UNITED ARAB EMIRATES
MINISTRY OF CLIMATE CHANGE
& ENVIRONMENT

THE UAE NATIONAL PLAN OF ACTION FOR THE CONSERVATION & MANAGEMENT OF SHARKS

2018 - 2021

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Special thanks to the Environment Agency – Abu Dhabi for their substantial input in developing of the action plan and providing scientific studies contributing to the content.

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PREFACE

The United Arab Emirates has a unique marine environment, overlooking the Arabian Gulf and the Sea of Oman, and contains a unique biological diversity that includes coral reefs, sea grasses, mangrove forests and many globally endangered species such as marine turtles, seabirds and sharks where 43 species of sharks have been recorded in the waters of the UAE. The UAE contains 15 marine protected areas which play a key role in the conservation of threatened species.

In an effort to conserve the marine environment and develop natural aquatic resources, the UAE has developed frameworks and legislations governing the exploitation of living aquatic resources, including the Federal Law No. 23 of 1999 on the exploitation, protection and development of living aquatic resources in the country. Federal Law No. 11 of 2002 on the Regulation of International Trade in Endangered Species of Wild Fauna and Flora and Ministerial Decision No. (500) of 2014 on the Regulation of Shark Fisheries and Trade and its Amendments. In addition, the UAE has joined international treaties and conventions aimed at the protection of marine species and their habitats, including the Convention on Biological Diversity, the Convention on International Trade in Endangered Species (CITES), and Convention on Migratory Species (CMS) and its memorandum of understanding on sharks. The Country has adopted many strategies and programs to conserve the various forms of marine life at risk, the most important of which is the National Biodiversity Strategy.

The UAE has also been active in training and qualifying national cadres and raising public awareness. The preparation of this national plan for the conservation and management of sharks is a culmination of these efforts and I extend my thanks and appreciation to our partners from the government and private sectors involved in preparing this plan and reviewing their constructive and effective contributions.

Dr. Thani bin Ahmed Al Zeyoudi

Minister of Climate Change & Environment

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SUMMARY

PLAN OF ACTION FOR THE CONSERVATION AND MANAGEMENT OF SHARKSPREFACE

In 1999, the Committee on Fisheries (COFI) of Food and Agriculture Organization of the United Nations adopted a voluntary International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks). This called upon all states to produce a Shark Assessment Report (SAR) and, if they have shark fisheries, to develop and implement National Plans of Action (NPOA). In this context, the term 'shark' is taken to include all species of sharks, skates, rays and chimaeras (Class Chondrichthyes), the term "shark catch" is taken to include directed, bycatch, commercial, recreational and other forms of taking sharks. This United Arab Emirates (UAE) NPOA is intended to illustrate UAE's commitment to the conservation and management of sharks in its territorial waters.

SCOPE

The NPOA sharks consists of goals and objectives to ensure the conservation of sharks and their sustainable use as well as identifies issues and challenges that should be considered in the context of shark conservation, and actions.

SHARKS IN THE UAE

A total of 43 shark and 29 batoid species have been recorded from UAE waters of the Arabian Gulf and Sea of Oman. Sharks are caught by commercial and recreational fishermen as targeted catch, non-target but retained catch (byproduct), or as non-target and non-retained catch (bycatch) in fisheries principally directed at other commercially important teleost (bony fish) species. Recent interviews with fishermen and fishery-dependent research indicate that catches have declined and have become dominated by six species. Commercial fisheries are reported to catch an average annual total of 1,569 mt of sharks, representing around %1.5 of total fisheries landings. However, landings data remain limited. There is a lack of information on the biological traits of the species confirmed in UAE waters and there are currently no stock assessments. Furthermore, studies are indicating that some species confirmed from these waters potentially need taxonomic revision to ensure we have an adequate understanding of their conservation needs.

ISSUES AND CHALLENGES FOR CONSERVATION

In recent years, there has been progress in gaining a better understanding of shark resources in the UAE through several research projects that have focused on investigating species diversity, distribution and biological traits, as well as taxonomic assessments using genetics. Notable improvements include developing an accurate checklist of shark species occurring in UAE waters; facilitating improved identification of species in the catch through peer reviewed publications; improving catch and effort data collection through capacity building of fisheries enumerators; and shark-specific management measures to address high-risk species including the ban on fishing sawfishes *(Pristidae spp.*), whale sharks (*Rhincodon typus*) and hammerhead sharks (*Sphyrnidae spp.*).

The country appears to be serving as a transit hub and processing point for many shipments from the Middle East and northern Africa. Data on species traded and information on trade dynamics remain challenging to collect. Finally, in addition to fishing pressures, sharks in the UAE may face threats from other factors such as habitat loss, pollution, disturbance from coastal development or tourism activities and climate change. However, the magnitude of these potential impacts is likely to be small in comparison to fishing.

RECOMMENDATIONS

The actions in this NPOA were developed based on the identified issues and highlight the need to work on a collaborative basis with various stakeholders both in the UAE and the broader region. Four main goals have been identified:

A) Improve our knowledge of sharks species and fisheries and their role in the ecosystem.

B) Ensure effective policy, legislation and enforcement mechanisms and develop a national, regional and international framework for cooperation;

C) Enable effective conservation through capacity building; and

D) Undertake education and outreach programs to improve awareness of the general public.

This NPOA is intended to have an initial four years duration (2018 - 2021) which will be followed by a consultative revision of the NPOA to enable an adaptive management approach and ensure the attainment of its strategic objectives and overall vision.

LIST OF ACRONYMS

AED	Arab Emirates Dirhams
MPDA	Municipality and Planning Department - Ajman
BRUV	Baited Remote Underwater Video
CBD	Convention on Biological Diversity
CCRF	Code of Conduct for Responsible Fisheries
CICPA	Critical Infrastructure and Coastal Protection Authority
CITES	Convention on International Trade in Endangered Species of Flora and Fauna
COFI	FAO Committee on Fisheries
COI	Cytochrome c oxydase subunit I gene
COP	Conference of Parties
CMS	Convention on Migratory Species
CPUE	Catch Per Unit Effort
CR	Critically Endangered
DD	Data Deficient
DM	Dubai Municipality
DPSIR	Driving forces - Pressures - States - Impacts - Responses
EAD	Environment Agency - Abu Dhabi
EEZ	Exclusive Economic Zone
EN	Endangered
EPDA	Ras Al Khaimah Environment Protection and Development Authority
EPAA	Sharjah Environment and Protected Areas Authority
FAO	Food and Agriculture Organization of the United Nations
FM	Fujairah Municipality
FRAS	Fish Resource Assessment Survey
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
GEP	Gulf Elasmo Project
ICCAT	International Commission for the Conservation of Atlantic Tuna
IFAW	International Fund for Animal Welfare
IOTC	Indian Ocean Tuna Commission
IPOA	International Plan of Action on the Conservation and Management of Sharks
IUCN	International Union for Conservation of Nature
LC	Least Concern
MoCCaE	Ministry of Climate Change and Environment
MoU	Memorandum of Understanding
MPA	Marine Protected Area
NGO	Non-Governmental Organization
NPOA	National Plan of Action for the Conservation and Management of Sharks
NT	Near Threatened
RECOFI	Regional Commission for Fisheries
RFMO	Regional Fisheries Management Organization
ROPME	Regional Organization for the Protection of the Marine Environment
SAR	Shark Assessment Report
UAE	United Arab Emirates
UAQM	Umm Al Quwain Municipality
UNCLOS	United Nations Convention on the Law of the Sea
USD	United States Dollar

GLOSSARY

Bycatch	species are discarded from the catch and that part of the "catch" not landed is instead killed as a result of interaction with fishing gear. This may include discards of commercially valuable species because of protective measures or because the animals are not fit for human consumption or discards for the purposes of high grading.
Byproduct	species are not the target species, but are retained because they are commercially valuable.
Critical habitat	is identified as an ecosystem type of high biodiversity value including habitats of significance to Critically Endangered and/ or Endangered Species; habitats supporting globally significant concentrations of migratory species and/or aggregating species; highly threatened and/or unique ecosystems; and/or areas associated with key evolutionary processes. This includes feeding, hunting, mating, birthing, and aggregation seasons.
Critical life stages	can, depending on the species, include eggs, neonates, juveniles, or adult females.
Discards	are the part of a fisher's catch returned to the sea either because it has no commercial value, or because regulations preclude it from being retained.
Ecosystem	is the biotic (living) community and its abiotic (non-living) environment.
Elasmobranch	means the taxonomic subgroup of cartilaginous fishes containing sharks and rays.
Finning	is the practice of removing the fins from a shark and returning the carcass to the sea (either dead or alive).
Fishery-dependent data	is information gathered independently of the fishing sector (e.g. research survey at sea).
Habitat	means any area in the range of a species, which contains suitable living conditions for that species.
Highly migratory species or stocks	are marine species whose life cycle includes lengthy migrations, usually through the EEZ of two or more countries as well as into international waters.
Longline	is a fishing gear in which short lines carrying hooks are attached to a longer main line at regular intervals. Longlines are laid on the bottom or suspended horizontally with the help of surface floats.
Migration	is the systematic 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	move over national boundaries, and require regional or international cooperation to enable their comprehensive management.
Non-consumptive use	are cases where one person's enjoyment does not prevent others from enjoying the same resource (e.g. the viewing of marine mammals and other wildlife).

Non-Governmental Organization	is any organization that is neither a part of a national or local government nor a conventional for-profit business.
Non-target species	are those for which the gear is not specifically set, although they may have immediate commercial value and be a desirable component of the catch.
Precautionary approach	is used for the implementation of the precautionary principle and should be guided by: 1) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and 2) an assessment of the risk-weighted consequences of the various options.
Precautionary principle	implies that the lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage.
Recreational fishing	is the catching and retaining of fish and/or Living Aquatic Resources for consumption or catch and release purposes, not for commercial gain.
Selective gear	is gear allowing fishers to capture few (if any) species other than the target species.
Shark catch	includes targeted, by-catch, commercial, recreational and any other forms of taking sharks.
Stakeholder	means an actor 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	means the part of a fish population which is under consideration from the point of view of actual or potential utilization.
Sustainable development	is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.
Sustainable use	is the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations

1. INTRODUCTION

1.1. OVERVIEW OF SHARKS

Sharks, rays, skates (elasmobranchs), as well as the chimaeras, are cartilaginous fishes that comprise the class Chondrichthyes. This diverse group of fish is distinguished by the possession of a cartilaginous skeleton and placoid scales as opposed to the bony skeleton and the leptoid scales of the class Osteichthyes, or bony fishes. In this National Plan of Action (NPOA), the term 'sharks' is applied broadly to include all species of true sharks, as well as related species of rays, skates and chimaeras, unless otherwise noted.

The life history characteristics of most sharks include late maturity, low fecundity, and relatively slow growth rates. Although their survival rate from birth is high, they produce few young per year, making them more susceptible to overfishing than most teleost (bony) fishes. Sharks are also primarily at the top of the food chain, mostly top-level carnivores, and their abundance is relatively low compared to species groups situated in lower trophic levels. These characteristics result in low productivity in most shark species and means they can be rapidly fished down to unsustainable levels. Furthermore, it is believed that the recovery of shark populations from stock depletion would likely take many years.

While there are still limited comprehensive and long-term global data on the status and population trends of sharks, there is increasing evidence that many populations in specific areas of the world have undergone dramatic declines since the 1950s. Indeed, extensive data, collected over long periods of time, on shark stocks from the northern Atlantic and the Gulf of Mexico indicate that rapid and significant declines have impacted populations of large coastal and oceanic populations (averaging between %50 and %90 of populations depending on species). These declines and stock collapses have been attributed to impacts from both targeted fisheries and as a result of by-catch in multi-species fisheries. However, while fisheries remains one of the main factors in the decline of sharks, other threats that are likely impacting populations stem from various anthropogenic activities and include coastal development leading to habitat loss and degradation, land and sea based pollution, as well as the effects of climate change.

Fishing pressure on sharks has mainly been increasing due to the high value of their fins, meat, and gill plates (from mantas and devil rays). While many shark derived products are utilized around the world (including liver and cartilage), the trade in shark fins has been the driving force in the exploitation of many species due to the high demand in south eastern Asia. Indeed, it is estimated that the fins of 73 - 26 million shark are traded globally each year, amounting to a value of US$ 400 to 550 million. Accurate reports on the exact number of landings of sharks are difficult to obtain and most data reported to the Food and Agriculture Organization of the United Nations (FAO) are likely to be underestimated. It is believed that catches are three to four times greater than reported because most catches of sharks are unregulated, often misidentified, unrecorded, aggregated, or discarded at sea, resulting in a lack of species-specific landings information. This lack of accurate data has made it increasingly difficult to determine the status of species.

A recent overview of the status of sharks, based on the observed threat level of assessed species (mainly from overfishing in both targeted and incidental fisheries), estimated that one in four shark species is threatened with extinction according to the International Union for the Conservation of Nature (IUCN) Red List criteria. Details of the observed and predicted number for each IUCN category are provided in the table below. The authors of the study suggest that almost half of all sharks are Data Deficient (DD), meaning that information is insufficient to assess their status; that they have the lowest percentage of Least Concern (LC) species of

fisheries. However, while fisheries remains one of the main factors in the decline of sharks, other threats that are likely impacting populations stem from various anthropogenic activities and include coastal development leading to habitat loss and degradation, land and sea based pollution, as well as the effects of climate change.

For a long time, the historically low economic value of shark and ray products compared to other fishes resulted in research and conservation of these species being a lower priority than for traditional high-value species. However, the growth in demand for some shark products, such as fins, meat, or gill plates, continues to drive exploitation. These increased shark catches in both directed and incidental fisheries have resulted in growing concern over the status of some elasmobranch populations in several areas of the world. In fact, many countries, Non-Governmental Organizations (NGO), Regional Fisheries Management Organizations (RFMO) (such as the Indian Ocean Tuna Commission (IOTC) and the International Commission for the Conservation of Atlantic Tuna (ICCAT)), and multi-lateral agreements and conventions (such as the FAO IPOA, Convention on International Trade in. Endangered Species (CITES) and the Convention on Migratory Species (CMS)) have realized the potentially devastating effects of the worldwide decline in shark stocks and have taken action for the conservation of sharks at national, regional and international levels. These measures have taken the form of national species protections for the most threatened species, finning bans to ensure sharks are landed whole, trade controls for species overexploited by the international trade, fishing quotas to ensure the sustainability of catches, and requirements for reporting all catches and discards

However, there remains a general lack of baseline information about the practices employed in shark fisheries worldwide; incomplete data on catch, effort, landings, and trade; and a lack of information on the biological parameters, importance of specific habitats to productivity, and population dynamics, including migratory status and routes, of many species.

Observed and predicted number and percentage of shark, ray, skate and chimaera species on IUCN Red List. Source: Dulvy et al. 2014.

Taxon	Species number	Threatened Species number	CR	EN	VU	NT	LC	DD
Skates and Rays	539 (51.8%)	107 (19.9%)	14 (1.3%)	28 (2.7%)	65 (6.2%)	62 (6.0%)	114 (11.0%)	256 (24.6%)
Sharks	465 (44.7%)	74 (15.9%)	11 (1.1%)	15 (1.4%)	48 (4.6%)	67 (6.4%)	115 (11.0%)	209 (20.1%)
Chimaeras	37 (3.6%)	0	0	0	0	3 (0.3%)	12 (1.2%)	22 (2.1%)
All Observed	1041	181 (17.4%)	25 (2.4%)	43 (4.1%)	113 (10.9%)	132 (12.7%)	241 (23.2%)	487 (46.8%)
All Predicted		249 (23.9%)	-	-	-	312 (29.9%)	389 (37.4%)	91 (8.7%)

CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient. Number threatened is the sum total of the categories CR, EN and VU. Species number and number threatened are expressed as percentage of the taxon, whereas the percentage of each species in IUCN categories is expressed relative to the total number of species. DOI: 10.7554/eLife.00590.004

1.2 DEVELOPMENT OF SHARKS' NATIONAL PLAN OF ACTION

The UAE has a unique and rich biodiversity with diverse ecosystems and habitats. Similar to other countries in the region, the UAE's biodiversity is threatened by the overexploitation of its resources, climate change, habitat destruction, and urban development. As identified in its national environmental strategic vision, the UAE's President His Highness Sheikh Khalifa Bin Zayed Al Nahyan, has made efforts to achieve a balance between the socio-economic development, and the conservation of cultural, social and environmental heritage in a unique practice that assures the success of the model of sustainable development, the foundations of which was laid by the late father Sheikh Zayed bin Sultan Al Nahyan, who worked from the beginning to put a firm footing for the protection of the environment in the UAE.

In line with its vision, the UAE is signatory to a number of regional and international agreements including the Convention of Biological Diversity (CBD), Convention on International Trade of Endangered Fauna & Flora (CITES), and Convention on Migratory Species (CMS), Regional Organization for the Protection of the Marine Environment (ROPME). The aim of these conventions is the sustainability of biodiversity resources and minimizing the threats facing them.

The development of the National Plan of Action for sharks (NPOA) comes as part of a response mechanism to conserve UAE's biodiversity and ensure the longterm survival of sharks and rays. An overview of the shark fisheries and the current state of knowledge on sharks in the UAE is provided in the UAE Shark Assessment Report.

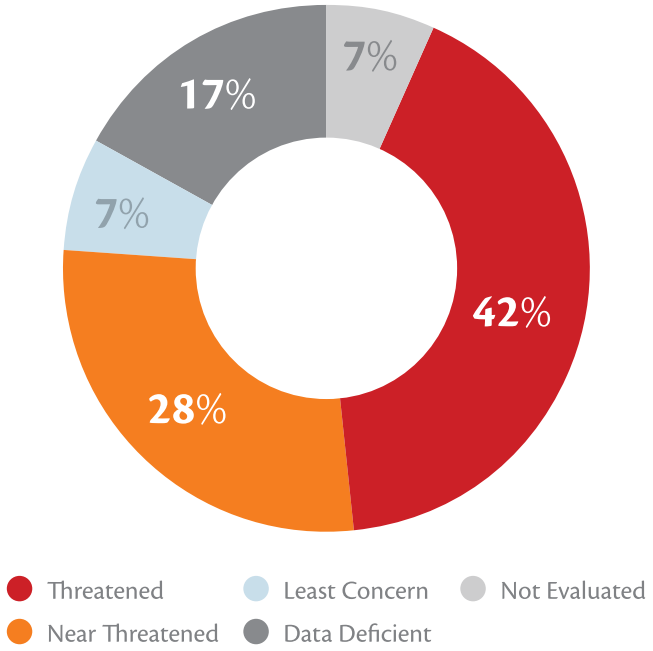
2. SHARK FISHERIES IN THE UAE

2.1. CURRENT STATE OF KNOWLEDGE

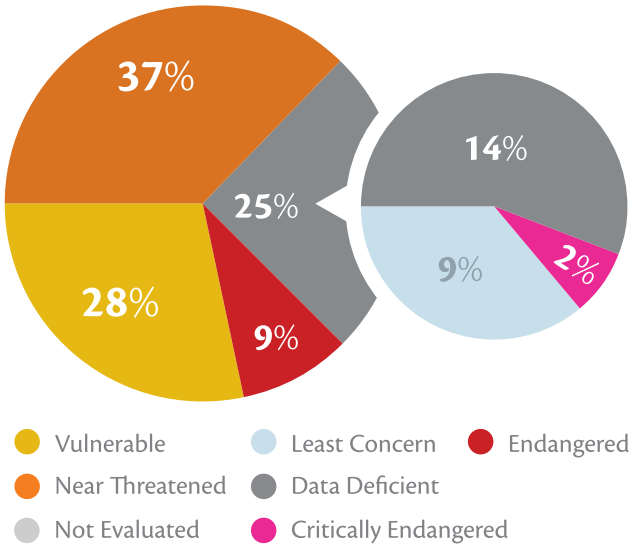
The status of sharks and rays

IUCN Red List statuses are generally based on global assessments and to date there has been no regional shark assessment undertaken in the north western Indian Ocean. Furthermore, many of these assessments need to be urgently updated as they are over 10 years old and the exploitation of sharks has continued to increase over the years with little management efforts. Yet, although the level of exploitation for species might drastically vary between regions, these assessments still provide an indication of the level of threats a species might be facing and its inherent vulnerability to fisheries and other threats. Almost %42 of shark and ray species confirmed through studies across the water of the UAE are considered to be of global conservation concern and are threatened with extinction (a combination of Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) categories). This includes species such as the green sawfish *P. zijsron*, the longtail butterfly ray, *Gymnura cf. poecilura*, *C. limbatus*, the whitecheek shark, *C. dussumieri*, the silky shark, C. falciformis, the sandbar shark, *C. plumbeus*, and two species of hammerheads, *S. lewini* and *S. mokarran*. Finally, few species were considered to be Least Concern (LC) while %24 were Data Deficient (DD) or Not Evaluated (NE), further highlighting the need for research in order to gain a better understanding of their status and determine the best actions for their management and conservation.

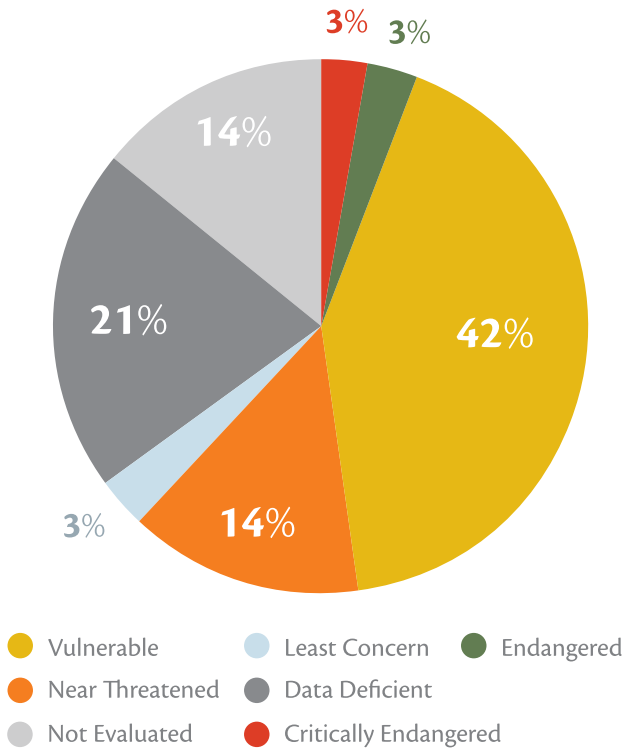
IUCN Red list Status of shark/rays species confirmed from the UAE waters Percentage



IUCN Red list Status, Percentage of shark species confirmed in each category Percentage



IUCN Red list Status, Percentage of ray species confirmed in each category Percentage



In 2017, EAD in cooperation with IUCN Species Survival Commission Shark Specialist Group had published a report which provided an overview of the conservation status of chondrichthyan (sharks, rays, and chimaeras) in the Arabian Seas Region (ASR) and described the results of a regional Red List workshop held in Abu Dhabi, United Arab Emirates early 2017. It identified those species that are threatened with extinction at the regional level, so that appropriate conservation action can be taken to improve their status. A regional overview of chondrichthyan fisheries, management and conservation is also presented.

Furthermore, the report indicated that 78) % 50.9 species) of the 153 chondrichthyans assessed are considered threatened within the ASR (9.2 % CR - Critically Endangered, 22.2 % EN - Endangered, 19.6 % VU - Vulnerable). Of these, three species were also flagged as CR – Possibly Extinct as they had not been recorded in the region for at least three decades despite increasing research and survey efforts. A further 27) % 17.6 species) are considered NT - Near Threatened and 12.4 % LC - Least Concern (19 species). However, for 29 species (19 %), there was insufficient scientific information available to evaluate their risk of extinction and these are therefore classified as DD - Data Deficient.

Conclusions from findings

Our current state of knowledge on the local shark fishery and shark and ray species in the UAE has greatly expanded over the past five years especially within the Arabian Gulf. Interviews with fishermen allowed the first description of the geographical extent, size, gear characteristics and target species of the shark fishery. Results showed that the fishery was highly opportunistic and varied considerably in fishing behavior. The existence of a targeted shark fishery fuelled by the shark fin trade, and the high levels of bycatch recorded, indicate that this fishery is likely to have a substantial impact on shark populations locally. In fact, fishermen confirmed that the status of sharks had changed in recent years and that they were witnessing noticeable declines in catches, abundance and average sizes of sharks in UAE Arabian Gulf waters.

Understanding of the species composition, relative abundance and size distribution of sharks exploited by the fishery in the UAE has also improved. The 32 species of sharks recorded here, confirmed both through morphological traits and genetic analysis, indicated that shark biodiversity in the Gulf was relatively high and comparable to other countries in the region when considering that deep water species are precluded from inhabiting these waters. Similarly, the sixteen species of rays recorded at landing sites and those reported from a citizen science project indicate that ray diversity is likely to be high. Yet further research needs to be undertaken both nationally and regionally to gain a better understanding of differences in biological traits and of the status of the various species on a local level.

Finally, the trade survey conducted was the first attempt at quantifying and characterizing the trade in shark products in the UAE and the broader

region. The prevalent trade in both shark meat and fins, indicated that demand was not likely to be curbed and that this trade would likely continue in years to come. While information was limited to the trade in shark products originating from the UAE and Oman, results indicated that the majority of species encountered were listed by the IUCN Red List as facing high risks of extinction globally. Using the data gathered from studies as a baseline, building on the current legislation in the UAE, strengthening enforcement of the existing regulations, and developing and formulating new appropriate management strategies for a sustainable shark fishery are now needed. These actions will need to be supported with a rigorous research and monitoring plan, dedicated education and awareness programs, capacity building opportunities as well as a national approach that combines a regional framework for the conservation and management of sharks.

The Driving forces - Pressure - State - Impact - Response Framework

In order to appropriately visualize the shark fishery in the UAE, a Driving forces - Pressure - State - Impact - Response (DPSIR) framework schematic summary was developed. It identifies the human motivations (driving forces) to act within the shark fishery, the actions performed with potential to damage the fishery (pressure), the status and the potential changes on shark stocks and the marine environment and the socio-economic features with a negative influence (state and impact), and the preventive or curative measures that may be applied to improve the situation (response).

The Driving forces - Pressure - State - Impact - Response framework related to the shark fishery in the UAE.

Driving forces

- Market demand for shark products (fin and meat trade)
- Profit (value of landings)
- Consumption (tradition and culture)
- Recreation (sports fishing)

Pressures

- Fishing effort (commercial and recreational)
- Land and sea-based pollution
- Coastal development
- Habitat alteration
- Climate change
- Discards

State

- Possible changes in abundance, age and size structure, diversity
- Dominance of small species
- Small mean sizes
- Unknown status
- Unknown areas of critical habitats

Impacts

- Biodiversity loss
- Changes in community structure / ecosystems
- Endangered species
- Changes in relative abundance
- Overfishing
- Bycatch
- Food security
- Changes in fisheries benefit

Responses

- Improved science through research
- Capacity building
- Monitoring, surveillance and control measures
- Education and awareness programs
- Species recovery plans
- Policy / regulations
- Critical habitat protection
- Local and regional collaborations
- Enforcement
- Fisheries policy, regulation & management
- Trade regulation & management
- Private Sector Engagement
- Local, regional and international collaboration

2.2. CHALLENGES AND ISSUES FOR SHARK CONSERVATION

While undertaking research and compiling information on sharks in the UAE several challenges and issues were identified that are critical to the implementation and success of this NPOA. The following section provides a list of the main issues, describes progress that has been made in rectifying them, as well as the challenges that remain and that need to be prioritized within the time frame of this plan

ISSUE 1. The accurate identification of shark species by all resource users

The collection of accurate shark species data is inherently difficult and is further complicated by limited taxonomical assessments in the region. This is especially true for rays and guitarfishes which have received limited attention in terms of research. Also, the situation is exacerbated by inadequate identification and data collection training across the country as well as the lack of logbook requirements for recording shark information. Much of the shark catch in the UAE is either not recorded, only recorded to family level, or recorded as 'other' from a list of marine species available. Furthermore, an unknown proportion of the recorded catch is likely incorrectly identified and there are currently no data validation programs.

The MOCCAE has had a finning ban since 1999 and therefore all sharks need to be landed whole. Because sharks are utilized in the UAE, implementation of this law ensures that the identification is made easier since whole specimens are available at markets and landing sites. Also, the International Fund for Animal Welfare (IFAW) produced a poster on shark species in 2010 which was distributed across the country to assist with the identification of species.

Furthermore, the EAD undertook several shark identification workshops in 2011. These focused on the Abu Dhabi Emirate and included both class and field components to train fisheries enumerators. A manual for data collection, prepared by the Gulf Elasmo Project (GEP), was distributed and included detailed information to allow for the identification of species-specific data on sharks and family level identification of batoids. Finally, with the support of CMS and IFAW, a shark identification guide was produced in 2015 for the Arabian Seas region and made freely available in both English and Arabic. Print copies of this guide were distributed to all fisheries organizations and research institutes on a regional scale and soft copies remain available for download on the IFAW, CMS and GEP websites.

However, contents of the guide are limited to shark species and only a handful of rays, listed on CITES and CMS appendices, are included. Furthermore, while this guide includes all shark species found in UAE waters, it is not in a format that can be used on vessels (i.e. small and waterproof). EAD is using this guide to further train fisheries enumerators in data collection and ensure species-specific information can be collected on sharks. However, taxonomic uncertainties (especially for rays) still require urgent research in order to be able to collect accurate data across the range of landed species.

(cont...)

ISSUE 2.
Secure, accessible and validated data sets that record all catch data and are consistent over time with compatible resolution between emirates over the full range of each species from all resource users

The Abu Dhabi Emirate currently has a system in place to collect data on sharks, the lack of quantification of shark catches is a prime concern. A standardized system of data collection and validation needs to be set up across the UAE to support fisheries management initiatives and ensure the accuracy of data collected. This is especially important as future stock assessments will need to be supported by rigorous data that can be aggregated across emirates. Furthermore, cryptic fishing mortality needs to be better understood. The major causes include predation mortality, gear drop out, ghost fishing, discards due to regulations or lack of market (especially for rays), deliberate killing of sharks, and post release mortality (particularly for rays and protected species). Finally, the development of a system that allows securing data from other resource users, including recreational fishermen, illegal foreign fishermen, and vessels fishing shared stocks in the EEZ, is needed. The MOCCAE and EAD have launched the UAE Sustainable Fisheries Program and there are several opportunities to integrate shark projects within the program. This is particularly the case with the restructuring of the fisheries statistical system across the country which can now include training on shark identification and standardized data collection protocols.

ISSUE 3.
Need for shark research and coordination of projects between various national entities

Currently, the only focused shark research that has been undertaken in the UAE formed part of a PhD project supported by the UAE University. While this PhD study has been completed, much of the research is continuing under the umbrella of the GEP, an initiative to advance research, conservation and awareness of shark conservation in the UAE and the broader Arabian Gulf region. This research was undertaken and supported through a network of regional and international collaborators that provide the capacity in terms of research facilities and funding. Moving forward, a comprehensive and targeted national research shark plan needs to be developed, taking into consideration a collaborative approach, in order to support conservation measures.

The multi-jurisdictional management arrangements in the UAE need to be considered in order to ensure a coordinated approach to shark research. Furthermore, the identification of national research priorities, in line with research required and identified for teleost species under the UAE Sustainable Fisheries Program, would ensure a consistent approach to shark research. Some of the immediate research initiatives that need to be undertaken include:

- Taxonomic assessments to determine which species occur in UAE waters (east and west coast waters), with a special focus on batoids;
- Research into the biological traits, growth rates, life history, fecundity and breeding of the various species;
- Stock assessments of most commonly landed species (a total of 10 species of sharks and rays);
- Rapid risk assessments for all species, particularly bycatch and byproduct species including assessments of all impacts on these species;

- Assessment of threatened species and species specific research plans based on results and gaps identified;
- Accurate identification and quantification of target, byproduct and bycatch shark species;
- Determination of relative productivities, catchabilities and gear selectivity of various species;
- Investigation of shark catches by non-commercial sectors including recreational and charter fishing;
- Mapping of shark species distributions, biological productivity and migration patterns;
- Mapping of critical habitats, which for some species includes nursery areas and aggregation sites for feeding, mating and pupping;
- Research into bycatch reduction techniques, including research into gear modifications to minimise interactions with fisheries (especially during the open net season from October to April);
- Assessment of the sustainability of fisheries from which the UAE imports shark products, particularly fisheries for shared/straddling stocks (i.e. Oman);
- Evaluation of the impact of shark management and conservation measures on ecosystem structure and function;
- Assessment of the impact of natural environmental variations on shark populations; and
- Investigation on the impact of changes to the marine environment, including climate change, on shark populations.

ISSUE 4.
Our understanding of the markets for and trade in shark products

The domestic and particularly international markets for UAE shark products are poorly understood. Greater knowledge of the relationship between market demand may help to predict future changes in fishing and trade patterns as well as facilitate proactive management responses. International trade conventions such as CITES can supplement traditional fisheries management tools. With CITES shark listings, the UAE is required to issue permits to allow trade of specimens originating from other countries. Furthermore, to facilitate compliance with CITES listings, the UAE has protected all shark species listed on CITES that occur in the UAE as well as banned the export and re-export of fins from the country.

There have been a series of workshops organized by IFAW, with the collaboration of the MOCCAE and EAD, that have focused on increasing awareness of CITES requirements and aimed at training fisheries and customs officers in the identification of sharks and fins.

ISSUE 5.
Develop a risk assessment framework for all shark species to identify the nature and extent of all impacts on those species

Although it is believed that most shark landings in the UAE are a result of bycatch, little is known about catch levels. Total removals of each shark species must be known if overfishing of these species is to be averted.

While improving the identification & quantification of byproduct and bycatch species is an important prerequisite to a better understanding of ecologically sustainable catch levels of these species, the quantity of the species taken will not in itself provide a basis for effective management. An indication of the vulnerability of these species to fishing operations in terms of their own biological productivity and the nature of the fishing operation itself is required. The nature of the appropriate and feasible assessment of these species will vary and may range from qualitative or quantitative risk

(cont...)

assessments to full-scale stock assessments. Given that little information is currently available on these species the focus initially will be on risk assessments to determine the vulnerability of these species to fishing operations and other impacts.

Much of the information and status evaluations on sharks in the UAE are based on the IUCN Red List Global Assessments. Many of these are over 10 years old and do not take into account species information and trends from the north western Indian Ocean. Therefore, the determination of the risk status of species is a priority and needs to addressed urgently in order to prioritize research, management and compliance. With this information, species can be categorized into high, medium or low risk profiles based on their susceptibility to capture by various fishing methods and the ability of the species to recover. Initial assessments will need to be based on existing data on species characteristics and biology from the UAE and the wider region and will also assist in identifying gaps and deficiencies in our knowledge. With this information, species that need to be protected or receive immediate attention will be identified and appropriate management actions can be taken.

ISSUE 6.
Strategies for the recovery of species and populations

Data and knowledge gathered from risk assessments can serve to identify species that will require immediate actions through the development of recovery plans. These plans will set out the research and management actions necessary to halt the decline of, and support the recovery of, threatened species to ensure their long-term survival in the wild.

ISSUE 7.
Our understanding of the impacts of recreational fishing

There has historically been little management of recreational and charter fishing across the country. Furthermore, data is not collected on the number of recreational boats operating in UAE waters. However, it is clear that sharks are often targeted and retained for personal consumption or as trophies. The recreational fishing sector is currently being evaluated and new comprehensive regulations are being developed in order to regulate it. Research is also needed to obtain overall catch estimates and ensure that protected species are not retained. Education programs aimed at encouraging live release along with guidelines for safe handling are critical. Furthermore, the feasibility of developing a catch and release program should be investigated.

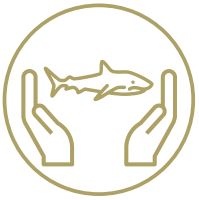
ISSUE 8.
Adequacy of current management measures and innovative approaches to dealing with identified shark management issues

Fisheries management arrangements in the UAE have generally been developed on the basis of fishing methods used to target commercial species. There needs to be some effort to better understand how various fishing methods and management measures (species protection or protected areas) might benefit shark species, particularly highly threatened species such as sawfishes. Furthermore, regional agreements for complementary management of shared and highly migratory species have not been developed in the region. Shark stocks fished by UAE fishermen are shared with other nations or are fished in foreign waters by other nations. In these circumstances, there is a need for bilateral and regional fisheries management arrangements to ensure all shark stocks are managed adequately.

Stock assessments will require the sharing of data, hence standardization of data collections both domestically and internationally within various regions. Several countries in the region have now signed the CMS Sharks MOU indicating they are interested in shark conservation. Furthermore, RFMO's such as the Indian Ocean Tuna Commission (IOTC) have implemented several measures for the protection and conservation of threatened shark species. Working with such organizations, along with RECOFI, could build cooperation between countries in the region and strengthen efforts to manage shark fisheries.

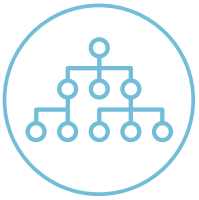
ISSUE 9.
The identification of critical habitats and reduction of the impact of environmental degradation on sharks

Identifying and maintaining critical habitats used by sharks for feeding, pupping or as nursery grounds can be a critical factor in ensuring the survival of shark species. These habitats are often associated with ecosystems such as mangroves, seagrass beds or coral reefs which are vulnerable to many anthropogenic activities, including coastal development, and can be degraded from the disposal of heavy metals or desalinated waters. With the high rate of coastal development in the UAE, many such critical habitats for sharks are likely to have already disappeared. While there have been a series of rehabilitation efforts with mangrove and coral replantation projects across the UAE, these initiatives could not consider the requirements for sharks due to the lack of information available. During interviews undertaken with fishermen, respondents highlighted a number of locations where sharks are usually found during fishing trips. A recent research carried by scientists from EAD between October 2015 and June 2016 have while adult sawfishes preferred habitat is offshore deep-water habitats of 70–30 m. While the results of this study provide evidence of a large decline in sawfish it also highlights the importance of conservation and recovery efforts to avoid local extinction and recover their populations. However, further surveys using Traditional Ecological Knowledge are needed to identify shark habitats and determine how they overlap with fishing grounds. Mapping these areas will ensure that measures can be taken for their management or protection.



ISSUE 10.
Shark handling practices for the conservation and management of sharks

In line with general animal welfare practices, there is a need to undertake an assessment of the harvesting and handling practices of sharks in the UAE. Furthermore, there is a need to disseminate information on how to safely release sharks and launching an awareness campaign on existing laws and regulations.



ISSUE 11.
Understanding of the effects of shark fishing on ecosystem structure and function

There is a limited knowledge about the effects of commercial shark fishing or shark management and conservation measures on ecosystem structure and function. Fishing for sharks has impacts on the ecosystem from which those animals are removed. Fishermen targeting sharks are likely also taking other bycatch species (including threatened species or species at risk). Most of this catch is likely unaccounted for and can include the cryptic fishing mortality of non-shark species. Management and conservation measures for sharks also have differential impacts on the ecosystem. In fact, the impact of the protection and subsequent increase in the population of apex predators, such as sharks, on ecosystem structure is largely unknown and warrants further investigation.

ISSUE 12. Communication and information sharing system between government agencies and stakeholders

Currently, there is insufficient information on sharks available for government agencies and stakeholders in the UAE. This is primarily because the data available on sharks has only been published in peer reviewed journals which may not be directly available to all resource users. Yet all resources users have a role to play in the conservation and management of sharks. Information sharing amongst relevant agencies and stakeholders needs to be promoted and enhanced. In addition, accurate and up-to-date information about the importance of shark conservation should be available to stakeholders and the public. In fact, findings of all relevant research, including international developments, should be interpreted and disseminated to the commercial and recreational fishing community as well as the general public in a manner which facilitates uptake, including the use of fact sheets, workshops and mentor programs. This will facilitate the uptake of ideas such as best practice mitigation and live release and allow fishers to be better informed on the need for shark conservation and management.

3. RECOMMENDATIONS FOR ACTION

VISION

'Sharks in the UAE are effectively conserved and managed to enable their long term sustainable use'.

GOALS OF THE UAE NPOA

Improve our knowledge of sharks' species and fisheries and their role in the ecosystem;

Ensure effective policy, legislation and law enforcement mechanisms and develop a national, regional and international framework for cooperation; and

Enable effective conservation through capacity building; and,

Undertake education and outreach programs to improve awareness of the general public, and increase understanding of the role that individuals and the private sector can play in shark conservation.

This NPOA is intended to have an initial four years duration (2018 - 2021) followed by a review which will provide the basis for a consultative revision of the NPOA to enable an adaptive management approach and ensure the attainment of its strategic objectives and overall vision. Actions in this section are based on the four broad goals of the NPOA and specific objectives. These objectives are specific to the situation in the UAE, address the issues and challenges identified in the previous section.

National stakeholders identified as playing a critical role in the implementation of this NPOA.

GOVERNMENT

- Ministry of Climate Change and Environment
- Environment Agency - Abu Dhabi
- Dubai Municipality
- Sharjah Environment and Protected Areas Authority
- Municipality & Planning Department - Ajman
- Umm Al Quwain Municipality
- Ras Al Khaimah Environment Protection and Development Authority
- Fujairah Municipality
- National Bureau of Statistics
- Critical Infrastructure and Coastal Protection Authority
- Port Authorities (in all Emirates)
- Federal Customs Authority
- Chambers of Commerce (in all Emirates)

NON-GOVERNMENTAL GROUPS AND ORGANIZATIONS

- Fishermen Cooperatives
- Gulf Elasmo Project
- International Fund for Animal Welfare
- Emirates Wildlife Society in association with the World Wide Fund for Nature (EWS-WWF)
- Emirates Marine Environmental Group

(cont...)

- Emirates Natural History Groups (all chapters)
- New York University Abu Dhabi
- UAE University
- Zayed University
- American University of Sharjah
- Dive clubs (across all emirates)

Regional and international stakeholders identified as playing a role in supporting components of this NPOA and the potential implementation of a regional plan of action.

REGIONAL/INTERNATIONAL

- Gulf Cooperation Council
- FAO Regional Commission on Fisheries (RECOFI)
- Regional Organization for the Protection of the Marine Environment (ROPME)
- Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA)
- CMS Secretariat
- IUCN Shark Specialist Group
- CITES Secretariat
- Indian Ocean Tuna Commission (IOTC)

OBJECTIVE	ACTIVITY	PRIORITY	TIMEFRAME
GOAL A - Improve our knowledge of sharks' species and fisheries and their role in the ecosystem			
Develop and Improve the collection of fishery-dependent data	Improve species-specific catch and landings data and monitoring of shark catches. **ACTIONS:** • Identify gaps in existing monitoring and data collection programs; • Ensure data are validated and well managed in a fisheries database that allows for data extraction, exchange and summarization.	high	ongoing
	Establish systems to provide data of catch from recreational fisheries **ACTIONS:** • Develop a catch and release program that allows recreational fishermen to collect information on shark catches	medium	medium
	Promote the use of Traditional Ecological Knowledge in research and involve the community **ACTIONS:** • Engage with fishermen to collect data on species and critical habitats	medium	ongoing
	Improve the identification and reporting of species specific biological and trade data.	high	ongoing
Improve our understanding of the status of sharks' populations	Determine and protect critical habitats of shark **ACTIONS:** • Undertake studies to determine feeding, mating, pupping and nursery areas for live-bearing sharks; • Take action to protect and/or minimize threats to these habitats by designating protected or conservation areas;	high	long
	Undertake studies to determine seasonal and spatial migration patterns and routes of sharks **ACTIONS:** • Develop programs using acoustic, satellite tracking, and mark recapture techniques to determine distributional ranges of species; • Cooperate where possible in the designation and establishment of trans-boundary MPA's using ecological boundaries	low	long

(cont...)

OBJECTIVE	ACTIVITY	PRIORITY	TIMEFRAME
Improve our understanding of the status of sharks' populations	Promote stock assessments for enhanced conservation measures **ACTIONS:** • Establish conservation targets and indicators to assess progress towards reaching those targets at the species population level	high	ongoing
	Fill taxonomical gaps for the classification and assessment of shark species **ACTIONS:** • Use genetics and morphometric to reclassify species with uncertain taxonomical classification; and • Publish information in peer reviewed journals.	medium	medium
	Determine and delineate stock identity **ACTIONS:** • Identify and delineate stocks by collecting additional genetic material through national research surveys	low	long
	Compile the necessary information to assess threats to shark populations and develop an action plan to reduce or eliminate threats. **ACTIONS:** • Compile data on all vulnerable shark species and determine priorities for research; and • Review periodically and evaluate monitoring activities.	low	long
Understand and reduce the direct and indirect anthropogenic causes of declining shark population	Assess and prioritize threats to sharks from human activities (especially in commercial and recreational fisheries) and identify the species most vulnerable to them **ACTIONS:** • Determine which species are most affected by targeted and incidental capture in fisheries • Assess threats from other anthropogenic activities such as dredging, reclamation, habitat destruction	high	medium
	Develop a system to reduce, to the greatest extent possible, the illegal take of protected, high risk shark species **ACTIONS:** • Develop best practice guidelines to minimize interactions between fishermen and protected and high risk species; • Enable and encourage the live release of sharks.	high	ongoing

OBJECTIVE	ACTIVITY	PRIORITY	TIMEFRAME
GOAL B - Ensure effective policy, legislation and enforcement mechanisms and develop a national, regional and international framework for cooperation			
Improve existing legislation to enable the sustainability of sharks and their habitats through policy review	Assess compliance and enforcement issues **ACTIONS:** • Plan monitoring and strengthen the application and enforcement of local fisheries regulations	high	ongoing
	Assess UAE export and import data for shark products **ACTIONS:** • Collect information on post-harvesting processing including facilities, market chains, prices and utilization • Build a database on imports and exports of sharks	high	ongoing
	Provide recommendations for improvements on current legislative framework, based on the assessment and policy review findings, **ACTIONS:** • Review domestic policies and laws to address gaps or impediments to shark conservation	medium	long
Effectively enforce existing laws through enacting robust implementation mechanisms	Develop a framework for determining species at high risk and viable protection mechanisms **ACTIONS:** • Develop protocols and guidelines for assessing species and establish criteria for the evaluation of their conservation status	high	medium
	Assess current management arrangements for shark fishing and determine if these are consistent with a precautionary approach and for achieving ecological sustainability of shark species **ACTIONS:** • Assess current management arrangements for sharks against the objectives of this NPOA and the issues it seeks to address	high	medium
	Develop guidelines for shark interactions in recreational fisheries **ACTIONS:** • Assess whether catch and release programs can be established either within a policy framework or as a voluntary mechanism	low	medium

(cont...)

OBJECTIVE	ACTIVITY	PRIORITY	TIMEFRAME
Initiate and build national, regional and international collaboration	Develop a system to reduce, to the greatest extent possible, the illegal take of protected, high risk shark species **ACTIONS:** • Develop best practice guidelines to minimize interactions between fishermen and protected and high risk species; • Enable and encourage the live release of sharks.	high	short
	Engage with neighboring countries and set up data sharing agreements **ACTIONS:** • Collate and manage information relevant to shark conservation and management in a regional database that is easily accessible to all interested parties	medium	medium
GOAL C - Enable effective conservation through capacity building			
Enable effective conservation of sharks and its habitats through capacity building	Build capacity in the implementation of the NPOA **ACTIONS:** • Provide and coordinate training workshops in conservation and management techniques for sharks and their habitats to relevant agencies; • Provide a platform where legislations are available and regularly updated	high	short
	Promote capacity building for the safe handling and release of sharks **ACTIONS:** • Develop material to aid in safe handling practices of sharks	low	medium
	Develop frameworks for establishing and coordinating effective consultation involving stakeholders in research, management and educational initiatives within and between emirates	medium	medium
GOAL D - Undertake education and outreach programs to improve awareness of the general public, and increase understanding of the role that individuals and the private sector can play in shark conservation			
Raise awareness for shark conservation through educational programs	Develop and introduce a public education and awareness strategy aimed at the general public, recreational and commercial fishermen and other stakeholders	medium	ongoing

OBJECTIVE	ACTIVITY	PRIORITY	TIMEFRAME
Raise awareness for shark conservation through educational programs	**ACTIONS:** • Address bycatch issues by educating about the cumulative impact of shark bycatch, and the need to successfully return live sharks to the sea to maximize their survival; • Highlight the status, role and progressive implementation of the NPOA;	medium	ongoing
	Disseminate identification keys and information on sharks **ACTIONS:** • Produce identification posters and pamphlets on sharks and specifically protected species to distribute to stakeholders and scuba divers	low	long
	Develop and implement mass media information programs and promote public participation in conservation activities **ACTIONS:** • Organize special events related to shark conservation and biology	medium	medium

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