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Shark Biodiversity Management Plan

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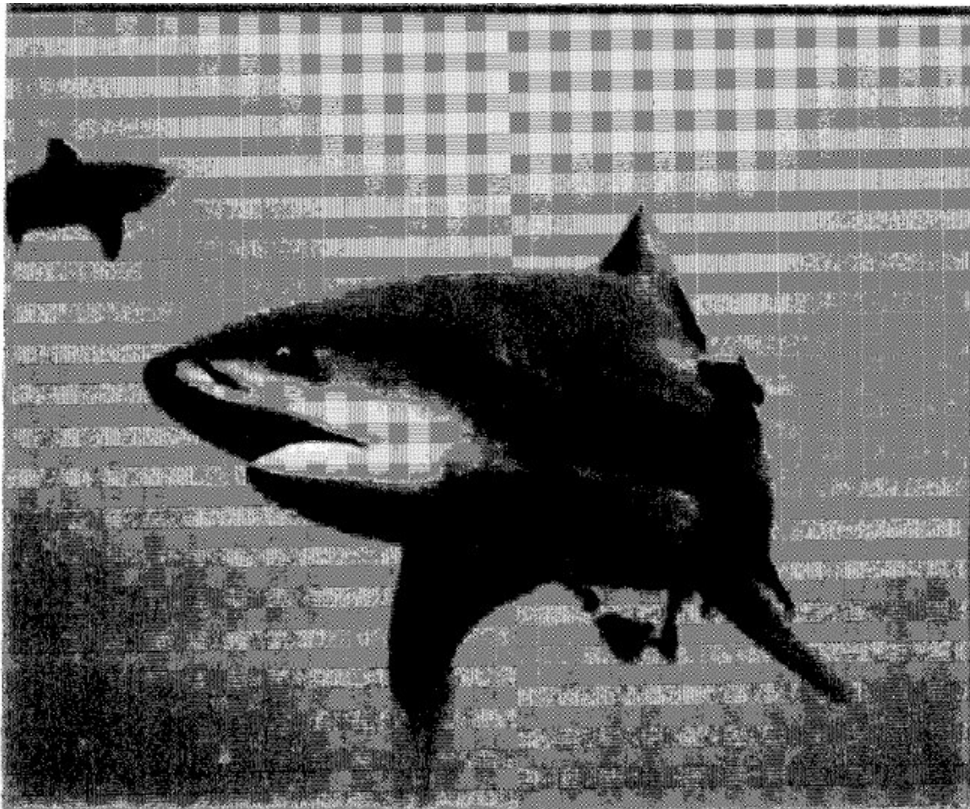
GN 258 in GG 38607 of 25 March 2015

I, Bomo Edith Edna Molewa, Minister of Environmental Affairs hereby publish for implementation in terms of section 43(3)(a) read with sections 99 and 100 of the National Environmental Management Biodiversity Act (Act 10 of 2004), Shark Biodiversity Management Plan, as contained in the Schedule hereto.

Copies of the English version of the Shark Biodiversity Management Plan are available at the offices of the Department's Oceans and Coasts branch, located at East Pier Building, East Pier Road, V and A Waterfront and on the Department's website at www.environment.gov.za.

(Signed)

BOMO EDITH EDNA MOLEWA
Minister of Environmental Affairs

SOUTH AFRICAN SHARK BIODIVERSITY MANAGEMENT PLAN**EXECUTIVE SUMMARY**

Approximately 185 species of cartilaginous fish (Class *Chondrichthyes*) have been recorded in South African waters, of which about one third are classed as rare. There are 15 species that are endemic to South African waters and a further 34 to southern African waters. Sharks have life history characteristics such as slow growth, late age at maturity, small litter sizes and low fecundity, which make them vulnerable to overexploitation. In terms of their global conservation status, 47 (or 25%) of the 185 species of cartilaginous fish that occur in South African waters are regarded as threatened in terms of the Red List of Threatened Species of the International Union for the Conservation of Nature (IUCN), of these, 37 are regarded as Vulnerable, four as Endangered and six as Critically Endangered. A further 34 species (18%) are regarded as Near Threatened.

Historically, shark fisheries management has been of low priority in South African waters, with the focus having been on high value teleost and crustacean fisheries. In addition, few shark species have the benefit of specific protection. Within commercial fisheries, there are few restrictions on catch although some fisheries are restricted in terms of total allowable effort. Protection from fishing is provided to certain shark species in some of the Marine Protected Areas (MPAs) that have been declared in terms of the Marine Living Resources Act (MLRA). A small number of shark species are protected in terms of international agreements such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Convention on Migratory Species (CMS).

Threats include trophy hunting, marine debris, anthropogenic disturbances, habitat degradation and increasing pressures on the marine environment due to climate change. Other additional concerns are the potential effect on the decline of shark populations and the impact it may have on ecosystem functioning, given their role as apex predators. There is thus an urgent need for the Department of Environmental Affairs (DEA), which is ultimately accountable for shark conservation in South African waters, to develop a national Shark Biodiversity Management Plan for Sharks (SBMP) which will set targets to improve the status of sharks within South African waters.

The purpose of the SBMP is to achieve and maintain a favourable conservation status for resident and migratory sharks within South African waters, taking into account the socio-economic and other values of these species, based on the best available scientific information. The SBMP would be the mechanism whereby this effort can be coordinated, directed and implemented on a national and international scale to the benefit of sharks and their habitats. The SBMP would also identify species and areas where additional interventions would be necessary to address threats to populations. The SBMP will be implemented in conjunction with, and takes cognisance of, the National Plan of Action for the

Conservation and Management of Sharks (NPOA), that has been developed by the Department of Agriculture, Forestry and Fisheries (DAFF) and which focuses on shark fisheries management.

The SBMP contains specific objectives that need to be achieved and a number of actions that need to be implemented to ensure that its aims are fulfilled. The Department (DEA) will be the lead agency in terms of implementation and monitoring and will appoint an Ecosystem and Species Steering Committee to oversee these tasks.

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Definitions

'Attract' - To feed, chum or bait, or to use any other means, method or device to lure or attract a live specimen;

'Bait' - A food put on a hook or in a trap to attract or entice fish or other animals;

'Biological diversity' or **'Biodiversity'** - The variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part and also includes diversity within species, between species and of ecosystems;

'Chum' - Mix that only consists of chopped or minced bony fish and fish oil;

'Chumming' - Scenting of water using chum;

'Bycatch' - The part of a catch of a fishing unit taken incidentally in addition to the target species towards which fishing effort is directed;

'Critical habitats' - Habitats that are of significant importance to portions of a species' life history and areas that promotes biological diversity and enhance representivity e.g. pupping, mating, nursery and feeding areas;

'Ecosystem' - A dynamic complex of animal, plant and micro-organism communities and their non-living environment interacting as a functional unit;

'Ecotourism' - A form of tourism involving controlled interaction or observation of fragile, pristine, or in some cases protected areas or protected species, intended as a low impact activity;

'Exclusive economic zone' - The exclusive economic zone (EEZ) as defined in section 7 of the Maritime Zones Act 1994 (Act 15 of 1994);

'Global change' - Changes in the global environment (including alterations in climate, land productivity, oceans or other water resources, atmospheric chemistry, and ecological systems) that may alter the capacity of the earth to sustain life;

'Habitat' - Means a place where a species or ecological community naturally occurs;

'Invasive species' - Any species whose establishment and spread outside its natural distribution range threatens ecosystems, habitats or other species or has demonstrable potential to threaten ecosystems, habitats or other species and may result in economic or environmental harm or harm human health;

'Listed threatened or protected species' - Means any species listed in terms of section 56(1) of the National Environmental Management Biodiversity Act (10 of 2004);

'Marine Protected Area (MPA)' - A marine area that is protected in terms of section 43 of the MLRA;

'MPA management authorities' - Means the organ of state or other institution or person in which the authority to manage a protected area is vested in terms of the Protected Areas Act, and includes any organ of state contracted by the Department to monitor, manage and undertake compliance and enforcement in a marine protected area;

'Non-consumptive use' - The non-extractive use of a living resource;

'Pollution' - Any change in the environment caused by-

- 1) substances;
- 2) radioactive or other waves;
- 3) noise, odours, dust or heat

emitted from any activity, including the storage and treatment of waste, or substance, construction or provision of services, whether engaged in by any person or organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on material useful to people, or will have such an effect in the future;

'Protected Areas Act' - Means the National Environmental Management: Protected Areas Act, 2003;

'Protected species' - Any species listed as a protected species in terms of section 56(1) of the National Environmental Management Biodiversity Act (10 of 2004);

'Provisioning' - The act of offering or providing a food stimulus to species;

'Range' - All the areas of water that a species inhabits, stays in temporarily, or crosses at any time on its normal migration route;

'Research institutions' - Organisations other than tertiary institutions with a capacity to undertake research, including but not limited to

KZNSB, Ocean Research Institute (ORI), Port Elizabeth Museum at Bayworld, South African Environment SAEON, SAIAB, Iziko Museum, SANBI;

'Regional Fisheries Management Organisations (RFMO)' - An international fisheries organisation or arrangement, as appropriate, that has the competence to establish conservation and management measures;

'Shark' - Any species in the Class *Chondrichthyes*, which includes sharks, rays, skates and chimaeras;

'Shark Control Mechanism/Shark Control Programme' - Refers to bather safety programmes administered by including but not limited to KZNSB that may include shark nets, drum-lines and/or any combination thereof;

'Shared populations' - Species populations whose range extends over the EEZ of more than one country;

'South African Waters' - Its internal waters which include all harbours;

- its territorial waters which include the sea within a distance of twelve nautical miles from the baselines established in terms of the Maritime Zones Act 15 of 1994. (A nautical mile approximates to 1,85 kilometers);
- its contiguous zone, including its marine cultural zone, which includes the sea beyond the territorial waters but within a distance of 24 nautical miles from the baselines;
- its EEZ which includes the sea beyond the territorial waters but within a distance of 200 nautical miles from the baselines; and
- its continental shelf as defined in Article 76 of the United Nations Convention on the Law of the Sea;

'Species of conservation concern' - Species that are classified as Threatened in terms of the criteria of the IUCN Red List of Threatened Species;

'Sustainable development' - As highlighted in section 2(4)(a) of NEMA 107 of 1998;

'Threatened species' - Species that are classified as Vulnerable, Endangered or Critically Endangered in terms of the IUCN Red List criteria;

'Integrated Development Plan' - Means a plan envisaged in section 25 of Municipal Systems Act 32 of 2000.

ACRONYMS

BCC	Benguela Current Commission
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species
COFI	Committee on Fisheries
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DME	Department of Minerals and Energy
ECPTA	Eastern Cape Parks and Tourism Authority
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
Ezemvelo	Ezemvelo KwaZulu-Natal Wildlife
FAO	Food and Agriculture Organisation of the United Nations
GIS	Geographic Information System
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
IUCN	International Union for the Conservation of Nature
IUU	Illegal, Unreported and Unregulated (fishing)
IDPs	Integrated Development Plans
KZN	KwaZulu-Natal
KZNSB	KwaZulu-Natal Sharks Board
MCM	Branch: Marine and Coastal Management in the former Department of Environmental Affairs and Tourism
MLRA	Marine Living Resources Act (18 of 1998)
MPA	Marine Protected Area
NEMBA	National Environmental Biodiversity Act (10 of 2004)
NGO	Non-governmental Organisation
NPOA	National Plan of Action for the Conservation and Management of Sharks

O&C	Branch: Oceans and Coasts in the Department of Environmental Affairs
ORI	Oceanographic Research Institute
RFMO	Regional Fisheries Management Organisation
SAEON	South African Environmental Observation Network
SAIAB	South African Institute for Aquatic Biodiversity
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
BMPS	Biodiversity Management Plan for Species
SBMP	Sharks Biodiversity Management Plan
Shark MoU	Memorandum of Understanding on the Conservation of Migratory Sharks

1 Introduction

1.1 Why sharks require a Biodiversity Management Plan

In 2011 South Africa signed the Shark Memorandum of Understanding (MoU) under the Convention on Migratory Species. This non-binding agreement recognises the critical role that migratory sharks play in marine ecosystems and local economies. There is a concern about the significant mortality of sharks, including those listed in Appendices I and II of the Convention from a range of impacts and threats including target fisheries, fisheries by-catch, Illegal, Unreported and Unregulated (IUU) fishing, trophy hunting, marine debris, ecosystem modifications, anthropogenic disturbances and increasing pressures on the marine environment due to climate change. The objective of this Memorandum of Understanding (MoU) is to achieve and maintain a favourable conservation status for migratory sharks based on the best available scientific information, taking into account the socio-economic and other values of these species. Signatories are requested to implement the concepts founded within this agreement at a national scale.

In addition, the vulnerability of sharks and the implications of their declining conservation status warrant further development of conservation measures, where they do not already exist and enhanced implementation and enforcement of existing measures. Therefore there is an urgent need for the Department of Environmental Affairs (DEA) to develop a national Biodiversity Management Plan (BMP) with set targets to improve the status of sharks.

1.2 PURPOSE OF THE BIODIVERSITY MANAGEMENT PLAN

The development of the SBMP is driven by the National Environmental Management Biodiversity Act (NEMBA), Act 10 of 2004 which seeks to provide for the management and conservation of biodiversity within the Framework of the National Environmental Management Act, 1998; and the protection of species and ecosystem that warrant national protection. As it is stated in NEMBA that the BMP must be aimed at ensuring the long-term survival in nature of the species or ecosystem which the plan relates. Therefore the purpose of the SBMP is to attain and maintain a favourable conservation status for resident and migratory sharks within South Africa, taking into account the socio-economic value of these species. Conservation and management decisions should be based on the best available scientific information. A goal of the SBMP is to formalise much of the conservation orientated work that is currently being conducted on sharks and to provide the mechanism whereby this effort can be coordinated, directed and implemented to the benefit of sharks and their habitats. Another goal is to identify other species and areas where additional interventions are required to address issues impacting negatively on the status of sharks.

The SBMP includes legislative, strategic and research-related aims for the conservation and management of sharks including the following:

- Identifying and protecting critical shark habitats;
- Identifying and mitigating threats to shark populations (e.g. reducing the impact of environmental degradation on sharks);
- Identifying and providing special protection to threatened shark species or populations;
- Improving scientific knowledge that is used to make informed management decisions;
- Coordinating and undertaking conservation-orientated shark research and management, with particular reference to threatened species;
- Developing conservation strategies for the recovery of threatened shark species and their habitats;
- Promote the dissemination of scientific findings, public participation and education with regard to the socio-economic value of sharks, their conservation status and bather safety and its management.

The conservation status of shark species and their habitats would be considered to be 'favourable' when all the following conditions are met:

- Their range or habitats are currently not reduced to levels that cannot sustain viable populations in the long term, nor are likely to be reduced in future;
- The abundance and structure of their populations remain at levels that are adequate for maintaining ecosystem integrity.

The conservation status of sharks and their habitats will be taken as 'unfavourable' if any of the conditions set out above are not met. In cases where human and financial resources or regulatory frameworks limit the capacity of management agencies to mitigate known threats to shark species, precautionary management approaches must be considered.

1.3 Benefits of the Biodiversity Management Plan

South Africa recognises the concerns expressed by many international bodies, such as the United Nations Food and Agriculture Organisation (FAO), the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), relating to the conservation and management of sharks; and the existing management arrangements that may require improvements in order to address concerns within its national waters. The development of a SBMP will contribute to the conservation, protection and management of shark species of conservation concern through coordinated actions. It is also noted that the concurrent development of the National Plan of Action for the Conservation and Management

The implementation of a SBMP can enhance shark conservation through: (i) strengthening the political will to implement shark conservation measures in a coordinated and timely fashion; (ii) bridging shark fisheries and conservation interests; (iii) contributing to the implementation of the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks) of the FAO and building on it; and (iv) adding to global shark conservation efforts in the areas of research, monitoring, data collection and analysis, threat definition and reduction, habitat identification and protection; education and public awareness; information exchange and capacity building.

1.4 Implementation and monitoring of the Biodiversity Management Plan

The Department (DEA) will be the lead agency in implementing and monitoring all BMPs. To assist with this, DEA will appoint a Steering Committee with terms of reference to plan and monitor the implementation of these plans. The officials from DEA will be permanently appointed as Steering Committee members. An initial meeting for the planning of implementation will be scheduled, thereafter annual meetings will be held to assess progress, review priorities, identify any hindrances to implementation and recommend remedial action. Annual progress reports in this

regard must be submitted to DEA.

Collectively, DEA will be responsible for assessing the overall implementation and effectiveness of the SBMP against its objectives within approved timelines and outputs on annual bases. Regular assessments will be conducted to ensure the achievement of indicators. Recommendations will be made where challenges exist and may prompt the amendment of the SBMP or its timeframes. Fisheries Branch at DAFF has been the lead agency for the production of the South African NPOA for sharks and will remain responsible for coordinating its implementation.

1.5 integration of Shark Management Plan in the Integrated Development Plans (IDPs)

Bather Protection Programs have been introduced at most popular public bathing beaches as a public safety measure against the risk of shark attacks. The Bather Protection Programmes can adversely affect shark species threatened species, populations or ecological communities and may also affect species, populations or ecological communities that were not previously threatened to become threatened. The inclusion of the management of sharks in the Integrated Development Plans (IDPs) is essential in protecting shark species while minimising interactions and conflicts between recreational water users and sharks. Some of the objectives that can be included in the IDPs are:

- Strive to minimise human/shark incidents by keeping them apart through ecological alternative
- Reduce the impact on non-target species
- Strive to obtain the latest technology on shark monitoring
- Environmental Education and Awareness
- Ensure that monitoring and reporting is undertaken in a transparent manner.

2 Background

2.1 Information pertinent to the conservation of sharks

There are approximately 185 species of cartilaginous fish (Class *Chondrichthyes*) that have been recorded in South African waters consist of 109 shark species, 68 ray species and 8 chimaera species (Compagno, 2000; Compagno, 2002(a) and Compagno *et al* 1989; species checklist provided as Appendix 1). Of these, about one third are classed as rare, in that they are known from only 1-10 taxonomic recordings of the species. Fifteen species are endemic to South African waters and a further 34 to southern African waters. Compagno (2002(b)) suggested that, with further exploration, a number of additional species found in the neighbouring waters of Namibia and Mozambique are likely to be found in South African waters. Three species have been recorded from the waters of the Prince Edward Islands in the southern Indian Ocean.

Habitats occupied by cartilaginous fish may be broadly divided into the continental shelves (from the intertidal zone to a depth of 200 m), the continental slopes (from below 200 m to the ocean floor) and the oceanic zone (beyond the shelves and above the slopes and sea bottom) (Compagno, 2002b). South Africa has an unusually large number of slope species (ca 87), but only a few species that penetrate fresh water (6) and few oceanic species (ca 23). Amongst some of the shelf species and some of the deep-slope species, the distribution can be further sub-divided into cool-temperate (west of Cape Point), warm-temperate (from Cape Point to East London) and subtropical-tropical species (east of East London), with diversity increasing from west to east.

Sharks and rays, through life history characteristics such as slow growth, late age at maturity and small litter sizes are not particularly productive and are vulnerable to overexploitation. A number of shark and ray species are under threat in many parts of the world. In terms of their global conservation status, 47 (or 25%) of the 185 species of cartilaginous fish that occur in South African waters are regarded as threatened, as assessed in terms of the Red List of Threatened Species of the International Union for the Conservation of Nature (IUCN) (www.iucnredlist.org, accessed December 2011). Of these, 37 are regarded as Vulnerable, four as Endangered and six as Critically Endangered, with a further 34 regarded as Near Threatened. Compagno (2002(b)) notes that, although the diversity of cartilaginous fish in South African waters is high, population sizes are relatively small because the various habitats are limited in extent.

Given the inherently low productivity of cartilaginous fish, at low abundance their vulnerability to overexploitation is increased. In addition, the historically low economic value of shark and ray products compared to other fish has resulted in research and conservation of these species having a lower priority than traditionally high-value species (US NPOA 2001). Recently, however, there has been a growing demand for certain shark products, such as fins and fishery managers are generally required to manage shark fisheries without adequate data. This generalisation applies in the South African context, where, with some notable exceptions, shark research has tended to focus on iconic species (such as the great white shark (*Carcharodon carcharias*) and the spotted ragged-tooth shark (*Carcharias taurus*), on shark taxonomy and on the life history of sharks caught in the beach protection scheme in KwaZulu-Natal (KZN). In the past five years, however, the South African government has begun to address this shortcoming with an increased focus on shark fisheries research.

Few shark species enjoy specific protection in South African waters. The great white shark is fully protected by the Marine Living Resources Act (MLRA), while any fishing of whale shark (*Rhincodon typus*), basking shark (*Cetorhinus maximus*) and the sawfishes (*Pristis* spp) is prohibited in terms of the MLRA. Several species may be caught by recreational linefishers only and may not be traded commercially; these are the spotted ragged-tooth shark, spotted gully shark (*Triakis megalopterus*), pyjama shark (*Poroderma africanum*) and leopard catshark (*Poroderma pantherinum*). For all shark species other than those that are fully protected or for which line fishing is prohibited, there is a recreational bag limit of one per species per day. Within commercial fisheries, other than the specific examples provided above, the only restriction on catch is a limit on shark bycatch in the pelagic long line fishery for tuna and swordfish. Some fisheries are restricted in terms of total allowable effort, including the demersal long line fishery, the traditional line fishing and the gillnet fishery for the St Joseph shark (*Callorhynchus capensis*). No sharks caught in South African waters may be finned, meaning that it is illegal to catch a shark, remove the fins at sea and discard the carcass. Protection from fishing is provided to certain shark species by some of the Marine Protected Areas (MPAs) that have been declared in terms of the MLRA.

Certain shark species are protected in terms of international agreements. The great white shark, whale shark, basking shark and the sawfishes are listed either in Appendix I or Appendix II of CITES, meaning that trade is strictly controlled. A number of countries, including South Africa, have signed a Memorandum of Understanding on the Conservation of Migratory Sharks (Shark MoU) in terms of CMS, the objective of which is to ensure the conservation and management of migratory sharks and their long-term sustainable use. A number of species are listed under CMS, including the great white shark, whale shark, basking shark, shortfin mako shark (*Isurus oxyrinchus*) and the giant manta ray (*Manta birostris*). The effectiveness of agreements such as CMS is limited if neighbouring states with which stocks are shared are not signatories, and because it is a non-binding instrument.

Research into the ecological importance of sharks and rays is still at an early stage, but, as predators, it is thought that they have probably influenced the structure of marine communities over geological time (Heithaus *et al.* 2010). The mechanisms through which they are likely to have had this effect include (i) direct predation effects, (ii) risk effects (behavioural changes in prey) and (iii) cascading effects of predator-prey interactions (Heithaus *et al.* 2010). Hence the unsustainable exploitation of sharks would not only affect the populations of the exploited species themselves but may also affect marine ecosystems more generally. In addition to their important ecological role, sharks are also valuable as a resource. Well-managed shark fisheries based on the more productive species can sustain livelihoods but so, too, can shark-based marine ecotourism, including diving with species such as great white, tiger (*Galeocerdo cuvier*), blacktip (*Carcharhinus limbatus*) and spotted ragged-tooth sharks. In other parts of the world whale shark diving is a lucrative business but the local occurrence of whale sharks is probably too unpredictable to sustain an industry.

The single major threat to shark populations is fishing, including commercial, recreational, targeted and bycatch. Other threats or potential threats include bather protection measures, habitat loss and degradation (including shark nursery areas, effects of fishing on habitat and aquaculture), marine ecotourism, invasive marine organisms, pollution, subsea cable electric and magnetic fields and climate change (Stevens *et al.* 2005).

2.2 Legislative and institutional context of shark conservation

2.2.1 National Legislation

Development of the shark biodiversity management plan has considered different environment legislations and policies:

- Constitution of Republic of South Africa (Act 108 of 1996)
- National Environmental Management Act (107 of 1998) (NEMA)
- The National Environmental Management: Biodiversity Act (10 of 2004) (NEM:BA)
- The National Environmental Management Protected Areas (NEM:PAA) (57 of 2003)
- The National Environmental Management: Integrated Coastal Management Act (24 of 2008)
- Marine Living Resources Act 1998 (18 of 1998)
- Animal Protection Act (71 of 1962)
- Societies for the Prevention of Cruelty to Animals Act (169 of 1993)
- Maritime Zone Act (15 of 1994)
- Dumping at Sea Control Act, 1980 (Act 73 of 1980)
- Mineral and Petroleum Resources Development Act (28 of 2002)
- National Heritage Resources Act (25 of 1999)
- South African Maritime Safety Authority (5 of 1998)
- Wreck and Salvage Act (94 of 1996)
- The Hazardous Substances Act (15 of 1973)
- KwaZulu-Natal Sharks Board Act (05 of 2008)
- Threatened or Protected Species (TOPS) Regulations
- Any other relevant legislations/policies/bylaws are considered in term of sharks management.

2.2.2 International Agreements

There are several international and regional treaties and instruments that provide further protection (Binding and non-binding) for sharks and their habitats;

CITES	IPOA-Sharks
CMS	United Nations General Assembly Resolution on Sustainable Fisheries
Shark MoU	Agreed Measures for the Conservation of Antarctic Fauna and Flora (1964)
World Heritage Convention	The Convention on the Conservation of Migratory Species of Wild Animals
Convention on Biological Diversity (CBD)	The United Nations Law of the Sea Convention
FAO and Regional Fisheries Management Organisations (RFMOs)	The Convention on the Prevention of Marine Pollution by dumping of Wastes and Other Matter (The London Convention)
International Commission for the Conservation of Atlantic Tunas (ICCAT)	SADC Protocol on Fisheries
Indian Ocean Tuna Commission (IOTC)	
NPOAs for sharks	

The SBMP is in line with South Africa's position and obligations in terms of these treaties and instruments. It is also consistent with other international shark conservation and management initiatives, which calls upon States to develop and implement NPOAs for sharks.

2.13 Institutional Arrangements

These are agencies/institutions actively support the management and conservation of sharks.

Organisation/Agencies
Department of Environmental Affairs (DEA)
Department of Agriculture, Forestry and Fisheries (DAFF)
KwaZulu-Natal Sharks Board (KZNSB)
iSimangaliso Wetland Park Authority
Ezemvelo KwaZulu-Natal Wildlife (EKZNW)
South African Institute for Aquatic Biodiversity (SAIAB)
Oceanographic Research Institute (ORI)
South African National Biodiversity institute (SANBI)
South African National Parks (SANParks)
Eastern Cape Parks and Tourism Agency (ECPTA)
CapeNature
Iziko Museum of Natural History

Academic Institutions
Non-Governmental Organisations
Research Institutions

3 Threats

3.1 Lack of co-ordinated legislative framework and governance (domestic, regional and international)

Successful shark conservation and management requires the fullest possible cooperation between governments, intergovernmental organisations, non-governmental organisations, academia, research institutions and local communities, as well as engagement with relevant international instruments. A national SBMP would need to set forth legislative and strategic measures to achieve this, by including a coordinated engagement strategy that can operate at a national, regional and international level.

Considering the escalating pressures on sharks, the growing body of scientific evidence regarding the cascading ecological effects of the removal (as a result of anthropogenic activities) of sharks, (as marine apex predators) has had on marine ecosystem and the growing public awareness and concern regarding this problem. Therefore, there is an urgent need to engage in this task.

3.2 Anthropogenic impacts excluding fishing

In South Africa, certain shark species are protected or partially protected from extractive use. This provides the opportunity for the non-consumptive use of sharks, which includes diving with sharks and the viewing of sharks from cages. This activity has expanded in South Africa since the early 1990s and has now been brought into a regulated management framework. Non-consumptive marine-based ecotourism is increasingly being recognised as an important alternative form of livelihood given that consumptive fish utilisation is unable to sustain current socio-economic needs of some coastal communities. For some shark species (e.g. great white sharks, spotted ragged tooth sharks, and tiger sharks) non-consumptive uses (including eco-filming) far outweigh consumptive utilisation in economic terms. Potentially, however, non-consumptive uses could impact negatively on sharks and their habitats. Hence these activities need to be regulated according to sound conservation and ecosystem management principles.

Current shark management practices are primarily focused upon impacts of direct and indirect fisheries (see below) and of non-consumptive uses. However, there is a much broader scope of impacts that must be considered and fully understood to enable the conservation of sharks in South Africa. These include habitat degradation, trophic level impacts and climate change impacts at the level of species, their habitats and the ecosystem. There is an urgent need for research and monitoring regarding such impacts, as well as management interventions to prevent pollution, protect critical habitats and reduce the impact of environmental degradation on sharks.

Shark-control programs have been put in place at various beaches across the country to provide protection against shark attacks at popular beaches. The main objective of such programs is to protect bathers from shark attacks also minimising impacts on biodiversity. Research is currently being undertaken concerning the biology and behaviour of sharks and other marine species impacted by the current shark control programme. The program also conducts public education and outreach programmes on sharks, safe bathing activities.

As such the mandated duties of the KZNSB are cognoscente and they are cognisant of the need to minimise the environmental impact on biodiversity, while striving to improve/evaluate methods that have a lower environmental cost.

3.3 Fishing (both directed and bycatch)

Fishing of shark populations to below sustainable levels may occur rapidly. Given the susceptibility of shark species to overfishing, successful management of shark fisheries requires a stronger commitment to fishery monitoring, biological research and proactive management than is the case for many teleost fisheries (Walker, 1998). In 1999, the FAO Committee on Fisheries (COFI) endorsed the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks). This plan was adopted during the November 1999 FAO Conference. The IPOA-Sharks builds upon the FAO Code of Conduct for Responsible Fisheries, encompassing all elasmobranch fisheries (commercial and recreational), and calls on all member nations to voluntarily implement the IPOA-Sharks through the development of a National Plan of Action for the Conservation and Management of Sharks (NPOA). South Africa, as a signatory to the FAO Code of Conduct for Responsible Fisheries, has a responsibility to fish sharks sustainably; to develop population estimates of the targeted and bycatch species, to protect and manage the conservation status of sharks in South Africa and to adopt a NPOA for sharks. This task is being undertaken by DAFF. The conservation of shark species requires that regional cooperation be strengthened through RFMOs and CMS.

Some of the IPOA specific objectives that are relevant to the SBMP are:

- Improve knowledge of fisheries and shark species, as well as their role in the ecosystem;
- Introduce sustainable exploitation of shark stocks and reduce bycatch;
- Enhance a coherent approach between national and international policy for sharks; and
- Enhance and improve research and collaboration.

3.4 Insufficient data and uncoordinated research and monitoring

Scientific research is vital to improve our understanding of shark biology, ecology, population status and for assessing the impact of human activities on sharks. While our information base has improved, our ability to address many shark conservation and management issues is still constrained by the quality of shark catch and effort data. There is also a lack of data on the roles of sharks in the marine ecosystem. One of the goals of the SBMP is to improve the quality of scientific information collected, through coordination of research and information sharing and by identifying and prioritising research projects and monitoring programmes. If successful, this would result in better communication among government agencies, Interested and Affected Parties (I&APs) and the general public, and would lead to more informed decision-making. It would also inform South Africa's position with regard to relevant international instruments and would help to guide and prioritise national, multi-jurisdictional and regional approaches to shark conservation, in particular on identified shark species with a poor conservation status.

Consideration should be given to the adequacy of funding for shark research that has been identified as a high priority for the conservation and management of sharks and their habitats. Research and management efforts should have an emphasis on identified protected species and areas. Consideration should be given to the use of risk assessment methodologies for the identification of priority (high risk) species requiring the implementation of management measures.

In the past, ecosystem focused research in relation to sharks had a lower priority than species specific research aimed at better understanding the impacts of fishing on target or high-risk species. This must be rectified to reflect the complexity of broad scale ecosystem research, while recognising that such research may be expensive.

4 Biodiversity management action plans

(1) Lack of co-ordinated legislative framework and governance (domestic, regional and international)	
Threat category	(1.1) Uncoordinated efforts pertaining to conservation of shark species and their habitats
Details of threats	- Lack of protocol to determine optimal use of certain shark species (e.g. fishing vs ecotourism)

Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority ¹	Start time	Duration ²
(1.1a) To have a management protocol in place to determine optimal use of shark species	Establish inter-departmental task group to develop protocol and assess candidate species for optimal use	DEA, DAFF	Relevant tertiary institutions, MPA management authorities	DEA, DAFF	Task team appointed	M	<2y.	2y.
					Candidate species identified and assessed	M	<2y.	3y.
(1.1b) Ensure listed shark species and habitats are protected	Legislation for protecting listed shark species identified, amended as required, and implemented in terms of restricted activities	DEA		DEA	Legislation in place and implemented	H	<1y.	<5y.
	Identify critical habitat requiring protection and declare protected areas as appropriate	DEA	Relevant tertiary and research institutions	DEA	Critical habitat identified and mapped	M	<5y.	<5y.
(1.1c) Improved conservation status of identified shark species	Where applicable, develop recovery plans for identified shark species with poor conservation status	DEA	Relevant tertiary, research and Conservation Management institutions	DEA	Recovery plans in place	L	<5y.	<2y.

Threat category	(1.2) Lack of cooperative management of shared populations and migratory species between countries							
Details of threats	<ul style="list-style-type: none"> - Lack of regional coordination with regard to conservation and management of shared populations and their habitats - Lack of standardisation with regard to monitoring and reporting of shared populations 							
Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
(1.2a) Effective regional coordination with regard to conservation and management of shared populations and their habitats	Determine whether regional/international agreements exist under which shark conservation and management platforms can be established	DEA	DAFF, EKZNW, Isimangaliso Wetland Park Authority, relevant national authorities	DEA	Identification of agreements	M	<3y.	<5y.
	Use regional/international agreements or other means to set up platforms for shark conservation and management	DEA	NGOs, relevant tertiary institutions	DEA	Establishment of platforms	M	<3y.	<5y.
	Explore other opportunities for exchange of information relevant to shark conservation and management at a regional/international scale (e.g. through NGOs or academic institutions)	DEA	DAFF, EKZNW, Isimangaliso Wetland Park Authority, relevant national authorities in the region	DEA	Shared information documented	M	<2y.	<5y.
(1.2b) Assessments of the conservation status of shared populations at regional level	Organise a regional workshop to assess conservation status of sharks	DEA	DAFF, relevant national authorities in the region, relevant research institutions	DEA, regional agreement (e.g. BCC), international instruments (e.g. CMS)	Conservation status of sharks at regional level assessed	M	<3y.	<1y.

(2) Anthropogenic impacts excluding fishing

Threat category	(2.1) Shark control program							
Details of threats	<ul style="list-style-type: none"> - Bycatch of shark species that pose little or no threat to bathers - Impacts on all shark species 							
Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
(2.1a) Minimise bycatch of shark species that pose little or no threat to bathers	Research and implement methods of mitigating bycatch (e.g. drumlines)	KZNSB	DEA, DAFF	KZNSB	Reduction of bycatch of shark species that pose little or no threat to bathers	H	<1y.	5y.

(2.1b) Minimise impact on all shark species	Investigate alternatives to shark fishing systems	KZNSB	DEA, DAFF	KZNSB	Alternative system investigated	H	<1y.	5y.
(2.1c) Raise public awareness on bather safety and shark control programs	Development of education programs of bather safety and shark control programs through	DEA	Local and Provincial Management authorities and MPA management	DEA	Education programs	M	<2y.	5y.
Threat category	(2.2) Aquaculture, aquariums and invasive alien species (Aquaculture in terms of risk assessment to bather safety)							
Details of threats	<ul style="list-style-type: none"> - Incubation of fish diseases and parasites and transfer to wild stocks - The introduction and spread of invasive alien species - Localised habitat degradation (e.g. declines in water quality and other physical effects) and attraction of predators (e.g. behavioural changes) - Entanglement of sharks in aquaculture gear - Contribute to management and regulation of aquaria collections and management of export of species removed from the wild 							
Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
2.2a) To investigate potential effects of aquaculture and aquaria on shark species and habitats, (e.g. through spread of diseases or parasites, aquaculture wastes, chemical pollution, escapement of farmed fish or release of fish from aquaria	Conduct specific research on effects of aquaculture and aquaria (e.g. diseases, parasites, water quality) on wild sharks.	DAFF, DEA (Aquaculture Research)	Aquaculture industry, relevant tertiary institutions	DAFF, Aquaculture industry	Risks to shark species and habitats posed by activities related to aquaculture or aquaria, identified	L	<3y.	5y.
(2.2b) Evaluate the aquarium trade for sharks	Access the scale of the aquarium trade and identify if it constitutes a new fishery	DAFF and DEA	DAFF and DEA	DAFF and DEA	Report on the evaluation of the scale of the activity	M	<1y.	5y.

Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration ²
(2.2b) To limit, on a precautionary basis and pending availability of research results, potential contamination of critical shark habitats in inshore waters	Limit aquaculture in areas of local abundance of threatened or protected species	DAFF (Aquaculture Research and Management) DEA	Aquaculture industry, relevant tertiary institutions	DEA, DAFF	Critical shark habitat of threatened or protected species included as criterion for exclusion of aquaculture from areas	M	<1y.	5y.
(2.2c) To prevent entanglement in aquaculture gear	Develop appropriate aquaculture gear to avoid shark entanglement and operational procedures for disentanglement	Aquaculture industry, DEA, DAFF	Relevant tertiary institutions	Aquaculture industry	<ul style="list-style-type: none"> • Gear to mitigate shark entanglement developed • Operational procedures developed for disentanglement, including monitoring protocols 	L	<3y.	5y.

Threat category	(2.3) Mining and Petroleum							
Details of threats	<ul style="list-style-type: none"> - Seismic surveys - Pollution 							
Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
(2.3a) To minimise impacts of petroleum exploration and extraction, prospecting and mining on critical habitat and areas of high shark diversity	Identify potential impacts of petroleum exploration and extraction on sharks (desktop study)	SANBI, DEA	Industry, DME, relevant tertiary institutions	DEA	Report with potential impacts identified	M	<2y.	2y.
	Identify potential impacts of prospecting and mining on sharks (desktop study)	SANBI, DEA	Industry, DME, relevant tertiary institutions	DEA	Report with potential impacts identified	M	<2y.	2y.

Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
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(2.3a cont)	Incorporate shark conservation and management into the aquaculture concerns, if any, into the EIA process for mining and petroleum	SANBI, DEA	Industry, DME, relevant tertiary institutions	DEA	Shark-related concerns addressed in EIAs	M	<2y.	5y.
	Research into the need for proclaiming inshore and offshore MPAs to mitigate effects of petroleum and mining industries on shark species and habitats	SANBI, DEA	Industry, DME, relevant tertiary institutions, Management authorities	DEA	Scientific recommendations regarding the need for MPAs to protect shark species and habitats	M	<3y.	4y.
Threat category	(2.4) Pollution (land- and ship-based sources)							
Details of threats	<ul style="list-style-type: none"> - Waste-water discharge - Marine debris (plastics, fishing gear) 							

	<ul style="list-style-type: none"> - Heavy metals - PCBs - Organochlorine contaminants 							
Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
(2.4a) To determine specific impacts of pollution on sharks	Initiate appropriate research and monitoring programmes, including: <ul style="list-style-type: none"> - Monitor chemical pollutant levels in shark tissues 	DEA	DAFF, KZNSB	DEA	Functional research and monitoring programme initiated	L	<2y.	y2.
	<ul style="list-style-type: none"> - Assess metabolic effects of pollutants - Monitor plastic entanglement and ingestion 				Baseline information on pollution levels and effects			

Threat category	(2.5) Habitat alteration or disturbance							
Details of threats	<ul style="list-style-type: none"> - Effects of global changes (e.g. including ocean acidification, freshwater and nutrient inflow reduction, sedimentation etc) on trophic interactions, ecosystem structure and functioning - Coastal development - Loss of habitat 							
Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
(2.5a) To understand impacts of habitat alteration or disturbance on sharks	Mapping of important nursery areas and other critical habitat for sharks species	DEA, SANBI, DAFF	Relevant tertiary, research and Conservation Management institutions	DEA, DAFF	Maps of shark nursery areas and other critical habitat	H	<2y.	3y.
	Assess levels of disturbance of nursery areas and other critical habitat for sharks				Report indicating disturbance on nursery areas and other critical habitat			

	Investigate effect of reduced or increased nutrient inputs from freshwater sources (e.g. uThukela Banks system) on sharks	DEA, SANBI, DAFF	Relevant tertiary, research and conservation management institutions	DEA, DAFF	Report on effects of reduced nutrient inputs on sharks (e.g. model)	L	<4y.	3y.			
	Assess potential effects of ocean acidification on sharks				Report on effects of ocean acidification on sharks				L	<4y.	3y.
	Assess range extensions of shark species that may be associated with global changes e.g. sea temperature				Maps of range extensions				L	<4y.	3y.

Threat category	(2.6) Non-consumptive use							
Details of threats	<ul style="list-style-type: none"> - Disturbance/behavioural alteration of species associated with ecotourism activities (boat-viewing, diving, attraction, 							

	provisioning) - Disturbance/behavioural alteration of species associated with filming activities - Disturbance of habitats							
Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
(2.6a) To regulate non-consumptive use of relevant shark species	Review impacts of attraction, provisioning, boat- or diver disturbance	DEA	Tour operators, relevant tertiary institutions, MPA Management authorities including Ezemvelo	DEA	Report with scientific recommendations regarding levels of impacts of attraction, provisioning, boat- or diver-disturbance	H	<1y.	3y.
	Develop mitigation measures to reduce tourism impacts on target shark species and local ecosystems	DEA	Tour operators, relevant tertiary institutions	DEA	Mitigation measures to reduce tourism impacts on target	H	<1y.	5y.

					shark species and local ecosystems compiled and implemented			
	Develop Code of Conduct for diving with ragged-tooth sharks, tiger sharks, blacktips sharks, white sharks, whale sharks and manta rays	DEA	Tour operators, relevant tertiary institutions, MPA management authorities, including Ezemvelo	DEA	Published Code of conduct documents for public use for all the six species	H	<1y.	2y

(3) Fishing (both directed and bycatch)

Threat category	(3.1) Targeted shark fisheries							
Details of threats	Due to their life-history characteristics (slow growth, low fecundity, late age at maturity) sharks are particularly vulnerable to overexploitation							
Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
(3.1a) To manage shark fisheries on a sustainable basis	Implement the NPOA	DAFF	DEA	DAFF	Actions identified in the NPOA implemented	H	<1y.	5y.
Threat category	(3.2) Shark bycatch							
Details of threats	Due to their life-history characteristics (slow growth, low fecundity, late age at maturity) sharks are particularly vulnerable to overexploitation							
Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
(3.2a) To minimise bycatch of shark species, in particular protected species, in all fisheries	Implement the NPOA	DAFF	DEA	DAFF	Actions identified in the NPOA implemented	H	<1y.	5y.

(4) Insufficient knowledge, uncoordinated research and absence of long term monitoring

Threat category	(4.1) Insufficient knowledge							
Details of threats	<ul style="list-style-type: none"> - Inadequate knowledge of shark diversity, distribution and insufficient information on life history parameters of identified shark species - Lack of knowledge on the effectiveness of MPAs or seasonal closures as tools for shark conservation - Insufficient knowledge of population delineation/genetic diversity of certain shark species - Insufficient understanding with respect to effects of reduced predation by sharks in various ecosystems - Inadequate understanding of the socio-economic value and impact of sharks 							
Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
(4.1a) To improve knowledge of shark diversity, distribution and abundance	Desktop study of available information on diversity, distribution and abundance of	DEA	DAFF, relevant research, tertiary institutions and MPA Management	DEA	Report with review and gap analysis completed	H	<1y.	2y.

	different shark species		Authorities including Ezemvelo					
	Biodiversity survey of less known habitats (e.g. shelf edge, slope) DEA	DEA, DAFF	DAFF, Relevant research and tertiary institutions and MPA Management Authorities including Ezemvelo	DEA, DAFF	Database and Geographical Information Systems of survey data developed	M	<3y.	5y.
(4.1b) To improve understanding of life history parameters of identified shark species	Desktop study of available information on life history parameters of identified shark species	DEA	DAFF, relevant research and tertiary institutions	DEA	Report with review and gap analysis completed	M	<2y.	3y.
	Conduct research to investigate life history parameters of identified species	DEA, DAFF	Relevant research and tertiary institutions including	DEA	Database	L	<4y.	5y.

			Ezemvelo					
(4.1c) To increase understanding of the effectiveness of MPAs or seasonal closures as tools for shark conservation	Conduct research with respect to the use of MPAs by shark species	DEA, DAFF	Relevant research and tertiary institutions, MPA management authorities including Ezemvelo	DEA, DAFF	Inventory of shark species in five MPAs	M	<2y	5y.

Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
(4.1d) To improve knowledge of population delineation/genetic diversity of identified shark species	Genetic studies of identified shark populations	DEA, DAFF	Relevant research and tertiary institutions	DEA, DAFF	Genetic profiles of collected species completed	L	<3y.	4y.
(4.1e) To improve understanding with respect to trophic effects of reduced predation by sharks in various ecosystems	Desktop study of available information on diet of identified shark species	DEA	KZNSB, DAFF	DEA	Database and gap analysis	M	<2y.	2y.
	Diet studies (e.g. gut content analysis, stable isotope analysis) of identified shark species replicated in space and time	DEA, DAFF	Relevant research and tertiary institutions	DEA, DAFF	Database of relevant trophic information	M	<1y.	5y.
	Modelling approach to evaluate potential effects of reduced shark predation on ecosystems	DEA	DAFF, relevant tertiary institutions	DEA	Model and report on model outputs	M	<4y.	3y
(4.1f) Assess the socio-economic value and impact of sharks	Research into the value of sharks, their conservation and bather safety measures	DEA	Provincial Management Authorities and MPA management	DEA	Initiate research program	M	<4y.	3y.
Threat category	(4.2) Uncoordinated research							

Details of threats	<ul style="list-style-type: none"> - Lack of research prioritisation and regulation of research into species of conservation concern - Replication of research effort - Disproportional allocation of effort, funding and infrastructure - Inadequate dissemination of research findings Insufficient communication 							
Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
(4.2a) To put in place a research plan for species of conservation concern	Prioritise, regulate and facilitate research on identified species of conservation concern	DEA	DAFF, relevant tertiary and research institutions	DEA	Strategic research plan and prioritisation completed and implemented	H	<1y	2y.

Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
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(4.2b) To facilitate dissemination of shark research findings	Establish a shark research forum	DEA	DAFF, relevant tertiary and research institutions including Ezemvelo	All participating parties	Biennial forum established	M	<2y.	1y.
(4.2c) Data mobilisation and sharing, and database management plan	Urge researcher to contribute metadata to national databases	DEA, SAEON	DAFF, relevant tertiary and research institutions	SAEON	Increased centrally lodged data	M	<2y.	1y.
Threat category	(4.3) Absence of long-term monitoring							
Details of threats	<ul style="list-style-type: none"> - Lack of long term monitoring on population trends/indices of identified shark species - Coordination of existing and new databases 							
Objectives	Actions	Responsible parties	Collaborators	Funding source	Indicator	Priority	Start time	Duration
(4.3a) To put in place a functional long term monitoring plan	Develop and implement a long term monitoring plan data management protocols for shark species	DEA	DAFF, relevant research and tertiary institutions	DEA	Long term monitoring plan developed and implemented	M	<3y	2y.

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APPENDIX 1

<p>Checklist of cartilaginous fishes from South Africa</p> <p>The list of species was extracted from Appendix 1 of the draft South African Shark Management Plan of 2002, which was compiled by Leonard Compagno and was based on Compagno, Ebert & Smale (1989). The IUCN column was added, as were a small number of species known to have been described since, such as <i>Haploblepharus kistnasamyi</i> and <i>Manta alfredi</i>, or recorded since, such as the megamouth shark. It should not be regarded as fully updated to 2011, however, i.e. there may well be additional records of which we were not aware. IUCN categories as at December 2011; CR-Critically Endangered, EN-Endangered, VU-Vulnerable, NT-Near Threatened, LC-Least Concern, DD-Data Deficient.</p>			
Scientific name	Common name	IUCN Listing	Comments
CLASS CHONDRICHTHYES	CARTILAGINOUS FISHES		

SUBCLASS ELASMOBRANCHII	SHARKS AND RAYS		
SUPERORDER GALEOMORPHII	GALEOMORPH SHARKS		
ORDER HETERODONTIFORMES	BULLHEAD SHARKS		
FAMILY HETERODONTIDAE	BULLHEAD SHARKS		
<i>Heterodontus ramalheira</i> (Smith, 1949)	Whitespotted bullhead shark	DD	
ORDER LAMNIFORMES	MACKEREL SHARKS		
FAMILY MITSUKURINIDAE	GOBUN SHARKS		
<i>Mitsukurina owstoni</i> Jordan, 1898	Goblin shark	LC	
FAMILY MEGACHASMIDAE	MEGAMOUTH SHARKS		
<i>Megachasma pelagios</i> Taylor, Compagno & Struhsaker, 1983	Megamouth shark	DD	Included in Compagno (2002a) as post-completion footnote.
FAMILY ODONTASPIDIDAE	SAND TIGER SHARKS		
<i>Carcharias taurus</i> Rafinesque, 1810	Spotted raggedtooth	VU	
<i>Odontaspis ferox</i> (Risso, 1810)	Bumpytail raggedtooth	VU	
FAMILY PSEUDOCARCHARIIDAE	CROCODILE SHARKS		
<i>Pseudocarcharias kamoharai</i> (Matsubara, 1936)	Crocodile shark	NT	

FAMILY ALOPIIDAE	THRESHER SHARKS	VU	
<i>Alopias pelagicus</i> Nakamura, 1935	Smalltooth thresher	VU	
<i>Alopias superciliosus</i> (Lowe, 1839)	Bigeye thresher		
<i>Alopias vulpinus</i> (Bonnaterre, 1788)	Thresher shark	VU	
FAMILY CETORHINIDAE	BASKING SHARKS		
<i>Cetorhinus maximus</i> (Gunnerus, 1765)	Basking shark	VU	
FAMILY LAMNIDAE	MACKEREL SHARKS		
<i>Carcharodon carcharias</i> (Linnaeus, 1758)	Great white shark	VU	
<i>Isurus oxyrinchus</i> Rafinesque, 1810	Shortfin mako	VU	
<i>Isurus paucus</i> Guitart, 1966?	Longfin mako	VU	
<i>Lamna nasus</i> (Bonnaterre, 1788)	Porbeagle shark	VU	
ORDER ORECTOLOBIFORMES	CARPET SHARKS		
FAMILY STEGOSTOMATIDAE	ZEBRA SHARKS		
<i>Stegostoma fasciatum</i> (Hermann, 1783)	Zebra shark	VU	
FAMILY GINGLYMOSTOMATIDAE	NURSE SHARKS		
<i>Nebrius ferrugineus</i> (Lesson, 1830)	Tawny nurse shark	VU	
FAMILY RHINCODONTIDAE	WHALE SHARKS		
<i>Rhincodon typus</i> Smith, 1829	Whale shark	VU	
ORDER CARCHARHINIFORMES	GROUND SHARKS		
FAMILY SCYLIORHINIDAE	CATSHARKS		
<i>Apristurus manis</i> (Springer, 1979)	Ghost catshark	LC	
<i>Apristurus microps</i> (Gilchrist, 1922)	Smalleye catshark	LC	

<i>Apristurus saldanha</i> (Barnard, 1925)	Saldanha catshark	LC	
<i>Apristurus indicus</i> (Brauer, 1906)	Smallbelly catshark	DD	Compagno (2002a) had this as <i>Apristurus</i> sp. (black wonder catshark). Compagno <i>et al.</i> (2005) said SA records for <i>A. indicus</i> may be erroneous.

<i>Cephaloscyllium sufflans</i> (Regan, 1921)	Balloon shark	LC	
<i>Galeus polli</i> Cadenat, 1959	African sawtail catshark	LC	
<i>Halaelurus lineatus</i> (Bass, D'Aubrey & Kistnasamy, 1975b)	Lined catshark	DD	
<i>Halaelurus natalensis</i> (Regan, 1904)	Tiger catshark	DD	
<i>Haploblepharus edwardsii</i> (Voigt, in Cuvier, 1832)	Puffadder shyshark	NT	
<i>Haploblepharus fuscus</i> Smith, 1950	Brown shyshark	VU	
<i>Haploblepharus pictus</i> (Müller & Henle, 1838)	Dark shyshark	LC	
<i>Haploblepharus kistnasamyi</i> Human & Compagno, 2006	Natal shyshark	CR	Compagno (2002a) had this as <i>Haploblepharus</i> sp. nov.
<i>Holohalaelurus punctatus</i> (Gilchrist, 1914)	African spotted catshark	EN	
<i>Holohalaelurus regani</i> (Gilchrist, 1922)	Izak catshark or halalujah shark	LC	
<i>Poroderma africanum</i> (Gmelin, 1789)	Striped catshark or pyjama shark	NT	
<i>Poroderma pantherinum</i> (Smith, in Müller & Henle, 1838)	Leopard catshark	DD	
<i>Scyliorhinus capensis</i> (Smith, in Müller & Henle, 1838)	Yellowspotted catshark	NT	
FAMILY PROSCYLLIIDAE	FINBACK CATSHARKS	LC	
<i>Eridacnis sinuans</i> (Smith, 1957)	African ribbontail catshark		
FAMILY TRIAKIDAE	HOUND SHARKS		
<i>Galeorhinus galeus</i> (Linnaeus, 1758)	Tope shark or soupfin	VU	
<i>Hypogaleus hyugaensis</i> (Miyosi, 1939)	Blacktip tope	NT	
<i>Mustelus mosis</i> Hemprich & Ehrenberg, 1899	Arabian smoothhound	DD	
<i>Mustelus mustelus</i> (Linnaeus, 1758)	Smoothhound	VU	
<i>Mustelus palumbes</i> Smith, 1957	Whitespot smoothhound	DD	
<i>Scylliogaleus queckettii</i> Boulenger, 1902	Flapnose houndshark	VU	
<i>Triakis megalopterus</i> (Smith, 1849)	Spotted gully shark	NT	
FAMILY HEMIGALEIDAE	WEASEL SHARKS		
<i>Hemipristis elongatus</i> (Klunzinger, 1871)	Snaggletooth shark	VU	
<i>Paragaleus leucolornatus</i>	Whitefin weasel shark	DD	

Compagno & Smale, 1985			
FAMILY CARCHARHINIDAE	REQUIEM SHARKS		
<i>Carcharhinus albimarginatus</i> (Rüppell, 1837)	Silvertip shark	NT	
<i>Carcharhinus altimus</i> (Springer, 1950)	Bignose shark	DD	
<i>Carcharhinus amblyrhynchos</i> (Bleeker, 1856)	Gray reef shark	NT	
<i>Carcharhinus amboinensis</i> (Müller & Henle, 1839)	Pigeye or Java shark	DD	
<i>Cartihaihinus brachyurus</i> (Günther, 1870)	Copper shark or bronze whaler	NT	
<i>Carcharhinus brevipinna</i> (Müller & Henle, 1839)	Spinner shark	NT	
<i>Carcharhinus falciformis</i> (Bibron, in Müller & Henle, 1839)	Silky shark	NT	
<i>Carcharhinus leucas</i> (Valenciennes, in Müller & Henle, 1839)	Zambezi shark	NT	
<i>Carcharhinus limbatus</i> (Valenciennes, in Müller & Henle, 1839)	Blacktip shark	NT	
<i>Carcharhinus longimanus</i> (Poey, 1861)	Oceanic whitetip shark	VU	
<i>Carcharhinus melanopterus</i> (Quoy & Gaimard, 1824)	Blacktip reef shark	NT	
<i>Carcharhinus obscurus</i> (Lesueur, 1818)	Dusky shark	VU	
<i>Carcharhinus plumbeus</i> (Nardo, 1827)	Sandbar shark	VU	
<i>Carcharhinus sealei</i> (Pietschmann, 1916)	Blackspot shark	NT	
<i>Carcharhinus sorrah</i> (Valenciennes, in Müller & Henle, 1839)	Spottail shark	NT	
<i>Galeocerdo cuvier</i> (Peron & Lesueur, in Lesueur, 1822)	Tiger shark	NT	
<i>Loxodon macrorhinus</i> Willer & Henle, 1839 Sliteye	Sliteye shark	LC	
<i>Negaprion acutidens</i> (Rüppell, 1837)	Sharptooth lemon shark	VU	
<i>Prionace glauca</i> (Linnaeus, 1758)	Blue shark	NT	
<i>Rhizoprionodon acutus</i> (Ruppell, 1837)	Milk shark	LC	
<i>Triaenodon obesus</i> (Röppell, 1837)	Whitetip reef shark	NT	
FAMILY SPHYRNIDAE	HAMMERHEAD SHARKS		
<i>Sphyrna lewini</i> (Griffith & Smith, in Cuvier, Griffith & Smith, 1834)	Scalloped hammerhead	EN	
<i>Sphyrna mokarran</i> (Rüppell, 1837)	Great hammerhead	EN	
<i>Sphyrna zygaena</i> (Linnaeus, 1758)	Smooth hammerhead	VU	
SUPERORDER SQUALOMORPHII	SQUALOMORPH SHARKS		
ORDER HEXANCHIFORMES	COW SHARKS		

FAMILY CHLAMYDOSELACHIDAE	FRILLED SHARKS		
<i>Chlamydoselachus</i> sp. nov	Southern African frilled shark	NT	
FAMILY HEXANCHIDAE	COW SHARKS		
<i>Heptranchias perlo</i> (Bonnaterre, 1788)	Sharpnose sevengill shark	NT	
<i>Hexanchus griseus</i> (Bonnaterre, 1788)	Bluntnose sixgill shark	NT	
<i>Hexanchus nakamurai</i> Teng, 1962	Bigeye sixgill shark	DD	
<i>Notorynchus cepedianus</i> (Peron, 1807)	Spotted sevengill shark	DD	
ORDER SQUALIFORMES	DOGFISH SHARKS		
FAMILY ECHINORHINIDAE	BRAMBLE SHARKS		
<i>Echinorhinus brucus</i> (Bonnaterre, 1788)	Bramble shark	DD	
FAMILY SQUALIDAE	DOGFISH SHARKS		
<i>Cirrhigaleus asper</i> (Merrett, 1973)	Roughskin spurdog	DD	
<i>Squalus acanthias</i> Linnaeus, 1758	Piked dogfish	VU	
<i>Squalus</i> cf. <i>blainvillei</i> (Risso, 1826)?	Longspine spurdog	DD	
<i>Squalus</i> cf. <i>megalops</i> (Macleay, 1881)	Shortnose spurdog	DD	
<i>Squalus</i> cf. <i>mitsukurii</i> Jordan & Snyder, in Jordan & Fowler, 1903	Shortspine spurdog	DD	
FAMILY CENTROPHORIDAE	GULPER SHARKS		
<i>Centrophorus granulosus</i> (Bloch & Schneider, 1801)	Gulper shark	VU	
<i>Centrophorus</i> cf. <i>harrissoni</i> McCulloch, 1915	Longnose gulper shark	CR	
<i>Centrophorus moluocensis</i> Bleeker, 1860	Smallfin gulper shark	DD	
<i>Centrophorus niaukang</i> Teng, 1959	Taiwan gulper shark	NT	
<i>Centrophorus squamosus</i> (Bonnaterre, 1788)	Leafscale gulper shark	VU	
<i>Deania calcea</i> (Lowe, 1839)	Birdbeak dogfish	LC	
<i>Deania hystricosum</i> (Garman, 1906)	Rough longnose dogfish	DD	
<i>Deania profundorum</i> (Smith & Radcliffe, 1912)	Arrowhead dogfish	LC	
<i>Deania quadrispinosum</i> (McCulloch, 1915)	Longsnout dogfish	NT	
FAMILY ETMOPTERIDAE	LANTERN SHARKS		
<i>Centroscyllium fabricii</i> (Reinhardt, 1825)	Black dogfish	LC	

<i>Etmopterus bigelowi</i> Shirai & Tachikawa, 1993	Blurred smooth lanternshark	LC	
<i>Etmopterus cf. brachyurus</i> Smith & Radcliffe, 1912	Shorttail lanternshark	DD	
<i>Etmopterus compagnoi</i> Fricke & Koch, 1990	Brown lanternshark	DD	
<i>Etmopterus gracilispinis</i> Krefft, 1968	Broadband lanternshark	LC	
<i>Etmopterus cf. baxteri</i> Garrick, 1957	Giant lanternshark	LC	
<i>Etmopterus pussillus</i> (Lowe, 1839)	Smooth lanternshark	LC	
<i>Etmopterus sentosus</i> Bass, D'Aubrey & Kistnasamy, 1976	Thorny lanternshark	LC	
FAMILY SOMNIOSIDAE	SLEEPER SHARKS		
<i>Centroscymnus coelolepis</i> Bocage & Capello, 1864	Portugese shark	NT	
<i>Centroscymnus owstoni</i> Garman, 1906	Shortnose velvet dogfish	LC	
<i>Centroselachus crepidater</i> (Bocage & Capello, 1864)	Longnose velvet dogfish	LC	
<i>Somniosus antarcticus</i> Whitley, 1939	Southern sleeper shark	DD	
<i>Zameus squamulosus</i> (Günther, 1877)	Velvet dogfish	DD	
FAMILY OXYNOTIDAE	ROUGHSHARKS		
<i>Oxynotus centrina</i> (Linnaeus, 1758)	Rough shark	VU	
FAMILY DALATIIDAE	KITEFIN SHARKS		
<i>Dalatis licha</i> (Bonnaterre, 1788)	Kitefin shark	NT	
<i>Euprotomicroides zantedeschla</i> Hulley & Penrith, 1966	Taillight shark	DD	
<i>Euprotomicrus bispinatus</i> (Quoy & Gaimard, 1824)	Pygmy shark	LC	
<i>Heteroscymnoides marleyi</i> Fowler, 1934	Longnose pygmy shark	LC	
<i>Isistius brasiliensis</i> (Quoy & Gaimard, 1824)	Cookiecutter shark	LC	
ORDER SQUATINIFORMES	ANGEL SHARKS		
FAMILY SQUATINIDAE	ANGEL SHARKS		
<i>Squatina africana</i> Regan, 1908	African angelshark	DD	
ORDER PRISTIOPHORIFORMES	SAWSHARKS		
FAMILY PRISTIOPHORIDAE	SAWSHARKS		
<i>Pliotrema warreni</i> Regan, 1906	Sixgill sawshark	NT	
ORDER RAJIFORMES	RAYS		

SUBORDER PRISTOIDEI	SAWFISHES		
FAMILY PRISTIDAE	SAWFISHES		
<i>Pristis microdon</i> Latham, 1794	Greattooth sawfish	CR	
<i>Pristis pectinata</i> Latham, 1794	Smalltooth sawfish?	CR	
<i>Pristis zijsron</i> Bleeker, 1851	Green sawfish	CR	
<i>Pristis pristis</i>	Sawfish	T	
SUBORDER RHINOIDEI	SHARKRAYS		
FAMILY RHINIDAE	SHARKRAYS		
<i>Rhina ancylostoma</i> Bloch & Schneider, 1801	Bowmouthed guitarfish	VU	
SUBORDER RHYNCHOBATOIDEI	WEDGEFISHES		
FAMILY RHYNCHOBATOIDEI	WEDGEFISHES		
<i>Rhynchobatus djiddensis</i> (Forsskål, 1775)	Giant guitarfish	VU	
SUBORDER RHINOBATOIDEI	GUITARFISHES		
FAMILY RHINOBATIDAE	GUITARFISHES		
<i>Rhinobatos annulatus</i> Smith, in Müller & Henle, 1841	Little guitarfish	LC	
<i>Rhinobatos blochii</i> Müller & Henle, 1841	Fiddlefish	LC	
<i>Rhinobatos hdecorhynchus</i> Norman, 1922	Slender guitarfish	DD	
<i>Rhinobatos leucospilus</i> Norman, 1926	Greyspot guitarfish	DD	
<i>Rhinobatos ocellatus</i> Norman, 1926	Speckled guitarfish	DD	
SUBORDER TORPEDINOIDEI	ELECTRIC RAYS		
FAMILY NARKIDAE	SLEEPER RAYS		
<i>Electrolux addisoni</i> Compagno & Heemstra, 2007	Ornate sleeper ray	CR	Compagno (2002a) had this as <i>Heteronarce?</i> sp. nov.
<i>Heteronarce garmani</i> Regan, 1921	Natal electric ray	VU	
<i>Narke capensis</i> (Gmelin, 1789)	Onefin electric ray	DD	
FAMILY TORPEDINIDAE	TORPEDO RAYS		
<i>Torpedo cf. fuscomaculata</i> Peters, 1855	South coast blackspotted torpedo	DD	
<i>Torpedo cf. nobiliana</i> Bonaparte, 1835	South coast torpedo	DD	

<i>Torpedo cf. sinuspersici</i> Olfers, 1831	Marbled torpedo	DD	
SUBORDER RAJOIDEI	SKATES		
FAMILY ARHYNCHOBATIDAE	SOFTNOSE SKATES		
<i>Bathyraja smithii</i> (Müller & Henle, 1841)	African softnose skate	DD	
FAMILY RAJIDAE	HARDNOSE SKATES		
<i>Amblyraja robertsi</i> (Hulley, 1970)	Bigmouth skate	LC	
<i>Amblyraja taaf</i> (Meisner, 1987)	Whiteleg skate	DD	
<i>Dipturus campbelli</i> (Wallace, 1967)	Blackspot skate	NT	
<i>Dipturus doutrei</i> (Cadenat, 1960)	Javelin skate	DD	
<i>Dipturus pullopunctata</i> (Smith, 1964)	Graybelly or slime skate	LC	
<i>Dipturus springeri</i> (Wallace, 1967)	Roughbelly skate	DD	
<i>Dipturus stenorhynchus</i> (Wallace, 1967)	Prownose skate	DD	
<i>Leucoraja compagnoi</i> (Stehmann, 1995)	Tigertail skate	DD	
<i>Leucoraja wallacei</i> (Hulley, 1970)	Yellowspotted skate	LC	
<i>Malacoraja spinacidermis</i> (Barnard, 1923)	Roughskin skate	LC	
<i>Neoraja stehmanni</i> (Hulley, 1972)	African pygmy skate	DD	
<i>Raja miraletus</i> Linnaeus, 1758	Twineyed skate	LC	
<i>Raja straeleni</i> Poll, 1951	Biscuit skate	DD	
<i>Rajella barnardi</i> (Norman, 1935)	Bigthorn skate	LC	
<i>Rajella caudaspinosa</i> (von Bonde & Swart, 1923)	Munchkin skate	NT	
<i>Rajella dissimilis</i> (Hulley, 1970)	Ghost skate	LC	
<i>Rajella leopardus</i> (von Bonde & Swart, 1923)	Leopard skate	LC	
<i>Rajella ravidula</i> (Hulley, 1970)	Smoothback skate	LC	
<i>Rostroraja alba</i> (Lacepede, 1803)	Spearnose skate	EN	
FAMILY ANACANTHOBATIDAE	LEGSKATES		
<i>Anacanthobatis marmoratus</i> (von Bonde & Swart, 1924)	Smooth legskate	DD	
<i>Cruriraja durbanensis</i> (von Bonde & Swart, 1924)	Smoothnose legskate	DD	
<i>Cruriraja parcomaculata</i> (von Bonde & Swart, 1924)	Roughnose legskate	LC	
<i>Cruriraja triangularis</i> Smith, 1964	Triangular legskate	DD	
SUBORDER MYLIOBATOIDEI	STINGRAYS		

FAMILY PLESILOBATIDIDAE	DEEPWATER STINGRAYS		
<i>Plesiobatis daviesi</i> (Wallace, 1967)	Deepwater stingray	LC	
FAMILY HEXATRYGONIDAE	SIXGILL STINGRAYS		
<i>Hexatrygon bickelli</i> Heemstra & Smith, 1980	Sixgill stingray	LC	
FAMILY DASYATIDAE	WHIPTAIL STINGRAYS		
<i>Dasyatis brevicaudatus</i> (Hutton, 1875)	Shorttail stingray	LC	
<i>Dasyatis chrysonota</i> (Smith, 1828)	Blue stingray	LC	
<i>Dasyatis kuhlii</i> (Müller & Henle, 1841)	Bluespotted stingray	DD	
<i>Dasyatis thetidis</i> Ogilby, in Waite, 1899	Thorntail stingray	DD	
<i>Himantura cf. fai</i> Jordan & Seale, 1906	Roundnose stingray	LC	
<i>Himantura cf. gerrardi</i> (Gray, 1851)	Sharpnose stingray	VU	
<i>Himantura jenkinsii</i> (Annandale, 1909)	Dragon stingray	LC	
<i>Himantura undulata</i> (Bleeker, 1852)	Honeycomb stingray	VU	
<i>Pastinachus sephan</i> (Forsskål, 1775)	Feathertail stingray	DD	
<i>Pteroplatytrygon violacea</i> (Bonaparte, 1834)	Pelagic stingray	LC	
<i>Taeniura lymma</i> (Forsskål, 1775)	Bluespotted ribbontail ray	NT	
<i>Taeniura meyeni</i> Müller & Henle, 1841	Round ribbontail ray	VU	
<i>Urogæsperrimus</i> (Bloch & Schneider, 1801)	Porcupine ray	VU	
FAMILY GYMNURIDAE	BUTTERFLY RAYS		
<i>Gymnura japonica</i> (Temminck & Schlegel, 1850)?	Japanese butterfly ray	DD	
<i>Gymnura natalensis</i> (Gilchrist & Thompson, 1911)	Diamond ray	DD	
FAMILY MYLILOBATIDAE	EAGLE RAYS		
<i>Aetobatus narinari</i> (Euphrasen, 1790)	Spotted eagleray or bonnetray	NT	
<i>Myliobatis aquila</i> (Linnaeus, 1758)	Eagleray or bullray	DD	
<i>Pteromylaeus bovina</i> (Geoffroy St. Hilaire, 1817)	Duckbill ray	DD	
FAMILY RHINOPTERIDAE	COWNOSE RAYS		
<i>Rhinoptera javanica</i> Müller & Henle, 1841	Flapnose ray	VU	

FAMILY MOBULIDAE	DEVIL RAYS		
<i>Manta birostris</i> (Walbaum, 1792)	Giant manta ray	VU	
<i>Manta alfredi</i> (Krefft, 1868)	Reef manta ray	VU	
<i>Mobula eregoodootenkee</i> (Bleeker, 1859)	Longhorn devilray	NT	
<i>Mobula japonica</i> (Müller & Henle, 1841)	Spinetail devilray	NT	
<i>Mobula kuhlii</i> (Valenciennes, in Müller & Henle, 1841)	Shorthorn devilray	DD	
<i>Mobula tarapacana</i> (Philippi, 1892)	Sicklefin devilray	DD	
<i>Mobula thurstoni</i> (Lloyd, 1908)	Bentfin devilray	NT	
SUBCLASS HOLOCEPHALII	CHIMAERAS OR SILVER SHARKS		
ORDER CHIMAERIFORMES	CHIMAERAS		
FAMILY CALLORHINCHIDAE	ELEPHANTFISHES		
<i>Callorhynchus capensis</i> Dumèril, 1865	St. Joseph	LC	
FAMILY CHIMAERIDAE	SHORTNOSE CHIMAERAS		
<i>Chimaera notafricana</i> Kemper, Ebert, Compagno & Didier, 2010	Cape chimaera	LC	Compagno (2002a) had this as <i>Chimaera</i> sp.
<i>Hydrolagus africanus</i> (Gilchrist, 1922)	African chimaera	DD	
<i>Hydrolagus trolli</i> Didier & Sêret, 2002	Pointnose blue chimaera	DD	Compagno (2002a) had this as <i>Hydrolagus</i> sp. nov.
<i>Hydrolagus</i> sp. nov	Giant blue-black chimaera	NO RESULT	We are unsure what species this refers to
FAMILY RHINOCHIMAERIDAE	LONGNOSE CHIMAERAS		
<i>Harriota raleighana</i> Goode & Bean, 1895	Narrownose chimaera	LC	
<i>Rhinochimaera atlantica</i> Holt & Byrne, 1909	Broadnose chimaera	LC	
<i>Rhinochimaera africana</i> Compagno, Stehmann & Ebert, 1991	Paddlenose chimaera	DD	

¹ H - high priority, M - medium priority, L - low priority

² Duration refers to the number of years (y.) taken to achieve the indicator, even though some actions will be ongoing thereafter