THE CONSERVATION STATUS OF SHARKS, RAYS, AND CHIMAERAS IN THE ARABIAN SEA AND ADJACENT WATERS

2017

Edited by

Rima W. Jabado, Peter M. Kyne, Riley A. Pollom, David A. Ebert, Colin A. Simpfendorfer, Gina M. Ralph, Nicholas K. Dulvy

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Whitetip Reef Shark -- ***Triaenodon obesus*** © Simone Caprodossi Photography

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Bowmouth Guitarfish -- ***Rhina ancylostoma*** © Andy Murch -- Elasmodiver.com

SUMMARY

SCOPE AND ASSESSMENT METHODS

This report provides an overview of the conservation status of chondrichthyans (sharks, rays, and chimaeras) in the Arabian Seas Region (ASR) and describes the results of a regional Red List workshop held in Abu Dhabi, United Arab Emirates, in February 2017. It identifies 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.

Although 184 species of sharks, rays, and chimaeras occur in the ASR, only the confirmed 153 species were considered in this project. The geographic scope encompasses the Red Sea, Gulf of Aden, Arabian Sea, Sea of Oman and the Gulf. This includes the Exclusive Economic Zone (EEZ) of 20 countries bordering three Large Marine Ecosystems (i.e., the Arabian Sea, Red Sea, and Somali Current). This region comprises some of the largest and most important chondrichthyan fishing nations in the world, including India and Pakistan.

All assessments followed the IUCN Red List Categories and Criteria Version 3.1 and the Guidelines for Application of the IUCN Red List Criteria at Regional and National Levels Version 4.0. During the workshop, a network of leading international and regional experts on chondrichthyans and fisheries compiled data and knowledge to prepare 30 global (endemic species) and 123 regional species assessments. All assessments were agreed on by consensus at the workshop and any changes to statuses during the review process were agreed on through email correspondence with lead assessors and contributors prior to their submission to the IUCN Red List of Threatened Species™ and inclusion in this report.

RESULTS

Overall, results indicate that 50.9 % (78 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 17.6 % (27 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. When more data become available, some of these species might also prove to be threatened. By comparison, this is a significantly higher level of threat than the same species face on a global scale. Globally, of the 153 species assessed, 34 % are threatened (2.6 % CR, 7.2 % EN, 24.2 % VU), 17 % are NT, 9.2 % are LC, 28.8 % are DD, and 11.1 % had not been previously evaluated.

The best estimate of extinction risk, which assumes that DD species are equally threatened as data sufficient species, indicates that 62.9 % of

extant species are threatened (assessed as CR, EN, and VU), although the precise figure is uncertain and could lie between 50.9 % (if all DD species are not threatened) and 69.9 % (if all DD species are threatened). For sharks, results indicate that 61.9 % of extant species are threatened (range between 50.6 % and 68.8 %), while for rays, 66.1 % of extant species are threatened (range between 52.7 % and 72.9 %). Of the two species of chimaeras assessed, one was DD and the other LC. Furthermore, the proportion of species of elevated conservation concern (defined as (EW - Extinct in the Wild + CR + EN + VU + NT) / (assessed – DD)) is high at 84.6 % for all assessed chondrichthyans, 80.9 % for sharks, and 89.8 % for rays.

Of the 30 species that are endemic to the ASR, three were CR (10 %), three EN (10 %), two VU (6.6 %), five NT (16.6 %), eight LC (26.6 %), and nine DD (30 %). In total, 26.6 % of these species are threatened, and 43.2 % are in either threatened or Near Threatened categories. It is interesting to note that most of the species assessed as LC mostly occur in deepwater, therefore placing the majority of their populations outside the range of current fishing pressure.

Species accounts are presented for all chondrichthyans assessed. Each account provides the global and/or regional IUCN Red List Category and summarizes the documentation supporting the Red List assessment.

RECOMMENDATIONS

The ASR is home to some of the most threatened chondrichthyan populations in the world. The proportion of species with elevated conservation concern in the ASR is significantly higher than in other areas where regional assessments have been conducted. Only those undertaken for the Mediterranean region have shown such high numbers of threatened chondrichthyan species, where 39 of 73 species are considered threatened (53.4 %). The completion of this ASR regional assessment provides an important baseline for monitoring the regional status of sharks, rays, and chimaeras.

Pressure from artisanal and industrial fisheries are clearly a significant issue in the region, with bycatch considered the biggest threat to the majority of chondrichthyan fishes. Limited species-specific reporting from fisheries does not allow for a full assessment of the chondrichthyan catch in the region. However, any increase in fishing effort, particularly if unregulated, is a cause of concern in the absence of species-specific monitoring. Furthermore, the increasing decline in the extent and quality of habitat as a result of coastal development and other anthropogenic disturbances, particularly for those critical habitats that many species depend on (e.g., coral reefs, mangroves, seagrasses) pose a serious threat to the survival of many species.

There is also an urgent need for concerted national and regional actions, and management measures, to ensure the sustainability of most chondrichthyan species. It is vital that measures are taken in the region to strengthen research, conservation, policy-making, and enforcement mechanisms. This will require increasing efforts and commitments from all countries bordering the ASR to regulate the exploitation of already depleted stocks. Although limited data availability

remains a challenge, a precautionary approach should be applied. A series of recommendations intended to complement and enhance existing scientific advice on the conservation and management of chondrichthyans occurring in the ASR is provided. These recommendations mostly pertain to improvements in governance, research, and collaboration including:

- Use the outcomes of this workshop to inform revisions, and implementation, of relevant national legislation;
- Make provisions for the full protection of chondrichthyan species considered as CR and EN in the region;
- Take immediate measures to reduce incidental catches of species assessed as threatened and encourage proper handling techniques and live release;
- Ensuring the implementation and compliance with requirements from international agreements;
- Initiating the development of an Arabian Seas Regional Shark Plan;
- Establish and enforce Marine Protected Areas with no-take zones;
- Develop and facilitate training, particularly in the fields of taxonomy, monitoring methods, and stock assessment;
- Collect fisheries-dependent data on artisanal and commercial fisheries, especially data on catch composition, bycatch, landings, discards, and Catch Per Unit Effort;
- Conduct basic biological research for deepsea and DD species, especially those that are commercially exploited; and,
- Encourage research aimed at identifying and mapping critical habitats in the region.

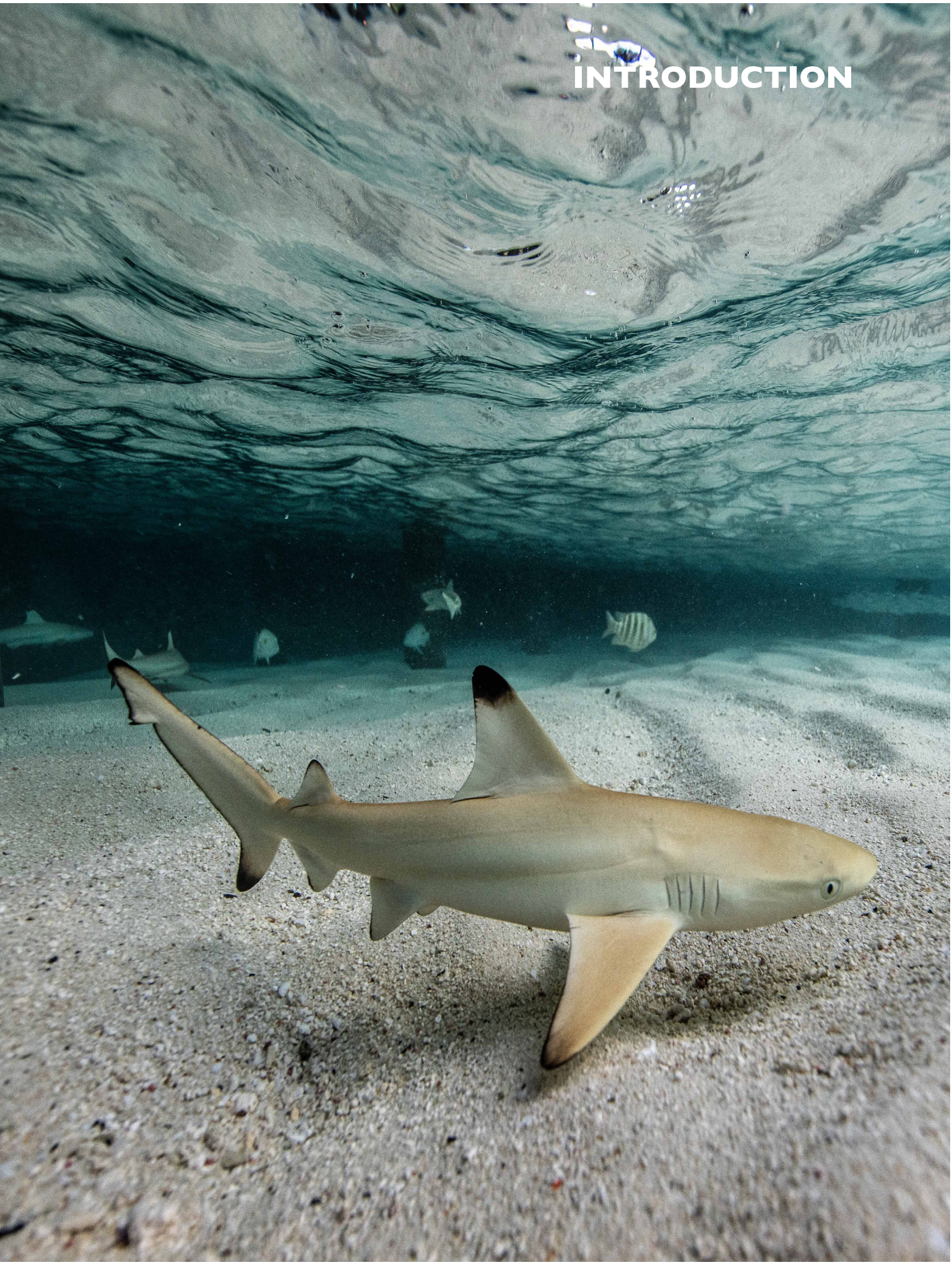
Evaluating the conservation status of species is a dynamic, iterative process and the IUCN requires that the status of a species be re-evaluated, in the least, every 10 years. Key challenges for the future are to improve monitoring and data quality, and to further develop data openness and dissemination so that the information and analyses presented here can be updated and improved, and conservation actions can be given as solid a scientific basis as possible.

Reef Manta Ray -- ***Manta alfredi*** © Simone Caprodossi Photography

ACRONYMS

ASR -- Arabian Seas Region
BDL -- Body Length
BRUV -- Baited Remote Underwater Video
CBD -- Convention on Biological Diversity
CITES -- Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS -- Convention on the Conservation of Migratory Species of Wild Animals
CPUE -- Catch per Unit Effort
CR -- Critically Endangered
DD -- Data Deficient
DW -- Disc Width
EAD -- Environment Agency-Abu Dhabi
EEZ -- Exclusive Economic Zone
EN -- Endangered
ERA -- Ecological Risk Assessment
FAD -- Fish Aggregating Device
FAO – Food and Agriculture Organization of the United Nations
FMA -- Fishery Managed Area
FMP -- Fishery Management Plan
Gulf -- Arabian Gulf
HMS -- Highly Migratory Species
IFAW -- International Fund for Animal Welfare
IOTC -- Indian Ocean Tuna Commission
IPOA -- International Plan of Action for the Conservation and Management of Sharks
IUCN -- International Union for Conservation of Nature
IUU -- Illegal, Unreported, and Unregulated fishing
LC -- Least Concern
LME -- Large Marine Ecosystem
MCS -- Monitoring, Control, and Surveillance
mh -- Million Hours
MoU -- Memorandum of Understanding
MPA -- Marine Protected Area
NA -- Not Applicable
NEI -- Not Elsewhere Included
NPOA -- National Plan of Action for the Conservation and Management of Sharks
NT -- Near Threatened
PA -- Protected Area
PERSGA -- Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden
RECOFI -- Regional Commission for Fisheries
RFB -- Regional Fishery Body
RFMO -- Regional Fisheries Management Organization
ROPME -- Regional Organization for the Protection of the Marine Environment
SIS -- IUCN Species Information System
SSC -- Species Survival Commission of the IUCN
SSG -- Shark Specialist Group of the IUCN SSC
t -- Tonnes (metric tons)
TAC -- Total Allowable Catch
TL -- Total Length
UAE -- United Arab Emirates
UNCLOS -- United Nations Convention on the Law of the Sea
UNFSA -- United Nations Fish Stock Agreement
VU -- Vulnerable
WPEB -- Working Party on Ecosystem and Bycatch

INTRODUCTION



Blacktip Reef Shark -- ***Carcharhinus melanopterus*** © Simone Caprodossi Photography

1. INTRODUCTION

1.1 THE CLASS CHONDRICHTHYES

Sharks and their relatives, including skates, rays, and chimaeras, are collectively termed chondrichthyan fishes (class Chondrichthyes). The skates, rays, and guitarfishes are known collectively as rays (superorder Batoidea), while the rays and sharks together comprise the elasmobranchs (subclass Elasmobranchii).

Chondrichthyans are a relatively small (~1,212 described species) (Weigmann 2017), evolutionarily conservative group that has functioned successfully in diverse aquatic ecosystems for over 400 million years. Despite their evolutionary success, many species are increasingly threatened with extinction as a result of their very conservative life-history traits and anthropogenic activities. Although there is considerable variation between species, many chondrichthyans grow slowly, mature relatively late, have a small number of young, and low natural mortality (in the absence of anthropogenic pressures). These characteristics result in very low rates of population increase with little capacity to recover from overfishing (either direct or indirect) and other impacts, including habitat loss and degradation. However, knowledge of the population status of most of the known species of chondrichthyans remains limited.

1.2 THE IUCN SPECIES SURVIVAL COMMISSION'S SHARK SPECIALIST GROUP

The International Union for Conservation of Nature (IUCN) is the world's largest global intergovernmental environmental network. Its Species Survival Commission (SSC) established the Shark Specialist Group (SSG) in 1991 in response to growing awareness and concern of the severe impact of fisheries on chondrichthyan populations around the world. The SSG provides leadership for the conservation of threatened species and populations of all chondrichthyan fishes. It aims to promote the long-term conservation of the world's sharks and related species (skates, rays, and chimaeras), effective management of their fisheries and habitats and, where necessary, the recovery of their populations. The SSG's Red List Program aims to assess the IUCN Red List of Threatened Species status of all chondrichthyan species in order to inform management and conservation measures. For further information, see: www.iucnssg.org

1.3 THE IUCN RED LIST CATEGORIES

The IUCN Red List IUCN Red List of Threatened Species™ (www.iucnredlist.org) is the world's most comprehensive inventory of the global status of plant and animal species. It is one of the most widely used indicators for assessing the condition of ecosystems and their biodiversity. These conservation status assessments are intended to be policy-relevant, and can be used to inform conservation planning and priority setting processes. However, they are not envisaged to be policy prescriptive and are not in themselves a system for setting biodiversity conservation priorities.

The IUCN Red List uses a single standardized set of Categories and Criteria to determine the relative risk of extinction of thousands of species,

subspecies, and subpopulations, worldwide. The main purpose is to catalogue and highlight those taxa that are facing the highest risk of extinction. The five quantitative criteria used to assess a taxon are based on biological factors related to extinction risk and include rate of population decline, population size and structure, area of geographic distribution, and degree of population and distribution fragmentation (IUCN 2012, 2016, see Annex II). Each species assessment produced is supported by detailed documentation, and provides information on taxonomy, distribution, population trends, habitat, ecology, life-history, threats, and conservation measures. When assessing species at the global level, there are nine Red List categories used, with species classified as Critically Endangered (CR), Endangered (EN), and Vulnerable (VU), considered threatened (Fig. 1). However, when conducting regional or national assessments, regional guidelines are applied (http://www.iucnredlist.org/technical-documents/categories-and-criteria) and an additional two categories are used including Regionally Extinct (RE), and Not Applicable (NA).

Regional assessments are used to assess species' extinction risk and publish Red Lists within specific sub-global geographically defined areas. For widespread species, when the global assessment differs from the regional assessments, only the global assessment is displayed on the Red List. However, the regional assessment is documented on the SSG website (in addition to this report) and details from the assessment can be used in combination with other regional assessments in order to support later global assessments of species. When a species is endemic to the region, then the 'regional' assessment is considered the 'global' assessment and displayed as such on the Red List and its status highlighted in this report. Following are the 11 IUCN Red List Categories (Fig. 1), their abbreviations and brief descriptions according to the Guidelines for Using the IUCN Red List Categories and Criteria (version 12 - IUCN 2016) and the Guidelines for Application of IUCN Red List Criteria at Regional and National Levels (version 4.0) (IUCN 2012).

A taxon is **Extinct** (EX) when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

A taxon is **Extinct in the Wild** (EW) when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

A taxon is **Regionally Extinct** (RE) when there is no reasonable doubt that the last individual potentially capable of reproduction within the region has died or has disappeared from the wild in the region, or when, if it is a former vis-

iting taxon, the last individual has died or disappeared in the wild from the region. The setting of any time limit for listing under RE is left to the discretion of the regional Red List Authority, but should not normally pre-date 1500 AD.

A taxon is **Critically Endangered** (CR) when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Annex II), and it is therefore considered to be facing an ***extremely high*** risk of extinction in the wild.

A taxon is **Endangered** (EN) when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Annex II), and it is therefore considered to be facing a ***very high*** risk of extinction in the wild.

A taxon is **Vulnerable** (VU) when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Annex II), and it is therefore considered to be facing a ***high*** risk of extinction in the wild.

A taxon is **Near Threatened** (NT) when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for, or is likely to, qualify for a threatened category in the near future.

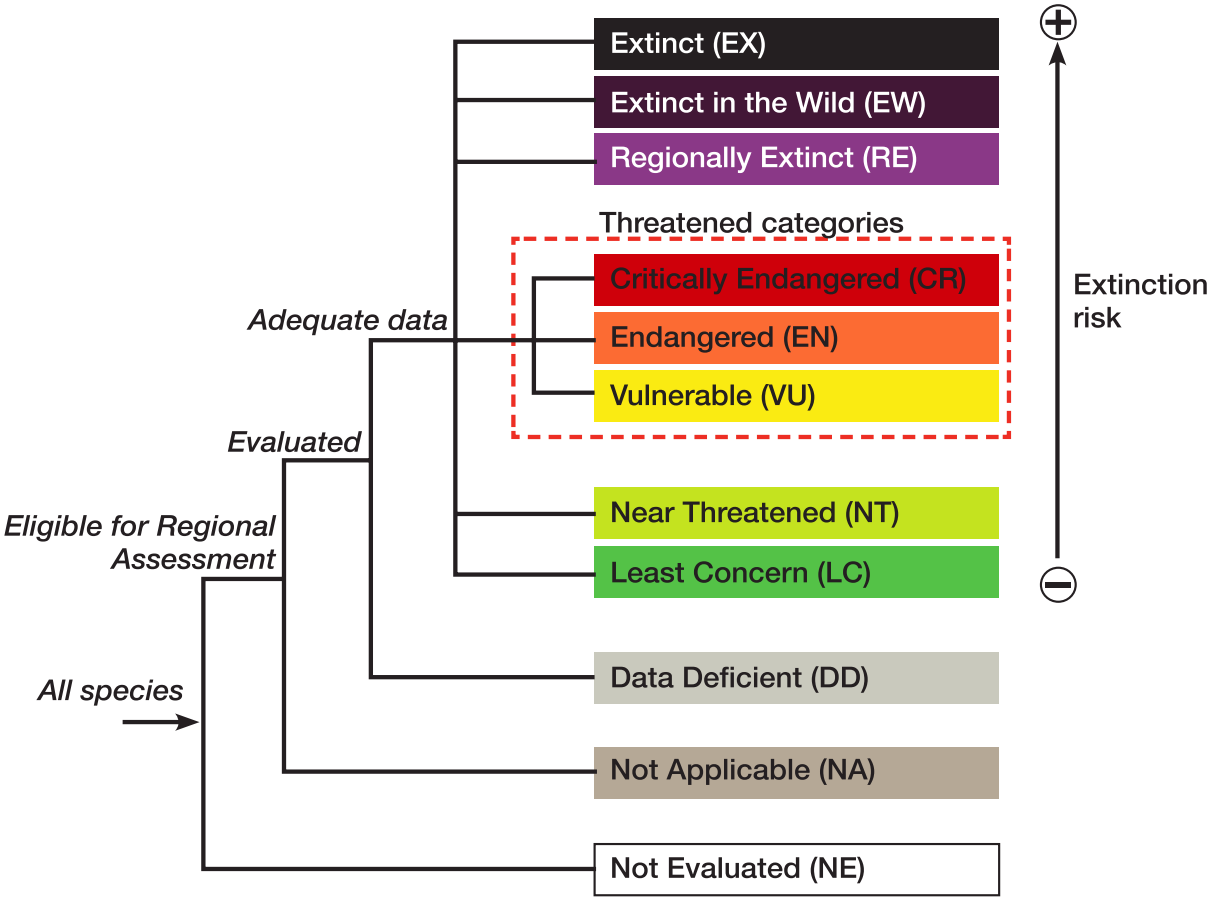


Figure 1. The IUCN Red List Categories at the regional level (IUCN 2012).

A taxon is **Least Concern** (LC) when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

A taxon is **Data Deficient** (DD) when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

A taxon is **Not Applicable** (NA) when it is not eligible for assessment at the regional level (mainly introduced taxa and vagrants).

A taxon is **Not Evaluated** (NE) when it has not yet been evaluated against the criteria.

The Halavi Guitarfish -- ***Glaucostegus halavi*** is endemic to the Arabian Seas Region. Therefore, this 'regional' assessment is also considered the 'global' assessment and will be published on the IUCN Red List © Philippe Lecomte

1.4 OBJECTIVES AND OUTPUTS OF THE RED LIST ASSESSMENT OF SHARKS, RAYS, AND CHIMAERAS IN THE ARABIAN SEAS REGION

This regional IUCN Red List assessment of chondrichthyans in the Arabian Sea and adjacent waters has five main objectives:

1. To provide a full and objective assessment of extinction risk and conservation status of all chondrichthyans naturally reproducing in the Arabian Seas Region (ASR) including detailed, up-to-date, authoritative information on known geographical distribution, population trends, and threats;

2. To contribute to conservation planning by providing a baseline dataset on the Red List status of chondrichthyans occurring in the region, by which governments can measure changes in status as a response to improvements in management;

3. To identify the major threatening processes to chondrichthyans in the region, as well as those species most in need of conservation interventions, and propose appropriate mitigation measures and actions to address them;

4. To recommend priority areas in terms of policy, research, and management that can ensure species maintain a favorable conservation status; and,

5. To strengthen the network of regional experts working on fisheries and chondrichthyans, foster future collaborations, and ensure this expertise can be targeted to address the highest conservation priorities and provide support to policy and management development.

This report provides a summary of the regional IUCN Red List assessment for chondrichthyan species occurring in the ASR. The main outputs include:

1. A first comprehensive list of chondrichthyans occurring in the region, including species that are endemic to the region, those considered vagrant, those for which the distribution is uncertain and/or whose validity is uncertain;

2. A summary report on the status of 153 shark, ray, and chimaera species occurring in the region highlighting those species of conservation concern and establishing a valuable baseline that can be used as a tool to measure and monitor improvement in our knowledge of the taxa, and changes in the overall conservation and management status of the group;

3. A review of the main threatening processes and regional issues affecting these species, allowing the identification of gaps in knowledge, and support the development of research on species considered of conservation concern, or Data Deficient, as well as serve as a basis to enable policy and management priorities to be targeted; and,

4. Recommendations for future research and conservation actions needed in order to move chondrichthyans in the ASR towards healthy wild populations and a status of Least Concern.

OVERVIEW OF THE ARABIAN SEAS REGION

Scalloped Hammerhead -- ***Sphyrna lewini*** © R.W. Jabado

2 OVERVIEW OF THE ARABIAN SEAS REGION

The Arabian Seas Region, encompassing the waters of the Red Sea, Gulf of Aden, Arabian Sea, Sea of Oman, and the Gulf, is often termed the Northwest Indian Ocean. However, for consistency with terminology in the current Red List assessments, Arabian Seas Region (ASR) is used in this report. This region consists of three Large Marine Ecosystems (LME): the Somali Coastal Current (LME 31), the Arabian Sea (LME 32), and the Red Sea (LME 33) (Fig. 2). These LMEs mostly overlap with the northern borders of Food and Agriculture Organization (FAO) Major Fishing Area 51 (Western Indian Ocean) but do not completely match the FAO defined region as it extends south of the region of interest here.

2.1 ARABIAN SEAS REGION -- LARGE MARINE ECOSYSTEMS

The ASR includes and is bordered by 20 sovereign states: Bahrain, Djibouti, Egypt, Eritrea, India (west coast waters), Iraq, the Islamic Republic of Iran, Israel, Jordan, Kuwait, the Maldives, Oman, Pakistan, Qatar, the Kingdom of Saudi Arabia (Red Sea and Gulf waters), Somalia, Sri Lanka, the Sudan, the United Arab Emirates (UAE) (Sea of Oman and Gulf waters), and Yemen (including the Socotra Archipelago).

The Somali Coastal Current LME extends from the Comoros Islands and the northern tip of Madagascar in the south to the Horn of Africa in the north. It is bordered by Somalia, Kenya, and Tanzania and covers an area of approximately 840,710 km^2. The upwelling off Somalia is one of the most intense coastal upwelling systems in the world. It is dominated by the Southwest monsoon (June to September) which results in a highly productive ecosystem through the upwelling of cold, nutrient rich waters along the Somali coast (Bakun *et al.* 1998, Belkin *et al.* 2009). This LME is characterized by a rich diversity of coastal habitats including coral reefs, mangroves, and seagrass beds as well as unique bathymetry traits resulting from major submarine tectonic features in the Indian Ocean (Okemwa 1998).

An extensive interchange of surface waters occurs between this LME and the Arabian Sea LME which lies between the Arabian Peninsula and India, and includes the Gulf. The Arabian Sea LME is bordered by Bahrain, India, Iran, Iraq, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, the UAE and Yemen. It covers an area of approximately 3.9 million km^2. Within this LME, three sub-systems, each with distinct physical, physio-chemical and biological characteristics are present and include the Western Arabian Sea along the African coast; the Central Arabian Sea bordering Iran; and the Eastern Arabian Sea bordering the coasts of Sri Lanka, India, and Pakistan (Dwivedi & Choubey 1998). Freshwater run-off from the Indus River (Pakistan) and the Shatt Al Arab (Euphrates, Karun, and Tigris rivers in the northern Gulf) also influence this region (UNEP 2006). These waters are highly productive and are also strongly influenced by a monsoon regime, which causes significant seasonal variations in marine productivity. During the southwest monsoon, strong southwesterly winds blow across the Arabian Sea, producing intense upwellings along the Oman and Somalia

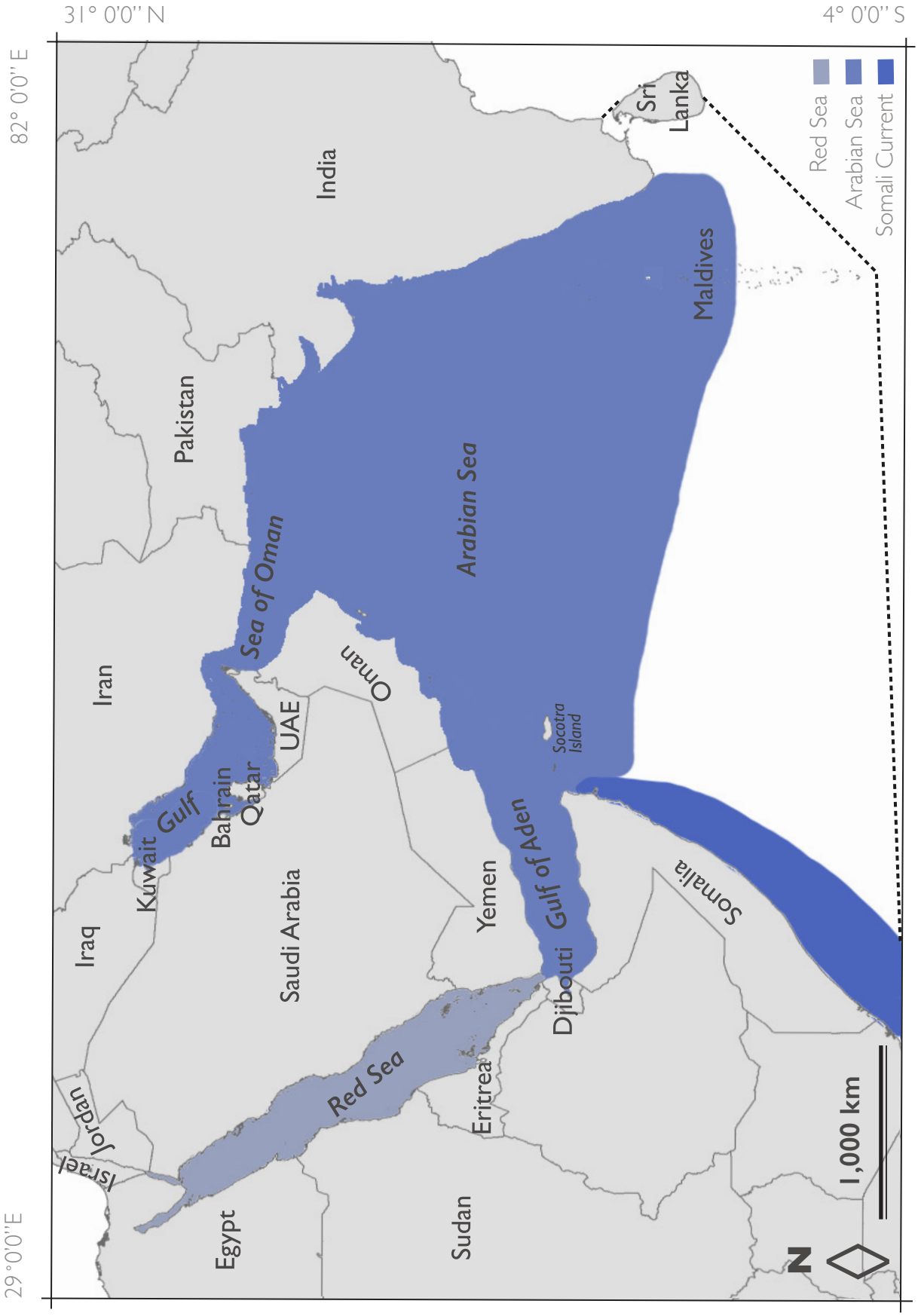


Figure 2. Map indicating marine boundaries for the Arabian Seas Region (dashed lines) and the Large Marine Ecosystems of the region (Red Sea, Somali Current, and Arabian Sea).

coast. This is the most intense large-scale seasonal and coastal upwelling system in the world (Bakun *et al.* 1998), making the Arabian Sea one of the world's most productive marine regions (Codispoti 1991).

The Red Sea LME has a surface area of 458,620 km^2 and is bordered by Djibouti, Egypt, Eritrea, Israel, Jordan, Saudi Arabia, Sudan and Yemen. This LME is characterized by high evaporation and low precipitation, making it one of the most saline water masses in the world (Sofianos *et al.* 2002). Three depressions greater than 2,000 m in depth occur in the axial trough of this LME. Its complex reefs, extensive coral reefs, seagrass, and macro-algal beds form highly productive habitats with unique species assemblages and high endemism, especially among reef fishes and invertebrates (Getahun 1998).

2.2 CHONDRICHTHYAN FISHES IN THE ARABIAN SEAS REGION

The ASR has a moderately diverse chondrichthyan fauna with an estimated 184 species reported to occur within these waters, approximately 15 % of the 1,212 known chondrichthyans species (Weigmann 2017). However, several of these species are vagrants (e.g., Megamouth Shark *Megachasma pelagios*), have questionable occurrences (e.g., Pencil Shark *Hypogaleus hyugaensis*), are at the edge of their range (e.g., Mozambique Numbfish *Narcine rierai*), or require taxonomic work (e.g., Slender Bamboo Shark *Chiloscyllium indicum*), and were therefore considered as Not Applicable at this workshop (see ***Methods*** for details). A total of 153 species of chondrichthyans were assessed, comprising 12 orders, 39 families, and 84 genera. This includes seven orders, 22 families, and 46 genera of sharks (77 species); four orders, 16 families, and 37 genera of rays (74 species); and one order, one family, and one genus of chimaeras (2 species). Of these, approximately 19.6 % (30 species) are considered endemic to the ASR.

Although the diversity of sharks and rays in the ASR is relatively high, the region remains remarkably understudied. Several studies have highlighted the incompleteness of elasmobranch checklists and the urgent need for research with particular focus on the collection of life-history data, taxonomic work, as well as monitoring of landings (Bonfil 2003, Henderson *et al.* 2004, Moore *et al.* 2012, Spaet *et al.* 2012, Akhilesh *et al.* 2014, Jabado *et al.* 2015, Jabado and Spaet 2017). Specifically, many species remain poorly-known taxonomically and it is likely that additional species will be described from this region. For example, a recent taxonomic assessment of sharks and rays landed in Oman and the UAE suggests that specimens currently identified as the Bramble Shark (*Echinorhinus brucus*) and the Broad Cowtail Ray (*Pastinachus ater*) are actually undescribed species that require further work (Henderson *et al.* 2016). Also, new species are still being described from across the ASR. For instance, Vivaldi's Catshark (*Bythaelurus vivaldii*) has just been described from off the coast of Somalia in the Arabian Sea from two specimens collected during a cruise in 1899 at a depth of 628 m (Weigmann and Kaschner 2017).

The ASR is also recognized as one of the regions of the world with the largest shark catchers and traders (Dent and Clarke 2015, Jabado *et al.*

2015, Jabado and Spaet 2017). Overall reported capture production of marine fishes in the ASR reached 3,658,373 metric tons (t) in 2015 (excluding inland waters and reports from other bodies of water) representing 5.5 % of the reported 65,997,938 t global capture production of fishes (FAO 2017). Landings of chondrichthyans in the region were estimated at 72,534 t in 2015, a decline from a peak of 195,490 t reported in 1996. These reported landings represent 9.62 % of the global chondrichthyan landings at 753,761 t in 2015 (Table 1). However, seven countries in the region do not report their chondrichthyan catches which could be substantial. For instance, Glaser *et al.* (2015) suggest that Somali marine fish capture production averaged 40,833 t yearly between 2005 and 2009. Of these catches, 25 % were sharks averaging

Table 1 – Reported global and regional capture production of marine fishes and chondrichthyans (in metric tons (t)) to FAO by country in 2015. Numbers in green indicate FAO estimates, NR refers to Not Reported, and NA refers to Not Applicable. Data was filtered from FishStatJ (2017) to remove inland waters, and only include fishing areas for each country within the ASR.

Country	Total marine fishes production (t)	% of global marine fishes production	% of regional marine fishes production	Total chondrichthyan production (t)	% of global chondrichthyan production	% of regional chondrichthyan production
Bahrain	7,055	0.01 %	0.19 %	32	<0.01 %	0.04 %
Djibouti	1,985	0 %	0.05 %	92	0.01 %	0.13 %
Egypt	42,547	0.06 %	1.16 %	0	<0.01 %	<0.01 %
Eritrea	3,883	0.01 %	0.11 %	90	0.01 %	0.12 %
India (west coast)	1,647,235	2.5 %	45.03 %	15,234	2.02 %	21 %
Iran	532,100	0.81 %	14.54 %	17,874	2.37 %	24.64 %
Iraq	3,865	0.01 %	0.11 %	NR	NA	NA
Israel	50	<0.01 %	<0.01 %	NR	NA	NA
Jordan	277	<0.01 %	0.01 %	NR	NA	NA
Kuwait	2,760	<0.01 %	0.08 %	NR	NA	NA
Maldives	127,352	0.19 %	3.48 %	15	<0.01 %	0.02 %
Oman	250,643	0.38 %	6.85 %	8,069	1.07 %	11.12 %
Pakistan	319,292	0.48 %	8.73 %	14,192	1.88 %	19.57 %
Qatar	14,841	0.02 %	0.41 %	NR	NA	NA
Saudi Arabia	53,003	0.08 %	1.45 %	894	0.12 %	1.23 %
Somalia	28,700	0.04 %	0.78 %	NR	NA	NA
Sri Lanka	401,051	0.61 %	10.96 %	6,542	0.87 %	9.02 %
Sudan	1,749	<0.01 %	0.05 %	NR	NA	NA
UAE	72,460	0.11 %	1.98 %	400	0.05 %	0.55 %
Yemen	147,525	0.22 %	4.03 %	9,100	1.21 %	12.55 %
TOTAL	3,658,373	5.54 %	100 %	72,534	9.62 %	100 %

10,200 t per year. These numbers are comparable to reported landings in Yemen and would make Somalia one of the largest chondrichthyan fishing nations in the ASR. When including estimates of catches from foreign fleets operating in Somali waters (e.g., from Iran, Yemen, Pakistan, Sri Lanka, Egypt, South Korea, Greece, Italy) chondrichthyan production reaches 26,000 t per year. However, it is unclear if these quantities are included in reported landings of countries operating within Somali waters. These limited, largely underestimated, and inaccurate landings data from shark fisheries throughout the region has made population estimates and assessments of decline difficult.

2.3 THREATS TO CHONDRICHTHYANS IN THE ARABIAN SEAS REGION

Available data suggest that chondrichthyans in the ASR are mostly declining in abundance, diversity, and sizes (e.g., Akhilesh *et al.* 2011, Bonfil 2003, Henderson *et al.* 2004, Jabado *et al.* 2016, Moore *et al.* 2012, Spaet and Berumen 2015; Valinassab *et al.* 2006, Veena and Mohamed 2016). These declines are attributed to several factors, including the intrinsically low life-history characteristics of this group, intense and unregulated fishing activities throughout the coastal areas of the region and in some pelagic waters, as well as the effects of habitat loss and environmental degradation (Price *et al.* 2014, Sheppard *et al.* 2010). The high level of exploitation in the ASR is of concern with increasing effort, intensifying fisheries, and a lack of overall fisheries management or enforcement of existing measures. Some of the known major chondrichthyan fishing countries within the ASR are Iran, India, Pakistan, Oman, Yemen, Somalia, and Sri Lanka (Dent and Clarke 2015, Glaser *et al.* 2015, Herath and Maldeniya 2013, Jabado and Spaet 2017).

Fisheries in the ASR are primarily artisanal although industrial fleets also operate in the waters of the Arabian Sea. Artisanal fleets fish most often in nearshore coastal waters, with occasional large-scale trips to productive areas, and employ traps (in the Gulf and Red Sea), gillnets, hook and line, and longlines. Industrial fisheries mostly employ trawls, longlines, and purse-seines. Although often targeted, chondrichthyan catch is predominantly the result of incidental capture in fisheries targeting other, more valuable, demersal or pelagic species such as shrimp or tuna. Most species are susceptible to and are caught in a wide variety of fishing gears including gillnets, longlines, hand lines, as well as trawl nets (which also capture small individuals of larger species). Overall, chondrichthyans are retained and fully utilized across the region, although many species of rays are often discarded at sea (with the exception of India and Pakistan). However, finning (removal of fins at sea and discarding of the body) is still reported (e.g., from Yemen, Oman, and other European and Asian fleets operating in the Arabian Sea), especially in offshore and high seas fisheries (Anderson and Simpfendorfer 2005, IOTC 2006), although the extent of the issue in the region remains unknown (Jabado and Spaet 2017).

Fisheries resources in the region are under extreme pressure with a number of teleost species having shown declines of between 40 and 80 % from virgin biomass conditions in the last 15-20 years, especially in the waters fished by Iran, In-

dia, and Pakistan. For example, in Indian inshore marine species are thought to be fully or overexploited, with extensive use of illegal mesh sizes reported (Flewwelling and Hosch 2006). India's inshore fisheries are generally characterized by declining catch rates, declining recruitment and biomass, and a shift from regular landing patterns (Flewwelling and Hosch 2006). Similarly, in the UAE, stocks of commercially important demersal species (e.g., the Orange-Spotted Grouper *Epinephelus coioides*) have declined by 80 % in the past 20 years (Grandcourt 2012).

Fisheries in the region have experienced increased demand for sharks since the 1970s due to the shark fin trade and as a result, effort is increasing in traditional shark fisheries in many areas (Ali 2015, Bonfil 2003, Henderson *et al.* 2007, Jabado *et al.* 2015). Historic fishery landings have been poorly documented in the region and therefore the status of most exploited chondrichthyan stocks are unknown. However, reports indicate that shark resources in the Red Sea, particularly off Sudan, Djibouti, Yemen (including the Socotra Archipelago), and Somalia were already showing signs of depletion over 15 years ago (PERSGA 2002, Glaser *et al.* 2015, Shaher 2007). Similarly, results from interviews with fishermen in the UAE indicate that the majority of fishers started seeing a decline in the abundance of sharks over 20 years ago, and that these declines have been significant (Jabado *et al.* 2015). In Oman, Henderson *et al.* (2004) reported that the shark fishery was heavily exploited, and suggested that larger, slower-growing species were being displaced by smaller, faster-growing species. In Pakistan, significant declines in shark catches were recorded in the last 15 years (Khan 2012). Data from tuna gillnet vessels, which land approximately 55 % of the sharks in Pakistan, show declines in landings from 22,471 t in 2002 to 4,660 t in 2011 (Khan 2012). Reports from Iran based on a comparison of results from fisheries-independent trawl surveys in the Gulf indicate that the biomass of sharks (particularly whaler sharks, family Carcharhinidae) has been decreasing since the 1970s (Valinassab *et al.* 2006). Historical surveys in the Gulf indicated that carcharhinid sharks comprised up to 22 % of biomass in trawl surveys in 1980-1981, whereas in 2002, they represented only ~2 % (Valinassab *et al.* 2006). Shark catches in Sri Lanka decreased by 30 % between 1994 and 1999 from 13,000 t to 9,000 t, and have been steadily declining since 2001 despite increasing effort (Dissanayake 2005). De Silva (2006) notes that some species of reef sharks such as the Zebra Shark (*Stegostoma fasciatum*), Tawny Nurse Shark (*Nebrius ferrugineus*), and Whitetip Reef Shark (*Triaenodon obesus*) have practically disappeared from Sri Lankan waters. Furthermore, in India, the mechanization of fishing fleets increased by 57 % between 1960 and 1990, contributing to a situation of overcapacity and overfishing (Mohamed and Veena 2016). Studies show that several chondrichthyan stocks are either declining (Mohanraj *et al.* 2009, Karnad *et al.* 2014), including stocks of whiprays (*Himantura* spp.) - which show declines of 55 % from their historical maximum catch in Karnataka - or have already collapsed, such as the blacktip sharks (*Carcharhinus* spp.) (Mohamed and Veena 2016). Indeed, the proportion of sharks in total fish landings in India has declined from 64 % in 1985 to 44 % in 2013 (Kizakhudan *et al.* 2015). In the Maldives, shark stocks were show-

ing signs of decline in the early 1980s and many reef shark stocks in the northern atolls were reportedly overfished while oceanic stocks were showing reduced catch (Ali 2015).

These reported declines, along with the high level of exploitation on the habitats of most species, is of concern. Most studies highlight that increased fishing intensity and technological advancement of fishing gear has resulted in a decline in many chondrichthyan species captured in a range of gear across the region (e.g., Bonfil 2003, Henderson *et al.* 2007, Spaet and Berumen 2015, Mohamed and Veena 2016). Indeed, there has been a significant increase in coastal fishing effort and power in some parts of the ASR leading to this reduction in chondrichthyan catches. For example, in the Red Sea, the number of traditional boats operating more than tripled from about 3,100 to 10,000 between 1988 and 2006 (Bruckner *et al.* 2011). In Eritrea, catch and effort data showed that total fishing effort, as well as total annual catch, increased more than two-fold from 1996 to 2002 (Tsehaye *et al.* 2007). In Yemen, the number of boats and fishermen operating in the Gulf of Aden at least doubled between 1990-1999 (Shaher 2007). Bonfil and Abdullah (2004) noted that there were at least 27,900 artisanal fishermen and 6,400 vessels operating in the Gulf of Aden. In Oman, almost 19,000 artisanal vessels operate in coastal waters using a variety of net and line gear (Jabado and Spaet 2017). In Iran, there is increasing fishing effort with the number of fishermen increasing from 70,729 in 1993 to 109,601 in 2002 (Valinassab *et al.* 2006). In Pakistan waters, about 2,000 trawlers operate over the continental shelf, targeting shrimp in shallow waters and fish in outer shelf waters (M. Khan pers. comm. 06/02/2017), and at least another 300 gillnetters targeting tuna in the broader Arabian Sea (Khan 2012). In India, there are over 13,400 gillnetters operating along the west coast, with many other types of net gear also deployed in coastal areas (CMFRI 2010). Furthermore, there were about 6,600 trawlers operating in the Indian state of Gujarat in the early 2000s (Zynudheen *et al.* 2004). This number almost doubled to 11,582 trawlers in 2010 (CMFRI 2010), and all Indian states in the region have high numbers of trawlers operating (e.g., Kerala: 3,678 trawlers and Tamil Nadu: 5,767 trawlers). In Sri Lanka, 24,600 gillnet vessels were operating in the coastal fishery in 2004 (Dissanayake 2005).

Simultaneously, while no accurate numbers are available, there has been an uncontrolled expansion of industrial trawling in the Red Sea through licenses issued to foreign industrial trawlers (particularly off Yemen) which has resulted in the depletion of marine resources (PERSGA 2002). In Somalia and Yemen, illegal and unregulated fishing by foreign and regional trawlers and longliners is rife and impacting shark populations (De Young 2006, Glaser *et al.* 2015, Khan 2012, Tesfamichael *et al.* 2012, M. Ali pers. comm. 06/02/2017). In addition to national fleets, at least 400 longline vessels and purse seine fleets from countries in the European Union, as well as China, Japan, South Korea, and Taiwan, are active in the waters of the northwest Indian Ocean (IOTC 2013). In fact, pelagic fisheries have operated in the Indian Ocean for more than 50 years with Japanese longliners in the western region since 1956. Russian, Taiwanese, and South Korean vessels have fished there

since 1954-1966 (Gubanov and Paramonov 1993). The amount of sharks caught by longliners targeting swordfish in the Indian Ocean have been constantly increasing since the mid-1990s and some have switched to targeting sharks in recent years (IOTC 2006). Significant reductions are thought to have occurred there as a result of this intensive pelagic fishing effort (IOTC 2016). The major bycatch of these foreign longline and driftnet fleets include thresher sharks (*Alopias* spp.), the Silky Shark (*Carcharhinus falciformis*), the Blue Shark (*Prionace glauca*), the Oceanic Whitetip Shark (*C. longimanus*), and the Shortfin Mako (*Isurus oxyrinchus*). In the Indian Exclusive Economic Zone (EEZ), there has been a decline in the Catch Per Unit Effort (CPUE) of pelagic sharks from a peak at 2.4 in 1991 to 0.09 in 2006, highlighting the need for urgent conservation and management measures.

The shallow depth distribution of many demersal species, particularly rays, means that they are unlikely to have a depth refuge from fisheries and large declines of various species have been reported. For example, in India, annual landings of rays by trawlers operating from New Ferry Wharf, Mumbai during 1990-2004 ranged from 205.7 t to 765.1 t with an average of 502.8 t constituting nearly 1 % of trawl catches. The trawling effort nearly doubled from 0.95 million hours (mh) in 1990 to 1.73 mh in 2004, whereas the catch rate declined by 60 % from 0.65 kg h^{-1} in 1990 to 0.24 kg h^{-1} in 2004. Trawlers land 98 % of rays and the rest are landed by gillnets and dol nets (bag nets). Analysis of this trawl data indicates that although actual trawling hours increased, the catch of all species of rays showed declining population trends. It appears that the resource of rays off India may not be able to withstand any further increase in fishing effort. Innate biological characteristics such as limited fecundity, late maturation, and capture of gravid females, have led to these long-term declines. Conservation measures are required to protect these resources from further depletion. Furthermore, significant declines in wedgefishes and guitarfishes (order Rhinopristiformes) landings have been documented in Tamil Nadu through monitoring at Chennai (Mohanraj *et al.* 2009). Even though this is just outside of the ASR, trawlers in Tamil Nadu fish widely throughout southern India (Karnad *et al.* 2014) and data can be considered representative of the broader area. Wedgefish and guitarfish landings decreased by 86 % over five years of monitoring (2002-2006). Fishing pressure is consistently increasing in these inshore areas and the demand for fins for the international fin trade is helping drive landings of large wedgefish and guitarfish. Although exact catch data are not available, many species of wedgefish and guitarfish in the region are seen less regularly than they previously were, and fishing pressure continues unabated over most of their range and habitat.

With regards to the Mobulidae, the recent rise in demand for gill plates has resulted in dramatic increases in fishing pressure, with many former bycatch fisheries having become directed commercial export fisheries (Dewar 2002, White *et al.* 2006, Heinrichs *et al.* 2011, Fernando and Stevens 2012). There are now also reports of mobulids being 'gilled' (gills removed and the carcasses discarded at sea) (D. Fernando pers. comm. 07/02/2017). The main threat to *Mobula* spp. occurring in the region is target-

ed or incidental fisheries where they are killed or captured by a variety of methods including harpooning, netting and trawling. Furthermore, they are taken as bycatch in pelagic gillnet and longline fisheries in the Indian Ocean targeting swordfish (Coelho *et al.* 2011), and the tuna purse seine fishery (Lezama-Ochoa *et al.* 2015). These rays are easy to target because of their large size, slow swimming speed, aggregative behavior, predictable habitat use, and lack of human avoidance. Most species have a high value in international trade markets and their gill plates are particularly sought after and used in Asian medicinal products for the purpose of treating ailments ranging from acne to cancer, and as a general health tonic (Anderson *et al.* 2010, Croll *et al.* 2015, Lawson *et al.* 2017). Historically, this market has resulted in directed fisheries which are targeting these rays in unsustainable numbers. Mobulids are taken in significant numbers as bycatch in the Pakistani, Indian and Sri Lankan gillnet and purse seine fisheries (Rajapackiam *et al.* 2007, Nair *et al.* 2013, Kizhakudan *et al.* 2015). It should be noted that Sri Lankan fisheries operate throughout the region, ranging from the British Indian Ocean Territory to Somalia. Historically, there was a targeted harpoon Manta (family Mobulidae) fishery in the Lakshadweep Islands, India (Raje *et al.* 2007, Pillai and Krishna 1998). A usual fecundity of a single pup per litter results in exceptionally limited reproductive potential, a low intrinsic rate of increase, and enhanced susceptibility to population depletion. In the context of carrying out species-specific population trend analyses, the aggregation and misidentification of *Mobula* spp. in catches and landings poses a threat to the entire genus by confounding accurate determination of each species' population status. Mobulid bycatch data, if recorded at all, are historically recorded under various broad categories such as "other", "rays", or "batoids", but almost never recorded to species level (Lack and Sant 2009). A lack of appropriate species-specific catch, effort and population information poses a barrier to the conservation and management of these species.

The development of intense deepsea fishing, historically off the Maldives, and recently off southwest India, is also a concern. The deepsea targeted gulper shark (*Centrophorus* spp.) fishery led to a collapse of the gulper shark stock off the Maldives in the early 2000s demonstrating the susceptibility of the group to overfishing. This collapse was due to targeted fishing, after only about 20 years of exploitation. Although time-series data are not available for catches or landings, there are figures for shark liver oil exports. These show a peak in 1982 soon after the fishery commenced, followed by a general downwards trend until 1989, increases in 1990 and 1991, before a complete crash sometime thereafter as available data shows very low export figures for 1996 onward (Kyne and Simpfendorfer 2007, Ali 2015). The fishery has ceased and since 2010 there is no shark fishing in the Maldives. However, given the life-history of *Centrophorus* spp., recovery is expected to be very slow (Simpfendorfer and Kyne 2009). Although time-series data are not available from India, the gulper shark (*Centrophorus* spp.) stock there is suspected to have similarly collapsed as a result of the rapid development of deepsea fishing. A targeted *Centrophorus* liver oil fishery (operating at depths of >300-1,000 m) commenced in 2002 and during the period 2002-2008 there

had been a major increase in landings of deepsea sharks (see Akhilesh *et al.* 2011, 2013b, Akhilesh and Ganga 2013). The fishery slowed after 2009 due to market forces, as well as an apparent decrease in the size of sharks in the fishery (Akhilesh and Ganga 2013). Furthermore, a deepsea shrimp trawl fishery developed rapidly in 1999 (Akhilesh *et al.* 2011a), with trawler numbers peaking in 2000-2001 before dropping significantly, although there are still some 300-400 boats operating in the fishery (Fernandez *et al.* 2015). *Centrophorus* spp. are a major bycatch of this fishery (Akhilesh *et al.* 2011, 2013a, 2013b). This fishery is intense and operates on the Quilon Bank and Wedge Bank areas off southwest India at depths of 200-500 m. The lesson from the Maldives experience (as well as elsewhere such as Australia; Graham *et al.* 2001) is that the extremely biologically unproductive *Centrophorus* spp. are unable to sustain directed or bycatch fishing pressure. Furthermore, many of the small species taken in this fishery are sometimes discarded but survivorship is likely to be low (e.g., Quagga Shark, *Halaelurus quagga*). This shark's small size means that it would be discarded at sea, and survivorship is thought to be low for species being brought up from such depths. Other deepsea species such as the Sicklefin Chimaera (*Neoharriotta pinnata*) also face threats from the rapid expansion of this fishery.

On the other hand, some deepsea species in the region might find refuge in areas where they occur since most deepsea trawl fisheries in the region only exist off western India. For example, the Harlequin Catshark (*Ctenacis fehlmanni*) has only been collected in deepwater surveys (over 200 m depth) off Oman and Somalia and does not currently interact with fisheries. Furthermore, Akhilesh *et al.* (2011) report that the Indian deepsea fisheries have resulted in considerable changes in the species composition of landings compared to those reported during the 1980s and 1990s with many new species recorded such as the Bluntnose Sixgill Shark (*Hexanchus griseus*) and the Velvet Dogfish (*Zameus squamulosus*). Such patterns in changes in composition are also reported from Sri Lanka where a targeted deepsea shark fishery using bottom longlines on the continental slope was developed in the early 1980s (Herath and Maldeniya 2013). As marine fish stocks from nearshore waters off India are heavily exploited, it is likely that fisheries will continue to expand into deeper water with likely incursion into waters outside their EEZ. Many species could be put under fishing pressure in the future if fisheries were to expand further.

Other threats to chondrichthyans in the ASR include habitat degradation and destruction due to coastal development (e.g., the loss of mangrove habitat) leading to decline in habitat quality and environmental change. Overall, marine habitats in the region have experienced high levels of disturbance and are quickly deteriorating due to major impacts from development activities. For example, studies in the Red Sea suggest that coral cover has markedly declined in the last 30 years, mirroring increased coastal construction (Price *et al.* 2014). The occurrence of certain species in coral reef areas make them particularly susceptible to habitat loss. For example, the Sicklefin Lemon Shark (*Negaprion acutidens*), Whitetip Reef Shark (*Triaenodon obesus*), and the Blotched Fantail Ray

(*Taeniurops meyeni*), are often associated with shallow reef habitats throughout multiple life stages, increasing their vulnerability to changes in habitat quality. The Arabian Carpetshark (*Chiloscyllium arabicum*) is also known to have close association with coral reef habitats, which are particularly prone to anthropogenic degradation and the effects of climate change (Carpenter *et al.* 2008, Normile 2016). In the Gulf, this includes changes due to the damming of the Tigris-Euphrates river system in Turkey and the drainage of the Iraqi marshes (Al-Yamani *et al.* 2007), chronic and acute (e.g., war-related) releases of oil, and rapid large-scale coastal development (e.g., megastructures in the UAE). In fact, coastal land reclamation (sea-filling) has accelerated in this area in recent years and, as a result, coral reefs and other habitats have been destroyed. For example, this has resulted in the almost total loss of mangrove areas around Bahrain (Morgan 2006). Throughout the Gulf, major impacts from development activities (including dredging and reclamation), desalination plants, industrial activities, habitat destruction through the removal of shallow productive areas (from dredging and reclamation), and major shipping lanes, have also led to changes in the marine environment landscape (Sheppard *et al.* 2010). Therefore, although little is known about the biology or habitat of many species of inshore shallow water sharks and rays, they are likely to be particularly susceptible to habitat degradation and loss. In fact, their young may use coastal nursery grounds that are easily impacted by habitat degradation through pollution and coastal development. In other parts of the region (e.g., Sri Lanka) historic coral mining and prevalent dynamite fishing has led to a reduction in the extent of suitable habitats (D. Fernando pers. comm. 09/02/2017). Furthermore, pollution can contaminate food sources, concentrating in animals at the top of the food chain and potentially affecting physiology and functioning (UNEP MAP RAC/SPA 2003). For example, one study has reported high levels of polycyclic aromatic hydrocarbons and benzo [a] pyrene in the Arabian Carpetshark from Kuwait (Al-Hassan *et al.* 2000).

Overall, modifications to the natural environment are affecting a variety of species, particularly small coastal sharks and rays, as well as large species that use inshore habitats for breeding and nursery functions. For example, in some areas of the Red Sea (e.g., Yemen, Saudi Arabia, and Sudan), there is a common practice of targeting elasmobranch aggregations at breeding and pupping grounds (including the Silky Shark and the Blacktip Shark (*Carcharhinus limbatus*), leading to concerns for the sustainability of targeted species. Furthermore, one of the known centers of abundance of the Smoothtooth Blacktip Shark (*C. leiodon*), a species endemic to the ASR and only recently rediscovered, is around Kuwait and is subject to habitat degradation and change from water management practices in the Tigris and Euphrates rivers (Moore *et al.* 2013). Other species, such as the Ganges Shark (*Glyphis gangeticus*), are euryhaline (not obligate to freshwater), and largely occupy large tidal rivers, estuaries and coastal areas. This habitat specificity increases their susceptibility to the impacts of human activities, particularly overfishing and habitat modification. In the region, the habitat of the Ganges Shark, in Pakistan and India, faces intense anthropogenic pressure, from river and

coastal fisheries, riparian habitat degradation and pollution (including untreated discharge from industrial and chemical plants), increasing river use, sand mining in rivers, and the construction of dams and barrages which alter flow and affect river productivity. For example, there are four large dams and 22 barrages on the Indus River, with several more proposed (Braulik *et al.* 2015). Barrages have fragmented the river habitat, with fragment size declining steadily as more barrages are built (Braulik *et al.* 2015). The construction of barrages led to the collapse of the commercial Hilsa Shad (*Tenualosa ilisha*) fishery due to the disruption of their migration (Braulik *et al.* 2015) and is likely also impacting the Ganges Shark.

Fisheries activities often exacerbate these impacts on habitats with intensive bottom-trawling reducing the complexity of benthic habitats, affecting the epiflora and epifauna and reducing the availability of suitable habitats for predators and prey (Stevens *et al.* 2005). In the Red Sea and Gulf of Aden, much of the fishing activity occurs in shallow waters in the vicinity of coral reefs and is therefore impacting critical habitats (PERSGA 2010). In addition, the high level of exploitation on the various habitats used by the different life-history stages of many species in the ASR is of concern. Fishing pressure is intense in coastal areas, rivers, and estuaries, including gillnetting and stake netting with juvenile sharks and many ray species being particularly susceptible to entanglement in gillnets. Information is critically needed in order to protect the habitats that are crucial to the life cycle of chondrichthyans in the region. In fact, mating and nursery grounds have not been defined for most species and critical habitats, particularly for offshore, open water, and deepsea species, are virtually unknown. Some reports provide anecdotal information on aggregations of various shark species such as the Scalloped Hammerhead (*Sphyrna lewini*) or Silky Shark in the southern Red Sea. Furthermore, landing site surveys across the region have high numbers of juveniles indicating that there are nursery grounds around the area. While several Marine Protected Areas (MPAs) have been established in the region, with the goal of preserving habitats and protecting species at various life-stages (See section 2.4.3), the scale of these reserves is variable, many of them do not have no-take zones, and restrictions are poorly enforced. These MPAs therefore do not provide high levels of protection for species and further efforts are required to ensure their effectiveness.

2.4 CHONDRICHTHYAN MANAGEMENT IN THE ARABIAN SEAS REGION

International and regional conventions and agreements, as well as national measures, relevant to ASR chondrichthyans are discussed in this section. These highlight the fact that only a small number of shark and ray species are currently protected with some fishing restrictions in place. While there has been progress with chondrichthyan management in the region, these restrictions appear to be insufficient and inadequate to ensure the long-term survival of many species and populations. This is particularly true since the life-history characteristics of most chondrichthyans require a precautionary approach to their management, rather than the application of conventional management models

of teleost fisheries. The following section provides international, regional, and country-specific details of conservation and management measures.

2.4.1 International Measures

In response to the growing concern about overfishing of sharks, many international measures have been developed to ensure sustainable catches, collection of species-specific fisheries data, special protections for threatened species, trade controls, and the conservation of biodiversity. These range from different sets of binding rules and non-binding principles that are relevant to chondrichthyan species on a global, regional, and national level. However, not all are relevant to the current management regime of fisheries in the ASR, and therefore, the following sections provide an overview of the international and regional fisheries and trade instruments that are considered most relevant for chondrichthyan conservation and management in this region. Further information on instruments not covered here, such as the 1982 United Nations Convention on the Law of the Sea (UNCLOS), or the 1995 United Nations Agreement for the Implementation of the Provisions of UNCLOS relating to the Conservation of Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA), have been reviewed in Fischer *et al.* (2012).

The 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

All countries in the ASR are parties to CITES. This convention was established as an intergovernmental agreement to ensure that the international trade in wild animals and plants does not threaten their survival. It is a legal framework to regulate international trade in species listed on the convention, through a system of permits and certificates, and ensure that such trade is legal, sustainable, and traceable. The term 'trade' under CITES refers to all import, export, re-export, import, and introduction from the sea. Key conditions must be met before a permit is granted and are focused on ensuring that the trade of the specimen will not be detrimental to the survival of the species (a non-detriment finding), and that the specimen has been obtained in accordance with the laws of the exporting State (legality finding).

International trade in shark species has been regulated under CITES since 2000 and, currently, all five species of sawfishes (Pristidae) are included in Appendix I (species threatened with extinction, whose international trade is prohibited except in exceptional non-commercial circumstances), and 12 species of sharks and 11 species of rays are included in Appendix II (species that could become threatened with extinction, and whose international trade must be closely controlled to avoid utilization detrimental to the survival of their populations in the wild). Eighteen of these species occur in the ASR consisting of seven shark and 11 ray species (See Table 2).

The 1979 Convention on Migratory Species (CMS) and the 2010 Sharks Memorandum of Understanding (MoU)

Six countries from the ASR are not parties to CMS, namely Bahrain, Kuwait, Qatar, the Maldives, Oman, and Sudan. The CMS aims at con-

Table 2 – Chondrichthyan species listed on CITES, CMS, and/or Sharks MoU, including dates of listing and Appendix number, and their occurrence in the Arabian Seas Region (ASR). ^ refers to the northern hemisphere population (* indicates that in this regional assessment, these two species were assessed as one due to recent taxonomic changes).

Common name	Scientific name	CITES	CMS	Sharks MoU	ASR
SHARKS					
Pelagic Thresher	*Alopias pelagicus*	App II (2016)	II (2014)	2016	Yes
Bigeye Thresher	*Alopias superciliosus*	App II (2016)	II (2014)	2016	Yes
Common Thresher	*Alopias vulpinus*	App II (2016)	II (2014)	2016	No
Great White Shark	*Carcharodon carcharias*	App II (2004)	I and II (2002)	2010	No
Silky Shark	*Carcharhinus falciformis*	App II (2016)	II (2014)	2016	Yes
Oceanic Whitetip Shark	*Carcharhinus longimanus*	App II (2013)	*Not listed*	*Not listed*	Yes
Basking Shark	*Cetorhinus maximus*	App II (2001)	I and II (2005)	2010	No
Shortfin Mako	*Isurus oxyrinchus*	*Not listed*	II (2008)	2010	Yes
Longfin Mako	*Isurus paucus*	*Not listed*	II (2008)	2010	Yes
Porbeagle Shark	*Lamna nasus*	App II (2013)	II (2008)	2010	No
Scalloped Hammerhead	*Sphyrna lewini*	App II (2013)	II (2014)	2016	Yes
Great Hammerhead	*Sphyrna mokarran*	App II (2013)	II (2014)	2016	Yes
Smooth Hammerhead	*Sphyrna zygaena*	App II (2013)	*Not listed*	*Not listed*	Yes
Whale Shark	*Rhincodon typus*	App II (2001)	II (1999)	2010	Yes
Spiny Dogfish	*Squalus acanthias*^	Not listed	II (2008)	2010	No
RAYS					
Narrow Sawfish	*Anoxypristis cuspidata*	App I (2007)	I and II (2014)	2016	Yes
Dwarf Sawfish	*Pristis clavata*	App I (2007)	I and II (2014)	2016	No
Smalltooth Sawfish	*Pristis pectinata*	App I (2007)	I and II (2014)	2016	No
Largetooth Sawfish	*Pristis pristis*	App I (2007)	I and II (2014)	2016	Yes
Green Sawfish	*Pristis zijsron*	App I (2007)	I and II (2014)	2016	Yes
Reef Manta Ray	*Mobula alfredi*	App II (2013)	I and II (2014)	2016	Yes
Giant Manta Ray	*Mobula birostris*	App II (2013)	I and II (2011)	2016	Yes
Longhorned Pygmy Devil Ray	*Mobula eregoodootenkee*	App II (2016)	I and II (2014)	2016	Yes
Atlantic Devil Ray	*Mobula hypostoma*	App II (2016)	I and II (2014)	2016	No
Spinetail Devil Ray	*Mobula japonica* *	App II (2016)	I and II (2014)	2016	Yes
Shortfin Devil Ray	*Mobula kuhlii*	App II (2016)	I and II (2014)	2016	Yes
Giant Devil Ray	*Mobula mobular* *	App II (2016)	I and II (2014)	2016	Yes
Pygmy Devil Ray	*Mobula munkiana*	App II (2016)	I and II (2014)	2016	No
Sicklefin Devil Ray	*Mobula tarapacana*	App II (2016)	I and II (2014)	2016	Yes
Bentfin Devil Ray	*Mobula thurstoni*	App II (2016)	I and II (2014)	2016	Yes
Lesser Guinean Devil Ray	*Mobula rochebrunei*	App II (2016)	I and II (2014)	2016	No

serving species that cross national boundaries and/or inhabit areas beyond national jurisdiction. Parties to the convention are called on to prohibit the harvesting of endangered species, promote cooperation and support research related to migratory species, and endeavor to take immediate protective action for endangered migratory species.

Migratory species at risk of extinction in all or part of their ranges are listed on Appendix I of the CMS and range states should strive to strictly protect these species and, where feasible and appropriate, conserve and restore important habitats of those species, minimize sources of obstacles on migratory routes, control the introduction of exotic species, and prohibit the taking of these species. Migratory species with an unfavorable conservation status, or that would significantly benefit from international cooperation, are listed in Appendix II. For these species, the CMS acts as a framework convention – it does not provide any specific protection to them, but requires that State parties enter into global or regional agreements for their conservation and management. Species can be listed on both Appendices and there are a total of 29 species of chondrichthyans currently listed on these.

In 2010, a non-legally binding Memorandum of Understanding (MoU) on the conservation of migratory sharks was agreed under the CMS and applies to several species (Table 2). The focus of the MoU is to help improve fisheries management and international conservation measures through a cooperative approach with range states, scientists, and relevant organizations. Signatories adopted a conservation plan for these species in 2012. From the ASR, the MoU has six signatories: Egypt, Saudi Arabia, Somalia, Sudan, the UAE, and Yemen.

The 1995 FAO Code of Conduct for Responsible Fisheries (CCRF) and the 1999 International Plan of Action for the Conservation and Management of Sharks (IPOA – Sharks)

The CCRF is voluntary and it sets out principles and international standards of behavior for responsible fishing and fishing activities. Its goals are, to promote the conservation, management, and development of all fisheries, and to provide guidance in the formulation and implementation of further instruments in support of the objectives of the CCRF. Several provisions of the CCRF refer to the need to develop or use selective and environmentally safe fishing gear and to minimize waste, catch of non-target species (both fish and non-fish species), and impacts on associated or dependent species. In addition, measures are to be taken to conserve biodiversity, to protect endangered species, and to allow depleted stocks to recover, or even to be actively restored. Areas of utmost importance to conservation, such as nurseries and spawning areas, should be protected and rehabilitated.

The IPOA was adopted in 1999 as an instrument within the framework of the CCRF and all shark fishing states are encouraged to implement it voluntarily. Its goal is to ensure the conservation and management of sharks, skates, rays, and chimaeras, and their long-term sustainable use. A National Plan of Action (NPOA) should be developed and implemented after identifying research, monitoring, and management needs, for all chondrichthyans occurring in the waters

of a particular State. The IPOA Sharks also encourages States to cooperate through Regional Fisheries Management Organizations (RFMOs) and to ensure the effective management of transboundary stocks.

2.4.2 Regional Measures

Numerous Regional Fisheries Bodies (RFBs) have been established worldwide and have adopted measures relevant to the conservation and management of sharks. RFBs are established by international agreements or treaties and are either independent or function under the umbrella of the FAO. All promote long-term sustainable fisheries at regional and national levels, and are most important where international cooperation is required for species conservation and the management of shared fish populations. Their functions may include the collection, analysis and dissemination of information, coordinating fisheries management through joint schemes and mechanisms, serving as a technical and policy forum, providing a forum for capacity-building, and making decisions relating to the conservation, management, development and responsible use of the resources. Some of these RFBs, the RFMOs, adopt measures that are binding on their members and play an important role in facilitating international fisheries management by governing fishing operations on the high seas for the most valuable teleost species such as tuna, billfishes, cods, and flatfishes. Countries are expected to ensure measures are implemented in their waters and on their vessels. Within the ASR, most RFBs have not developed actions with regards to chondrichthyan fisheries. The following section provides an overview of the most important and/or active RFBs in which countries from the region are involved.

Indian Ocean Tuna Commission (IOTC)

IOTC parties from the ASR include: Eritrea, India, Iran, Maldives, Oman, Pakistan, Somalia, Sri Lanka, Sudan, and Yemen. The IOTC Agreement covers tuna and tuna-like species. In addition, the Commission's Secretariat collates data on non-target, associated and dependent species affected by tuna fishing operations, i.e., marine turtles, marine mammals, seabirds, sharks, and fish species caught incidentally (bycatch). The IOTC Working Party on Ecosystem and By-catch (WPEB) provides scientific advice on the management of bycatch species including sharks. Measures for the conservation and management of sharks have been in force since 2005. These currently include annual reporting requirements for shark catches, finning limited to 5 % of retained fins/carcass ratio (Resolution 05-05), recording shark and ray catches in logbooks, and encouraging the live release of unwanted bycatch. The binding Resolution 12-09 prohibits the retention of Thresher Sharks (other than for scientific research endorsed by the WPEB); Resolution 13-05 prohibits intentionally setting purse seines on Whale Sharks, mandating the live release of accidental catches and setting reporting requirements; and, Resolution 13-06 prohibits the retention of the Oceanic Whitetip Shark (other than for scientific research endorsed by the WPEB). Silky Sharks benefit from reduced bycatch under Resolution 15-08 on a Fish Aggregating Device (FAD) management plan, including the development of improved FAD designs to reduce the incidence of entanglement of non-target species. Parties

are also encouraged to undertake research into more selective fishing gear and identify shark nursery areas (Resolution 13-06).

Regional Commission for Fisheries (RECOFI)

Members of RECOFI are: Bahrain, Iraq, Iran, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE. Established in 2001, RECOFI's purpose is to promote the development, conservation, rational management and best utilization of all living marine resources in the Gulf. While no measures have been adopted for the conservation and management of sharks, its decisions are binding on its members. Recent meetings of the RECOFI Working Group on Fisheries Management have noted the relevance of the mandate of CITES in fisheries management with reference to sharks.

Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA)

PERSGA's member states are: Djibouti, Egypt, Jordan, Saudi Arabia, Somalia, Sudan, and Yemen. PERSGA is an advisory RFB and has the roles of the coordinating body for the Red Sea regional seas program, and the regional fisheries advisory body. It has benefited from a Strategic Action Program that has produced one of the strongest regional capacity building, training, and technical assistance programs for shark and ray fisheries in the broader Indian Ocean region. PERSGA has undertaken baseline landing site surveys as the basis for a regional shark assessment program. It is the first body in the region to have undertaken a consultancy program on sharks and rays in the Red Sea (Bonfil 2003). However, since the completion of these surveys, progress has been very slow in the Red Sea and Gulf of Aden in terms of research and developing conservation measures for chondrichthyans.

The Regional Organization for the Protection of the Marine Environment (ROPME)

Member states to ROPME are: Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE. Established in 1979, ROPME aims to coordinate efforts of its member states towards the protection of the marine and coastal environment and ecosystems in the Gulf, and abating the pollution caused by development activities and/or other drivers of change. Its Kuwait Convention and Action Plan, as part of the United Nations Regional Seas Program, covers activities relating to oil pollution, industrial wastes, sewage, and marine resources, including fisheries, environmental awareness, and capacity building. Recognizing the overlap in geographical area with RECOFI, measures are currently underway to strengthen cooperation between these two entities by formalizing a partnership to undertake joint activities in fisheries management.

2.4.3 National Measures

Chondrichthyan fisheries management in the ASR region is largely underdeveloped and inconsistent across countries. The large number of countries bordering these waters, and the stark difference in their governance capacity, is confounded by gaps in knowledge and scientific information to inform management decisions. Overall, fisheries management has focused on basic input and output controls across the re-

gion. Input controls aim to reduce or contain effective fishing effort through limits on the number of fishing units (i.e., licensing and entry controls), the number and types of gear (e.g., prohibition of dynamite, poison fishing, minimum mesh sizes), and areal/temporal closures; while output controls are used to restrict total catch with pre-determined limits, and focus on establishing catch quotas, setting size limits on catches (minimum legal lengths), and the release of spawning females.

This section summarizes actions and measures for the conservation and management of sharks adopted by countries in the ASR. However, details of fisheries regulations, and/or input/output controls are not provided here unless they are directly relevant, or might indirectly benefit, sharks and rays. Finally, it is important to note that although these measures for chondrichthyans exist, effective enforcement is a challenge and an ongoing issue for most, if not all, countries.

2.4.3.1 Bahrain

In 2012, Bahrain prohibited the targeted fishing of the Green Sawfish *(Pristis zijsron)*, in its territorial waters. All fishermen need to release any specimens caught and report incidental catches. In 1998, fish trawling by industrial steel-hulled vessels was banned in Bahraini waters. Currently, artisanal vessels equipped with hydraulic winches carry out all shrimp fishing. A ministerial decree is issued yearly to close the shrimp season for five months (usually from March to July). Bahrain has declared five MPAs, namely the Hawar Islands, Tubli Bay, Mashtan Island, Dohat Arad, and Hayr and Fasht Bulthama. Specifications on fishing within these MPAs have only been elaborated for the Hawar Islands, where only the use of traditional gear such as intertidal fixed stake nets (Hadrah), fish traps/cages (Gargour), and trolling is allowed; and Hayr and Fasht Bulthama, where trawling and the use of nets has been banned.

2.4.3.2 Djibouti

Djibouti has yet to develop any plans or implement measures for the conservation and management of sharks. Two MPAs have been declared: Musha (1972) and Maskali Islands (1980) where only artisanal fishing with traditional gear is allowed.

2.4.3.3 Egypt

In 2004, Egypt prohibited the displaying, fishing, moving, and trading of sharks. This legislation was updated in 2005 to include the sale of sharks. In 2006, all sharks within the Red Sea territorial waters of Egypt (12 nautical miles from shore) were protected. Within the Red Sea, seven MPAs have been established since the 1980s and include the Abu Gallum Protected Area (PA), Elba PA, Nabq PA, Ras Mohammed National Park, Red Sea Islands Development Resources PA, Taba Natural Monument, and Wadi El-Gemal – Hamata National Park. Most of the PA's are zoned with no-take areas prohibiting all fishing as well as areas where local communities are allowed to fish using traditional methods including trammel, gillnets, and hook and line by using non-mechanized vessels.

In 2009, an additional decree was issued prohibiting the selling, fishing, or trading in live or dead whole or parts of sharks, in all Egyptian

waters. Additional fisheries legislations that might benefit sharks include a ban on the issuance of new trawling licenses in 1992, the prohibition of fishing around reefs, as well as a yearly seasonal trawl ban in the Gulf of Suez from June 1st to September 30th implemented since 1980.

2.4.3.4 Eritrea

Eritrea has yet to develop any plans or implement measures for the conservation and management of sharks. Since 1998, to protect coastal areas, trawling is limited to areas deeper than 30 m.

2.4.3.5 India

In 2001, under Schedule 1 of the Wildlife (Protection) Act of 1972, India banned the exploitation and trade of 10 species of sharks and rays: the Narrow Sawfish (*Anoxypristis cuspidata*), Largetooth Sawfish (*Pristis microdon* (*P. pristis*)), Green Sawfish (*P. zijsron*), Whale Shark (*Rhincodon typus*), Pondicherry Shark (*Carcharhinus hemiodon*), Ganges River Shark (*Glyphis gangeticus*), Speartooth Shark (*G. glyphis*), Ganges Stingray (*Himantura fluviatilis* = *P. sephen*), Porcupine Ray (*Urogymnus asperrimus*) and the Giant Guitarfish (*Rhynchobatus djiddensis*). In 2013, a policy advisory on shark finning was approved, prohibiting the removal of shark fins at sea and imposing that all sharks are landed whole. In 2015, the export and import of shark fins of all species was banned. Furthermore, in 2015, a 'Guidance on a National Plan for Sharks in India' was published with the aim of providing an overview of the current status of India's fishery, assessing the effectiveness of current management measures, identifying knowledge gaps, and suggesting an action plan for a shark NPOA. In addition to these measures, India has regulated fishing practices in eight MPAs designated along the west coast. Overall, fisheries in territorial waters are managed by coastal states through their Marine Fisheries Regulation Acts which generally restricts mechanized fishing in nearshore waters. Furthermore, a seasonal ban on mechanized fishing is in effect during the monsoon season on the west coast of India in June - July each year. In coastal states like Maharashtra, the closed fishing season often extends to mid-August due to religious beliefs (festival of *Narial Poornima* celebrating the end of the monsoon season and the beginning of the fishing season).

2.4.3.6 Islamic Republic of Iran

Iran banned the fishing of sharks in 2005 (T. Valinassab pers. comm. 03/07/2017). Since 1993, fish bottom trawlers are prohibited from operating in the Gulf and can only operate in the Sea of Oman for approximately four months per year. Also, shrimp trawling is open in each province (Boushehr, Hormozgan and Khozistan) for only 45 days each year. Once the CPUE falls below a certain level, the shrimp fishing season is closed. Many coastal habitats have been preserved through the designation of over 16 MPAs covering 15,617 km^2 of coastline in the Khuzestan (3,289 km^2), Bushehr (1,507 km^2), Hormozgan (6,170 km^2), and Sistan and Balochistan (4,651 km^2) provinces including the Hara Mangrove Forest PA and the Nayband Bay National Park (Karimi *et al.* 2010, Owfi and Danehkar 2014).

2.4.3.7 Israel

All sharks and rays are protected in Israel, and the finning of sharks has been banned since 1980. In 2016, a Plan of Action for the Protec-

tion of Sharks and Rays in the Israeli Mediterranean was produced but does not include any information or actions relevant to Israeli Red Sea fisheries (Ariel and Barash 2015).

2.4.3.8 Iraq

Iraq has yet to develop any plans or implement measures for the conservation and management of sharks.

2.4.3.9 Jordan

Jordan has yet to develop any plans or implement measures for the conservation and management of sharks.

2.4.3.10 Kuwait

In 2008, Kuwait banned the targeted fishing for all rays and sharks with the exception of the Grey Sharpnose Shark (*Rhizoprionodon oligolinx*) and the Graceful Shark (*Carcharhinus amblyrhynchoides*). This prohibition includes the display and sale of any species at markets or landing sites across the country. All animals accidentally captured need to be released back alive and the authorities notified. Additionally, since 1980, the shrimp fishery runs from September 1st of any given year to February or March of the next depending on catch rates. Kuwait Bay and a three-mile coastal zone have been closed to trawling since 1983.

2.4.3.11 Maldives

In 1981, the Maldives banned all shark fishing during daytime in tuna fishing areas. This measure was strengthened by prohibiting shark fishing with bait by tuna fishing vessels around schooling tuna. In 1995, the Whale Shark was declared a protected species in Maldivian waters. The same year, the export of rays was banned followed by a ban on the export of ray skins in 1996. Furthermore, in 1996, longlining for sharks was banned around seamounts considered important for tuna fisheries. During the same time, to support the diving and tourism industry, nine shark watching areas were included in the first network of 15 MPAs. In 1998, a ten-year moratorium on shark fishing was announced within 12 nautical miles in seven atolls important for tourism. In 2009, a ban on the fishery of reef sharks was imposed, followed by a complete ban on shark fishing within the Maldivian EEZ in 2010. Furthermore, this ban specified that all shark bycatch needed to be landed with fins attached and reported to a fisheries enforcement officer. In 2014, a ban on fishing, extracting, capturing, and harming of all species of rays and skates in Maldivian waters was declared. In April 2015, after extensive consultations with stakeholders, the Maldives endorsed its first NPOA Sharks to ensure the long-term sustainability of its shark stocks.

2.4.3.12 Oman

In 1994, Oman banned the discard of fish and therefore all sharks must be landed, transported, or sold whole. The handling, marketing, or exporting of any shark parts without a license from the competent authority is prohibited. Oman has indicated that it is currently working on an NPOA for chondrichthyan fishes that it intends to adopt in the near future. Industrial trawling in Omani waters was phased out in 2011 which might benefit sharks and rays. Furthermore, several MPAs have been declared where only traditional fishing is allowed including the Daymaniyat Islands National Nature Reserve.

2.4.3.13 Pakistan

The two maritime provinces of Pakistan issued amendments to their laws in 2016 restricting or banning the catch of some species of sharks and rays. The Sindh Fisheries Ordinance 1980 and the Balochistan Sea Fisheries Rules 1971 were amended in May and September 2016, respectively. These legislations were strengthened to ban the catch, retention, marketing, sale, and trade of some threatened, protected, and endangered species. This includes year-round protection for the Whale Shark, Silky Shark, Oceanic Whitetip Shark, thresher sharks, hammerhead sharks, mobulid rays and sawfishes. Any guitarfishes and wedgefishes under 30 cm total length (TL) are also regulated throughout the year in Sindh whereas their catch is prohibited in Balochistan throughout the year. The shrimp fishery (i.e., trawling) is closed each year between June and July which might benefit shark and ray species. Since 2016, there is also a ban on all commercial fishing in Balochistan during June and July with an additional seasonal closure of the tuna gillnetting fishery from May 15th to July 30th each year. There is also a year-round ban on trawl net and set bag net fisheries in the estuary region of the country. Finally, in 2017, the first MPA (Astola Island in Balochistan) was declared as a no-take zone for all sharks and rays.

2.4.3.14 Qatar

Qatar banned the fishing of sawfish (Pristidae) in 2010. The commercial shrimp fishery was closed in 1983, essentially banning industrial trawling in Qatari waters. Overall, three MPAs have been declared including the Khor Al-Odaid Protected Area (1993) where commercial fishing is prohibited.

2.4.3.15 Somalia

Somalia has yet to develop any plans or implement measures for the conservation and management of sharks. Since 2012, Somaliland ceased licensing foreign fishing vessels. With the new Somali Fisheries Law passed in 2014, all bottom trawling was banned in territorial waters for all vessels.

2.4.3.16 Sri Lanka

In 2001, Sri Lanka banned the finning of sharks and all specimens captured must be landed with fins attached to the body. In 2012, in accordance with IOTC Resolution 12.09, the catching, landing and selling of thresher sharks was prohibited in Sri Lankan waters. In October 2016, the Whale Shark and Oceanic Whitetip Shark were also protected. After multiple stakeholder consultation workshops across the country, in 2014, an NPOA was published with a focus on actions that can ensure the enforcement of current regulations, the improvement of data collection and reporting requirements, and the development of research programs. Additional measures that might benefit some species of chondrichthyans include the six small MPAs that have been declared, namely Hikkaduwa National Park (2002), Pigeon Island National Park (2003), Bar Reef Marine Sanctuary (1992), Rummasalla Marine Sanctuary (2003), Great and Little Bassess Fishery Managed Area (FMA) (2001), and Polhena FMA (2001) (Perera and de Vos 2007). These MPAs were declared to conserve coral reef habitats and the marine diversity they encompass. Commercial fishing is prohibited within these areas although Bar Reef Marine Sanctuary allows artisanal fishermen to fish within its boundaries, and Great and Little Basses FMA

which allows fishing with permits. Furthermore, to regulate the impact of fishing on fisheries resources, in 2006, monofilament nets were prohibited and since 2015, all mangrove areas in the country are protected.

2.4.3.17 The Kingdom of Saudi Arabia

Saudi Arabia banned the fishing of sharks across its waters (Red Sea and Gulf) in 2008 and requires fishermen to release all animals alive when caught. A seasonal ban on shrimp trawling is in place both in the Red Sea and the Gulf. This season varies yearly, and depending on the water body, but usually lasts from March/April to the end of July. While two MPAs have been designated in the Red Sea (Um Al-Qamari Island (1977) and the Farasan Islands (1996)), and one in the Gulf, (Jubail Marine Wildlife Sanctuary (1992)), no-take zones have not been declared.

2.4.3.18 The Sudan

Sudan banned the fishing of sharks in 2008 along with the possession of any shark products. In March 2017, this law was strengthened and fishing, along with any form of trade, transport, sale, and possession of sharks or their products, was prohibited. Various species of sharks (i.e., Scalloped Hammerheads) and manta rays are known to occur in large aggregations around the MPAs of Sudan. The Sanganeb Atoll Marine National Park was declared in 1990 and fishing is prohibited (no-take zone) throughout the park. The Dungonab Bay - Mukkawar Island Marine National Park declared in 2005 includes zones where fishing is restricted. In both MPAs, commercial fishing and trawling is banned and fishing can only be carried out for subsistence using traditional gears and methods.

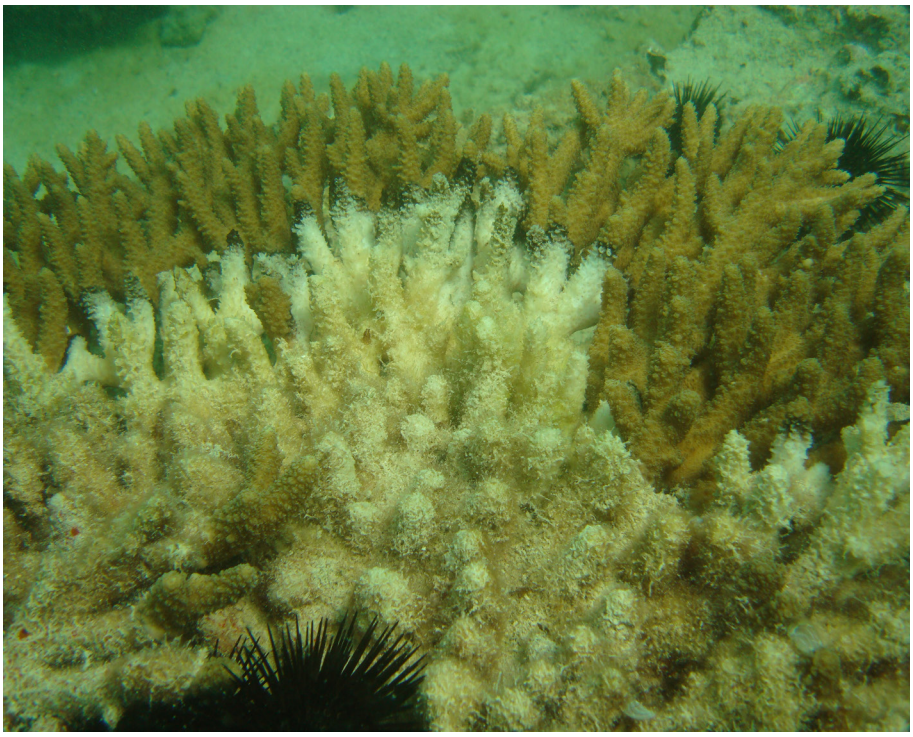
2.4.3.19 UAE

In 1999, the UAE indirectly banned the practice of finning by prohibiting all discards of fish. Since 2008, a series of decrees have been issued about shark fisheries and trade. The latest decree (in 2014) prohibits the take of all shark species listed on any CITES appendix (e.g., Whale Shark, sawfishes, and hammerheads). An annual ban on shark catches (between February 1st and June 30th) is intended to protect sharks during the breeding and pupping season. All exports and re-exports of shark fins were also banned. In 2016, a new law was passed banning all shark fishing (catching and retaining) for recreational purposes. Furthermore, an NPOA was prepared in 2016 and is currently being finalized after extensive stakeholders consultations. Additionally, since 1980 all trawling for shrimps was banned in territorial waters. The UAE has also declared several MPAs including the Marawah Biosphere Reserve and Al Yasat where fishing is limited to the use of traditional gear and the Sir Bu Nair MPA where all fishing is prohibited within two miles of the coastline.

2.4.3.20 Yemen

Yemen has yet to develop any plans or implement measures for the conservation and management of sharks. The country banned the dumping of damaged and undesirable fish at sea in 1991 and therefore indirectly banned the practice of finning. In 2007, it imposed a 5 % fin-to-dressed weight ratio limit to enforce it. A 6-mile coastal zone is reserved for artisanal fisheries and might benefit coastal species of sharks and rays.

Utilization patterns of sharks and rays vary across the region. Most small-bodied sharks (<150 cm TL) are often sold at local markets in fresh or dried form (opposite page). Fins of all shark species are dried and processed for export including those of deepsea shark species in India (lower left picture on opposite page © Akhilesh K.V.). Most remains are processed as fishmeal or used as fertilizers (lower right on opposite page). Jaws of large sharks are often retained for the curio trade (above). © Rima W. Jabado



Modifications to the natural environment are affecting a variety of species, particularly small coastal sharks and rays, as well as large species that use inshore habitats for breeding and nursery functions. Critical habitats such as mangroves, coral reefs, and seagrass beds, are increasing affected by anthropogenic activities in the region, particularly those caused by large-scale coastal development activities (i.e., reclamation and dredging) and desalination plants. This habitat loss and degradation has led to changes in the marine environment landscape and is believed to pose a significant threat to many species.
© Maitha M. Al Hameli (above left) and Rima W. Jabado (lower left)

Rays are a major component of bycatch across the region. In many countries bordering the Red Sea and the Gulf, these species are often discarded by fishermen due to their low value meat. There is currently no information on post-release survivorship and the impact on species. However, in India and Pakistan, rays are fully utilized and are marketed either fresh (above), or salted and dried for local consumption or export. (right) Their skins are also often dried and exported. © Rima W. Jabado

METHODS

Broad Cowtail Ray -- ***Pastinachus ater*** © Philippe Lecomte

3. METHODS

3.1 RED LISTING PROCESS: WORKSHOP AND DATA COLLATION

The regional IUCN Red List assessments in this report were carried out by 22 experts during a 5-day workshop from February 5th to 9th, 2017 hosted by the Environment Agency - Abu Dhabi (EAD), UAE. IUCN SSG members and regional fisheries experts having worked in Bahrain, Djibouti, Egypt, Eritrea, India, Iran, Kuwait, the Maldives, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sri Lanka, Sudan, Yemen, and the UAE participated in the meeting (see **Annex I** for list of participants and observers). The primary sources of data included published peer-reviewed papers, government reports and other grey literature, unpublished fisheries data accessible to the participants from their respective countries, as well as anecdotal information and personal observations. Additional analyses of the data on each of the species were undertaken between February and July 2017 while completing the assessments and compiling this report by the report editors.

The first part of the workshop comprised an introduction to and/or review of the Red List process and the regional guidelines, an overview of the list of species to be evaluated and their global status, and how to use the IUCN Species Information System (SIS). The remainder of the workshop was taken up by small working groups guided by lead assessors which focused on discussing and sharing data while undertaking species assessments. Participants were assigned species to assess based on their knowledge of species and field expertise. However, working groups were kept highly dynamic so that each participant could contribute data to species assessments undertaken by other working groups. The whole group reconvened at regular intervals for discussion sessions and to reach consensus on completed assessments. Working groups focused on consolidating data on ***Population*** information and ***Threats*** to species since much of the research on existing ***Conservation Actions*** and ***Use and Trade*** for each species was carried out in advance of the workshop. This enabled the aims of the workshop to be achieved during the short time period available.

3.2 APPLICATION OF THE IUCN RED LIST CATEGORIES AND CRITERIA

All species were assessed using the IUCN Red List Categories and Criteria (version 3.1) (IUCN 2016) and Guidelines for Application of IUCN Red List Criteria at Regional and National Levels (version 4.0) (IUCN 2012). Initially, species were systematically evaluated against each criterion A-E. This allowed a preliminary category for each species to be assigned. Finally, the effect of populations of the same taxon in neighboring regions on the regional population was considered, and the preliminary category was up- or down-listed if appropriate. Thus, the final categorization reflects the extinction risk for the taxon within the ASR, having considered potential influences of populations from outside.

All assessments were undertaken at the species level. An important consideration, however, is that some species may have multiple, distinct

stocks in the ASR, and these stocks can be subject to different levels of exploitation. These subpopulations, which are geographically or otherwise distinct groups in the population between which there is little demographic or genetic exchange (IUCN 2016), have not been defined in the ASR since there are limited data on the population structure of most species. Accordingly, these stocks may have different statuses. Many marine species have a markedly disjunct distribution, where there is clearly no possible opportunity for exchange between subpopulations. There may also be no evidence for interchange among well studied subpopulations, which breed on different sides of an ocean basin, even though the species carries out extensive migrations. Finally, many species do not migrate at all, but remain close to their place of birth throughout their life cycle. In these conditions, there is minimal interchange between stocks, even when there is apparently little spatial separation.

The IUCN guidelines recommend assessors should adopt a precautionary, yet realistic approach when applying criteria, but that all reasoning should be explicitly documented (IUCN 2016). For instance, when a population decline is known to have occurred (e.g., as a result of fishing pressure) but no management has been applied to change the pressures on the population, it can be expected that the decline will likely continue in the future. If fisheries are known to be underway, but no information is available on changes in CPUE, data from similar fisheries elsewhere may be used by informed specialists to extrapolate likely population trends. Furthermore, where no life-history data are available, the demographics of a very closely related species may be applied to estimate biological parameters (Fowler and Cavanagh 2005). For example, generation length, the median age of parents of the current cohort (i.e., newborn individuals in the population), which is calculated based on female age at maturity and maximum age (IUCN 2016) is often estimated due to a lack of data. If age data are not available for a particular species, data was used for a similar species (generally from the same genus or family, and of similar size).

The application of the Red List criteria was undertaken with some discretion by the SSG, however, the reasoning is detailed in the individual rationales provided in this report, and group consensus was reached in each case. This was sometimes because of concerns about the way in which the population decline Criterion A can still sometimes over-estimate biological extinction risk, particularly for many of the more common and wide-ranging chondrichthyans. Some species that would have qualified for a threatened species assessment if the recommended precautionary approach had been strictly applied were not, therefore, listed in such a high category of risk by the SSG. This approach was taken when there was doubt whether the estimated population decline was actually operating at a regional/global level, or when, despite a well documented decline, knowledge of fisheries population dynamics demonstrated that risk of biological extinction was negligible, if not virtually non-existent in the foreseeable future. On the other hand, many of the assessments have highlighted concern for species caught as bycatch. Continued research

on the bycatch of elasmobranchs in non-target fisheries is important to provide accurate estimates of the impacts of all fisheries on stocks, including levels of post-release mortality. In a mixed-species fishery where all species are subjected to the same fishing mortality rate, less-abundant species could be driven to extinction while numerically dominant, more resilient species still continue to support the fishery (Musick 1999). A species is particularly likely to be threatened where taken as bycatch in fisheries which are not economically reliant on it, and when the entire population is exposed to exploitation at some stage in the life cycle.

Most species were assessed under Criterion A, which is based on the rate of decline over the longer timeframe of three generation lengths (the average age of the current cohort of reproducing individuals) or ten years (whichever is longer). This is primarily because the main source of data for chondrichthyans in the region is derived from catch rates (including landings data) and fisheries-dependent surveys. No species were assessed under criteria D or E, as sufficient data to support the presence of a very small or restricted population, and for a fully quantitative assessment, were not available for any of the species in the ASR. All species data were entered and stored in SIS during the workshop.

Results are presented by first summarizing the proportion of species in each of the IUCN Red List Categories. Additionally, due to the uncertainty over the degree of threat to DD species, estimates of the proportion of chondrichthyan species threatened as a whole in the ASR are reported using lower bound, mid-point, and upper bound estimates (IUCN 2011). These values are calculated as follows:

- **Lower bound:** percentage of threatened species among all species assessed, including EX and EW, i.e., number of threatened species divided by the total number of species assessed [(CR+EN+VU) / Assessed]. This corresponds to the assumption that none of the DD species are threatened.

- **Mid-point:** percentage of threatened species among those for which threat status could be determined, i.e., number of threatened species divided by the number of DD species [(CR+EN+VU) / (Assessed - DD)]. This corresponds to the assumption that DD species have the same fraction of threatened species as data sufficient species. This represents a best estimate, and demonstrates that the true value lies somewhere between the upper and lower bound.

- **Upper bound:** percentage of threatened or DD species among those assessed, i.e., number of threatened species plus DD species, divided by the total number of species assessed [(CR+EN+VU+DD) / Assessed]. This corresponds to the assumption that all of the DD species are threatened.

Furthermore, the proportion of "species of elevated conservation concern", defined as (EW+CR+EN+VU+NT) / (assessed – DD), is also reported.

3.3 TAXONOMIC SCOPE

The nomenclature and authorities used for

chondrichthyans in this report follow those of the online electronic version of the ***Catalog of Fishes*** (Eschemeyer *et al.* 2017) for sharks, and ***Rays of the World*** (Last *et al.* 2016) for rays. Common names are based on those presented in Jabado and Ebert (2015) for sharks and Last *et al.* (2016) for rays, with the exception of some species where the most commonly used regional name is used (e.g., *Rhina ancylostoma* where the common name used is Bowmouth Guitarfish instead of Shark Ray).

Over 180 species of chondrichthyans have been reported in the literature for the region and each of these were reviewed and decisions on whether to include them in the current RLA were made. Those assessed at this workshop include species known to occur in the ASR and believed to have resident, breeding populations. Species not assessed and listed as Not Applicable were those only found at the margins of the study area, those for which the validity was uncertain, those with questionable occurrences in the ASR, and species for which no holotype exists or has been lost. A list of species (n=31; 17 shark and 14 ray species) considered not eligible for assessment at the regional level is provided in Table 3. On the other hand, several species assessed at this workshop still have unresolved taxonomic issues. Where relevant, this has been noted in the individual assessments. For example, a recent taxonomic assessment of the Bramble Shark (*Echinorhinus brucus*) from Omani waters supports the presence of a potentially undescribed species in the ASR (Henderson *et al.* 2016). However, until these issues are resolved, the population of this species was assessed as currently known. Furthermore, the Spinetail Devil Ray, *Mobula japonica*, was treated as the Giant Devil Ray, *M. mobular*, as these two forms are now considered conspecifics with *M. mobular* being the valid name (Last *et al.* 2016). Other devil rays, including *M. kuhlii* and *M. eregoodootenkee*, were treated as separate species but it is important to note that ***Rays of the World*** treats them as one species. Finally, Last *et al.* (2016) proposed that the genus *Manta* is nested within the genus *Mobula*. White *et al.* (2017) resolved this and during the review process, the genus *Manta* was amended to *Mobula* for the Giant Manta Ray (*Mobula birostris*) and the Reef Manta Ray (*M. alfredi*).

3.4 SPECIES MAPPING

Generalized distribution maps were generated for each species, based on known and inferred occurrences. For visualization on the IUCN Red List website, the distribution maps were based on specific habitat characteristics. Coastal species maps are generated using a standardized polygon that is either the 200 m bathyline or 100 km from the shoreline, whichever is further from the coast, while those for oceanic species are digitized by hand using depth and habitat preferences as a broad guide. The initial maps were reviewed during the assessment workshop and vetted by taxonomic and regional experts. This was done using regional and global guides (i.e., Adams *et al.* 1998, Almojil *et al.* 2015, Anderson and Ahmed 1993, Bianchi 1985, Bonfil and Abdallah 2004, Compagno 2001, De Silva 2015, Ebert 2013, 2014, Ebert *et al.* 2013, Jabado and Ebert 2015, Last and Stevens 2009, Last *et al.* 2016, Raje *et al.* 2007), species-specific

records in the literature (including unpublished fisheries and scientific reports), and records from experts at the workshop. In many cases, records of a particular species could be verified at the workshop through examination of photographs. Further refinements occurred during the post-workshop review process to ensure the most reliable information could be incorporated into the final assessment.

The maps generated for species endemic to the ASR were submitted with the global assessments for publication on the Red List website. Non-endemic species maps were restricted to the Western Indian Ocean region. These maps will be retained in the database of marine species maps hosted by the IUCN Marine Biodiversity Unit for use in future global assessments.

Maps included in the ***Species Accounts*** section of this report were created based on the information collected at the workshop and sometimes include areas where the presence of a species might be uncertain. In such cases, a question mark has been added onto the map.

3.5 REVIEW AND CONSENSUS PROCESS

The SSG has been appointed by the IUCN SSC as the Red List Authority for chondrichthyan assessments. It considers full and open consultation with its membership, through workshops and correspondence, to be essential for the preparation of accurate and robust Red List assessments (Fowler 1996).

During the workshop, an open consensus process was undertaken to ensure participants had no issues with the status assigned to each species. Following the workshop, assessments were edited and all documentation underwent significant review. All outstanding questions and edits were resolved and finalized following email correspondence with workshop participants and relevant experts to ensure thorough and transparent review. Each assessment was peer-reviewed by at least two experts prior to finalization. Furthermore, consistency in the use of IUCN criteria was checked by IUCN SSG staff and members. This process of consultation with all members has led to a consensus agreement being reached on each Red List assessment published here.

The resulting finalized assessments are supported by relevant literature and other data sources. It is important to note that since the extinction risk of a species can be assessed at global, regional, or national levels, a species may have a different Red List Category in the global Red List than in the regional Red List. For instance, a species that is common worldwide and classed as Least Concern globally might be Endangered within a certain region where population numbers are very small or declining. Conversely, taxa classified as Vulnerable on the basis of their global declines in numbers or range might be Least Concern within a particular region where their populations is stable.

The IUCN Red List is currently updated twice a year. Readers are therefore urged to always consult the current IUCN Red List to check if species of interest have recently been updated. The 30 assessments of endemic species produced at this workshop are *de facto* global assessments, and after being peer-reviewed by

at least two reviewers, were submitted to the IUCN Red List Unit for a final consistency check and inclusion in the 2017.2 IUCN Red List global update. All assessments should be periodically revisited and updated as new information becomes available. It is recommended that a complete reassessment of this regional Red List be undertaken in 2027.

4.6 SPECIES ACCOUNTS

In this report, species accounts are provided for the 153 species of described chondrichthyans assessed during the ASR workshop. Although some taxonomic work is ongoing with new species to be described from the region, undescribed species (i.e., those not yet formally described by science) are not included. The species accounts are in two sections: sharks, and, rays and chimaeras. Within each of these groups, accounts are provided in alphabetical order starting with the order, family, genus, and species. Each account provides the following:

1. Species common and scientific names as well as the taxonomic authority;

2. Global Red List assessment for that species (Category and Criteria), including the year of the assessment (note that the year of assessment might differ from the date it was published on the Red List website) along with the assessor name(s);

3. The regional Red List assessment for that species along with the assessor name(s);

4. A map of the species' regional distribution;

5. The rationale for the species' assessment which acts as a stand-alone summary of the species' Red List assessment. Citations and references are not provided in chondrichthyan Red List assessment rationales, but a full reference list for literature used in the preparation of assessments is provided at the end of this report.

All sources of information used by the assessors are included in this report for reference purposes, even if not cited in the text. In addition to this report, a supplementary volume, with full species accounts, will be published on the SSG website: www.iucnssg.org. The supplementary volume will include details of distribution, population information and overall trends, ecology and habitat preferences (including pertinent biological information such as size and age at maturity, generation length, maximum size and age, etc.). Where relevant, a note may be provided regarding the taxonomic status of the species in the supplementary volume of the report. These generally relate to the uncertainty over the species' validity or where taxonomic resolution is required within a species-complex. These details have been stored in SIS but have not been included in this report.

As much standardization as possible in the short time available was undertaken when compiling this publication. However, many assessors and reviewers were involved in writing these assessments, thus inevitable inconsistencies in writing style and content will be apparent. These assessments form a baseline for future work in the region, some of which is urgent.

Table 3 – Chondrichthyan species excluded from this regional assessment (Not Evaluated) with the rationale for exclusion

Order	Family	Scientific name	Common name	Rationale for exclusion	Notes
SHARKS					
Carcharhiniformes	Carcharhinidae	*Carcharhinus galapagensis*	Galapagos Shark	Record needs confirmation	Reported from one record of a neonate from Muscat, Oman (Henderson *et al.* 2004)
		Carcharhinus obscurus	Dusky Shark	Probably vagrant	Only a few records (Ebert *et al.* 2013)
	Scyliorhinidae	*Bythaelurus lutarius*	Mud Catshark	Previous records are misidentifications	This species has now been described as *B. tenuicephalus* and occurs from Mozambique to Somali waters (Kaschner *et al.* 2015)
		Cephaloscyllium sufflans	Balloon Shark	Record likely erroneous	Records from the Gulf of Aden and India are considered doubtful (Ebert *et al.* 2013, Akhilesh *et al.* 2014)
	Triakidae	*Hypogaleus hyugaensis*	Pencil Shark	Records are likely misidentifications	Records from the Gulf are likely records of *Paragaleus randalli* (Campagno 1988) but it is found in Kenya and outside the limits of our region (Ebert *et al.* 2013)
		Mustelus cf. mangalorensis	Mangalore Houndshark	Validity of the species is questionable	The validity of this record is questionable and the holotype appears to be lost (Akhilesh *et al.* 2014)
Hexanchiformes	Chlamydoselachidae	*Chlamydoselachus anguineus*	Frilled Shark	Record unconfirmed	Possibly occurs in the Maldives but the record has not been confirmed (Adam *et al.* 1998)
Lamniformes	Alopiidae	*Alopias vulpinus*	Common Thresher	Records unconfirmed	Was believed to occur throughout most of the ASR but there have been no substantiated records (Romanov 2015)
	Lamnidae	*Carcharodon carcharias*	Great White Shark	Few records, probably vagrant	One record from Sri Lanka and one from Somalia (unconfirmed) (Compagno 2001)
		Megachasma pelagios	Megamouth Shark	Probably vagrant	Only one record from Sri Lanka (Fernando *et al.* 2015)

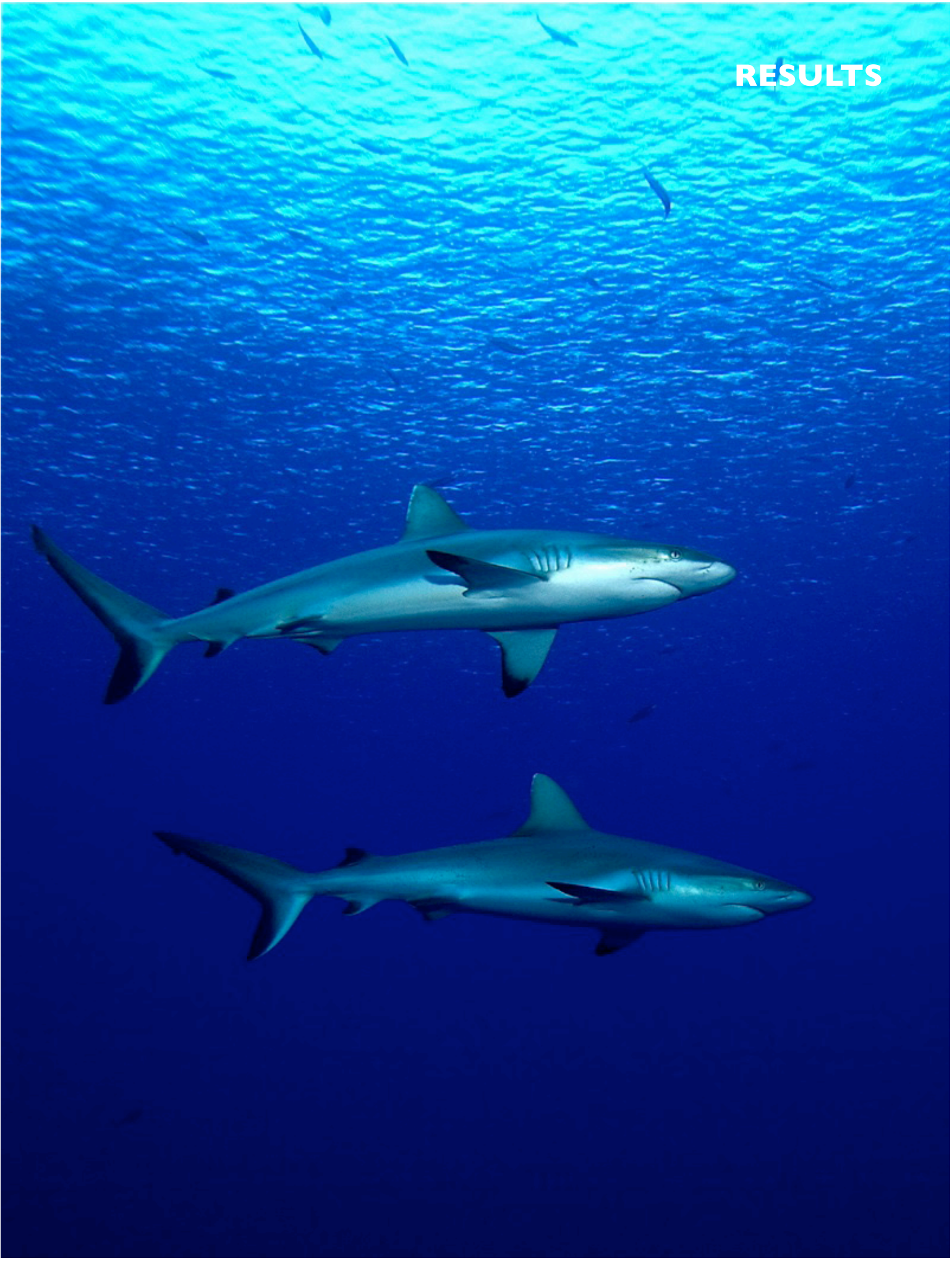
	Pseudocarchariidae	*Pseudocarcharias kamoharai*	Crocodile Shark	Probably vagrant	One record from Kerala, India (Akhilesh *et al.* 2013) and six specimens from Sri Lanka (Moron *et al.*, 1998)
Orectolobiformes	Hemiscylliidae	*Chiloscyllium indicum*	Slender Bamboo Shark	Records unclear and do not fit with the morphology of specimens in the ASR	This genus needs taxonomic revision in the ASR (R.W. Jabado unpubl. data)
		Chiloscyllium plagiosum	Whitespotted Bamboo Shark	Records unclear and do not fit with the morphology of specimens in the ASR	This genus needs taxonomic revision in the ASR (R.W. Jabado unpubl. data)
Squaliformes	Centrophoridae	*Centrophorus cf. isodon*	Blackfin Gulper Shark	Records unconfirmed	Possibly occurs in India but records have not been confirmed (D. Ebert unpubl. data)
		Centrophorus moluccensis	Smallfin Gulper Shark	Records unconfirmed	Possibly occurs in India but records have not been confirmed (D. Ebert unpubl. data)
		Centrophorus uyato	Little Gulper Shark	Occurrence of the species in the ASR questionable	Uncertain records in India and from Gulf of Aden which are likely *C. atromarginatus* (D. Ebert unpubl. data)
	Dalatiidae	*Euprotomicrus bispinatus*	Pygmy Shark	Species considered marginal	Reported as possibly in the region but has only been confirmed south of the Maldives (Ebert *et al.* 2013); an open ocean species, so may not be well associated with a specific country unless caught within EEZ
	Squalidae	*Cirrhigaleus asper*	Roughskin Dogfish	Records unconfirmed	This species occurs in the southwestern Indian Ocean but records from India but records need confirmation (Ebert *et al.* 2013)
Squatiniformes	Squatinidae	*Squatina africana*	African Angelshark	Record unconfirmed	One record from Somalia but has not been confirmed (Ebert *et al.* 2013). Two possible records from India (Akhilesh K.V. unpubl. data)
RAYS					
Myliobatiformes	Dasyatidae	*Himantura marginata*	Blackedge Whipray	Species no longer considered valid	Was believed to occur off India and Sri Lanka but this species is no longer considered valid (Last *et al.* 2016)

		Taeniurops grabatus	Round Stingray	Occurrence of the species in the ASR questionable	Thought to occur in the Red Sea but records have not been confirmed (Last *et al.* 2016)
		Dasyatis centroura	Roughtail Stingray	Occurrence of the species in the ASR questionable	Now *Bathytoshia centroura*, known to occur in the Atlantic Ocean. Records in the ASR has not been confirmed (Akhilesh *et al.* 2014, Last *et al.* 2016)
	Gymnuridae	*Gymnura hormosensis*	Hormuz Butterfly Ray	Validity of the species questionable	In the Catalog of Fishes, this species is under unavailable names because it does not have an assigned holotype or a description (R. Fricke pers. comm. to D. Ebert 21/02/2017)
Rajiformes	Rajidae	*Dipterus springeri*	Roughbelly Skate	Validity of the species in the ASR questionable	Further work is needed on this species as it could be a different species occurring in the region (D. Ebert unpubl. data)
		Orbiraja philipi	Aden Ring Skate	Validity of the species in the ASR questionable	Described from the Gulf of Aden but the holotype has been lost and further specimens are needed to determine its validity (Last *et al.* 2016)
		Fenestraja mamillidens	Prickly Pygmy Skate	Species considered marginal	One specimen off western Sri Lanka in the Gulf of Mannar but holotype lost (Last *et al.* 2016)
Rhinopristiformes	Glaucostegidae	*Glaucostegus thouin*	Clubnose Guitarfish	Records unclear	Thought to occur in the Red Sea and Gulf of Aden but the location of these records are unclear. One specimen from Saudi Arabia and one from Djibouti are deposited at the Museum National d'Histoire Naturelle (specimens MNHN-IC-A-7950, and MNHN-IC-1903-0027, respectively)
		Glaucostegus typus	Giant Guitarfish	Species considered marginal	Occurs at the limit of the ASR with records from southern India and Sri Lanka (Last *et al.* 2016)
	Rhinobatidae	*Rhinobatos lionotus*	Smoothback Guitarfish	Occurrence of the species in the ASR questionable	Confirmed on the east coast of India but has not been confirmed in the ASR (Last et al. 2016)

Torpediniformes	Narcinidae	*Narcine rierai*	Mozambique Numbfish	Species considered marginal	Occurs at the limit of the region with records from southern Somalia (Last *et al.* 2016)
	Narkinidae	*Heteronarce prabhui*	Quilon Electric Ray	Synonym of another species	Junior synonym of the Soft Sleeper Ray *Heteronarce mollis* (Last *et al.* 2016)
	Torpedinidae	*Torpedo zugmayeri*	Baluchistan Torpedo	No longer considered a valid species (Last *et al.* 2016)	Described from Gwadar, Pakistan but the holotype no longer exists and the validity has been questioned for many years (de Carvalho *et al.* 2002)

Juvenile male specimen of the Angel Shark -- ***Squatina* sp.** landed on June 21, 2017 at the Cochin Harbour in India. This is the second individual recorded in Cochin since 2016. However, capture location data are not available and Indian fishers have expanded their fishing efforts to areas beyond their EEZ, suggesting these specimens could have been caught in the broader Western Indian Ocean. This species was deemed Not Applicable for the purposes of the ASR Red List Workshop © Akhilesh K.V.

RESULTS



Grey Reef Shark -- ***Carcharhinus amblyrynchos*** © Simone Caprodossi Photography

4 RESULTS

4.1 OVERVIEW

This section provides a summary of the conservation status of the 153 chondrichthyan species assessed at the ASR workshop as well as discussing threatened, Near Threatened, Least Concern, Data Deficient, and endemic species. Overall results of the number and proportion of the assessed ASR chondrichthyans in each Red List Category are presented in Tables 4 and 5, and Figures 1 and 2 at the regional and global level, respectively.

The best estimate of extinction risk, which assumes that DD species are equally threatened as data sufficient species, indicates that 62.9 % of extant species are threatened (assessed as CR, EN, and VU), although the precise figure is uncertain and could lie between 50.9 % (if all DD species are not threatened) and 69.9 % (if all DD species are threatened). For sharks, results indicate that 61.9 % of extant species are threatened (range between 50.6 % and 68.8 %), while for rays, 66.1 % of extant species are threatened (range between 52.7 % and 72.9 %). Of the two species of chimaeras assessed, one was DD and the other LC. The calculated proportion of species of elevated conservation concern (defined as (EW - Extinct in the Wild + CR + EN + VU + NT) / (assessed – DD)) is high at 84.6 % for all assessed chondrichthyans, 80.9 % for sharks, and 89.8 % for rays.

In comparison, global assessments for these species indicate that 34 % of chondrichthyans occurring in the ASR are considered threatened with another 17 % considered Near Threatened. A 'synopsis' of the status of species assessed here with details of their regional and global status is provided in Annex III. The Red List status and rationale for each of these is provided in Section 5 of this report.

4.2 THREATENED SPECIES

Seventy-eight species (50.9 %) of chondrichthyans occurring in the ASR are assessed within one of the three threatened categories. These species face an ***extremely high*** risk of extinction in the wild (Critically Endangered CR; 9.2 %), a ***very high*** risk of extinction in the wild (Endangered, EN; 22.2 %) or a ***high risk*** of extinction in the wild (Vulnerable VU; 19.6 %). Twenty-two (of 39) families within the region contain one or more threatened species.

The 14 CR species in the ASR include three species that have been flagged as CR – Possibly Extinct. These are the Pondicherry Shark (*Carcharhinus hemiodon*), the Red Sea Torpedo (*Torpedo suessi*), and the Tentacled Butterfly Ray (*Gymnura tentaculata*). Despite increasing fishery dependent and independent survey efforts across the region, there are no verifiable records of these three species since 1979, 1898, and 1986, respectively. It is possible that other species may have also disappeared from the region before they were recorded and described by researchers.

The remaining 11 species were listed as CR as a result of documented declines due to intense fishing pressure within their regional range as

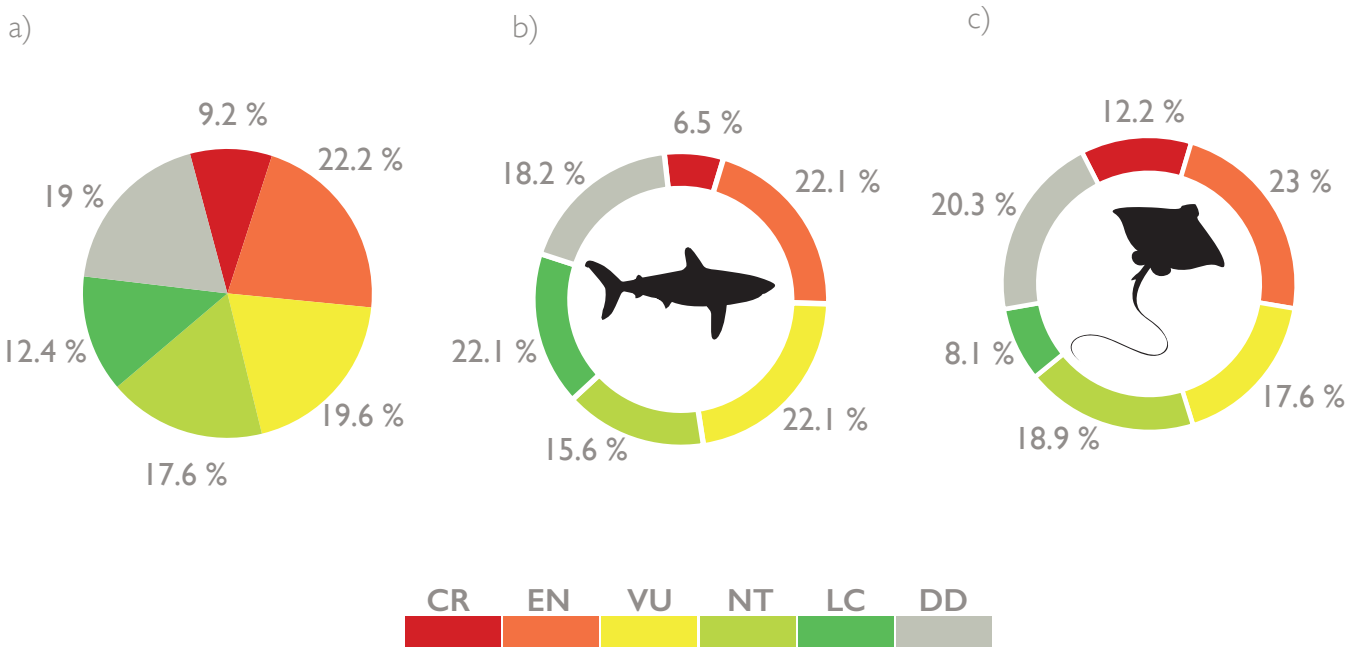


Figure 1 – Percentage distribution of a) all chondrichthyans occurring in the Arabian Seas Region, b) sharks, c) rays, in each Red List Category at the regional level (CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient)

Table 4 – The number and proportion of all chondrichthyans, sharks, rays, and chimaeras, assessed from the Arabian Seas Region in each Red List Category at the regional level (CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient) as well as the total for the three threatened categories (CR, EN, VU)

IUCN Red List Category	ASR Red List status -- All species	ASR Red List status -- Sharks	ASR Red List status -- Rays	ASR Red List status -- Chimaeras
Critically Endangered	14 (9.2 %)	5 (6.5 %)	9 (12.2 %)	0
Endangered	34 (22.2 %)	17 (22.1 %)	17 (23 %)	0
Vulnerable	30 (19.6 %)	17 (22.1 %)	13 (17.6 %)	0
Total threatened	78 (50.9 %)	39 (50.6 %)	39 (52.7 %)	0
Near Threatened	27 (17.6 %)	12 (15.6 %)	14 (18.9 %)	1 (50 %)
Least Concern	19 (12.4 %)	12 (15.6 %)	6 (8.1 %)	1 (50 %)
Data Deficient	29 (19 %)	14 (18.2 %)	15 (20.3 %)	0
Not Evaluated	0	0	0	0
Total number of species	153	77	74	2

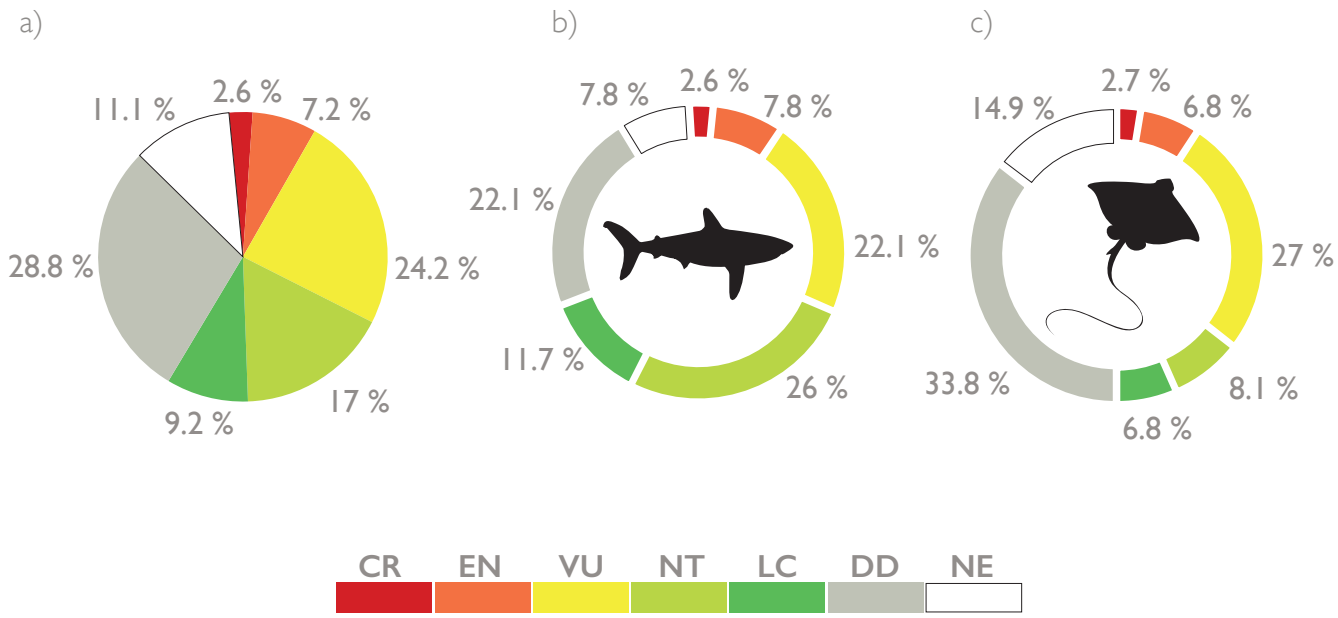


Figure 2 – Percentage distribution of a) all chondrichthyans occurring in the Arabian Seas Region, b) sharks, c) rays, in each Red List Category at the global level (CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient; NE, Not Evaluated)

Table 5 – The number and proportion of all chondrichthyans, sharks, rays, and chimaeras, assessed from the Arabian Seas Region in each Red List Category at the global level (CR, Critically Endangered; EN, Endangered; VU, Vulnerable; NT, Near Threatened; LC, Least Concern; DD, Data Deficient; NE, Not Evaluated) as well as the total for the three threatened categories (CR, EN, VU)

IUCN Red List Category	Global Red List status -- All species	Global Red List status -- Sharks	Global Red List status -- Rays	Global Red List status -- Chimaeras
Critically Endangered	4 (2.6 %)	2 (2.6 %)	2 (2.7 %)	0
Endangered	11 (7.2 %)	6 (7.8 %)	5 (6.8 %)	0
Vulnerable	37 (24.2 %)	17 (22.1 %)	20 (27 %)	0
Total threatened	52 (34 %)	25 (33 %)	27 (37 %)	0
Near Threatened	26 (17 %)	20 (26 %)	6 (8.1 %)	0
Least Concern	14 (9.2 %)	9 (11.7 %)	5 (6.8 %)	0
Data Deficient	44 (28.8 %)	17 (22.1 %)	25 (33.8 %)	2 (100 %)
Not Evaluated	17 (11.1 %)	6 (7.8 %)	11 (14.9 %)	0
Total number of species	153	77	74	2

well as their low intrinsic population growth rate. These species include all three species of sawfish (family Pristidae) occurring in the region which have received considerable attention in the past five years as they are arguably the most imperiled group of fishes worldwide. Populations of the Narrow Sawfish (*Anoxipristis cuspidata*), Largetooth Sawfish (*Pristis pristis*), and Green Sawfish (*P. zijsron*) have disappeared in many former range states in the region and remaining populations are now small and fragmented (Dulvy *et al.* 2016b). Regional reports indicate that the only areas where sawfish are still sometimes recorded include the Gulf (Green Sawfish: UAE and Iran), the Red Sea (Green Sawfish: Sudan), and northeastern Arabian Sea (Largetooth Sawfish: Pakistan and India). Declines are a result of largely unintentional mortality in fisheries as well as habitat degradation and loss due to coastal development. Other CR species include the Sand Tiger Shark (*Carcharias taurus*) and the Winghead Shark (*Eusphyra blochii*) where severe declines in abundance have been documented with only one or two specimens of each species reported annually from across their regional range. Subpopulations of such species, which are likely to be isolated with discrete geographical boundaries, can be threatened at the population level, despite being less threatened on an overall global basis.

Species assessed as EN include three species of deepsea sharks, the Dwarf Gulper Shark (*Centrophorus atromarginatus*), the Gulper Shark (*C. granulosus*), and the Leafscale Gulper Shark (*C. squamosus*). Dramatic declines in these species have been reported from the Maldives, where stocks collapsed in the early 2000s, and they are increasingly caught in the southwest Indian deepsea shrimp trawl fishery. The limited biological productivity of *Centrophorus* spp. restricts their ability to sustain targeted or bycatch fishing pressure and makes them highly susceptible to overexploitation, even more so than coastal and epipelagic species. Other families with high numbers of species considered EN include the eagle rays (family Myliobatidae) and the hammerheads (family Sphyrnidae). Of the six eagle rays occurring in the region, four species are considered EN including the Longhead Eagle Ray (*Aetobatus flagellum*), Mottled Eagle Ray (*Aetomylaeus maculatus*), Ocellate Eagle Ray (*A. milvus*), and Ornate Eagle Ray (*A. vespertilio*). These species are generally rare, have low productivity, and restricted ranges in the ASR with their whole distribution subject to extremely intense and increasing demersal fishing pressure. Three of the four hammerhead species are considered EN, including the Scalloped Hammerhead (*Sphyrna lewini*), Smooth Hammerhead (*S. zygaena*), and Great Hammerhead (*S. mokarran*). Hammerheads have been depleted worldwide by coastal as well as pelagic fisheries. All life-stages are susceptible to targeted and incidental capture as their fins are amongst the most prized in the shark fin market. The continuing fishing pressure from both inshore and offshore fisheries, along with a low resilience to exploitation, threaten the populations of these large species in the ASR. Similarly, the high value fins of several species of guitarfishes and wedgefishes has driven major declines in population in less than a decade. All three *Rhynchobatus* spp. and the Sharpnose Guitarfish (*Glaucostegus granulatus*) are large species occurring in the ASR and have suspected

population declines of 50-80 % over the past 40 years (approximately three generations).

Species assessed as VU are mostly wide-ranging large carcharhinids such as the Bignose Shark (*Carcharhinus altimus*), Blacktip Shark (*C. limbatus*), and Tiger Shark (*Galeocerdo cuvier*), as well as both species of manta rays, the Reef Manta Ray (*Mobula alfredi*) and Giant Manta Ray (*M. birostris*), or rarer species that are facing increasing pressure in their habitats which are being heavily impacted by coastal development and destructive fishing such as the Mangrove Whipray (*Urogymnus granulatus*) and the Porcupine Ray (*U. asperrimus*). Most of these species also have relatively low rates of population increase and are subjected to high fishing mortality throughout large parts of their range leading to substantial declines in their numbers. For example, *Carcharhinus* sp. stocks in India have already collapsed and it is likely that with no management action, other stocks of these species might also decline in the region. The status of all the species assigned to a threatened category must be monitored closely, and research must be conducted without delay to better understand their biology, threats and conservation needs, and to implement management and recovery plans where necessary.

4.3 NEAR THREATENED SPECIES

Twenty-seven species (17.6 %) of chondrichthyans assessed in the ASR are considered Near Threatened (NT). These species do not currently qualify for a threatened category, however, this listing reflects sufficient concern that they are close to qualifying for, or are likely to qualify for a threatened category in the near future. These include several commercially important species that dominate landings across the region such as the Milk Shark (*Rhizoprionodon acutus*), Grey Sharpnose Shark (*R. oligolinx*), the Spadenose Shark (*Scoliodon laticaudus*), and the Sliteye Shark (*Loxodon macrorhinus*). These species are generally taken as bycatch by artisanal fisheries, utilized for meat consumption and sometimes for their fins, yet may be unable to withstand continued exploitation pressure.

Families with a high proportion of NT in the ASR include the guitarfishes (Rhinobatidae; 60 % NT), whiptail stingrays (Dasyatidae; 31.8 % NT), and whaler sharks (Carcharhinidae; 25 % NT). In some cases, species have been assessed as NT as a precautionary measure, to highlight concerns for their conservation status, but where there is insufficient evidence of fishing activity at levels that would lead to a significant decline in range, habitat quality, or number of individuals. For instance, there is particular concern for guitarfishes such as the Bengal Guitarfish (*Rhinobatos annandalei*) and the Spotted Guitarfish (*R. punctifer*) that have often been confused in the region and for which declines are suspected. While these species remain poorly-known, with further information on their range and biology urgently required, they are commonly caught in inshore gillnet and trawl fisheries. Declines in guitarfishes have been reported from across the region and present levels of catches are of concern, especially with increasing fishing pressure and ongoing decline in habitat quality. Further data

for these, as well as other NT guitarfishes such as the Salalah Guitarfish (*Acroteriobatus salalah*), may eventually show that a threatened category is warranted.

Species assessed as NT may be unable to withstand prolonged exploitation, particularly if fishing pressure increases. It is therefore essential that these species are closely monitored, data are collected, and where possible, precautionary management actions taken to avoid their movement into threatened categories. New data may indicate that some of these species in fact qualify for a threatened category and their status should be adjusted accordingly following reassessment in this case.

4.4 LEAST CONCERN SPECIES

Only nineteen species (12.4 %) of chondrichthyans assessed in the ASR are considered Least Concern (LC). These species do not qualify for a threatened category or for NT and are not considered to be at threat of extinction now or in the foreseeable future. Generally, species with widespread distributions and an abundant and healthy population are included in this category.

In the ASR, many of the species considered LC also had limited geographical distributions within the region and/or occurred in the deepsea where there is limited fishing pressure. Families with all species considered LC include the kitefin sharks (Dalatiidae: 1 species), finback catsharks (Proscyllidae: 2 species), ground sharks (Pseudotriakidae: 1 species), sawsharks (Pristiophoridae: 1 species), and cow sharks (Hexanchidae: 2 species). These families have low diversity in the region and were represented by one or two species that usually occurred beyond the range of intensive fisheries in the region. For example, the Dwarf False Catshark (*Planonasus parini*) was only known from deep waters (560-1,120 m) around Socotra Island, Yemen, beyond normal fishing operations. Furthermore, many of these LC species are small (maximum sizes of <50 cm TL) and are not the focus of targeted fisheries. On the other hand, the Sharpnose Sevengill Shark (*Heptranchias perlo*) is larger (to 140 cm TL), has a wider regional range and occurs in the Gulf of Aden, the Maldives, and southwest India. Because it occurs at depths of over 1,000 m, it is rarely taken in fisheries. Furthermore, it receives refuge in the Maldives where targeted shark fishing is banned and in the Gulf of Aden where deepsea fisheries do not currently operate.

Intrinsic biological characteristics can also contribute to LC assessments. For example, the houndsharks (Triakidae), which are small, relatively fast growing and early maturing, are relatively productive. For instance, the Arabian Smoothhound (*Mustelus mosis*) occurs throughout the region and is often a bycatch product in most fisheries. However, no data are currently available to indicate declines and it remains relatively abundant in the areas where it occurs. While, data on the biology of some species remains scarce, several species with a limited regional range that occur in shallow inshore waters, were also assessed as LC. For example, the Arabian Whipray (*Maculabatis randalli*) and Baraka's Whipray (*M. ambigua*) only occur in the Gulf and the Red Sea, respectively.

Within their range, they have limited commercial value and are often discarded in fisheries. Both species are still common within their range with no evidence to indicate declines in populations.

Species considered LC would also benefit from conservation and management actions to ensure their populations remain stable. This is particularly true for deepsea species since any expansion of deepsea fisheries may begin to threaten them, especially those with restricted ranges. Many assessments highlight the need to carefully monitor population trends of these species and manage the expansion of deepsea fisheries into their range.

4.5 DATA DEFICIENT SPECIES

Although efforts were made to place a species into a category other than DD, twenty-nine species (19 % of chondrichthyans) occurring in the ASR are classified as Data Deficient. In many cases, there is insufficient or inadequate information available on their distribution and/ or abundance to make a direct or indirect assessment of their status. This is sometimes due to a species' rarity, limited geographic distribution and/ or limited economic interest, which result in a reduced capacity to undertake research on the species to obtain details on habitat, ecology, distribution, and population.

Within the ASR, some of the groups with the highest proportion of DD species include the skates (Rajidae; 80 % DD), catsharks (Scyliorhinidae; 55.5 % DD), and the Torpediniformes (Narcinidae, Narkidae, and Torpedinidae; 46.1 % DD). The relatively high proportion of DD species in the region highlights how large the information and knowledge gap is, and the need to increase capacity for chondrichthyan research. In some instances, species are only known from a single or a few specimens. For example, the Arabian Catshark (*Bythaelurus alcockii*), is only known from one specimen caught in the Arabian Sea off Pakistan at a depth of 1,134-1,262 m. Furthermore, its holotype from the India Museum in Calcutta may be lost. This highlights the importance of collecting voucher specimens and preserving museum collections within the ASR. Furthermore, the Velvet Dogfish (*Zameus squamulosus*) is only known from three records from off Cochin, India. However, the rapid development of deepsea fishing off southwest India is a concern for its local population. Several other species, including the Brown Stingray (*Bathytoshia lata*) and the Whitespotted Bullhead Shark (*Heterodontus ramalheira*) were assessed as DD due to the lack of information about their interactions with fisheries.

Further research is critically needed for those deepsea species that are likely interacting with fisheries in the region, especially since there are virtually no available data on population sizes or biological parameters of these species. More information is required on their biology, abundance and full range, capture in fisheries and population trends. This is because there have been concerns that deepsea sharks appear to be amongst the most vulnerable of species to depletion as a result of fisheries exploitation, even if only taken as bycatch. A lack of data is clear with several deepsea species that have only recently been confirmed from the region as

deepsea fishing operations expand. For example, only a small number of records are available for the Indian Swellshark (*Cephaloscyllium silasi*) from the deepsea shrimp trawl fishery operating off southwest India.

Newly described species account for some DD listings, as information on them is sometimes sparse. For example, Human's Whaler Shark (*C. humani*) was only described in 2014 and there is currently little information on its abundance and biology. The likelihood of widespread misidentification with another similar species, the Whitecheek Shark (*C. dussumieri*) precludes an assessment other than DD. Species with unresolved taxonomic problems may also have been assessed as DD, particularly where there is uncertainty regarding a species' occurrence within the region. For instance, the Bluespotted Maskray (*Neotrygon caeruleopunctata*) was only recently confirmed from the region and its current taxonomic uncertainty, which limits a full understanding of the species' range and regional occurrence, precludes an assessment beyond DD at this time.

DD species require further information and research. This is particularly true as future research might indicate that a threatened classification is appropriate. Many species placed in the DD category may be overlooked for conservation action, however, they are often in need of relatively urgent action.

4.6 ENDEMIC SPECIES

Thirty chondrichthyans (19.6 %) assessed here are endemic to the ASR (Table 6). These endemics comprise three CR (10 %), three EN (10 %), two VU (6.6 %), five NT (16.6 %), eight LC (26.6 %), and nine DD (30 %) species. In total, 26.6 % of the endemics are threatened, and 43.2 % are in either threatened or Near Threatened categories. It is interesting to note that most of the species assessed as DD and LC occur in the deepsea, therefore placing the majority of their populations outside the range of current fishing pressure. It is concerning though that very little is known about several of the DD species that occur within the range of expanding deepsea fisheries in the region and may have very limited geographic and bathymetric distributions (see LC and DD sections). Of particular concern is the endemic Red Sea Torpedo (*Torpedo suessi*) which is considered CR -- Possibly Extinct and has not been recorded since its original description in 1898. This highlights the lack of information for some species in the region and that some of these endemics might actually be driven to extinction before management can be implemented, and possibly even before the species have been recorded and described by researchers.

Increasing taxonomic work is underway in the ASR and results might reveal that additional species are also endemic to the region. For example, records of the Bigeye Houndshark (*Iago omanensis*) in the ASR are currently confirmed from the Red Sea, Oman, Pakistan and India (up to Cochin). Ebert *et al.* (2013) suggest that specimens referred to as the Bigeye Houndshark in the Bay of Bengal may in fact be a distinct species and genetics indicate several different forms occur in the ASR. Similarly,

specimens of the Travancore Skate (*Dipturus johannisdavisi*) have been reported from outside the ASR (off Zanzibar, Tanzania), however, these still require confirmation (D. Ebert unpubl. data). If these turn out to be a separate species, the Travancore Skate would be added to the endemic list for the ASR. Finally, the taxonomy of the Broadfin Shark (*Lamiopsis temmincki*) has only been recently reviewed with results suggesting that this species currently only occurs in the northern Arabian Sea (Akhilesh *et al.* 2016). Species recorded as the Broadfin Shark from the Bay of Bengal still require confirmation and might actually be referring to the Borneo Broadfin Shark (*L. tephrodes*) (Akhilesh K.K. pers. comm. 21/02/2017). Because many of these taxonomic and distributional issues have not yet been clarified, we have not included these species with our endemics.

Additional species are currently being described in the ASR and some might also turn out to be endemics. For example, the recently described Vivaldi's Catshark (*Bythaelurus vivaldii*) is only known from two specimens off Somalia (Weigmann and Kaschner 2017) and nothing is known of its population size, structure, and biology. This species was not yet described at the time of this ASR workshop, and so is not included in this report.

Table 6 – Sharks, rays, and chimaeras endemic to the Arabian Seas Region in each Red List Category

Critically Endangered	
Stripenose Guitarfish	*Acroteriobatus variegatus*
Pakistan Whipray	*Maculabatis arabica*
Red Sea Torpedo	*Torpedo suessi*
Endangered	
Ocellate Eagle Ray	*Aetomylaeus milvus*
Smoothtooth Blacktip Shark	*Carcharhinus leiodon*
Aden Torpedo	*Torpedo adenensis*
Vulnerable	
Halavi Guitarfish	*Glaucostegus halavi*
Speckled Catshark	*Halaelurus boesemani*
Near Threatened	
Salalah Guitarfish	*Acroteriobatus salalah*
Scaly Whipray	*Brevitrygon walga*
Arabian Carpetshark	*Chiloscyllium arabicum*
Cowtail Ray	*Pastinachus sephen*
Spotted Guitarfish	*Rhinobatos punctifer*
Least Concern	
Shortbelly Catshark	*Apristurus breviventralis*
Smallbelly Catshark	*Apristurus indicus*
Indian Blind Numbfish	*Benthobatis moresbyi*
Harlequin Catshark	*Ctenacis fehlmanni*
Arabian Banded Whipray	*Maculabatis randalli*
Arabian Sicklefin Chimaera	*Neoharriotta pumila*
Ornate Skate	*Okamejei ornata*
Dwarf False Catshark	*Planonasus parini*
Data Deficient	
Oman Guitarfish	*Acroteriobatus omanensis*
Reverse Skate	*Amblyraja reversa*
Arabian Catshark	*Bythaelurus alcockii*
Quagga Catshark	*Halaelurus quagga*
Oman Bullhead Shark	*Heterodontus omanensis*
Eilat Electric Ray	*Heteronarce bentuviai*
Soft Electric Ray	*Heteronarce mollis*
Bigeye Numbfish	*Narcine oculifera*
Pita Skate	*Raja pita*

Bycatch in both artisanal and industrial fisheries is considered the biggest threat to the majority of sharks and rays across the Arabian Seas Region (opposite page). © Rima W. Jabado

Wedgefishes (Rhinidae), guitarfishes (Rhinobatidae and Glaucostegidae) (above left), and hammerheads (Sphyrnidae) (left) represent some of the most threatened families in the Arabian Seas Region. They are often taken as highly valued bycatch due to their fins which are among the most valuable of all elasmobranchs. Populations of these species across the region have significantly declined and present levels of catches are of concern with fishing pressure increasing. © Rima W. Jabado (above) and Simone Caprodossi Photography (left)

Devil rays (Mobulidae) are highly valued for their meat and gill plates. They have extremely low reproductive rates (around one pup per year) and low post-release survival. Despite increasing fishing effort, population declines of devil rays have been documented in the Arabian Seas Region with India and Sri Lanka reported as having two of the top five devil ray fisheries in the world (top right). © Daniel Fernando

Sawfishes (Pristidae) are extremely susceptible to capture in gillnets and demersal trawl nets.. Believed to have once been abundant across the Arabian Seas Region, there are now only very occasional records (right). © Rima W. Jabado

SHARKS

Tiger Shark -- ***Galeocerdo cuvier*** © Simone Caprodossi Photography

CARCHARHINIFORMES

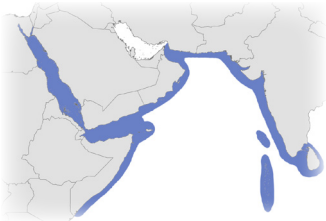
Blacktip Shark -- ***Carcharhinus limbatus*** © David P. Robinson

FAMILY **CARCHARHINIDAE**

EN

Silvertip Shark *Carcharhinus albimarginatus* (Rüppell, 1837)

Regional Red List assessment:
Endangered A2cd+3cd
Pollom, R. A., Romanov, E., Owfi, F., Akhilesh, K.V. & Ali, K.
Global Red List assessment:
Vulnerable A2bd
Espinoza, M., González-Medina, E., Dulvy, N.K. & Pillans, R.D. (2015)



Rationale The Silvertip Shark (*Carcharhinus albimarginatus*) is a medium-sized (to 300 cm TL) coral reef-associated coastal and shelf species of requiem shark. It is widespread but has a patchy distribution in the Indo-Pacific and inhabits waters throughout the ASR except for the Gulf. The species exhibits slow life-history characteristics, and is threatened by extensive fishing pressure and habitat loss and degradation throughout the region. Although the Maldivian stock is now protected, ongoing high levels of fishing pressures and coastal development are of concern, and overall it is suspected that this species has declined by at least 60-70 % over the past three generations lengths (~64 years) in the ASR. A further population reduction is suspected over the next three generations (2017–2081) based on current levels of exploitation and decline in habitat quality. As such, the species is assessed as Endangered A2cd+3cd.

Bignose Shark *Carcharhinus altimus* (Springer, 1950)

VU

Regional Red List assessment:
Vulnerable A2d+3d
Simpfendorfer, C.A., Pollom, R. A., Al Mamari, T., Fernando, D. & Jabado, R. W.
Global Red List assessment:
Data Deficient
Pillans, R., Amorim, A., Mancini, P., Gonzalez, M. & Anderson, C. (2008)

Rationale The Bignose Shark (*Carcharhinus altimus*) is a medium-sized (to 282 cm TL) deep water, diurnally migrating (12-800 m) shark which probably has a circumglobal distribution on the continental shelf edge in tropical and warm seas, although records are patchy. This species is widespread but patchy throughout the Indo-Pacific and Atlantic Oceans. It is suspected to occur throughout the ASR except in the Gulf. The species is caught in a variety of gear but seems particularly susceptible to gillnet and longline fisheries. It was targeted in the Maldives in the 1970s and 1980s with declines reported, but that fishery was closed in 2010. While there is limited information available on this species in the region, its large size, valuable fins, and intensive fisheries mean that like many other large carcharhinids, it will have declined significantly. Information from other parts of its global range have demonstrated that it is quickly overfished even with moderate levels of fishing, adding further evidence of potential declines. It is therefore suspected that this species has declined by >30 % over the past three generations lengths (~80 years), and that these declines are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2097) based on current levels of exploitation. As such, the species is assessed as Vulnerable A2d+3d.

Graceful Shark *Carcharhinus amblyrhynchoides* (Whitley, 1934)

VU

Regional Red List assessment:
Vulnerable A2d+3d
Simpfendorfer, C.A., Moore, A.B.M., Elhassan, I., Valinassab, T. & Jabado, R. W.
Global Red List assessment:
Near Threatened
Simpfendorfer, C. A. (2005)

Rationale The Graceful Shark (*Carcharhinus amblyrhynchoides*) is a medium-sized (to 243 cm TL) inshore species that is widespread but patchy in the Indo-West Pacific and occurs throughout the ASR, except in the Red Sea and possibly the Maldives. It is often confused with similar species such as the Blacktip Shark (*C. limbatus*) and possibly the Spinner Shark (*C. brevipinna*), limiting species-specific data. It is captured in gillnet, line, purse seine and trawl fisheries and utilised for its flesh and fins. Fishing is suspected to have caused region-wide declines of 30-50 %, similar to those of the closely-related Blacktip Shark, for which there are reports of stock collapse off India. Overall, the ongoing intensification of fisheries in the region, combined with reported declines in landings, and the high demand for its valuable fins, lead to a suspected population decline of at least 30-50 % over the past three generations (~39 years) in the ASR, with these declines likely to be ongoing.

A further population reduction is suspected over the next three generations (2017–2056) based on current levels of exploitation. The species is therefore assessed as Vulnerable A2d+3d.

EN

Grey Reef Shark *Carcharhinus amblyrhynchos* (Bleeker, 1856)

Regional Red List assessment:
Endangered A2cd+3cd
Simpfendorfer, C. A., Jabado, R.W., Valinassab, T., Elhassan, I. & Moore, A.B.M.
Global Red List assessment:
Near Threatened
Smale, M.J. (2005)

Rationale The Grey Reef Shark (*Carcharhinus amblyrhynchos*) is a medium-sized (to at least 255 cm TL) species, widespread in the tropical Indo-West and Central Pacific that occurs throughout the ASR. It is commonly taken in gillnet and longline fisheries, and pressure on coral reef habitats in the region is likely a significant threat. It was formerly common in coastal waters but anecdotal evidence suggests that it has declined across its regional range. In other parts of its global range (e.g., Hawaii), some local populations have been severely depleted by modest fishing pressure. While there is limited species-specific information available in the region, its restricted habitat, site fidelity, inshore distribution, small litter size, and relatively late age at maturity, along with the presence of intensive and increasing fishing pressure suggests that, similar to other carcharhinids, populations of this species have declined significantly. It should be noted that in the Maldives, this species is showing signs of increased abundance following the introduction of a ban on shark fishing in 2010. However, ongoing high levels of fishing pressures in its remaining range and decline in habitat quality are of concern, and overall it is suspected that this species has declined by 50-80 % over the past three generations (36 years) in the ASR, and that these declines are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2053) based on current levels of exploitation and declines in habitat quality. As such, this species is assessed as Endangered A2cd+A3cd.

VU

Pigeye Shark *Carcharhinus amboinensis* (Müller & Henle, 1839)

Regional Red List assessment:
Vulnerable A2cd+3cd
Simpfendorfer, C. A., Moore, A.B.M., Valinassab, T., Jabado, R.W. & Elhassan, I.
Global Red List assessment:
Data Deficient
Cliff, G. (2005)

Rationale The Pigeye Shark (*Carcharhinus amboinensis*) is a large (to 303 cm TL) shark that is widespread but patchily distributed in the Indo-West Pacific and Eastern Atlantic Oceans. It occurs throughout the region in inshore waters, although it has not been reported from the Maldives

or the northern Red Sea. It is likely to have often been confused with the Bull Shark (*C. leucas*) but has a wider regional range. It grows slowly and matures late, giving it a low productivity. It is commonly taken in gillnet and longline fisheries, and development around rivers and estuaries is likely a significant threat, particularly to juveniles. Ongoing high levels of fishing pressure, the low productivity of the species, its large size, and decline in habitat quality due to coastal development are of concern, and overall it is suspected that this species has declined by at least 30-50 % over the past three generations (~65 years). A further population reduction is suspected over the next three generations (2017–2082) based on current levels of exploitation. As such, the species is assessed as Vulnerable A2cd+3cd.

Spinner Shark *Carcharhinus brevipinna* (Müller & Henle, 1839)

VU

Regional Red List assessment:
Vulnerable A2d+3d
Simpfendorfer, C.A., Tesfamichael, D., Valinassab, T., Elhassan, I. & Fernando, D.
Global Red List assessment:
Near Threatened
Burgess, G.H. (2005)

Rationale The Spinner Shark (*Carcharhinus brevipinna*) is a common large (to 283 cm TL) carcharhinid that is widespread in the tropical Indo-West Pacific and Atlantic Oceans. It occurs throughout the region and is commonly taken in gillnet, line and trawl fisheries that are extensive and intensive. Both juveniles and adults of this species are valued and retained for their meat and fins across the region. While there is limited species-specific information available on this species in the region, its large size, valuable fins and intensive fisheries mean that like many other large carcharhinids, it will have declined significantly. There is additional concern for this species as it is often confused with blacktip sharks (*Carcharhinus* sp.) whose stocks are reported to have collapsed off India. The ongoing intensification of fisheries in the region, combined with reported declines of sharks in general lead to a suspected population decline of at least 30-50 % over the past three generations (39 years) and further population reduction is suspected over the next three generations (2017-2056) based on current levels of exploitation. As such, this species is assessed as Vulnerable A2d+3d.

Whitecheek Shark *Carcharhinus dussumieri* (Müller & Henle, 1839)

EN

Regional Red List assessment:
Endangered A2d+3d
Simpfendorfer, C.A., Jabado, R.W, Moore, A.B.M., Valinassab, T. & Elhassan, I.
Global Red List assessment:
Near Threatened
Bennett, M.B. & Kyne, P. M. (2003)

Rationale The Whitecheek Shark (*Carcharhinus dussumieri*) is a small (to 100 cm TL) shark that occurs in the Indian Ocean from at least the Gulf to the southeast coast of India. It is common in

inshore waters over soft substrates at depths of 0-100 m and is particularly susceptible to inshore fisheries. It is caught in commercial trawling, artisanal fishing, hook-and-line fishing and gillnetting throughout the region. Like many shark species, it has a relatively low reproductive capacity (normal litter size of two pups) making it particularly susceptible to over-exploitation. The Whitecheek Shark is often the dominant species landed in the Gulf (e.g., Iran and Qatar). However, off Pakistan and India, where it used to be common, there is evidence of declines exceeding 50-70 % over the last 15 years with recent surveys in India failing to report the species. Localized extinctions of this species have been documented in other areas of the world, and it is suspected that this has also likely occurred in Indian waters due to high levels of fishing pressure. The ongoing intensification of fisheries in the region, combined with reported declines of sharks in general lead to a suspected population decline of at least 50-70 % over the past three generations (12 years) and a further population reduction is suspected over the next three generations (2017-2029) based on current levels of exploitation. As such, this species is assessed as Endangered A2d+3d.

NT

Silky Shark *Carcharhinus falciformis* (Müller & Henle, 1839)

Regional Red List assessment:
Near Threatened
Dulvy, N.K., Ali, K., Romanov, E., Spaet, J.L.Y. & Owfi, F.
Global Red List assessment:
Near Threatened
Rigby, C.L., Sherman, C.S., Chin, A. & Simpfendorfer, C. A. (2015)

Rationale The Silky Shark (*Carcharhinus falciformis*) is a large (over 300 cm TL) oceanic and coastal-pelagic shark with a circumglobal distribution in tropical waters. It is widespread in the ASR except in the Gulf where it has only been reported close to the entrance at the Strait of Hormuz. It is one of the dominant species in landings across the region and is a target or bycatch species in pelagic tuna longline and purse seine fisheries where it is taken in high numbers. Juveniles of this species are a major component of artisanal fisheries landings and pelagic purse seine shark bycatch. Adults are also captured in coastal shark fisheries and pelagic longline open ocean fisheries, yet there are few estimates of population trajectory. Both juveniles and adults of this species are valued and retained for their meat and fins across the region. While there is limited species-specific information available on this species in the region, its large size, valuable fins and intensive fisheries mean that like many other large carcharhinids, it has certainly declined. Reports from the Maldives indicate historic declines in landings, and recent declines are also reported from Sri Lanka. However, such declines have not been reported in other parts of its regional range (e.g., Red Sea). Overall, the ongoing intensification of fisheries in the region, combined with reported declines of sharks in general lead to a suspected population decline of at least 20-30 % over the past three generations (45 years) and further population reduction is suspected over the next three generations (2017-2062) based on current levels of exploitation. As such this species is assessed as Near Threatened (nearly meeting Vulnerable A2d+3d). Further research and monitoring is urgently needed to determine if declines greater than those currently suspected have occurred and this assessment should be revisited as further catch data and stock assessments become available.

Pondicherry Shark *Carcharhinus hemiodon* (Müller & Henle, 1839)

CR

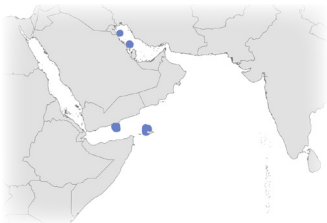
Regional Red List assessment:
Critically Endangered C2a(i) -- **Possibly Extinct**
Kyne, P. M., Dulvy, N.K., Bineesh, K.K., Fernando, D. & Akhilesh, K.V.
Global Red List assessment:
Critically Endangered A2acd; C2a(i) -- **Possibly Extinct**
Compagno, L.J.V., White, W.T. & Fowler, S. (2003)

Rationale The Pondicherry Shark (*Carcharhinus hemiodon*) is a small (to 102 cm TL) and very rare Indo-West Pacific whaler shark. It has a patchy distribution in areas which are subject to large, expanding and unregulated artisanal and commercial 'catch all' fisheries. The species appeared to occur in shallow coastal waters, and was also reported to enter rivers, although this has not been verified. Despite market surveys across its range there are no verifiable records since 1979. In the ASR, there are historical records from India, Pakistan and Oman. A recent published report from the Menik River in Sri Lanka is erroneous with photos showing a juvenile Bull Shark (*Carcharhinus leucas*). Given the intensity of whaler shark exploitation across coastal waters of the region, the collapse of whaler shark stocks in India, and a lack of records since the late 1970s, it is suspected that the population size is very small (<250 mature individuals) with <50 individuals in each subpopulation. Although information on subpopulations is not available, these can be inferred from the very patchy nature of historic records (India, Pakistan, Oman). A continuing decline is inferred from ongoing intense exploitation of coastal inshore whaler sharks across its range, and the Pondicherry Shark is assessed as Critically Endangered C2a(i). It is flagged as Possibly Extinct regionally given a lack of records in nearly 40 years.

Human's Whaler Shark *Carcharhinus humani* White & Weigmann, 2014

DD

Regional Red List assessment:
Data Deficient
Simpfendorfer, C.A., Jabado, R.W., Moore, A.B.M. & Elhassan, I.
Global Red List assessment:
Not Evaluated



Rationale Human's Whaler Shark (*Carcharhinus humani*) is a small (to 83 cm TL) shark patchily distributed in the Western Indian Ocean in waters to at least 43 m depth, although it likely occurs in both inshore and offshore waters. It is only known from a small number of specimens in the ASR, from the Gulf and Gulf of Aden, and has likely been widely misidentified (with the Whitecheek Shark *C. dussumieri*). There is little information on the abundance and biology of this species. It cannot be assessed beyond Data Deficient at present due to the small number of specimens, the likelihood of widespread misidentification, and the limited information available. This assessment should be revisited as further information becomes available.

EN

Endemic

Smoothtooth Blacktip Shark *Carcharhinus leiodon* Garrick, 1985

Global Red List assessment:
Endangered A2cd+3cd
Simpfendorfer, C.A., Jabado, R.W., Valinassab, T., Elhassan, I. & Moore, A.B.M.

Rationale The Smoothtooth Blacktip Shark (*Carcharhinus leiodon*) is medium-sized (to 165 cm TL) shark, endemic to the ASR, which was only rediscovered in 2009. Overall, there are a limited number of specimens reported. It is believed to occur in inshore waters where it is captured in gillnet, line and trawl fisheries within its range. Its recent re-discovery and re-description means that historically it has likely been under-recorded, however reliable identification of *Carcharhinus* species since then indicates that this species is rare and localised. Although there are limited data on its status, similar commercially important *Carcharhinus* species in the Gulf have undergone significant declines. One of the areas in which the Smoothtooth Blacktip Shark is known from (southern Oman/eastern Yemen) has been, and continues to be, subject to intensive fishing targeted at sharks, suggesting suspected population declines of 50-80 % are appropriate for this species. The other known centre of abundance around Kuwait is also subject to habitat degradation and change from water management practices in the Tigris and Euphrates rivers. Furthermore, the loss and modification of coastal habitats in the Gulf is a significant concern for inshore species such as this. A further population reduction is suspected over the next three generations (2017-2042) based on current levels of exploitation. The limited geographic range of this species compared to other similar "blacktip" species increase the risks to this species. As such, it is assessed as Endangered A2cd+3cd.

EN

Bull Shark *Carcharhinus leucas* (Müller & Henle, 1839)

Regional Red List assessment:
Endangered A2cd+3cd
Simpfendorfer, C.A., Elhassan, I., Jabado, R.W., Valinassab, T. & Moore, A.B.M.
Global Red List assessment:
Near Threatened
Simpfendorfer, C.A. & Burgess, G.H. (2005)

Rationale The Bull Shark (*Carcharhinus leucas*) is a large (to 340 cm TL) coastal species of shark that is cosmopolitan in tropical waters and occurs throughout the ASR except in the Red Sea. It grows slowly and matures late, giving it a low biological productivity. It is commonly taken in gillnet and longline fisheries, and development around rivers and estuaries is a significant threat, particularly to juveniles as these habitats are nursery areas. However, neonates have been reported from the UAE, where there are no rivers and estuaries. This highlights that, at least in the Gulf, this species is potentially not as dependent on these habitats as in other parts of the world. While still taken in fisheries in the region, there are reports of significant declines in several areas, including

Pakistan where there has been a suspected decline of 80 % since the 1990s. In India, it is a common occurrence in fisheries, but significant declines in landings have been recorded in the last 30 years. On the other hand, this species is still commonly landed in other parts of its regional range (e.g., the Gulf and Oman), and such declines are not suspected across the entire region. Ongoing high levels of fishing pressure and decline in habitat quality due to coastal and river development are of concern, and overall within the region, it is suspected that this species has declined by at least 50-80 % over the past three generations (~55 years). A further population reduction is suspected over the next three generations (2017–2072) based on current levels of exploitation and decline in habitat quality. As such the species is assessed as Endangered A2cd+3cd.

Blacktip Shark *Carcharhinus limbatus* (Müller & Henle, 1839)

VU

Regional Red List assessment:
Vulnerable A2d+3d
Simpfendorfer, C.A., Valinassab, T., Fernando, D., Elhassan, I., Tesfamichael, D. & Jabado, R.W.
Global Red List assessment:
Near Threatened
Burgess, G.H. & Branstetter, S. (2005)

Rationale The Blacktip Shark (*Carcharhinus limbatus*) is a large (to 287 cm TL) common carcharhinid species that is cosmopolitan in warm temperate, subtropical and tropical waters and occurs in inshore and offshore waters throughout the region. It is commonly taken in a wide range of artisanal and commercial fisheries and is one of the dominant species at many landing sites across the region. Inshore and offshore fishing pressure is intense throughout this species' range and is intensifying. In some areas, anecdotal evidence indicates that landings have declined (i.e., Pakistan) while in India, reports suggest that stocks of blacktip sharks (*Carcharhinus* sp.) have collapsed. Overall, the ongoing intensification of fisheries in the region, combined with reported declines in landings, and the high demand for its valuable fins, lead to a suspected population decline of at least 30-50 % over the past three generations (~39 years) in the ASR, with these declines likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2056) based on current levels of exploitation. The species is therefore assessed as Vulnerable A2d+3d.

CR

Oceanic Whitetip Shark *Carcharhinus longimanus* (Poey, 1861)

Regional Red List assessment:
Critically Endangered A2bd
Dulvy, N.K., Ali, K., Owfi, F., Spaet, J.L.Y. & Romanov, E.
Global Red List assessment:
Vulnerable A2ad+3d+4ad
Baum, J., Medina, E., Musick, J.A. & Smale, M. (2006)

Rationale The Oceanic Whitetip Shark (*Carcharhinus longimanus*) is a large (to 400 cm TL) widespread species, ranging across entire oceans in tropical and subtropical waters. It occurs throughout the ASR with the exception of the Gulf, but does not appear to be evenly distributed. This formerly abundant large oceanic shark is subject to fishing pressure virtually throughout its range. It was caught in large numbers as a bycatch in pelagic fisheries, with pelagic longlines, gillnets, handlines and occasionally pelagic and even bottom trawls. Catches, particularly in international waters, are inadequately monitored. Within the Indian Ocean (including the ASR), available historic population trend datasets show steep declines, which are the equivalent of a population decline of 94-96 % over the past three generations (~49 years). Although the Maldivian stock is now protected, theses declines are likely to represent the broader ASR with an inferred >80 % decline over the past three generations across the region. The species exhibits slow life-history characteristics, and remains at risk from extensive fishing pressure across its regional range, and is assessed as Critically Endangered A2bd.

NT

Hardnose Shark *Carcharhinus macloti* (Müller & Henle, 1839)

Regional Red List assessment:
Near Threatened
Simpfendorfer, C.A., Moore, A.B.M., Jabado, R.W. & Elhassan, I.
Global Red List assessment:
Near Threatened
Simpfendorfer, C.A. & Stevens, J.D. (2003)

Rationale The Hardnose Shark (*Carcharhinus macloti*) is a small (to 94 cm TL) continental shelf species that occurs in inshore and offshore waters to depths of 170 m. It is widespread in the Indo-West Pacific and within the ASR, occuring in coastal waters from Somalia to Sri Lanka. It has not been recorded from the Gulf of Aden or the Red Sea. Throughout this range it is caught in subsistence, artisanal and commercial fisheries that utilize gillnets, lines and trawls. Inshore fishing pressure is intense throughout this species' range, and the highest levels of exploitation probably occur in the UAE, Iran, Pakistan and India. Although of small size, its life-history may not be as productive as that of other small carcharhinids (e.g., *Rhizoprionodon* spp.), making it more susceptible to fishing pressure. Overall, the ongoing intensification of fisheries in the region, combined with reported declines of sharks in general lead to a suspected population decline of at least 20-30 % over the past three generations (~24 years) in the ASR, and that these declines are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2041) based on current levels of exploitation. As such, this species is assessed as Near Threatened (nearly meeting Vulnerable A2d+3d).

Blacktip Reef Shark *Carcharhinus melanopterus* (Quoy & Gaimard, 1824)

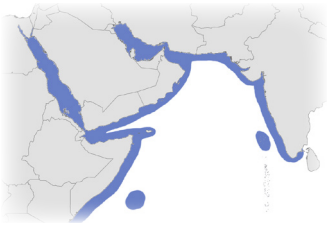
VU

Regional Red List assessment:
Vulnerable A2cd+3cd
Simpfendorfer, C.A., Fernando, D., Jabado, R.W., Valinassab, T. & Tesfamichael, D.
Global Red List assessment:
Near Threatened
Heupel, M. (2005)

Rationale The Blacktip Reef Shark (*Carcharhinus melanopterus*) is a medium-sized (to 180 cm TL) widespread species associated with coral reef habitats, occurring in the tropical Indo-West and Central Pacific, and throughout the ASR. It appears to be a resilient shark, persisting long after other species have been overfished, although it is threatened by extensive fishing pressure and habitat loss and degradation throughout the region. Ongoing high levels of fishing pressure and declines in habitat quality are of concern, and overall it is suspected that this species has declined by at least 30-50 % over the past three generations (~34 years) in the ASR. A further population reduction is suspected over the next three generations (2017–2051) based on current levels of exploitation and decline in habitat quality. As such, the species is assessed as Vulnerable A2cd+3cd.

Sandbar Shark *Carcharhinus plumbeus* (Nardo, 1827)

EN



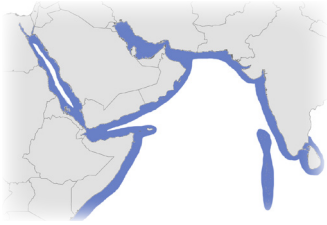
Regional Red List assessment:
Endangered A2d+3d
Simpfendorfer, C.A., Spaet, J.L.Y., Al Mamari, T. & Owfi, F.
Global Red List assessment:
Vulnerable A2bd+4bd
Musick, J.A., Stevens, J.D., Baum, J.K., Bradai, M., Clò, S., Fergusson, I., Grubbs, R.D., Soldo, A., Vacchi, M. & Vooren, C.M. (2007)

Rationale The Sandbar Shark (*Carcharhinus plumbeus*) is a medium-sized (to 240 cm TL) shark that occurs inshore and offshore to depths of 280 m. It is a cosmopolitan species but is patchily distributed and occurs throughout the ASR (although has not been reported from the Maldives). It is caught with longlines, hook-and-line, and set bottom nets. While there is limited information available on this species in the region, its large size, valuable fins and intensive fisheries mean that like many other large carcharhinids in the region, it will have declined significantly. However, this is one of the least biologically productive sharks, with high intrinsic vulnerability, and information from other parts of its global range have demonstrated that it is quickly overfished even with moderate levels of fishing. Despite a lack of species-specific data, serious concern is raised for its regional status given the intense fishing pressure on carcharhinid sharks, and the documented declines and collapses of their populations. In all likelihood, the Sandbar Shark would have been one of the first species to be depleted regionally in the face of intense and increasing fishing effort. Overall, it is suspected that this species has declined by at least 50 % over the past three generations (~86 years) in the ASR, and that these declines are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2103) based on levels of exploitation. It is therefore assessed as Endangered A2d+3d.

VU

Spottail Shark *Carcharhinus sorrah* (Müller & Henle, 1839)

Regional Red List assessment:
Vulnerable A2d+3d
Simpfendorfer, C. A., Valinassab, T., Moore, A.B.M., Jabado, R.W. & Elhassan, I.
Global Red List assessment:
Near Threatened
Pillans, R., Stevens, J.D. & White, W.T. (2007)

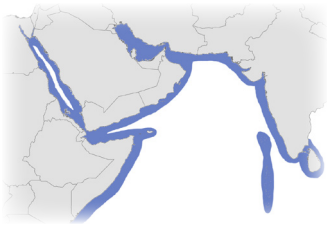


Rationale The Spottail Shark (*Carcharhinus sorrah*) is a medium-sized (to 196 cm TL) species that is widespread in the tropical Indo-West Pacific and occurs throughout the ASR in inshore and offshore waters to depths of 140 m. It is commonly taken in a wide range of artisanal and commercial fisheries and is often one of the dominant species at landing sites. Inshore fishing pressure is intense throughout this shallow water species' range, and is intensifying and in parts of its range with anecdotal evidence that stocks have declined due to fishing. Genetic studies suggest there might only be one subpopulation across the ASR raising concerns for this species if current fishing pressure persists. Overall, the ongoing intensification of fisheries in the region, combined with reported declines of sharks in general lead to a suspected population decline of at least 30-50 % over the past three generations (~24 years) in the ASR, and that these declines are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2041) based on current levels of exploitation. As such, this species is assessed as Vulnerable A2d+3d.

VU

Tiger Shark *Galeocerdo cuvier* (Péron & Lesueur, 1822)

Regional Red List assessment:
Vulnerable A2cd+3cd
Pollom, R. A., Elhassan, I., Khan, M., Spaet, J.L.Y. & Akhilesh, K.V.
Global Red List assessment:
Near Threatened
Simpfendorfer, C. A. (2005)



Rationale The Tiger Shark (*Galeocerdo cuvier*) is a large (to 550 cmTL) shelf-associated requiem shark. It is widespread in tropical waters and occurs throughout the ASR. It is a relatively productive species, and thus likely able to sustain some level of fishing pressure. However, it is subject to heavy fishing pressure by targeted shark fisheries and by being caught as bycatch in pelagic longline, bottom trawl, and gillnet fisheries. It also suffers from estuarine and mangrove habitat loss, areas which likely serve as nurseries. It has declined substantially in some areas and overall, it is suspected that declines in the Red Sea and the Gulf are in the order of 50-90 % and 90 %, respectively. Elsewhere in the region there are fewer large individuals, and declines in the order of 20-30 % have occurred. Overall, based on the ongoing intensification of fisheries in the region and decline in habitat quality, this species is suspected to have declined by at least 30-50 % in the region over the past three generations (~52 years), with a further population reduction suspected over the next three generations (2017-2069) based on current levels of exploitation. Therefore this species is assessed as Vulnerable A2cd+3cd.

Ganges Shark *Glyphis gangeticus* (Müller & Henle, 1839)

CR

Regional Red List assessment:
Critically Endangered C2a(ii)
Kyne, P. M., Khan, M., Bineesh, K.K., Akhilesh, K.V. & Jabado, R.W.
Global Red List assessment:
Critically Endangered A2cde; C2b
Compagno, L.J.V. (2007)

Rationale The Ganges Shark (*Glyphis gangeticus*) is a large (to ~275 cm TL) shark which has a patchy distribution in freshwater, estuarine and coastal areas of the Indo-West Pacific. In the region, it is known from the Karachi area adjacent to the Indus River, Pakistan, and a single record landed on the west coast of India which was likely not caught locally. There is no suitable habitat for the species west of the Indus River, Pakistan, and that system is likely to have been the most important site for the species regionally. As river sharks utilise rivers as nursery areas with female philopatry demonstrated in other species, it is assumed that the Indus River represents the only subpopulation of the species regionally (as exemplified by a lack of records of smaller individuals from outside the Karachi/Indus River area). Records of the Ganges Shark are sparse and the species is considered to be extremely rare, although its historical population size is unknown. Its reliance on riverine and estuarine habitat makes it particularly susceptible to a number of intensifying threats, including fishing, habitat degradation, increased river use, and dams and barrages which alter flow, river productivity and migration pathways. Given a lack of records, and inferred continuing decline from a variety of threats operating across its limited regional range, the Ganges Shark is assessed as Critically Endangered C2a(ii).

Broadfin Shark *Lamiopsis temminckii* (Müller & Henle, 1839)

EN

Regional Red List assessment:
Endangered A2cd+3cd
Dulvy, N.K., Bineesh, K.K., Moore, A.B.M., Grandcourt, E. & Al Mamari, T.
Global Red List assessment:
Endangered A2d+3d
White, W.T., Fahmi & Dharmadi (2008)

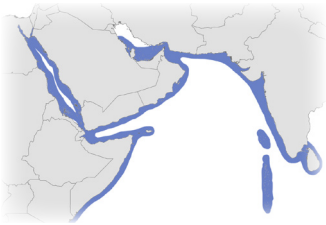
Rationale The Broadfin Shark (*Lamiopsis temmincki*) is a rare medium-sized (to 178 cm TL) shark with a sporadic distribution in the Indian Ocean including off Pakistan and India (it may prove to be endemic to the Arabian Sea as occurrence in the Bay of Bengal requires validation). It occurs on the continental shelf, mostly close inshore. The species is taken in trawl fisheries as well as bottom and floating gill nets and line gear regularly used by local fishermen off India and Pakistan. This species is apparently now rare throughout the majority of its range, but it was once known to be common off the western coast of India. No information is available to determine historical trends in other areas. It is now only observed in low numbers in heavily fished areas, indicating probable population depletion. Given its rarity, the very heavy, increasing, and unregulated fishing pressure throughout its entire range, and significant declines in the past off India, it is suspected that this species has undergone declines of 50 % or more over the past three generations (~20 years),

and with ongoing fishing pressure and habitat degradation and loss, future population declines are suspected over the next three generations (2017-2037). It is therefore assessed as Endangered A2cd+3cd.

NT

Sliteye Shark *Loxodon macrorhinus* Müller & Henle, 1839

Regional Red List assessment:
Near Threatened
Simpfendorfer, C. A., Akhilesh, K.V., Elhassan, I., Jabado, R.W. & Valinassab, T.
Global Red List assessment:
Least Concern
Simpfendorfer, C.A. & Stevens, J.D. (2003)

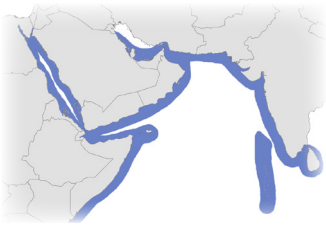


Rationale The Sliteye Shark (*Loxodon macrorhinus*) is a small (to 95 cmTL) inshore shark that is widespread in the Indo-West Pacific and occurs throughout the ASR, but has a patchy distribution. This makes the interpretation of its status more difficult (particularly off Iran, Pakistan, India and Sri Lanka) and further work to resolve trends in the population would be valuable. It is caught in inshore gillnet, trawl and line fisheries throughout its range. Inshore fishing pressure is intense throughout this shallow water species' range, is intensifying, and in parts of its range (e.g., Red Sea) its abundance has certainly declined due to fishing. While its life-history can support reasonable levels of fishing, the inference of declines in some parts of its range and the ongoing intensification of fisheries in the region, combined with reported declines of sharks in general lead to a suspected overall population decline of at least 20-30 % over the past three generations (~16 years) in the ASR, and that these declines are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2033) based on current levels of exploitation. As such, this species is assessed as Near Threatened (nearly meeting Vulnerable A2d+3d).

EN

Sharptooth Lemon Shark *Negaprion acutidens* (Rüppell, 1837)

Regional Red List assessment:
Endangered A2cd+3cd
Pollom, R. A., Ali, K., Akhilesh, K.V. & Owfi, F.
Global Red List assessment:
Vulnerable A2abcd+3bcd+4abcd
Pillans, R. (2003)



Rationale The Sharptooth Lemon Shark (*Negaprion acutidens*) is a large (to 340 cm TL) coastal shark that is widespread in the Indo-West and Central Pacific and occurs throughout the ASR. It inhabits insular shelves, coral reefs and in the Red Sea and the Gulf, uses mangroves as nursery grounds. This species exhibits slow life-history characteristics (reproductive periodicity of two years), and is at risk from extensive fishing pressure as bycatch in longline and gillnet fisheries throughout the region, and by extensive habitat degradation and loss as a result of coastal development. Landings surveys, dive surveys, diver interviews, and anecdotal evidence indicate substantial declines, likely at least 50 % over the past three generations (~49 years). While there is limited information

available on this species in the region, its large size, slow life-history, and intensive fisheries mean that like many other large sharks, it will have undergone declines across the region. Declines of at least 50 % are therefore suspected over the past three generations and are are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2066) based on current levels of exploitation and declines in habitat quality. As such, the species is assessed as Endangered A2cd+3cd.

Blue Shark *Prionace glauca* (Linnaeus, 1758)

NT

Regional Red List assessment:
Near Threatened
Dulvy, N.K., Romanov, E., Spaet, J.L.Y., Ali, K. & Owfi, F.
Global Red List assessment:
Near Threatened
Stevens, J.D. (2005)

Rationale The Blue Shark (*Prionace glauca*) is a large (to 380 cm TL) pelagic oceanic shark which is widespread in temperate and tropical waters. In the ASR, it does not occur in the Gulf or the Red Sea. This species is considered productive as it is relatively fast-growing and fecund, maturing in 4–6 years and producing average litters of 35 pups. Around the world, the Blue Shark is taken in large numbers (an estimated 20 million individuals annually), mainly as bycatch, but there are no population estimates and many catches are unreported. IOTC fishery assessments suggest a wide range of stock statuses ranging from 'underexploited' to 'overfished with overfishing' occurring. Although there is little information on stock status in the ASR, it is suspected that the extensive fishing pressure occurring in many parts of the region has resulted in the regional population undergoing a population size reduction of at least 20-30 % over the past three generations (~31 years). With ongoing fishing pressure, a future population decline is suspected over the next three generations (2017-2048), and the Blue Shark is therefore assessed as Near Threatened (nearly meeting Vulnerable A2d+3d).

Milk Shark *Rhizoprionodon acutus* (Rüppell, 1837)

NT

Regional Red List assessment:
Near Threatened
Simpfendorfer, C. A., Akhilesh, K.V., Elhassan, I., Jabado, R.W. & Valinassab, T.
Global Red List assessment:
Least Concern
Simpfendorfer, C. A. (2003)

Rationale The Milk Shark (*Rhizoprionodon acutus*), is a medium-sized species reported to attain a maximum size of 178 cm TL although it appears to be smaller in the region (to 98 cm TL). It is widespread in the Indo-West Pacific and Eastern Atlantic Oceans and occurs throughout the ASR. It is commonly taken in a wide range of artisanal, subsistence and commercial fisheries and is often

the dominant species at landing sites. It is one of the most productive shark species enhancing its ability to sustain some level of pressure from fisheries. Inshore fishing pressure is intense throughout this shallow water species' range, and is intensifying in parts of its range (e.g., Red Sea), and its abundance is suspected to have declined due to fishing. While its life-history can support reasonable levels of fishing, the inference of declines in some parts of its range and the ongoing intensification of fisheries in the region, combined with reported declines of sharks in general, lead to a overall suspected population decline of at least 20-30 % over the past three generations (~15 years) in the ASR, and that these declines are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2032) based on current levels of exploitation. As such, this species is assessed as Near Threatened (nearly meeting Vulnerable A2d+3d).

NT

Grey Sharpnose Shark *Rhizoprionodon oligolinx* Springer, 1964

Regional Red List assessment:
Near Threatened
Simpfendorfer, C. A., Valinassab, T., Elhassan, I., Jabado, R.W. & Akhilesh, K.V.
Global Red List assessment:
Least Concern
Simpfendorfer, C. A. (2003)

Rationale The Grey Sharpnose Shark (*Rhizoprionodon oligolinx*) is a small (to 93 cm TL) species widespread in the Indo-West Pacific in muddy littoral waters to depths of 36 m. In the ASR, it only occurs from the Gulf down to Sri Lanka. It is reported as a dominant species in landings in several countries and is particularly susceptible to inshore fisheries. It is caught in commercial trawling, artisanal fishing, hook-and-line fishing and gillnetting throughout the region. Its biology is poorly-known, but it is assumed to be a productive shark species, allowing it to sustain some fishing pressure. However, intensive and increasing fishing means that like many other species, populations are likely to have declined. The ongoing intensification of fisheries in the region, combined with reported declines of sharks in general lead to a suspected population decline of at least 20-30 % over the past three generations (12 years) and further population reduction is suspected over the next three generations (2017-2029) based on current levels of exploitation. As such, this species is assessed as Near Threatened (nearly meeting Vulnerable A2d+3d).

Spadenose Shark *Scoliodon laticaudus* Müller & Henle, 1838

NT

Regional Red List assessment:
Near Threatened
Simpfendorfer, C. A., Valinassab, T., Elhassan, I., Jabado, R.W. & Akhilesh, K.V.
Global Red List assessment:
Near Threatened
Simpfendorfer, C. A. (2005)

Rationale The Spadenose Shark (*Scoliodon laticaudus*) is a small (to 91 cm TL) coastal shark widespread in the Indo-West Pacific that inhabits muddy and sandy substrates at depths to 80 m. In the ASR it occurs from the Sea of Oman (eastern coast) to Sri Lanka. It is reported as a dominant species in landings in Pakistan and India and is particularly susceptible to inshore fisheries. It is caught in commercial trawling, artisanal fishing, hook-and-line fishing and gillnetting throughout the region. It is likely that its relatively high productivity makes it more resilient to fishing than most other shark species. However, because of its limited fecundity, concern exists that ongoing increases in catches will lead to recruitment overfishing and so a precautionary approach should be applied. Intensive and increasing fishing means that like many other species, populations will have declined. The ongoing intensification of fisheries in the region, combined with reported declines of sharks in general lead to a suspected population decline of at least 20-30 % over the past three generations (11 years) and further population reduction is suspected over the next three generations (2017-2028) based on current levels of exploitation. As such, this species is assessed as Near Threatened (nearly meeting Vulnerable A2d+3d).

Whitetip Reef Shark *Triaenodon obesus* (Rüppell, 1837)

VU

Regional Red List assessment:
Vulnerable A2cd+3cd
Pollom, R. A., Akhilesh, K.V., Spaet, J.L.Y., Owfi, F. & Ali, K.
Global Red List assessment:
Near Threatened
Smale, M.J. (2005)

Rationale The Whitetip Reef Shark (*Triaenodon obesus*) is a medium-sized (to at least 200 cm TL) coastal shark species that inhabits coral reefs. It is widespread in the tropical Indo-West Pacific and occurs through most of the ASR (excluding the Gulf). The species exhibits moderately slow life-history characteristics, and is threatened by extensive fishing pressure and habitat loss and degradation throughout the region. Although the Maldivian stock is common and protected, extensive declines have been observed elsewhere in the region including the Red Sea, Pakistan and India. Ongoing high levels of fishing pressure and coastal development are of concern, and overall it is suspected that declines of at least 30 % have occurred across the ASR over the past three generations (~37 years). A further population reduction is suspected over the next three generations (2017–2054) based on current levels of exploitation, and a decline in habitat quality. As such, the species is assessed as Vulnerable A2cd+3cd.

FAMILY HEMIGALEIDAE

VU

Hooktooth Shark *Chaenogaleus macrostoma* (Bleeker, 1852)

Regional Red List assessment:
Vulnerable A2d+3d
Simpfendorfer, C. A., Jabado, R.W., Valinassab, T., Moore, A.B.M. & Elhassan, I.
Global Red List assessment:
Vulnerable A2bd+3bd
White, W.T. (2008)

Rationale The Hooktooth Shark (*Chaenogaleus macrostoma*) is a small (to 93 cm TL) inshore species occurring on continental and insular shelves to depths of at least 160 m. It is wide-ranging but patchy in the Indo-West Pacific. In the ASR, it occurs in the Gulf, the Sea of Oman, to India and Sri Lanka, as well as along the Somali coast of the Arabian Sea. It is caught in gillnet, line and trawl fisheries and landed in coastal fisheries within its regional range although it is never abundant. Although information on its biology is still limited, it is suspected as having a moderately unproductive life-history, making it susceptible to fishing pressure. Furthermore, while there are limited data on its status, other commercially important species of sharks in the region have undergone significant declines with some stocks having collapsed. Given the suspected life-history of this species and the intensive fishing targeted at sharks in the region, it is suspected that the population has declined by at least 30-50 % over the past three generations (24 years) and these declines are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2041) based on current levels of exploitation. It is therefore assessed as Vulnerable A2d+3d.

VU

Sickelfin Weasel Shark *Hemigaleus microstoma* Bleeker, 1852

Regional Red List assessment:
Vulnerable A2d+3d
Pollom, R. A., Romanov, E., Owfi, F., Akhilesh, K.V. & Ali, K.
Global Red List assessment:
Vulnerable A2d+3d+4d
White, W.T. (2007)

Rationale The Sickelfin Weasel Shark (*Hemigaleus microstoma*) is a small (to 114 cm TL) and poorly-known weasel shark that inhabits coastal and shelf areas to depths of at least 170 m. It is widespread in the Indo-West Pacific and in the ASR, it is known to occur in the Red Sea, Gulf of Aden, Sea of Oman to southern India and Sri Lanka, but is not very common. It is regularly caught as bycatch in gillnet, longline, and hook-and-line fisheries. Although information on its biology is limited, it has a small litter size (2-5), and is suspected of having a moderately unproductive life-history, making it susceptible to fishing pressure. Furthermore, while there are limited data on its status, other commercially important species of sharks in the region have undergone significant declines with some stocks having collapsed. Given the life-history of this species and the intensive

fishing targeted at sharks in the region, it is suspected that the population has declined by at least 30-50 % over the past three generations (24 years) and these declines are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2041) based on current levels of exploitation. It is therefore assessed as Vulnerable A2d+3d.

Snaggletooth Shark *Hemipristis elongata* (Klunzinger, 1871)

VU

Regional Red List assessment:
Vulnerable A2d+3d
Simpfendorfer, C. A., Moore, A.B.M., Jabado, R.W. & Elhassan, I.
Global Red List assessment:
Vulnerable A2bd+3bd
White, W.T. & Simpfendorfer, C. A. (2015)

Rationale The Snaggletooth Shark (*Hemipristis elongata*) is a medium-sized (to 280 cm TL) shark that is widespread in the Indo-West Pacific. It is usually found on the continental shelf, inshore to a depth of 130 m and occurs throughout the ASR. This species is uncommon in areas where it occurs and has a relatively unproductive life-history. It is taken in a variety of gear and the increasing fisheries in the region are of concern, especially since localized extinctions have been documented outside this region. While there is limited information available on this species in the region, its large size, relative rarity, and the presence of intensive fisheries mean that like many other large carcharhinids (that are morphologically and ecologically similar to hemigaleids) in the region, it will have undergone declines. These declines are suspected to be in the order of 30-50 % over the past three generations (27 years) in the ASR, and are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2044) based on current levels of exploitation. As such, the species is listed as Vulnerable A2d+3d.

Slender Weasel Shark *Paragaleus randalli* Compagno, Krupp & Carpenter, 1996

VU

Regional Red List assessment:
Vulnerable A2cd+3cd
Simpfendorfer, C. A., Elhassan, I., Jabado, R.W. & Moore, A.B.M.
Global Red List assessment:
Near Threatened
Moore, A.B.M. (2008)

Rationale The Slender Weasel Shark (*Paragaleus randalli*) is a small (to 84 cm TL) shark with a patchy distribution in the Northern Indian Ocean. In the ASR, it occurs in the Gulf, inner Sea of Oman, India and Sri Lanka in inshore shallow waters to 18 m depth. The species is poorly-known, having only been described in 1996 and thus, misidentifications throughout its range are likely to have been (and continue to be) common, with its true abundance and distribution being poorly-known. It is caught in inshore gillnet, trawl and line fisheries throughout its range. This species is likely to be marketed widely (along with other small hemigaleids and carcharhinids) throughout its range. Inshore fishing pressure is intense throughout this shallow water species' range, and is

intensifying with an ongoing decline in habitat quality due to coastal development, particularly in the Gulf. This is of critical concern for this species, since it occurs in a very narrow depth range in shallow coastal waters. Overall, the ongoing intensification of fisheries in the region, combined with reported declines of sharks in general, and a decline in habitat quality, lead to a suspected population decline of at least 30-50 % over the past three generations (~24 years) in the ASR, and these declines are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2041) based on current levels of exploitation. As such, this species is assessed as Vulnerable A2cd+3cd.

FAMILY **PROSCYLLIDAE**

LC

Endemic

Harlequin Catshark *Ctenacis fehlmanni* (Springer, 1968)

Global Red List assessment:
Least Concern
Ebert, D.A., Akhilesh, K.V., Tesfamichael, D., Valinassab, T. & Cronin, E.S.

Rationale The Harlequin Catshark (*Ctenacis fehlmanni*) is a small (to at least 52 cm TL) outer shelf dwelling shark, known from 70 m to over 300 m depth off Somalia in the Arabian Sea. It is endemic to the ASR, and little is known about the biology or ecology of this species. This poorly-known deepsea shark occurs in an area where no deepsea trawling fisheries take place and there are no other known threats. Due to the depth of occurrence and the lack of deepsea fisheries in its range, the species is assessed as Least Concern.

LC

Pygmy Ribbontail Catshark *Eridacnis radcliffei* Smith, 1913

Regional Red List assessment:
Least Concern
Ebert, D.A., Valinassab, T., Tesfamichael, D. & Akhilesh, K.V.
Global Red List assessment:
Least Concern
McCormack, C., White, W.T., Tanaka, S., Nakayno, K., Iglesias, S., Gaudiano, J.P. & Capadan, P. (2008)

Rationale The Pygmy Ribbontail Catshark (*Eridacnis radcliffei*) is a very small (to 25.7 cm TL) deepsea catshark, occurring on the outer continental shelf and upper slopes at depths of 71 to 766 m. It has a widespread but patchy distribution in the Indo-West Pacific, and in the ASR is known from southwest India, Sri Lanka and the Gulf of Aden. It is reportedly common off India where it is a regular bycatch in the deepsea shrimp trawl fishery. Given the intensity of that fishery,

it is possible that the species has declined locally, although no data are available. The species has a low fecundity of 1-2 young per litter, which suggests it has low biological productivity. The Pygmy Ribbontail Catshark probably has some refuge at depth off southern India beyond the current limits of the Indian trawl fishery (~500 m). Furthermore, there are currently no deepsea trawl fisheries in the Gulf of Aden so no threats are evident in that part of its range. Given these refugia, the species is assessed as Least Concern. Catches should be monitored off India, and a reassessment may be required if declines become evident.

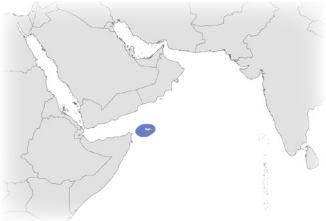
FAMILY **PSEUDOTRIAKIDAE**

Dwarf False Catshark *Planonasus parini* Weigmann, Stehmann & Theil, 2013

LC

Endemic

Global Red List assessment:
Least Concern
Ebert, D.A., Akhilesh, K.V., Grandcourt, E. & Khan, M.



Rationale The Dwarf False Catshark (*Planonasus parini*) is a small (to at least 53 cm TL) shark which is endemic to the ASR, where it is known from only three specimens taken off Socotra Island, Yemen. It occurs at depths beyond any current fisheries (560-1,120 m). The only known specimens of this species were taken on survey trawls in the late 1980s and no additional specimens of this species are known. It appears to occur in very deep water, beyond normal fishing operations, and there are no other known threats. Therefore it is assessed as Least Concern, although further information is required on its distribution and biology.

FAMILY **SCYLIORHINIDAE**

Shortbelly Catshark *Apristurus breviventralis* Kawauchi, Weigmann & Nakaya, 2014

LC

Endemic

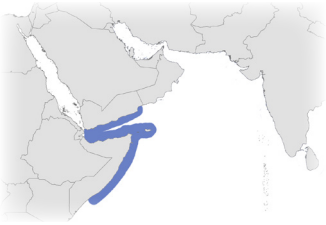
Global Red List assessment:
Least Concern
Ebert, D.A., Akhilesh, K.V., Khan, M. & Ali, M.

Rationale The Shortbelly Catshark (*Apristurus breviventralis*) is endemic to the ASR and known from only nine specimens from the Gulf of Aden around the Socotra Island, Yemen. It occurs at 1,000-1,120 m depth, reaches at least 48.5 cm TL, but its biology is virtually unknown. It is assessed as Least Concern due to its deepsea habitat and the lack of fisheries where it occurs. A reassessment may be required as more information is obtained on the full range of its occurrence in the region.

LC

Endemic

Smallbelly Catshark *Apristurus indicus* (Brauer, 1906)



Global Red List assessment:
Least Concern
Ebert, D.A., Akhilesh, K.V., Valinassab, T. & Tesfamichael, D.

Rationale The Smallbelly Catshark (*Apristurus indicus*) is endemic to the ASR and known from only a handful of specimens captured in the Gulf of Aden and off Somalia in the Arabian Sea. It occurs at depths of 1,282-1,840 m, reaches at least 34 cm TL, but its biology is virtually unknown. Records from off Oman and India require confirmation and previous records referring to this species from the Southeast Atlantic are of a different species. It is assessed as Least Concern due to its deepsea habitat and the lack of fisheries where it occurs. A reassessment may be required as more information is obtained on the full range of its occurrence in the region.

DD

Coral Catshark *Atelomycterus marmoratus* (Anonymous [Bennett], 1830)

Regional Red List assessment:
Data Deficient
Kyne, P. M., Ebert, D.A., Akhilesh, K.V., Tesfamichael, D. & Valinassab, T.
Global Red List assessment:
Near Threatened
White, W.T. (2003)

Rationale The Coral Catshark (*Atelomycterus marmoratus*) is a small (to 70 cm TL) species that has a wide range in the tropical regions of the Indo-West Pacific. In the ASR, it has been confirmed from Sri Lanka, but requires confirmation from elsewhere. The Coral Catshark is a little known inshore species found on coral reefs. Given the species' small size, it is not targeted locally for food, but may be caught as bycatch on occasion, particularly in trawls operating near reef areas. The species was apparently never common around Sri Lanka where it is suspected to have undergone possible declines due to collection for the aquarium trade. In other parts of its range, it is landed and utilised, despite low value, and its interactions with fisheries in the region needs to be better understood. Given the current lack of knowledge on its status in the region (where it may only occur marginally), it is assessed as Data Deficient, noting that there is some concern for the status of the species locally.

Arabian Catshark *Bythaelurus alcockii* (Garman, 1913)

DD

Endemic

Global Red List assessment:
Data Deficient
White, W.T., Ebert, D.A., Grandcourt, E., Khan, M. & Akhilesh, K.V.

Rationale The holotype, and only known specimen of the Arabian Catshark (*Bythaelurus alcockii*), from the Indian Museum in Calcutta may be lost. It was presumably small (<30 cm TL) and was captured in the Arabian Sea, off Pakistan, at a depth of between 1,134 to 1,262 m. All aspects of the biology (including maximum size) and levels of threats are unknown. The taxonomic status and validity of this species is uncertain. The only known specimen may have actually been an *Apristurus* species. Given the uncertain taxonomic status of this species, and the fact that the only known specimen may be lost, it is assessed as Data Deficient at present. This assessment should be revisited as further information becomes available.

Bristly Catshark *Bythaelurus hispidus* (Alcock, 1891)

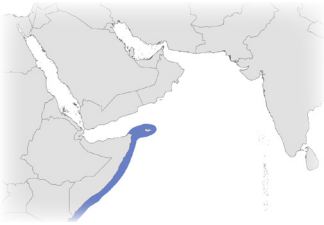
DD

Regional Red List assessment:
Data Deficient
Ebert, D.A., Akhilesh, K.V., Ali, M. & Khan, M.
Global Red List assessment:
Data Deficient
White, W.T. (2004)

Rationale The Bristly Catshark (*Bythaelurus hispidus*) is a benthic deepsea shark found on the upper continental slope at depths of 200 to 766 m. It has a patchy distribution in the Northern Indian Ocean, and within the ASR is known only from off southern India and Sri Lanka. This small shark reaches a maximum size of around 36 cm TL, and is viviparous with a low fecundity of two young per litter, suggesting it has low biological productivity. It is a relatively rare bycatch in the deepsea shrimp trawl fishery off southwest India, and there are concerns that the regional population may have been impacted by that fishery given its intensity. The species may have some refuge in depths outside of the current operations of the trawl fishery (200-500 m). Further information is required on the impact of the trawl fishery through catch monitoring which may show that the species meets a threatened category based on actual levels of exploitation (bycatch). Until such information is available the species cannot be assessed beyond Data Deficient.

LC

Narrow Catshark *Bythaelurus tenuicephalus* Kaschner, Weigmann & Thiel, 2015



Regional Red List assessment:
Least Concern
Ebert, D.A., Akhilesh, K.V., Valinassab, T. & Tesfamichael, D.
Global Red List assessment:
Not Evaluated

Rationale The Narrow Catshark (*Bythaelurus tenuicephalus*) is a small (to at least 29 cm TL) species that occurs in deep waters at depths of 463-550 m around Somalia and the Socotra Island, Yemen. Little else is known of its biology or ecology. Specimens from the region were taken during trawl surveys in the late 1980s and this species appears to occur in very deep water, beyond normal fishing operations, with no other known threats. Therefore, it is assessed as Least Concern, although information is required on the full range of its occurrence in the region and its biology.

DD

Indian Swellshark *Cephaloscyllium silasi* (Talwar, 1974)

Regional Red List assessment:
Data Deficient
Ebert, D.A., Akhilesh, K.V., Ali, M. & Khan, M.
Global Red List assessment:
Data Deficient
McCormack, C. (2008)

Rationale The Indian Swellshark (*Cephaloscyllium silasi*) is a small (to 45 cm TL) deepsea catshark known from only a small number of specimens caught off southwest India and in Andaman waters. The reported depth range is 150-500 m, and it has been caught in the deepsea shrimp trawl fishery operating off southwest India. More information is required on its biology, abundance and full range, capture in fisheries and population trends. While the limited number of individuals recorded to date may suggest this species occurs in areas outside the range of current fisheries, there is little information on its life-history and geographic range and it cannot be assessed beyond Data Deficient at present. However, concerns are raised due to its apparent rarity and patchy distribution, and the intensity of deepsea trawling off southwest India. This assessment should be revisited as further information becomes available.

Speckled Catshark *Halaelurus boesemani* Springer & D'Aubrey, 1972

VU

Endemic

Global Red List assessment:
Vulnerable A2d
Kyne, P. M., Ebert, D.A., Akhilesh, K.V., Tesfamichael, D. & Valinassab, T.

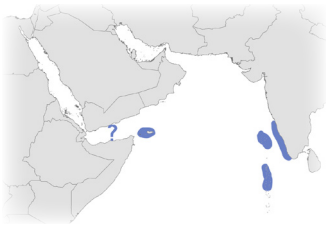
Rationale The Speckled Catshark (*Halaelurus boesemani*) is a relatively small (to 48 cm TL), data-poor catshark. It is endemic to the ASR and known from a limited number of specimens collected from four locations along an ~900 km stretch of Somali coastline. It occurs on continental and insular shelves at depths of 29-91 m. Its entire distribution has been subject to at least four decades of unregulated commercial benthic trawling; shelf-occurring catsharks are very susceptible to capture in this fishing gear. The new Somali Fisheries Law bans benthic trawling, but it is suspected that past declines have already occurred given the long history of unregulated fishing across its entire range. Furthermore, enforcement of this new regulation will be a challenge. While specific data are lacking, a population size reduction of 30-50 % is suspected over the past three generations (~45 years) based on actual levels of exploitation (bycatch) and the species is assessed as Vulnerable A2d. It is of concern that there have been no records since 1991, although it is acknowledged that research and monitoring have been limited in Somalia. Further investigation of this species is required to accurately define its range, biology, extent of catches in local fisheries and levels of declines. This assessment should be revisited as soon as this is available.

Quagga Catshark *Halaelurus quagga* (Alcock, 1899)

DD

Endemic

Global Red List assessment:
Data Deficient
Ebert, D.A., Tesfamichael, D., Valinassab, T. & Akhilesh, K.V.



Rationale The Quagga Catshark (*Halaelurus quagga*) is a poorly-known catshark, endemic to the ASR, and recorded from very few specimens. It has a fragmented known distribution occurring off southwest India, and around the Socotra Archipelago (Yemen). This small shark (reaching ~37 cm TL) occurs at depths of 54-300 m, but appears to be a mostly deepsea species. The development of intense deepsea bottom trawl fishing off southwest India where the species is most likely to be taken as bycatch is a concern. Its small size means that it would be discarded at sea, but survivorship would be low. There are currently no deepsea fishing activities around the Socotra Archipelago. Declines off southwest India are suspected, but the extent to which fishing is affecting the species there is not known. Despite some concern, the species is assessed as Data Deficient, with an urgent need to assess bycatch rates in the Indian deepsea shrimp trawl fishery.

FAMILY SPHYRNIDAE

CR

Winghead Shark *Eusphyra blochii* (Cuvier, 1816)

Regional Red List assessment:
Critically Endangered A2d+3d
Pollom, R. A., Bineesh, K.K., Owfi, F., Moore, A.B.M. & Spaet, J.L.Y.
Global Red List assessment:
Endangered A2d+3d
Smart, J.J. & Simpfendorfer, C. A. (2015)

Rationale The Winghead Shark (*Eusphyra blochii*) is a medium-sized (to 186 cm TL) highly distinctive Indo-West Pacific continental shelf species. In the ASR, it occurs from the Sea of Oman to Sri Lanka, with records from the Gulf requiring confirmation. It is a slow growing species, and its life-history parameters along with its apparent patchy localised distribution increases its susceptibility to depletion due to heavy fishing effort. Anecdotal evidence from India and Pakistan suggests that this species has drastically declined in landings over the past 30-40 years (by over 50 %) where it used to be commonly reported. It has become extremely rare throughout its regional range with only 1-2 individuals reported yearly despite extensive landing site surveys, raising serious concerns for this species. Its whole regional range overlaps with areas of intense and increasing fishing pressure with large numbers of artisanal and industrial vessels operating in inshore and offshore waters of India and Pakistan. Both juveniles and adults mostly occur in shallow coastal areas or close to estuaries where fishing effort is intense and therefore this species is unlikely to have any refuge. Furthermore, significant declines in landings of commercial shark species have been documented in the region with other more abundant hammerhead species suspected to have declined by at least 50-80 % over the past three generations. While there is limited information available on this species in the region, its low productivity, rarity, valuable fins, and the presence of intensive fisheries mean that like many other shark species in the region it has undergone significant declines. It is suspected that this species has declined by at least 80 % over the past three generations (42 years) in the ASR based on current levels of exploitation, and that these declines are ongoing. A further population reduction is suspected over the next three generations (2017–2059). It is therefore assessed as Critically Endangered A2d+3d.

EN

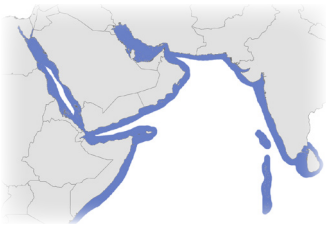
Scalloped Hammerhead *Sphyrna lewini* (Griffith & Smith, 1834)

Regional Red List assessment:
Endangered A2d+3d
Dulvy, N.K., Owfi, F., Romanov, E., Spaet, J.L.Y. & Ali, K.
Global Red List assessment:
Endangered A2bd+4bd
Baum, J., Clarke, S., Domingo, A., Ducrocq, M., Lamónaca, A.F., Gaibor, N., Graham, R., Jorgensen, S., Kotas, J.E., Medina, E., Martinez-Ortiz, J., Monzini Taccone di Sitizano, J., Morales, M.R., Navarro, S.S., Pérez-Jiménez, J.C., Ruiz, C., Smith, W., Valenti, S.V. & Vooren, C.M. (2007)

Rationale The Scalloped Hammerhead (*Sphyrna lewini*) is a large (to 346 cm TL) coastal and semi-oceanic hammerhead shark that is circumglobal in warm temperate and tropical seas, from the surface and intertidal zone to at least 1,000 m depth. It occurs throughout the ASR and there is evidence for a distinct subpopulation of this species from a genetic study of samples from the Gulf (UAE), northern Arabian Sea (Oman), and Red Sea (Saudi Arabia). All life-stages are vulnerable to capture as both target and bycatch in fisheries; large numbers of juveniles are captured in a variety of fishing gears in nearshore coastal waters, and adults are taken in gillnets and longlines along the shelf and offshore in oceanic waters. Across the region, there are reports of declines in landings of this species combined with heavy and increasing fishing pressure. The species is particularly susceptible to fishing and its aggregating behavior means that it is usually caught in high numbers which can lead to a rapid depletion of regional stocks. Given reported declines in landings, high value fins, vulnerability to and intensifying fishing pressure in the region, it is suspected that the Scalloped Hammerhead has declined by at least 50 % over the past three generations (72 years) in the ASR and that these declines are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2089) based on current levels of exploitation. Therefore, this species is assessed as Endangered A2d+3d.

EN

Great Hammerhead *Sphyrna mokarran* (Rüppell, 1837)



Regional Red List assessment:
Endangered A2d+3d
Dulvy, N.K., Spaet, J.L.Y., Romanov, E., Ali, K., Khan, M. & Owfi, F.
Global Red List assessment:
Endangered A2bd+4bd
Denham, J., Stevens, J.D., Simpfendorfer, C.A., Heupel, M.R., Cliff, G., Morgan, A., Graham, R., Ducrocq, M., Dulvy, N.K., Seisay, M., Asber, M., Valenti, S.V., Litvinov, F., Martins, P., Lemine Ould Sidi, M., Tous, P. & Bucal, D. (2007)

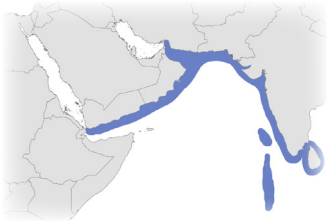
Rationale The Great Hammerhead (*Sphyrna mokarran*) is a large (to 610 cm TL), widely distributed, tropical hammerhead shark largely restricted to continental shelves, that occurs throughout the ASR. Generally regarded as solitary, this species is therefore unlikely to be abundant wherever it occurs. It is caught in a variety of gear but seems particularly susceptible to gillnet and longline

fisheries. It is highly valued for its fins (in target and incidental fisheries), suffers very high bycatch mortality, making it vulnerable to over-exploitation and population depletion. While there is limited information available on this species in the region, its large size, valuable fins, and intensive fisheries mean that like many other large sharks, it has undergone significant declines. Based on declines in catch in adjacent regions, the relative rarity of the species in landings, the intensifying of fisheries in the region, and the species' low productivity and high post-release mortality, it is suspected that this species has declined by at least 50 % over the past three generations (75 years) and that these declines are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2092) based on current levels of exploitation. Therefore the Great Hammerhead is assessed as Endangered A2d+3d.

EN

Smooth Hammerhead *Sphyrna zygaena* (Linnaeus, 1758)

Regional Red List assessment:
Endangered A2d+3d
Dulvy, N.K., Owfi, F., Romanov, E., Ali, K., Khan, M. & Spaet, J.L.Y.
Global Red List assessment:
Vulnerable A2bd+3bd+4bd
Casper, B.M., Domingo, A., Gaibor, N., Heupel, M.R., Kotas, E., Lamónaca, A.F., Pérez-Jimenez, J.C., Simpfendorfer, C. A., Smith, W.D., Stevens, J.D., Soldo, A. & Vooren, C.M. (2005)



Rationale The Smooth Hammerhead (*Sphyrna zygaena*) is a large (to 400 cm TL) species found world-wide in temperate and tropical seas. It is semi-pelagic and occurs on the continental shelf. The full extent of this species' range in tropical waters may be incompletely known at present, due to probable confusion with the more abundant Scalloped Hammerhead (*S. lewini*). In the ASR, it is widespread in the Arabian Sea including in southern India and Sri Lanka but has not been reported from the Gulf or the Red Sea. Although few data are available on the Smooth Hammerhead's life-history characteristics, it is a large hammerhead shark and presumably at least as susceptible to over-exploitation as the Scalloped Hammerhead due to its low productivity. This species is caught with a wide variety of fishing gears in both coastal and oceanic fisheries, as bycatch and a target species. The Smooth Hammerhead's large fins are highly valued for their high fin ray count and they are being increasingly targeted in some areas in response to increasing demand for the fin trade. Despite the lack of data, the similar ecology, low productivity, and presence of intensive fisheries, mean that this species, like other large sharks in the region, will have undergone significant declines. It is suspected it has undergone declines of 50 % over the past three generations (72 years) in the ASR, and that these declines are likely to be ongoing. A further population reduction is suspected over the next three generations (2017–2089) based on current levels of exploitation. The Smooth Hammerhead is assessed as Endangered A2d+3d.

FAMILY TRIAKIDAE

Bigeye Houndshark *Iago omanensis* (Norman, 1939)

LC

Regional Red List assessment:
Least Concern
Simpfendorfer, C. A., Jabado, R.W., Elhassan, I. & Moore, A.B.M.
Global Red List assessment:
Least Concern
Baranes, A. & McCormack, C. (2008)

Rationale The Bigeye Houndshark (*Iago omanensis*) is a small (to 84 cm TL) shark found on continental shelves and slopes at depths of 110-1,000 m, and possibly to as deep as 2,195 m. It occurs in the Red Sea and along the coast from Oman to India with the exception of the Gulf. It is taken by gillnet or trawl fisheries and appears to be common in some areas of its range, such as Oman and northwest India. The species segregates by sex and adult females occur in shallower waters than males (~300 m) and are therefore more vulnerable to capture in fisheries. Although there is some anecdotal evidence for declines in the Gulf of Aqaba (Red Sea), the species has a wide depth and geographic range and, overall, there is no evidence to suggest that the regional population has declined sufficiently to warrant concern. Also, while there is some fishing in deeper waters from trawls and longliners in the Red Sea, over 80 % of fisheries are artisanal and do not operate in deep waters. Similarly, in Oman trawling was banned in 2011 which has likely provided this species with refuge. The species is therefore assessed as Least Concern, given probable extensive refuge in deep waters. Further investigation of this species is required to accurately define its range, biology, extent of catches in local fisheries and any levels of declines, especially off the coast of India. This assessment should be revisited as soon as this is available.

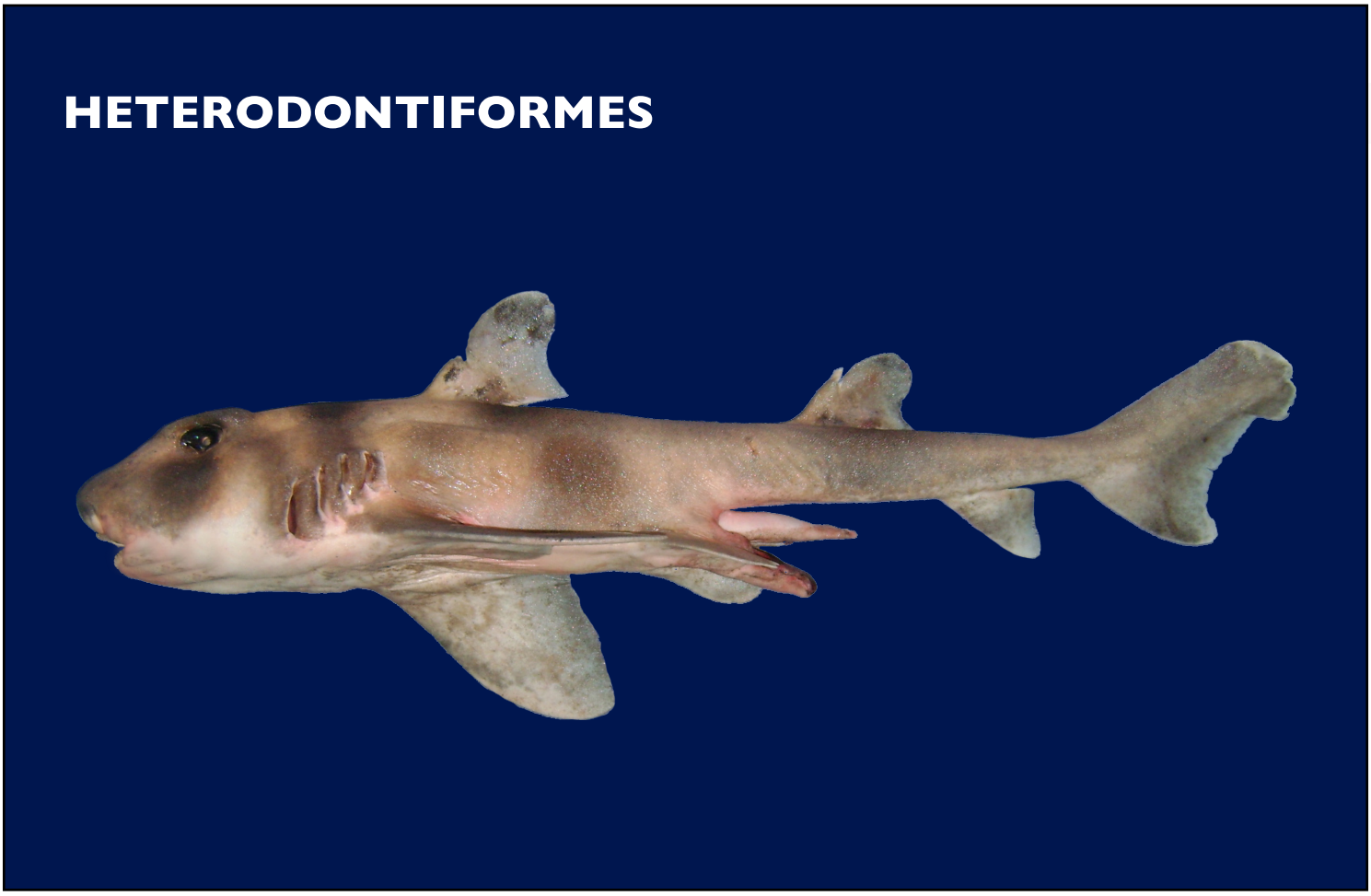
Arabian Smoothhound *Mustelus mosis* Hemprich & Ehrenberg, 1899

LC

Regional Red List assessment:
Least Concern
Simpfendorfer, C.A., Jabado, R.W., Moore, A.B.M., Elhassan, I. & Spaet, J.L.Y.
Global Red List assessment:
Data Deficient
Valenti, S.V. (2008)

Rationale The Arabian Smoothhound (*Mustelus mosis*) is a small houndshark attaining about 100 cm TL which occurs throughout the ASR. It is reported as relatively common in its range and is found at depths of 0-250 m but has a patchy distribution. This species is captured in multiple gears (bottom trawls, fixed bottom and floating gillnets, and line gear) and retained for human consumption in some parts of its range. Inshore fishing pressure is generally intense within its range, although no data are currently available on population trends. Furthermore, in the Gulf, it remains one of the dominant species in landings. It is likely to be relatively productive, as are many *Mustelus* species. Based on the lack of evidence for declines, continued importance in fisheries landings and relatively high biological productivity, this species is assessed as Least Concern.

HETERODONTIFORMES



Oman Bullhead Shark -- ***Heterodontus omanensis*** © Muhammad Moazzam Khan

FAMILY HETERODONTIDAE

DD

Endemic

Oman Bullhead Shark *Heterodontus omanensis* Baldwin, 2005

Global Red List assessment:
Data Deficient
Ebert, D.A., Khan, M., Valinassab, T., Akhilesh, K.V. & Tesfamichael, D.

Rationale The Oman Bullhead Shark (*Heterodontus omanensis*) is a small (to at least 61 cm TL) shark, endemic to the ASR, and known only from central Oman and Pakistan. Although information is limited on its habitat and ecology, based on known habitats of other *Heterodontus* species, it likely inhabits a rocky reef substrate, reducing its vulnerability to bottom trawl fisheries. However, there are trawl caught records of this species, and it is a potential bycatch of demersal line fisheries operating within its range, although no specific information is currently available. More information is required on its biology, abundance and full range, capture in fisheries and population trends. While the limited number of individuals recorded to date may suggest this species occurs in areas not fished heavily, there is currently insufficient information to assess how fisheries in the region are interacting with the species, and as such, it is assessed as Data Deficient.

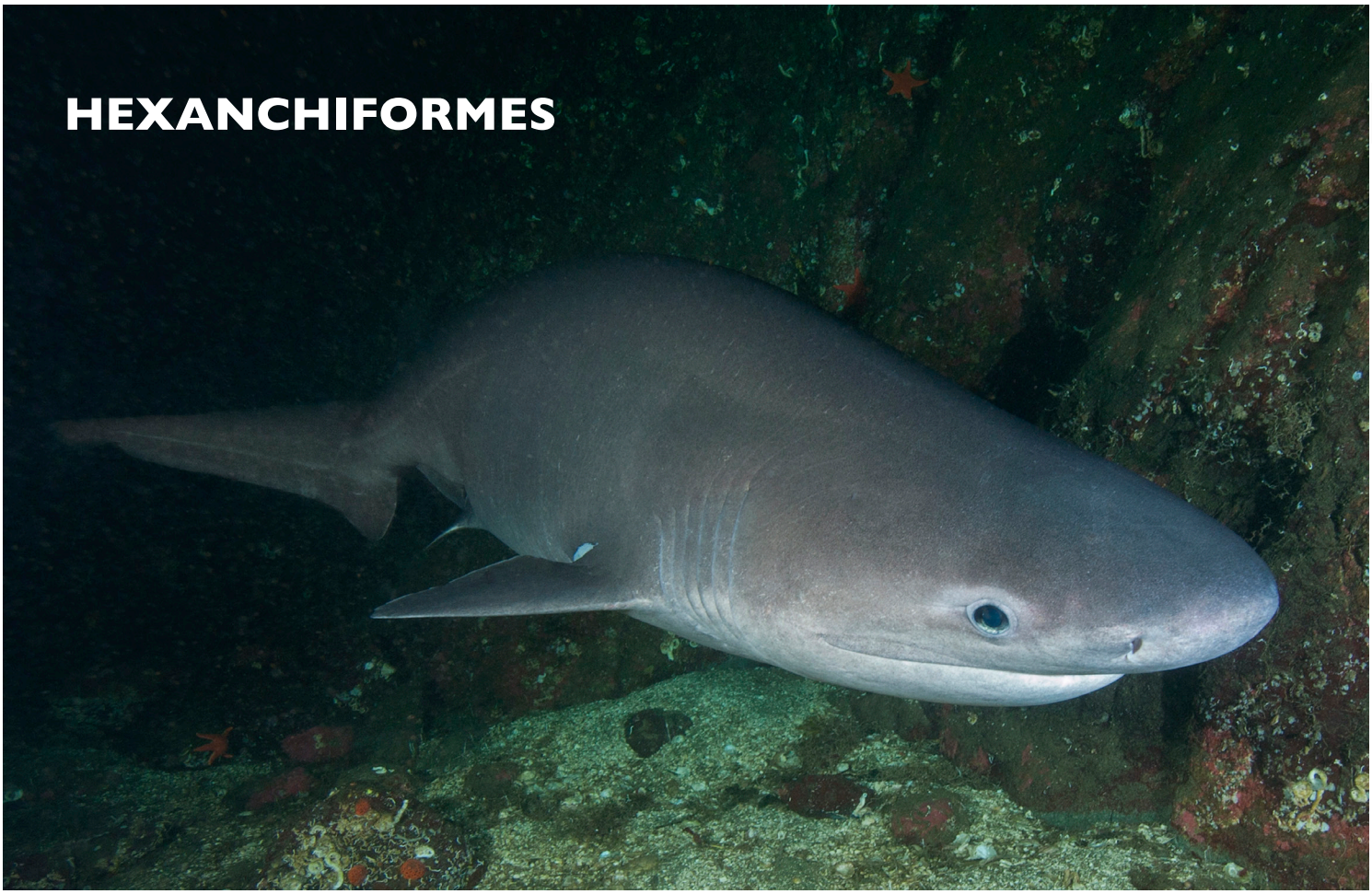
DD

Whitespotted Bullhead Shark *Heterodontus ramalheira* (Smith, 1949)

Regional Red List assessment:
Data Deficient
Ebert, D.A., Akhilesh, K.V., Valinassab, T. & Tesfamichael, D.
Global Red List assessment:
Data Deficient
Ebert, D.A. (2004)

Rationale The Whitespotted Bullhead Shark (*Heterodontus ramalheira*) is a rare and little-known benthic shark of the outer continental shelf and uppermost slope found at depths of 40-275 m, with most records below 100 m and caught in trawls. It attains a maximum size of about 83 cm TL and is restricted to the Western Indian Ocean. In the ASR, it occurs along the coast of Somalia, eastern Yemen and Oman. It is unusual amongst members of the family Heterodontidae as it occurs at deep depths. This species is known from only a very few records within its range and virtually nothing is known of its biology. It is presumably taken as bycatch in demersal line and trawl fisheries. Trawl fishing is generally intense on the Somali and Yemeni shelf, while trawling was banned in Oman in 2011. It may also have some refuge at the deeper part of its depth range as fishing generally occurs shallower. Given the lack of information on the species, particularly its interactions with fisheries, it cannot be assessed beyond Data Deficient at this time.

HEXANCHIFORMES



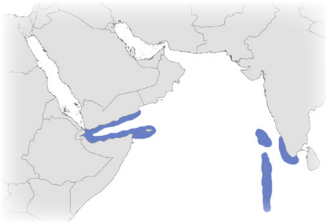
Bluntnose Sixgill Shark -- ***Hexanchus griseus*** © Andy Murch -- Elasmodiver.com

FAMILY **HEXANCHIDAE**

LC

Sharpnose Sevengill Shark *Heptranchias perlo* (Bonnaterre, 1788)

Regional Red List assessment:
Least Concern
Ebert, D.A., Khan, M., Ali, M. & Akhilesh, K.V.
Global Red List assessment:
Near Threatened
Paul, L. & Fowler, S. (2003)

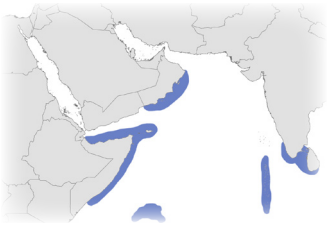


Rationale The Sharpnose Sevengill Shark (*Heptranchias perlo*) is a small (to 140 cm TL) wide-ranging, deepsea, demersal species occurring at depths to 1,000 m. It is not very common in the ASR, and given its deepsea habitat is rarely encountered. It appears to be of no commercial importance and is not targeted. Although is it occasionally taken as bycatch off southern India, it receives protection through a shark fishing ban in the Maldives and the limited deep sea fisheries off Somalia. It is assessed as Least Concern due to its deepsea habitat and the lack of fisheries across most of its known depth range.

LC

Bluntnose Sixgill Shark *Hexanchus griseus* (Bonnaterre, 1788)

Regional Red List assessment:
Least Concern
Ebert, D.A., Akhilesh, K.V., Valinassab, T. & Tesfamichael, D.
Global Red List assessment:
Near Threatened
Cook, S.F. & Compagno, L. J.V. (2005)



Rationale The Bluntnose Sixgill Shark (*Hexanchus griseus*) is a large (to 550 cm TL) wide-ranging species both globally and within the ASR. It occupies a diversity of habitats in the benthic and pelagic zones, down to depths of 2,500 m. Young are often found close inshore while adults often occur in deeper water; although adults and sub-adults are known to enter shallow water in bays with adjacent deepsea canyons. This species was formerly taken off the Maldives but is now protected within that range state. It is taken as bycatch off India by a variety of fishing gears, but little information is available on catches. Elsewhere in the region, deeper water fishing is limited and so the species likely has refuge at depth. It is therefore assessed as Least Concern, although monitoring is required where deepsea fisheries occur, particularly off southwest India.

LAMNIFORMES

Pelagic Thresher -- *Alopias pelagicus* © Elke Bojanowski - Red Sea Sharks

FAMILY **ALOPIIDAE**

EN

Pelagic Thresher *Alopias pelagicus* Nakamura, 1935

Regional Red List assessment:
Endangered A2bd
Dulvy, N.K., Khan, M., Romanov, E., Fernando, D. & Robinson, D.P.
Global Red List assessment:
Vulnerable A2d+4d
Reardon, M., Márquez, F., Trejo, T. & Clarke, S.C. (2004)

Rationale The Pelagic Thresher (*Alopias pelagicus*) is a large (to 365 cm TL), wide-ranging Indo-Pacific pelagic shark that occurs to depths of 300 m. In the ASR, the species is found in the Red Sea, Gulf of Aden, and the Arabian Sea. It is apparently highly migratory, and has slow life-history characteristics including low fecundity (two pups/litter) and a low (2-4 %) annual rate of population increase. This species is especially susceptible to fisheries exploitation (target and bycatch) because its epipelagic habitat occurs within the range of many largely unregulated and under-reported gillnet and longline fisheries, in which it is readily caught. Although this species is reportedly relatively common in some coastal localities, current levels of exploitation in some areas are considered to be unsustainable, particularly because the species has a low capacity to recover from even moderate levels of exploitation. Given documented CPUE declines from Soviet surveys of 42 % over three generations (~56 years), its large size, valuable fins, intensive and increasing fisheries,

high biological vulnerability and a low intrinsic rate of increase, overall declines of at least 50 % are inferred over the past three generations (~56 years). Some management measures are now in place in the region (i.e., through the IOTC), although domestic fisheries are likely to continue placing heavy pressure on thresher sharks. The Pelagic Thresher is assessed as Endangered A2bd.

EN

Bigeye Thresher *Alopias superciliosus* Lowe, 1841

Regional Red List assessment:
Endangered A2bd
Dulvy, N.K., Romanov, E., Robinson, D.P., Fernando, D. & Khan, M.
Global Red List assessment:
Vulnerable A2bd
Amorim, A., Baum, J., Cailliet, G.M., Clò, S., Clarke, S.C., Fergusson, I., Gonzalez, M., Macias, D., Mancini, P., Mancusi, C., Myers, R., Reardon, M., Trejo, T., Vacchi, M. & Valenti, S.V. (2007)

Rationale The Bigeye Thresher (*Alopias superciliosus*) is a large (to 484 cm TL), wide-ranging Indo-Pacific Ocean pelagic shark found from coastal waters to depths of over 900 m. In the ASR, it is found in the Red Sea, Gulf of Aden, and the Arabian Sea. It is apparently highly migratory, with low fecundity (two pups/litter) and the lowest intrinsic rebound potential and least resistance to fisheries of the genus. This species is especially susceptible to fisheries exploitation (target and bycatch) because its pelagic habitat occurs within the range of many largely unregulated and under-reported gillnet and longline fisheries, in which it is readily caught. Although this species is reportedly relatively common in some coastal localities, current levels of exploitation in some areas are considered to be unsustainable, particularly because the species has a low capacity to recover from even moderate levels of exploitation. Given documented CPUE declines from Soviet surveys of 42 % over three generations (~56 years), its large size, valuable fins, intensive and increasing fisheries, high biological vulnerability and a low intrinsic rate of increase, overall declines across the region of at least 50 % are inferred over the past three generations (~56 years). Some management measures are now in place in the region (i.e., through the IOTC), although domestic fisheries are likely to continue placing heavy pressure on thresher sharks. The Bigeye Thresher is assessed as Endangered A2bd.

FAMILY **LAMNIDAE**

NT

Shortfin Mako *Isurus oxyrinchus* Rafinesque, 1810

Regional Red List assessment:
Near Threatened
Dulvy, N.K., Romanov, E., Ali, M., Owfi, F. & Spaet, J.L.Y.
Global Red List assessment:
Vulnerable A2abd+3bd+4abd
Cailliet, G.M., Cavanagh, R.D., Kulka, D.W., Stevens, J.D., Soldo, A., Clo, S., Macias, D., Baum, J., Kohin, S., Duarte, A., Holtzhausen, J.A., Acuña, E., Amorim, A. & Domingo, A. (2004)

Rationale The Shortfin Mako (*Isurus oxyrinchus*) is a large (to 445 cm TL) pelagic shark species that is widespread in temperate and tropical oceanic waters of all oceans. It occurs throughout the ASR with the exception of the Gulf. It is mostly caught as bycatch in tuna and billfish longline, purse seine, and driftnet fisheries and is highly susceptible to these gears. Most catches are inadequately recorded and likely underestimated in landings data. The available standardised CPUE data suggest variable abundance but there is little evidence of a significant population reduction, nevertheless there is some evidence of declines in average size of individuals in catches (e.g., Oman). Given the intense pelagic fisheries in this region, and high susceptibility of this species, overall it is suspected that declines of at least 20-30 % have occurred across this species' range over the past three generations (75 years) and with ongoing fishing pressure, future population declines are suspected over the next three generations (2017-2092). This species is therefore assessed as Near Threatened (nearly meeting Vulnerable A2d+3d).

NT

Longfin Mako *Isurus paucus* Guitart, 1966

Regional Red List assessment:
Near Threatened
Dulvy, N.K., Owfi, F., Ali, M., Ali, K., Spaet, J.L.Y. & Romanov, E.
Global Red List assessment:
Vulnerable A2bd+3d+4bd
Reardon, M.B., Gerber, L. & Cavanagh, R.D. (2006)

Rationale The Longfin Mako (*Isurus paucus*) is a widely distributed, but rarely encountered, large (to 425 cm TL) epipelagic oceanic shark. In the ASR, it is widespread but is not known to occur in the Red Sea, Gulf of Aden and the Gulf. This species is known to be caught incidentally in tropical pelagic longline fisheries, which operate throughout its range, but at much lower ratios than the smaller, more fecund Shortfin Mako (*Isurus oxyrinchus*). Most catches of this species are inadequately recorded and likely underestimated in landings data especially due to common misidentification with Shortfin Makos. This is a species of conservation concern due to its apparent rarity, large maximum size, low fecundity (2 to 8 pups/litter) and continued bycatch in intensive fisheries. Given the intense coastal and pelagic fisheries in this region, and moderate sensitivity and susceptibility,

overall, it is suspected that declines of at least 20-30 % have occurred across this species' range over the past three generations (75 years) and with ongoing fishing pressure, future population declines are suspected over the next three generations (2017-2092). This species is therefore assessed as Near Threatened (nearly meeting Vulnerable A2d+3d).

FAMILY ODONTASPIDIDAE

CR

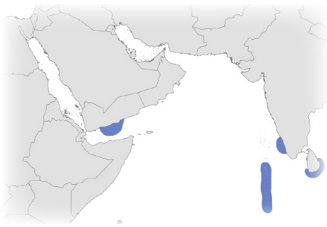
Sand Tiger Shark *Carcharias taurus* Rafinesque, 1810

Regional Red List assessment:
Critically Endangered A2d+3d
Dulvy, N.K., Owfi, F., Grandcourt, E., Bineesh, K.K. & Moore, A.B.M.
Global Red List assessment:
Vulnerable A2ab+3d
Pollard, D. & Smith, A. (2005)

Rationale The Sand Tiger Shark (*Carcharias taurus*) is a large (to 325 cm TL) coastal shark with a disjunct distribution, occurring in most subtropical and warm temperate oceans. In the ASR, this species has been reported from the Red Sea and occurs as far east as India. This species has a 2-3 year reproductive cycle producing only two large pups per litter, and consequently annual rates of population increase are very low, greatly reducing its ability to withstand fishing pressure. Based on its aggregation behaviour, philopatric migrations, shallow depth distribution, low population growth rate, and severe well-documented declines elsewhere in its range, it is suspected to have been severely depleted in the ASR. Indeed, this species is now only occasionally recorded in the Gulf, has not been recorded from Pakistan in the past three decades, has not been recorded in the past decade of landings surveys along the west coast of India, and there have been no confirmed records in the Red Sea in several decades. It is suspected that this species has declined by >80 % over the past three generations (~40 years) in the ASR, and a further population reduction is suspected over the next three generations (2017–2057) based on current levels of exploitation. Therefore, the Sand Tiger Shark is assessed as Critically Endangered A2d+3d.

DD

Smalltooth Sand Tiger *Odontaspis ferox* (Risso, 1810)

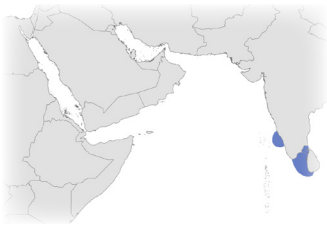


Regional Red List assessment:
Data Deficient
Ebert, D.A., Akhilesh, K.V., Grandcourt, E. & Khan, M.
Global Red List assessment:
Vulnerable A2bd
Graham, K.J., Pollard, D.A., Gordon, I., Williams, S., Flaherty, A.A., Fergusson, I. & Dicken, M. (2015)

Rationale The Smalltooth Sand Tiger (*Odontaspis ferox*) is a large (to 450 cm TL), widespread lamnoid shark that occurs in waters of 10-1,015 m. This species has a fragmented distribution and in the ASR, has only been reported from Yemen, India, Sri Lanka and the Maldives. This species is presumed to have a very low reproductive capacity but not much is known of its biology. The few specimens recorded were caught as bycatch in longline and gillnet fisheries, however, it is unclear to what extent current fishing activities are interacting with the species. It is currently assessed as Data Deficient due to a lack of information on the species' biology and population trends. This assessment should be revisited as further information becomes available.

DD

Bigeye Sand Tiger *Odontaspis noronhai* (Maul, 1955)



Regional Red List assessment:
Data Deficient
Ebert, D.A., Grandcourt, E., Akhilesh, K.V. & Khan, M.
Global Red List assessment:
Data Deficient
Amorim, A.F., Arfelli, C.A. & Fagundes, L. (2005)

Rationale The Bigeye Sand Tiger (*Odontaspis noronhai*) is a large (to 427 cm TL) widespread lamnoid shark that occurs in waters of 35 to >1,000 m depth. It has mostly been recorded in open ocean, pelagic waters but there are only two known records of this species in the ASR (one each in India and Sri Lanka). This species is presumed to have a very low reproductive capacity but little is known of its biology. Although it is rarely caught it may be particularly susceptible to over-exploitation given its life-history characteristics. However, it is unclear to what extent current fishing activities are interacting with the species. It is currently assessed as Data Deficient due to a lack of information on the species' biology and population trends. This assessment should be revisited as further information becomes available.

ORECTOLOBIFORMES

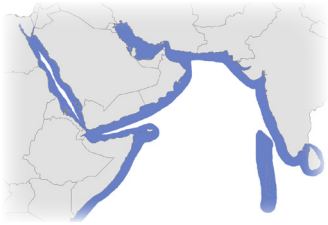
Tawny Nurse Shark -- ***Nebrius ferrugineus*** © Elke Bojanowski - Red Sea Sharks

FAMILY GINGLYMOSTOMATIDAE

NT

Tawny Nurse Shark *Nebrius ferrugineus* (Lesson, 1831)

Regional Red List assessment:
Near Threatened
Dulvy, N.K., Ali, K., Bineesh, K.K., Fernando, D., Akhilesh, K.V. & Kyne, P. M.
Global Red List assessment:
Vulnerable A2abcd+3cd+4abcd
Pillans, R. (2003)



Rationale The Tawny Nurse Shark (*Nebrius ferrugineus*) is a large (to at least 320 cm TL) widespread coastal shark that occurs throughout the Indo-West Pacific. In the ASR, it has a patchy occurrence due to its association with coral reefs where if often aggregates. The species is caught as bycatch in some areas. Its meat is of low quality and value, but it is landed in Sri Lanka and India. Declines have been noted by divers around Sri Lanka. The species has always been uncommon in the Gulf, whereas it is commonly observed in the southern Red Sea and in the Maldives. There are no reported threats to this species in the Maldives, and minimal threats in the southern Red Sea. However, this species is suspected to have declined in some parts of the region due to a significant increase in coastal fishing effort and power over the last few decades. Furthermore, it may suffer from ongoing loss and habitat degradation of coral reefs. Overall, it is suspected that the regional

population has undergone a population size reduction approaching 30 % over the past three generations (30 years). With ongoing and increasing fishing pressure in some parts of its range as well as habitat degradation and loss, future population declines are suspected over the next three generations (2017-2107). This species is therefore assessed as Near Threatened, nearly meeting Vulnerable A2cd+3cd.

FAMILY HEMISCYLLIDAE

NT

Endemic

Arabian Carpetshark *Chiloscyllium arabicum* Gubanov, 1980

Global Red List assessment:
Near Threatened
Moore, A.B.M.

Rationale The Arabian Carpetshark (*Chiloscyllium arabicum*) attains a maximum length of 80 cm TL. It is endemic to the ASR and appears to be reasonably common; however, its distribution requires clarification as confusion with congeners such as the Grey Bamboo Shark (*Chiloscyllium griseum*) may lead to a revision of distribution. This small benthic shark is not targeted but appears to be a major bycatch element of trawl (and other) fisheries, although it is hardy to trawl capture and aerial exposure, and may have relatively high post-capture survival rates. Apparently it is little utilised in the Gulf but probably is used in Pakistan and India. The species is threatened by habitat loss and degradation throughout its range. It is known to have a close association with coral reef habitats, which are particularly prone to anthropogenic degradation and there is evidence that such habitats have been severely degraded or lost in some parts of the Gulf, in addition to stress placed on these systems by climate change. More generally, it is exposed to widespread habitat loss and modification, not least in the Gulf (e.g., modification of the Tigris/Euphrates system), coastal developments and effects to benthic communities from demersal trawling throughout much of its range. It is also known to accumulate organic pollutants such as PAHs. The threats of fishing and habitat degradation are likely to continue into the future and increase in intensity and coverage (for example, fishing pressure continues to increase in India and elsewhere). As a result of these combined factors, this species is assessed as Near Threatened (nearly meeting Vulnerable A2cd) based on inferred continuing population declines approaching 30 % over the past three generations (~27 years), particularly as a result of habitat loss. Given that this species is often discarded (in the Gulf at least) and a proportion of discards may have a relatively high survival rate, a threatened category is not yet warranted, but the species is suspected to meet Near Threatened (nearly meeting Vulnerable 3cd) over the next three generation period (2017-2044). There is a need for quantitative distribution and abundance data.

Grey Bamboo Shark *Chiloscyllium griseum* Müller & Henle, 1838

NT

Regional Red List assessment:
Near Threatened
Ebert, D.A., Fernando, D., Akhilesh, K.V., Tesfamichael, D., Valinassab, T. & Kyne, P. M.
Global Red List assessment:
Near Threatened
Lisney, T.J. & Cavanagh, R.D. (2003)

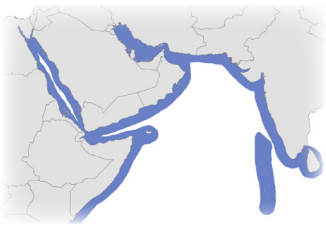
Rationale The Grey Bamboo Shark (*Chiloscyllium griseum*) is a small (to at least 77 cm TL) coastal carpet shark that inhabits waters in the Gulf and off the coasts of Iran, Pakistan, India and Sri Lanka. The reproductive and population biology of this small inshore species is poorly-known, however the species is assessed as Near Threatened (nearly meeting Vulnerable A2cd+3cd) based on suspected continuing population declines approaching 30 % over the past three generations (~27 years), as it is regularly taken in fisheries off India and possibly Pakistan, and is likely to be threatened by population declines over the next three generations (2017-2044) resulting from overfishing, destructive fishing practices and habitat modification, including the damage and destruction of coral reefs. Such threats have been increasing recently, and are likely to increase further in the future. Surveys and population and habitat monitoring are needed in order to more accurately assess the conservation status of this species.

FAMILY RHINCODONTIDAE

Whale Shark *Rhincodon typus* Smith, 1828

EN

Regional Red List assessment:
Endangered C1
Dulvy, N.K., Robinson, D. P., Pierce, S.J., Norman, B., Fernando, D., Khan, M. & Romanov, E.
Global Red List assessment:
Endangered A2bd+4bd
Pierce, S.J. & Norman, B. (2016)



Rationale The Whale Shark (*Rhincodon typus*) is a large (to at least 20 m TL) circumglobal tropical and warm temperate species that occurs throughout the ASR. The species inhabits pelagic and coastal waters, exhibiting seasonal migrations and occurs at localized feeding aggregations. This species is aplacental viviparous, and has a generation length of approximately 25 years, leading to slow growth and low productivity. The large majority of individuals sighted in this region are juveniles or recently mature individuals. The species is valued for its meat and fins, and is threatened by target and bycatch fisheries. The population size in the region is estimated at 2,837 ± 1,243 individuals based on counts of juveniles. Based on this, it is conservatively estimated that there are less than 2,500 mature adults. Steep rates of decline just outside the region (in Seychelles and Mozambique)

and high fishing pressure within the region lead to a suspected decline in excess of 20 % over two generations (50 years). Therefore, the Whale Shark in the ASR is assessed as Endangered C1.

FAMILY STEGOSTOMATIDAE

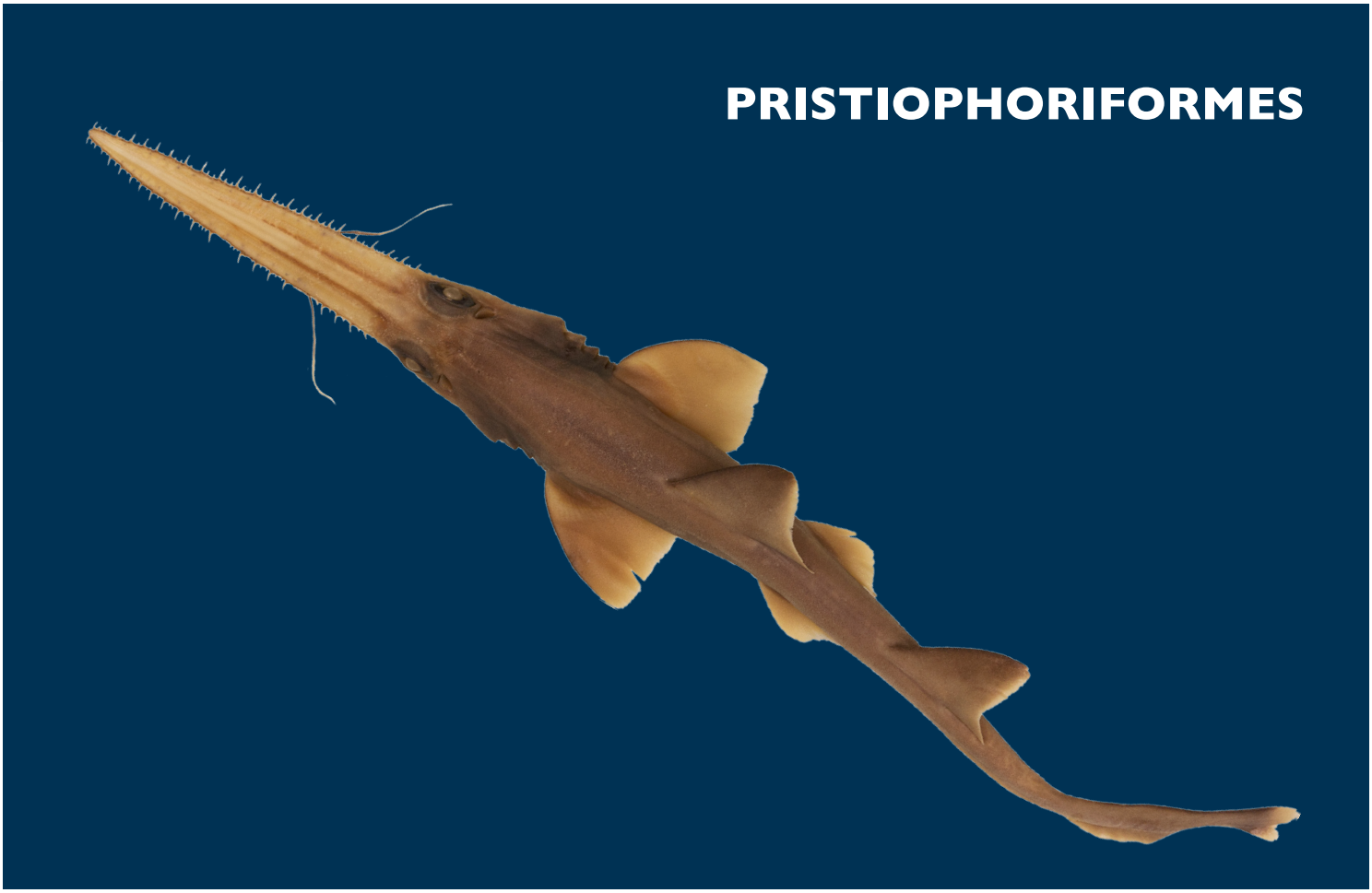
VU

Zebra Shark *Stegostoma fasciatum* (Hermann, 1783)

Regional Red List assessment:
Vulnerable A2cd+3cd
Kyne, P. M., Bineesh, K.K., Jabado, R. W. & Spaet, J.
Global Red List assessment:
Endangered A2bd+3bd
Dudgeon, C.L., Simpfendorfer, C. A. & Pillans, R.D. (2015)

Rationale The Zebra Shark (*Stegostoma fasciatum*) is a medium-sized (to 246 cm TL) shark that is widespread in shallow waters of the ASR but is usually found associated with coral and rocky reef and soft bottom habitats, which results in localised occurrence. This habitat specificity and apparent patchy occurrence in low densities means that it is generally uncommon in fisheries landings although it is susceptible to capture from a range of different fishing methods. The species shows strong site fidelity and can form aggregations which facilitate the rapid removal of individuals. While this species is landed in some countries such as India and Pakistan, it is less commonly landed (and often released alive) in other areas such as the Saudi Red Sea. Given intense fishing pressure in its habitat and the coastal zones in parts of its range such as Sri Lanka, India and Pakistan, and the general declines in sharks in those areas and elsewhere in the region, it is suspected that the Zebra Shark has declined locally. Furthermore, it is susceptible to habitat loss and alteration in places like the Gulf, where the coastal marine environment is changing rapidly. It may find refuge in the Maldives where there is limited fishing pressure, and is still commonly observed by divers at some popular dive sites of the UAE and Oman. Given actual levels of exploitation and suspected decline in habitat quality, the regional population is suspected to have declined by >30 % over the past three generations (~50 years), with refuge areas limiting a greater overall regional decline. Given on-going exploitation levels of sharks, it is suspected that the species will undergo a further decline over the next three generations (2017-2067), and the species is therefore assessed as Vulnerable A2cd+3cd.

PRISTIOPHORIFORMES



African Dwarf Sawshark -- ***Pristiophorus nancyae*** © Simon Weigmann

FAMILY **PRISTIOPHORIDAE**

African Dwarf Sawshark *Pristiophorus nancyae* Ebert & Caillet, 2011

LC

Regional Red List assessment:
Least Concern
Ebert, D.A., Akhilesh, K.V., Khan, M. & Grandcourt, E.
Global Red List assessment:
Not Evaluated

Rationale The African Dwarf Sawshark (*Pristiophorus nancyae*) is known from less than 20 specimens in the Western Indian Ocean. Within the region, it occurs in deep waters off Socotra Island, Yemen, at depths of 286-570 m, reaches at least 62 cm TL, but little else is known of its biology. Despite being recorded from a limited number of specimens, there are currently no known threats to this species since deepsea fisheries do not operate within its known distribution in the region, and it is therefore assessed as Least Concern. Further information is required on its life-history, population size, and geographic and depth range, and this assessment would need to be revisited if deepsea fishing expanded in the region.

SQUALIFORMES

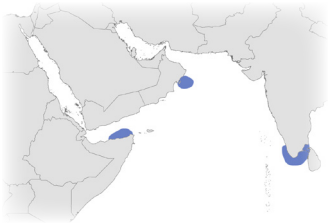
Gulper Shark -- ***Centrophorus granulosus*** © Andy Murch -- Elasmodiver.com

FAMILY **CENTROPHORIDAE**

EN

Dwarf Gulper Shark *Centrophorus atromarginatus* Garman, 1913

Regional Red List assessment:
Endangered A2d
Kyne, P. M., Ebert, D.A., Akhilesh, K.V., Khan, M. & Grandcourt, E.
Global Red List assessment:
Data Deficient
McCormack, C., & White, W.T. (2008)



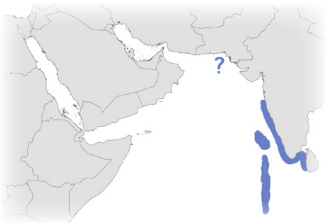
Rationale The Dwarf Gulper Shark (*Centrophorus atromarginatus*) is a poorly-known small (to at least 94 cm TL) deepsea shark occurring at depths of 150-450 m. It has a patchy Indo-West Pacific distribution and in the ASR is known to occur off Somalia in the Gulf of Aden, Oman, southwest India and possibly Sri Lanka. The limited biological productivity of *Centrophorus* spp. restricts their ability to sustain targeted or bycatch fishing pressure. This is exemplified by the *Centrophorus* stock collapse off the Maldives in the early 2000s due to targeted fishing after only about 20 years of exploitation. The southwest Indian part of the species' regional range is under intense and increasing fishing pressure. A targeted fishery for liver oil expanded rapidly off southwest India at depths of >300-1,000 m from 2002 onwards, while a deepsea shrimp trawl fishery operating at depths of 200-500 m commenced in 1999 which takes *Centrophorus* as a major bycatch. Unlike other *Centrophorus* spp., the Dwarf Gulper Shark does not have refuge in deeper waters as its entire

depth range overlaps with the Indian deepsea fisheries. The documented fishery collapse in the Maldives, and the intensity of targeted and bycatch fishing across a large majority of the known regional range, suggests that the regional population has declined by >80 % where fished. There is however no deepsea fishing where the species occurs off Oman and Somalia, so it would appear to have refuge outside of India. Overall, based on actual levels of exploitation together with some potential regional refugia, the regional population is suspected to have declined by >50 % over the past three generations (~60 years). Therefore, this species is assessed as Endangered A2d. Recovery will be slow, and catches of all deepsea species require close monitoring and management intervention in the Indian deepsea fisheries.

Gulper Shark *Centrophorus granulosus* (Bloch & Schneider, 1801)

EN

Regional Red List assessment:
Endangered A2d
Kyne, P. M., Ebert, D.A., Akhilesh, K.V., Khan, M. & Grandcourt, E.
Global Red List assessment:
Not Evaluated

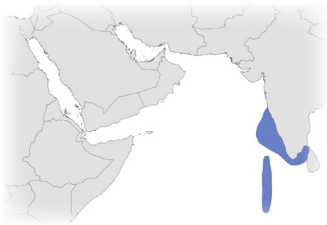


Rationale The Gulper Shark (*Centrophorus granulosus*) is a medium-sized (to 170 cm TL) deepsea shark with a widespread but patchy global distribution in the Indo-West Pacific and Atlantic Oceans. In the ASR, it has been recorded from western India, Sri Lanka and the Maldives. Its full distribution may be wider than presently known due to a lack of deepsea fisheries and surveys in other parts of the ASR. However, as currently known, its regional range has been and continues to be subject to intense deepsea fishing. The limited biological productivity of *Centrophorus* spp. restricts their ability to sustain targeted or bycatch fishing pressure. The *Centrophorus* stock collapsed off the Maldives in the early 2000s due to targeted fishing after only about 20 years of exploitation. A targeted fishery for liver oil expanded rapidly off southwest India at depths of >300-1,000 m from 2002 onwards, while a deepsea shrimp trawl fishery operating at depths of 200-500 m commenced in 1999 which takes *Centrophorus* as a major bycatch. The documented fishery collapse in the Maldives, and the intensity of targeted and bycatch fishing across a large majority of the known regional range, suggests that the regional population has declined by >80 % where fished. Shark fishing is now banned in the Maldives, but the stock there will take a long time to recover given the limited biological productivity of gulper sharks. The species does have some refuge in deeper waters as it occurs at a depth range of 50-1,440 m while Indian deepsea fishing is currently not reaching those deeper depths. Overall, based on actual levels of exploitation together with some refuge at depth, the regional population is suspected to have declined by >50 % over the past three generations (~84 years). Therefore, this species is assessed as Endangered A2d. Recovery will be slow, and catches of all deepsea species require close monitoring and management intervention in the Indian deepsea fisheries.

EN

Leafscale Gulper Shark *Centrophorus squamosus* (Bonnaterre, 1788)

Regional Red List assessment:
Endangered A2d
Kyne, P. M., Ebert, D.A., Akhilesh, K.V., Khan, M. & Grandcourt, E.
Global Red List assessment:
Vulnerable A2bd+3bd+4bd
White, W.T. (2003)

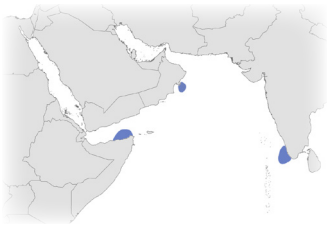


Rationale The Leafscale Gulper Shark (*Centrophorus squamosus*) is a medium-sized (to 164 cm TL) deepsea shark with a widespread but patchy global distribution in the Indo-West Pacific and Atlantic Oceans. In the ASR, it has been recorded from western India, Sri Lanka and the Maldives. Its full distribution may be wider than presently known due to a lack of deepsea fisheries and surveys in other parts of the Arabian Sea. However, as currently known, the shallower parts of its regional range has been, or continues to be, subject to intense deepsea fishing. The limited biological productivity of *Centrophorus* spp. restricts their ability to sustain targeted or bycatch fishing pressure. The *Centrophorus* stock collapsed off the Maldives in the early 2000s due to targeted fishing after only about 20 years of exploitation. A targeted fishery for liver oil expanded rapidly off southwest India at depths of >300-1,000 m from 2002 onwards, while a deepsea shrimp trawl fishery operating at depths of 200-500 m commenced in 1999 which takes *Centrophorus* as a major bycatch. The documented fishery collapse in the Maldives, and the intensity of targeted and bycatch fishing across a large majority of the known regional range, suggests that the regional population has declined by >80 % where fished. Shark fishing is now banned in the Maldives, but the stock there will take a long time to recover given the limited biological productivity of gulper sharks. The species however, does have some refuge in deeper waters as it occurs at a depth range of 230-2,400 m while Indian deepsea fishing is not reaching those deeper depths. Overall, based on actual levels of exploitation together with refuge at depth, the ASR population is suspected to have declined by >50 % over the past three generations (~150 years). Therefore the Leafscale Gulper Shark is listed as Endangered A2d. Recovery will be slow, and catches of all deepsea species require close monitoring and management intervention in the Indian deepsea fisheries.

VU

Arrowhead Dogfish *Deania profundorum* (Smith & Radcliffe, 1912)

Regional Red List assessment:
Vulnerable A2d
Kyne, P. M.
Global Red List assessment:
Least Concern
Ebert, D.A., McCormack, C. & Samiengo, B. (2008)



Rationale The Arrowhead Dogfish (*Deania profundorum*) is a small (to 97 cm TL) deepsea shark with a patchy distribution in the Atlantic and Indo-West Pacific Oceans. In the ASR, it is known only from off southwest India, Oman and the Gulf of Aden. The species occurs on the continental slope at depths of 275-1,785 m, and has low biological productivity, which limits its ability to sustain targeted or bycatch fishing pressure and recover from population depletion. Globally, there are

several examples of the rapid collapse of centrophorid stocks from fishing. The southwest Indian part of the species' regional range is under intense fishing pressure. A targeted fishery for deepsea shark liver oil expanded rapidly off southwest India at depths of >300-1,000 m from 2002 onwards, while a deepsea shrimp trawl fishery operating at depths of 200-500 m commenced in 1999; the Arrowhead Dogfish has been recorded from both of these fisheries. Despite a lack of species-specific data, the intensity of fishing across a large majority of the known regional range suggests that the regional population has declined where fished. The species, however, may have a deep refuge at depths beyond these fisheries, as well as in the western part of its range where there is no deepsea fishing at its depths of occurrence. Overall, based on actual levels of exploitation together with some regional refugia, the regional population is suspected to have declined by >30 % over the past three generations (~75 years), and therefore the species is assessed as Vulnerable A2d. Recovery will be slow, and catches of all deepsea species require close monitoring and management intervention in the Indian deepsea fisheries.

FAMILY DALATIDAE

LC

Spined Pygmy Shark *Squaliolus laticaudus* Smith & Radcliffe, 1912

Regional Red List assessment:
Least Concern
Ebert, D.A., Akhilesh, K.V., Grandcourt, E. & Khan, M.
Global Red List assessment:
Least Concern
Kyne, P. M. & Burgess, G.H. (2006)

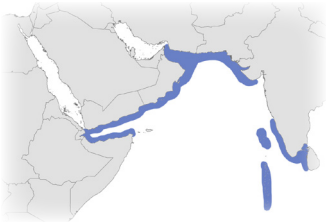
Rationale The Spined Pygmy Shark (*Squaliolus laticaudus*) is one of the world's smallest sharks reaching a maximum size of ~28 cm TL. It is oceanic, with a widespread but patchy warm-temperate and tropical distribution, occurring near land masses generally over continental slopes and avoiding central ocean basins. Within the ASR it is known only from off Somalia, although it is likely to be wider-ranging within the region. Little is known of its biology but it is known to undertake diel vertical migrations from depth (~500 m to ~200 m) probably related to prey movements. An absence of identifiable threats (it is irregularly taken by fisheries due to its small size and habitat) justifies an assessment of Least Concern.

FAMILY ECHINORHINIDAE

VU

Bramble Shark *Echinorhinus brucus* (Bonnaterre, 1788)

Regional Red List assessment:
Vulnerable A2d
Kyne, P. M., Pollom, R. A., Owfi, F., Akhilesh, K.V., Ali, K. & Romanov, E.
Global Red List assessment:
Data Deficient
Paul, L. (2003)



Rationale The Bramble Shark (*Echinorhinus brucus*) is a large (to 318 cm TL) deepsea shark with a widespread but patchy distribution in the Atlantic and Indo-West Pacific Oceans. It primarily occurs on continental and insular slopes at depths of 200-900 m (although it has been recorded from 18 m to 1,214 m). In the ASR, it is distributed from the Gulf of Aden to the Sea of Oman, and Pakistan to Gujarat, India, as well as southwest India and Sri Lanka, and reportedly also from the Maldives. Limited life-history data is available, but the species is suspected to have low biological productivity, which would limit its ability to sustain targeted or bycatch fishing pressure and recover from population depletion. The southwest Indian part of the species' regional range is under intense fishing pressure. A targeted fishery for deepsea shark liver oil (primarily gulper sharks *Centrophorus* spp.) expanded rapidly off southwest India at depths of >300-1,000 m from 2002 onwards, while a deepsea shrimp trawl fishery operating at depths of 200-500 m commenced in 1999. The Bramble Shark is a major component of the landed bycatch of these fisheries, and a significant population decline is suspected based on levels of exploitation. The species' entire depth range in this area is fished, and thus, it does not have any refuge at depths outside of fishing activities. In contrast, deepsea fisheries do not operate in the western part of the species' regional range, and the species is not likely to have declined across the region to the extent that it has off India. Overall, based on actual levels of exploitation combined with some regional refugia, the regional population is suspected to have declined by >30 % over the past three generations (~90 years), and therefore the species is assessed as Vulnerable A2d. Recovery will be slow, and catches of all deepsea species require close monitoring and management intervention in the Indian deepsea fisheries.

FAMILY ETMOPTERIDAE

DD

Ornate Dogfish *Centroscyllium ornatum* (Alcock, 1889)

Regional Red List assessment:
Data Deficient
Ebert, D.A., Akhilesh, K.V., Grandcourt, E. & Khan, M.
Global Red List assessment:
Data Deficient
McCormack, C. (2008)

Rationale The Ornate Dogfish (*Centroscyllium ornatum*) is a small (to 51 cm TL) poorly-known deepsea species, occurring at depths of 521–1,262 m on the upper to mid continental slope. It is known from the Bay of Bengal, and reportedly from the Arabian Sea off the west coast of India, although these records require confirmation. Its wide depth distribution would provide it with some refuge beyond current fishing pressure, although it may occur as bycatch in the deepsea shrimp trawl fishery operating off southwest India. The species is assessed as Data Deficient, and its occurrence in the region requires confirmation.

DD

Smooth Lanternshark *Etmopterus pusillus* (Lowe, 1839)

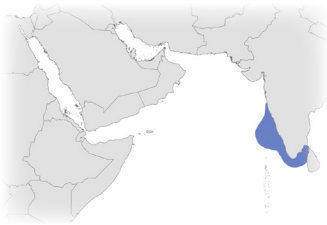
Regional Red List assessment:
Data Deficient
Ebert, D.A., Grandcourt, E., Akhilesh, K.V. & Khan, M.
Global Red List assessment:
Least Concern
Coelho, R., Tanaka, S. & Compagno, L.J.V. (2008)

Rationale The Smooth Lanternshark (*Etmopterus pusillus*) is a small (to 50 cm TL) shark occurring on the continental slope at depths of 274-1,000 m (possibly to 2,000 m) which has also been recorded as epipelagic and mesopelagic over deep water. It has a widespread but patchy global distribution but in the ASR has only been recorded from off southwest India and Oman, and is known from a limited number of specimens. This species is a rare bycatch in both the deepsea shrimp trawl fishery (operating at 200-500 m depth) and the targeted *Centrophorus* spp. longline fishery (>300-1,000 m depth) off southwest India. Further information is required on the impact of these fisheries through catch monitoring. Until such information is available the species cannot be assessed beyond Data Deficient. There are no deepsea fisheries where it occurs off Oman, so it does have some refuge in the region.

FAMILY SOMNIOSIDAE

DD

Longnose Velvet Dogfish *Centroselachus crepidater* (Barbosa du Bocage & de Brito Capello 1864)



Regional Red List assessment:
Data Deficient
Kyne, P.M., Ebert, D.A., Akhilesh, K.V., Grandcourt, E. & Khan, M.
Global Red List assessment:
Least Concern
Stevens, J.D. (2003)

Rationale The Longnose Velvet Dogfish (*Centroselachus crepidater*) is a small (to at least 105 cm TL) deepsea shark with a widespread but patchy global distribution. In the ASR, it is presently known only off southwest India and Sri Lanka. It occurs on the continental slope at depths of 200-2,080 m, and most commonly at depths greater than 500 m. It is an occasional bycatch in Indian deepsea fisheries, both in the targeted gulper shark (*Centrophorus* spp.) longline fishery (operating at depths of >300-1,000 m) and the deepsea shrimp trawl fishery (200-500 m). Given the localised regional occurrence of the species, there are concerns that the local population may have been impacted by those fisheries given their rapid expansion and their intensity. The species is however, likely to have some refuge in depths outside of the current operations of these fisheries (>1,000 m). Further information is required on the impact of deepsea fishing off India to show that the species does not meet a threatened category based on actual levels of exploitation (bycatch). Until such information is available the species cannot be assessed beyond Data Deficient.

DD

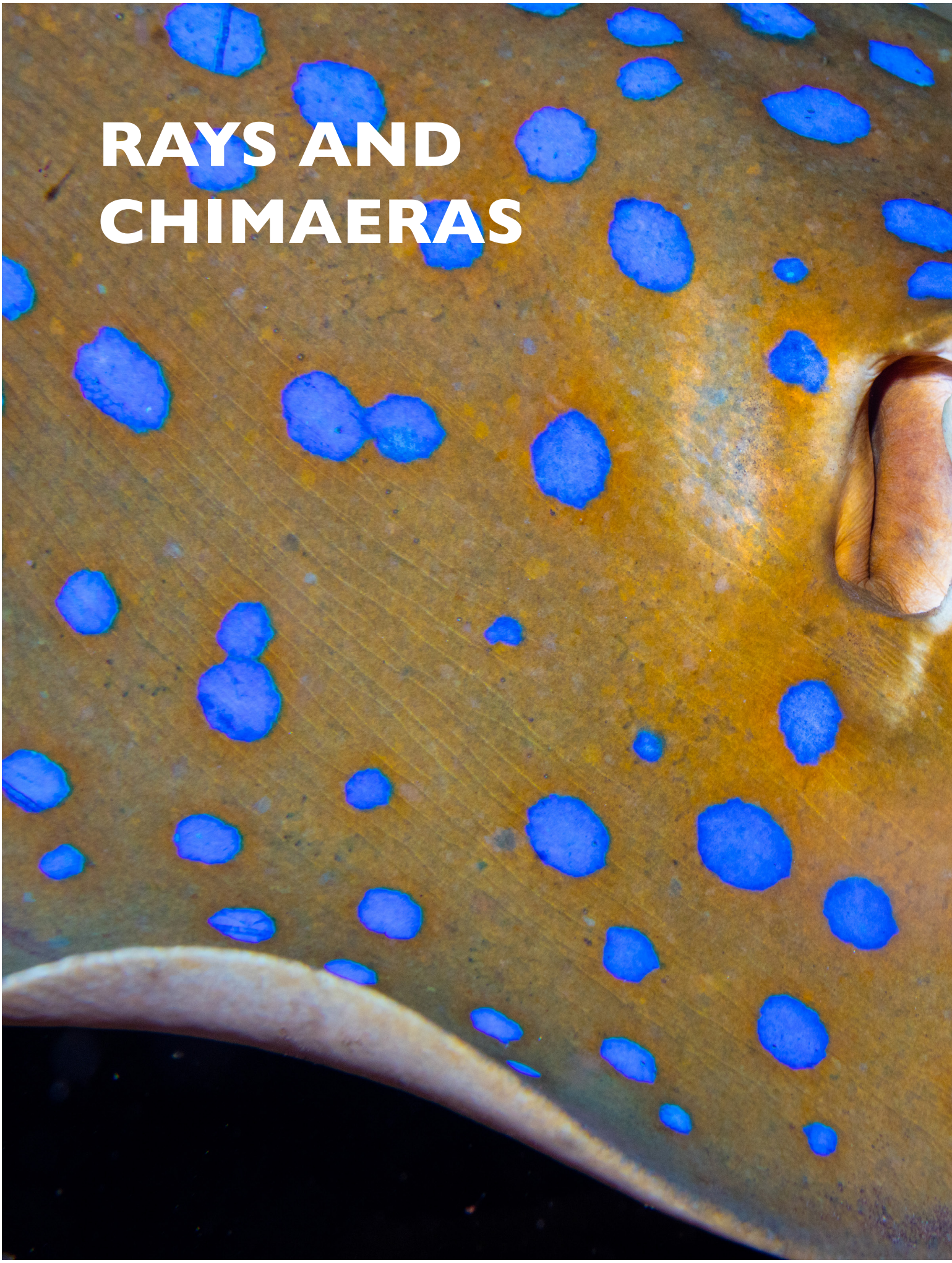
Velvet Dogfish *Zameus squamulosus* (Günther, 1877)

Regional Red List assessment:
Data Deficient
Ebert, D.A., Khan, M., Grandcourt, E. & Akhilesh, K.V.
Global Red List assessment:
Data Deficient
Burgess, G.H. & Chin, A. (2006)

Rationale The Velvet Dogfish (*Zameus squamulosus*) is a small (to 90 cm TL) species that is widespread but patchy in the Indo-West Pacific and the Atlantic Oceans. Throughout the Western Indian Ocean it is known from a limited number of specimens, and in the ASR, it is known only from three records from off Cochin, India. It is benthic on the continental and insular slopes at depths of 550 -1,450 m, and epipelagic over deep oceanic waters. Little information is available on its biology. It is apparently a rare species, and its patchy occurrence suggests that it may occur more widely in the region, however since it is known only from three records, it cannot be assessed beyond Data Deficient for the region. The rapid development of deepsea fishing off southwest India is a concern for its local population.

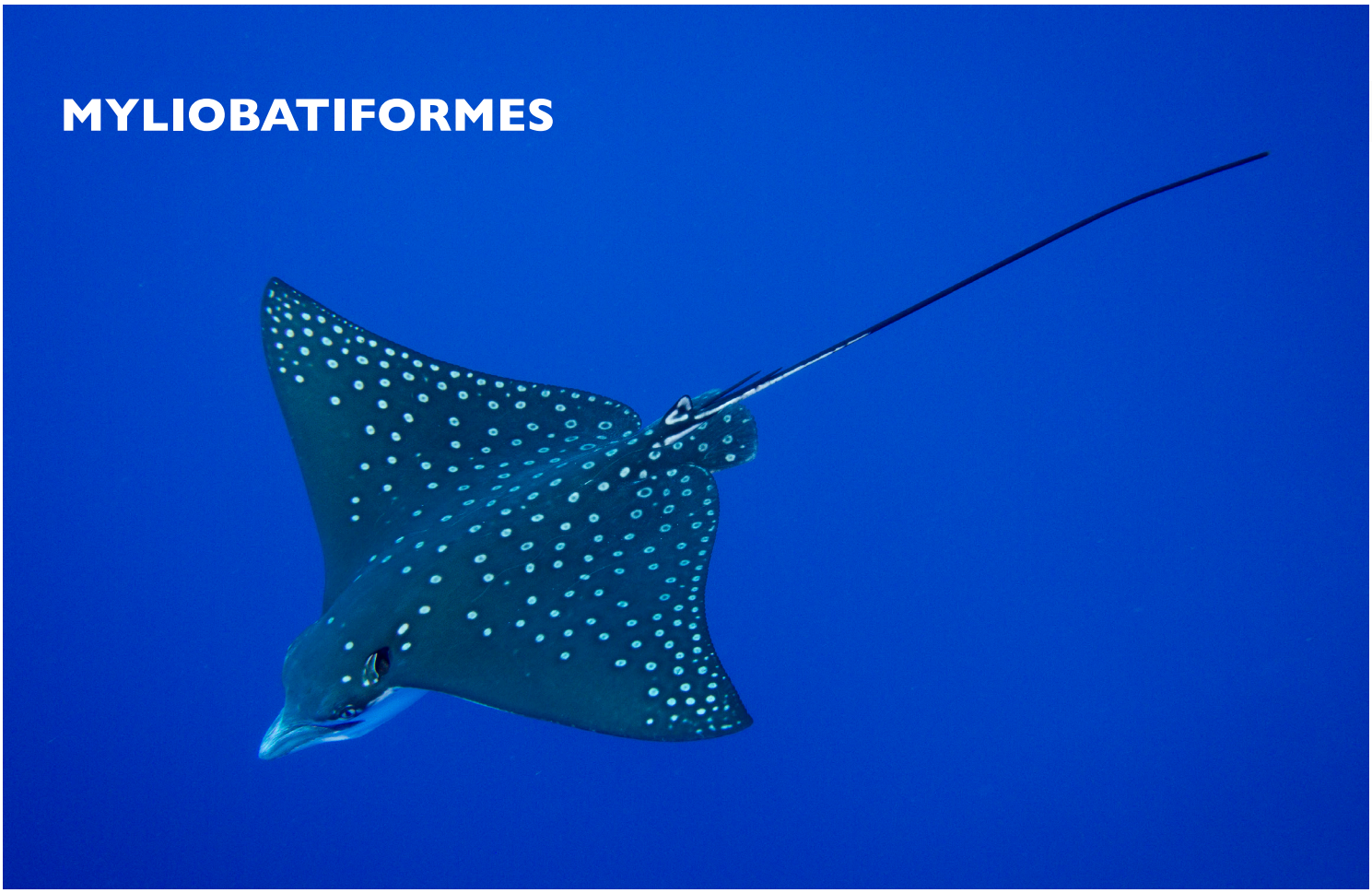
There are currently approximately 100,000 registered vessels operated by over 350,000 registered commercial fishermen in the Arabian Seas Region. The large majority of vessels are artisanal and operate in coastal waters. However, foreign industrial vessels using a variety of gear, including longliners, trawlers, and purse-seiners, are granted rights to operate in the waters of most countries. Furthermore, illegal, unreported, and unregulated fishing is a significant issue in the region, especially due to the limited capacity to enforce current management measures. © R. W. Jabado

RAYS AND CHIMAERAS



Bluespotted Fantail Ray -- ***Taeniura lymma*** © Simone Caprodossi Photography

MYLIOBATIFORMES



Spotted Eagle Ray -- ***Aetobatus ocellatus*** © Elke Bojanowski - Red Sea Sharks

FAMILY **AETOBATIDAE**

EN

Longhead Eagle Ray *Aetobatus flagellum* (Bloch & Schneider, 1801)

Regional Red List assessment:
Endangered A2cd+3cd
Pollom, R. A., Owfi, F., Elhassan, I. & Ali, K.
Global Red List assessment:
Endangered A2d+3d+4d
White, W.T. (2006)

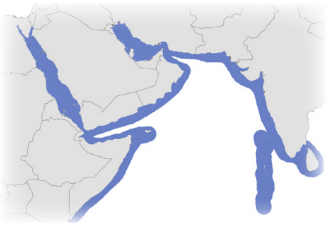
Rationale The Longhead Eagle Ray (*Aetobatus flagellum*) is a medium-sized (to 90 cm DW), uncommon, inshore eagle ray with a patchy Indo-West Pacific range which occurs in the ASR from the northern Gulf to Sri Lanka. It is highly susceptible to a variety of fishing methods in areas where the level of exploitation of marine resources is extremely high. It is mainly caught as bycatch in inshore and shelf trawl and gillnet fisheries. Most of the distribution of the species is under extremely intense and increasing demersal fishing pressure. For example, the number of trawlers operating in Gujarat waters almost doubled from ~6,600 boats in 2004 to ~11,500 boats in 2010, and about 2,000 trawlers operate in Pakistan shelf waters. Significant declines of rays have been documented on the west coast of India, including eagle rays. Furthermore, the loss and modification of coastal habitats in the Gulf is a significant concern for inshore species such as this. The relative rarity, large size, and low productivity of the Longhead Eagle Ray makes it particularly susceptible

to an overall population decline as a result of fishing pressure and habitat loss. It is suspected that this species has undergone declines of 50 % or more over the past three generations (~45 years), and with ongoing fishing pressure and habitat degradation and loss, future population declines are suspected over the next three generations (2017-2062). It is therefore assessed as Endangered A2cd+3cd.

Spotted Eagle Ray *Aetobatus ocellatus* (Kuhl, 1823)

VU

Regional Red List assessment:
Vulnerable A2bcd+3bcd
Pollom, R. A., Ali, K., Elhassan, I. & Owfi, F.
Global Red List assessment:
Vulnerable A2bd
Kyne, P. M., Dudgeon, C.L., Ishihara, H., Dudley, S.F.J. & White, W.T. (2015)



Rationale The Spotted Eagle Ray (*Aetobatus ocellatus*) is a large (to 330 cm DW) benthopelagic eagle ray that is widespread in the Indo-West and Central Pacific, and which occurs in coastal waters throughout the ASR. The species inhabits coral reef lagoons and estuaries and is often associated with coral reefs. It is highly susceptible to a variety of fishing methods in areas where the level of exploitation of marine resources is extremely high. It is mainly caught as bycatch in inshore and shelf trawl and gillnet fisheries. Most of the distribution of the species is under extremely intense and increasing demersal fishing pressure. For example, the number of trawlers operating in Gujarat waters almost doubled from ~6,600 boats in 2004 to ~11,500 boats in 2010, and about 2,000 trawlers operate in Pakistan shelf waters. Significant declines of rays have been documented on the west coast of India, including this species, which showed the equivalent of an ~97 % decline over the past three generations of the Spotted Eagle Ray. Furthermore, the loss and modification of coastal habitats across the region is a significant concern for inshore species such as this. The relative rarity, large size and low productivity of the Spotted Eagle Ray make it particularly susceptible to an overall population decline as a result of decline in habitat quality from fishing pressure and coastal development. However, eagle rays are regularly discarded in other parts of the region, for example the Red Sea. Balancing significant declines due to intense and increasing fishing pressure in the eastern part of the region, with more limited mortality in the western part of the region, it is suspected that this species has undergone declines of 30 % or more over the past three generations (~45 years) based on actual levels of exploitation, and with ongoing fishing pressure and habitat degradation and loss, future population declines are suspected over the next three generations (2017-2062). It is therefore assessed as Vulnerable A2bcd+3bcd.

FAMILY DASYATIDAE

DD

Brown Stingray *Bathytoshia lata* (Garman, 1880)

Regional Red List assessment:
Data Deficient
Pollom, R. A., Valinassab, T., Ali, M. & Al Mamari, T.
Global Red List assessment:
Least Concern
Ebert, D.A., Vidthayanon, D.A. & Samiengo, B. (2007)

Rationale The Brown Stingray (*Bathytoshia lata*) is a large (to 260 cm DW) demersal species found on continental shelves and insular slopes to 800 m depth. Very little information is available on the life-history of this species and its occurrence in the region is not well known. It has been confirmed from off Oman and southern India, although it is likely to be more widespread in the ASR. There is no information on catches in local fisheries, but given its coastal habitat it can be presumed that it is taken incidentally in trawl and longline fisheries. It also occurs deeper than most stingrays and this may offer it some refuge from fishing in deeper waters, although a deepsea shrimp trawl fishery operates off southern India. It is assessed as Data Deficient for the region since its occurrence is not well known, and there is insufficient information to assess how fisheries in the region are interacting with the species. This assessment should be revisited as further information becomes available.

NT

Endemic

Scaly Whipray *Brevitrygon walga* (Müller & Henle, 1841)

Global Red List assessment:
Near Threatened
Simpfendorfer, C. A., Moore, A.B.M., Elhassan, I., Owfi, F. & Akhilesh, K.V.

Rationale The Scaly Whipray (*Brevitrygon walga*) is a very small (to 32 cm DW) whipray species whose true range is poorly-known due to taxonomic issues. It is endemic to the ASR but there are various forms across its range (Red Sea to India), but until taxonomy is resolved, the forms in the ASR are treated as a single species for the current assessment. This species appears to be very common in waters less than 40 m deep, including in intertidal areas. Given its size it is likely to have a productive life-history, but this needs to be confirmed with species-specific research. It is regularly caught in shallow water trawls and is normally discarded at sea in the western part of its range, but landed in considerable numbers in the eastern part (i.e., India). Overall, fishing pressure is increasing across its habitat, and declines in rays have been documented in India. At one landing site, catches have been stable over a 15 year period after an initial increase. However, over that same time period, trawl effort doubled. Overall, declines of 20-30 % are suspected over the past three generations (~33 years), and with ongoing fishing pressure, further population declines are suspected over the next three generations (2017-2050). The species is therefore assessed as Near

Threatened (nearly meeting Vulnerable A2d+3d). Uncertainty arising from unresolved taxonomy, the unknown fate of discards, and uncertainty about its life-history, all support a precautionary approach. Indeed, it is possible that in the near future the intense trawling pressure in parts of its range could lead to further declines and make it eligible for listing as Vulnerable if not higher.

Leopard Whipray *Himantura leoparda* Manjaji-Matsumoto & Last, 2008

VU

Regional Red List assessment:
Vulnerable A2d
Pollom, R. A., Valinassab, T., Ali, M. & Al Mamari, T.
Global Red List assessment:
Vulnerable A2bd
Rigby, C., Moore, A.B.M. & Rowat, D. (2015)

Rationale The Leopard Whipray (*Himantura leoparda*) is a large (to 140 cm DW) coastal demersal whipray that is widespread in the Indo-West Pacific. It inhabits depths to 70 m and occurs throughout the ASR excluding the Red Sea. A large part of the species' regional distribution (namely, India and Pakistan) is under extremely intense and increasing demersal fishing pressure. For example, the number of trawlers operating in Gujarat waters has increased from ~6,600 boats in 2004 to ~11,500 boats in 2010 while about 2,000 trawlers operate in Pakistan shelf waters. Significant declines of rays have been documented on the west coast of India, including the equivalent of a >99 % decline over three generations (60 years) for *Himantura* species recorded from one major landing site. In Pakistan, *Himantura* species have declined by the equivalent of ~95 % over three generations. In contrast, *Himantura* species are regularly discarded in other parts of the region, for example the Gulf, and they remain common there. Balancing significant declines due to intense and increasing fishing pressure in the eastern part of the region, with more limited mortality in the western part of the region, overall a decline of 30-50 % is suspected for the regional population, and the species is assessed as Vulnerable A2d.

Reticulate Whipray *Himantura uarnak* (Gmelin, 1789)

VU

Regional Red List assessment:
Vulnerable A2d
Pollom, R. A., Valinassab, T., Al Mamari, T., Ali, M. & Bineesh, K.K.
Global Red List assessment:
Vulnerable A2bd
Manjaji-Matsumoto, B.M., White, W.T. & Gutteridge, A.N. (2015)

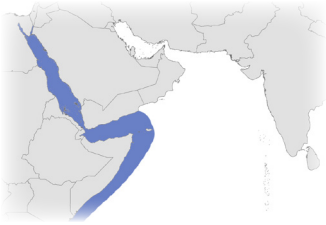
Rationale The Reticulate Whipray (*Himantura uarnak*) is a large (to 160 cm DW) coastal demersal whipray inhabiting depths to 50 m. It is widespread in the Indo-West Pacific and occurs throughout the ASR. A large part of the species' regional distribution (namely, India and Pakistan) is under extremely intense and increasing demersal fishing pressure. For example, the number of trawlers operating in Gujarat waters (India) has increased from ~6,600 boats in 2004 to ~11,500 boats in 2010 while about 2,000 trawlers operate in Pakistan shelf waters. Significant declines of rays

have been documented on the west coast of India, including the equivalent of a >99 % decline over three generations (60 years) for *Himantura* species recorded from one major landing site. In Pakistan, *Himantura* species have declined by the equivalent of ~95 % over three generations. In contrast, *Himantura* species are regularly discarded in other parts of the region, for example the Gulf, and they remain common there. Balancing significant declines due to intense and increasing fishing pressure in the eastern part of the region, with more limited mortality in the western part of the region, overall a decline of 30-50 % is inferred for the regional population, and the species is assessed as Vulnerable A2d.

LC

Baraka's Whipray *Maculabatis ambigua* Last, Bogorodsky & Alpermann, 2016

Regional Red List assessment:
Least Concern
Dulvy, N.K., Bineesh, K.K., Moore, A.B.M., Al Mamari, T. & Grandcourt, E.
Global Red List assessment:
Not Evaluated



Rationale Baraka's Whipray (*Maculabatis ambigua*) is a medium-sized (to 90 cm DW) coastal inshore species, found in shallow soft sediment habitats. It is restricted to the Western Indian Ocean and occurs from the Red Sea down to Tanzania. It is taken as incidental catch in inshore trawl fisheries and using bottom-set gillnets in the Red Sea. It is consumed locally for fresh and dried flesh, or discarded. This species has a relatively broad distribution and fisheries are unlikely to be intense throughout its range, and there is currently no evidence of decline, with the species remaining common. It is therefore assessed as Least Concern in the ASR, although additional information is needed on life-history and fisheries capture and post-release survival to monitor status into the future.

CR

Endemic

Pakistan Whipray *Maculabatis arabica* Manjaji-Matsumoto & Last, 2016

Global Red List assessment:
Critically Endangered A2d+3d
Dulvy, N.K., Bineesh, K.K., Owfi, F., Fernando, D., Moore, A.B.M. & Ali, K.

Rationale The Pakistan Whipray (*Maculabatis arabica*) is a small (to 61 cm DW) coastal inshore species, endemic to the ASR, with a restricted range in eastern Pakistan and the west coast of India in depths to 37 m. This species is taken as incidental catch in inshore trawl fisheries and targeted using bottom-set gillnets, and is consumed locally for fresh and dried flesh. Juveniles are found in estuaries and much of the fishing effort, particularly with stake nets, occurs in this habitat. Adults are captured in trawl fisheries. The limited distribution overlaps with intense coastal fisheries throughout the entire geographic range of the species and the shallow depth distribution means this species is unlikely to have a depth refuge. There has been a significant increase in coastal fishing effort and power over the past 30 years (approximately three generations) and a simultaneous >80 %

reduction in landings of rays. The Pakistan Whipray is suspected to have declined by >80 % over the past three generations, and with fishing ongoing is suspected to further decline over the next three generations, sufficient to warrant listing as Critically Endangered A2d+3d.

Shorttail Whipray *Maculabatis bineeshi* Manjaji-Matsumoto & Last, 2016

CR

Regional Red List assessment:
Critically Endangered A2d+3d
Dulvy, N.K., Bineesh, K.K., Moore, A.B.M., Ali, K. & Fernando, D.
Global Red List assessment:
Not Evaluated

Rationale The Shorttail Whipray (*Maculabatis bineeshi*) is a medium-sized (to 66 cm DW) coastal inshore and shelf species restricted to the Northern Indian Ocean. It occurs in Pakistan and along the east coast of India from Gujarat to Mumbai. It is taken as incidental catch in inshore trawl fisheries and bottom-set gillnets and consumed locally for fresh and dried flesh. Juveniles are found in estuaries and much of the fishing effort, particularly with stake or dol nets, occurs in this habitat. The geographic range of this species mostly overlaps with intense coastal fisheries, and the shallow depth distribution means this species is unlikely to have a depth refuge. In India, there has been a significant increase in coastal fishing effort and power over the past 30 years and a simultaneous >80 % reduction in landings of rays. Coastal fishing effort has doubled over the 15 years from 1990-2004 and a 60 % reduction in landings per unit effort of rays has been reported. Overall, it is suspected that declines of at least 80 % have occurred across this species' range over the past three generations (30 years), and with ongoing fishing pressure, future population declines are suspected over the next three generations (2017-2047). It is therefore assessed as Critically Endangered A2d+3d.

Whitespotted Whipray *Maculabatis gerrardi* (Gray, 1851)

EN

Regional Red List assessment:
Endangered A2d+3d
Pollom, R. A., Spaet, J.L.Y., Valinassab, T., Ali, M. & Elhassan, I.
Global Red List assessment:
Vulnerable A2bd+3bd
Manjaji Matsumoto, B.M., Fahmi & White, W.T. (2004)

Rationale The Whitespotted Whipray (*Maculabatis gerrardi*) is a large (to 116 cm DW) inshore whipray species that is moderately widespread in the Northern Indian and Western Pacific. It inhabits waters from the Gulf to southern India and Sri Lanka to depths of 60 m. This species is impacted by being caught as bycatch in trawl, gillnet, and longline fisheries. Fishing pressure is intense and increasing in the region, particularly in India and Pakistan. The geographic range of this species mostly overlaps with intense coastal fisheries, and the relatively shallow depth distribution means this species is unlikely to have a depth refuge. In India, there has been a significant increase

in coastal fishing effort and power over the past 30 years. Data from one landing site in western India shows an overall decline in ray landings of 60 % over a 14 year period, and given fishing pressure, this is likely broadly representative of a large part of the range of the Whitespotted Whipray. Ongoing fishing is suspected to result in continuing population declines in the future. Overall, it is suspected that declines of at least 50 % have occurred across this species' range over the past three generations (60 years) due to actual levels of exploitation, and with ongoing fishing pressure, future population declines are suspected over the next three generations (2017-2077). The species is therefore assessed as Endangered A2d+3d.

LC

Endemic

Arabian Banded Whipray *Maculabatis randalli* (Last, Manjaji-Matsumoto & Moore, 2012)

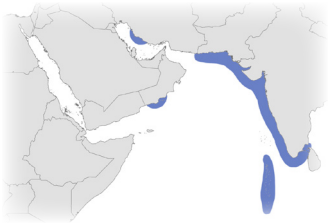
Global Red List assessment:
Least Concern
Dulvy, N.K., Bineesh, K.K., Grandcourt, E., Al Mamari, T. & Moore, A.B.M.

Rationale The Arabian Banded Whipray (*Maculabatis randalli*) is endemic to the Gulf in the ASR, where it is common throughout shallow waters. It occurs from inshore to 60 m depth and reaches a maximum size of 62 cm DW. It is captured incidentally in trawls and gillnets, however, it is often discarded, with unknown post-release survival. Furthermore, the loss and modification of coastal habitats in the Gulf is a significant concern for inshore species such as this. Despite this, and a relatively restricted distribution, there is no evidence of decline and the species remains common. It is therefore assessed as Least Concern, although data on population and catch trends are needed to monitor status into the future.

VU

Smalleye Stingray *Megatrygon microps* (Annandale, 1908)

Regional Red List assessment:
Vulnerable A3d
Pollom, R. A., Spaet, J.L.Y., Al Mamari, T. & Valinassab, T.
Global Red List assessment:
Data Deficient
Fahmi, White, W.T., Manjaji-Matsumoto, B.M. & Pierce, S.J. (2015)



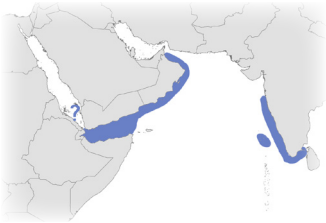
Rationale The Smalleye Stingray (*Megatrygon microps*) is a large (to 222 cm DW) coastal stingray that has a patchy distribution in the Indo-West Pacific, and in the ASR has been recorded in Iran, Oman, Pakistan, India, and the Maldives. It inhabits estuaries and coastal areas and offshore waters to depths of 200 m, although its habitat is poorly-defined. The rarity of the species elsewhere in the region indicates that the majority of the regional population exists in Indian waters, an area that is under extremely intense and increasing demersal fishing pressure. For example, the number of trawlers operating in Gujarat waters has increased from ~6,600 boats in 2004 to ~11,500 boats in 2010, and about 2,000 trawlers operate in Pakistan shelf waters. Furthermore, significant declines of rays have been documented on the west coast of India. The species' low fecundity and

slow life-history, combined with a recent sudden increase in landings in India, are of concern. It is projected that current landings of 200 t per year will lead to declines of at least 30 % over the next three generations (~62 years: 2017-2079). It is therefore assessed as Vulnerable A3d. Further investigation of this species is required to accurately define its range, biology, extent of catches in local fisheries and levels of declines. This assessment should be revisited as soon as this is available.

Bluespotted Maskray *Neotrygon caeruleopunctata* Last, White & Séret, 2016

DD

Regional Red List assessment:
Data Deficient
Dulvy, N.K., Grandcourt, E., Moore, A.B.M., Bineesh, K.K. & Owfi, F.
Global Red List assessment:
Not Evaluated



Rationale The Bluespotted Maskray (*Neotrygon caeruleopunctata*) is a small shallow coastal species. Apparently widespread in the Indian Ocean, however its full regional distribution is unresolved due to taxonomic uncertainty. It occurs from the Gulf of Aden to Oman, but appears not to be present in the Red Sea or the Gulf. It has also been recorded from Cochin, India to Sri Lanka. Its maximum size is around 47 cm DW but little else is known of its biology. In India, it is incidentally captured in trawl fisheries and consumed fresh, dried and salted. Elsewhere in the region, its small size may mean that it would be discarded at sea, but no information is available about survivorship. Overall, the taxonomic uncertainty, which limits a full understanding of the species' range and regional occurrence, precludes an assessment beyond Data Deficient at this time.

Broad Cowtail Ray *Pastinachus ater* (Macleay, 1883)

NT

Regional Red List assessment:
Near Threatened
Kyne, P. M., Jabado, R.W., Spaet, J.L.Y. & Bineesh, K.K.
Global Red List assessment:
Least Concern
Morgan, D.L., White, W.T. & Manjaji Matsumoto, B.M. (2015)

Rationale The Broad Cowtail Ray (*Pastinachus ater*) is a large (to at least 200 cm DW) species. It is widespread in the Indo-West Pacific and probably extends across coastal areas of the ASR. The exact distribution of the species is uncertain due to confusion between *Pastinachus* species, and recent taxonomic changes within the genus. Cowtail rays are caught throughout the region, by trawl, gillnet, and longline fishing. Inshore fishing pressure is intense and increasing in the region, particularly in India, Pakistan and elsewhere. Cowtail rays are landed and utilized in India, where ray landings have declined significantly. In contrast, cowtail rays are generally released when caught in the Gulf and the Red Sea, and although fishers often cut off the tail before release, rays without tails have been observed alive. On the basis of intense and increasing fishing in coastal regions and high mortality in India, but a lack of retention in the Gulf and Red Sea, it is suspected that the

regional population has undergone a population size reduction of close to 30 % over the past three generations (60 years). With ongoing fishing pressure and habitat degradation and loss, future population declines are suspected over the next three generations (2017-2077) and the Broad Cowtail Ray is therefore assessed as Near Threatened (nearly meeting Vulnerable A2d+3d). Species-specific information on each *Pastinachus* species occurring in the region is needed to ascertain status with greater confidence.

NT

Endemic

Cowtail Ray *Pastinachus sephen* (Forsskål, 1775)

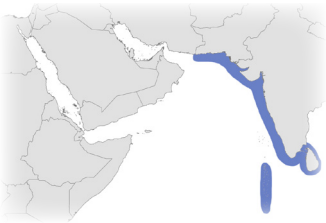
Global Red List assessment:
Near Threatened
Kyne, P. M., Jabado, R.W., Bineesh, K.K. & Spaet, J.L.Y.

Rationale The exact distribution of the Cowtail Ray (*Pastinachus sephen*) is uncertain due to confusion between *Pastinachus* species, and recent taxonomic changes within the genus. The Cowtail Ray is a medium-sized (to at least 89 cm DW) ray, endemic to the ASR, and known to occur in the Red Sea (the type locality), and probably extends across coastal areas of the region. Cowtail Rays are caught throughout the region, by trawl, gillnet and longline fishing. Inshore fishing pressure is intense and increasing in the region, particularly in India, Pakistan, and elsewhere. Cowtail Rays are landed and utilized in India, where ray landings have declined significantly. In contrast, they are generally released when caught in the Gulf and the Red Sea, and although fishers often cut off the tail before release, rays without tails have been observed alive. In addition to fishing pressure, the loss and modification of coastal habitats in the Gulf is a significant concern for inshore species such as this. On the basis of intense and increasing fishing in coastal regions and high mortality in India, but a lack of retention in the Gulf and Red Sea, it is suspected that the regional population has undergone a population size reduction of close to 30 % over the past three generations (60 years). With ongoing fishing pressure and habitat degradation and loss, future population declines are suspected over the next three generations (2017-2077), and the Cowtail Ray is therefore assessed as Near Threatened (nearly meeting Vulnerable A2d+3d). Species-specific information on each *Pastinachus* species occurring in the region is needed to ascertain status more accurately.

EN

Bleeker's Whipray *Pateobatis bleekeri* (Blyth, 1860)

Regional Red List assessment:
Endangered A2bd+3bd
Ebert, D.A., Khan, M., Akhilesh, K.V. & Ali, M.
Global Red List assessment:
Not Evaluated



Rationale Bleeker's Whipray (*Pateobatus bleekeri*) is a medium-sized (to 119 cm DW) inshore ray that occurs to depths of 40 m. It is recorded in Pakistan, India, the Maldives and Sri Lanka and is

incidentally caught in inshore trawl fisheries and targeted using bottom-set gillnets. Fishing pressure is intense and increasing in the region, particularly in India and Pakistan. The geographic range of this species mostly overlaps with intense coastal fisheries, and the shallow depth distribution means this species is unlikely to have a depth refuge. In India, there has been a significant increase in coastal fishing effort and power over the past 30 years and a simultaneous significant reduction in landings of rays. Bleeker's Whipray is estimated to have declined by >90 % over the past three generations (60 years) in these waters. However, it is likely to receive some refuge in Sri Lanka where trawl fisheries do not operate (although illegal fishing from Indian vessels is an ongoing issue), and in the Maldives where rays have been protected since 1995. Overall, it is suspected that the regional population has undergone a population reduction of 50-80 % over the past three generations (60 years) and with ongoing fishing pressure, future population declines are suspected over the next three generations (2017-2077), sufficient to warrant listing as Endangered A2bd+3bd.

Pink Whipray *Pateobatis fai* (Jordan & Seale, 1906)

NT

Regional Red List assessment:
Near Threatened
Ebert, D.A., Akhilesh, K.V., Ali, M. & Khan, M.
Global Red List assessment:
Vulnerable A2bd
Manjaji-Matsumoto, B.M., White, W.T., Fahmi & Gutteridge, A.N. (2015)

Rationale The Pink Whipray (*Pateobatis fai*) is a large (to 146 cm DW) inshore ray found on soft sandy bottoms and coral rubble from the intertidal zone to at least 70 m. It is recorded from across the region but is reported as more common in the southern portion of India, the Maldives and Sri Lanka. This species is incidentally captured in inshore trawl fisheries and targeted using bottom-set gillnets. Fishing pressure is intense and increasing in the region, particularly in India and Pakistan. The geographic range of this species overlaps with intense coastal fisheries, and the shallow depth distribution means this species is unlikely to have a depth refuge. In India, there has been a significant increase in coastal fishing effort and power over the past 30 years and a simultaneous significant reduction in landings of rays. In contrast, they are generally discarded in the Gulf and the Red Sea, although information on post-release survival is not available. Furthermore, it is likely to receive some refuge in Sri Lanka where trawl fisheries do not operate (although illegal fishing from Indian vessels is an ongoing issue), and in the Maldives where rays have been protected since 1995. On the basis of intense and increasing fishing in coastal regions and high mortality in India, but likely limited pressure in other areas (i.e., Maldives, Red Sea), it is suspected that the regional population has undergone a population size reduction of 20-30 % over the past three generations (60 years). With ongoing fishing pressure, future population declines are suspected over the next three generations (2017-2077) and the Pink Whipray is therefore assessed as Near Threatened (nearly meeting Vulnerable A2d+3d).

NT

Jenkins' Whipray *Pateobatis jenkinsii* (Annandale, 1909)

Regional Red List assessment:
Near Threatened
Ebert, D.A., Akhilesh, K.V., Ali, M. & Khan, M.
Global Red List assessment:
Vulnerable A2bd
Manjaji Matsumoto, B.M., Fahmi & White, W.T. (2015)

Rationale Jenkins' Whipray (*Pateobatis jenkinsii*) is a large (to at least 150 cm DW) inshore ray, usually found on sandy bottoms down to at least 90 m deep. It is widespread but patchy in the Indo-West Pacific, including the northern Arabian Sea. Little information is available about the life-history of this species and its occurrence in the region is not well known. Given its coastal habitat in some regions it can be presumed that it is taken incidentally in net and longline fisheries across its range as well as in trawl fisheries off the coast of Iran, Pakistan and India. Fishing pressure is intense and increasing in the region, particularly in India and Pakistan. The geographic range of this species overlaps with intense coastal fisheries, and the relatively shallow depth distribution means this species is unlikely to have a depth refuge. In India, there has been a significant increase in coastal fishing effort and power over the past 30 years and a simultaneous decline in ray landings (60 % over 14 years at one landing site). In contrast, they are generally discarded in the Gulf and Oman, although information on post-release survival is not available. On the basis of intense and increasing fishing in coastal regions and high mortality in India, but likely limited pressure in other areas (i.e., the Gulf), it is suspected that the regional population has undergone a population size reduction of 20-30 % over the past three generations (60 years). With ongoing fishing pressure, future population declines are suspected over the next three generations (2017-2077) and Jenkins' Whipray is therefore assessed as Near Threatened (nearly meeting Vulnerable A2d+3d).

LC

Pelagic Stingray *Pteroplatytrygon violacea* (Bonaparte, 1832)

Regional Red List assessment:
Least Concern
Pollom, R. A., Ali, K., Owfi, F., Akhilesh, K.V. & Romanov, E.
Global Red List assessment:
Least Concern
Baum, J., Bianchi, I., Domingo, A., Ebert, D.A., Grubbs, R.D., Mancusi, C., Piercy, A., Serena, F. & Snelson, F.F. (2007)

Rationale The Pelagic Stingray (*Pteroplatytrygon violacea*) is a medium-sized (to 80 cm DW) pelagic species of stingray. It is cosmopolitan in tropical and temperate oceans, and inhabits all areas of the Arabian Sea away from the continental shelf at depths to 381 m. It is susceptible to capture as bycatch in pelagic longline and gillnet fisheries. Although declines occurred between the 1960s and late 1980s, the species is still very common and more recently appears to be stable or even increasing. This species is therefore assessed as Least Concern, although more data on population and catch trends are needed to monitor status into the future.

Bluespotted Fantail Ray *Taeniura lymma* (Forsskål, 1775)

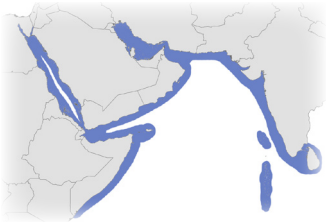
LC

Regional Red List assessment:
Least Concern
Pollom, R. A., Simpfendorfer, C. A., Owfi, F. & Spaet, J.L.Y.
Global Red List assessment:
Near Threatened
Compagno, L.J.V. (2005)

Rationale The Bluespotted Fantail Ray (*Taeniura lymma*) is a small (to 35 cm DW) coastal reef-associated stingray that is widespread in the Indo-West Pacific. In the ASR, it occurs in the Red Sea, along the Somali coast and the Maldives. The species is not targeted in any fisheries, and the nature of its coral habitat typically prevents trawling from occurring. If captured in other types of gear, it is usually discarded due to its undesirable meat. Furthermore, it is protected across its range in the Maldives. It may be impacted by coral reef degradation and loss due to increasing pressure from coastal development, but it likely does not require healthy reefs as it mostly uses them for shelter. The species remains common and abundant in many areas, and is therefore assessed as Least Concern.

Blotched Fantail Ray *Taeniurops meyeni* (Müller & Henle, 1841)

NT



Regional Red List assessment:
Near Threatened
Pollom, R. A., Al Mamari, T., Valinassab, T. & Bineesh, K.K.
Global Red List assessment:
Vulnerable A2d
Kyne, P. M. & White, W.T. (2015)

Rationale The Blotched Fantail Ray (*Taeniurops meyeni*) is a large (to 180 cm DW), widely distributed, Indo-West Pacific stingray which occurs across the region and is associated with coral reef and sandy habitats. Inshore fishing pressure is intense and increasing in the region, particularly in India and Pakistan where ray landings have declined significantly. In contrast, they are generally released alive when caught in the Gulf and the Red Sea and are protected from exploitation in the Maldives. In addition to fishing pressure, the loss and modification of coastal habitats in the Gulf is a significant concern for inshore species such as this. On the basis of intense and increasing fishing in coastal regions and high mortality in India, but a lack of retention in the Gulf and Red Sea, it is suspected that the regional population has undergone a population size reduction of close to 30 % over the past three generations (63 years). With ongoing fishing pressure and decline in habitat quality, future population declines are suspected over the next three generations (2017-2080), and the Blotched Fantail Ray is therefore assessed as Near Threatened (nearly meeting Vulnerable A2cd+3cd).

EN

Indian Sharpnose Ray *Telatrygon crozieri* (Blyth, 1860)

Regional Red List assessment:
Endangered A2d+3d
Dulvy, N.K., Bineesh, K.K., Moore, A.B.M., Owfi, F. & Grandcourt, E.
Global Red List assessment:
Not Evaluated

Rationale The Indian Sharpnose Ray (*Telatrygon crozieri*) is a small (to 40 cm DW) ray occurring in shallow inshore waters to depths of 50 m. Given its size, it is likely to have a productive life-history, but this needs to be confirmed with species-specific research. It is regularly captured in shrimp trawl and gillnets, and although catches are likely to be considerable in India, data remain limited due to species misidentifications and recent taxonomic changes (often recorded as *Amphotistius imbricatus* or *Dasyatis zugei* in landings data). Overall, fishing pressure is increasing across its habitat, and declines in rays have been documented in India. At one landing site, catches of what is reported as *A. imbricatus* have been stable over a 15 year period after an initial increase. On the other hand, landings of *D. zugei* steadily declined from 4.5 t between 1990-1992 to no reported catches in 2002-2004. Simultaneously, over that same time period, trawl effort doubled. The overall catch rate of rays at this landing site declined by 60 % over this time. This species is likely to receive some refuge in Sri Lanka where trawl fisheries do not operate (although illegal trawling by Indian fishermen is an ongoing issue). Uncertainty arising from misidentifications and uncertainty about its life-history, all support a precautionary approach. Overall, declines of 30-50 % are suspected over the past three generations (~33 years), and with ongoing fishing pressure, further population declines are suspected over the next three generations (2017-2050), and the species is assessed as Endangered A2d+3d.

VU

Porcupine Ray *Urogymnus asperrimus* (Bloch & Schneider,1801)

Regional Red List assessment:
Vulnerable A2cd
Pollom, R. A., Ali, M., Valinassab, T. & Ali, K.
Global Red List assessment:
Vulnerable A2bd
Chin, A. & Compagno, L.J.V. (2015)

Rationale The Porcupine Ray (*Urogymnus asperrimus*) is a large (to at least 115 cm DW) shallow water species that is widespread in the Indo-West Pacific and occurs throughout the ASR, from the Red Sea and Somalia to southern India, the Maldives and Sri Lanka. It inhabits inshore waters to at least 30 m depth and is associated with coral reefs, sandy reef lagoons, beaches, mud flats and mangroves. Its life-history characteristics likely make it particularly susceptible to over-exploitation. It is highly susceptible to a variety of fishing methods in areas where the level of exploitation of marine resources is extremely high. The species is rare throughout most of the region, but is relatively common in the Maldives, where it is protected. Threats include being caught as bycatch in inshore trawls and gillnet fisheries and localized habitat loss. Significant declines of rays have been documented in parts of the region and the loss and modification of coastal habitats across

the region is a significant concern for species such as this. The relative rarity, large size and low productivity of the Porcupine Ray make it particularly susceptible to an overall population decline as a result of fishing pressure and a decline in habitat quality from coastal development. It is suspected that this species has undergone declines of 30 % or more over the past three generations (~63 years) based on actual levels of exploitation and decline in habitat quality and is therefore assessed as Vulnerable A2cd.

Mangrove Whipray *Urogymnus granulatus* (Macleay, 1883)

VU

Regional Red List assessment:
Vulnerable A2cd
Pollom, R. A., Owfi, F., Al Mamari, T., Spaet, J.L.Y. & Ali, K.
Global Red List assessment:
Vulnerable A2bd
Manjaji-Matsumoto, B.M., White, W.T., Fahmi, Ishihara, H. & Morgan, D.L. (2015)

Rationale The Mangrove Whipray (*Urogymnus granulatus*) is a large (to at least 141 cm DW) coastal whipray species that occurs throughout the northwest Indian Ocean from the Red Sea to India and the Maldives, including the Gulf and Sea of Oman, to depths of 85 m. The species inhabits mangroves, estuaries, coral reefs, sand flats, and broken rocky-sandy substrate. It has slow life-history characteristics and is rare across the region except in the Maldives and the Gulf of Aden coast of Somalia. It is highly susceptible to a variety of fishing methods in areas where the level of exploitation of marine resources is extremely high. Threats include being caught as bycatch in inshore trawls and gillnet fisheries and localized habitat loss. Significant declines of rays have been documented in parts of the region (e.g., India) and the loss and modification of coastal habitats across the region is a significant concern for species such as this. Declines have been reported from Pakistan over the last ~15 years and are suspected elsewhere (although they have always been rare in the Gulf). The relative rarity, large size and low productivity of the Mangrove Whipray make it particularly susceptible to an overall population decline as a result of fishing pressure and a decline in habitat quality from coastal development. It is suspected that this species has undergone declines of 30 % or more over the past three generations (~63 years) based on actual levels of exploitation and decline in habitat quality and is therefore assessed as Vulnerable A2cd.

FAMILY GYMNURIDAE

NT

Longtail Butterfly Ray *Gymnura poecilura* (Shaw, 1804)

Regional Red List assessment:
Near Threatened
Ebert, D.A., Akhilesh, K.V., Tesfamichael, D. & Valinassab, T.
Global Red List assessment:
Near Threatened
Bizzarro, J.J. & White, W.T. (2006)

Rationale The Longtail Butterfly Ray (*Gymnura poecilura*) is a large (to 104 cm DW) species that occurs over sandy and muddy substrates in shallow, inshore waters to a depth of at least 30 m. It is widespread in the Indo-West Pacific, and in the ASR, occurs in shallow, inshore waters of the Red Sea, Somalia and Oman, the Gulf and from Pakistan to India and Sri Lanka. Little is known about most aspects of its biology and no recent quantitative information is available to determine population structure or fluctuations and potential fishery impacts. Fecundity appears to be low, being reported up to seven pups/litter, and females are known to commonly abort embryos upon capture. It is regularly caught in shallow water trawls and is normally discarded at sea in the western part of its range, but landed in the eastern part (i.e., India). Fishing is increasing across its habitat, and significant declines in rays have been documented in India. Overall, declines of 20-30 % are suspected over the past three generations (45 years), and with ongoing fishing pressure, further population declines are suspected over the next three generations (2017-2062). Therefore, the species is assessed as Near Threatened, however, uncertainty arising from the unknown fate of discards, unresolved taxonomy, and uncertainty about its life-history, all support a precautionary approach. Indeed, it is possible that in the near future the intense trawling pressure in parts of its range could lead to further declines and make it eligible for listing as Vulnerable A2d+3d.

CR

Tentacled Butterfly Ray *Gymnura tentaculata* (Müller & Henle, 1841)

Regional Red List assessment:
Critically Endangered A2d -- Possibly Extinct
Kyne, P. M., Ebert, D.A. & Akhilesh, K.V.
Global Red List assessment:
Data Deficient
Jacobsen, I. (2008)

Rationale The Tentacled Butterfly Ray (*Gymnura tentaculata*) is a medium-sized (to 76 cm DW) poorly-known ray of the Northern Indian Ocean, reportedly widespread in the ASR, but in fact has only been confirmed from Iran, Pakistan and India. There is only a single historical record from the Bay of Bengal, so it appears the Arabian Sea was the historical centre of its range. The type locality has been reported as the Red Sea, but this is uncertain and has been debated in the literature. This species occurs from close inshore to at least 75 m deep and attains a maximum

size of 76 cm DW. Despite field and fish market surveys across its range, the species has not been recorded since 1986. Fishing pressure is intense throughout its reported range and rapid declines have been observed in ray species where they are heavily fished. One dataset from a landing site in Mumbai, India shows significant declines in ray landings (~60 % over 14 years) with increasing fishing effort. This is the equivalent of a ~95 % decline over three generations (45 years) for the Tentacled Butterfly Ray. Although regularly observed in landings along the Balochistan coast of Pakistan between 1982 and 1986, it has not been encountered there in the last 30 years. Fishing pressure on the continental shelf of India and Pakistan, particularly trawl and gillnet, is intense and increasing, and the Tentacled Butterfly Ray is assessed as Critically Endangered A2d due to declines from actual levels of exploitation. While landings of the Longtail Butterfly Ray (*Gymnura poecilura*) have been documented across the region in recent decades, the complete lack of records of the Tentacled Butterfly Ray despite ongoing surveys, raises concerns for its persistence and it is flagged as Possibly Extinct.

FAMILY HEXATRYGONIDAE

DD

Sixgill Stingray *Hexatrygon bickelli* Heemstra & Smith, 1980

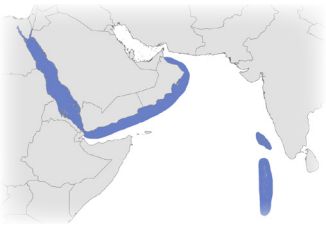
Regional Red List assessment:
Data Deficient
Ebert, D.A., Bineesh, K.K., Owfi, F. & Tesfamichael, D.
Global Red List assessment:
Least Concern
McCormack, C., Wang, Y., Ishihara, H., Fahmi, Manjaji-Matsumoto, B.M., Capuli, E. & Orlov, A. (2015)

Rationale The Sixgill Stingray (*Hexatrygon bickelli*) is a medium-sized (to 170 cm TL) deepsea ray that occurs on soft bottoms on continental slopes and seamounts at depths of 300-1,120 m. It is widespread but patchy in the Indo-West and Central Pacific. In the ASR, it is known only from off southwest India and Sri Lanka. Little is known of its biology. This species is a rare bycatch in the deepsea shrimp trawl fishery which operates at 200-500 m depth and over most of the known regional range of the species. It is presumably a slow growing species, with a relatively large size at maturity, making it particularly susceptible to overfishing. Further information is required on the impact of these fisheries through catch monitoring. Until such information is available the species cannot be assessed beyond Data Deficient.

FAMILY MOBULIDAE

VU

Reef Manta Ray *Mobula alfredi* (Krefft, 1868)



Regional Red List assessment:
Vulnerable A2d
Dulvy, N.K., Fernando, D., Romanov, E., Ali, K. & Khan, M.
Global Red List assessment:
Vulnerable A2abd+3bd+4abd
Marshall, A., Kashiwagi, T., Bennett, M.B., Deakos, M., Stevens, G., McGregor, F., Clark, T., Ishihara, H. & Sato, K. (2010)

Rationale The Reef Manta Ray (*Mobula alfredi*) is a large (to 550 cm DW) species with a circum-tropical and subtropical distribution, and is found in the Pacific, Atlantic and Indian Oceans. Within this broad range, populations appear to be sparsely distributed and highly fragmented. In the ASR, it is found in the Red Sea, coastal waters of Yemen and Oman, and from the Lakshadweep Islands (India) south through the Maldives. This species has a very conservative life-history with an extremely low reproductive output and maximum population growth rate. Manta rays are caught as bycatch in trawl and purse seine fisheries, and are often traded internationally for traditional medicine. Historically, there was high fishing intensity from trawls and gillnet fisheries that began in the 1950s, potentially resulting in bycatch mortality where it occurs in the region. In the ASR, populations are likely to be stable in locations where they receive some level of protection such as the Maldives, or in the Red Sea where there is no evidence of targeted fisheries and where this species is likely to be discarded if caught. However, populations are likely to have drastically declined in the region which contains some of the largest *Mobula* fisheries in the world. Overall, based on the evidence of declines of up to 80 % outside the region, suspected historic decline within the ASR, its slow life-history strategy, and low likelihood of rescue from outside this region (based on low interchange and a high degree of residency), it is suspected that declines of at least 30-50 % have occurred over the past three generations (75 years) based on actual levels of exploitation. As such, this species is assessed as Vulnerable A2d.

VU

Giant Manta Ray *Mobula birostris* (Walbaum, 1792)

Regional Red List assessment:
Vulnerable A2d
Dulvy, N.K., Fernando, D., Ali, K., Khan, M. & Romanov, E.
Global Red List assessment:
Vulnerable A2abd+3bd+4abd
Marshall, A., Bennett, M.B., Kodja, G., Hinojosa-Alvarez, S., Galvan-Magana, F., Harding, M., Stevens, G. & Kashiwagi, T. (2010)

Rationale The Giant Manta Ray (*Mobula birostris*), the largest (to 910 cm DW) living ray, has a circum-tropical and also semi-temperate distribution throughout the world's major oceans, however within this broad range, subpopulations appear to be sparsely distributed and highly fragmented. In

the ASR, it is confirmed throughout the Red Sea, Oman, Pakistan, coastal India and Sri Lanka, and south through the Maldives. Its fragmented distribution is likely due to the specific resource and habitat needs of this species. Overall population size is unknown, but subpopulations appear to be small (about 100–1,000 individuals). Only recently separated from the Reef Manta Ray (*M. alfredi*), little is currently known about this ray except that it is elusive and potentially highly migratory. This species exhibits a slow life-history with an extremely low reproductive output (one pup per litter). This extreme biological sensitivity would also contribute to its slow or lack of recovery from population reductions. This species still has a high value in international trade and there is significant bycatch and retention particularly in India and Sri Lanka (which supports one of the largest *Mobula* fisheries in the world). However, the population is likely to be stable in locations where it receives some level of protection such as the Maldives, or in the Red Sea where there is no evidence of targeted fisheries and where this species is likely to be discarded if caught. Globally, the rate of population reduction appears to be high in several regions, as much as 80 % over the past three generations (approximately 75 years). Overall, based on the evidence of declines of up to 80 % outside the region, suspected historic decline within the ASR, its very low productivity, and low likelihood of rescue from outside this region, it is suspected that declines of at least 30-50 % have occurred over the past three generations (75 years) based on actual levels of exploitation. As such, this species is assessed as Vulnerable A2d.

Longhorned Pygmy Devil Ray *Mobula eregoodootenkee* (Bleeker, 1859)

NT

Regional Red List assessment:
Near Threatened
Dulvy, N.K., Khan, M., Ali, K., Fernando, D. & Romanov, E.
Global Red List assessment:
Near Threatened
Pierce, S.J. & Bennett, M.B. (2003)

Rationale The Longhorned Pygmy Devil Ray (*Mobula eregoodootenkee*) is a large (to at least 100 cm DW) species. It is locally common within its wide tropical Indo-West Pacific distribution. In the ASR, it occurs in the Red Sea, Arabian Sea, and the Gulf, but has not been recorded from oceanic islands or from Sri Lanka. Little is known about its biology and ecology, although inference from related *Mobula* species suggests this species is likely to have a low reproductive output. This species is likely a bycatch component of several fisheries through entanglement in nets, with much of this catch unreported. The lack of species-specific catch, fishing effort, and population data necessitates the use of genus-wide inferences on population reduction. Despite increasing fishing effort, population declines of devil rays have been documented in the region with India and Sri Lanka reported as having two of the top five devil ray fisheries in the world. However, there are no records of this species from Sri Lanka suggesting that Sri Lankan fisheries operating in the wider region are not interacting with it. Also, in the western part of the species' range (Red Sea and Gulf), devil rays are likely to be discarded alive, and such severe declines are not expected. Overall, it is suspected that declines of at least 20-30 % have occurred across this species' range over the past three generations (~23 years) based on current levels of exploitation. Fishing pressure could severely impact this species, and given the lack of quantitative data available it is prudent to assess this species as Near Threatened (nearly meeting Vulnerable A2d) until its population is otherwise proven to be stable.

NT

Shortfin Devil Ray *Mobula kuhlii* (Müller & Henle, 1841)

Regional Red List assessment:
Near Threatened
Dulvy, N.K., Khan, M., Ali, K., Fernando, D. & Romanov, E.
Global Red List assessment:
Data Deficient
Bizzarro, J., Smith, W., White, W.T. & Valenti, S.V. (2007)

Rationale The Shortfin Devil Ray (*Mobula kuhlii*) is an uncommon large (to at least 119 cm DW) schooling devil ray with a patchy distribution in the Indian Ocean. In the ASR, it is reported from Yemen, Oman, Pakistan, India, Sri Lanka, and the Maldives. It does not appear to be present in the Red Sea but is present inside the Gulf. Mobulid rays are particularly vulnerable to overfishing as their fecundity is amongst the lowest of all elasmobranchs (typically one pup per litter and a gestation period assumed to be 1 year). Mobulid rays, including the Shortfin Devil Ray, are incidentally captured in gillnet, longline, and purse seine fisheries. The Shortfin Devil Ray occurs primarily in coastal waters, placing it within the range of inshore fisheries that are intensive in many parts of its range. Data to determine population trends are unavailable because mobulid fisheries are generally poorly documented and *M. kuhlii* are often misidentified as *M. japonica*/*M. mobular*, hence specific catch data are rarely recorded. The lack of species-specific catch, fishing effort, and population data necessitates the use of genus-wide inferences on population reduction. Despite increasing fishing effort, population declines of devil rays have been documented in the region with India and Sri Lanka reported as having two of the top five devil ray fisheries in the world. However, only two records of this species have been confirmed from Sri Lanka suggesting that Sri Lankan fisheries operating in the wider region are not interacting with this species. Also, in other parts of the species' range (i.e., the Gulf, Oman), devil rays are likely to be discarded alive, and such severe declines of this species are not expected. Overall, it is suspected that declines of at least 20-30 % have occurred across this species' range over the past three generations (~23 years) based on current levels of exploitation. Fishing pressure could severely impact this species, and given the lack of quantitative data available it is prudent to assess this species as Near Threatened (nearly meeting Vulnerable A2d) until its population is otherwise proven to be stable.

EN

Giant Devil Ray *Mobula mobular* (Bonnaterre, 1788)

Regional Red List assessment:
Endangered A2d
Dulvy, N.K., Khan, M., Ali, K., Fernando, D. & Romanov, E.
Global Red List assessment:
Endangered A2d
Notarbartolo di Sciara, G., Serena, F. & Mancusi, C. (2014)

Rationale The Giant Devil Ray (*Mobula mobular*) is a large (to 520 cm DW) oceanic and sometimes coastal devil ray that is probably circumglobal in tropical and subtropical waters. In the ASR, it occurs in the Gulf of Aden, Oman, southern Gulf, Pakistan, India, Sri Lanka, and the Maldives. Little is known about its biology and ecology, although inference from related *Mobula* species suggests this species is likely to have a low reproductive output and is therefore particularly vulnerable to overfishing.

The Giant Devil Ray is a large component of targeted fisheries in Pakistan, India, and Sri Lanka, and likely to be a bycatch component of several other fisheries through entanglement in nets, with much of this catch unreported. The lack of species-specific catch, fishing effort, and population data necessitates the use of genus-wide inferences on population reduction. Despite increasing fishing effort, population declines of devil rays have been documented in the region with India and Sri Lanka reported as having two of the top five devil ray fisheries in the world. While species-specific data are not available, the presence of intensive fisheries across the regional range of this species, increasing effort, its large size and low reproductive output, mean that like other *Mobula* in the region it is likely to have declined. It is therefore suspected that this species has declined by 30-50 % over the past three generations (60 years) based on current levels of exploitation in the ASR (meeting Vulnerable A2d). Immigration is likely into the region from the east and south, regions also under intense pressure, with mobulids also threatened in Asia. Applying the regional guidelines, immigration is expected to decrease and the regional population is a sink, resulting in uplisting to Endangered A2d. The collection of species-specific population, catch, distribution, and trade data is highly recommended to allow for a more comprehensive assessment of this highly sensitive species in the future.

Sicklefin Devil Ray *Mobula tarapacana* (Philippi, 1892)

EN

Regional Red List assessment:
Endangered A2d
Dulvy, N.K., Khan, M., Ali, K., Fernando, D. & Romanov, E.
Global Red List assessment:
Vulnerable A2bd
Pardo, S.A., Walls, R.H.L. & Bigman, J.S. (2016)

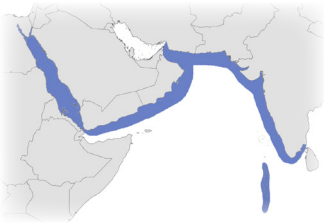
Rationale The Sicklefin Devil Ray (*Mobula tarapacana*) is a large (to at least 328 cm DW) ray with a circumglobal range in temperate, subtropical, and tropical waters of the Indian, Pacific, and Atlantic Oceans. It occurs in the northern Red Sea and its presence is confirmed in Pakistan, India, Sri Lanka, and the Maldives. It is primarily oceanic, but is also found in coastal waters. Little is known about its biology and ecology, although inference from related *Mobula* species suggests this species is likely to have an extremely low reproductive output (producing around one pup per year) and is therefore particularly vulnerable to overfishing. Increasing international trade in gill plates has led to the expansion of largely unregulated and unmonitored manta and devil ray (*Mobula* spp.) fisheries worldwide. The Sickelfin Devil Ray is a large component of targeted fisheries in India and Sri Lanka, and likely to be a bycatch component of several other fisheries through entanglement in nets, with much of this catch unreported. It is also highly valued for its meat and gill plates which fetch the highest prices for *Mobula* products in international trade. The lack of species-specific catch, fishing effort, and population data necessitates the use of genus-wide inferences on population reduction. Where documented, catches are decreasing yet fishing effort is stable or increasing, suggesting populations are declining. In the last decade, significant reductions have been either inferred or suspected in the Indian Ocean (particularly in Sri Lanka, where they are heavily fished). These declines suggest population reductions of a minimum of 75 % over the past three generations (30 years) based on current levels of exploitation throughout the region, which, combined with sustained international trade value and demand for devil ray gill plates, domestic demand for meat, high intrinsic sensitivity to overexploitation, and the likelihood that fishing effort

will increase, leads to this species being assessed as Endangered A2d. The collection of species-specific population, catch, distribution, and trade data is highly recommended to allow for a more comprehensive assessment of this susceptible species in the future.

EN

Bentfin Devil Ray *Mobula thurstoni* (Lloyd, 1908)

Regional Red List assessment:
Endangered A2d
Dulvy, N.K., Romanov, E., Khan, M., Ali, K. & Fernando, D.
Global Red List assessment:
Near Threatened
Walls, R.H.L., Pardo, S.A., Bigman, J.S., Clark, T.B., Smith, W.D. & Bizzarro, J.J. (2016)



Rationale The Bentfin Devil Ray (*Mobula thurstoni*) is a large (to at least 180 cm DW), patchily distributed ray found in both shallow neritic waters (<100 m depth), and offshore pelagic waters of tropical and subtropical seas worldwide. In the region, it occurs in the Red Sea and Sea of Oman, through to Pakistan, Indian, Sri Lanka, and the Maldives. Little is known about its biology and ecology, although inference from related *Mobula* species suggests it is sensitive to even moderate levels of fishing pressure because devil rays have extremely low reproductive rates (around one pup per year) and low post-release survival. The international trade in gill plates has led to the expansion of largely unregulated and unmonitored devil and manta ray fisheries worldwide. The Bentfin Devil Ray is a large component of targeted fisheries in India and Sri Lanka, and likely to be a bycatch component of several other fisheries through entanglement in nets, with much of this catch unreported. The lack of species-specific catch, fishing effort, and population data necessitates the use of genus-wide inferences on population reduction particularly from the Bentfin Devil Ray's congener, the Sicklefin Devil Ray (*M. tarapacana*). Where documented, catches are decreasing yet known fishing effort is stable or increasing, suggesting that populations are declining. In the last decade, population reductions have been either inferred or suspected in the Indian Ocean (particularly in Sri Lanka, where they are heavily fished). Overall, it is suspected that this species has declined by 30-50 % over the past three generations (~23 years) in the ASR based on current levels of exploitation and genus-wide population reductions (therefore meeting Vulnerable A2d). Immigration is likely into the region from the east and south, regions also under intense pressure, with mobulids also threatened in Asia. Applying the regional guidelines, immigration is expected to decrease and the regional population is a sink, resulting in uplisting to Endangered A2d. The collection of species-specific population, catch, distribution, and trade data is highly recommended to allow for a more comprehensive assessment of this susceptible species in the future.

FAMILY MYLIOBATIDAE

Mottled Eagle Ray *Aetomylaeus maculatus* (Gray, 1834)

EN

Regional Red List assessment:
Endangered A2cd+3cd
Pollom, R. A., Owfi, F., Ali, K. & Elhassan, I.
Global Red List assessment:
Endangered A2d+3d+4d
White, W.T. (2006)

Rationale The Mottled Eagle Ray (*Aetomylaeus maculatus*) is a medium-sized (to 100 cm DW), uncommon, inshore Indo-West Pacific eagle ray. It has been confirmed on the east coast of India and is thought to be present in Sri Lanka. Only one record has been confirmed from the west Indian coast (Gujarat) and from Gulf waters (Ras Al Khaimah, UAE), and it is suspected to occur in Pakistan and eastern Iran based on anecdotal reports and one museum specimen from Karachi University. Further research is needed in order to confirm the distribution of this species in the ASR. Its potentially fragmented distribution as well as apparent rarity may make it susceptible to localised depletion, but the full extent of interactions with fisheries is unknown at present. However, like other species of eagle rays, it is highly susceptible to a variety of fishing methods in areas where the level of exploitation of marine resources is extremely high. It is mainly caught as bycatch in inshore and shelf trawl and gillnet fisheries. Most of the distribution of the species is under extremely intense and increasing demersal fishing pressure. For example, the number of trawlers operating in Gujarat waters almost doubled from ~6,600 boats in 2004 to ~11,500 boats in 2010, and about 2,000 trawlers operate in Pakistan shelf waters. Significant declines of rays have been documented on the west coast of India, including eagle rays. Furthermore, the loss and modification of coastal habitats in the Gulf is a significant concern for inshore species such as this. The relative rarity, large size and low productivity of the Mottled Eagle Ray makes it particularly susceptible to an overall population decline as a result of fishing pressure and habitat loss. It is suspected that this species has undergone declines of 50 % or more over the past three generations (~45 years), and with ongoing fishing pressure and habitat degradation and loss, future population declines are suspected over the next three generations (2017-2062). It is therefore assessed as Endangered A2cd+3cd.

Ocellate Eagle Ray *Aetomylaeus milvus* (Valenciennes, 1841)

EN

Endemic

Global Red List assessment:
Endangered A2d+3d
Pollom, R. A., Spaet, J.L.Y., Valinassab, T. & Elhassan, I.

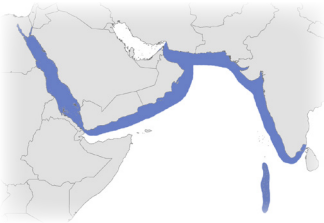
Rationale The Ocellate Eagle Ray (*Aetomylaeus milvus*) is a relatively large species of eagle ray (to 123 cm DW), endemic to the ASR, that inhabits waters from Oman to northern India (Gujarat).

It is caught as bycatch in inshore and shelf trawl and gillnet fisheries. Most of the distribution of the species is under extremely intense and increasing demersal fishing pressure. For example, the number of trawlers operating in Gujarat waters has increased from ~6,600 boats in 2004 to ~11,500 boats in 2010, and about 2,000 trawlers operate in Pakistan shelf waters. Significant declines of rays have been documented on the west coast of India, including eagle rays. Furthermore, the loss and modification of coastal habitats in the Gulf is a significant concern for inshore species such as this. The relative rarity, large size, low productivity, and relatively small range of the Ocellate Eagle Ray makes it particularly susceptible to an overall population decline as a result of fishing pressure and habitat loss. It is suspected that this species has undergone declines of 50 % or more over the past three generations (~45 years), and with ongoing fishing pressure and habitat degradation and loss, future population declines are suspected over the next three generations (2017-2062). It is therefore assessed as Endangered A2d+3d.

VU

Banded Eagle Ray *Aetomylaeus nichofii* (Bloch & Schneider, 1801)

Regional Red List assessment:
Vulnerable A2cd+3cd
Pollom, R. A., Ali, K., Owfi, F. & Elhassan, I.
Global Red List assessment:
Vulnerable A2bd
Kyne, P. M., Compagno, L.J.V. & Bennett, M.B.(2015)

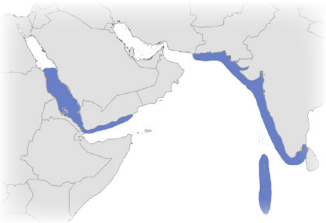


Rationale The Banded Eagle Ray (*Aetomylaeus nichofii*) is a medium-sized (to at least 72 cm DW) wide-ranging Indo-West Pacific eagle ray which occurs across the ASR. It is caught as bycatch in inshore and shelf trawl and gillnet fisheries. Most of the distribution of the species is under extremely intense and increasing demersal fishing pressure. For example, the number of trawlers operating in Gujarat waters has almost doubled from ~6,600 boats in 2004 to ~11,500 boats in 2010, and about 2,000 trawlers operate in Pakistan shelf waters. Although still common and apparently reasonably stable in the Gulf, in Pakistan, India and the Red Sea, the species has undergone significant declines, similar to documented declines of other species of rays along the west coast of India. Furthermore, the loss and modification of coastal habitats in the Gulf and the Red Sea is a significant concern for inshore species such as this. The low productivity of the Banded Eagle Ray makes it particularly susceptible to an overall population decline as a result of fishing pressure and habitat loss. It is suspected that this species has undergone an overall regional decline of 30 % or more over the past three generations (~45 years), and with ongoing fishing pressure and habitat degradation and loss, a future population decline is suspected over the next three generations (2017-2062). It is therefore assessed as Vulnerable A2cd+3cd.

Ornate Eagle Ray *Aetomylaeus vespertilio* (Bleeker, 1852)

EN

Regional Red List assessment:
Endangered A2cd+3cd
Pollom, R. A., Owfi, F., Elhassan, I. & Ali, K.
Global Red List assessment:
Endangered A2d
White, W.T. & Kyne, P. M. (2015)



Rationale The Ornate Eagle Ray (*Aetomylaeus vespertilio*) is a large (to 300 cm DW), uncommon eagle ray that has not been sighted in any great numbers since its description more than 160 years ago. It has a widespread but patchy distribution in the Arabian Sea, including the southern Red Sea (Sudan, Eritrea and Yemen), Pakistan, India, and the Maldives. The species is highly susceptible to a variety of fishing methods in this region and is mainly caught as bycatch in inshore and shelf trawl and gillnet fisheries. Most of the known distribution of the species is under extremely intense and increasing demersal fishing pressure. For example, the number of trawlers operating in Gujarat waters has increased from ~6,600 boats in 2004 to ~11,500 boats in 2010, and about 2,000 trawlers operate in Pakistan shelf waters. Significant declines of rays have been documented on the west coast of India, including eagle rays. Furthermore, the loss and modification of coastal habitats in the Red Sea is a significant concern for inshore species such as this. The relative rarity, large size, low productivity, and relatively small range of the Ocellate Eagle Ray makes it particularly susceptible to an overall population decline as a result of fishing pressure and habitat loss. It is suspected that this species has undergone declines of 50 % or more over the past three generations (~45 years), and with ongoing fishing pressure and habitat degradation and loss, future population declines are suspected over the next three generations (2017-2062). It is therefore assessed as Endangered A2cd+3cd.

FAMILY PLESIOBATIDAE

Giant Stingaree *Plesiobatis daviesi* (Wallace, 1967)

DD

Regional Red List assessment:
Data Deficient
Ebert, D.A., Bineesh, K.K., Tesfamichael, D. & Owfi, F.
Global Red List assessment:
Least Concern
White, W.T., Kyne, P. M. & Holtzhausen, H. (2015)

Rationale The Giant Stingaree (*Plesiobatis daviesi*) is a large (to 270 cm TL) deepsea ray. It has a widespread but patchy distribution in the Indo-Pacific. In the ASR, it is only known from off southern India and possibly off Sri Lanka. It is demersal on the continental slope at depths of 275–680 m but its biology is poorly-known. This species is occasionally caught in the southwest Indian deepsea shrimp trawl fishery. That fishery developed and expanded rapidly and currently operates over most of the known regional range of the species. The Giant Stingaree may have some

refuge at depth beyond the fishery which operates at 200-500 m, which would suggest it may be regionally considered as Least Concern. However, the large size of this species and low number of records indicate low productivity, hence poor resilience to fisheries, and possible rarity. Until further information is available on the impact of the deepsea shrimp trawl fishery on the species or until it is shown to be wider-ranging in the region, it cannot be assessed beyond Data Deficient.

FAMILY **RHINOPTERIDAE**

EN

Javan Cownose Ray *Rhinoptera javanica* Müller & Henle, 1841

Regional Red List assessment:
Endangered A2d
Kyne, P. M., Jabado, R.W., Bineesh, K.K., Spaet, J.L.Y. & Ali, M.
Global Red List assessment:
Vulnerable A2d+3cd+4cd
Dudley, S.F.J, Kyne, P. M. & White, W.T. (2006)

Rationale The Javan Cownose Ray (*Rhinoptera javanica*) is widespread in the Indo-West Pacific. In the ASR, the species occurs from the Red Sea to India and Sri Lanka, including the Gulf. Of the two cownose rays occurring in the region, the Javan Cownose Ray is the rarer species in landings although identification between the two species is problematic, and as such species-specific data is lacking. It is more likely to be caught singularly or in small groups, rather than the large aggregations formed by some other cownose rays. It is caught throughout its range by trawl and gillnet fishing. Inshore fishing pressure is intense and increasing in the region, particularly in India, Pakistan and elsewhere. This large species (to 162 cm DW) is susceptible to capture and is utilized when caught. It has very limited productivity (1-2 pups per litter) and therefore a low ability to support continual exploitation. Serious declines in cownose ray landings have been observed in Pakistan, and of rays in general in India, which is probably reflective of the wider regional situation. On the basis of intense and increasing fishing in coastal regions and high mortality, it is suspected that the regional population has undergone a population size reduction of at least 30 % over the past three generations (45 years), and is therefore listed as Vulnerable. Immigration is likely into the region from the east, a region also under intense pressure with cownose rays threatened there. Applying the regional guidelines, immigration is expected to decrease and the regional population is a sink, resulting in uplisting to Endangered A2d for the ASR.

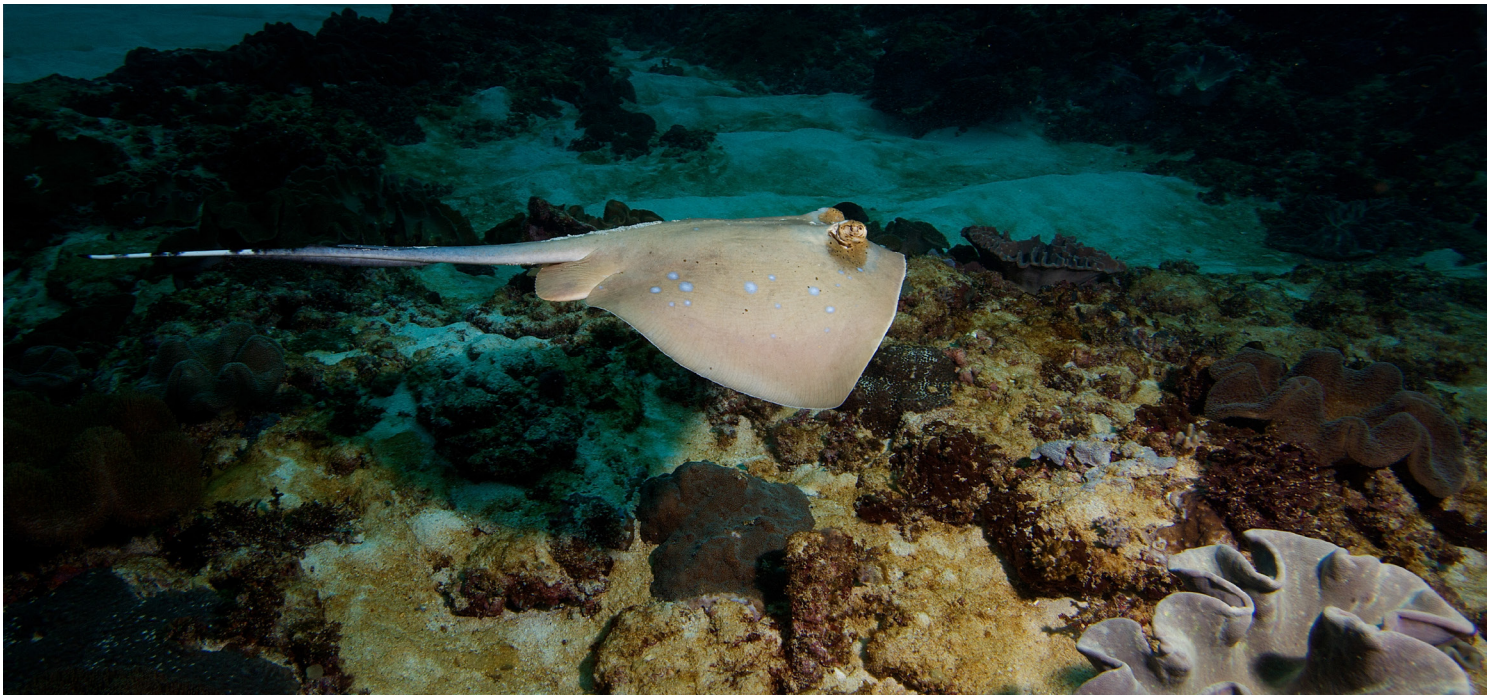
EN

Oman Cownose Ray *Rhinoptera jayakari* Boulenger, 1895

Regional Red List assessment:
Endangered A2d
Kyne, P. M., Jabado, R.W., Bineesh, K.K., Spaet, J.L.Y. & Ali, M.
Global Red List assessment:
Not Evaluated

Rationale The Oman Cownose Ray (*Rhinoptera jayakari*) is widespread in the Indo-West Pacific. In the ASR, the species occurs from the Red Sea to India and Sri Lanka, including the Gulf. Of the two cownose rays occurring in the region, the Oman Cownose Ray is the more common species in landings, and forms very large aggregations. Identification between the two species is problematic, and as such species-specific data is lacking. It is caught throughout its range by trawl and gillnet fishing. Inshore fishing pressure is intense and increasing in the region, particularly in India and Pakistan. Aggregations of this medium-large sized ray (to 90 cm DW) are susceptible to capture and the species is utilised when caught. This species has very limited productivity (1 pup per litter) and therefore a low ability to support continual exploitation. Serious declines in cownose ray landings have been observed in Pakistan, and of rays in general in India, which may be reflective of the wider regional situation. On the basis of intense and increasing fishing in coastal regions and high mortality, it is suspected that the regional population has undergone a population size reduction of at least 30 % over the past three generations (30 years), and is therefore listed as Vulnerable. Immigration is likely into the region from the east and south, regions also under intense pressure, with cownose rays threatened in Asia. Applying the regional guidelines, immigration is expected to decrease and the regional population is a sink, resulting in uplisting to Endangered A2d.

Bluespotted Maskray -- ***Neotrygon caeruleopunctata*** © Simone Caprodossi Photography



RAJIFORMES

Ornate Skate -- ***Okamejei ornata*** © Simon Weigmann

FAMILY **RAJIDAE**

DD

Endemic

Reverse Skate *Amblyraja reversa* (Lloyd, 1906)

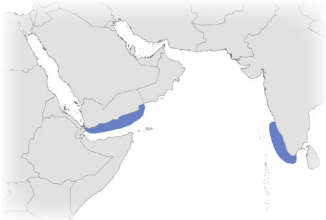
Global Red List assessment:
Data Deficient
Ebert, D.A., Khan, M., Akhilesh, K.V. & Grandcourt, E.

Rationale The Reverse Skate (*Amblyraja reversa*) is endemic to the ASR and only known from a single specimen measuring 60 cm TL, collected from 1,500 m depth on the deep slope of the Baluchistan coast off Pakistan in the Arabian Sea. As virtually nothing is known of this species, it cannot be assessed beyond Data Deficient at present. This assessment should be revisited as further information becomes available.

Travancore Skate *Dipturus johannisdavesi* (Alcock, 1899)

DD

Regional Red List assessment:
Data Deficient
Ebert, D.A., Bineesh, K.K., Tesfamichael, D. & Valinassab, T.
Global Red List assessment:
Data Deficient
McCormack, C. (2006)



Rationale The Travancore Skate (*Dipturus johannisdavesi*) is a small (to 54 cm TL) poorly-known deepsea skate with a patchy Indian Ocean distribution including off southwest India and the Gulf of Aden in the ASR. Little information is currently available on its biology, distribution and population trends. Its occurrence in deeper waters (220-660 m) may provide it with some refuge in the Gulf of Aden. It is sometimes caught in the deepsea shrimp trawl fishery operating off southwest India, but the extent to which fishing is affecting the species there is not known. It is currently assessed as Data Deficient due to the lack of available information, but concerns are raised due to its potential rarity and patchy distribution.

Ornate Skate *Okamejei ornata* Weigmann, Stehmann & Thiel, 2015

LC

Endemic

Global Red List assessment:
Least Concern
Ebert, D.A., Khan, M., Ali, M. & Akhilesh, K.V.

Rationale The Ornate Skate (*Okamejei ornata*) is endemic to the ASR, where it is only known from 10 specimens caught around the Socotra Island (Yemen). It occurs on the upper continental slope at depths of 375-390 m, reaches at least 51 cm TL, but virtually nothing is known of its biology. Despite being recorded from only a limited number of specimens, there are currently no known threats to this species since deepsea fisheries do not operate within its known depth range, and it is therefore assessed as Least Concern. Further information is required on its life-history, population size, and geographic and depth range.

Indian Ring Skate *Orbiraja powelli* (Alcock, 1898)

DD

Regional Red List assessment:
Data Deficient
Ebert, D.A., Akhilesh, K.V., Khan, M. & Ali, M.
Global Red List assessment:
Data Deficient
Cronin, E.S. (2008)

Rationale The Indian Ring Skate (*Orbiraja powelli*) is a small (to at least 53 cm TL) poorly-known

skate found regionally on the continental shelf and upper slope at depths of 15–460 m off the southwest coast of India and Sri Lanka. Off Indian waters, the species appears to occur more in depths of 70–230 m. It has been recorded as bycatch in the trawl fisheries in India but is not targeted. Outside Indian waters (i.e., Sri Lanka) there are limited or no trawl fisheries that might encounter it, although illegal trawling by Indian vessels in Sri Lankan waters is an ongoing issue. Very little is known of the biology of this species and the extent to which fishing might be affecting it, particularly the deepsea shrimp trawl fishery off southwest India. It is currently assessed as Data Deficient due to a lack of information on the species' biology and population trends. This assessment should be revisited as further information becomes available.

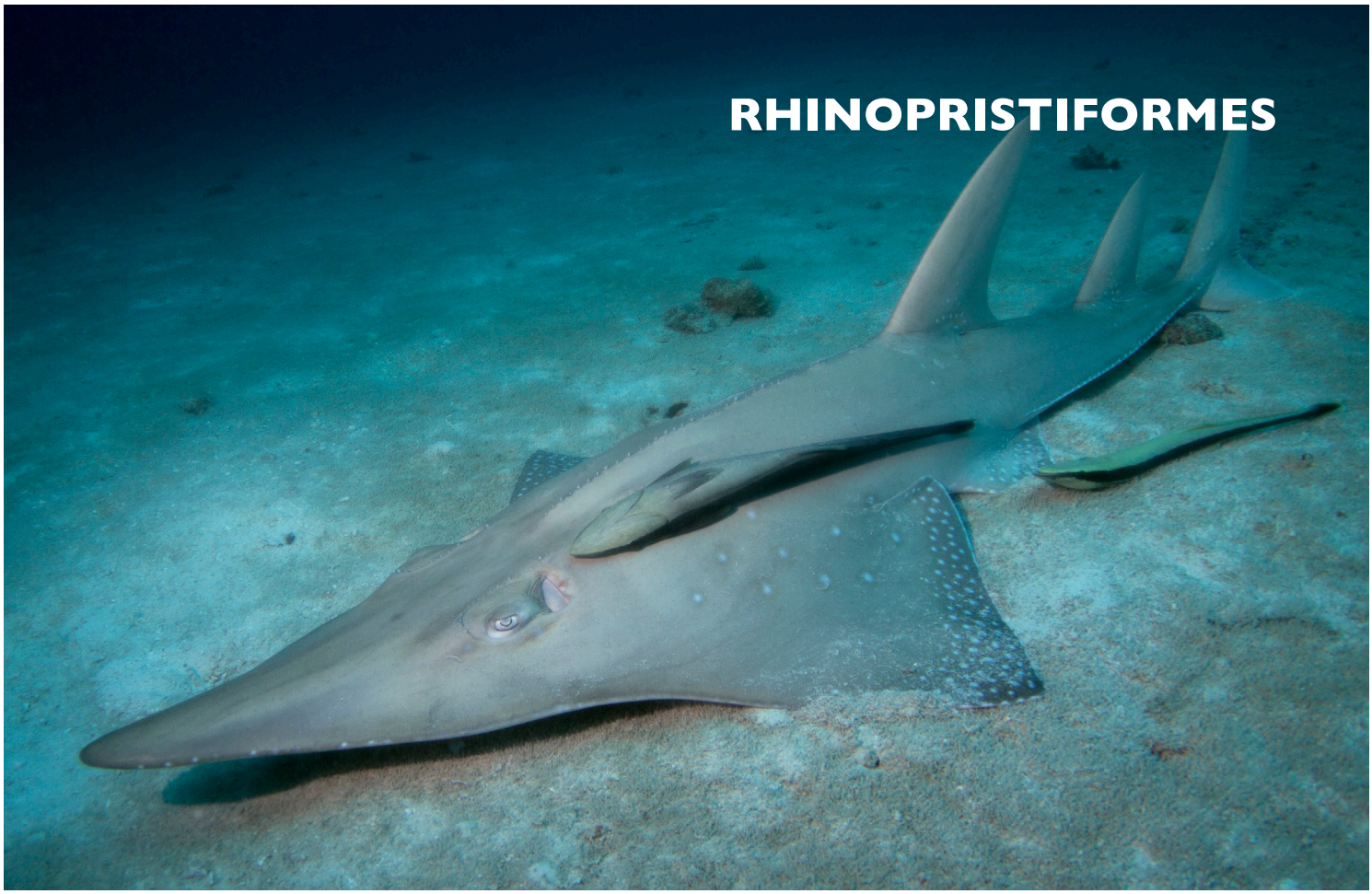
DD

Endemic

Pita Skate *Raja pita* Fricke & Al-Hassan, 1995

Global Red List assessment:
Data Deficient
Moore, A.B.M. & Weigmann, S.

Rationale The Pita Skate (*Raja pita*) was listed as Critically Endangered in 2008, based on the single known individual (the holotype) and the threats present at the location from which it was reported. However, re-evaluation of the available information in the 20+ years since its capture provides strong justification for a Data Deficient listing until further specimens that confirm its distribution are recorded. The rationale for this re-assessment is based on three factors: no further specimens of this species have been reported in the 20+ years since the capture of the single holotype, despite local and regional surveys (including elasmobranch surveys of nearby fish markets and landing sites, and numerous general fish surveys using methodologies such as demersal trawling that would be expected to commonly record this species); the absence of records is not likely to be a result of a lack of identification materials, as the species is both a highly distinctive taxon (the only rajid reported as occurring in shallow waters of the Arabian peninsula), and is also figured in a widely-used FAO marine species identification guide; and the presence of a rajid in a shallow, turbid, subtropical estuary is broadly inconsistent with patterns shown by other rajid species, which tend to be distributed in cooler, deeper waters. Therefore, a Data Deficient status is appropriate until such time when further information is available.



Bottlenose Wedgefish -- ***Rhynchobatus australiae*** © Elke Bojanowski - Red Sea Sharks

FAMILY GLAUCOSTEGIDAE

Sharpnose Guitarfish *Glaucostegus granulatus* (Cuvier, 1829)

EN

Regional Red List assessment:
Endangered A2cd+3cd
Simpfendorfer, C. A., Jabado, R. W., Moore, A.B.M. & Valinassab, T.
Global Red List assessment:
Vulnerable A2bd+3d+4d
Marshall, A.D. & Last, P.R. (2006)

Rationale The Sharpnose Guitarfish (*Glaucostegus granulatus*) is a large (to 229 cm TL) species which occurs from intertidal areas to depths of 119 m. It is moderately widespread in the Northern Indian Ocean and occurs along the northern part of the ASR from the Gulf to Sri Lanka. Although little is known of its biology, the species is likely to grow slowly and mature late and thus exhibit a low productivity. It is commonly taken in gillnet and trawl fisheries, and coastal development is a significant threat. The entire regional distribution of the species is under extremely intense and increasing demersal fishing pressure. For example, the number of trawlers operating in Gujarat waters has increased from ~6,600 boats in 2004 to ~11,500 boats in 2010, and about 2,000 trawlers operate in Pakistan shelf waters. Significant declines of rays have been documented on the west coast of India and significant declines (86 %) in the landings of wedgefishes and guitarfishes combined have been documented from only a short period of time (5 years since 2002) at a

landing site in Tamil Nadu (just outside the ASR, but pressures and declines can be considered representative of the broader area). While still taken in fisheries in the region, there are anecdotal reports of significant declines in several areas, including India, Pakistan and Iran. Given the intensity of shallow water fishing pressure over the species' entire regional range, it is suspected that the regional population has declined between 50 and 80 % over the past three generations (39 years), and the heavy ongoing fishing pressure is likely to see declines continue into the future (2017-2056). This species is therefore assessed as Endangered A2cd+3cd.

VU

Endemic

Halavi Guitarfish *Glaucostegus halavi* (Forsskål, 1775)

Global Red List assessment:
Vulnerable A2d+3d
Simpfendorfer, C. A., Jabado, R.W., Moore, A.B.M., Al Mamari, T. & Grandcourt, E.

Rationale The Halavi Guitarfish (*Glaucostegus halavi*) is a medium-sized (to at least 187 cm TL) guitarfish, endemic to the ASR, that occurs in shallow waters of the Red Sea, Gulf of Aden, Sea of Oman, the Gulf and Arabian Sea to Pakistan and northern India (Gujarat). It is likely to grow slowly and mature late, giving it a low productivity. It is taken in variable quantities in gillnet and trawl fisheries, and habitat modification is a significant threat, particularly in the Gulf. There is preliminary evidence for declines of over 50 % in the southern Gulf, and it would certainly have been impacted where heavy trawling pressure occurs off Gujarat (India) and probably elsewhere. Ongoing high levels of fishing pressure and coastal development are of concern, and overall it is suspected that the population would have declined by >30 % over the past three generations (33 years). A further population reduction is suspected over the next three generations (2017-2050) based on current levels of exploitation, and the species is assessed as Vulnerable A2d+3d.

CR

Widenose Guitarfish *Glaucostegus obtusus* (Müller & Henle, 1841)

Regional Red List assessment:
Critically Endangered A2d+3d
Simpfendorfer, C. A., Moore, A.B.M., Al Mamari, T. & Grandcourt, E.
Global Red List assessment:
Vulnerable A2bd+3d+4d
Compagno, L.J.V. & Marshall, A.D. (2006)

Rationale The Widenose Guitarfish (*Glaucostegus obtusus*) is a small (to 93 cm TL) guitarfish that occurs in inshore and offshore waters to depths of 60 m. It is moderately widespread in the Northern Indian Ocean and in the region, occurs in the waters of Pakistan, India and Sri Lanka. It is poorly-known but likely to grow slowly and mature late, giving it a low productivity. Guitarfish are commonly caught in gillnet, trawl and line fisheries throughout the region, but specific threats to

this species are poorly-known due to the lack of information on distribution and fisheries data. The entire range of this species is subject to intense and increasing fishing pressure with large numbers of trawlers operating around Pakistan and India (as well as other fishing gear). For example, the number of trawlers operating in Gujarat waters has increased from ~6,600 boats in 2004 to ~11,500 boats in 2010, and about 2,000 trawlers operate in Pakistan shelf waters. Significant declines of rays have been documented on the west coast of India and significant declines (86 %) in the landings of wedgefishes and guitarfishes combined have been documented from only a short period of time (5 years since 2002) at a landing site in Tamil Nadu (just outside the ASR, but pressures and declines can be considered representative of the broader area). There is anecdotal information of significant declines in India, and the ongoing intensive fishing in coastal waters means that declines are likely to continue into the future. Overall, a decline of 80-90 % over the past three generations (~42 years) is suspected across the range of the Widenose Guitarfish due to current levels of fishing, with a future decline suspected over the next three generations (2017-2059). It is therefore assessed as Critically Endangered A2d+3d.

FAMILY PRISTIDAE

Narrow Sawfish *Anoxypristis cuspidata* (Latham, 1794)

CR

Regional Red List assessment:
Critically Endangered A2cd
Dulvy, N.K., Romanov, E., Fernando, D. & Khan, M.
Global Red List assessment:
Endangered A2cd
D'Anastasi, B., Simpfendorfer, C. A. & van Herwerden, L. (2012)

Rationale The Narrow Sawfish (*Anoxypristis cuspidata*) is an Indo-West Pacific species occurring from the Northern Indian ocean, including the Gulf to Pakistan and Sri Lanka. It is a large (to 350 cm TL) bentho-pelagic species that occurs from inshore and estuarine areas to offshore habitats at depths to 128 m. It is the most productive sawfish species, reaching maturity early (2–3 yr) and having intrinsic rates of population increase > 0.27 yr^{-1}, however, it does have the highest post-release mortality of all sawfish species. While the current population size and its historic abundance are unknown, there are now only very occasional records in this region. Like other sawfishes, the toothed rostrum and demersal occurrence makes the Narrow Sawfish extremely susceptible to capture in gillnets and demersal trawl nets. The species has been affected by commercial net and trawl fisheries, which operate in inshore areas of its range, reductions in habitat quality, and coastal development, the impacts of which have cumulatively led to population decline. This species is listed on Appendix I of CITES, is protected in some range states as a no-take species but these actions alone will not be sufficient to ensure its survival in some regions. Ongoing fishing and development is likely to lead to future population declines. Despite a lack of quantitative data to support declines, current information indicates that Narrow Sawfish across its Indo-West Pacific range are considerably more rare than historically recorded. Overall, a population reduction based on a reduction in extent of occurrence (EOO) of ≥80 % over a period of three generations (i.e., 1990s to present) is suspected. Declines have primarily been attributed to ongoing capture in

commercial net and trawl fisheries, with the Narrow Sawfish being particularly susceptible given it has poor post-release survival. Hence in this region, this species meets the criteria for Critically Endangered A2cd. Urgent action is needed in order to prevent further declines, most notably a regional implementation of the Global Sawfish Conservation Strategy.

CR

Largetooth Sawfish *Pristis pristis* (Linnaeus, 1758)

Regional Red List assessment:
Critically Endangered A2cd
Dulvy, N.K., Romanov, E., Fernando, D., Khan, M. & Kyne, P. M.
Global Red List assessment:
Critically Endangered A2cd
Kyne, P. M., Carlson, J. & Smith, K. (2013)

Rationale The Largetooth Sawfish (*Pristis pristis*) formerly had a widespread tropical distribution. It is a large (650 + cm TL) euryhaline species, with juveniles occurring in freshwater systems and adults in marine and estuarine environments. This species has undergone significant population declines and is now apparently extinct in many former range states, and there are few recent records in the ASR, mainly in Pakistan and India. Overall, a population reduction based on a reduction in extent of occurrence (EOO) of ≥80 % over a period of three generations (i.e., 1970s to present) is suspected. Despite protection in some range states (Pakistan, India), threats are ongoing and the species is assessed as Critically Endangered A2cd. Urgent action is needed in order to prevent further declines, most notably a regional implementation of the Global Sawfish Conservation Strategy.

CR

Green Sawfish *Pristis zijsron* Bleeker, 1851

Regional Red List assessment:
Critically Endangered A2cd
Dulvy, N.K., Romanov, E., Fernando, D., Khan, M. & Simpfendorfer, C.A.
Global Red List assessment:
Critically Endangered A2cd
Simpfendorfer, C.A. (2012)

Rationale The Green Sawfish (*Pristis zijsron*) is probably the largest of the sawfish species, reaching lengths in excess of 700 cm TL. Historically, it occurred widely in the Indo-West Pacific including the Red Sea, the Gulf, Pakistan and India. The Green Sawfish is a coastal species, with the young occurring in shallow nearshore waters, while the adults are more common offshore in waters to >70 m. Its life-history is poorly-known, and it has low intrinsic rates of population increase, making its resilience to fishing pressure low and its recovery from depletion slow. While the current population size and historic abundance is unknown, it is suspected as having declined in all of its range states. Like all sawfishes, the toothed rostrum and shallow depth distribution makes Green Sawfish extremely susceptible to capture in gillnets and demersal trawl nets. Historically, the population has been negatively affected by commercial net and trawl fisheries which operate in

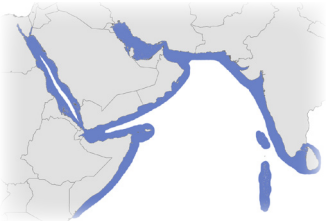
inshore areas throughout most of its range, the cumulative impacts of which have led to population declines. This species is now protected by no-take status in some range states (e.g., UAE, Bahrain, Qatar, Pakistan, and India), is listed on Appendix I of CITES, and is protected by some areas that are closed to fishing; but these actions alone will not be sufficient to ensure its survival in most regions. Despite a lack of quantitative data to support declines, available information indicates that populations of Green Sawfish are considerably rarer now than historically across its entire range. Overall, a population reduction based on a reduction in extent of occurrence of ≥80 % over a period of three generations (i.e., 1970s to present) is suspected. It is possible that there has been localised extinction in a number of range states due to intensive fishing, reducing its extent of occurrence, and supporting its listing as Critically Endangered A2cd. Urgent action is needed in order to prevent further declines, most notably a regional implementation of the Global Sawfish Conservation Strategy.

FAMILY RHINIDAE

Bowmouth Guitarfish *Rhina ancylostoma* Bloch & Schneider, 1801

VU

Regional Red List assessment:
Vulnerable A2cd+3cd
Simpfendorfer, C.A., Tesfamichael, D., Moore, A.B.M., Jabado, R.W. & Ali, K.
Global Red List assessment:
Vulnerable A2bd+3bd+4bd
McAuley, R.B., Compagno, L.J.V. & Chin, A. (2015)



Rationale The Bowmouth Guitarfish (*Rhina ancylostoma*) is a large (to at least 294 cm TL) species. It is widespread in the Indo-West Pacific and occurs in shallow waters throughout the ASR. Its biology is poorly-known but it is likely to grow slowly and mature late, giving it a low productivity. It is taken in variable quantities in gillnet and trawl fisheries, and habitat modification is a significant threat, particularly in the Gulf. The entire regional distribution of the species is under extremely intense and increasing demersal fishing pressure. For example, the number of trawlers operating in Gujarat waters has increased from ~6,600 boats in 2004 to ~11,500 boats in 2010, and about 2,000 trawlers operate in Pakistan shelf waters. Significant declines of rays have been documented on the west coast of India and significant declines (86 %) in the landings of wedgefishes and guitarfishes combined have been documented from only a short period of time (5 years since 2002) at a landing site in Tamil Nadu (just outside the ASR, but pressures and declines can be considered representative of the broader area). However, unlike other species from the same family (*Rhynchobatus* spp.) which have some of the highest value fins, the Bowmouth Guitarfish is considered of low value and therefore not targeted by fishermen. While still taken in fisheries in the region, there is some anecdotal information of decline in some parts of the region (i.e., west coast of India), along with a decline in habitat quality due to coastal development. However due to its broader range (compared to other rhinid species) and its low value, overall, a decline of 30-50 % over the past three generations (39 years) is suspected. The ongoing intensive fishing in coastal waters means that declines are likely to continue into the future over the next three generations (2017-2056). As such, this species is assessed as Vulnerable A2cd+3cd.

EN

Bottlenose Wedgefish *Rhynchobatus australiae* Whitley, 1939

Regional Red List assessment:
Endangered A2cd+3cd
Simpfendorfer, C. A., Moore, A.B.M., Grandcourt, E., Jabado, R. W. & Al Mamari, T.
Global Red List assessment:
Vulnerable A2bd+3bd+4bd
White, W.T. & McAuley, R. (2003)

Rationale The Bottlenose Wedgefish (*Rhynchobatus australiae*) is a large (to 300 cm TL) species that is widespread in the Indo-West Pacific and occurs in inshore and offshore waters over soft substrates to depths of 60 m throughout the ASR. The similarity of the three species of *Rhynchobatus* that occur in the region mean there are few reliable species-specific data available. Its biology is poorly-known but presumably grows slowly and matures late, giving it a low productivity. It is commonly taken in gillnet, longline and trawl fisheries as highly valued bycatch, and coastal development is a significant threat. Fishing pressure is intense and increasing. For example, the number of trawlers operating in Gujarat waters has increased from ~6,600 boats in 2004 to ~11,500 boats in 2010, and about 2,000 trawlers operate in Pakistan shelf waters. Significant declines of rays have been documented on the west coast of India and significant declines (86 %) in the landings of wedgefishes and guitarfishes combined have been documented from only a short period of time (5 years since 2002) at a landing site in Tamil Nadu (just outside the ASR, but pressures and declines can be considered representative of the broader area). While still taken in fisheries in the region, there are anecdotal reports of significant declines in several areas, including India, Pakistan and Iran. Given the intensity of shallow water fishing pressure over the species' entire regional range, it is suspected that the regional population has declined between 50 and 80 % over the past three generations (39 years), and the heavy ongoing fishing pressure is likely to see declines continue into the future over the next three generations (2017-2056). This species is therefore assessed as Endangered A2cd+3cd.

EN

Whitespotted Wedgefish *Rhynchobatus djiddensis* (Forsskål, 1775)

Regional Red List assessment:
Endangered A2cd+3cd
Simpfendorfer, C. A., Moore, A.B.M., Jabado, R.W., Grandcourt, E. & Al Mamari, T.
Global Red List assessment:
Vulnerable A2d+3d+4d
Dudley, S.F.J. & Cavanagh, R.D (2006)

Rationale The Whitespotted Wedgefish (*Rhynchobatus djiddensis*) is a large (to 310 cm TL) species. It is widespread in the Western Indian Ocean and is reported to occur throughout the ASR, but it may not be present in Pakistan, India, Sri Lanka and the Maldives. It occurs in coastal and continental shelf waters to depths of 70 m. The similarity of the three species of *Rhynchobatus* that occur in the region mean there are few reliable species-specific data available, and that this species' true range is not fully known. Its biology is poorly-known but presumably grows slowly and matures

late, thus it exhibits low productivity. It is commonly taken in gillnet, longline and trawl fisheries as highly valued bycatch, and coastal development is a significant threat. Declines in all species of wedgefishes have been documented in the region and present levels of catches are of concern with fishing pressure increasing. Furthermore, if this species is found to occur along the coasts of India and Pakistan, the population would be highly impacted by heavy trawling pressure. Significant declines of rays have been documented on the west coast of India and significant declines (86 %) in the landings of wedgefishes and guitarfishes combined have been documented from only a short period of time (5 years since 2002) at a landing site in Tamil Nadu (just outside the ASR, but pressures and declines can be considered representative of the broader area). While still taken in fisheries in the region, there are anecdotal reports of significant declines in several areas, including the Saudi Red Sea and Iran. Given the intensity of shallow water fishing pressure over the species' entire suspected regional range, it is suspected that the ASR population has declined between 50 and 80 % over the past three generations (39 years), and the heavy ongoing fishing pressure is likely to see declines continue into the future over the next three generations (2017-2056). This species is therefore assessed as Endangered A2cd+3cd.

Smoothnose Wedgefish *Rhynchobatus laevis* (Bloch & Schneider, 1801)

EN

Regional Red List assessment:
Endangered A2cd+3cd
Simpfendorfer, C. A., Jabado, R.W., Al Mamari, T., Grandcourt, E. & Moore, A.B.M.
Global Red List assessment:
Vulnerable A2bd+3bd+4bd
Compagno, L.J.V. & McAuley, R.B. (2015)

Rationale The Smoothnose Wedgefish (*Rhynchobatus laevis*) is a medium-sized (to at least 200 cm TL) species that has a poorly-defined distribution in the Indo-West Pacific. In the ASR, it may occur widely with the exception of the Gulf of Aden and Red Sea. It occurs near the coast in shallow bays and off river mouths in the Gulf and Arabian Sea. The similarity of the three species of *Rhynchobatus* that occur in the region mean there are few reliable species-specific data available. Its biology is poorly-known but it presumably grows slowly and matures late, and thus exhibits low productivity. It is commonly taken in gillnet, longline and trawl fisheries as highly valued bycatch, and coastal development is a significant threat. Fishing pressure is intense and increasing. For example, the number of trawlers operating in Gujarat waters has increased from ~6,600 boats in 2004 to ~11,500 boats in 2010, and about 2,000 trawlers operate in Pakistan shelf waters. Significant declines of rays have been documented on the west coast of India and significant declines (86 %) in the landings of wedgefishes and guitarfishes combined have been documented from only a short period of time (5 years since 2002) at a landing site in Tamil Nadu (just outside the ASR, but pressures and declines can be considered representative of the broader area). While still taken in fisheries in the region, there are anecdotal reports of significant declines in several areas, including India, Pakistan, and Iran. Given declines in landings, the heavy and increasing fishing pressure over the species' entire regional range, and coastal habitat degradation, it is suspected that the regional population has declined between 50-80 % over the past three generations (39 years), and the heavy ongoing fishing pressure is likely to see declines continue into the future over the next three generations (2017-2056). This species is therefore assessed as Endangered A2cd+3cd.

FAMILY RHINOBATIDAE

DD

Endemic

Oman Guitarfish *Acroteriobatus omanensis* Last, Henderson & Naylor, 2016

Global Red List assessment:
Data Deficient
Simpfendorfer, C.A., Valinassab, T., Moore, A.B.M., Jabado, R.W. & Elhassan, I.

Rationale The Oman Guitarfish (*Acroteriobatus omanensis*) is a small (to at least 60 cm TL) poorly-known species, endemic to the ASR, with a restricted distribution in inshore waters of the Sea of Oman. It has only recently (2016) been described and is known from only a handful of specimens. Its biology and ecology are unknown, but assumed to be similar to other small rhinobatids. Given the limited number of specimens it is assessed as Data Deficient. Further research and monitoring are required to understand the status of this species as it occurs in a region with relatively intense coastal fishing.

NT

Endemic

Salalah Guitarfish *Acroteriobatus salalah* (Randall & Compagno, 1995)

Global Red List assessment:
Near Threatened
Simpfendorfer, C. A., Jabado, R.W., Moore, A.B.M., Elhassan, I. & Valinassab, T.

Rationale The Salalah Guitarfish (*Acroteriobatus salalah*) is a small (to at least 74 cm TL) guitarfish, endemic to the ASR, and reportedly uncommon off Oman and Pakistan. Guitarfish are commonly caught in gillnet, trawl and line fisheries throughout the region, but specific threats to this species are poorly-known due to the lack of information on distribution and fisheries data. Declines of several species of inshore guitarfish have been documented within the region and present levels of catches are of concern. Limited available information for this species makes assessment difficult, but it is suspected to have declined by 20-30 % across its range given the regular capture in Pakistan where fishing is intense. Furthermore, ongoing fishing is suspected to result in a future decline over the next three generation periods (2017-2032). The species is therefore assessed as Near Threatened (nearly meeting Vulnerable A2d+3d). Further investigation of this species is required to accurately define its range, biology, extent of catches in local fisheries and levels of declines. This assessment should be revisited as soon as this is available.

Stripenose Guitarfish *Acroteriobatus variegatus* (Nair & Lal Mohan, 1973)

CR

Endemic

Global Red List assessment:
Critically Endangered A2cd+3cd
Kyne, P. M., Simpfendorfer, C. A., Bineesh, K.K., Moore, A.B.M., Jabado, R.W. & Valinassab, T.

Rationale The Stripenose Guitarfish (*Acroteriobatus variegatus*) is a little known guitarfish, endemic to the ASR, with a restricted distribution off southern India and Sri Lanka. It occurs on the continental shelf, mainly at depths of 10-40 m, although the type specimen was reportedly collected from 366 m which would be unusual for a rhinobatid. There is also some information that indicates it prefers coral reefs. It is a small guitarfish, reaching 75 cm TL, with a small litter size (mostly 1-4, occasionally up to 6). The entire range of this species is subject to intense and increasing fishing pressure with large numbers of trawlers operating around southern India (as well as other fishing gear). Significant declines (86 %) in the landings of wedgefishes and guitarfishes combined have been documented from only a short period of time (5 years since 2002) at a landing site in Tamil Nadu. This is the equivalent of >97 % decline for the Stripenose Guitarfish over the past three generations (15 years). This is likely to be fully representative of the species' entire range. Ongoing intense fishing pressure, as well as declines in the quality of coral reefs raise serious concerns for this species, and a future population decline is suspected over the next three generations (2017-2032). The species is therefore assessed as Critically Endangered A2cd+3cd.

Bengal Guitarfish *Rhinobatos annandalei* Norman, 1926

NT

Regional Red List assessment:
Near Threatened
Ebert, D.A., Akhilesh, K.V., Khan, M., Tesfamichael, D. & Jabado, R.W.
Global Red List assessment:
Data Deficient
Valenti, S.V. (2008)

Rationale The Bengal Guitarfish (*Rhinobatos annandalei*) is a poorly-known, small (to 87 cm TL) guitarfish found in the Northern Indian Ocean. Due to previous misidentification with the Spotted Guitarfish (*Rhinobatos punctifer*), the species' range is poorly-defined. However, it has been reported from India, Pakistan, Sri Lanka, Oman, and the UAE and Iran in the Gulf. Some information is available on the habitat and biology of the species, but it is limited. Throughout the region, guitarfish are commonly caught in gillnet, trawl and line fisheries, but specific threats to this species are poorly-known due to the lack of information on distribution and fisheries data. Declines of several species of inshore guitarfish have been documented within the region and present levels of catches are of concern. Limited available information for this species makes assessment difficult, but known areas of this species' geographic range are subject to intensive fisheries as well as other threats such as coastal development, sea-filling, and aquaculture development. Increasing pressure from fisheries

across the region suggest that the Bengal Guitarfish is likely to have been impacted in areas where heavy fishing pressure occurs (e.g., off Gujarat, India) and probably elsewhere. Ongoing high levels of fishing pressure and coastal development are of concern, and overall, a decline of 20-30 % is suspected over the past three generations (15 years) across the range of the Bengal Guitarfish due to current levels of exploitation, with a future decline suspected over the next three generations (2017-2032). Therefore, this species is assessed as Near Threatened (nearly meeting Vulnerable A2cd+A3cd). Further investigation of this species is required to accurately define its range, biology, extent of catches in local fisheries and levels of declines. This assessment should be revisited as soon as this is available.

NT

Endemic

Spotted Guitarfish *Rhinobatos punctifer* Compagno & Randall, 1987

Global Red List assessment:
Near Threatened
Ebert, D.A., Khan, M., Ali, M., Akhilesh, K.V. & Jabado, R.W.

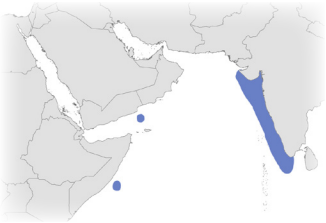
Rationale The Spotted Guitarfish (*Rhinobatos punctifer*) is a small (to at least 90 cm TL) guitarfish, endemic to the ASR. It occurs from the northern Red Sea to Sea of Oman and the Gulf in depths to 70 m. Due to previous misidentification with the Bengal Guitarfish (*Rhinobatis annandalei*), accurate information on the species is limited. Guitarfish are commonly caught in gillnet, trawl and line fisheries throughout the region, but specific threats to this species are poorly-known due to the lack of information on distribution and fisheries data. Declines of several species of inshore guitarfish have been documented within the region and present levels of catches are of concern with fishing pressure increasing. Furthermore, the loss and modification of coastal habitats in the Gulf is a significant concern for inshore species such as this. A decline of <30 % is suspected across its range due to current levels of fishing, which is ongoing and suspected to result in a future decline over the next three generation periods (2017-2032). The species is therefore assessed as Near Threatened (nearly meeting Vulnerable A2cd+3cd). Further investigation of this species is required to accurately define its range, biology, extent of catches in local fisheries and levels of declines. This assessment should be revisited as soon as this is available.

Gulf Torpedo -- ***Torpedo sinuspersici*** © Simone Caprodossi Photography

FAMILY **NARCINIDAE**

Indian Blind Numbfish *Benthobatis moresbyi* Alcock, 1898

Global Red List assessment:
Least Concern
Kyne, P. M., Bineesh, K.K., Fernando, D. & Tesfamichael, D.



LC

Endemic

Rationale The Indian Blind Numbfish (*Benthobatis moresbyi*) is a small (to 40 cm TL) deepsea electric ray, endemic to the ASR, but with a patchy distribution. It has recently been shown to be more wider-ranging than previously known around India. Although very poorly-known, its depth range (787-1,071 m) is outside that of current trawl fisheries in its range (for example trawling mainly occurs at <500 m depth off India), and there are no other known threats. Therefore this species is assessed as Least Concern.

NT

Oman Numbfish *Narcine atzi* Carvalho & Randall, 2003

Regional Red List assessment:
Near Threatened
Kyne, P. M., Bineesh, K.K., Fernando, D. & Tesfamichael, D.
Global Red List assessment:
Data Deficient
Carvalho, M.R. de & McCord, M.E. (2004)

Rationale The Oman Numbfish (*Narcine atzi*) is small (to at least 41 cm TL) electric ray with a very limited and patchy distribution in the region. It is known from the Gulf of Mannar (India), Sri Lanka, Iran (Sea of Oman) and Oman. It occurs in shallow waters (to 27 m depth) in heavily fished areas. For example, there are about 3,000 trawlers operating out of the Indian state of Tamil Nadu, where this species is a known bycatch in the Gulf of Mannar. Electric rays are generally discarded at sea, although post-release survival of numbfishes is expected to be very low. In contrast, trawling has been banned in Omani waters since 2011 and so does not represent a threat in that area. There is also a trawl ban in Sri Lanka, although illegal fishing by Indian fishermen is an ongoing issue. Given the intensity of shallow water fishing pressure over a large part if its regional range (India and Sri Lanka represent the bulk of the species' regional range), it is suspected that the regional population has declined by close to 30 % over the past three generations (15 years). As such, it is assessed as Near Threatened (nearly meeting Vulnerable A2d). Further examination of the species' status is required, both where it is suspected to suffer high bycatch mortality, and where there is no trawling.

VU

Chinese Numbfish *Narcine lingula* Richardson, 1846

Regional Red List assessment:
Vulnerable A2d
Kyne, P. M., Bineesh, K.K., Fernando, D. & Tesfamichael, D.
Global Red List assessment:
Data Deficient
Carvalho, M.R de, McCord, M.E., Vidthayanon, C., Fahmi, Samiengo, B., Capuli, E. & Manjaji, M. (2007)

Rationale The Chinese Numbfish (*Narcine lingula*) is a small (to 35 cm TL) inshore and offshore electric ray. It has a patchy distribution in the Indo-West Pacific. It occurs in a relatively restricted distribution in the region, from Gujarat, India to about Karachi, Pakistan. The entire regional distribution of the species is under extremely intense and increasing demersal fishing pressure. The number of trawlers operating in Gujarat waters has almost doubled from ~6,600 boats in 2004 to ~11,500 boats in 2010, and 2,000 trawlers operate in Pakistani shelf waters. Significant declines of rays have been documented on the west coast of India. Electric rays are generally discarded at sea, although survivorship of numbfishes is expected to be very low. Given the intensity of shallow water fishing pressure over the species' entire regional range, it is suspected that the regional population has declined by at least 30 % over the past three generations (15 years) (if not much more), and as such, is assessed as Vulnerable A2d. There is no recent information on the species in the region, adding concern for its status.

Bigeye Numbfish *Narcine oculifera* Carvalho, Compagno & Mee, 2002

DD

Endemic

Global Red List assessment:
Data Deficient
Kyne, P. M., Bineesh, K.K., Fernando, D. & Tesfamichael, D.

Rationale The Bigeye Numbfish (*Narcine oculifera*) is endemic to the ASR and known only from the Sea of Oman off the Omani coast, and the Gulf of Aden off Somalia. This currently known range is fragmented, but the species may be more widespread in the region. It has been reported from only a handful of records and sightings from depths of 21-152 m. It grows to a maximum size of 35 cm TL and one individual was carrying three embryos in the right uterus (with a mass of fertilised eggs in the left uterus). Otherwise its ecology is largely unknown. Fishing activity within the region of occurrence of the Bigeye Numbfish is generally intense and this may have historically, or may currently be, impacting this species through fishery-induced mortality. It was a known but rare bycatch on the Arabian Sea trawl grounds off Oman. Within Oman's EEZ however trawling is banned which would benefit the species. Electric rays have not been recorded from market surveys of Oman's long established artisanal shark fishery, where the majority of catch is landed, suggesting little interaction with that fishery or discarding at sea, which is usually the case with electric rays. Overall, the lack of information available on this species precludes an assessment beyond Data Deficient at this time.

Tonkin Numbfish *Narcine prodorsalis* Bessednov, 1966

DD

Regional Red List assessment:
Data Deficient
Kyne, P. M., Bineesh, K.K., Fernando, D. & Tesfamichael, D.
Global Red List assessment:
Data Deficient
Wang, Y., Vidthayanon, C. & Samiengo, B. (2007)

Rationale The validity of the Tonkin Numbfish (*Narcine prodorsalis*) is uncertain, and it is possibly a junior synonym of the Smallspot Numbfish (*N. maculata*). It is a small species (to at least 35 cm TL), but nothing is known of its biology. It has a patchy occurrence in the Indo-West Pacific, although its distribution is uncertain due to taxonomic issues. In the ASR, it is known from Gujarat, India to Sri Lanka. Due to the taxonomic uncertainty, the species is assessed as Data Deficient. Resolution of this issue is a priority given that demersal trawling is intense across the continental shelf of western India, which has resulted in threatened species listings for other numbfishes in the region.

VU

Brown Numbfish *Narcine timlei* (Bloch & Schneider, 1801)

Regional Red List assessment:
Vulnerable A2d
Kyne, P. M., Bineesh, K.K., Fernando, D. & Tesfamichael, D.
Global Red List assessment:
Data Deficient
Carvalho, M.R. de, McCord, M.E., Manjaji, M., Samiengo, B., Vidthayanon, C., Fahmi & Capuli, E. (2007)

Rationale The Brown Numbfish (*Narcine timlei*) is a small (to at least 38 cm TL) inshore and offshore electric ray. It is moderately widespread in the Indo-West Pacific. In the ASR, it occurs from Pakistan, the west coast of India, and Sri Lanka. The entire regional distribution of the species is under extremely intense and increasing demersal fishing pressure. For example, the number of trawlers operating in Gujarat waters (India) has increased from ~6,600 boats in 2004 to ~11,500 boats in 2010, and about 2,000 trawlers operate in Pakistan shelf waters. Significant declines of rays have been documented on the west coast of India. Electric rays are generally discarded at sea, however survivorship of numbfishes is expected to be very low. Given the intensity of shallow water fishing pressure over the species' entire regional range, it is suspected that the regional population has declined by at least 30 % over the past three generations (15 years) (if not much more), and as such, is assessed as Vulnerable A2d. There is no recent information on the species in the region, adding concern for its status.

FAMILY NARKIDAE

DD

Endemic

Eilat Sleeper Ray *Heteronarce bentuviai* (Baranes & Randall, 1989)

Global Red List assessment:
Data Deficient
Kyne, P. M.

Rationale The Eilat Sleeper Ray (*Heteronarce bentuviai*) is a small (to at least 19 cm TL) electric ray endemic to the ASR. It is known only from the Gulf of Aqaba and the Gulf of Aden. Few specimens are available, with the single Gulf of Aden specimen differing slightly from the Gulf of Aqaba specimens, and the relationship between them needs to be examined. The Eilat Sleeper Ray is a component of the discarded bycatch in trawl and gillnet fisheries in the area and it is thought that the post-discard survival rate is low. Its occurrence in relatively deeper waters (80-200 m) may provide it with some refuge in the Gulf of Aqaba. The species' restricted and potentially fragmented distribution as well as apparent rarity may make it susceptible to depletion, but the full extent of interactions with fisheries is unknown at present. Due to an overall lack of information, as well as uncertainties over the relationship between specimens from different parts of its range, the species

as assessed as Data Deficient. Careful monitoring is required, and further research concerning its biology, fisheries, population size, and trends in abundance is needed for future assessment.

Soft Sleeper Ray *Heteronarce mollis* (Lloyd, 1907)

DD

Endemic

Global Red List assessment:
Data Deficient
Kyne, P. M., de Carvalho, M.R. & McCord, M.E.

Rationale The Soft Sleeper Ray (*Heteronarce mollis*) is a small (to at least 26 cm TL) poorly-known and apparently rare electric ray found in waters of 73-346 m depth. It is endemic to the ASR and has a patchy distribution off Yemen, Somalia and southern India. Very few specimens of this species are known (it is extremely rare in collections). The range of the Soft Sleeper Ray is under significant commercial fishing pressure, particularly Yemen and southern India where trawl fisheries overlap with its range. Most electric rays are discarded at sea with probable low survivorship. Fishing pressure is unlikely to decrease or cease in this area, and further research is needed to determine population size and trends in abundance. It is currently assessed as Data Deficient due to a lack of available information, but concerns are raised due to its apparent rarity and patchy restricted distribution.

Spottail Sleeper Ray *Narke dipterygia* (Bloch & Schneider, 1801)

NT

Regional Red List assessment:
Near Threatened
Kyne, P. M.
Global Red List assessment:
Data Deficient
Ishihara, H. & Wang, Y. (2007)

Rationale The Spottail Sleeper Ray (*Narke dipterygia*) is a small (to at least 35 cm TL) species that has a widespread distribution in the Indo-West Pacific. In the ASR, it occurs from Oman, Pakistan, the west coast of India, and Sri Lanka. All electric rays are poorly-known in the region, with no species-specific data available. Electric rays are not targeted, but are a bycatch of demersal trawl fisheries, and are usually discarded at sea with probable low survivorship. Demersal trawl pressure is intense and increasing across a large part of the species' regional range, particularly, India and Pakistan. In contrast, trawling is banned in Omani waters and the species may receive some refuge there, where industrial trawling was limited prior to the trawl ban. Given intense demersal trawling on the continental shelf across a large part of the species' regional range, it is suspected that the species has undergone a population size reduction of at least 30 % over the past three generations (15 years) in the trawled part of its range. Given that there is no trawling in Omani waters, an assessment of Near Threatened (nearly meeting Vulnerable A2d) is appropriate for the ASR.

FAMILY TORPEDINIDAE

EN

Endemic

Aden Torpedo *Torpedo adenensis* Carvalho, Stehmann & Manilo, 2002

Global Red List assessment:
Endangered B1ab(v)
Kyne, P. M., Ali, K., Grandcourt, E. & Tesfamichael, D.

Rationale The Aden Torpedo (*Torpedo adenensis*) is a small (to 41 cm TL) species, endemic to the ASR, known only from a very restricted area of the eastern Gulf of Aden off the coast of Yemen in depths of 26-230 m. Its extent of occurrence is estimated to be less than 2,000 km², and it is known from three distinct locations in that range. Shrimp trawls operate across the entire distribution of the species, with a suspected continuing decline in the number of mature individuals from bycatch mortality in ongoing indiscriminate trawling (survivorship of discarded electric rays is low). It is thus assessed as Endangered B1ab(v).

DD

Panther Torpedo *Torpedo panthera* Olfers, 1831

Regional Red List assessment:
Data Deficient
Kyne, P. M., Grandcourt, E., Tesfamichael, D. & Ali, K.
Global Red List assessment:
Data Deficient
de Carvalho, M.R. & McCord, M.E. (2006)

Rationale The Panther Torpedo (*Torpedo panthera*) is a medium-sized (to at least 60 cm TL) species that has a poorly-defined distribution in the Western Indian Ocean. It probably occurs from the Red Sea through the Gulf of Aden, the Arabian Sea, the Sea of Oman and the Bay of Bengal. It may be more widely ranging than currently known and taxonomic examination is required to clarify the status of the species in the region. *Torpedo* species are often confused in the region and species-specific data is therefore limited. Parts of the species range are under severe fishing pressure from trawling (i.e., Iran, Pakistan) while in other areas (i.e., Oman, UAE) there is no trawling threat. There is a very low probability of survivorship when discarded at sea. However, the complete lack of catch data and scarcity of information on biology and distribution precludes an assessment beyond Data Deficient. An effort is required to obtain bycatch data in order to quantify fishing mortality.

Gulf Torpedo *Torpedo sinuspersici* Olfers, 1831

DD

Regional Red List assessment:
Data Deficient
Kyne, P. M., Tesfamichael, D., Ali, K. & Grandcourt, E.
Global Red List assessment:
Data Deficient
Smale, M.J. (2006)

Rationale The Gulf Torpedo (*Torpedo sinuspersici*) is a large (to 130 cm TL) electric ray with a wide distribution in the Western Indian Ocean from southern Africa to India. However, the presently recognised species is likely a species-complex of several, localized species. Until this taxonomy is resolved, the species as currently recognised cannot be assessed beyond Data Deficient.

Red Sea Torpedo *Torpedo suessii* Steindachner, 1898

CR

Endemic

Global Red List assessment:
Critically Endangered B1ab(v) -- Possibly Extinct
Kyne, P. M., Tesfamichael, D., Fernando, D. & Bineesh, K.K.

Rationale The Red Sea Torpedo (*Torpedo suessii*) is a small (to at least 29 cm TL) species that has not been recorded since its original collection in 1898. It is endemic to the ASR and known only from a very small area (estimated to be <100 km²) off Mocha, Yemen in the southern Red Sea. It has not been recorded in landing site surveys in adjacent countries such as the Saudi Arabian Red Sea and Sudan, or in underwater survey work in Saudi Arabia. Artisanal and industrial fisheries are ongoing and intense in Yemeni waters, and illegal fishing is a serious issue. Industrial fishing commenced in 1970 and overall Yemen Red Sea catches have undergone a major decline from a peak in the late 1990s. While electric rays are generally not utilized, survival of bycatch is very low. Due to a very limited extent of occurrence, presence in only one location, and an ongoing decline inferred from intensive and ongoing fishing, the species is assessed as Critically Endangered B1ab(v). Given that it has not been recorded for nearly 120 years (this species has a distinct colour pattern and is very recognisable), it is flagged as Possibly Extinct.

CHIMAERIFORMES

Sicklefin Chimaera -- *Neoharriotta pinnata* © Bineesh K. K.

FAMILY **RHINOCHIMAERIDAE**

NT

Sicklefin Chimaera *Neoharriotta pinnata* (Schnakenbeck, 1931)

Regional Red List assessment:
Near Threatened
Kyne, P. M., Ebert, D.A., Khan, M., Bineesh, K.K. & Akhilesh, K.V.
Global Red List assessment:
Data Deficient
Dagit, D.D. (2006)

Rationale The Sicklefin Chimaera (*Neoharriotta pinnata*) is a large (to 127 cm TL) deepsea chimaeroid that inhabits waters of 200-550 m depth. It occurs in the Eastern Atlantic and Northern Indian Oceans, where in the ASR, it has a relatively widespread distribution from the Gulf of Aden to Sri Lanka. It is a major bycatch of deepsea fisheries which expanded rapidly off India, and has been landed in significant quantities. These fisheries include a targeted gulper shark (*Centrophorus* spp.) fishery, which reduced effort after 2009, and an ongoing deepsea trawl fishery. Pressure is generally intense across the depth range of this species off India, and local declines of 20-30 % are suspected over the past three generations (45 years) based on the level of fishing effort (actual levels of exploitation). Declines are suspected to continue over the next three generations (2017-2062) as fishing pressure is ongoing. The Sicklefin Chimaera has also been recorded in exploratory deepsea trawls off Oman, but pressure is far lower outside India, reducing the overall level of

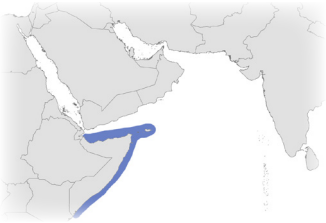
population decline compared to India. The species is therefore assessed as Near Threatened (nearly meeting Vulnerable A2d+3d). Monitoring of deepsea fishing activities in the region (particularly India) is required.

Arabian Sicklefin Chimaera *Neoharriotta pumila* Didier & Stehmann, 1996

LC

Endemic

Global Red List assessment:
Least Concern
Ebert, D.A., Bineesh, K.K., Khan, M. & Akhilesh, K.V.



Rationale The Arabian Sicklefin Chimaera (*Neoharriotta pumila*) is endemic to the ASR and inhabits waters off Socotra Island, Yemen and Somalia at depths of 100-1,120 m. It may have a wider distribution in the Indian Ocean, particularly at depths of 1,000 m or more. The maximum size is around 65 cm TL, but biology is poorly-known. There are no targeted fisheries for the species and it is not known from bycatch given its deep occurrence. As there are currently no known threats to this species, it is therefore listed as Least Concern.

Landings of the Sicklefin Chimaera -- ***Neoharriotta pinnata*** in Cochin, India. As fisheries expand to deeper waters along the western coast of India, there has been a shift in species dominance at landings sites in India with deepsea species captured more frequently © Bineesh K. K.

FUTURE DIRECTIONS AND RECOMMENDATIONS

Porcupine Ray -- ***Urogymnus asperrimus*** © Simone Caprodossi Photography

6. FUTURE DIRECTIONS AND RECOMMENDATIONS

This report presents the first comprehensive regional IUCN Red List of chondrichthyans in the ASR and contains the latest information available for the conservation assessment of all regional sharks, rays, and chimaeras. However, information is still lacking from many countries, particularly those bordering the Red Sea and Gulf of Aden (e.g., Egypt, Eritrea, Djibouti, Somalia). Even with limited data from these countries, overall results of this workshop highlight that fisheries in the region, particularly those in the eastern Arabian Sea, are severely impacting chondrichthyan populations. With 78 out of 153 species considered threatened (50.9 % CR, EN, or VU), the ASR is home to some of the most threatened chondrichthyan populations in the world. The proportion of species with elevated conservation concerns in the ASR is significantly higher than from other areas where regional assessments have been conducted. Only those undertaken for the Mediterranean region have shown such high numbers of threatened chondrichthyan species, where 39 of 73 species were considered threatened (53.4 %) (Dulvy et al. 2016a).

The completion of this regional assessment provides an important baseline for monitoring the regional status of sharks, rays, and chimaeras. Through the process of compiling data for the workshop and each assessment, a number of knowledge gaps have been identified. Across the ASR, there are significant geographical, geopolitical, and taxonomic biases in the quality of data on the distribution and status of species. It is clear that there is a need to draw together a network of initiatives to collect standardized information on all species occurring in the region. It is hoped that with this report, local, national, regional, and international research will be stimulated to provide new data and improve the quality of what is currently available. Furthermore, with 19 % of ASR chondrichthyan species lacking sufficient information to make a sound status assessment, encouraging improvements to our knowledge base through concerted research should be a priority. Directed and long-term research efforts in the ASR towards chondrichthyans is slowly increasing, particularly in India, Iran, Pakistan, Sudan, Saudi Arabia, and the UAE, however, it is lagging behind in the rest of the region with only snapshots of the current situation available. Furthermore, species-specific population assessments are available for very few species, and mostly only for species that are covered under RFMO mandates (e.g., thresher sharks). The continued discovery of new chondrichthyan species within the region, and the need for resolution of taxonomic issues related to even some of the most well-known species, reinforces that research needs to be not only sustained, but increased in the fundamental field of taxonomy and systematics.

Pressure from artisanal and industrial fisheries are clearly a significant issue in the region with bycatch being the biggest threat to the majority of chondrichthyan fishes. The limited species-specific reporting does not allow for a full assessment of the situation, however, any increase in fishing effort, particularly if

unregulated, is a cause of concern. Furthermore, the increasing decline in habitat quality resulting from coastal development and other anthropogenic disturbances, particularly for those critical habitats that many species depend on (e.g., coral reefs, mangroves) pose a serious threat to the survival of many species.

There is also an urgent need for concerted national and regional actions, and management measures, to ensure the sustainability of most chondrichthyan species. It is vital that measures are taken in the region to strengthen research, conservation, policy-making, and enforcement mechanisms. This will require increasing efforts and commitments from all countries bordering the ASR to regulate the exploitation of already depleted stocks. Although limited data availability remains a challenge, a precautionary approach should be applied.

In light of the newly collated information on the IUCN Red List status of chondrichthyans in the ASR, a series of governance, research, and regional collaboration recommendations that could support the conservation and management of chondrichthyans in the region are proposed below:

GOVERNANCE

- Use the outcomes of this workshop to inform revisions, and implementation, of relevant national legislation such as catch limits, size limits, and areal and/or seasonal closures (including meaningful penalties for violations);
- Make provisions for the full protection of chondrichthyan species considered as CR and EN in the region, even when these are not listed on international agreements;
- Take immediate measures to reduce incidental catches of species assessed as threatened and encourage proper handling techniques and live release;
- Ensure implementation and compliance with requirements from international agreements (i.e., CMS Appendix I listings for signatory countries and issuance of CITES Non-Detriment Findings for Appendix II species);
- Propose and support the listing of additional threatened chondrichthyan species under CITES and CMS;
- Sign and engage in the implementation of the Sharks MoU under CMS;
- Initiate the development of a Regional Shark Plan specifically aimed at increasing cooperation between countries in relation to the conservation and sustainable use of commercially exploited and bycaught chondrichthyans;
- Establish and enforce MPAs with no-take zones to ensure they provide adequate protection to threatened species, and to alleviate pressure on certain non-migratory species and on the critical habitats (e.g., spawning, pupping, nursery, and feeding grounds) that are necessary for their conservation;
- Implement catch limits in accordance with scientific advice and when sustainable catch levels are uncertain, implement fishing limits based on the precautionary approach;
- Strengthen finning bans, if applicable, by requiring all sharks taken in all fisheries to be landed with their fins still naturally attached;
- Propose and work to secure science-based chondrichthyan conservation measures nationally and within RFMOs, especially for

fisheries that target or affect species assessed as threatened or NT; and,

- Engage with RFMOs to fully document fisheries including mapping of areas fished and fishing effort deployed through observer programs or technologies such as Vessel Monitoring Systems.

RESEARCH

- Develop and facilitate training, particularly in the fields of taxonomy and population monitoring methods, (to enable the accurate collection of species-specific landings data) and stock assessment;
- Collect fisheries-dependent data on artisanal and commercial fisheries, especially data on catch composition, bycatch, landings, discards, and CPUE;
- Improve knowledge of species by expanding fisheries-independent monitoring (especially for threatened and DD species), and ensure that such data are shared with relevant scientific bodies and RFMOs;
- Conduct basic biological research for deepsea and DD species, especially those that are commercially exploited;
- Assess population status and safe fishing levels for chondrichthyan populations through stock assessments and ecological risk assessments with priority given to heavily fished, unassessed populations;
- Promote research on gear modifications and fishing methods aimed at mitigating chondrichthyan bycatch and discard mortality;
- Encourage research aiming at identifying and mapping of critical habitats in the region;
- Establish monitoring schemes for small-scale artisanal and recreational fisheries;
- Improve species identification for those taxa with threatened species and taxonomic problems, in all data collection activities (including both commercial landings as well as scientific surveys). This can be achieved through the provision of species identification training to fishers, observers, and researchers; and,
- Evaluate the feasibility of cooperative programs to promote viable, sustainable livelihood alternatives to shark fishing.

REGIONAL COLLABORATION

Evaluating the conservation status of species is a dynamic process. As our knowledge of a species' ecology improves through research, and as new information on catch trends, trade, and threats becomes available, the status of species may need to be reconsidered. In fact, the IUCN requires that the status of a species be re-evaluated, in the least, every 10 years. Key challenges for the future are to improve monitoring and data quality, and to further develop data openness and dissemination so that the information and analyses presented here can be updated and improved, and so conservation actions can be given as solid a scientific basis as possible. These assessments would not have been possible without the collaboration of experts working across countries in the region. It is therefore essential that this strong regional collaboration continues, and that new collaborations with other countries are forged to ensure actions are taken to halt reported declines.

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Whale Shark -- ***Rhincodon typus*** © David P. Robinson

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ANNEXES

Blotched Fantail Ray -- ***Taeniurops meyeni*** © Simone Caprodossi Photography

Participants of the Arabian Sea and Adjacent Waters workshop - February 2017 - Abu Dhabi, UAE © Rima W. Jabado

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Summary of the five criteria (A-E) used to evaluate if a taxon belongs in a threatened category (Critically Endangered, Endangered or Vulnerable)*

A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ %90	≥ %70	≥ %50
A2, A3 & A4	≥ %80	≥ %50	≥ %30

A1 Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.

A2 Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) *[(a) cannot be used for A3]*.

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation *[except A3]*

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality

(d) actual or potential levels of exploitation

(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)

	Critically Endangered	Endangered	Vulnerable
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented **OR** Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** area, extent and/or quality of habitat; **(iv)** number of locations or subpopulations; **(v)** number of mature individuals			
(c) Extreme fluctuations in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** number of locations or subpopulations; **(iv)** number of mature individuals			

C. Small population size and decline

	Critically Endangered	Endangered	Vulnerable
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2			
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	%25 in 3 years or 1 generation (whichever is longer)	%20 in 5 years or 2 generations (whichever is longer)	%10 in 10 years or 3 generations (whichever is longer)
C2. An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:			
(a) **(i)** Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(ii) % of mature individuals in one subpopulation =	%100–90	%100–95	%100
(b) Extreme fluctuations in the number of mature individuals			

D. Very small or restricted population

	Critically Endangered	Endangered	Vulnerable
D. Number of mature individuals	< 50	< 250	**D1.** < 1,000
D2. *Only applies to the VU category* Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	-	-	**D2.** typically: AOO < 20 km² or number of locations ≤ 5

E. Quantitative Analysis

	Critically Endangered	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ %50 in 10 years or 3 generations, whichever is longer (100 years max.)	≥ %20 in 20 years or 5 generations, whichever is longer (100 years max.)	≥ %10 in 100 years

* Use of this summary sheet requires full understanding of the IUCN Red List Categories and Criteria and Guidelines for Using the IUCN Red List Categories and Criteria. Please refer to both documents for explanations of terms and concepts used here.

List of chondrichthyan species assessed during the workshop (by regional category in alphabetical order by genus) with details of their global IUCN Red List status (CR - Critically Endangered, EN - Endangered, VU - Vulnerable, NT - Near Threatened, LC - Least Concern, DD - Data Deficient), whether they are endemic to the Arabian Seas Region, and the species account page number. Additional regional or subpopulation assessments, not displayed in this table, are available and can be downloaded from http://www.iucnssg.org/publications.html including from Australasia (Cavanagh et al. 2003); Northeast Atlantic (Gibson et al. 2008); North American, Central American, and Caribbean (Kyne et al. 2012); Europe (Nieto et al. 2015); the Mediterranean (Cavanagh and Gibson 2007, Dulvy et al. 2016); and pelagic sharks and rays (Camhi et al. 2009).

Scientific name	Common name	Global status	Endemic to ASR	Species account page number
SHARKS				
Critically Endangered				
Carcharhinus hemiodon	Pondicherry Shark	CR (PE)	No	74
Carcharhinus longimanus	Oceanic Whitetip Shark	VU	No	77
Carcharias taurus	Sand Tiger Shark	VU	No	104
Eusphyra blochii	Winghead Shark	EN	No	93
Glyphis gangeticus	Ganges Shark	CR	No	80
Endangered				
Alopias pelagicus	Pelagic Thresher	VU	No	101
Alopias superciliosus	Bigeye Thresher	VU	No	102
Carcharhinus albimarginatus	Silvertip Shark	VU	No	69
Carcharhinus amblyrhynchos	Grey Reef Shark	NT	No	71
Carcharhinus dussumieri	Whitecheek Shark	NT	No	72
Carcharhinus leiodon	Smoothtooth Blacktip Shark	EN	Yes	75
Carcharhinus leucas	Bull Shark	NT	No	75
Carcharhinus plumbeus	Sandbar Shark	VU	No	78
Centrophorus atromarginatus	Dwarf Gulper Shark	DD	No	111
Centrophorus granulosus	Gulper Shark	NE	No	112
Centrophorus squamosus	Leafscale Gulper Shark	VU	No	113
Lamiopsis temmincki	Broadfin Shark	EN	No	80
Negaprion acutidens	Sicklefin Lemon Shark	VU	No	81
Rhincodon typus	Whale Shark	EN	No	108

Sphyrna lewini	Scalloped Hammerhead Shark	EN	No	94
Sphyrna mokarran	Great Hammerhead Shark	EN	No	94
Sphyrna zygaena	Smooth Hammerhead Shark	VU	No	95
Vulnerable				
Carcharhinus altimus	Bignose Shark	DD	No	70
Carcharhinus amblyrhynchoides	Graceful Shark	NT	No	70
Carcharhinus amboinensis	Pigeye Shark	DD	No	71
Carcharhinus brevipinna	Spinner Shark	NT	No	72
Carcharhinus limbatus	Blacktip Shark	NT	No	76
Carcharhinus melanopterus	Blacktip Reef Shark	NT	No	78
Carcharhinus sorrah	Spottail Shark	NT	No	79
Chaenogaleus macrostoma	Hooktooth Shark	VU	No	85
Deania profundorum	Arrowhead Dogfish	LC	No	113
Echinorhinus brucus	Bramble Shark	DD	No	115
Galeocerdo cuvier	Tiger Shark	NT	No	79
Halaelurus boesemani	Speckled Catshark	VU	Yes	92
Hemigaleus microstoma	Sicklefin Weasel Shark	VU	No	85
Hemipristis elongata	Snaggletooth Shark	VU	No	86
Paragaleus randalli	Slender Weasel Shark	NT	No	86
Stegostoma fasciatum	Zebra Shark	EN	No	109
Triaenodon obesus	Whitetip Reef Shark	NT	No	84
Near Threatened				
Carcharhinus falciformis	Silky Shark	NT	No	73
Carcharhinus macloti	Hardnose Shark	NT	No	77
Chiloscyllium arabicum	Arabian Carpetshark	NT	Yes	107
Chiloscyllium griseum	Grey Bamboo Shark	NT	No	108
Isurus oxyrinchus	Shortfin Mako	VU	No	103
Isurus paucus	Longfin Mako	VU	No	103
Loxodon macrorhinus	Sliteye Shark	LC	No	81

Scientific name	Common name	Global status	Endemic to ASR	Species account page number
Nebrius ferrugineus	Tawny Nurse Shark	VU	No	106
Prionace glauca	Blue Shark	NT	No	82
Rhizoprionodon acutus	Milk Shark	LC	No	82
Rhizoprionodon oligolinx	Grey Sharpnose Shark	LC	No	83
Scoliodon laticaudus	Spadenose Shark	NT	No	84
Least Concern				
Apristurus breviventralis	Shortbelly Catshark	LC	Yes	88
Apristurus indicus	Smallbelly Catshark	LC	Yes	89
Bythaelurus tenuicephalus	Narrow Catshark	NE	No	91
Ctenacis fehlmanni	Harlequin Catshark	LC	Yes	87
Eridacnis radcliffei	Pygmy Ribbontail Catshark	LC	No	87
Heptranchias perlo	Sharpnose Sevengill Shark	NT	No	99
Hexanchus griseus	Bluntnose Sixgill Shark	NT	No	100
Iago omanensis	Longnose Houndshark	LC	No	96
Mustelus mosis	Arabian Smoothhound	DD	No	96
Planonasus parini	Dwarf False Catshark	LC	Yes	88
Pristiophorus nancyae	African Dwarf Sawshark	NE	No	110
Squaliolus laticaudus	Spined Pygmy Shark	LC	No	114
Data Deficient				
Atelomycterus marmoratus	Coral Catshark	NT	No	89
Bythaelurus alcockii	Arabian Catshark	DD	Yes	90
Bythaelurus hispidus	Bristly Catshark	DD	No	90
Carcharhinus humani	Human's Whaler Shark	NE	No	74
Centroscyllium ornatum	Ornate Dogfish	DD	No	116
Centroselachus crepidater	Longnose Velvet Dogfish	LC	No	117
Cephaloscyllium silasi	Indian Swellshark	DD	No	91
Etmopterus pusillus	Smooth Lanternshark	LC	No	116
Halaelurus quagga	Quagga Catshark	DD	Yes	92

Heterodontus omanensis	Oman Bullhead Shark	DD	Yes	97
Heterodontus ramalheira	Whitespotted Bullhead Shark	DD	No	98
Odontaspis ferox	Smalltooth Sand Tiger Shark	VU	No	105
Odontaspis noronhai	Bigeye Sand Tiger Shark	DD	No	105
Zameus squamulosus	Velvet Dogfish	DD	No	117
RAYS AND CHIMAERAS				
Critically Endangered				
Acroteriobatus variegatus	Stripenose Guitarfish	CR	Yes	158
Anoxypristis cuspidata	Narrow Sawfish	EN	No	152
Glaucostegus obtusus	Widenose Guitarfish	VU	No	151
Gymnura tentaculata	Tentacled Butterfly Ray	DD	No	135
Maculabatis arabica	Pakistan Whipray	CR	Yes	125
Maculabatis bineeshi	Shorttail Whipray	NE	No	126
Pristis pristis	Largetooth Sawfish	CR	No	153
Pristis zijsron	Green Sawfish	CR	No	153
Torpedo suessi	Red Sea Torpedo	CR – PE	Yes	166
Endangered				
Aetobatus flagellum	Longhead Eagle Ray	EN	No	121
Aetomylaeus maculatus	Mottled Eagle Ray	EN	No	142
Aetomylaeus milvus	Eagle Ray	EN	Yes	142
Aetomylaeus vespertilio	Ornate Eagle Ray	EN	No	144
Glaucostegus granulatus	Sharpnose Guitarfish	VU	No	150
Maculabatis gerrardi	Whitespotted Whipray	VU	No	126
Mobula mobular	Giant Devil Ray	EN	No	139
Mobula tarapacana	Sicklefin Devil Ray	VU	No	140
Mobula thurstoni	Bentfin Devil Ray	NT	No	141
Pateobatis bleekeri	Bleeker's Whipray	NE	No	129
Rhinoptera javanica	Javan Cownose Ray	VU	No	145
Rhinoptera jayakari	Oman Cownose Ray	NE	No	146
Rhynchobatus australiae	Bottlenose Wedgefish	VU	No	155

Scientific name	Common name	Global status	Endemic to ASR	Species account page number
Rhynchobatus djiddensis	Whitespotted Wedgefish	VU	No	155
Rhynchobatus laevis	Smoothnose Wedgefish	VU	No	156
Telatrygon crozieri	Indian Sharpnose Ray	NE	No	133
Torpedo adenensis	Aden Torpedo	EN	Yes	165
Vulnerable				
Aetobatus ocellatus	Spotted Eagle Ray	VU	No	122
Aetomylaeus nichofii	Banded Eagle Ray	VU	No	143
Glaucostegus halavi	Halavi Guitarfish	VU	Yes	151
Himantura leoparda	Leopard Whipray	VU	No	124
Himantura uarnak	Reticulate Whipray	VU	No	124
Mobula alfredi	Reef Manta Ray	VU	No	137
Mobula birostris	Giant Manta Ray	VU	No	137
Megatrygon microps	Smalleye Stingray	DD	No	127
Narcine lingula	Chinese Numbfish	DD	No	161
Narcine timlei	Brown Numbfish	DD	No	163
Rhina ancylostoma	Bowmouth Guitarfish	VU	No	154
Urogymnus asperrimus	Porcupine Ray	VU	No	133
Urogymnus granulatus	Mangrove Whipray	VU	No	134
Near Threatened				
Acroteriobatus salalah	Salalah Guitarfish	NT	Yes	157
Brevitrygon walga	Scaly Whipray	NT	Yes	123
Gymnura poecilura	Longtail Butterfly Ray	NT	No	135
Mobula eregoodootenkee	Longhorned Pygmy Devil Ray	NT	No	138
Mobula kuhlii	Shortfin Devil Ray	DD	No	139
Narcine atzi	Oman Numbfish	DD	No	161
Narke dipterygia	Spottail Sleeper Ray	DD	No	164
Neoharriotta pinnata	Sicklefin Chimaera	DD	No	167

Pastinachus ater	Broad Cowtail Ray	LC	No	128
Pastinachus sephen	Cowtail Ray	NT	Yes	129
Pateobatis fai	Pink Whipray	VU	No	130
Pateobatis jenkinsii	Jenkins Whipray	VU	No	131
Rhinobatos annandalei	Bengal Guitarfish	DD	No	158
Rhinobatos punctifer	Spotted Guitarfish	NT	Yes	159
Taeniurops meyeni	Blotched Fantail Ray	VU	No	132
Least Concern				
Benthobatis moresbyi	Indian Blind Numbfish	LC	Yes	160
Maculabatis ambigua	Baraka's Whipray	NE	No	125
Maculabatis randalli	Arabian Banded Whipray	LC	Yes	127
Neoharriotta pumila	Arabian Sicklefin Chimaera	LC	Yes	168
Okamejei ornata	Ornate Skate	LC	Yes	148
Pteroplatytrygon violacea	Pelagic Stingray	LC	No	131
Taeniura lymma	Bluespotted Fantail Ray	NT	No	132
Data Deficient				
Acroteriobatus omanensis	Oman Guitarfish	DD	Yes	157
Amblyraja reversa	Reverse Skate	DD	Yes	147
Bathytoshia lata	Brown Stingray	LC	No	123
Dipturus johannisdavisi	Travancore Skate	DD	No	148
Heteronarce bentuviai	Eilat Sleeper Ray	DD	Yes	163
Heteronarce mollis	Soft Sleeper Ray	DD	Yes	164
Hexatrygon bickelli	Sixgill Stingray	LC	No	136
Narcine oculifera	Bigeye Numbfish	DD	Yes	162
Narcine prodorsalis	Tonkin Numbfish	DD	No	162
Neotrygon caeruleopunctata	Bluespotted Maskray	NE	No	128
Orbiraja powelli	Indian Ring Skate	DD	No	148
Plesiobatis daviesi	Giant Stingaree	LC	No	144
Raja pita	Pita Skate	DD	Yes	149
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Torpedo sinuspersici	Gulf Torpedo	DD	No	166

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Established in 1996, the Environment Agency – Abu Dhabi (EAD) is committed to protecting and enhancing air quality, groundwater as well as the biodiversity of our desert and marine ecosystem. By partnering with other government entities, the private sector, NGOs and global environmental agencies, we embrace international best practice, innovation and hard work to institute effective policy measures. We seek to raise environmental awareness, facilitate sustainable development and ensure environmental issues remain one of the top priorities of our national agenda.

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SHARK Specialist Group

IUCN SSC Species Survival Commission

The IUCN Species Survival Commission (SSC) Shark Specialist Group (SSG) is a global network of 128 experts in the fields of shark biology, conservation, management, fisheries and taxonomy, that promotes the sustainable use, wise management and conservation of all sharks, rays and chimaeras and serves as the custodian for the chondrichthyan fishes for the IUCN Red List of Threatened Species.

www.iucnssg.org

save our seas foundation

The Save Our Seas Foundation was established in 2003 with a mission to protect our oceans and the vulnerable creatures that live in them, with a focus on sharks and rays. In the years since then, the foundation has sponsored more than 230 projects, supporting a host of brilliant researchers, educators and conservationists who are dedicated to conserving our planet's marine life. Our project leaders work in every corner of the globe, their research spanning diverse habitats from shallow reefs to hidden sea mounts and the immense pelagic zone.

www.saveourseas.com

IFAW
International Fund for Animal Welfare

IFAW's mission is to rescue and protect animals around the world. We rescue individuals, safeguard populations, and preserve habitat. Founded in 1969 in Canada and in the UK in 1981, the International Fund for Animal Welfare saves individual animals, animal populations and habitats all over the world. With projects in more than 40 countries, IFAW provides hands-on assistance to animals in need, whether it's dogs and cats, wildlife and livestock, or rescuing animals in the wake of disasters. We also advocate saving populations from cruelty and depletion, such as our campaign to end commercial whaling and seal hunts.

www.ifaw.org

CMS SHARKS MOU

CMS

The Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MoU) is the first global instrument for the conservation of migratory species of elasmobranchs. The MoU was developed under the auspices of the Convention on the Conservation of Migratory Sharks (UNEP/CMS) in 2010 and aims to achieve and maintain a favourable conservation status for migratory elasmobranchs. Activities under the MoU are based on the best available scientific information and do also consider the socio-economic value of elasmobranchs.

The focus of the MoU is to help improve fisheries management and international conservation measures through a cooperative approach with range states, scientists and relevant organizations. To this end it supports increasing knowledge about the ecology, population trends and main threats to elasmobranchs.

www.cms.int/sharks

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