
30 S	6h11 21h13	6h01 21h03
35 S	6h03 21h21	5h53 21h11
40 S		

	5 E	10 E
20 S	6h40 20h28	6h30 20h18
25 S	6h40 20h27	6h30 20h17
30 S	6h39 20h28	6h29 20h18
35 S	6h39 20h28	6h29 20h18
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										



Annexure 3

BIRD-SCARING LINE

Specifications for bird scaring lines for vessels >35 m total length

Streamer Lines (Also termed a “bird-scaring line or “*tori* line”)

Specifications for construction and Deployment

The line must be a minimum of 150 meters in length and the attachment point of the line at the stern of the vessel must be a minimum of eight (8) meters above the surface of the water. The optimum aerial extent of the line, (the portion of the line that extends from the vessel to the sea surface astern of the vessel) should extend for at least 100 meters.

The construction of the streamer line is divided into four sections. The first three sections of the line should consist of a lightweight cord that is ultra-violet (UV) resistant and have a tensile strength to withstand the tension of the drag of the line and maintain the optimum aerial extent.

Specifications for each section;

Section 1 (From the stern, the first 50 meters)

Attach a minimum of nine (9) single or paired streamers that meet the following minimum specified lengths

- 2 streamers 8 m long
- 2 streamers 7 m long
- 2 streamers 6m long
- 1 streamer 5 m long
- 1 streamer 4 m long
- 1 streamer 3 m long

Commencing with the longest streamer in the range and in order of decreasing length,

- The first streamer must be attached within 10 m from stern,
- The second streamer must be attached not more than 15 m from stern, and
- Subsequent streamers (numbers 3 to 9) shall to be attached at not more than 5 m intervals in order of decreasing length.

Section 2 (51 to 75 meters from the stern of the vessel)

Attach streamers of a minimum of one (1) meter in length at intervals of a minimum of one (1) meter apart.

Section 3 (76 –100 meters from the stern of the vessel)

Attach streamers of a minimum of 50 centimetres in length, at intervals of a minimum of one (1) meter apart.

Section 4 (101 to 150 meters, in-water section)

Attach groups or bundles of streamers spaced approximately 3-5 meters apart. These are designed to create drag and tension the streamer-line as well as deterring birds from landing on the sea surface and diving down to the baits.

Bird-Scaring Streamer / (Tori) Line deployment

The line must be deployed on the side to which the baited hooks are deployed. If baits are cast to both port and starboard during a set, streamer-lines must be deployed on both sides. The streamer line must also be deployed prior to the first baited hook entering the water. An additional streamer line that meets the required specifications should be kept on board and ready for immediate deployment if required.

It is highly recommended that two streamer lines are deployed at all times, one on either side of the mainline being set.

Streamer Line Recommendations (What makes an effective 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, at least 8 meters above sea level. On small vessels where a high attachment point is not accessible, an outrigger pole can be mounted to provide this height.

Increasing the drag or tension on the line also increases the aerial extent of the line and its resultant effectiveness. Extending the length of the line to more than 150 meters or by adding a length of thicker rope will provide additional drag and tension.

Buoys, road cones and similar devices are not recommended for creating drag as they 'bounce' through the water and result in an uneven tension or "snatching" on the line that can cause the tori poles to break and can injure crew members when deploying or recovering the line.

A "Break-off" point or "weak link" should be built into the junction between the sections 3 and 4 to allow section four to break off should this section of the line become entangled with the fishing line and prevent damage to the tori pole or fishing line.

Affixing backstays to the tori pole to counteract the drag of the streamer line, reduce bending and wear, is also highly recommended.

The importance of streamers: it is advised that streamers should be paired, but single reflective streamers may also be considered. The longer streamers of Section-1 should be of a light-weight, UV-protected material that does not become entangled easily (such as bright Sekiyama cord sheathed in clear tubing)

Streamer material for sections 2-4 should be light-weight and brightly coloured, such as yellow and red package straps.

The bundles of short streamers attached to section 4 of the line are designed to create drag and tension on the streamer-line. Extending the length of this section will both assist in increasing the effective aerial extent as well as deterring seabird from diving on baits for an extended area astern of the vessel.

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 mainline, allowing the vessel to continue setting. The line can then be retrieved during hauling. The lazy line also allows the line to be adjusted according to wind conditions. To be effective a streamer line should be over the point where the gear enters the water.

Bait-Casting Machine (BCM)

When fishers use a bait-casting machine (BCM), they must ensure coordination of streamer line and machine by:

- (i) Ensuring the BCM casts the baits within or directly under the streamer line protection, and
- (ii) When using a BCM that allows throwing to port and starboard, ensure that two streamer lines are used.

When casting branchlines by hand, fishers should ensure that the baited hooks and coiled branchline sections are

- (i) Thrown under the streamer line protection, defined as the area between the propeller wash and the sea directly beneath the streamers,
- (ii) Avoiding throwing the baits and coiled branchline sections into the propeller turbulence, which may slow the sink rate.

Specifications for bird scaring lines for vessels <35 m total length

The development of a bird scaring line configuration for small vessels was recognised as a mitigation research priority by the Agreement on the Conservation of Albatrosses. Recent research has suggested the following recommended design specifications for vessels UNDER 35 m.

Two design options have been shown to be effective:

1. a design with a mix of long and short (1 m) streamers (Fig. 1). A total of 9 single long streamers, each cut to varying lengths as follows: (1) 5 m, (2) 4.5 m, (3) 4.0 m, (4) 3.5 m, (5) 3.0 m, (6) 2.5 m, (7) 2.0 m, (8) 1.5 m and (9) 1.5 m. Long streamers are placed at 5 m intervals with two short (1 m) streamers in between over at least the first 55 m of the BSL. The first long streamer is placed 10 m from the stern to reduce the chances of tangles with the longline fishing gear. Over the next 20 m short 1 m streamers placed at 2 m intervals. The last 5 m has no streamers attached, and
2. a design that only uses short streamers (Fig. 2). Short streamers should be no less than 1 m in length and placed at 1 m intervals along the length of the aerial extent, minimum 75 m. The first streamer should be placed at 10 m.

In all cases:

- i) Total length of the BSL should be a minimum of 90 m (excluding towing device) with a minimum aerial section of 75 m,
- ii) Streamers must be bright yellow/orange in colour,
- iii) To achieve a minimum recommended aerial extent of 75 m, the BSLs must be attached so that the start of the BSL is suspended at a minimum of 6 m above the water at the stern. This may require the erection of an attachment pole. Use of a towing device will further assist in achieving the necessary aerial extent.
- iv) Towing devices such as floats, trawl braids or lengths of rubber tubing are possible options.

Rights Holders wishing to deploy a modified BSL design following the specifications given above, can do so while research is carried out on a final longline design. Rights Holders

wishing to use an updated bird scaring line shall inform and seek approval from the Department.

Figure 1.

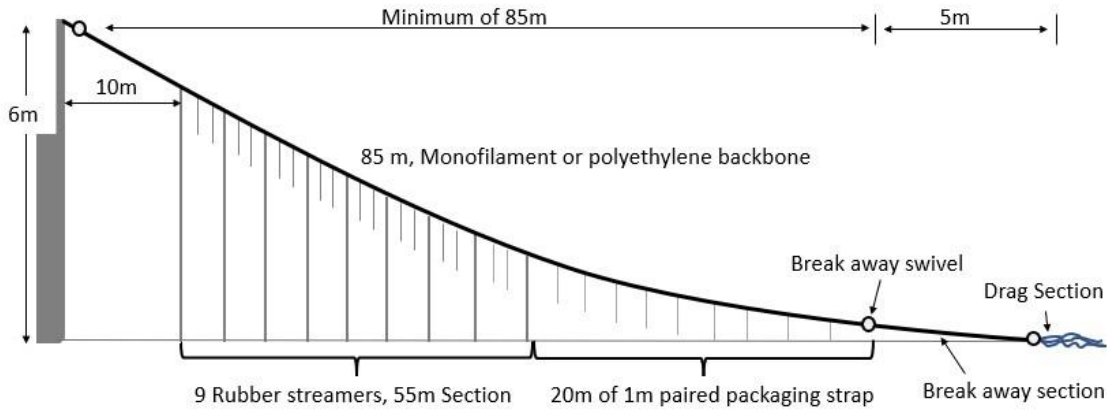
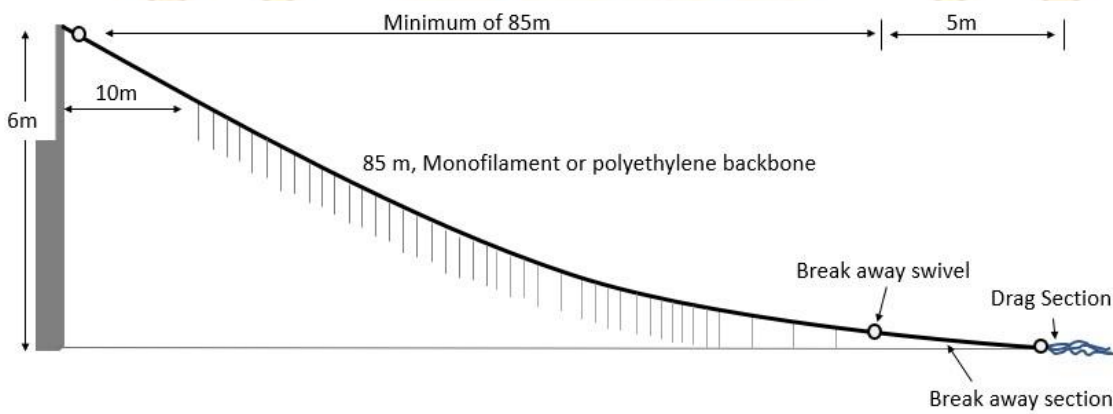


Figure 2.



For further guidelines and options for materials please contact BirdLife South Africa:
Andrea Angel, Email: andrea.angel@birdlife.org.za or Reason Nyengera, Email:
reason.nyengera@birdlife.org.za ; Tel: 021 419 7347

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.

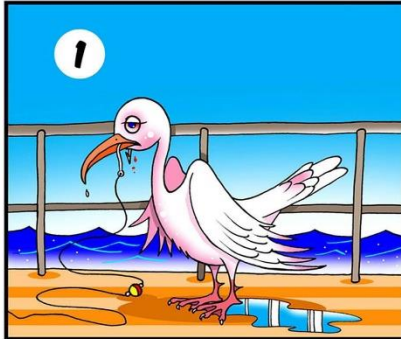
Hooks can then be extracted easily from wings, legs or bill tips using bolt cutters to remove the barb.

If an albatross has swallowed a hook, and its position can be found, the following procedure is recommended, but must only be attempted 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. 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.

HOW TO HANDLE A LIVE BIRD THAT HAS BEEN HOOKED



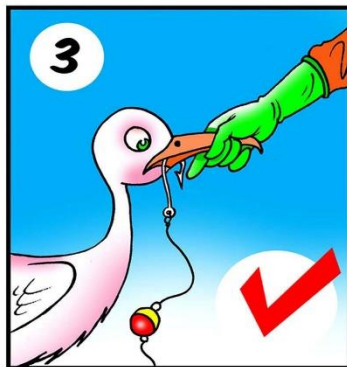
LIVE BIRD THAT HAS BEEN HOOKED



WEAR GLOVES



DO NOT HOLD THE BIRD AROUND THE NECK



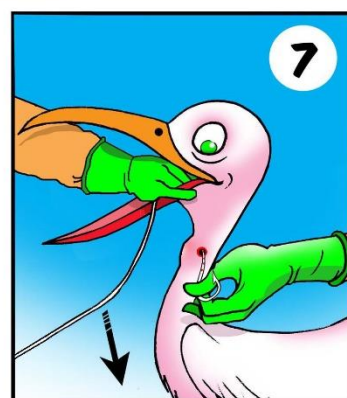
HOLD THE BIRD BY THE BILL, NOT COVERING ITS NOSTRILS.



CONTROL THE BIRD BY STRADDLING IT - HOLD THE BOTTOM BILL WITH YOUR ONE HAND



IF THE HOOK IS LIGHTLY HOOKED, GENTLY WIGGLE IT FREE



IF THE HOOK IS DEEPLY HOOKED AND CANNOT BE PULLED OUT WITHOUT HURTING THE BIRD SERIOUSLY, RATHER PUSH THE HOOK THROUGH THE BIRDS SKIN AND REMOVE.

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 5

Seabird Mitigation Checklist for Tuna Vessels

Section A (Check sheet by Observer)

Date	Tori line length (150m)	Attachment point for tori line (>7 m high)	Dehooker device	Observer Name	Observer signature

Section B (Observer Report On Compulsory Measures)

Date	Tori line(s) deployed?	Night setting / (weighted lines)?	Comments	Skipper signature	Observer Name & signature

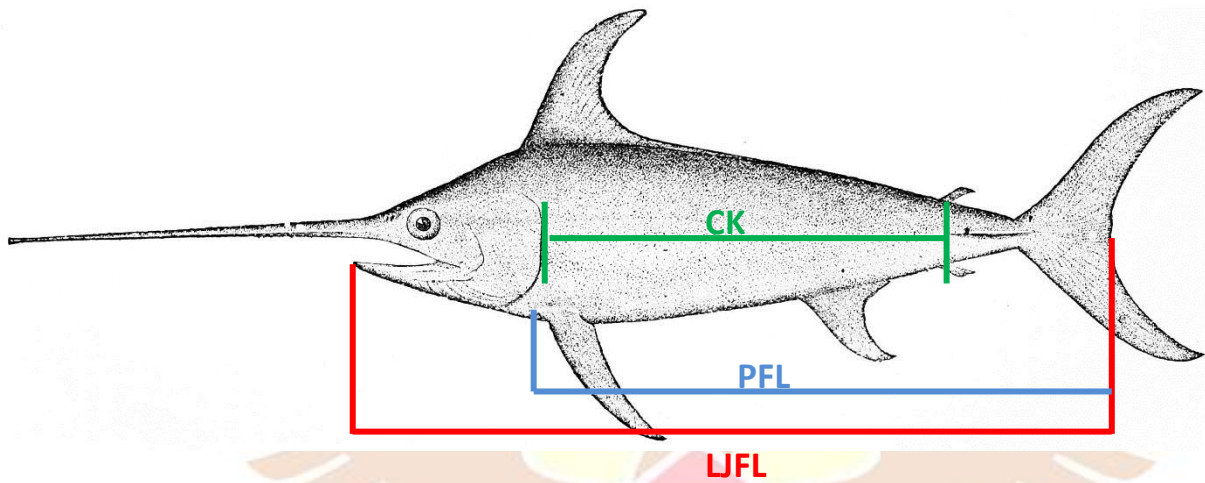
Section C (Observer Report On Additional Measures)

Date	Second tori line / (no full moon fishing)?	Weighted branch lines?	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 6

Types of length measurements



Lower Jaw Fork Length (LJFL): lower jaw to fork of the tail

Pectoral Fork Length (PFL): insertion of pectoral fin to fork of the tail

Cleithrum to Keel (CK): Bony area right behind the gill slit, to the horizontal ridge right before the tail fin.

Annexure 7



**agriculture,
forestry & fisheries**

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

**LARGE PELAGIC LONGLINE
LANDING DECLARATION SHEET**

Tel: 021-402 3627 Fax: 021-402 3034

**Submit with the corresponding catch statistics sheet(s)*

Vessel name: _____ Registration No: _____
 Rights Holder: _____ Permit No: _____
 Factory Name: _____ Date: _____
 Harbour Name: _____ Gear Type: _____

SPECIES	NUMBER OF FROZEN FISH	NUMBER OF FRESH FISH	TOTAL WEIGHT PER SPECIES (kg)
Swordfish			
Yellowfin tuna			
Southern bluefin tuna			
Bigeye tuna			
Longfin tuna (albacore)			
Marlin			
Mako shark			
Blue shark			
Copper / Bronze Whaler shark			
Other shark			
Shark fins			
Oilfish			
Escolar			
Dorado			
Other:			
.....			
.....			
.....			

Declaration: *To the best of my knowledge, the figures reported are correct and are the true reflection of the vessel's landed catch.*

Print Name Signature Date
 Skipper/Owner: _____
 Monitor: _____
 Fishery Control Officer: _____

Comments: _____

Annexure 8



agriculture,
forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

**APPLICABLE CONSERVATION MANAGEMENT MEASURES AS ADOPTED BY VARIOUS
TUNA REGIONAL FISHERIES MANAGEMENT ORGANISATIONS**

Commission for the Conservation of Southern Bluefin Tuna (CCSBT)

RESOLUTIONS		
Number	Title	Status
	Mandatory use of Tori poles is required by all Members in all longline SBT fisheries below 30° south.	As per permit conditions
	Resolution for a CCSBT Scheme for Minimum Standards for Inspection in Port	All foreign fishing vessels are subjected to port inspection
	Resolution on a CCSBT Record of Vessels Authorised to Fish for Southern Bluefin Tuna	Only authorised vessels shall fish and land SBT
	Resolution on the CCSBT Vessel Monitoring System (VMS)	All authorised vessels fishing for SBT are required to have a fully functional VMS on board
	Resolution on the Implementation of a CCSBT Catch Documentation Scheme	For all transshipments, landings of domestic product, exports, imports and re-exports, all SBT shall be accompanied by a statistical document
	Resolution on Establishing a Program for Transshipment by Large-Scale Fishing Vessels	At sea transshipment is prohibited. 100% monitoring of transshipment in port
	Resolution on Establishing a List of Vessels Presumed to have Carried Out Illegal, Unreported and Unregulated Fishing Activities for SBT	Vessels found to be fishing for SBT but not authorised shall be reported to the CCSBT Secretariat and will be listed

		under the IUU vessel list
	Resolution on large-scale driftnet fishing	Use of large-scale driftnets is prohibited in this sector
	Recommendation to Mitigate the Impact on Ecologically Related Species of Fishing for SBT	As per permit conditions

International Commission for the Conservation of Atlantic Tunas (ICCAT)

RECOMMENDATIONS		
Number	Title	Status
17-01	Recommendation by ICCAT on Prohibition on Discards of Tropical Tunas by Purse Seine	Purse Seine fishing is strictly prohibited in the Large Pelagic Longline sector
16-01	Recommendation by ICCAT on Multi-Annual Conservation and Management Programme for Tropical Tunas	Only authorised vessels (20m or greater) fishing in the ICCAT Convention Area are required to be registered on the ICCAT authorized vessel list, shall fish for Bigeye, Yellowfin and Skipjack tunas in the ICCAT Convention Area
16-15	Recommendation by ICCAT on Transshipment	At sea transshipment is prohibited. 100% monitoring of transshipment in port
15-06	Recommendation by ICCAT on Porbeagle caught in association with ICCAT fisheries	Retention of Porbeagle is prohibited
13-13	Recommendation by ICCAT concerning the establishment of an ICCAT record of vessels 20 metres in length overall or greater authorized to operate in the Convention Area	Only authorised vessels (20m or greater) fishing in the ICCAT Convention Area are required to be registered on the ICCAT authorized vessel list
13-11	Recommendation by ICCAT on the by-catch of Sea Turtles in ICCAT fisheries	As per permit conditions
12-07	Recommendation by ICCAT for an ICCAT Scheme for minimum standards for inspection in Port	All foreign fishing vessels are subjected to port inspection
12-05	Recommendation by ICCAT on compliance	Hammerhead sharks (belonging

	with existing measures on shark Conservation and Management	to genus <i>Sphyrna</i>), oceanic whitetip sharks, porbeagle sharks, dusky sharks and silky sharks shall not be retained on board the vessel. Fins may not be removed from the shark trunks (i.e. headed, gutted).
11-18	Recommendation by ICCAT further amending Recommendation 09-10 Establishing a list of vessels presumed to have carried out illegal, unreported and unregulated fishing in the ICCAT Convention Area	Vessels found to be fishing in the ICCAT Convention Area (for ICCAT species) without authorization shall be reported to the ICCAT Secretariat and will be listed under the IUU vessel list
11-09	Supplemental Recommendation by ICCAT on reducing incidental by-catch of Seabirds in ICCAT Longline fisheries	As per permit conditions
11-08	Recommendation by ICCAT on the conservation of Silky sharks caught in association with ICCAT fisheries	Silky sharks shall not be retained on board the vessel
10-08	Recommendation by ICCAT on Hammerhead sharks (Family Sphyrnidae) caught in association with fisheries managed by ICCAT	Hammerhead sharks shall not be retained on board the vessel
10-07	Recommendation by ICCAT on Oceanic Whitetip sharks caught in association with fisheries in the ICCAT Convention Area	Oceanic Whitetip sharks shall not be retained on board the vessel

Indian Ocean Tuna Commission (IOTC)

RESOLUTIONS		
Number	Title	Status
18-01	On an Interim Plan for Rebuilding The Indian Ocean Yellowfin Tuna Stock in the IOTC Area of Competence	Purse Seine, FADs and Supply vessels not permitted; YFT catches below 5000mt in 2014
18-02	On Management Measures for the Conservation Of Blue Shark Caught in Association with IOTC Fisheries	All catch data is required to be submitted to the Department
18-03	On Establishing a List of Vessels Presumed	Only vessels registered on the

	to Have Carried Out Illegal, Unreported and Unregulated Fishing in the IOTC Area of Competence	IOTC Record of Authorised Vessels shall fish for IOTC species in the IOTC Area of Competence. Any other vessel that is carrying tuna and tuna like species and not registered with the IOTC shall be reported for IUU and will be listed in the IUU vessel list. Further, S28 of the MLRA shall be initiated.
18-05	On Management Measures for the Conservation of the Billfishes: Striped Marlin, Black Marlin, Blue Marlin and Indo-Pacific Sailfish	CPCs shall endeavour to ensure that the overall catches, of the Indian Ocean Striped Marlin, Black Marlin, Blue Marlin and Indo Pacific Sailfish in any given year do not exceed either the MSY level or, in its absence, the lower limit of the MSY range of central values as estimated by the Scientific Committee. 3. The limits referred to in paragraph 2 correspond to the following: a. Striped Marlin: 3,260 t b. Black Marlin: 9,932 t c. Blue Marlin: 11,930 t d. Indo Pacific Sailfish: 25,000 t CPCs shall not retain on board, trans-ship, land, any specimen smaller than 60 cm Lower Jaw Fork Length (LJFL) of any of the species
18-06	On Establishing a Programme for Transshipment by Large-Scale Fishing Vessels	At-sea transshipment is prohibited. 100% monitoring of transshipment in port
18-08	Procedures on a Fish Aggregating Devices (FADs) Management Plan, Including a	FADs related fishing is prohibited

	Limitation on the Number of FADs, More Detailed Specifications of Catch Reporting from FAD Sets, and the Development of Improved FAD Designs to Reduce the Incidence of Entanglement of Non-Target Species	
18-10	On Vessel Chartering in the IOTC Area of Competence	Only vessels registered in the IOTC authorised vessel list are permitted
17-05	On the conservation of sharks caught in association with fisheries managed by IOTC	Hammerhead sharks (belonging to genus Sphyrna), oceanic whitetip sharks, porbeagle sharks, dusky sharks and silky sharks shall not be retained on board the vessel. Fins may not be removed from the shark trunks (i.e. headed, gutted).
17-07	Resolution 17/07 On The Prohibition to Use Large-Scale Driftnets in The IOTC Area	Use of Large Scale Driftnets is prohibited
16-02	On harvest control rules for skipjack tuna in the IOTC area of competence	Not applicable. South Africa's total skipjack catch in the IOTC area was less than 1 ton, hence the HCR's have not been applied
16-07	On the use of artificial lights to attract fish	The use, installing or operating surface or submerged artificial lights is prohibited
16-08	On the prohibition of the use of aircrafts and unmanned aerial vehicles as fishing aids	Use of aircrafts and unmanned aerial vehicles as fishing aids is prohibited
15-03	On the vessel monitoring system (VMS) programme	A fully functional VMS is mandatory on all vessels
15-04	Concerning the IOTC record of vessels authorised to operate in the IOTC area of competence	Only vessels registered on the IOTC Record of Authorised Vessels shall be authorised to fish for, retain on board, tranship or land tuna and tuna-like species in the IOTC Area of

		Competence.
12/04	On the conservation of Marine Turtles	As per permit conditions





**MEMORANDUM OF UNDERSTANDING
ON THE CONSERVATION AND
MANAGEMENT OF MARINE TURTLES
AND THEIR HABITATS OF THE INDIAN
OCEAN AND SOUTH-EAST ASIA**

CMS/IOSEA/MOS8/Inf.7.1.n

28 August 2019

Original: English

8TH MEETING OF THE SIGNATORY STATES

Da Nang, Viet Nam, 21-25 October 2019

Agenda Item 9.1

SOUTH AFRICA – NATIONAL REPORT 2019

(Prepared by South Africa)

IOSEA MARINE TURTLES MEMORANDUM OF UNDERSTANDING - NATIONAL REPORTING 2019

IOSEA Marine Turtles MoU - National Reports

The purpose of completing the national report is to provide information on your country's implementation of the IOSEA Marine Turtle MoU including, as far as possible, contributions of cooperating non-governmental partners. Implementation will be assessed in terms of the six objectives of the Conservation and Management Plan (CMP). The online questionnaire is divided into these six main objectives, and asks specific questions in relation to the activities that need to be carried out to fulfil those objectives.

Please answer all questions as fully and as accurately as possible. It may seem time-consuming, but once you have completed the first report, the next time will be much easier because you can simply revise your existing report online. Comprehensive responses to the questions posed in Section 1.4 should satisfy many of the reporting requirements of the 2004 FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations, thereby avoiding duplication of effort.

Description text is provided below some of the questions to explain what information needs to be provided. Text boxes can be expanded to accommodate longer answers or to explain and provide additional information, beyond what is requested. Details of future plans are especially encouraged. Wherever possible, please try to indicate the source of information used to answer a particular question, if a published reference is available. Remember that you are sharing information with other countries about your progress, so that it may be of benefit to them. At the same time, you may find it useful to look at other countries' reports to get ideas for marine turtle conservation that might be adapted to your context.

When working on the online questionnaire, save your information by clicking on the "Save all" button inside each section. An auto-save feature also saves any changed responses every 30 seconds, and whenever you move between sections. Feel free to attach additional material (published reports, maps etc) to this questionnaire.

Throughout the questionnaire, alongside each question you will find one or more 3-letter abbreviations within square brackets. These are used to indicate the purpose for which the information provided will be used in the subsequent analysis of all of the national reports, as shown in the following table.

To some extent, the order in which these different types of information are listed below is a reflection of their importance - ranging from critical indicators of performance to factual details that are merely informative.

Abbreviation

Type

Treatment / Purpose

IND

Indicator

The information provided serves, in and of itself, as a key indicator of successful implementation or of pre-requisites for same (eg. of core actions undertaken, resource availability, capacity etc.)

PRI

Priorities

The collective data will be synthesized to give an indication of what has been done already (helping to avoid duplication of effort); what is generally not being done (gaps that need to be addressed); and what interventions or specific assistance may be required.

TSH

Trouble-shooting

Particular implementation problems and issues (possibly of special interest to a small group of countries) are identified/highlighted with a view to stimulating remedial action in the short-term.

BPR

Best practice

Well-documented examples of best practices / success stories will be compiled and presented as approaches that other Signatory States might consider pursuing (ie adopting or adapting to suit their own circumstances).

SAP

Self-Appraisal

Self-assessment of effectiveness and completeness of actions undertaken – intended to stimulate reflection within a given Signatory State on what more could or should be done in relation to a particular activity.

INF

Information

The information will be collected and compiled, with little or no modification, mainly for purpose of sharing of information that could be of interest or value to other readers and/or other analyses.

GENERAL INFORMATION

Signatory State:

Which agency or institution has been primarily responsible for the preparation of this report?

> Department of Environmental Affairs (DEA)

List any other agencies, institutions, or NGOs that have provided input:

- > - Department of Agriculture, Forestry and Fisheries;
- Ezemvelo KZN Wildlife;
- iSimangaliso Wetland Park Authority
- Nelson Mandela University (NMU)
- South African Association of Marine Biological Research

Memorandum in effect in Signatory State since (dd/mm/yyyy):

> Since 22/02/2005

This report was last modified (dd/mm/yyyy):

> 30 June 2019

Designated Focal Point (and full contact details):

> Mr Gcobani Popose

Director: Oceans Conservation Strategies

Department of Environmental Affairs

Branch: Oceans and Coasts

1 East Pier Building,

East Pier Road,

V&A Waterfront,

Cape Town, 8002

E-mail: GPopose@environment.gov.za

Tel: +27 21 819 2416

OBJECTIVE I: REDUCE DIRECT AND INDIRECT CAUSES OF MARINE TURTLE MORTALITY

1.1 Introduction to marine turtle populations and habitats, challenges and conservation efforts

Please introduce and summarise, in an abstract of less than a page, the marine turtle populations and their habitats in your country. Comment on their status and highlight the main conservation challenges and achievements to date. It is not necessary to list here by name the individual nesting beaches, feeding areas and developmental habitats that are important for marine turtles in your country, as this information can be generated from the 'Site-Threat' data sheets to be completed in Annex 1. **[INF]**

> Five species of sea turtles are shared among the countries of the western Indian Ocean, all of which are common to South Africa. These include the Loggerhead (*Caretta caretta*) and Leatherback (*Dermochelys coriacea*) turtles which nest along the beaches of KwaZulu-Natal, with the bulk of nesting for the western Indian Ocean populations taking place between Cape Vidal and South African/Mozambican border in the iSimangaliso Wetland Park (a UNESCO World Heritage Site and forms part of the Network of Sites of Importance). The reefs along the coast of KwaZulu-Natal are also important feeding grounds for juvenile to adult stage green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) turtles. Olive ridley (*Lepidochelys olivacea*) turtles are thought to be occasional migrants to this region as they are rarely encountered. The best information for turtle abundances exist for the nesting beaches and reefs in the iSimangaliso Wetland Park where the numbers of nesting female loggerhead and leatherback turtles have been monitored since 1963. The stretch of beach patrolled to monitor nesting turtles was initially 8km and over time, has been expanded to the current approximately 85 km stretch that extends from Sodwana Bay to the South African/Mozambican border. Despite the changing effort expended in monitoring, it is the stretch of beach from Bhanga Nek to the Kosi mouth that has been consistently monitored over time - it is for this reason that this 13km stretch of beach is referred to as the "Index Beach" as nesting data from this stretch is used to determine the nesting trend for the female leatherback and loggerhead sub-population over time. The monitoring is achieved primarily by foot patrol, with vehicle patrols backing them up when conditions allow. The duration of the monitoring is 5 months and includes the entire nesting and most of the hatching season. The nesting leatherback and loggerhead turtle populations are shared with Mozambique with nesting taking place on both side of the border.

South Africa has a robust network of protected areas and all of the nesting areas, as well as a substantial amount of reef habitats within Marine contained in Protected Areas (MPA's). The result is that direct harvesting and habitat destruction are marginal threats in South Africa. Few water surveys for non-nesting species (i.e. green and hawksbill turtles) have been undertaken. Fisheries impacts and bather protection nests are the known threats to turtles while in South African waters, with plastic pollution as an emerging threat, specifically for post-hatchlings. Pelagic long-lining for tuna and tuna like species is known to incur incidental catches of turtles. Catches are well monitored and survival rates are high, Catches in the well-monitored midwater trawl fishery uncommon, but monitoring in other fishing sectors is required. Diseases such as fibropapilloma or fungal infections in nests seem to be largely absent with only one confirmed case of a stranded green turtle. The effect of climate change is largely unknown but could be positive or negative. Studies undertaken to date suggest that the South African nesting beaches are well buffered against temperature changes or erosion; however, the effect of shallow subtidal reefs is less known. Studies can be undertaken in the near future to better understand the threats associated with climate change and South African turtle populations.

1.2 Best practice approaches to minimizing threats

Describe any protocol or approaches practiced in your country, which you consider exemplary, for minimising threats to marine turtle populations and their habitats, which may be suitable for adaptation and adoption elsewhere. **[BRP]**

> 1. DEDICATED TURTLE PROTECTION.

South Africa has a comprehensive turtle monitoring programme to document the nesting activities of female leatherback and loggerhead turtles that involve:

- a. Continuous patrolling and monitoring of turtle nesting activity on key nesting beaches (monitoring area of 56km and index area of 8km).
- b. Hiring and training community monitors to undertake turtle monitoring..
- c. Supporting and enhancing turtle-friendly eco-tourism ventures (ranging from walk-on community tours to lodge developments) to capitalise on turtles and turtle monitoring and nest protection.
- d. Supporting and enhancing education and awareness programmes around nesting beaches highlighting the importance of marine turtles and advocating best management practices.
- e. Expansion of research associated with all aspects of turtle management but particularly trying to build a population model of nesting species.

2. ENABLING LEGISLATION ENVIRONMENTAL MANAGEMENT

- a. A network of protected areas adequately protecting turtles as well as their habitats during various life stages. The bulk of the nesting area fall within a UNESCO World Heritage Site.
- b. South Africa has formally declared 20 additional new Marine Protected Areas (MPA's) as part of its MPA network that will benefit all life stages of marine turtles as well as various in-shore and offshore ecosystems. The declaration of these MPAs will take effect on 1 August 2019. Two of these are to protected *Dermochelys coriacea*'s internesting habitat as well as foraging habitat on sea mounts within the country's EEZ.

- c. All sea turtles in South Africa are listed in the Threatened or Protected Marine Species Regulations. This affords all turtles a protected status in South Africa.
- d. Controlling the use of off-road vehicles in the coastal zone which not only protects turtles, their nests and their hatchlings from disturbance and crushing.
- e. The National Biodiversity Assessment (NBA) for the marine environments to the edge of the EEZ. This provides an indication of biodiversity, habitats, threats and conservation targets for each aspect throughout the EEZ. An update version of the NBA is expected in the latter part of 2019.
- f. Practical contingency plans during strandings, oil spills and other shipping, pollution or natural disasters. South Africa has a series of stranding networks along its coast that responds to incidences of turtle strandings and provide a rapid response to ensure that they are taken to registered and permitted rehabilitation centres. South Africa is also in the process of updating a National Oil spill Contingency Plan, which will include a National Oiled Wildlife Preparedness Response.

3. FISHERIES LEGISLATION AND MANAGEMENT

- a. Basic turtle by-catch information from the pelagic longline fishery has been obtained since 2000. Observer Coverage has been continuously improved and is now legislated at 20%, stratified by area, season and vessel
- b. Observers are trained in turtle ID and handling practices
- c. Turtle incidental bycatch and release information recording is mandatory and dead animals are to be retained and handed over to the authorities
- d. Handling and release procedures are detailed in the permit conditions for the Pelagic Longline Fishery.
- e. De-hookers and line cutters need to be on board every longline vessel.
- f. ID guides for turtles have been disseminated to all vessels

4. ENABLING ENVIRONMENTAL LEGISLATION AND MANAGEMENT:

South Africa is in the process of rationalizing its environmental legislation. Most of marine species and marine and coastal related processes were included in numerous acts. The first process was to:

- a. Repeal the section on Marine Protected Areas from the Marine Living Resources Act, which largely concentrated on fisheries related issues, to the National Environmental Management: Protected Areas Act. The section on MPAs was gazetted in 2014. Subsequently, South Africa has gazetted 20 new MPAs, and includes numerous offshore protected areas.
- b. Threatened or Protected Marine Species Regulations include all turtle species found in South African waters. These regulations were amended from 2012, and were gazetted for implementation in May 2017 updating all marine species and their conservation status, including sea turtles found in South African waters.
- c. The Marine Living Resources Act is aimed at regulating the long-term sustainable utilisation of marine living resources and access to exploitation, utilisation and protection of certain of marine resources.

1.3 Programmes to correct adverse economic incentives

1.3.1 Describe any socio-economic studies or activities that have been conducted among communities that interact with marine turtles and their habitats. [BPR, INF]

Elaborate on the nature of the socio-economic study/ activity undertaken, the results obtained (successful or otherwise) and the desirability/ suitability for replication.

Include references to published reports, where available.

> Current Studies:

- A PhD is currently underway using Community Voice Method in a transboundary investigation between Mozambique and South Africa to investigate the value of sea turtles to the local community and the likely impact of a new port development in southern Mozambique on both turtle populations and local communities. Short title of the study is Community David vs Economic Goliaths.

- Attempted a citizen science approach project (2012 – 2015) which was very unsuccessful. A different approach is needed.

Other published studies:

Troeng, S., Drews, C., 2004. Money talks: economic aspects of marine turtle use and conservation. WWF-International, Gland, Switzerland: 41pp. Online at: <http://assets.panda.org/downloads/moneytalks.pdf>.

Monitoring Activities:

Interactions with sea turtles takes primary place in iSimangaliso Wetland Park, hence the option for sustainable use is direct and indirect. To deter unsustainable use, members from local subsistence communities are hired annually (for five months of the year) to act as turtle monitors and some are allocated the exclusive right to host guided beach tours (i.e. walk-on concessions). Indirect benefits are generated to the communities by a few exclusive lodges in or around iSimangaliso Wetland Park that have developed around the turtle nesting activities. These ventures pay for the exclusive right to take high-end tourists on exclusive vehicle drives (drive concessions). These lodges and ventures are obliged to employ members from the local or nearby communities and ideally develop a range of business, tourism and hospitality industry related skills.

Direct negative interactions in South Africa is no incidental (or accidental) although a concern is raised through increased recent interest in turtle products (through an increase in foreign nationals setting up small businesses in the area).

1.3.2 Which of these adverse economic incentives are underlying threats to marine turtles in your country?

[TSH]

- Ease of access to the turtle resource (e.g. by virtue of proximity or ease of land/water access)
- Low penalties against illegal harvesting
- Others (Please describe)

> Illegal development in protected areas = uncontrolled tourism;

Rapid economic development in the area surrounding the protected area;

The northern sections of the iSimangaliso Park have "open" access since there are communities living in the bounds of the Park. Most of these individuals live a subsistence lifestyle due to the remoteness of the area and a consequent lack of economic opportunities. However, the remoteness also provides a fantastic attraction for tourism with some unregulated developments erected. This is done by both locals as well as outsiders to the area with the intent of bringing more visitors and economic opportunities. Lately, infrastructure (particularly roads) have been upgraded facilitating access which makes access control more complicated. Despite significant effort by the local authorities (iSimangaliso and Ezemvelo) these developments however do not always go through proper authorisation or EIA procedures. However, individuals are eventually prosecuted especially if the effect is the destruction of biodiversity through habitat transformation and/or disturbance of turtles through unregulated beach use during nesting and hatching season, and indiscriminate use of lights.

There is also rapid economic developments outside of the park which attracts more individuals to the area, with greater means of accessing the park. However, enforcement has not been increased despite greater influx of people.

1.3.3 Has your country taken any measures to try to correct these adverse economic incentives? [BPR]

- Yes (If yes, please describe these measures in detail)

> Empowerment programmes to subsistence communities: Working for the Coast, Sustainable Livelihoods Programme, joint development ventures in and around the iSimangaliso Park.

Capping (and controlling) the number of tourism ventures in the conservation areas: Restricted number of exclusive developments as well as number of drive-concessions.

When process of negotiation is unsuccessful legal action is taken against illegal developments/developers. But resources to law enforcement has not increased accordingly.

1.4 Reduction of incidental capture and mortality

1.4.1 Indicate, and describe in more detail, the main fisheries occurring in the waters of your country, as well as any high seas fisheries in which flag vessels of your country participate and interact with marine turtles.

Tick 'YES' to indicate that a fishery is present and interacting marine turtles or 'NO' to indicate that a fishery is not present or is not interacting with marine turtles. [INF]

If a fishery is present, use the text box to indicate, for example, the approximate geographic distribution of the fishery, how long it has been operating, how many vessels are involved, etc.

a) Shrimp trawls:

- Yes (Please provide details)

> Ephemeral and Erratic - As catch per unit effort (CPUE) in the WIO shallow trawl fisheries continues to decline and consequently effort has also declined. South Africa had virtually zero shallow trawling effort in 2013 owing to poor prawn recruitment and poor prices for prawns. Deep water trawling along the east coast is at a low level. However, several new rights holders have been issued since beginning 2014 but are not yet operational. Approximately three active vessels of a possible max of 7. No observer programme on prawn vessels since 2010. Reports of prawn (and turtle catches) from the rest of the WIO region has also declined. Generally though operational depth on the Tugela Bank is 10 - 50 m; Trawl duration is 4-6 hours. TEDs are not used. Grids to exclude elasmobranchs were introduced in 2006 which also exclude turtles. Fennessey & Isaksen (2007) evaluated the use of BRDs (bycatch reduction devices) in Mozambique. These are comparable fisheries in terms of species composition for catch and bycatch but more stable. They indicated that BRDs can be used successfully, but needs industry buy-in.

Fennessey, S. & Isaksen, B. 2007. Can bycatch reduction devices be implemented successfully on prawn trawlers in the Western Indian Ocean - South African Journal of Marine Science 29(3): 453-463.

Fennessey, S.T., Vincent, X., Budeba, Y., Mueni, E. M. & Gove, D. Z. 2008. An update on initiatives to reduce prawn trawl bycatch in the Western Indian Ocean. Western Indian Ocean Journal of Marine Science. 7(2): 217-222.

Mellet, B. 2015 Ecological Risk Assessment of Fisheries on Sea Turtles in the South Western Indian Ocean. Unpublished MSc Dissertation, Nelson Mandela Metropolitan University. 217 pages.

b) Set gill nets:

- Yes (Please provide details)

> Gill-nets used as bather protection nets against shark attacks in KwaZulu-Natal. ~27 km of semi-permanent gill net installations scattered over 36 localities. These are set outside of protected areas, and checked ~ 20 times per month. Turtles are caught year-round with a mean number of catches per annum around 50 turtles, of which about half are released alive. (Details can be found in Brazier et al 2012). In February 2007 the Natal Sharks Board started with a systematic replacement of the gill nets with baited drum lines. Drum lines catches are more targeted (to predatory sharks) and should reduce inter alia turtle bycatch. Up to half of the 27km of nets will be replaced with drum lines (<http://www.shark.co.za/nets.htm>).

A small-scale, coastal St Joseph Shark / Harder fishery is in operation on the Atlantic coast of SA using beach seine nets. It does not seem to interact with turtles since there are no reports of turtles being caught in this activity.

No other gill net fisheries are used legally in the EEZ of South Africa. The illegal use is suspected but should be incidental with negligible towards impacts on turtles.

Young, N. 2001. An analysis of the trends in by-catch of turtle species, angelsharks and batoid species in the protective gillnets off KwaZulu-Natal, South-Africa. Unpublished MSc Thesis, University of Reading, 99pp.

Brazier, W., Nel, R., Cliff, G., Dudley, S., 2012. Impact of protective shark nets on sea turtles in KwaZulu-Natal, South Africa, 1981-2008. African Journal of Marine Science 34, 249-257.

Mellet, B. 2015 Ecological Risk Assessment of Fisheries on Sea Turtles in the South Western Indian Ocean. Unpublished MSc Dissertation, Nelson Mandela Metropolitan University. 217 pages.

c) Anchored Fish Aggregating Devices (FADs):

Yes (Please provide details)

> No permits are issued for any FADs in South Africa but they are sometimes deployed illegally in commercial skiboat line-fishery to attract pelagic fish. Associated direct impact on turtles is unquantified but entanglement at sea or in ghost gear is possible.

d) Purse seine (with or without FADs):

Yes (Please provide details)

> The fishery currently supports around 100 purse-seine vessels of which most are of the pelagic vessels are between 20-24 m long (Nielsen & Nara 2006). These are mostly are operating on the on west and south coast of South Africa with a strong seasonal pattern. The licensed vessels in South Africa target mainly sardines and anchovy with few other small. No information exists on the impacts on sea turtles although it is predicted to be limited. The purse seiners though fishing offshore tend to operate closer inshore (that what turtles seem to frequent) and are mostly restricted to the upwelling regions. Turtles seem to have moved offshore by the time they reach the south and west coast of the country.

Nielsen, J.R. & M. Hara. 2006 Transformation of South African industrial fisheries. Marine Policy 30(1): 43-50.

Mellet, B. 2015 Ecological Risk Assessment of Fisheries on Sea Turtles in the South Western Indian Ocean. Unpublished MSc Dissertation, Nelson Mandela Metropolitan University. 217 pages.

e) Longline (shallow or deepset):

Yes (Please provide details)

> An investigation into in the South African Pelagic Longline Fishery between 1995 and 2005 has estimated turtle bycatch as 0.04 turtles per 1000 hooks, with loggerhead turtles being the most frequently caught species and leatherbacks the second most frequently (Petersen et al. 2009). Extrapolating these observer numbers to actual catch figures indicate that about 164 turtles may have been caught per annum of which 84% are released alive. . Demersal longlining also takes place in South Africa and mostly targets hake. No turtle bycatch has been reported in this fishery (Petersen 2008). Three post-graduate studies have been conducted on the impacts of longlines: Samantha Petersen: Environmental impacts of longline fisheries on bycatch (UCT 2008) Anje De Wet: Factors affecting mortality of loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*) sea turtles of South Africa (NMMU 2013) Darrell Anders: Spatial and temporal overlap between South African leatherback turtles (*Dermochelys coriacea*) and pelagic longliners fishing in the South African EEZ (CPUT, 2010). Recommendations from Petersen et al 2009, to mitigate against turtle by-catch have either been fully implemented or are in the implementation phase. These include an increase in Observer Coverage, mandatory reporting, training in handling and release procedures for skippers and observers, gear manipulations such as the use of circle hooks, establishment of offshore Marine Protected Areas.

DAFF 2019: Permit conditions of the Large Pelagic Longline fishery. 45 pp.

DEAT 2007: Government Gazette. Republic Of South Africa. Vol 510. 7 December 2007. No 30535. Notice 1718 of 2007. Draft policy and application forms concerning the allocation and management of the longterm fishing rights in the large pelagic (tuna and swordfish) sector, 2007.

Petersen, S.L., Honig, M.B., Ryan, P.G., Nel, R., Underhill, L.G., 2009. Turtle bycatch in the pelagic longline fishery off southern Africa. African Journal of Marine Science 31, 87-96.

Mellet, B. 2015 Ecological Risk Assessment of Fisheries on Sea Turtles in the South Western Indian Ocean.

Unpublished MSc Dissertation, Nelson Mandela Metropolitan University. 217 pages.

Harris, L., Nel, R., Oosthuizen, H., Meÿer, M., Kotze, D., Anders, D., McCue, S., Bachoo, S., 2018. Managing conflicts between economic activities and threatened migratory marine species towards creating a multi-objective blue economy. *Conservation Biology*,32(2): 411-423.

f) Driftnet:

No (Please provide details)

> Illegal in South Africa with no evidence of transgressions.

g) Others (Please provide details)

> Inshore demersal sole & hake fishery ~ south coast (30 vessels) - no obvious interaction with turtles.

> The South African midwater trawl fishery targets horse mackerel *Trachurus capensis*, a semi-pelagic species found all along the South African coast The bulk of the catch is currently taken by a single vessel, the Desert Diamond, a 120 meter long freezer-trawler and the largest South African registered commercial fishing vessel. The vessel has close to 100% observer coverage in terms of outings and 85% of the trawls were observed during the period from 2005 to 2013 and no turtle bycatch had low turtle interactions have been recorded.

h) None of the above (Please provide details)

> Linefishery - no major interaction with turtles although can have incidental capture through hooking or entanglement, especially in estuaries.

1.4.2 Please indicate the relative level of fishing effort and perceived impact of each of the above fisheries on marine turtles (e.g. in terms of by-catch) [TSH]. Select from one of the following descriptions: RELATIVELY HIGH, MODERATE, RELATIVELY LOW, NONE (i.e. not present), UNKNOWN (i.e. unable to answer for whatever reason).

a) Shrimp trawls

Please select only one per line

	UNKNOW N	NON E	RELATIVELY LOW	MODERAT E	RELATIVELY HIGH
Fishing efforts:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Perceived impact:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Source of information / clarification

> Source:

Fennessey and Isaksen evaluated the impacts of prawn trawl fisheries in South Africa and suggested this to be low despite the lack of the use of TEDs. However, recent evidence (i.e. increase in loggerhead nesting numbers coinciding with the decline in trawling) suggests that the historical impact might have been bigger that realised (Nel et al. 2013).

Fennessey, S. & Isaksen, B. 2007. Can bycatch reduction devices be implemented successfully on prawn trawlers in the Western Indian Ocean - *South African Journal of Marine Science* 29(3): 453-463.

Nel, R., Punt, A.E., Hughes, G.R., 2013. Are Coastal Protected Areas Always Effective in Achieving Population Recovery for Nesting Sea Turtles? *PLoS ONE* 8, e63525.

Mellet, B. 2015 Ecological Risk Assessment of Fisheries on Sea Turtles in the South Western Indian Ocean. Unpublished MSc Dissertation, Nelson Mandela Metropolitan University. 217 pages.

Harris, L., Nel, R., Oosthuizen, H., Meÿer, M., Kotze, D., Anders, D., McCue, S., Bachoo, S., 2018. Managing conflicts between economic activities and threatened migratory marine species towards creating a multi-objective blue economy. *Conservation Biology*,32(2): 411-423.

b) Set gill nets

Please select only one per line

	UNKNOW N	NON E	RELATIVELY LOW	MODERAT E	RELATIVELY HIGH
Fishing effort:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Perceived impact:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Source of information / clarification

> Young 2001, Brazier et al 2012, and Nel 2014 evaluated the impacts of the shark nets on sea turtles on the

South African sea board. In all instances, the conclusions were that the impacts are not significant, and that the effort by the KZN Sharks Board leads to a continuous reduction in sea turtle mortalities in shark nets.

Young, N. 2001. An analysis of the trends in by-catch of turtle species, angelsharks and batoid species in the protective gillnets off KwaZulu-Natal, South-Africa. Unpublished MSc Thesis, University of Reading, 99pp. 27km fixed nets / drum lines ~50 Caught per annum; 1/2 released alive.

Brazier, W., Nel, R., Cliff, G., Dudley, S., 2012. Impact of protective shark nets on sea turtles in KwaZulu-Natal, South Africa, 1981-2008. African Journal of Marine Science 34, 249-257.

Nel, R. 2014 50 Years of turtle conservation, monitoring and research: A state of knowledge report. Unpublished report to Ezemvelo KZN Wildlife. Pg43.

Mellet, B. 2015 Ecological Risk Assessment of Fisheries on Sea Turtles in the South Western Indian Ocean. Unpublished MSc Dissertation, Nelson Mandela Metropolitan University. 217 pages.

Harris, L., Nel, R., Oosthuizen, H., Meÿer, M., Kotze, D., Anders, D., McCue, S., Bachoo, S., 2018. Managing conflicts between economic activities and threatened migratory marine species towards creating a multi-objective blue economy. Conservation Biology,32(2): 411-423.

c) Anchored Fish Aggregating Devices (FADs)

Please select only one per line

	UNKNOW N	NON E	RELATIVELY LOW	MODERAT E	RELATIVELY HIGH
Fishing effort:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Perceived impact:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

d) Purse seine (with or without FADs)

Please select only one per line

	UNKNOW N	NON E	RELATIVELY LOW	MODERAT E	RELATIVELY HIGH
Fishing efforts:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Perceived impact:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Source of information / clarification

> Harris, L., Nel, R., Oosthuizen, H., Meÿer, M., Kotze, D., Anders, D., McCue, S., Bachoo, S., 2018. Managing conflicts between economic activities and threatened migratory marine species towards creating a multi-objective blue economy. Conservation Biology,32(2): 411-423.

e) Longline (shallow or deepset)

Please select only one per line

	UNKNOW N	NON E	RELATIVELY LOW	MODERAT E	RELATIVELY HIGH
Fishing effort:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Perceived impact:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

- Source of information / clarification

> Particularly important for leatherback turtles and somewhat for loggerhead turtles. Probably one of the biggest (known and quantified) threats to leatherbacks.

Source:

DAFF unpublished logbook and observer data for the Large Pelagic Longline Fishery. 2005-2018.

Harris, L., Nel, R., Oosthuizen, H., Meÿer, M., Kotze, D., Anders, D., McCue, S., Bachoo, S., 2018. Managing conflicts between economic activities and threatened migratory marine species towards creating a multi-objective blue economy. Conservation Biology,32(2): 411-423.

f) Driftnet

Please select only one per line

	UNKNOW N	NON E	RELATIVELY LOW	MODERAT E	RELATIVELY HIGH
Fishing effort:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Perceived impact:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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g) Others (from 1.4.1 g))

Please select only one per line

	UNKNOW N	NON E	RELATIVELY LOW	MODERAT E	RELATIVELY HIGH
Fishing effort:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Perceived impact:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Source of information / clarification

> Inshore demersal sole & hake fishery

Source:

Demersal Trawling: Petersen, S. (2008) Understanding Bycatch of vulnerable species. PhD thesis UCT.
Harris, L., Nel, R., Oosthuizen, H., Meÿer, M., Kotze, D., Anders, D., McCue, S., Bachoo, S., 2018. Managing conflicts between economic activities and threatened migratory marine species towards creating a multi-objective blue economy. Conservation Biology,32(2): 411-423.

1.4.3 Describe any **illegal fishing** that is known to occur in or around the waters of your country that may impact marine turtles. Describe the measures being taken to deal with this problem and any difficulties encountered in this regard. **[TSH]**

> Across-boarder poaching (in protected areas) is a potential problem, especially by foreign longliners, trawlers and beach poaching. Even though "high tech" surveillance equipment is used, effective enforcement is difficult due to the remoteness (and border location).

The magnitude of non-turtle related illegal imports (drugs, goods, shells etc); it is making local law enforcement difficult; Law enforcement agencies can only concentrate on semi-commercial and commercial scale activities. Continuous "smallscale" imports are therefore ignored.

The targeted harvesting of young green turtles in remote estuaries are from very recent reports without appropriate response yet discussed. (Nel, pers com).

1.4.4 Which of the following methods are used by your country to minimise incidental capture/mortality of marine turtles in fishing activities? [IND]

a) **Appropriate handling** of incidentally caught turtles (e.g. resuscitation or release by fishers using equipment such as de-hooking, line cutting tools and scoop nets)

YES (Details/future plans)

> Details/future plans:

The use of circle hooks is encouraged as stated in the permit conditions. The South African government has worked closely with WWF to educate skippers on release procedures for turtles. According to the handling and release instructions provided to vessels in their permit conditions, vessels are required, amongst others, to:

- Remove the hook using a long-handled de-hooker on turtles too large to bring onboard and a de-hooker on turtles brought onboard.
- Use a line-cutter when a de-hooker is not possible and to cut the line as close to the hook as possible.
- Use net to bring the turtle onboard and to avoid pulling on the line.
- Handle the turtle with gentle care. Release the turtle headfirst and away from fishing gear once it has recovered onboard.

Observers are present on all foreign flagged vessels fishing South African rights in terms of Joint Venture Agreements. Observer coverage for the entire longline fleet is stipulated as 20% stratified per vessel, time and area; all interactions with marine turtles during the fishing operations are recorded. Since 2013, all vessels have been required to record interactions with marine turtles in their logbooks, and each vessel has been given a species guide to aid identification of turtles to species level. However, despite regulations, reports indicate that lines are preferentially cut rather than to dehook turtles (seen as a waste of time). Bather protection (shark) nets are regularly inspected (~ daily) and all live bycatch is recorded and released. H. Winker, S. Kerwath, D. Parker, M. Meyer, and Q. Mketsu, Department of Agriculture, Forestry and Fisheries. South Africa's Annual Report to the Ecologically Related Species Working Group (ERSWG) of the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) 2019. 20 pp.

b) **Devices that allow the escape of marine turtles** (e.g. turtle excluder devices (TEDs) or other measures that are comparable in effectiveness)

YES (Details/future plans)

> Details/future plans:

Fennessey, S. / Oceanographic Research Institute with the help of industry evaluated the need and value of

TEs. The fishery is not large enough, and the turtle bycatch is not large enough to justify. However, general BRDs are supported (Fennessy & Isaksen 2007) which will also serve to reduce the bycatch of sea turtles. .

Fennessy, S. & Isaksen, B. 2007. Can bycatch reduction devices be implemented successfully on prawn trawlers in the Western Indian Ocean - South African Journal of Marine Science 29(3): 453-463.

c) Measures to avoid encirclement of marine turtles in purse seine

NO (Details/future plans)

> Very low bycatch so specific regulations not warranted.

d) Appropriate combinations of hook design, type of bait, depth, gear specifications and fishing practices

YES (Details/future plans)

> Details/future plans:

Petersen, S. evaluated the impacts of longlining on vulnerable species. This thesis makes recommendations on mitigation. For sea turtles there are a range of measures that can be taken to reduce impact.

e) Monitoring and recovery of fish aggregating devices (FADs)

UNDER INVESTIGATION or NOT APPLICABLE

> Locally (on the east coast) regular law enforcement exercises are undertaken to remove all FADs encountered.

f) Net retention and recycling schemes

NO (Details/future plans)

> Nothing for trawlers or purse seiners. Only the lifting of shark nets during the annual sardine run where the potential for entanglement of target and non-target species (and resultantly net loss or damage) may be elevated.

g) Spatial and temporal control of fishing (e.g. seasonal closures of fishing activities)

NO (Details/future plans)

> Nothing turtle specific - although the majority of nesting beaches and coral containing reefs are protected in MPAs. An excellent network of marine protected areas exists with good spatial planning and the achievement of international biodiversity targets. MPA targets just increased to 5% of the EEZ including sea mount reserves for leatherback turtles.

h) Effort management control

YES (Details/future plans)

> All of the fisheries have capped effort either through a restricted number of rights holders or catch limits. However, none of these measures are specifically targeting sea turtles. Tugela banks prawn fishing closed from September to February i.e. includes peak summer - aimed at protecting recruitment of juvenile squaretail kob (*Argyrosomus thorpei*) and at reducing bycatch ~ 4 years / 6 years: Most likely benefiting developing green turtles.

1.4.5 Which of the following programmes has your country developed - in consultation with the fishing industry and fisheries management organisations - to promote implementation of measures to minimise incidental capture and mortality of turtles in national waters and in the high seas? [IND]

Please use the corresponding text boxes to explain/clarify each of your responses, including 'NOT APPLICABLE' responses, and indicate future plans in this regard. [IND]

Please describe the collaboration, when/where the programmes were introduced, any difficulties encountered, and general results obtained (i.e. successful and unsuccessful). Provide references to publications, where available.

a) Onboard observer programmes

X

YES (Details/future plans)

> Details/future plans:

Observers are present on all foreign flagged vessels fishing South African rights in terms of Joint Venture Agreements. Observer coverage for the entire longline fleet is stipulated as 20% stratified per vessel, time and area; all interactions with marine turtles during the fishing operations are recorded. Since 2013, all

vessels have been required to record interactions with marine turtles in their logbooks, and each vessel has been given a species guide to aid identification of turtles to species level

b) Vessel monitoring systems

YES (Details/future plans)

> All SA-flag commercial vessels are required to have VMS. VMS information can be useful to protect turtles through the identification of spatial overlap with fishing and turtle hot spot areas, as well as entry into protected areas.

c) Inspections (i.e. at sea, in port, at landing sites)

YES (Details/future plans)

> The majority of vessels (from all fisheries) are only inspected in port. There is limited coverage of these vessels. National level inspections are estimated to be ~ 80%. However, there is a large inconsistency along the South African coast in of enforcement. There is no national minimum requirement on monitoring authorities. South Africa has four patrol vessels that conduct inspections along SA's coastline.

However, the Department of Environmental Affairs along with SA Navy have increased their marine fleet and is in a position to enforce offshore compliance. Current activities along the South African eastern seaboard include anti-piracy activities as well as fisheries permit inspections

d) Training programmes / workshops to educate fishers

YES (Details/future plans)

> Awareness campaigns such as the Southern African Sustainable Sea Food Initiative (<http://www.wwfsassi.co.za/?m=1>) is trying to educate both sellers of sea food as well as consumers to be more critical about their sea food choices. Issues such as by-catch impacts from longlining is addressed, although it is not turtle specific. Training of compliance officers has taken place (as a BirdLife SA - WWF initiative) and awareness campaign for fishers was launched in Jan 2006 by BirdLife/WWF Responsible Fisheries Programme. No recent initiatives have been undertaken especially turtle specific endeavours. Training of observers as well as compliance officers should however be expanded before it can be effective.

e) Informative videos, brochures, printed guidelines etc.

YES (Details/future plans)

> Southern African Sustainable Sea Food Initiative - National campaign with booklets & training courses (available on <http://www.wwfsassi.co.za/?m=1>). A practical guide to understanding and reducing vulnerable bycatch by Samantha Petersen (BirdLife SA and WWF) and a brochure Keeping or endangered marine life off the hook: Benefits to fishers and marine life by Samantha Petersen (BirdLife/WWF Responsible Fisheries Programme SA). Identification guides for turtles and other by-catch (Birds, Sharks) are distributed together with the permit conditions of the Large Pelagic Longline Fishery. Guidelines on handling practices are included in the permit conditions. Observers are trained in Turtle ID.

1.4.6 Are the mitigation measures described in 1.4.4 and 1.4.5 periodically reviewed and evaluated for their efficiency? [SAP]

YES (Please give details)

> Permit conditions in the Large Pelagic Longline Fishery are reviewed annually. South Africa, being a member of three tuna directed Regional Fisheries Management Organisations (RFMOs), namely ICCAT, IOTC and CCSBT, is required to report data and bycatch mitigation measures to all three RFMOs annually. No in-depth analyses of mitigation measure effectiveness exist, but data from observers suggest that turtle bycatch has decreased by 80% in the last decade and survival has increased to 96%.

1.4.7 In your country, what types of data collection, research and development have been undertaken to support the reduction of marine turtle incidental catch (while taking into consideration the impact of various mitigation measures on other species)? [SAP]

> BirdLife SA and WWF have (jointly) reviewed the impacts of longlining and trawling on vulnerable species (see Petersen et al 2009). It assessed the impact of these sectors on vulnerable species including turtles. Kwa-Zulu Natal is collecting data on an ongoing basis to evaluate the impacts of shark nets (now partly replaced by drumlines) on target and non-target species. These figures are released annually with the season report for the nest protection programme by Ezemvelo KwaZulu Natal-Wildlife (Ezemvelo) (see Brazier et al 2012, and Nel 2014). The Department of Agriculture, Forestry and Fisheries has increased observer coverage in the large pelagic longline fishery to a minimum of 20%, with mandatory recording of turtle catch and release success. The increased awareness of industry due to the information included in the permit conditions and during road shows have improved the data collection. DAFF reports turtle by-catch and release by its longline fleet on an annual basis to ICCAT, IOTC and CCSBT. Prawn trawl bycatch impacts have been under review for the last 10 years by the Oceanographic Research Institute. The SA prawn fishery is very small and not really justified to be monitored continuously. However, turtle bycatch can be reduced by the implementation of BRDs targeting elasmobranchs which are caught more frequently (Fennessy & Isaksen 2007). Oceans and Coasts (O&C) and

partners are mapping the paths of leatherback turtles away from the nesting grounds using satellite tags to assess the spatial and temporal overlap of these migratory animals with fisheries.

***** Brazier, W., Nel, R., Cliff, G., Dudley, S., 2012. Impact of protective shark nets on sea turtles in KwaZulu-Natal, South Africa, 1981-2008. African Journal of Marine Science 34, 249-257. Nel, R., 2014. 50 Years of turtle conservation, monitoring and research: a state-of-knowledge report. Ezemvelo KZN Wildlife, Nelson Mandela Metropolitan University, p. 43. Petersen, S.L., Honig, M.B., Ryan, P.G., Nel, R., Underhill, L.G., 2009. Turtle bycatch in the pelagic longline fishery off southern Africa. African Journal of Marine Science 31, 87-96. Harris, L., Nel, R., Oosthuizen, H., Meÿer, M., Kotze, D., Anders, D., McCue, S., Bachoo, S., 2018. Managing conflicts between economic activities and threatened migratory marine species towards creating a multi-objective blue economy. Conservation Biology,32(2): 411-423.

1.4.8 Has your country exchanged information and provided technical assistance (formally or informally) to other Signatory States to promote the activities described in 1.4.4, 1.4.5 and 1.4.7 above? **[SAP]**

YES (If yes, please give details of the exchanges/technical assistance)

> These exchanges have mostly been informally through activities of parastatals or NGOs. BirdLife SA particularly has sent a country representative to attend and present at an IOTC bycatch working group meeting. Birdlife SA has also developed and distributed material aimed at observers. This material was made available to representatives of neighbouring countries (Namibia and Mozambique particularly). The Oceanographic Research Institute tested the efficacy of BRDs in local (South African and Mozambican prawn fisheries) and presented the results at 3 different events (two regional FAO workshops and a WIOMSA conference) attended by all of the WIO signatories and non-signatories. All of these activities were pre-2010 with nothing new since.

1.4.9 What legislative and practical measures has your country taken in support of UN General Assembly Resolution 46/215 concerning the moratorium on the use of large-scale driftnets? **[SAP]**

> Driftnets are banned in South Africa since 1998 when new legislation, the Marine Living Resources Act, came into effect.

1.5 Addressing harvest of, and trade in, marine turtles; and protecting of habitat

1.5.1 Does your country have legislation to prohibit direct harvest and domestic trade in marine turtles, their eggs, parts and products; and to protect important turtle habitats? **[IND]**

Please provide details (title/date) of the relevant legislation, as well as any exemptions (e.g. for traditional harvest) under that legislation.

YES

> • The National Environmental Management Act (NEMA) (Act 107 of 1998) is the overarching environmental legislation. The NEMA has six Specific Environmental Management Acts (SEMA's), among them are the Biodiversity Act (Act 10 of 2004) and the Protected Areas Act (Act 57 of 2003).

-- National Environmental Management: Biodiversity Act (NEM:BA) (Act 10 of 2004) ensures the management and protection of species and ecosystems.

----- Section 51-57 (Chapter 4): Addresses Threatened or Protected species and ecosystems. This is to ensure that these species are protected to ensure their ecological integrity and species survival. The Threatened or Protected Species (ToPS) Regulation (instituted under NEM:BA) is currently under review. However, Section 56 (1) stipulates that any activity involving a specimen listed threatened or protected species requires a permit. The Threatened or Protected Marine Species Regulations was gazetted in 2017, following an amendment from the 2007 TOPS Regulations. All sea turtles in South Africa are protected according to law, and there are specific provisions outlined with regards to turtles. The Regulations under its definition of "Harassing" stipulates that this "means a behaviour or conduct that threatened, disturbs or torments a live specimen of a listed threatened or protected marine species, and includes-

a)...

b)...

c)...

d. in the case of turtles, photographing or shining a light at a turtle at night, climbing on, touching or flipping over a turtles or digging up turtle nests or eggs;

d....

These regulations provide full protection to turtles/products. The National Environmental Management: Biodiversity Act, under which the TOPMS Regulations are gazetted, also provide protection of habitats in need of protection. A consequence of this regulation is that a permit is needed in terms of the TOPMS Regulations to undertake any activity (excluding research) pertaining to turtles. There are very permits issued to Researchers and national aquaria to be in possession of turtles. The Regulations also covers live strandings (including hatchlings) where anyone in possession of a turtle without a permit can be in contravention of the law. Research of marine species as well as marine and coastal habitats is covered under the Marine Living Resources Act.

----- Chapter 7 of NEM:BA gives clear directions regarding the permit process. This further ensures that the harvesting of turtles and its derivatives are protected.

-- National Environmental Management: Protected Areas Act (Act 57 of 2003) Provides for the protection and conservation of ecologically viable areas representative of the biological diversity. iSimangaliso Wetland Park has been declared a World Heritage Site under the World Heritage Convention (Act 49 of 1999). The NEM:PAA makes provision in Section 50 for the Management Authority of a protected area to allow for any commercial activity within the protected area provided that it may not impact negatively on the survival of any species or significantly disrupt the integrity of the ecological system of the protected area. In terms of the marines turtles, harvesting was banned in Kwa-Zulu -Natal by the Natal Coastal Fisheries Ordinance (Hughes, 1989). Due to the low levels of breeding females, any harvesting of marine turtles or any of its eggs, parts or products will result in an illegal activity. The combination of this legislation ensures that the turtles, its eggs, parts and products and turtle habitats are fully protected according to the country's environmental legislation. South Africa is also a Signatory to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) for about 40 years, ensuring that these sentiments are upheld across our borders insofar possible. Recent reports have recently indicated that impoverished communities living outside of protected areas (in remote areas) are targeting juvenile green turtles.

1.5.2 Which, among the following list, are economic uses and cultural values of marine turtles in your country? [INF]

Please rate the relative prevalence / importance of each consumptive or non-consumptive use. Use the text boxes below each rating to explain or clarify your responses.

a1) Meat consumption

YES

> The conservation and monitoring programme was introduced in 1963. The use of turtle meat has now been reduced to less than one turtle slaughtered per annum from the protected areas. However, there are suggestions of illegal harvesting in the former Transkei areas, harvesting non-nesting juvenile green turtles entering estuaries.

a2) Meat consumption: relative prevalence/importance

UNKNOWN

b1) Egg consumption

YES

> This was a use prior to 1963. The incidence of (attempted) nest raiding by people has dropped and is less than 5 per annum. (Nel, pers obs; Ezemvelo unpublished data; S. Kyle pers comm 2014). This is also illegal in accordance to the Threatened or Protected Marine Species Regulations gazetted in May 2017.

b2) Egg consumption: relative prevalence/importance

LOW

c1) Shell products

NO

c2) Shell products: relative prevalence/importance

UNKNOWN

> The acquisition of any parts and derivatives is prohibited unless a permit is obtained. Turtles are protected in accordance with the Threatened or Protected Marine Species Regulations

d1) Fat consumption

NO

d2) Fat consumption: relative prevalence/importance

UNKNOWN

e1) Traditional medicine

YES

e2) Traditional medicine: relative prevalence/importance

LOW

> In the late nineties, suggestions that eating sea-turtle eggs will cure HIV/Aids was propagated. It was through the cooperation of the local Thonga amaKhosi and Ezemvelo KZN Wildlife that this was dispelled (Hughes 2012)

Hughes, G. 2012. Between the Tides. In search of sea turtles. Janaca Media. Cape Town, Republic of South

Africa

f1) Eco-tourism programmes

YES

f2) Eco-tourism programmes: relative prevalence/importance

HIGH

> Between 4 - 8 tour operators have concessions in iSimangaliso which operate for approximately 90 days during the nesting season either through walk-on and drive concessions. The number of visitors viewing sea turtles per annum on concession tours is estimated to range between 5000 to 9000 pa. It is thus by far the most important activity related to sea turtles. All of the major aquaria in the country also host rehabilitated sea turtles, with dedicated turtle displays at two rehabilitation centres (uShaka and Bayworld) and rehabilitation programs at these two and Two Oceans Aquarium.

g1) Cultural / traditional significance

YES

g2) Cultural/traditional significance: relative prevalence/importance

MODERATE

> The turtle monitoring programme was initiated in 1963 because nesting were being slaughtered as they emerged from the water to nest. The effect was that nesting numbers of turtles started to recover while incidents of slaughtering and nest raiding dropped significantly (Nel et al 2013). The monitoring programme went from strength to strength and became dependent on greater participation from local communities. The monitoring programme now employs and pay people that were otherwise subsistence farmers in the protected area. Employment notices are sent into the communities and interviews are conducted at the beginning of the season assessing particular basic skills. Successful candidates are then provided with the necessary identification gear (like programme t-shirts, caps, rain gear, torch lights, reflective vests and watches, as well as transport to town on month-end shopping days). The outcome was that there is now "authority" and "prestige" associated with turtle conservation, plus a limited amount of training (possibly increased employability) and support. As a consequence, approximately 15 - 20 households are thus directly supported off the monitoring programme with an additional ripple effect generating (indirect) income and opportunity for other members of the community (through craft and curio selling, carrying gear, guiding, domestic services and babysitting) by attracting turtle-viewing tourist to the area. The attitude/value has thus changed from "consumptive use" to a sustainable non-consumptive, conservation ethic. One superstition that has remained though is that the high fecundity of turtles can be transferred to domestic animals. Sometimes turtle eggs are fed to chickens in the hope that the chickens will increase their production. (R Kyle pers comm).

Nel, R., Punt, A.E., Hughes, G.R. (2013) Are Coastal Protected Areas Always Effective in Achieving Population Recovery for Nesting Sea Turtles? PLoS ONE 8, e63525.

1.5.3 Please indicate the relative level and impact of traditional harvest on marine turtles and their eggs. [IND, TSH]

	RELATIVELY HIGH	UNKNOW N	NON E	RELATIVELY LOW	MODERAT E
Level of harvest:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Impact of harvest:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Source of information / explanation:

> De Wet, A., 2013. Factors affecting survivorship of loggerhead (Caretta caretta) and leatherback (Dermochelys coriacea) sea turtles of South Africa, Zoology Department. Nelson Mandela Metropolitan University, Port Elizabeth, p. 196.

Nel, R., Punt, A.E., Hughes, G.R. (2013) Are Coastal Protected Areas Always Effective in Achieving Population Recovery for Nesting Sea Turtles? PLoS ONE 8, e63525.

New anecdotal information suggests harvesting of non-nesting turtles outside of MPAs in remote parts of the country. The extent of the impacts is not known.

1.5.4 Have any domestic management programmes been established to limit the levels of intentional harvest? [SAP]

Use the text box to give details.

YES

> Yes - a very effective turtle monitoring programme with a concomitant law enforcement component exists in South Africa. Nesting beaches are patrolled nightly (and early morning) through-out the entire nesting and hatching season, for the entire peak nesting area which makes it difficult for any person (local or foreign) to harvest turtle/products. This has been in existence since 1963 and covers an approximately 85km stretch of beach from the South African/Mozambican border south to Sodwana Bay. South Africa has supported a monitoring program across the border around Ponto Du Oro / Malongane area.

1.5.5 Describe any management agreements negotiating between your country and other States in relation to sustainable levels of traditional harvest, to ensure that such harvest does not undermine conservation efforts. **[BPR]**

> No formal agreements. As per 1.5.4 the interactions are mostly informal taking place at a provincial/programme to programme level. A Peace Park (Africa's first Trans Frontier Marine Park) has been created between Mozambique and South Africa including the bulk of the turtle nesting area. This park arrangement facilitates close co-operation on across border law enforcement activities. There is an active project currently to expand the iSimangaliso World heritage site with another 100km into Mozambique to Maputo. The nomination to UNESCO will be submitted by end 2021.

1.6 Minimizing mortality through nesting beach programmes

1.6.1 Measures and effectiveness

First, tick one of the YES/NO-boxes to indicate whether or not your country has any of the following measures in place to minimise the mortality of eggs, hatchlings and nesting females. If yes, then **estimate the relative effectiveness** of these measures. **[IND, SAP]**

Use the text boxes below each rating to elaborate on your responses, including any lessons learned that might be of value to other Signatory States, and indicate your plans for the coming year. Please explain any "Not Applicable (N/A)" responses.

a1) Monitoring/protection programmes

YES

a2) Monitoring/protection programmes: relative effectiveness

EXCELLENT

> This is the strongest aspect of turtle conservation in South Africa. The programme was initiated in 1963 where the highest density rookery (8km) was monitored. Over time the area was expanded and 56km of beach is now monitored for 5 months of the year, either on foot or by vehicle. The consistent increase in the number of nests per season indicates that this programme is very successful.

Nel, R., 2014. 50 Years of turtle conservation, monitoring and research: a state-of-knowledge report. Ezemvelo KZN Wildlife, Nelson Mandela Metropolitan University, p. 43.

Nel, R., Punt, A.E., Hughes, G.R., 2013. Are Coastal Protected Areas Always Effective in Achieving Population Recovery for Nesting Sea Turtles? PLoS ONE 8, e63525.

b1) Education/awareness programmes

YES

b2) Education/awareness programmes: Relative effectiveness

GOOD

> Three particular programmes are currently in place:

a) a 3-day training programme for turtle monitors: this training is not limited to only monitoring skills, but include aspects of turtle biology, life history, threats, and potential conservation measures. It has been found that if monitoring and conservation is contextualised the outcomes of the monitoring programme is greater (data more reliable and consistent).

b) a 1-day training programme for tour operators: the training is very similar to the monitor training and also cover turtle biology, life history and threats. The operator training then expands to cover appropriate behaviour and best practice principles of tourists around a turtle.

c) an Eco-School programme was in place. This programme targeted teachers of two grade classes (one junior and one senior) at 10 schools in/around iSimangaliso. The school syllabus is modified and adapted to use sea turtles as a flagship to bring across different concepts. However, this programme is replaced with regular contact between the conservation officer tasked with Community Conservation visiting each school in iSimangaliso informing them about sea turtles and related conservation issues. This message is also expanded to visitors to the Park during peak holidays.

Monitor and tour operator training is conducted at the beginning of each season whereas the school activities takes place on an ongoing basis. Most of the organised programmes are focussed around the conservation areas. This totals to presentations to ~21 schools, 25 groups mainly tourists but Ezemvelo staff.

c1) Egg relocation/hatcheries

N/A

> The long-term monitoring programme negates the current need for relocation/hatcheries. It was however used in the past when there was a serious threat to the main loggerhead rookery due to a potential harbour development. The future need for it is however consistently monitored and will be used if necessary.

c2) Egg relocation/hatcheries: Relative effectiveness

UNKNOWN

> The long-term monitoring programme negates the current need for relocation/hatcheries. It was however used in the past, between 1983 and 1993 when approximately 200 000 loggerhead turtle eggs were translocated from the beaches of the Maputaland MPA to the beaches south of Sodwana Bay within the St. Lucia MPA (both of which are now incorporated into the iSimangaliso MPA). This was done in response to Swaziland claiming that parts of its territory were incorporated unlawfully into South Africa during the 19th Century. The disputed areas include portions of land found in Mpumalanga and the northern KwaZulu-Natal. It was speculated at the time that the Swazi government wanted access to the Indian ocean via Kosi Bay, which remained undeveloped. Kosi Bay would have been developed into a deepwater harbour, and the loggerhead hotspot north of Bhanga Nek would have been destroyed. The future need for it is however consistently monitored and will be used if necessary.

d1) Predator control

N/A

d2) Predator control: Relative effectiveness

LOW

> Predator control Was evaluated by De Wet (2013) indicating low levels of predation and high levels of hatching and emergence success for both loggerhead and leatherback turtles.

De Wet, A., 2013. Factors affecting survivorship of loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*) sea turtles of South Africa, Zoology Department. Nelson Mandela Metropolitan University, Port Elizabeth, p. 196.

e1) Vehicle / access restrictions

YES

e2) Vehicle/access restriction: relative effectiveness

EXCELLENT

> South Africa has instituted a national ban on the use of offroad vehicles (ORV's) in the coastal zone since 2002. Driving in the coastal zone is only possible under a "permissible use" as identified in the regulations or a permit/exemption granted under these regulations. Within the iSimangaliso MPA, vehicle access to the coastal zone is strictly controlled via a permitting process and is only allowed:

- a) at licenced boat launch sites within the park,
- b) Conducting scientific research
- c) Operating tourism businesses – in this case, ferrying tourists to observe nesting turtles
- d) Film/documentary production
- e) By an employee or agent of an organ of state acting in the course and scope of their employment or mandate, or by any person contracted by an organ of state, for the purposes of performing the public duties of that organ of state mandated by law
- f) Emergencies.

f1) Removal of debris / clean-up

YES

f2) Removal of debris /clean-up: relative effectiveness

EXCELLENT

> There are three particular programmes:

- a) The international beach clean-up day. This functions as a significant awareness-raising day involving politicians, local authorities, schools etc. while cleaning up the beach. This event is generally very well organised and supported.
- b) The Working for the Coast programme. This programme takes place on an ongoing basis. Individuals from poor communities are employed to do various labour intensive, limited-skills tasks on the coast including beach cleaning and removal of alien vegetation. This is a multimillion rand, national programme but is particularly useful in parks and remote areas that do not receive such services from local authorities.
- c) Municipal solid waste removal projects: are operating in all urban and peri-urban coastal towns. During peak holiday periods (like new year which overlap with turtle nesting and hatching) the programme is

intensified and beaches are cleaned on a daily basis.

d) The Department of Environmental Affairs has also launched the Good Green Deeds programme in 2019.

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c) Municipal solid waste removal projects: are operating in all urban and peri-urban coastal towns. During peak holiday periods (like new year which overlap with turtle nesting and hatching) the programme is intensified and beaches are cleaned on a daily basis.

d) In 2019, the Department of Environmental Affairs launched the Good Green Deeds programme. A programme aimed to promote a South Africa that is clean of litter and illegal dumping and urges citizens to adopt sustainable living practices through responsible management of waste.

e) South Africa has amended its fiscal and waste management policy to introduce environmental levies for plastic bags and is looking at investments in plastic palletization plants which is looks at way to divert plastic waste from landfill sites. South Africa has also conducted a Plastic Material Flows and End of Life Management Study to assess the current status with regard to the production and management of plastics and identified barriers to improving the diversion of plastics from landfill sites.

f) In 2014, the Department of Environmental Affairs launched its National Coastal Management Programme under the National Environmental Management: Integrated Coastal Management Act to prioritise the management of pollution in the coastal zone. Under that priority, South Africa adopted Management Objective 4.3, which is to develop and implement programmes to address marine litter.

g1) Re-vegetation of frontal dunes

YES

g2) Re-vegetation of frontal dunes: relative effectiveness

EXCELLENT

> All the turtle nesting habitat in SA is located in protected areas with restricted access and very low levels of development. There is however on occasion impacts on frontal dunes. The philosophy applied to date has been that if primary dunes are impacted through natural causes (like wind blow-outs or storm erosion) it has to self-rehabilitate. If the degradation is due to public access, trampling or driving it is rehabilitated through brush-packing and signage erected to redirect traffic, unless it is in a "sacrificial area". Sacrificial areas are areas that are in permanent use and instead of "rehabilitation", "mitigation" is used as a principle. This generally include hardening of ramps using natural material "ladders" across the sand to stabilise the area and redirecting the opening of ramps/access paths not to face into the predominant wind direction which could cause severe blow-outs. Exotic vegetation such as Casuarina trees are also systematically being removed from nesting areas.

h1) Building location/design regulations

YES

h2) Buidling location/design regulations: relative efectiveness

EXCELLENT

> The turtle nesting beaches in SA have been proclaimed RAMSAR sites and protected areas since the mid-70's. The effect is that the coastal area is pristine with a maximum of 7 development nodes, 3 with <1km beach facing extent and 3 undetectable from the beach (out of ~ 180km). The only "not ideal" developments are ironically the turtle management and research station (at Bhanga Nek) and a police camp. These are restricted to 3 houses facing the beach from the frontal dunes and an eroded ramp at the police camp. All other developments are located behind primary or secondary dunes. Any new developments (irrespective of

size) go through an Environmental Scoping procedure. Furthermore, a new Integrated Environmental Coastal Management Act has been passed - protecting the coast and set out specific guiding principles and policies for all developments and activities along the coast.

i1) Light pollution reduction

YES

i2) Light pollution reduction: Relative effectiveness

EXCELLENT

> As per the previous two points, there are very few developments along the nesting beaches and those that are there are sheltered by frontal dunes. The developments around the nesting beaches are generally not on the national electricity grid and many require generators for electricity. The generators do not run past 10pm allowing for a temporal escape from lights for turtles. The larger development nodes generally have sheltered lights.

1.6.2 Has your country undertaken any evaluation of its nest and beach management programmes? [SAP]

Use the text box to elaborate on your response, if necessary.

YES

> Turtle monitoring has been taking place annually since 1963. A Season Report is drafted annually highlighting the population nesting trends, shark net catches, tag returns as well as management problems experienced during the season. The report will provide feedback on each of the aspects listed above (if it was problematic). The report is an internal Ezemvelo report that is sent to all other authorities (Park Authority, Oceans and Coasts etc) and donors. A full review of populations trends took place in 2010 which produced two academic publications.

Nel, R., Punt, A.E., Hughes, G.R., 2013. Are Coastal Protected Areas Always Effective in Achieving Population Recovery for Nesting Sea Turtles? PLoS ONE 8, e63525.

Thorson, J.T., Punt, A.E., Nel, R., 2012. Evaluating population recovery for sea turtles under nesting beach protection while accounting for nesting behaviours and changes in availability. Journal of Applied Ecology 49, 601-610.

OBJECTIVE II: PROTECT, CONSERVE AND REHABILITATE MARINE TURTLE HABITATS

2.1 Measures to protect and conserve marine turtle habitats

2.1.1 What is being done to protect critical habitats outside of established protected areas? (NB: It is assumed that legislation relating to established protected areas will have been described in Section 1.5.1) **[BPR, SAP]**

> The National Biodiversity Assessment process evaluate the integrity and status of all terrestrial, coastal and marine habitats. Management actions are enacted based on the outcomes of these assessments. For example, South Africa's cabinet has approved 20 new Marine Protected Areas (MPAs) in October 2018. These new MPA's will be gazetted in accordance with the National Environmental Management: Protected Areas Act (No. 57 of 2003), which will be augment the current network of MPA's. The increase protection from 0.5% to 5% and will increase protection of offshore ecosystem, which will take effect in 1 August 2019.. There are also other marine spatial programs that identify Critical Biodiversity Areas and Ecologically and Biologically Significant areas to ensure additional management of coastal and marine habitats in addition to protected areas.

2.1.2 Are assessments routinely made of the environmental impact of marine and coastal development on marine turtles and their habitats? **[IND, SAP]**

Use the text box to elaborate on your response.

YES

> Existing programmes include:

- Annual turtle nest monitoring
- 5-yearly National Spatial Biodiversity Assessment and KwaZulu-Natal's spatial use and habitat status (C-Plan)
- Ongoing reef monitoring in iSimangaliso by Ezemvelo and the Oceanographic Research Institute.

2.1.3 Is marine water quality (including marine debris) monitoring near turtle habitats? If yes, describe the nature of this monitoring and any remedial measures that may have been taken. **[SAP]**

NO

> River run-off is measured periodically by the Department of Water & Sanitation (DWS) although the input into the marine environment along the turtle beaches is not measured directly. The reason being that the nesting habitat is in a protected area with relatively low levels of adjacent development/industry/agriculture. It is thus not applicable. However, marine debris, particularly plastic pollution, is becoming a serious problem with near annual mass strandings of sea turtle hatchlings, frequently with plastic in the intestines. Ryan PG, Cole G, Spiby K, Nel R, Osborse A, Perold V (2016) Impacts of plastic ingestion on post-hatchling loggerhead turtles off South Africa. Marine Pollution Bulletin 107: 155-166.

2.1.4 Are measures in place to prohibit the use of poisonous chemicals and explosives? **[SAP]**

Use the text box to elaborate on your response.

YES

> The nesting beaches of turtles are protected and fall within a World Heritage Site, therefore, these activities are prohibited within the area.

However, there are multiple pieces of legislation that are in place as well as good enforcement thereof. Inter alia:

- Marine Living Resources Act (Act 18 of 1998)
- National Environmental Management Act No 107 of 1998
- National Environmental Management: Waste Act (Act 59 of 2008) • Explosives Act (Act 15 of 2003)
- Hazardous Substances Act (Act 15 of 1973)

Pollution levels were recently evaluated.

du Preez M, Nel R, Bouwman H (2018) First report of metallic elements in loggerhead and leatherback turtle eggs from the Indian Ocean. Chemosphere 197:716-728

2.2 Rehabilitation of degraded marine turtle habitats

2.2.1 Are efforts being made to recover degraded coral reefs? If yes, give details (location, duration, effectiveness, lessons learned, future plans etc.). **[IND, SAP]**

Provide sufficient details of the measures taken, especially those measures shown to have been effective in recovering degraded coral reefs. Please indicate future plans in this regard.

NOT APPLICABLE (no degraded coral reefs)

> There is no indication that the rocky reef covered in a coral veneer is degraded in SA. No extractive use is allowed on any of the coral reefs. Further, most of the coral reefs in SA are not only in protected areas but in sanctuary areas unavailable to public access. Coral bleaching is currently not an extensive problem although it should be monitored.

2.2.2 Are efforts being made to recover degraded mangrove habitats that are important for turtles? If yes, give details (location, duration, effectiveness, lessons learned future plans etc.). **[IND, SAP]**

NOT APPLICABLE (no mangrove habitats important for turtles)

> Details/future plans:

Mangrove habitats are marginal in South Africa. They are relatively small and occur to some extent in many of the estuaries along the eastern seaboard. Some of the mangroves are under pressure from poor estuarine management practices; water abstraction has led to a large fraction of the estuaries changing to temporary open-closed systems with a reduced tidal influence and being closed for extended periods of times. However, this habitat has not been of any importance to sea turtles in the past, although there is some anecdotal evidence of young green turtles using estuaries which also have estuaries. It is unclear if these habitats play a significant role in sea turtle life histories in SA

2.2.3 Are efforts being made to recover degraded sea grass habitats? If yes, give details (location, duration, effectiveness, lessons learned future plans etc.). **[IND, SAP]**

NOT APPLICABLE (No degraded sea grass habitats)

> Typical sea grass beds (mostly used by green turtles) are absent in SA. Sea grass occur only in the shallow sub-tidal margin on rocky habitats and in large intertidal rock pools. These habitats are restricted to the most northern part of the country, already protected in the World Heritage Site. There is no degradation of this habitat and thus no rehabilitation required. Dietary studies have indicated that green turtles in South Africa feed extensively on green and red algae including Caulerpa, Gelidium, and Codium.

OBJECTIVE III: IMPROVE UNDERSTANDING OF MARINE TURTLE ECOLOGY AND POPULATIONS THROUGH RESEARCH, MONITORING AND INFORMATION EXCHANGE

3.1 Studies on marine turtles and their habitats

3.1.1 Give a list of available literature that includes baseline information from studies carried out in your country on marine turtle populations and their habitats. **[INF]**

> Nolte, C. 2019 The distribution of South African sea turtles as indicated by epibionts and stable isotopes. Unpublished MSc Thesis, Nelson Mandela University. 140 pages

Pretorius, D 2019. Zoning the Western Indian Ocean to mitigate conflict between ocean-based hydrocarbon exploration and production on sea turtles. Unpublished MSc Thesis, Nelson Mandela University, 148 pages.

New Literature:

de Vos D, Nel R, Schoeman DS, Harris LR, du Preez, D (2019) Effect of introduced Casuarina trees on the vulnerability of sea turtle nesting beaches to erosion. *Estuarine Coastal and Shelf Science* 223:147-158.

du Preez M, Nel R, Bouwman H (2018) First report of metallic elements in loggerhead and leatherback turtle eggs from the Indian Ocean. *Chemosphere* 197:716-728

Harris, L., Nel, R., Oosthuizen, H., Meÿer, M., Kotze, D., Anders, D., McCue, S., Bachoo, S., 2018. Managing conflicts between economic activities and threatened migratory marine species towards creating a multi-objective blue economy. *Conservation Biology*,32(2): 411-423.

Le Gouvello D, Nel R, Harris LR, Bezuidenhout K, Woodbourne S (2017) Identifying potential pathways for turtle-derived nutrients cycling through beach ecosystems. *Marine Ecology Progress Series*, 583:49-62.

Robinson, NJ, Moreale, SJ, Nel, R, Paladino, FV (2017) Movements and diving behaviour of inter-nesting leatherback turtles in an oceanographically dynamic habitat in South Africa. *Marine Ecology Progress Series* 571: 221-232.

Le Gouvello D, Nel R, Harris LR, Bezuidenhout K (2017) The response of sandy beach meiofauna to nutrients from sea turtle eggs. *Journal of Experimental Marine Biology and Ecology* 487:94-105.

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Robinson NJ, Morreale SJ, Nel R, Paladino FV (2016) Coastal leatherback turtles reveal conservation hotspot. *Scientific Reports* 6:37851.

Robinson NJ, Majewska R, Lazo-Wasem E, Nel R, Paladino FV, Rojas L, Zardus JD, Pinou T (2016) Epibiotic diatoms are universally present on all sea turtle species. *PLoS ONE* 11(6): e0157011.

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Harris LR, Nel R, Oosthuizen H, Meÿer M, Kotze D, Anders D, McCue S, Bachoo S (2015) Paper-efficient multi-species conservation and management are not always field-effective: The status and future of Western Indian Ocean leatherbacks. *Conservation Biology* 191: 383-390.

Shamblin, B.M., A.B. Boltzen, F. A. Abreu-Grobois, K.A. Bjørndal, L. Cardona, C.C. Carreras, M. Clusa, C. Monzón-Argüello, C.J. Nairn, J.T. Nielsen, Ronel Nel, L.S. Soares, K.R. Stewart, O. Türkozan, Peter H. Dutton. (2014)

Loggerhead turtle phylogeography and stock structure revisited with expanded mitochondrial control region sequences. *PLoS ONE* 9(1): e85956.

Tucek J., Nel R, Girandot, M & Hughes, G. (2014) Estimating reproductive age and size of loggerhead sea turtles. *Endangered Species Research* 23:167-175.

Nel, R., Punt, A.E., Hughes, G.R. (2013) Are Coastal Protected Areas Always Effective in Achieving Population Recovery for Nesting Sea Turtles? *PLoS ONE* 8, e63525.

De Wet, A., 2013. Factors affecting survivorship of loggerhead (*Caretta caretta*) and leatherback (*Dermodochelys coriacea*) sea turtles of South Africa, Zoology Department. Nelson Mandela Metropolitan University, Port Elizabeth, p. 196.

Brazier, W., R. Nel, G. Cliff, & S. Dudley (2012). Impact of protective shark nets on sea turtles in KwaZulu-Natal, South Africa: 1981-2008. *Afr. J. Mar Sci* Vol 34(2):249-257.

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Boonzaaier, M.K., 2011. The effect of incubation temperature on hatching success and hatchling sex ratios of loggerhead turtles (*Caretta caretta*) in KwaZulu-Natal, South Africa, Zoology. Nelson Mandela Metropolitan University, Unpublished Thesis, p. 111.

Petersen, S., M.B. Honig, P.G. Ryan, R. Nel, L.G. Underhill 2009. Turtle Bycatch in the pelagic longline fishery off southern Africa. *African J. Marine Science* : 31(1):87-95.

McALLISTER, H.J., A.J. BASS, H.J. VAN SCHOOR. 1965. Marine turtles on the coast of the Tongaland, Natal. *The Lammergeyer* 3(2): 10-40.

HUGHES, G.R., A.J. BASS, M.T. MENTIS 1967. Further studies on the marine turtles in Tongaland I. The Lammergeyer 7: 5-54.

HUGHES, G.R., M.T. MENTIS 1967. Further studies on the marine turtles in Tongaland II. The Lammergeyer 7: 55-72.

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HUGHES, G R. 1971. Sea turtle research and conservation in South Africa. I U C N Publ. New Series supp. Pap., (31) : 57-67.

HUGHES, G R. 1971. Preliminary report on the sea turtles and dugongs of Mozambique. Veterin. Mocambicana, 4(2) : 45-62.

HUGHES, G R. 1972. The olive ridley sea turtle (*Lepidochelys olivacea*) in South East Africa. Biol. Conserv., 4(2) : 128-134. HUGHES, G R. 1972. Preliminary report to the Southern Africa Wildlife Foundation (World Wildlife Fund) on the status of sea turtles in South East Africa. Section 2 : Madagascar and the Mascarenes. Part 4 : Mauritius and the St Brandon turtle fishery. O.R.I. Special Report : 1-10.

HUGHES, G R. 1973. The survival situation of the hawksbill sea turtle (*Eretmochelys imbricata*) in Madagascar. Biol. Conserv., 5(1) : 41-45. HUGHES, G R. , B. Huntley and D. Wearne, 1973. Sea turtles in Angola. Biol. Conserv., 5(1) : 92-93.

HUGHES, G R. 1973. The sea turtles of South East Africa. Thesis submitted for the degree of Doctor of Philosophy, University of Natal, Durban, 1-409.

HUGHES, G R. 1976. The green turtle fishery of St Brandon. Proc. Roy. Soc. Arts and Science Mauritius. III (2) : 165-189. HUGHES, G R. 1976. Irregular reproductive cycles in the Tongaland loggerhead sea turtle, *Caretta caretta* L. Zool. Africana II (2): 285-292.

HUGHES, G R. 1977. Sea turtles : a guide. Natal Parks Board, Pietermaritzburg, 1-22.

HUGHES, G R. 1978. Marine turtles. IN : Ed. A E F Heydorn. Ecology of the Agulhas Current Region. Proc. Roy. Soc. S. Afr. 43(2) : 151-190.

HUGHES, G R. 1978. Diving record for leatherback sea turtle. Lammergeyer, 26 : 64. HUGHES, G R., and C. W. Sapsford, 1978. Body temperature of the loggerhead sea turtle *Caretta caretta* and the leatherback sea turtle *Dermochelys coriacea* during nesting. Zoo. Africana 13(1) : 63-69.

HUGHES, G R. 1982. Nesting cycles in sea turtles, typical or atypical - IN : Proc. "First World Conference on Sea Turtle Conservation" Ed. K. Bjorndal, Washington D.C. November 1979. pp 81-89.

HUGHES, G R. 1982. The conservation situation of sea turtle populations in the South African Region. IN : Proc. "First World Conference on Sea Turtle Conservation" Ed. K. Bjorndal, Washington D.C. November 1979. pp 297-303.

HUGHES, G R. , and J y LE GALL, 1987. Migration de la tortue verte *Chelonia mydas* a l'Ocean Indian a partir des marquages su les sites du ponte Europa and Tromelin (1970 1985) Amphibia Reptilia : 277-282.

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BALDWIN R., G.R. HUGHES AND R.I.T PRINCE 2003. Loggerhead turtles in the Indian ocean. (Chapter 14) In Bolten, A. B. Witherington B.E. (eds) Loggerhead Sea turtles. Smithsonian Books, Washington. P218-232.

SCHLEYER, M. L. CELLIERS. 2005. Modelling reef zonation in the Greater St Lucia Wetland Park, South Africa. Estuarine Coastal and Shelf Science 63:373-384.

3.1.2 Have **long-term** monitoring programmes (i.e. of at least 10 years duration) been initiated or planned for priority marine turtle populations frequenting the territory of your country? **[IND, BPR]**

Please give details of the nature, duration and continuity of these programmes.

YES

> In 1963 a long-term monitoring programme was initiated, monitoring the nesting loggerhead and leatherback turtles over a 8km stretch of beach. In 1972 this area was expanded to 60km including the highest density areas of both these species. During the course of the last 5 years, the nest monitoring area has been further expanded to the current 85 km stretch of beach from Sodwana Bay north to the South African/Mozambican border.

Shark- net bycatch (outside of protected areas) have been monitored for ~ 20 years. This is the only consistent information on non-nesting species in SA (including green turtles, hawksbill and olive ridleys). Strandings reporting is haphazardly done and reported through rehabilitation programmes at aquaria. Robinson NJ, Stewart KR, Dutton PH, Nel R, Paladino FV, Santidrián Tomillo P (2017) Standardising curved carapace length measurements for leatherback turtles, *Dermochelys coriacea*, to investigate global patterns in body size. Herpetological Journal 26: 133-136.

3.1.3 Has the genetic identity of marine turtle populations in your country been characterised? **[INF, PRI]**

Please give details (e.g. which species, which populations?).

YES

> BOWEN B.W., KAMEZAKI N., LIMPUS C.J., MEYLAN A.I. AND AVISE J.C., & HUGHES, G. 1994. Global phylogeography of the loggerhead turtle (*Caretta caretta*) as indicated by mitochondrial DNA haplotypes. *Evolution* 48 (6): 1820 - 1828.

DUTTON, P.H., B.W. BOWEN, D.W. OWENS A. BAQRAGAN AND S.K. DAVIS. 1999. Global phylogeography of the leatherback turtle (*Dermochelys coriacea*). *J. Zool. Lond.* 248:397-409.

Shamblin, B.M., A.B. Bolten, F. A. Abreu-Grobois, K.A. Bjorndal, L. Cardona, C.C. Carreras, M. Clusa, C. Monzón-Argüello, C.J. Nairn, J.T. Nielsen, Ronel Nel, L.S. Soares, K.R. Stewart, O. Türkozan, Peter H. Dutton. (2014) Loggerhead turtle phylogeography and stock structure revisited with expanded mitochondrial control region sequences. *PLoS ONE* 9(1): e85956.

Hickman, S. 2017 The origin of immature loggerhead (*Caretta caretta*), green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) turtles frequenting South African waters. Unpublished BSc Hons project, Nelson Mandela University. 25 Pages.

The genetic identity of the marine turtles of the iSimangaliso Wetland Park is underway at Nelson Mandela University as part of a Pew Marine Fellowship. Results expected to be completed in 2022.

3.1.4 Which of the following methods have been or are being used to try to identify migration routes of turtles? Use the text boxes to provide additional details [INF, PRI]

a) Tagging

YES (Details/future plans)

> Flipper tagging of both nesting loggerhead and leatherback females.
 Flipper tagging of turtles caught alive in bather protection nets.
 Satellite tagging of nesting loggerhead and leatherback turtles
 Satellite tagging a few non-nesting green and hawksbill turtles as well as rehabilitated turtles released from national aquaria (since 2017).
 Spatial modelling of satellite tagging data to identify migration routes for nesting loggerhead and leatherbacks.
 Oceanographic modelling of loggerhead and leatherback hatchling dispersal from the nesting ground.
 Epibionts and stable isotopes of nesting loggerhead and leatherback turtles.
 Epizoic diatoms on nesting loggerhead and leatherback turtles.
 Hughes, G.R. 1996. Nesting of the leatherback turtle (*Dermochelys coriacea*) in Tongaland, KwaZulu-Natal, South Africa 1963-1995. *Chel.Cons and biology.* 1996 2(2) : 153 - 158.
 Hughes, G.R. 1996. The Status of Sea Turtle Conservation in South Africa. IN : Proc. Western Indian Ocean Workshop on Sea Turtles. Sodwana Bay, S. Africa. Nov. 12-18, 1995 UNEP Regional Seas Rept. & Stud. 165: pp 95-102.

b) Satellite tracking

YES (Details/future plans)

> Details/future plans:
 A number of loggerhead and leatherback turtles have been tagged giving some indication of the migration routes of both nesting species. Leatherback tracking is ongoing as a partnership between Oceans and Coasts, NMMU and Ezemvelo.
 HUGHES, G.R AND F. PAPI, 1997. Information on sea turtle navigation obtained by satellite tracking. IN: Orientation and Navigation - Birds, Human and other Animals. 1997 Spring Conf. Of Royal Inst. Of Navigation 21 - 23 April 1997. pp 10 (-1) - 10(7).
 HUGHES, G.R AND F. PAPI, P. LUSCHI & E. CROSIO, 1997. Satellite tracing experiments on the navigational ability and migratory behaviour of the loggerhead turtle *Caretta caretta* IN: *Marine Biology* (1997) 129 pp 215-220.
 LUSCHI, P., J.R.E. LUTJEHARMS, P. LAMBARDI, R. MENCACCI, G.R. HUGHES AND G.C. HAYS. 2006. A review of migratory behaviour of sea turtles off south-eastern Africa. *Botha, M.* 2007.
 Internesting behaviour of leatherback turtles (*Dermochelys coriacea*) in the Greater St Lucia Wetland Park. Unpublished Hons Project. NMMU, p32.
 Harris, L., Nel, R., Oosthuizen, H., Meyer, M., Kotze, D., Anders, D., McCue, S., Bachoo, S., 2018. Managing conflicts between economic activities and threatened migratory marine species towards creating a multi-objective blue economy. *Conservation Biology*, 32(2): 411-423.
 Robinson, NJ, Moreale, SJ, Nel, R, Paladino, FV (2017) Movements and diving behaviour of inter-nesting leatherback turtles in on oceanographically dynamic habitat in South Africa. *Marine Ecology Progress Series* 571: 221-232.
 Robinson NJ, Morreale SJ, Nel R, Paladino FV (2016) Coastal leatherback turtles reveal conservation hotspot. *Scientific Reports* 6:37851.
 Ten leatherback turtles will be satellite tagged again in the 2019/20 nesting season in the iSimangaliso Wetland Park by Nelson Mandela University as part of a Pew Marine Fellowship. Results expected to be completed in 2022

c) Other OR None of the above

Other (List and provide details)

> Notching of loggerhead hatchlings:

Approximately 100 000 Cc hatchlings have been notched per annum for ~20 years. This provided some indication of the direction and the rate of dispersal of hatchlings in the few months after hatching. The following publication has been produced from this.

Tucek J., Nel R, Girandot, M & Hughes, G. (2014) Estimating reproductive age and size of loggerhead sea turtles. *Endangered Species Research* 23:167-175.

Past and current student projects.

PhDs:

Jenny Tucek - Recovery potential of loggerhead and leatherback turtles nesting in South Africa. (NMMU, 2015)

Diane Le Gouvello - Factors affecting fitness in sea turtles (NMU, ongoing)

Cristina Louro - Strengthening Marine Turtle Conservation within a Transfrontier Conservation Area: Introducing a Community Voice Approach to Inform Marine Spatial Planning (NMU, ongoing)

MScs:

Deidre De Vos - The effect of Casuarina trees on sea turtle nesting beaches throughout the Indian Ocean and South-East Asia regions: A beach vulnerability assessment.

Christopher Nolte -. The distribution of South African sea turtles as indicated by epibionts and stable isotopes. (NMU 2019)

Dirk Pretorius - Zoning the Western Indian Ocean to mitigate conflict between ocean-based hydrocarbon exploration and production on sea turtles.(NMU 2019)

Marinus Du Preez - Contaminants contained in sea turtle eggs. ((UNW 2017)

Diane Le Gouvello - The fate and effect of nutrients introduced by sea turtle nests on sandy beach ecosystems. (NMMU. 2015)

Bernice Mellet - Ecological Risk Assessment of sea turtles in fisheries in the Indian Ocean. (NMMU, 2015)

Ryan Rambaran - Ecological Role of sea turtles in iSimangaliso Wetland Park. (NMU, Ongoing)

Anje De Wet: Factors affecting mortality of loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*) sea turtles of South Africa (NMMU 2013)

Wayne Brazier: Environmental cues driving nesting in Maputaland sea turtles (NMMU 2012)

Melissa Boonzaaier: Factors affecting hatching success and sex ratios in sea turtles (NMMU 2011)

Marie Botha: Nest site fidelity of turtles in South Africa (NMMU 2010)

BTech:

Darrell Anders: Spatial and temporal overlap between South African leatherback turtles (*Dermochelys coriacea*) and pelagic longliners fishing in the South African EEZ (CPUT, 2010)

3.1.5 Have studies been carried out on marine turtle population dynamics and survival rates (e.g. including studies into the survival rates of incidentally caught and released turtles)? **[INF, PRI]**

YES

> Hughes (1974) provides a comprehensive overview of many of the parameters such as estimates for fecundity and reproductive output per female. This has been re-evaluated after 30 years by a PhD student. There is also some indication of survival rates of turtles caught in shark nets (which differ among species), but this has not been evaluated formally in South African fisheries.

HUGHES, G R. 1974. The sea turtles of South East Africa. Unpublished PhD thesis, University of Natal, Durban, 1-409.

3.1.6 Has research been conducted on the frequency and pathology of diseases in marine turtles? **[INF, PRI]**

YES

> This has been limited. Only one study described some of the typical diseases developed by sea turtles in captivity (by Wendt 1988). Furthermore, all of the aquaria keep some form of a log of the injuries/problems/disease that they can identify as sea turtles come in for rehabilitation, or that they may develop while in captivity. The pollution load in sea turtle eggs was investigated.

WENDT, G.E. 1988. Growth and osmoregulatory studies of loggerhead turtles, *Caretta caretta* L. An Unpublished MSc thesis, UPE. Pp 138.

du Preez M, Nel R, Bouwman H (2018) First report of metallic elements in loggerhead and leatherback turtle eggs from the Indian Ocean. *Chemosphere* 197:716-728

3.1.7 Is the use of traditional ecological knowledge in research studies being promoted? **[BPR, PRI]**

YES

> The national funding agency for research (National Research Foundation or NRF) has a specific program that addresses traditional knowledge. A PhD is currently underway to evaluate the value of sea turtles to local communities by Cristina Louro. Project title: Strengthening Marine Turtle Conservation within a Transfrontier Conservation Area: Introducing a Community Voice Approach to Inform Marine Spatial Planning (NMU,

ongoing).

3.2 Collaborative research and monitoring

- 3.2.1 List any **regional** or **sub-regional action plans** in which your country is already participating, which may serve the purpose of identifying priority research and monitoring needs. **[INF]**

Use the text box to elaborate on your response.

> South Africa was instrumental in the establishment of the Western Indian Ocean Marine Turtle Task Force. Through the activities of the WIO MTTF sites of importance have been identified, along with periodic reviews of the regional priorities and work plans.

SA also contributed genetic samples and isotope samples to Reunion for the Coca-Loca project.

DALLEAU M, et al 2016 Connectivity of Loggerhead turtle (*Caretta caretta*) in Western Indian Ocean:

Implementation of local and regional management. 28 pages.

South Africa and Mozambique is currently collaborating on a new submission to UNESCO for the extension of the iSimangaliso Wetland Park, world heritage site, into Mozambique.

3.2.2 On which of the following themes have collaborative studies and monitoring been conducted? Use the text boxes to describe the nature of this international collaboration or to clarify your response. Answer 'NO' if the studies/monitoring undertaken do not involve international collaboration. [INF, PRI]

a) Genetic identity

YES (Details/future plans)

> Details/future plans:

Bowen B.W., Kamezaki N., Limpus C.J., Meylan A.I. and Avise J.C., & Hughes, G. 1994. Global phylogeography of the loggerhead turtle (*Caretta caretta*) as indicated by mitochondrial DNA haplotypes. *Evolution* 48 (6) : 1820 - 1828.

DUTTON, P.H., B.W. BOWEN, D.W. OWENS A. BAQRAGAN AND S.K. DAVIS. 1999. Global phylogeography of the leatherback turtle (*Dermochelys coriacea*). *J. Zool. Lond.* 248:397-409.

Shamblin, B.M., A.B. Bolten, F. A. Abreu-Grobois, K.A. Bjørndal, L. Cardona, C.C. Carreras, M. Clusa, C. Monzón-Argüello, C.J. Nairn, J.T. Nielsen, Ronel Nel, L.S. Soares, K.R. Stewart, O. Türkozan, Peter H. Dutton. (2014) Loggerhead turtle phylogeography and stock structure revisited with expanded mitochondrial control region sequences. *PLoS ONE* 9(1): e85956.

Skin samples are also collected of green turtles that area caught in shark nets or strand to be analysed by France/Reunion. Sharing of skin samples for a regional project under the leadership of Kelonia that evaluated the distribution patterns of loggerhead turtles throughout the Western Indian Ocean.

DALLEAU M, et al 2016 Connectivity of Loggerhead turtle (*Caretta caretta*) in Western Indian Ocean:

Implementation of local and regional management. 28 pages

b) Conservation status

YES (Details/future plans)

> Leatherback SWOT analysis.

Loggerhead SWOT analysis.

Information sharing with southern Mozambique on nest monitoring ongoing.

c) Migrations

YES (Details/future plans)

> Details/future plans:

All projects are currently conducted at a national level.

Previous publications include:

HUGHES, G.R AND F. PAPI, 1997. Information on sea turtle navigation obtained by satellite tracking. IN : Orientation and Navigation - Birds, Human and other Animals. 1997 Spring Conf. Of Royal Inst. Of Navigation 21 - 23 April 1997. Pp 10 (-1) - 10(7).

HUGHES, G.R AND F. PAPI, P. LUSCHI & E. CROSIO, 1997. Satellite tracing experiments on the navigational ability and migratory behaviour of the loggerhead turtle *Caretta caretta*. IN : Marine Biology (1997) 129 pp 215-220.

LUSCHI, P., J.R.E. LUTJEHARMS, P. LAMBARDI, R. MENCACCI, G.R. HUGHES AND G.C. HAYS. 2006. A review of migratory behaviour of sea turtles off south-eastern Africa.

LAMBARDI, P, J.R.E. LUTJEHARMS, R. MENCACCI, G.C. HAYS, P. LUSCHI. 2008. Influence of ocean currents on long-distance movement of leatherback sea turtles in the Southwest Indian Ocean. *Marine Ecology Progress Series* 353: 289-301.

Nathan J. Robinson, Darell Anders, Santosh Bachoo, Linda Harris, George R. Hughes, Deon Kotze, Seshnee Maduray, Steven McCue, Michael Meyer, Herman Oosthuizen, Frank V. Paladino & Paolo Luschi. 2018. Satellite Tracking of Leatherback and Loggerhead Sea Turtles on the Southeast African Coastline. *Indian Ocean Turtle*

Linda R. Harris, Ronel Nel, Herman Oosthuizen, Santosh Bachoo. 2018. Challenges in Creating a Sustainable Blue Economy: When Cumulative, Multi-National Economic Activities Impact Threatened Migratory Species. *Conservation Biology*. Vol. 32, No. 2, 411-423

L Harris, R Nel, H Oosthuizen, M Meyer, D Kotze, D Anders, S McCue and S. Bachoo. 2015. Paper-efficient multi-species conservation and management is not always field-effective: the status and future of Western Indian Ocean leatherbacks. *Biological Conservation*. Vol. 191

d) Other biological and ecological aspects

NO (Details/future plans)

> None currently and none planned.

3.3 Data analysis and applied research

3.3.1 List, in order of priority, the marine turtle populations in your country in need of conservation actions, and indicate their population trends. **[PRI]**

> Population Trends – *Dermochelys coriacea* and *Caretta caretta*

Consistent effort has been applied to the 13km stretch of beach from the Bhanga Nek research station to the Kosi estuary mouth. Dedicated patrolling of this area has taken place every nesting season since 1965 and it is for this reason that this area is termed the “Index Area” (Nel and Bachoo 2011). Therefore, nest and track (emergence) counts from this area can be used as an index of abundance of the nesting population trend due to the application of consistent effort in this area. Track counts are particularly favoured as a metric/proxy of population size as this is least dependent on effort, equipment and interpretation and therefore gives a more reliable indicator of population trends (Nel 2014).

The nesting population trends from the 1965/1966 season to the 2018/2019 season for leatherbacks and loggerheads are presented in Figures 1 and 2 respectively in terms of emergences.

- *Dermochelys coriacea* (Critically endangered, but stable):

There is huge inter-annual nesting variation. Leatherback nest numbers typically range between 100 - 400 nests per season (~ 60 nests per annum in the 8km index area as opposed to 6 at inception). There is huge inter-annual variation exhibited in terms of both emergences and nesting and the overall population trend is considered to be stable. The 2018/2019 season was extremely poor one in terms of both emergences and nesting. Longlining seems to be the greatest current pressure.

- *Caretta caretta* (Vulnerable and increasing):

The long-term nesting loggerhead population trend, in terms of both tracks and nests, has undergone distinct phases since the implementation of the protection programme:

- An initial rapid increase – this was during the first 5-10 years of monitoring, quite likely an immediate positive response to protection;

- Prolonged stability – following the initial rapid increase, a prolonged period of stability spanning approximately 3 decades;

- Rapid increase – during the early 2000’s to around 2011/2012, where there was a dramatic (almost exponential) increase in the population. Nel (2014) attributed this to the consistent long-term protection afforded to hatchlings which were now coming back to nest. Other contributions noted by Nel (2014) was the increased protection in Mozambique since 1996 as well as the collapse of the prawn trawl industry off the east coast of KZN.

- Peak – the population, reported as having stabilised around between the 2011/2012 -2013/2014 (Nel 2016), seems to have now peaked with no further increase.

- Population decline – the population started showing the first signs of a possible declining trend since the start of the programme after the 2013/2014 season, both in terms of the tracks and nesting. This continued for 3 seasons up to the 2016/2017 season. The cause of the decline is currently unknown. The past 2 seasons do hint at a prospect of recovery and is cause for guarded optimism (Figure 2). The cause of the decline is currently unknown

- *Chelonia mydas* and *Eretmochelys imbricata*:

Developmental area - population size unknown. The bather protection catches can be used as proxy to indicate trends. From this information both these species are assumed to have stable populations in the SA borders. The KwaZulu-Natal Sharks Board, which manage the bather protection nets off the coast of KwaZulu-Natal, have embarked on a net reduction programme, replacing nets with baited drumlines to selectively fish out sharks and minimise bycatch. Neither of these species are apparently under pressure from within South Africa. Greatest pressure is likely from net fisheries (including ghost fishing). - The population size and dynamics of these species remain a knowledge gap, as it is scattered and collected unsystematically.

Nel, R. and Bachoo, S. 2011. Season Report: Turtle Monitoring 2010-2011. Internal Report for Ezemvelo KZN Wildlife and iSimangaliso Wetland Park.

Nel, R. 2014. 50 Years of Turtle Conservation, Monitoring and Research: A State-of-Knowledge Report for Ezemvelo KZN Wildlife.

3.3.2 Are research and monitoring activities, such as those described above in Section 3.1, periodically reviewed and evaluated for their efficacy? **[SAP]**

YES

> The routine monitoring activities i.e. nest monitoring is conducted on an ongoing basis. It is evaluated for success and impact at the end of each season. The projects that are aimed at addressing specific questions - such as satellite tagging, genetics, nest fidelity etc. are conducted as research projects. They are once-off until the question is addressed, or is only reviewed periodically.

The information obtained through research and monitoring is most credible for the nesting species (Cc & Dc) with scant information available on the non-nesting species (Ei, Cm & the occasional Lo).

There is an active university research programme reviewing monitoring results and integrating information from various projects. (See Nel 2014). Recommendations from the State of Knowledge Report (Nel 2014) has since been implemented in the turtle monitoring programme and will continue until the next review.

Nel, R., 2014. 50 Years of turtle conservation, monitoring and research: a state-of-knowledge report. Ezemvelo KZN Wildlife, Nelson Mandela Metropolitan University, p. 43.

3.3.3 Describe how research results are being applied to improve management practices and mitigation of threats (in relation to the priority populations identified in 3.3.1, among others). **[SAP]**

> With regards to habitat conservation there is very little room for improvement on current management practices. Research is however conducted to ensure that the current observed trends can/will be maintained into the future.

Nest monitoring – reports produced annually to review population status of nesting species.

Satellite tracking – data extensively incorporated into design of marine protected areas with a 10-fold increase in MPA protection coming into effect in 1 August 2019. Two of the 20 new MPAs are based on sea turtle satellite tracking data.

Incidental capture, fisheries practices and permit conditions have improved considerably. Recently, the Department of Environmental Affairs has been merged with Fisheries, which will largely assist in incidental capture, fishery practices and permit conditions relating to sea turtles. South Africa is also a signatory to various RFMOs where reporting of incidental capture of marine species are reported.

Threatened or Protected Marine Species Regulations have been gazetted in 2017, and warrants all turtle species found in RSA the necessary protection. In addition to this, South Africa's Biodiversity legislation is written in a way that ensures that all international conventions that the country is signatory to applies in the Republic.

The nesting beaches of turtles falls within a World Heritage Site.

South Africa has numerous interventions to dealing with marine litter including plastic pollution (which is an emerging threat for turtles):

- The Department has implemented its Working for the Coast Programme as an Extended Public Works Project aimed at creating jobs through dealing with challenges emanating from the coast, among which includes the clearing of litter from beaches nationally. Additionally in 2014, the Department launched its National Coastal Management Programme under the National Environmental Management: Integrated Coastal Management Act to prioritise the management of pollution in the coastal zone. Under that priority, South Africa adopted Management Objective 4.3, which is to develop and implement programmes to address marine litter.

- The Department will soon launch the Source-to-sea Programme to address the growing concern of litter from inland river systems, including catchment systems, therefore reducing marine litter. One of the other streams that has been prioritised by the Department is packaging waste, which includes plastic waste with the intent is to ensure that the industry commits to specific targets on the diversion of waste from landfill sites.

- Additionally, South Africa has amended its fiscal and waste management policy to introduce environmental levies for plastic bags and is looking at investments in plastic palletization plants to divert plastic waste from landfill sites.

- Lastly, South Africa has also conducted a Plastic Material Flows and End of Life Management Study to assess the current status with regard to the production and management of plastics and identified barriers to improving the diversion of plastics from landfill sites.

3.4 Information exchange

3.4.1 Has your country undertaken any initiatives (nationally or through collaboration with other Range States) to standardise methods and levels of data collection? **[BPR, INF]**

YES [If yes, please give details of the agreed protocol(s)]

> South Africa has one of the longest-running nest monitoring programs in the world and has thus contributed to the development of protocols and training of other programs in the region.

South Africa was instrumental in the establishment of the Western Indian Ocean Marine Turtle Task Force of the WIO MTTF regional meeting. Amongst other issues, standardization of monitoring protocols and prioritization was discussed.

Partnership and informal agreement between Kelsonia and Ezemvelo (previously Natal Parks Board) for exchange of information, and occasional staff exchange and training.

3.4.2 To what extent does your country exchange scientific and technical information and expertise with

other Range States? **[SAP, IND]**

OCCASIONALLY

3.4.3 If your country shares scientific and technical information and expertise with other Range States, what mechanisms have commonly been used for this purpose? Comment on any positive benefits/outcomes achieved through these interactions. **[INF]**

- > • South Africa and southern Mozambique try to have a close working relationship by inviting representatives to meetings/workshop that are of interest to both countries/programmes.
- South Africa also participates in (sub) regional activities/workshops such as the establishment of the WIO MTTF, or FAO workshops that can impact on regional conservation activities.
- South African scientist attend as many (sub) regional conferences/meetings e.g. WIOMSA to share information and lessons learned with the international audience.
- Two possible opportunities that could be expanded is a) joint multi-national research projects and b) cross-supervision of students doing post-graduate research in the (sub) region.

3.4.4 Does your country compile and make available to other countries data on marine turtle populations of a regional interest?

Please give details **[INF]**

YES

- > The objective of South African research has always been publishing findings in international literature as well as contribute reports to the IOSEA website and report data base

OBJECTIVE IV: INCREASE PUBLIC AWARENESS OF THE THREATS TO MARINE TURTLES AND THEIR HABITATS, AND ENHANCE PUBLIC PARTICIPATION IN CONSERVATION ACTIVITIES

4.1 Public education and information programmes

4.1.1 Describe the educational materials, including mass media information programmes that your country has collected, developed and/or disseminated. **[INF, PRI]**

Details/future plans:

> Major Events Showcasing the Turtle Monitoring Programme in South Africa

- In 2012, Ezemvelo, in conjunction with the iSimangaliso Authority, hosted a gala event to celebrate 50 years of turtle conservation at the uShaka Marine World in Durban, South Africa. This was done to commemorate the hard work of those that have served the programme and to celebrate its continued success. Following on from the gala event, VIP's and members of the media were treated to a turtle tour on the beaches at Sodwana Bay. The tour was broadcast on South African national news (SABC3) and is available on YouTube. The address is <https://www.youtube.com/watch?v=-P9dlvaHLA>. Dr George Hughes book, "Between the Tides - in Search of Sea Turtles" was officially launched at the gala. Dr Hughes also presented his book at other events around the country.

- The Royal Show - a major event in 2013 where the Turtle Monitoring Programme was showcased to the public. The display, which specifically focused on "50 Years of Sea Turtle Conservation" won the Gold Medal at the event for having the best display.

- An article detailing the 50 years of turtle conservation in South Africa was done for a major tourism magazine in KZN. The article is available at <http://southcoaststyle.co.za/monitoringleatherback-and-loggerhead-sea-turtles-in-kzn>

- The former Chief Executive Officer of Ezemvelo KZN Wildlife, Dr Bandile Mkhize, authored an article on the turtle monitoring programme for a major newspaper in KZN in 2014, hailing it as one of the most successful conservation programmes in the country. The article is available at <http://www.iol.co.za/dailynews/opinion/our-success-stories1.1656387#.U7PZS6Lb7fs>

Details/future plans:

Posters describing the nesting programme (in both English and Zulu)

Z-folder describing the turtle monitoring programme.

Regular Television coverage in natural science programmes (~6 pa)

Popular or web articles (~ 1pa) Newspaper articles highlighting turtle nesting events (1/2 pa)

Training of monitors and concessionaires

Public talks to conservancies / donors / public / schools

Eco-schools programmes

Scientific Conferences

Current plans: Through Pew Fellowship will redesign a previous turtle information booklet, along with an awareness campaign (using satellite tagging program as basis) and launching the awareness campaign on World Turtle Day 2020.

4.1.2 Which of the following groups have been the targets of these focused education and awareness programmes described in above in Section 4.1.1? **[PRI, INF]**

- Policy makers
- Fishing industry
- Local/Fishing communities
- Indigenous groups
- Tourists
- Media
- Students
- Military, Navy, Police
- Scientists
- Other (describe):

> Others: Tour Operators.

These programmes are targeting compliance officers and observers making them aware of impacts of long-lining on turtles (and other by-catch species).

School children that are targeted through the Community Conservation programme around iSimangaliso, as well as turtle monitors and/or concessionaires. Information to the tourists are generally disseminated through the tour operators or direct interactions with scientists in the field.

Research findings are communicated to government officials as part of Working Groups or as part of the national biodiversity assessments.

4.1.3 Have any community learning / information centres been established in your country? **[BPR, SAP]**

Please give details and indicate future plans

NO

> Non per se. There are no centers where the public can freely visit or access turtle information or nesting sites. However, the (fairly exclusive) tourist lodges have targeted programmes where visitors can attend a talk presented before they go on a turtle trot/drive. Also a flagship research programme has been established at NMU (Port Elizabeth) with a number of provincial aquaria hosting turtle displays, rehabilitation programmes and awareness programmes.

4.2 Alternative livelihoods opportunities Describe initiatives already undertaken or planned to identify and facilitate alternative livelihoods (including income-generating activities) for local communities. **[IND, BPR]**

> The alternative livelihood issues especially around turtle nesting beaches are complex since turtle nesting beaches are in protected areas (a world heritage site) that has been under conservation for an extended time (~1965). The area is an area of high poverty with limited economic opportunities. There are various programmes within the World Heritage Site that offers opportunities for economic upliftment – one of them being the turtle monitoring programme. The monitoring programme is of critical importance as it has effectively monitored and protected these marginal turtle subpopulations for 55 years while simultaneously changing the value of turtles from a short-term food source to a long-term sustainable source of income derived from tourism and the provision of employment for turtle monitors. It demonstrates great synergy between conservation and the creation of economic opportunities – two goals that otherwise generally seem to be at loggerheads.

The programme currently employs close to 40 community members for 5 months of the year during the nesting/hatching season.

In addition, Individuals are employed by their own community through walk concession operations (~ 3 months of the year), and ~6-10 individuals are employed through other drive concessions to act as guides or assistants with tourists. Other tourist related activities (like community accommodation camps etc) benefit from high occupancy during this period. There is scope for expansion with more creative thinking.

4.3 Stakeholder participation

4.3.1 Describe initiatives already undertaken or planned by your country to involve **local communities**, in particular, in the planning and implementation of marine turtle conservation programmes. Please include details of any incentives that have been used to encourage public participation, and indicate their efficacy.

[BPR, IND]

> As per description above, the local community in the Park that is dependent on economic opportunities from within the park and are included in the planning and prioritization of activities (e.g. community monitors and walk-on concessions). The success of the monitoring programme is due to the involvement and participation of the local communities. Close to 40 individuals are selected, trained and paid to undertake data collection on nesting turtles. In addition, they spread the word of turtle conservation to tourists and their own communities.

There is a new port development across the border in Mozambique, hence the research project to investigate the community perspective on these livelihood opportunities sustained by turtle nesting.

4.3.2 Describe initiatives already undertaken or planned to involve and encourage the cooperation of **Government institutions, NGOs** and the **private sector** in marine turtle conservation programmes.

[IND, BPR]

> Conservation, monitoring and research in South Africa is driven by the national and provincial government entities. These are Department of Environmental Affairs, Ezemvelo KZN Wildlife, iSimangaliso Wetland Authority, and KZN Sharks Board.

NGOs (WWF, Birdlife and Conservation trust) have historically been involved especially regarding particular themes. Private sector has been involved through operating hospitality industry within the park and paying for the right to drive on otherwise restricted beaches and expose the public to turtles. Also, there are rehabilitation centres that play a major role in the conservation of turtles, through their exhibition facilities and research conducted.

Research is mostly driven and coordinated by Nelson Mandela University. All these entities are however cooperating strongly for the purpose of turtle conservation. There is also the planned campaign to enhance awareness raising, data sharing and cooperation for the 2019/2020 year (as part of a Pew Marine Fellowship).

OBJECTIVE V: ENHANCE NATIONAL, REGIONAL AND INTERNATIONAL COOPERATION

5.1 Collaboration with, and assistance to, signatory and non-signatory States

5.1.1 Has your country undertaken a national review of its compliance with Convention on International Trade in Endangered Species (CITES) obligations in relation to marine turtles? **[SAP]**

NO

> Data suggests that turtle trade through South Africa is of low importance. However, there is continuous screening of import/export product (at harbours, airports and border crossings) since there is a large fraction of other (mostly non-marine) wildlife products moving through South Africa. There are 15 designated ports through which legal, permitted exports of CITES products may take place.

5.1.2 Does your country have, or participate/cooperate in, CITES training programmes for relevant authorities? **[SAP]**

YES (If yes, please provide details of these training programmes)

> This is Ongoing, although limited, and nothing turtle specific. The latest training session for CITES officers took place in 2018. Turtles are not common in international trade (as picked up through port inspections). However, under the national environmental legislation, leatherback, hawksbill and loggerheads are listed as "critically endangered" and therefore do receive specific attention during inspections.

5.1.3 Does your country have in place mechanisms to identify **international** illegal trade routes (for marine turtle products etc.)? Please use the text box to elaborate on how your country is cooperating with other States to prevent/deter/eliminate illegal trade. **[SAP]**

Please give details of particularly successful interventions and prosecutions; and/or mention any difficulties experienced that impede progress in this area. Please provide references to any published reports (e.g. already prepared for CITES purposes) that give a more ample explanation.

YES

> Yes - (covert) but turtles have not been identified as problem species. The marine species that are encountered include mollusc shells and hard and soft corals. These cases are investigated and if there are irregularities in permits etc. they are prosecuted. No cases of international turtle trade transgressions have been reported or gone to court. Regular compliance inspections take place at the national borders, and therefore, increases the chances of illegal products to be recovered.

5.1.4 Which international compliance and trade issues related to marine turtles has your country raised for discussion (e.g. through the IOSEA MoU Secretariat, at meetings of Signatory States etc.)? **[INF]**

> None. South Africa receives very few CITES applications annually specifically on turtles. Precaution, however, is taken as there is a potential for local (illegal) market on the SA/Mozambique border

5.1.5 Describe measures in place to prevent, deter and eliminate domestic illegal trade in marine turtle products, particularly with a view to enforcing the legislation identified in Section 1.5.1. **[INF]**

> Nothing new since the last report other than a few incidents of egg poaching. However, the individuals were apprehended and fined.

Turtle poaching although largely under control, with approximately 1 poached every 2-3 years. One person, from a nearby community, was apprehended in 2010 and received a five-year jail sentence. Any take/possession of turtle products from protected areas is taken very seriously and is prosecuted

5.2 Prioritisation, development and implementation of national action plans

5.2.1 Has your country already developed a national **action plan** or a set of **key management measures** that could eventually serve as a basis for a more specific action plan at a national level? **[IND]**

Please explain.

NO

> South Africa, in section 43 of its National Environmental Management: Biodiversity Act (No. 10 of 2004) has a provision to develop Biodiversity Management Plans for Species or ecosystems. None has been developed yet, as there are adequate legislation in place to address threats on turtles.

5.2.2 From your country's perspective, which **conservation and management activities**, and/or which particular **sites or locations**, ought to be among the highest priorities for action? (List up to 10 activities from the IOSEA Conservation and Management Plan). **[PRI]**

> Priorities - in no order of importance:

1. Identify and document threats to marine turtle populations and their habitats. (1.1);
2. Reduce to the greatest extent practicable the incidental capture and mortality of marine turtles in the course of fishing activities. (1.4) [Engage with multiple fishing industries to reduce bycatch]
3. Establish necessary measure to protect and conserve marine turtle habitats (2.1) [With respect to plastic pollution and climate change which are not buffered by MPAs].
4. Conduct studies on marine turtle and their habitats targeted to their conservation and management (3.1) [Particularly on non-nesting species]
5. Analyse data to support mitigation of threats to asses and improve conservation practices (3.2) [Good observer & strandings data are being recorded but it is not being analysed in a regular or rigorous way]
6. Establish public education awareness and information programmes (4.1);
7. Promote public participation (4.3);
8. Capacity building and training (5.4) [throughout the Western Indian Ocean];
9. Seek resources to support the implementation of the MoU (6.3);
10. Improve coordination among government and no-government sectors in the conservation of marine turtles and their habitats.

5.2.3 Please indicate, from your country's standpoint, the extent to which the following **local** management issues require **international** cooperation in order to achieve progress. **[PRI]**

In other words, how important is **international** cooperation for addressing these issues?

Please select only one per line

	NOT AT ALL	LIMITED	IMPORTANT	ESSENTIAL
Illegal fishing in territorial waters	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Incidental capture by foreign fleets	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Enforcement/patrolling of territorial waters	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Hunting/harvest by neighboring countries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Poaching, illegal trade in turtle products	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Development of gear technology	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Oil spills, pollution, marine debris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Training / capacity-building	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Alternative livelihood development	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Identification of turtle populations	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Identification of migration routes	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tagging / satellite tracking	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Habitat studies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Genetics studies	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Use the text box to list and rank any other local management issues for which international cooperation is needed to achieve progress.

> Mozambique:

- protection of nesting population and offshore habitats from illegal fishing.
- Overall equivalent application of best practice (banning of drift nets, gill nets), mitigatory actions (VMS, TEDs, long-lining time and speed of setting / release of caught turtles) data collection (Observer recordings).
- Potential development of a deep-water port in the middle of the shared rookery of a critically endangered leatherback turtle population.

5.3 Cooperation and Information exchange

5.3.1 Identify existing frameworks/organisations that are, or could be, useful mechanisms for cooperating in marine turtle conservation at the sub-regional level. Please comment on the strengths of these instruments, their capacity to take on a broader coordinating role, and any efforts your country has made to enhance their role in turtle conservation. **[INF, BPR]**

> WIOMSA as a research forum and an opportunity for exchange through MASMA grants. WIO MTTF to facilitate even implementation of the IOSEA CMP across WIO countries.

5.3.2 Has your country developed, or is it participating in, any networks for cooperative management of shared turtle populations? **[BPR, INF]**

YES (if yes, give details)

> Information exchange between South Africa and Mozambique through the Transfrontier Park and Peace Parks programs.

Informal exchange and research partnerships with Kelonia, Reunion

5.3.3 What steps has your country taken to encourage Regional Fishery Bodies (RFBs) to adopt marine turtle conservation measures within Exclusive Economic Zones (EEZs) and on the high seas? Please describe the interventions made in this regard, referring to specific RFBs. **[SAP]**

> South Africa is a member of ICCAT, IOTC and CCSBT. It has recently emerged as a leader in collecting data on and mitigating against bycatch and one of a only a few countries fully compliant with reporting and adherence to conservation measures of Long-line bycatch. Permit conditions in the Large Pelagic Fishery are refined annually. Turtle monitoring has improved and mortality reduced.

5.4 Capacity-building

5.4.1 Describe your country's needs, in terms of human resources, knowledge and facilities, in order to build capacity to strengthen marine turtle conservation measures. **[PRI]**

> The country is fairly strong on most aspects of turtle research and conservation and has an excellent history in monitoring. Collaboration with expert scientists from within the region and outside of the region (through the WIO MTTF) has provided insights into turtle movements not previously known. The sub-regional working groups is definitely a strength of the region. Better alignment between government departments and improved communication and information sharing is needed to strengthen and refine conservation measures.

5.4.2 Describe any training provided in marine turtle conservation and management techniques (e.g. workshops held, training manuals produced etc.), and indicate your plans for the coming year. **[PRI, INF]**

> Turtle monitor training: 2-day per annum before the nesting season begins.

Concession training: 1 day per annum before tourist seasons begins.

A number of post graduate degrees.

Observer training. This includes species identification, data collection, mitigatory measures and release of turtles (one day course).

Compliance officer training: One day workshop discussing legislation/permit conditions / mitigatory measures.

5.4.3 Specifically in relation to **capacity-building**, describe any partnerships developed or planned with universities, research institutions, training bodies and other relevant organisations. **[BPR]**

> WWF (Green Trust) used to fund most of the education and awareness programmes and materials on the nesting grounds. Birdlife SA & WWF used to fund the training related to the offshore training. Department of Environmental Affairs is funding monitoring, conservation and postgraduate research.

5.5 Enforcement of conservation legislation

5.5.1 National policies and laws concerning the conservation of marine turtles and their habitats will have been described in Section 1.5.1. Please indicate their effectiveness, in terms of their practical application and enforcement. **[SAP, TSH]**

> Very effective especially in proportion to the demand. (Relatively low demand with high enforcement). The National Environmental Management: Biodiversity Act protects turtles and their habitats. Furthermore, the National Environmental Management: Protected Areas Act allows for protected areas including marine protected area to be established. RSA has gazetted 20 additional MPAs to its network of MPAs.

5.5.2 Has your country conducted a review of policies and laws to address any gaps, inconsistencies or impediments in relation to marine turtle conservation? If not, indicate any obstacles encountered in this regard and when this review is expected to be done. **[SAP]**

Please give details.

YES

- > South Africa is in the process of rationalizing its environmental legislation. Most of marine species and marine and coastal related processes were included in numerous acts. The first process was to:
- a. Repeal the section on Marine Protected Areas from the Marine Living Resources Act, which largely concentrated on fisheries related issues, to the National Environmental Management: Protected Areas Act. The section on MPAs was gazetted in 2014. Subsequently, South Africa has gazetted 20 new MPAs, and includes numerous offshore protected areas.
 - b. Threatened or Protected Marine Species Regulations include all turtle species found in South African waters. These regulations were amended from 2012, and were gazetted for implementation in May 2017 updating all marine species and their conservation status, including sea turtles found in South African waters.

5.5.3 From the standpoint of law enforcement, has your country experienced any difficulties achieving cooperation to ensure compatible application of laws across and between jurisdictions? **[TSH]**

Please give details.

NO

> National perspective: turtle nesting is only taking place in one province (KZN) and conservation therefore originated in this province. It has been very successful. It is only recently that it has received national attention - through the two CMS MoUs that required national participation. The level of importance of turtle conservation issues with our neighbouring countries are not on quite the same level (as it has been in KZN). No national working group in place (yet) but it is expected to be established.

OBJECTIVE VI: PROMOTE IMPLEMENTATION OF THE MOU, INCLUDING THE CMP

6.1 IOSEA Marine Turtle MoU membership and activities

6.1.1 What has your country already done, or will it do, to encourage other States to sign the IOSEA MoU? **[INF]**

> All WIO Countries are signatories.

6.1.2 Is your country **currently** favourable, in principle, to amending the MoU to make it a legally binding instrument? **[INF]**

YES

6.1.3 Would your country be favourable, over a **longer time horizon**, to amending the MoU to make it a legally-binding instrument? **[INF]**

YES (Use the text box to elaborate on your response, if necessary)

6.2 Secretariat and Advisory Committee

What efforts has your country made, or can it make, to secure funding to support the core operations of the IOSEA MoU (Secretariat and Advisory Committee, and related activities)? **[IND]**

> SA has provided good financial support to the operations of the Secretariat. It will be re-evaluated in time for South Africa to host a signatory states meeting in the future.

6.3 Resources to support implementation of the MoU

6.3.1 What funding has your country mobilised for **domestic** implementation of marine turtle conservation activities related to the IOSEA Marine Turtle MoU? Where possible, indicate the specific monetary values attached to these activities/programmes, as well as future plans. **[IND]**

> All marine turtle conservation activities related to the IOSEA Marine Turtle MoU are conducted within the budget of the respective organisations.

The figures from 2014 are as follows:

Turtle Nest Monitoring: ~Rand 0.8M pa

Observer Programme: ~Rand 1.0M pa (estimate)

Bather Protection Nest monitoring: ~Rand 2.0M pa (estimate)

Education and Awareness: ~Rand 0.1M pa (estimate)

Meetings (Coordination): Rand 0.04M pa Research: ~Rand 0.25M pa

6.3.2 Has your country tried to solicit funds from, or seek partnerships with, other Governments, major donor organizations, industry, private sector, foundations or NGOs for marine turtle conservation activities? **[IND]**

YES (If yes, give details of the approaches made (both successful and unsuccessful))

> For 2019, Ezemvelo KZN Wildlife sought funding for the turtle monitoring programme in conjunction with WildOceans from the following sources:

- The US Fish and Wildlife Services - Still awaiting outcome of the application
- Blue Action Fund - Application has been successful. We are awaiting the allocation

6.3.3 Describe any initiatives made to explore the use of economic instruments for the conservation of marine turtles and their habitats. **[BPR]**

> None

6.4 Coordination among government agencies

6.4.1 Has your country designated a lead agency responsible for coordinating national marine turtle conservation and management policy? If not, when is this information expected to be communicated to the IOSEA MoU Secretariat? **[IND]**

Please elaborate, as necessary.

YES

> South Africa's National Environmental Management: Biodiversity Act and National Environmental Management: Protected Areas Act has provisions in the acts that designate various organisations to the conservation and the management of marine turtles. The Management Authority can develop a Protected Area Management Plan for the areas they manage. Furthermore, the Department of Environmental Affairs provides oversight.

Due to the long history of turtle conservation by the provincial conservation agency (since sea turtles nest in

KwaZulu-Natal), it has been a "bottom-up" approach under the initiative of the Natal Parks Board. The provincial responsibility is now with Ezemvelo KZN Wildlife and the iSimangaliso Wetland Authority. The national responsibility (including the at sea distribution of turtles) falls under the jurisdiction of the Department of Environmental Affairs: Oceans and Coasts Branch. Monitoring of fisheries impacts and fisheries related data is the responsibility of the Department of Agriculture, Forestry and Fisheries.

6.4.2 Are the roles and responsibilities of all government agencies related to the conservation and management of marine turtles and their habitats clearly defined? **[IND]**

Use the text box to elaborate.

YES

> The roles of the conservation agencies are legislated, although there are some overlaps on some responsibilities. South Africa's environmental legislation is written in a way that the different spheres of government has a concurrent function in terms of environmental legislation.

The responsibilities are as follows:

Department of Environmental Affairs: Is the custodian of the National Environmental Management Act (Act 107 of 1998). This is the overarching act of South Africa's Environmental Legislation. The National Environmental Management Act among other things encourages cooperative governance in terms of realising the conservation of biodiversity.

Department of Agriculture, Forestry and Fisheries – Is the custodian of the Marine Living Resources Act (Act 18 of 1998). The act introduces regulating measures for the conservation of the marine ecosystem and the long-term sustainable utilisation.

iSimangaliso Wetland Park Authority – Are the overall Protected Area Manager of the breeding sites under various legislations (World Heritage Convention (Act 49 of 1999); National Environmental Management: Protected Areas Act (Act 57 of 2003); National Environmental Biodiversity Act (Act 10 of 2004); Marine Living Resources Act (Act 18 of 1998); UNESCO's World Heritage Convention and Operational Guidelines and the Ramsar Convention (Convention on Wetlands of International Importance Especially as Water Fowl Habitats, 1971). iSimangaliso Wetland Park Authority have also entered into a contractual agreed Implementation Protocol regarding the Park with the Department of Environmental Affairs.

Ezemvelo KZN Wildlife – Is the Provincial Authority mandated to carry out environmental legislation in the Province of KwaZulu-Natal under which iSimangaliso Wetland Park falls. There are other organisations that provide support to government departments (e.g. KwaZulu-Natal Sharks Board; Oceanographic Research Institute; Nelson Mandela Metropolitan University; World Wildlife Fund for Nature (WWF); Birdlife SA).

There are overlaps in some areas; however government entities and various organisations take it upon themselves to minimize duplication through contractual agreements or Memoranda of Understanding (MoU).

6.4.3 Has your country ever conducted a review of agency roles and responsibilities? If so, when, and what was the general outcome? If not, is such a review planned and when? **[SAP]**

This question seeks to ascertain whether Signatories have made a serious examination of which agencies have a role to play in marine turtle conservation, either directly or indirectly, and which therefore should be apprised of the IOSEA MoU and its provisions.

If no internal review of interagency roles and responsibilities has been or will be undertaken, please elaborate if only to indicate that the necessary arrangements are already clear and not in need of further review.

YES (Use the text box to elaborate)

> South Africa is in the process of reviewing its current environmental legislation, some of which include the functions of agencies.

OTHER REMARKS

Please provide any comments/suggestions to improve the present reporting format.

> - Some boxes can be increased as it is difficult to scroll through and read your answer.

ANNEX 1: SPECIES, HABITAT AND THREAT DATA [PRI, INF]

PLEASE COMPLETE A SEPARATE SECTION FOR EACH SITE/AREA

Site 1

Name of site/area:

> iSimangaliso Marine Protected Area, iSimangaliso Wetland Park World Heritage Site

Geographic coordinates (North/South)

South

> 28° 31' 20.51" S

32° 24' 2.88" E

On-site research activities:

Tagging

Genetic Sampling

Satellite tracking

Province / State:

> KwaZulu-Natal, Republic of South Africa

Name of person / agency who has provided the information:

> Ezemvelo KZN Wildlife

Information was last updated: (dd/mm/yyyy)

> 27 June 2019

Short description of the site (optional):

> The iSimangaliso Marine Protected Area in KwaZulu-Natal is a coastal and offshore Marine Protected Area stretching from the South Africa-Mozambique border in the north, to Cape St Lucia Lighthouse in the south, extending offshore to a maximum depth of almost 2000m (Gazette 42478). This encompasses an area of approximately 11000 sq km and is of direct relevance to turtle conservation. This area protects both the nesting and interesting phases of the leatherback (*Dermochelys coriacea*) and loggerhead (*Caretta caretta*) turtles in South Africa, as well as their eggs and hatchlings. The entire nesting beach is bound within the boundaries of the iSimangaliso Marine protected area, and the coral reef complexes contained within the boundaries also provide important foraging habitats for loggerhead, hawksbill, green and quite possibly the very occasional olive ridley turtles.

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Indicate the species occurrence / use and relative importance of the site:

Abbreviations: Loggerhead *Caretta caretta* (CC); Olive Ridley *Lepidochelys olivacea* (LO); Green *Chelonia mydas* (CM); Hawksbill *Eretmochelys imbricata* (EI); Leatherback *Dermochelys coriacea* (DC); Flatback *Natator depressus* (ND)

Use one of the following symbols or letters to indicate the presence or absence of a species at this site in the table above, including details (if known) about the relative importance of the site for nesting, feeding or development.

Insufficient information is available on the presence or absence of the species (leave box empty)

The species is **not present** or does not use this particular habitat type at this site.

?

It is speculated (only) that the species is present at this site and may be using one or more particular habitat types. In the absence of definitive information, place a ? in the appropriate box(es).

✓

The species is definitely **known to be present** at this site; however no information is available on the relative importance of the site for nesting, feeding or development.

✓

H

The species is known to be present at this site and definitely uses this particular habitat. The site is considered to be of **high importance** for this species, relative to other sites in the country.

✓

A

The species is known to be present at this site and definitely uses this particular habitat. The site is considered to be of **average importance** for this species, relative to other sites in the country.

✓

L

The species is known to be present at this site and definitely uses this particular habitat. The site is considered to be of

lower importance for this species, relative to other sites in the country.

a - h

Additional information on nesting habitat (where available):

Indicate the estimated number of nests per year for each species by inserting, in the appropriate boxes, one of the letters 'a' through 'f', corresponding to the following scale: **a:** 1 - 10 nests ; **b:** 11 - 100 nests ; **c:** 101 - 500 nests ; **d:** 501 - 1,000 nests ; **e:** 1,001 - 5,000 nests ; **f:** 5,001 - 10,000 nests ; **g:** 10,001 - 100,000 nests ; **h:** more than 100,000 nests

	ND Flatback	DC Leatherback	EI Hawksbill	CM Green	LO Olive Ridley	CC Loggerhead
Nesting	--	✓ H c	--	✓ L a	--	✓ h e
Feeding	--	?	✓ H	✓ H	--	✓ A
Developmental	--	✓ H	✓ H	✓ H	?	✓ H

Describe the nature of and intensity of threats to marine turtles at this site:

	High (common occurrence)	Medium	Low (rare event)	None	Unknown
Exploitation of nesting females (i.e. direct harvest on land)			X		
Direct harvest of animals in coastal waters at or near the site				X	
Egg collection (i.e. direct harvest by humans)			X		
Incidental capture in coastal fisheries		X			
Boat strikes					X
Marine debris (e.g. plastics at sea, flotsam)					X
Industrial effluent				X	
Inshore oil pollution			X		
Agricultural/urban/tourism development (e.g. construction that disrupts nesting activities)		X			
Artificial lighting (on land or near shore)		X			
Habitat degradation (e.g. coastal erosion, debris that obstructs nesting etc.)		X			
Vehicles			X		
Sand mining / removal				X	
Natural threats, disease, predation of nests/nesting females (e.g. by domestic / feral animals), or natural predation at sea	X				
Other (type in):					

Please give further details or clarification about any of the information provided, as appropriate /

necessary.
> None